



2019 Global Product Catalog





KYOCERA SGS Precision Tools (KSPT) is an ISO-certified manufacturer of industry leading round solid carbide cutting tools. State of the art manufacturing and warehouse facilities have the capacity and processes to meet the quality and delivery demands of customers in all markets around the world. Complete inspections performed within its metallurgical lab and manufacturing quality departments ensure the use of high quality carbide and reliable manufacturing consistency regardless of when a cutting tool is produced.

KSPT is proud to have pioneered some of the world's most advanced cutting technologies due to rigorous testing of tools, coatings, and materials within its Global Innovation Center. It is this commitment to innovation that has launched patented products and technologies like the Z-Carb with its variable geometry and cutting edge preparation, Series 43 APR® and APF® ultra high performance aluminum cutting tools, and the JetStream coolant technology.

SGS has become an important part of the KYOCERA Precision Tools family, and while the name has changed, one thing has not. Its dedicated people and their relentless commitment to the customer. KSPT Technical Sales Engineers, Application Specialists, and Distribution Partners blanket the globe, delivering reliable service and support to all market segments. It is these people and products that drive innovative application strategies and cutting tool technologies into the end user, continually exceeding expectations and providing the most Value at the Spindle®.



Table of Contents

| | |
|---|---|
| KYOCERA SGS Precision Tools | 2 |
| KYOCERA SGS Precision Tools Europe Ltd. . . | 4 |
| Global Innovation Center | 5 |
| Tooling Services..... | 6 |
| Tech Hub | 7 |
| Medical Divison | 8 |
| Tool Wizard® | 9 |

OVERVIEW

| | |
|----------------------|----|
| Common Legend..... | 10 |
| End Mill Legend..... | 12 |
| Drill Legend..... | 13 |
| Router Legend | 14 |

| | |
|----------------|----|
| COATINGS | 15 |
|----------------|----|

MILLING

| | |
|---|-----|
| High Performance End Mills..... | 16 |
| End Mill Matrix..... | 22 |
| High Performance Aluminum End Mills . . . | 118 |
| General Purpose End Mills..... | 170 |

HOLE MAKING

| | |
|------------------------------------|-----|
| High Performance Drills | 238 |
| General Purpose Drills | 298 |
| General Purpose Countersinks | 324 |
| General Purpose Reamers | 340 |

ROUTING

| | |
|-------------------------------|-----|
| High Performance Routers..... | 352 |
| General Purpose Routers | 370 |

TECHNICAL INFORMATION

| | |
|----------------------------------|-----|
| EDP Index | 376 |
| KSPT Reference Information | 393 |
| Decimal Equivalent Chart | 394 |
| Hardness Conversion Chart | 395 |





MORE THAN JUST ANOTHER CUTTING TOOL SUPPLIER

KYOCERA SGS PRECISION TOOLS EUROPE, LTD.

The state of the art KYOCERA SGS Precision Tools Europe facility is located in Wokingham, England and is focused on the manufacture of special cutting tools, high accuracy form tools, tool modifications and regrinds. A highly skilled team of professionals specialize in the supply and support of high performance tools for the Aerospace, Medical, Power Generation and Motorsport markets.

KYOCERA SGS Precision Tools Europe also offers a full range of end mill and drill products as follows:

- Multi-Million Euro Warehouse Stocking Full Range of Catalog Products
- Same Day Shipment on Stock Items
- Multi-Lingual Sales and Technical Support
- Online Portal for Stock Availability, Pricing, Discount Information and 24-Hour Order Placement
- High Performance Product and Application Training, Including the New KYOCERA SGSTool Clinic

Additional services provided at this facility include:

- A Fast Track for Special Tools Via Our Rapid Response Centre
- Product Research and Development
- Product Engineering and Tool Application Support
- CAD/CAM Software Support





GLOBAL INNOVATION CENTER

INNOVATIVE CUTTING TOOL TECHNOLOGIES

The Global Innovation Center is an environment conducive to innovation. Through testing and development, the dedicated KYOCERA SGS Precision Tools Team focuses on the latest technical competence and machining techniques to bring a continuous stream of new products and advancements to market.

- Cutting Edge Equipment
- Highly Engineered Technology
- Incorporation of innovative machine tool technology for Research and Development

TECHNICAL TRAINING & EDUCATION

Our knowledge-based selling programs are specifically designed to challenge and educate by facilitating programs that mix classroom presentation with hands-on experience. Our own KSPT team members go through the same core training we provide to our valued distribution partners.

- KSPT Campus Tool Clinics
- On-Site Customer Training
- Basic, Advanced and Expert Level Material
- Market-Driven Knowledge

APPLICATION ENGINEERING

The KSPT expertise and global market knowledge allows us to translate customer needs into a commercial sales strategy. The portfolio of KSPT products and services offer an unparalleled track record in performance, cost savings, quality and value at the spindle.

- Market-Driven Productivity Improvements, including the Z-Carb HPR and S-Carb APR/APF®
- Tooling Solutions which include development of new tool geometries, extreme lab testing parameters and extensive field testing
- Technical Support and Troubleshooting
- Research and Development



TOOLING SERVICES

KSPT is committed to providing superior tooling services in the areas of Reconditioning, Recoating, Regrinding, Specials and Alterations. These services are offered to provide unique solutions and enhanced tool life with involvement from the KSPT Technical Support Team.

KSPT proudly offers Tooling Services in North America and Europe.



KSPT TOOLING SERVICES FACILITIES

UNITED STATES OF AMERICA KSPT

P.O. Box 187
55 South Main Street
Munroe Falls, Ohio 44262 U.S.A.
customer service -
US and Canada: (330) 686-5700
fax - US & Canada: (800) 447-4017
international fax: (330) 686-2146

KSPT

1021 N. Shephard Street
Anaheim, California 92806
phone: (714) 632-3000
fax: (714) 632-3003

EUROPE KSPTE

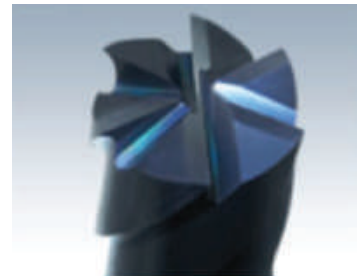
10 Ashville Way
Wokingham, Berkshire
RG41 2PL England
phone: (44) 1189-795-200
fax: (44) 1189-795-295
e-mail: SalesEU@kyocera-sgstool.com

KYOCERA SGS Precision Tools Tech Hub

149 Slayton Avenue
Danville, VA 24540
US and Canada: (434) 791-2020
Fax US & Canada: (434) 791-2044
web: www.kyocera-techhub.com



BEFORE



AFTER

TECH HUB

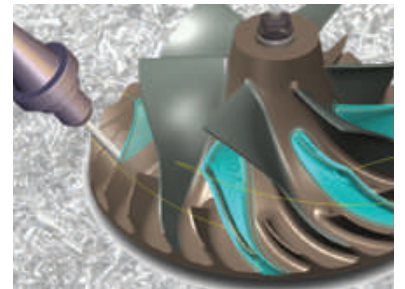
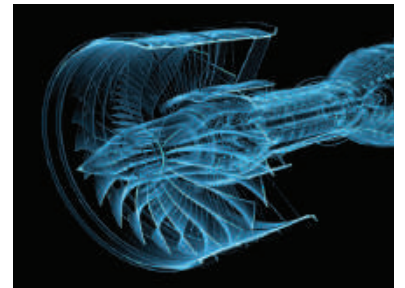
The KYOCERA SGSTech Hub (KSTH) is an independent subsidiary of the Kyocera SGS PrecisionTools (KSPT) group created to focus on custom cutting tool solutions and explore new technologies. This facility has resources designed to provide MORE than a cutting tool, but a complete scope of services to include managing the entire cutting tool application from conception to application and beyond.

CUSTOMIZED ENGINEERING SOLUTIONS

At KSTH we approach each opportunity as a project and manage it as such. We pride ourselves on engineering each project to the specific needs of our customers. Providing quotes often within 24 hours and following through with detailed drawings, solid models, process plans, and program simulations if needed. Our goal is to work hand in hand with the end user and maintain constant communication to customize our support to their needs.

RELEVANT TESTED SOLUTIONS

KSTH R&D has been created with a dual purpose. First and foremost is to create dedicated resources for testing and evaluating application solutions tailored to each customer project. The second is to focus on evaluating technologies within industry as a whole so that we can provide complete and relevant solutions to our customers. The KSTH R&D space is a collaborative think tank that allows KSTH to work for each customer individually with industry partners, new technology, and Universities to provide thorough next level solutions.



**KYOCERA SGS
Precision Tools Tech Hub**
149 Slayton Avenue
Danville, VA 24540
US and Canada: (434) 791-2020
Fax US & Canada: (434) 791-2044
web: www.kyocera-techhub.com



MEDICAL DIVISION

WHO WE ARE

With over 20 years of industry experience, KSPT Medical produces unique, customer designed orthopedic devices using highly trained engineers dedicated to new technology. KSPT Medical is a division of KYOCERA SGS Precision tools—an ISO-certified leader, who proudly pioneered some of the world's most advanced metal cutting technology and sells to more than 60 countries. With over 20 years of industry experience, KSPT Medical Division maintains their ISO13485 certification and is FDA Registered in the production of medical devices in the orthopedic marketplace.

ENGINEERING

We approach each opportunity as a project and manage it as such. We pride ourselves on engineering each project to the specific needs of our customers. Providing quotes often within 24 hours and following through with detailed drawings, solid models, process plans, and program simulations if needed. Our goal is to work hand in hand with the end user and maintain constant communication to customize our support to their needs.

MACHINING CAPABILITIES

- GRINDING
- MILLING
- TURNING
- PROFILING
- BENDING
- CUSTOMIZED ASSEMBLY
- Services Offered; Welding, Various Coatings, Anodizing, Passivation, Electropolishing, Laser Etching and Heat Treating



KYOCERA SGS

Precision Tools Medical Division

724 East Swihart Street
Columbia City, Indiana 46725
phone: (260) 244-7677
fax: (260) 244-7466

To Request a Quote:
rfq@kyocera-sgstool.com

Customer Service and Orders:
salesmd@kyocera-sgstool.com



ISO 13485 CERTIFIED



USE THE TOOLWIZARD® TO:

- Calculate application parameters
- Search the KSPT catalog
- Select products based on machining needs

TO SIGN UP FOR THE TOOLWIZARD®:

1. Visit www.kyocera-sgstool.com
2. Sign up for an account
3. Start calculating
4. Start saving



 **Common Legend**
 **Leyenda habitual**
 **Légende commune**
 **Gemeinsame Legende**

TO ORDER: Please specify quantity and EDP number.

PARA SU PEDIDO: Por favor especifique cantidad y número de EDP.

POUR COMMANDER: Veuillez préciser la quantité et le code article EDP.

BESTELLEN: Bitte Menge und EDV-Nummer angeben.

RETURN POLICY: An RMA number must accompany all product returns.
Contact your Customer Service Representative for an RMA number.

DEVOLUCIONES: Todo material devuelto debe ir acompañado de un número de RMA correspondiente.
Para solicitarlo, póngase en contacto con su Representante de Atención al Cliente.

POLITIQUE DE RETOUR: Tous les produits retournés doivent être accompagnés d'un numéro RMA.
Contacter votre interlocuteur commercial pour obtenir un numéro RMA.

RÜCKNAHMEGARANTIE: Eine RMA-Nummer (Rücksendegenehmigung) muss bei allen Produktrücksendungen beiliegen.
Wenden Sie sich bitte an Ihren Kundendienstmitarbeiter für RMA-Nummer.

REGULATION SAFETY GLASSES SHOULD ALWAYS BE WORN WHEN USING HIGH-SPEED CUTTING EQUIPMENT

DEBEN USARSE GAFAS PROTECTORAS CUANDO SE UTILICEN EQUIPOS DE ALTA VELOCIDAD

DES LUNETTES DE SÉCURITE DOIVENT ÊTRE IMPÉRATIVEMENT PORTÉES LORS D'UTILISATION D'OUTILS À GRANDE VITESSE

BEI SCHNELL LAUFENDEN SPANABHEBENDEN MASCHINEN MÜSSEN IMMER DIE VORGESCHRIEBENEN SICHERHEITSBRILLEN GETRAGEN WERDEN



WARNING: This product can expose you to chemicals including Cobalt, which is known to the State of California to cause cancer. For more information go to www.p65warnings.ca.gov



ADVERTENCIA: Este producto puede exponerlo a químicos como el Cobalto, reconocido como cancerígeno en el estado de California. Para más información visite esta página web: www.p65warnings.ca.gov



ATTENTION: Ce produit vous expose aux produits chimiques incluant le Cobalt, qui est reconnu par l'Etat de Californie a être une cause de cancer. Pour plus d'information veuillez regarder sur: www.p65warnings.ca.gov



WARNUNG: Dieses Produkt kann Sie mit Chemikalien wie Kobalt aussetzen, das dem Staat Kalifornien als krebserregend bekannt ist. Für weitere Informationen, besuchen Sie: www.p65warnings.ca.gov

**INTELLECTUAL PROPERTY
PROPIEDAD INTELECTUAL
PROPRIÉTÉ INTELLECTUELLE
GEISTIGES EIGENTUM**

KYOCERA SGS Precision Tools holds more than 12 patents globally. Please visit our website at www.kyocera-sgstool.com to learn more.

KYOCERA SGS Precision Tools posee más de 12 patentes a nivel mundial. Para más información, visite nuestra página web www.kyocera-sgstool.com.

KYOCERA SGS Precision Tools possède plus de 12 brevets mondialement reconnus. Pour plus d'information, veuillez consulter notre site web www.kyocera-sgstool.com.

KYOCERA SGS Precision Tools besitzt mehr als 12 Patente weltweit. Bitte besuchen Sie unsere Webseite www.kyocera-sgstool.com für weitere Informationen.

Common Legend

Leyenda habitual

Légende commune

Gemeinsame Legende

MATERIALS MATERIALES MATÉRIAUX WERKSTOFFE



Steels
Aceros
Aciers
Stähle



Stainless Steels
Aceros Inoxidables
Aciers inoxydables
Nichtrostende Stähle



Cast Iron
Acero de Fundición
Fonte
Grauguss



High Temp Alloys
Aleaciones Termorresistentes
Alliages hautes températures
Warmfeste Legierungen



Titanium
Titanio
Titane
Titan



Non-Ferrous
No Férricos
Non Ferreux
Nichteisenmetalle



Plastics/Composites
Plásticos/Resinas
Plastiques/Composites
Kunststoffe/Verbundkunststoffe



Hardened Steels
Aceros Endurecidos
Aciers Trempés
Gehärteter Stahl

TOOL LENGTH LONGITUDES DE HERRAMIENTAS LONGUEUR DE L'OUTIL WERKZEUGLÄNGE



Stub
Corta
Court
Kurze Bauform



Regular
Media
Moyen
Standard



Long
Larga
Long
Lang



Long Reach Neck
Larga con cuello
Détalonnage longue
portée
Freischliff



Extra Long
Extra-larga
Extra-long
Extra-Lang

FLUTES FILOS DENTS SCHNEIDEN



2 Flutes
2 Filos
2 Dents
2 Schneiden



3 Flutes
3 Filos
3 Dents
3 Schneiden



4 Flutes
4 Filos
4 Dents
4 Schneiden



5 Flutes
5 Filos
5 Dents
5 Schneiden



6 Flutes
6 Filos
6 Dents
6 Schneiden



7 Flutes
7 Filos
7 Dents
7 Schneiden



8 Flutes
8 Filos
8 Dents
8 Schneiden



9 Flutes
9 Filos
9 Dents
9 Schneiden



10 Flutes
10 Filos
10 Dents
10 Schneiden



11 Flutes
11 Filos
11 Dents
11 Schneiden



12 Flutes
12 Filos
12 Dents
12 Schneiden

 **End Mill Legend**
 **Leyenda fresas**
 **Légende fraise**
 **Fräser-Legende**

END CONFIGURATIONS
CONFIGURACIONES DE LA PUNTA
FORME DE L'OUTIL EN BOUT
ENDENAUSFÜHRUNG



Ball
Esférica
Boule
Kugelkopf



Corner
Plana con
borde romo
Rayon
mit Eckenradius



Square
Plana
Non rayonné
Scharfkantig

SHANK TYPE
TIPO DE VÁSTAGO
TYPE DE TIGE
SCHAFTART



Common
Normal
Dégagée
Standard



Straight
Recto
Cylindrique
Gerade



Weldon Flat
Weldon plano
Méplat Weldon
Spannfläche

HELIX ANGLES
ANGULOS DE LAS HELICES
SPANWINKEL
ANGLES DE L'HÉLICE



Right Spiral
Hélice con corte a
la derecha
Hélice droite
Rechtsspirale



Left Spiral
Hélice con corte a
la izquierda
Hélice gauche
Linksspirale



Variable Right Spiral
Hélice con corte a
la derecha y ángulo
variable
Hélice droite variable
Rechtsspirale, variabel

COOLANT OPTIONS
OPCIONES DE REFRIGERACIÓN
OPTIONS DE REFOIDISSEMENT
KÜHLSCHMIERMITTEL-OPTIONEN



Internal Coolant
Refrigeración interna
Refroidissement interne
Innenkühlung



JetStream Coolant Slots
Ranuras de refrigeración
JetStream
Fentes de refroidissement
JetStream
JetStream-
Kühlmittelschlitz

RAKE ANGLE
ANGULO DE DESPRENDIMIENTO
ANGLE DE COUPE
SPANWINKEL



Positive
Positivo
Positif
Positiv



Neutral
Neutro
Neutre
Neutral



Negative
Negativo
Négatif
Negativ



Variable
Variable
Variable
Variabel

ADDITIONAL GEOMETRY
GEOMETRÍAS ADICIONALES
GÉOMÉTRIE SUPPLÉMENTAIRE
WEITERE BAUFORMEN



Flute Spacing Unequal
Espaciado desigual de
los filos
Denture décalée
Nutenabstand Ungleich



Chip Breaker
Rompevirutas
Brise-copeaux
Spanteiler

All tools are in Right Cut Direction unless noted
 Todas las herramientas son con corte a la derecha a menos que se indique lo contrario
 Tous les outils ont une coupe à droite, sauf indications contraires
 Alle Werkzeuge sind rechtsschneidend, soweit nicht anders angegeben

Drill Legend

Leyenda brocas

Légende perçage

Bohrer-Legende

SHANK TYPE TIPO DE VÁSTAGO TYPE DE TIGE SCHAFTART



Common
Normal
Dégagée
Standard



Straight
Recto
Cylindrique
Gerade

REACH ALCANCE LONGUEUR NUTZLÄNGE

3xD

>3xD Reach
Alcance >3xD
>Longueur 3xD
>3xD Nutzlänge

5xD

5xD Reach
Alcance 5xD
Longueur 5xD
5xD Nutzlänge

8xD

8xD Reach
Alcance 8xD
Longueur 8xD
8xD Nutzlänge

HELIX ANGLES ANGULOS DE LAS HELICES ANGLES DE L'HÉLICE SPANWINKEL



Right Spiral
Hélice con corte a
la derecha
Hélice à droite
Rechtsspirale



None
Ninguno
Aucun
gerade genutet

COOLANT OPTIONS OPCIONES DE REFRIGERACIÓN OPTIONS DE REFRROIDISSEMENT KÜHLSCHMIERMITTEL-OPTIONEN



Internal Coolant
Refrigeración interna
Refrroidissement interne
Innenkühlung



External Coolant
Refrigeración externa
Refrroidissement
externe
Auskühlung

Router Legend

Leyenda ranuradores

Légende détourage

Konturenfräser-Legende

SHANK TYPE TIPO DE VÁSTAGO TYPE DE TIGE SCHAFTART



Straight
Recto
Cylindrique
Gerade

RAKE ANGLE ANGULO DE DESPRENDIMIENTO ANGLE DE PENTE SPANWINKEL



Positive
Positivo
Positif
Positiv



Neutral
Neutro
Neutre
Neutral



Negative
Negativo
Négatif
Negativ



Variable
Variable
Variable
Variabel

HELIX ANGLES ANGULOS DE LAS HELICES ANGLES DE L'HELICE SPANWINKEL



Right Spiral
Hélice con corte a
la derecha
Hélice à droite
Rechtsspirale



Left Spiral
Hélice con corte a
la izquierda
Hélice à gauche
Linksspirale

ADDITIONAL GEOMETRY GEOMETRÍAS ADICIONALES GÉOMÉTRIE SUPPLÉMENTAIRE WEITERE BAUFORMEN



Left Hand Cut Direction
Fresado sentido
izquierda
Coupe vers la gauche
Rechtsschneidend



Right Hand Cut Direction
Fresado sentido
derecha
Coupe vers la droite
Linksschneidend



Chip Breaker
Rompevirutas
Brise-copeaux
Spanbrecher

Ti-NAMITE® and Di-NAMITE® Tool Coatings are specifically engineered for KSPT solid carbide rotary tools. The coating lineup includes proprietary processes that result in optimized tool life and increased speed and feed rates in a variety of applications.



| | Coating | Identifying Color | Layer Structure | Thickness | Hardness (HV) | Coefficient of Friction (Fretting) | Thermal Stability | General Information |
|--|-----------------------------------|-------------------|-----------------|--------------|---------------|------------------------------------|-------------------|--|
| | Titanium Nitride (TiN) | gold | Multilayer | 1–4 microns | 2200 | 0.4–0.65 | 600°C / 1112°F | A general purpose coating with good adhesion and abrasion resistant properties. Suitable for a wide variety of materials. |
| | Aluminum Titanium Nitride (AlTiN) | dark grey | Nano structure | 1–4 microns | 3700 | 0.30 | 1100°C / 2010°F | Excellent thermal and chemical resistance allows for dry cutting and improvements in performance of carbide. The coating has a high hardness giving great protection against abrasive wear and erosion. |
| | Titanium DiBoride (TiB2) | light grey-silver | Monolayer | 1–2 microns | 4000 | 0.10–0.20 | 850°C / 1562°F | This ceramic based coating ensures a smooth surface and a low affinity to cold welding or edge build up, which makes it optimal for Aluminum and copper applications. It has high toughness and high hardness. |
| | Titanium Carbonitride (TiCN) | pink-red | Multilayer | 1–4 microns | 3000 | 0.3–0.45 | 400°C / 752°F | A very wear resistant coating with high toughness and shock resistance. Good in interrupted cuts found in applications like milling. |
| | Proprietary (TX) | black | Nano Composite | 1–4 microns | 3600 | 0.45 | 1150°C / 2100°F | The structural design of Ti-Namite-X is adapted to meet a diverse range of applications; everything from high- and low-alloy steels to hardened materials (up to 65 HRC core hardness). Ti-Namite-X is suitable for operations which require high cutting speeds, high temperatures at the cutting edge, and high metal removal rates. |
| | Crystalline Diamond (Diamond) | black | Monolayer | 6–20 microns | >8000 | 0.15–0.2 | 800°C / 1470°F | This is the hardest coating available with the best abrasion resistance. It is carbon based so it is limited in application capabilities. This coating is suitable for machining highly abrasive, non-ferrous materials such as CFRP and graphite. |
| | Proprietary (TM) | copper | Nano Composite | 1–4 microns | 3600 | 0.45 | 1150°C / 2100°F | Features include high wear resistance, reduced friction, and excellent prevention of edge build up. This coating provides superior material removal rates and tool life when used in high performance operations with difficult to machine materials like Titanium. |

High Performance End Mills



Milling

| HIGH PERFORMANCE END MILLS | SERIES | DESCRIPTION | PAGE |
|----------------------------|---------|--|------|
| Z-Carb-HPR | Z5 | 5 Flute Rougher Square End Fractional | 28 |
| | Z5CR | 5 Flute Rougher Corner Radius Fractional | 29 |
| | Z5MCR | 5 Flute Rougher Corner Radius Metric | 33 |
| Z-Carb-AP | Z1PCR | 4 Flute Variable Rake Corner Radius Fractional | 36 |
| | Z1MPCR | 4 Flute Variable Rake Corner Radius Metric | 42 |
| | Z1PLC | 4 Flute Variable Rake Long Reach Corner Radius Fractional | 38 |
| | Z1MPIC | 4 Flute Variable Rake Intermediate Reach Corner Radius Metric | 43 |
| | Z1MPLC | 4 Flute Variable Rake Long Reach Corner Radius Metric | 44 |
| | Z1PLB | 4 Flute Variable Rake Ball End Long Reach Fractional | 39 |
| | Z1 | 4 Flute Variable Geometry Square End Fractional | 47 |
| Z-Carb | Z1M | 4 Flute Variable Geometry Square End Metric | 52 |
| | Z1B | 4 Flute Variable Geometry Ball End Fractional | 49 |
| | Z1MB | 4 Flute Variable Geometry Ball End Metric | 53 |
| | Z16CR | 4 Flute Variable Geometry Corner Radius Fractional | 48 |
| | Z16CR | 4 Flute Variable Geometry Corner Radius Fractional | 48 |
| Z-Carb-HTA | ZH1CR | 4 Flute Variable Geometry High Temp Alloys Corner Radius Fractional | 56 |
| | ZH1MCR | 4 Flute Variable Geometry High Temp Alloys Corner Radius Metric | 58 |
| | ZH1MCRS | 4 Flute Variable Geometry High Temp Alloys Stub Corner Radius Metric | 58 |
| Z-Carb-MD | ZD1CR | 4 Flute Variable Geometry Hard Materials Long Reach Corner Radius Fractional | 60 |
| | ZD1MCR | 4 Flute Variable Geometry Hard Materials Long Reach Corner Radius Metric | 61 |
| Series 7 | 7 | 4 Flute Variable Geometry Long Length Square End Fractional | 100 |
| | 7M | 4 Flute Variable Geometry Long Length Square End Metric | 103 |
| | 7B | 4 Flute Variable Geometry Long Length Ball End Fractional | 101 |
| | 7MB | 4 Flute Variable Geometry Long Length Ball End Metric | 104 |
| V-Carb | 55 | 5 Flute Finisher & Semi-Finisher Square End Fractional | 63 |
| | 55CR | 5 Flute Finisher & Semi-Finisher Corner Radius Fractional | 64 |
| | 55B | 5 Flute Finisher & Semi-Finisher Ball End Fractional | 65 |
| | 55M | 5 Flute Finisher & Semi-Finisher Square End Metric | 68 |
| | 55MCR | 5 Flute Finisher & Semi-Finisher Corner Radius Metric | 69 |
| | 55MB | 5 Flute Finisher & Semi-Finisher Ball End Metric | 71 |

Speed & Feed Recommendations listed after each series

| HIGH PERFORMANCE END MILLS | SERIES | DESCRIPTION | PAGE |
|-------------------------------|--------|--|------|
| T-Carb® | 51 | 6 Flute High Speed Machining Square End Fractional | 75 |
| | 51M | 6 Flute High Speed Machining Square End Metric | 80 |
| | 51L | 6 Flute High Speed Machining Square End Long Reach Fractional | 76 |
| | 51ML | 6 Flute High Speed Machining Square End Long Reach Metric | 82 |
| | 51CR | 6 Flute High Speed Machining Corner Radius Fractional | 75 |
| | 51MCR | 6 Flute High Speed Machining Corner Radius Metric | 81 |
| | 51LC | 6 Flute High Speed Machining Long Reach Corner Radius Fractional | 77 |
| | 51MLC | 6 Flute High Speed Machining Long Reach Corner Radius Metric | 83 |
| Multi-Carb | 66 | Multi-Flute Finisher Square End Fractional | 86 |
| | 66M | Multi-Flute Finisher Square End Metric | 89 |
| | 66CR | Multi-Flute Finisher Corner Radius Fractional | 86 |
| | 66MCR | Multi-Flute Finisher Corner Radius Metric | 90 |
| Turbo-Carb | 56B | 2 Flute Contouring Long Reach Ball End Fractional | 106 |
| | 56MB | 2 Flute Contouring Long Reach Ball End Metric | 108 |
| Power-Carb | 57 | 6 Flute Finisher Square End Fractional | 110 |
| | 57M | 6 Flute Finisher Square End Metric | 112 |
| Series 33 | 33CR | 3 Flute Difficult to Machine Materials Corner Radius Fractional | 94 |
| | 33MCR | 3 Flute Difficult to Machine Materials Corner Radius Metric | 97 |
| CFRP Slow Helix | 27 | 4 Flute Slow Helix Square End Fractional | 114 |
| | 27M | 4 Flute Slow Helix Square End Metric | 116 |

Speed & Feed Recommendations listed after each series

| FRESAS DE ALTO RENDIMIENTO | SERIE | DESCRIPCIÓN | PÁGINA |
|---------------------------------|------------|--|---|
| Z-Carb-HPR | Z5 | 5 fillos, desbastador, punta cuadrada, fraccional | 28 |
| | Z5CR | 5 fillos, desbastador, radio angulado, fraccional | 29 |
| | Z5MCR | 5 fillos, desbastador, radio angulado, métrico | 33 |
| Z-Carb-AP | Z1PCR | 4 fillos, inclinación variable, radio angulado, fraccional | 36 |
| | Z1MPCR | 4 fillos, inclinación variable, radio angulado, métrico | 42 |
| | Z1PLC | 4 fillos, inclinación variable, largo alcance, radio angulado, fraccional | 38 |
| | Z1MPIC | 4 fillos, inclinación variable, medio alcance, radio angulado, métrico | 43 |
| | Z1MPLC | 4 fillos, inclinación variable, largo alcance, radio angulado, métrico | 44 |
| | Z1PLB | 4 fillos, inclinación variable, punta esférica, largo alcance, fraccional | 39 |
| Z-Carb | Z1 | 4 fillos, geometría variable, punta cuadrada, fraccional | 47 |
| | Z1M | 4 fillos, geometría variable, punta cuadrada, métrico | 52 |
| | Z1B | 4 fillos, geometría variable, punta esférica, fraccional | 49 |
| | Z1MB | 4 fillos, geometría variable, punta esférica, métrico | 53 |
| | Z16CR | 4 fillos, geometría variable, radio angulado, fraccional | 48 |
| Z-Carb-HTA | ZH1CR | 4 fillos, geometría variable, aleaciones termorresistentes, radio angulado, fraccional | 56 |
| | ZH1MCR | 4 fillos, geometría variable, aleaciones termorresistentes, radio angulado, métrico | 58 |
| | ZH1MCRS | 4 fillos, geometría variable, aleaciones termorresistentes, versión corta, radio angulado, métrico | 58 |
| Z-Carb-MD | ZD1CR | 4 fillos, geometría variable, materiales duros, largo alcance, radio angulado, fraccional | 60 |
| | ZD1MCR | 4 fillos, geometría variable, materiales duros, largo alcance, radio angulado, métrico | 61 |
| Serie 7 | 7 | 4 fillos, geometría variable, longitud larga, punta cuadrada, fraccional | 100 |
| | 7M | 4 fillos, geometría variable, longitud larga, punta cuadrada, métrico | 103 |
| | 7B | 4 fillos, geometría variable, longitud larga, punta esférica, fraccional | 101 |
| | 7MB | 4 fillos, geometría variable, longitud larga, punta esférica, métrico | 104 |
| V-Carb | 55 | 5 fillos, acabador y semiacabador, punta cuadrada, fraccional | 63 |
| | 55CR | 5 fillos, acabador y semiacabador, radio angulado, fraccional | 64 |
| | 55B | 5 fillos, acabador y semiacabador, punta esférica, fraccional | 65 |
| | 55M | 5 fillos, acabador y semiacabador, punta cuadrada, métrico | 68 |
| | 55MCR | 5 fillos, acabador y semiacabador, radio angulado, métrico | 69 |
| | 55MB | 5 fillos, acabador y semiacabador, punta esférica, métrico | 71 |
| T-Carb® | 51 | 6 fillos, mecanizado de alta velocidad, punta cuadrada, fraccional | 75 |
| | 51M | 6 fillos, mecanizado de alta velocidad, punta cuadrada, métrico | 80 |
| | 51L | 6 fillos, mecanizado de alta velocidad, punta cuadrada, largo alcance, fraccional | 76 |
| | 51ML | 6 fillos, mecanizado de alta velocidad, punta cuadrada, largo alcance, métrico | 82 |
| | 51CR | 6 fillos mecanizado de alta velocidad, radio angulado, fraccional | 75 |
| | 51MCR | 6 fillos mecanizado de alta velocidad, radio angulado, métrico | 81 |
| | 51LC | 6 fillos mecanizado de alta velocidad, largo alcance, radio angulado, fraccional | 77 |
| | 51MLC | 6 fillos mecanizado de alta velocidad, largo alcance, radio angulado, métrico | 83 |
| | Multi-Carb | 66 | Filo múltiple, acabador, punta cuadrada, fraccional |
| 66M | | Filo múltiple, acabador, punta cuadrada, métrico | 89 |
| 66CR | | Filo múltiple, acabador, radio angulado, fraccional | 86 |
| 66MCR | | Filo múltiple, acabador, radio angulado, métrico | 90 |
| Turbo-Carb | 56B | 2 fillos, contorneado, largo alcance, punta esférica, fraccional | 106 |
| | 56MB | 2 fillos, contorneado, largo alcance, punta esférica, métrico | 108 |
| Power-Carb | 57 | 6 fillos, acabador, punta cuadrada, fraccional | 110 |
| | 57M | 6 fillos, acabador, punta cuadrada, métrico | 112 |
| Serie 33 | 33CR | 3 fillos, materiales difíciles de mecanizar, radio angulado, fraccional | 94 |
| | 33MCR | 3 fillos, materiales difíciles de mecanizar, radio angulado, métrico | 97 |
| Helicoidal de avance lento CFRP | 27 | 4 fillos, helicoidal de avance lento, punta cuadrada, fraccional | 114 |
| | 27M | 4 fillos, helicoidal de avance lento, punta cuadrada, métrico | 116 |

Recomendaciones de velocidades y avances mostradas tras cada serie






| FRAISES A DETOURER UNIVERSELLES | SÉRIES | DESCRIPTION | PAGE |
|------------------------------------|---------|---|------|
| Z-Carb-HPR | Z5 | 5 dents non rayonné pour l'ébauche (fractionnel) | 28 |
| | Z5CR | 5 dents rayonnée pour l'ébauche (fractionnel) | 29 |
| | Z5MCR | 5 dents rayonnée pour l'ébauche (métrique) | 33 |
| Z-Carb-AP | Z1PCR | 4 dents pas décalé et hélice variable rayonnés (fractionnel) | 36 |
| | Z1MPCR | 4 dents pas décalé et hélice variable rayonnés (métrique) | 42 |
| | Z1PLC | 4 dents pas décalé et hélice variable rayonnés (fractionnel) | 38 |
| | Z1MPIC | 4 dents pas décalé, hélice variable, détalonné, rayonnés (métrique) | 43 |
| | Z1MPLC | 4 dents pas décalé et hélice variable rayonnés (métrique) | 44 |
| | Z1PLB | 4 dents à vague de coupe variable longue portée à bout hémisphérique (fractionnel) | 39 |
| | Z1 | 4 dents géométrie variable non rayonné (fractionnel) | 47 |
| Z-Carb | Z1M | 4 dents géométrie variable non rayonné (métrique) | 52 |
| | Z1B | 4 dents géométrie variable à bout hémisphérique (fractionnel) | 49 |
| | Z1MB | 4 dents géométrie variable à bout hémisphérique (métrique) | 53 |
| | Z16CR | 4 dents géométrie variable rayonné (fractionnel) | 48 |
| | Z16CR | 4 dents géométrie variable rayonné (fractionnel) | 48 |
| Z-Carb-HTA | ZH1CR | 4 dents géométrie variable alliages haute température rayonné (fractionnel) | 56 |
| | ZH1MCR | 4 dents géométrie variable alliages haute température rayonné (métrique) | 58 |
| | ZH1MCRS | 4 dents géométrie variable, alliages haute température, longueur de l'outil court, rayonné (métrique) | 58 |
| Z-Carb-MD | ZD1CR | 4 dents géométrie variable matériaux durs longue portée rayonné (fractionnel) | 60 |
| | ZD1MCR | 4 dents géométrie variable matériaux durs longue portée rayonné (métrique) | 61 |
| Série 7 | 7 | 4 dents géométrie variable à queue longue non rayonné (fractionnel) | 100 |
| | 7M | 4 dents géométrie variable à queue longue non rayonné (métrique) | 103 |
| | 7B | 4 dents géométrie variable à queue longue à bout hémisphérique (fractionnel) | 101 |
| | 7MB | 4 dents géométrie variable à queue longue à bout hémisphérique (métrique) | 104 |
| V-Carb | 55 | 5 dents en bout de finition et semi-finition plat (fractionnel) | 63 |
| | 55CR | 5 dents en bout finition et semi-finition rayonné (fractionnel) | 64 |
| | 55B | 5 dents en bout de finition et semi-finition hémisphérique (fractionnel) | 65 |
| | 55M | 5 dents en bout de finition et semi-finition plat (métrique) | 68 |
| | 55MCR | 5 dents en bout finition et semi-finition rayonné (métrique) | 69 |
| T-Carb® | 55MB | 5 dents en bout de finition et semi-finition hémisphérique (métrique) | 71 |
| | 51 | 6 dents pour usinage grande vitesse non rayonné (fractionnel) | 75 |
| | 51M | 6 dents pour usinage grande vitesse non rayonné (métrique) | 80 |
| | 51L | 6 dents pour usinage grande vitesse non rayonné extra longue (fractionnel) | 76 |
| | 51ML | 6 dents pour usinage grande vitesse non rayonné extra longue (métrique) | 82 |
| | 51CR | 6 dents pour usinage grande vitesse rayonné (fractionnel) | 75 |
| | 51MCR | 6 dents pour usinage grande vitesse rayonné (métrique) | 81 |
| | 51LC | 6 dents pour usinage grande vitesse extra longue rayonné (fractionnel) | 77 |
| Multi-Carb | 51MLC | 6 dents pour usinage grande vitesse extra longue rayonné (métrique) | 83 |
| | 66 | Multi-dents non rayonné pour finition (fractionnel) | 86 |
| | 66M | Multi-dents non rayonné pour finition (métrique) | 89 |
| | 66CR | Multi-dents rayonné pour finition (fractionnel) | 86 |
| Turbo-Carb | 66MCR | Multi-dents rayonné pour finition (métrique) | 90 |
| | 56B | 2 dents contournage longue portée à bout hémisphérique (fractionnel) | 106 |
| | 56MB | 2 dents contournage longue portée à bout hémisphérique (métrique) | 108 |
| Power-Carb | 57 | 6 dents en bout de finition plat (fractionnel) | 110 |
| | 57M | 6 dents en bout de finition plat (métrique) | 112 |
| Série 33 | 33CR | 3 dents rayonné pour l'ébauche dans tous les matériaux sauf non-ferreux (fractionnel) | 94 |
| | 33MCR | 3 dents rayonné pour l'ébauche dans tous les matériaux sauf non-ferreux (métrique) | 97 |
| CFRP hélice lente | 27 | 4 dents hélice lente non rayonné (fractionnel) | 114 |
| | 27M | 4 dents hélice lente non rayonné (métrique) | 116 |

Recommandatovons de vitesse et avance indiquées après chaque série



| HOCHLEISTUNGS-SCHAFTFRÄSER | SERIE | BESCHREIBUNG | SEITE |
|----------------------------|---------|---|--|
| Z-Carb-HPR | Z5 | Zölliger Schruppfräser mit 5 Schneiden ohne Eckenradien | 28 |
| | Z5CR | Zölliger Schruppfräser mit 5 Schneiden und Eckenradien | 29 |
| | Z5MCR | Schruppfräser mit 5 Schneiden und Eckenradien | 33 |
| Z-Carb-AP | Z1PCR | Zölliger Fräser mit 4 variablen Schneiden und Eckenradien | 36 |
| | Z1MPCR | Fräser mit 4 Schneiden und variablen Spanwinkel | 42 |
| | Z1PLC | Zölliger Langlochfräser mit 4 variablen Schneiden und Eckenradien | 38 |
| | Z1MPIC | Fräser mittlerer Länge mit 4 variablen Schneiden und Eckenradien | 43 |
| | Z1MPLC | Langlochfräser mit 4 variablen Schneiden und Eckenradien | 44 |
| | Z1PLB | Zölliger Radiuschaftfräser mit 4 Schneiden und variablem Spanwinkel | 39 |
| | Z-Carb | Z1 | Zölliger Schaftfräser mit 4 Schneiden ohne Eckenradien und variabler Form |
| Z1M | | Schaftfräser mit 4 Schneiden ohne Eckenradien und variabler Form | 52 |
| Z1B | | Zölliger Radiuschaftfräser mit 4 Schneiden und variabler Form | 49 |
| Z1MB | | Radiuschaftfräser mit 4 Schneiden und variabler Form | 53 |
| Z16CR | | Zölliger Fräser mit 4 variablen Schneiden und Eckenradien | 48 |
| Z-Carb-HTA | | ZH1CR | Hochwarmfester zölliger Fräser mit 4 variablen Schneiden und Eckenradien |
| | ZH1MCR | Hochwarmfester Fräser mit 4 variablen Schneiden und Eckenradien | 58 |
| | ZH1MCRS | Hochwarmfester Fräser mit 4 variablen Schneiden und Eckenradien | 58 |
| Z-Carb-MD | ZD1CR | Zölliger Langlochfräser mit 4 variablen Schneiden, Eckenradien und Form aus Hartmetall | 60 |
| | ZD1MCR | Langlochfräser mit 4 variablen Schneiden, Eckenradien und Form aus Hartmetall | 61 |
| Serie 7 | 7 | Zölliger Langloch-Schaftfräser mit 4 Schneiden ohne Eckenradien und variabler Form | 100 |
| | 7M | Langloch-Schaftfräser mit 4 Schneiden ohne Eckenradien und variabler Form | 103 |
| | 7B | Zölliger Langloch-Radiuschaftfräser mit 4 Schneiden und variabler Form | 101 |
| | 7MB | Langloch-Radiuschaftfräser mit 4 Schneiden und variabler Form | 104 |
| V-Carb | 55 | Zölliger Schlicht- und Halbschlichtfräser mit 5 Schneiden ohne Eckenradien und variabler Form | 63 |
| | 55CR | Zölliger Schlicht- und Halbschlichtfräser mit 5 Schneiden ohne Eckenradien | 64 |
| | 55B | Schlicht- und Halbschlicht-Radiuschaftfräser mit 5 Schneiden ohne Eckenradien | 65 |
| | 55M | Schlicht- und Halbschlichtfräser mit 5 Schneiden ohne Eckenradien und variabler Form | 68 |
| | 55MCR | Schlicht- und Halbschlichtfräser mit 5 Schneiden und Eckenradien | 69 |
| | 55MB | Schlicht- und Halbschlicht-Radiuschaftfräser mit 5 Schneiden und variabler Form | 71 |
| | T-Carb® | 51 | Zölliger Schaftfräser für die Hochgeschwindigkeitsbearbeitung mit 6 Schneiden ohne Eckenradien |
| 51M | | Schaftfräser für die Hochgeschwindigkeitsbearbeitung mit 6 Schneiden ohne Eckenradien | 80 |
| 51L | | Zölliger Langloch-Schaftfräser aus Schnellstahl mit 6 Schneiden ohne Eckenradien | 76 |
| 51ML | | Langloch-Schaftfräser aus Schnellstahl mit 6 Schneiden ohne Eckenradien | 82 |
| 51CR | | Zölliger Fräser für die Hochgeschwindigkeitsbearbeitung mit 6 Schneiden und Eckenradien | 75 |
| 51MCR | | Fräser für die Hochgeschwindigkeitsbearbeitung mit 6 Schneiden und Eckenradien aus Schnellstahl | 81 |
| 51LC | | Zölliger Langlochfräser für die Hochgeschwindigkeitsbearbeitung mit 6 Schneiden und Eckenradien | 77 |
| 51MLC | | Langlochfräser für die Hochgeschwindigkeitsbearbeitung mit 6 Schneiden und Eckenradien | 83 |
| Multi-Carb | | 66 | Zölliger mehrschneidiger Schlichtfräser ohne Eckenradien |
| | 66M | mehrschneidiger Schlichtfräser ohne Eckenradien | 89 |
| | 66CR | Zölliger mehrschneidiger Schlichtfräser mit Eckenradien | 86 |
| | 66MCR | mehrschneidiger Schlichtfräser mit Eckenradien | 90 |
| Turbo-Carb | 56B | Zölliger Langloch-Profil-Radiuschaftfräser mit 2 Schneiden | 106 |
| | 56MB | Langloch-Profil-Radiuschaftfräser mit 2 Schneiden | 108 |
| Power-Carb | 57 | Zölliger Schlichtfräser mit 6 Schneiden ohne Eckenradien | 110 |
| | 57M | Schlichtfräser mit 6 Schneiden ohne Eckenradien | 112 |
| Serie 33 | 33CR | Zölliger Fräser mit 3 Schneiden und Eckenradien für schwerspanbare Werkstoffe | 94 |
| | 33MCR | Fräser mit 3 Schneiden und Eckenradien für schwerspanbare Werkstoffe | 97 |
| CFRP Slow Helix | 27 | Zölliger Schaftfräser mit 4 steilen Schneiden ohne Eckenradien | 114 |
| | 27M | Schaftfräser mit 4 steilen Schneiden ohne Eckenradien | 116 |

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

End Mill Matrix

| Name | Series | Page No. | Material | | | | | | | No. Flutes | Helix ° | Flute Index | Rake | Relief | Center Cutting | |
|---------------------|----------------|----------|----------|--|-----------|--|---|---|----------------------|------------|-----------|-------------|------|--------|----------------|---|
| | | | Steel | Stainless Steels  | Cast Iron | High Temp Alloys  | Titanium Alloys  | Non Ferrous  | Plastics, Composites | | | | | | | Hardened Steels  |
| Z-Carb HPR | Z5 | 28 | ★ | ★ | ★ | ★ | ★ | | | ☆ | 5 | 37 | ≠ | + | E | N |
| Z-Carb | Z1 / Z16 / Z1B | 47 | ★ | ★ | ★ | ★ | ★ | | | ☆ | 4 | 35 / 38 | ≠ | + | E | Y |
| Z-Carb-AP | Z1P | 36 | ★ | ★ | ★ | ★ | ★ | | | ☆ | 4 | 35 / 38 | ≠ | + | E | Y |
| Z-Carb-HTA | ZH1 | 56 | ★ | ★ | ★ | ★ | ★ | | | ☆ | 4 | 38 / 41 | ≠ | + | E | Y |
| Z-Carb-MD | ZD1 | 60 | ★ | | | | | | | ★ | 4 | 42 / 45 | ≠ | - | E | Y |
| Series 33 | 33 | 94 | ★ | ★ | ★ | ★ | ★ | | | ☆ | 3 | 32 / 48 | ≠ | + | E | Y |
| T-Carb® | 51 | 75 | ★ | ★ | ★ | ★ | ★ | | | ☆ | 6 | 41 | ≠ | + | E | Y |
| Series 7 | 7 | 100 | ★ | ★ | ★ | ★ | ★ | | | ☆ | 4 | 38 | ≠ | + | P-S | Y |
| V-Carb | 55 | 63 | ★ | ★ | ★ | ★ | ★ | | | ☆ | 5 | 45 | ≠ | + | P-S | Y |
| Multi-Carb | 66 | 86 | ★ | ★ | ★ | ★ | ★ | | | ☆ | 7, 9, 11 | 35 | = | + | E | N |
| Turbo-Carb | 56B | 106 | ★ | | | | | | | ★ | 2 | 30 | = | + | E | Y |
| Power-Carb | 57 | 110 | | | | | | | | ★ | 6 | 45 | = | - | E | Y |
| Ski-Carb | 44, 45 | 164 | | | | | | | ★ | ★ | 2 | 45 | = | + | P-S | Y |
| S-Carb® 3 Flute | 43 | 134 | | | | | | | ★ | ★ | 3 | 38 | = | + | E | Y |
| S-Carb® Chipbreaker | 43CB | 144 | | | | | | | ★ | ★ | 3 | 38 | = | + | E | Y |
| S-Carb® 2 Flute | 47 | 157 | | | | | | | ★ | ★ | 2 | 35 | = | + | E | Y |
| S-Carb APR® | 43APR | 123 | | | | | | | ★ | | 3 | 38 | = | + | E | Y |
| S-Carb APR-3® | APR3 | 129 | | | | | | | ★ | | 3 | 38 | ≠ | + | E | Y |
| S-Carb APR-4® | APR4 | 130 | | | | | | | ★ | | 4 | 38 / 41 | ≠ | + | E | Y |
| S-Carb APF® | 43APF | 125 | | | | | | | ★ | | 4 | 38 / 41 | ≠ | + | E | Y |
| Slow Helix | 27 | 114 | | | | | | | ★ | | 4 | 10 / 12 | ≠ | + | P-S | Y |
| CCR * | 20-CCR | 356 | | | | | | | ★ | | 8, 10, 12 | 15 | = | + | C | EM or DR |
| CCR * | 31-CCR | 362 | | | | | | | ★ | | 5, 7, 10 | 15 | = | + | C | EM or DR |
| PCR * | 29-PCR | 352 | | | | | | | ★ | | 8, 9, 12 | 15 | = | 0 | E | EM or DR |
| Compression Router | 25 | 366 | | | | | | | ★ | | 4, 6, 8 | 30 | = | + | P-S | Y |
| Up Cut Router | 21 | 370 | | | | | | | ★ | ★ | 2 | 35 | = | + | P-S | Y |
| Down Cut Router | 22 | 371 | | | | | | | ★ | ★ | 2 | 35 | = | + | P-S | Y |

Main Key

- ★ Primary Function
- ☆ Secondary Function
-  Coolant Required
-  Plunging NOT Recommended

Coating Key

- Ti-Namite-A (TA) = AlTiN
- Ti-Namite-X (TX) = Proprietary nanocomposite
- Ti-Namite-M (TM) = AlTiSiN nanocomposite
- Ti-Namite-B (TB) = TiB₂
- Di-Namite® = polycrystalline diamond

Rake Key

- + = Positive
- = Negative
- 0 = Neutral

Center Cutting Key

- Y = Yes
- N = No
- EM = End Mill End
- DR = Drill End

Relief Key

- E = Eccentric
- P-S = Primary - Secondary
- C = Concave

Application Tips

| | |
|---------------------|---|
| Tool | <ul style="list-style-type: none"> Whenever possible, select an end mill with the largest diameter, shortest flute length, and shortest overall length for the best rigidity Long flute tools are not intended for pocketing, slotting, or heavy profiling – limit Ae to .02D High Performance tools minimize cycle time and extend tool life |
| Tool Holders | <ul style="list-style-type: none"> Holders with adequate gripping pressure and TIR are required Stub holders or zero length collet style holders are recommended for heavy stock removal When using solid holders, hand ground screw flats are not recommended |
| Workpiece | <ul style="list-style-type: none"> Secure clamping of the workpiece will reduce chatter and deflection |
| Machine | <ul style="list-style-type: none"> Spindle must be in optimum condition for precise TIR and maximum tool life Sufficient horsepower is required to perform at recommended speeds and feeds Reduce rates for low power machines to prevent workpiece and / or tool damage |
| Coolant | <ul style="list-style-type: none"> Avoid re-milling chips through use of air blast or liquid coolant as necessary Maintain clean coolant with appropriate concentration General recommendations: <ul style="list-style-type: none"> —Water Soluble Oil or Air Blast: Tool Steels, Mold & Die Steels, Carbon or Alloy Steels —Water Soluble Oil: Stainless Steels, Titanium, High Temperature Alloys, Non-Ferrous Alloys |
| Methods | <ul style="list-style-type: none"> Climb milling is generally preferred Attention to programming details, tool holders, TIR, balance, fixturing, etc. improve cutting tool performance and extend tool life |

END MILLING GUIDELINE

D_1 = cutting diameter L_2 = flute length


Speeds and Feeds for Cut Types are based on Radial Width (A_e) and Axial Depth (A_p)

Reductions to Speeds and Feeds may be necessary when:

- Ae and Ap exceed recommendations
- Using long flute or extended reach tools
- Using long tool holders
- Machining materials harder than listed


ENTRY METHODS

Pre-Drilled Hole

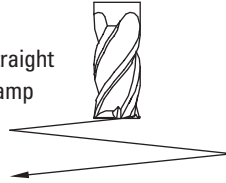


Pre-drilling is the preferred entry method for most applications.

Helical Ramp




Straight Ramp



Alternative methods are helical and straight ramping. High ramp angles require reduced feed. Lower ramp angles will allow higher feed rates and extend tool life. Use slotting speeds and feeds for ramp angles of 1° to 2°. Reduce feed to 25% when ramp angles approach 6°. General purpose tools and/or difficult to machine materials will require lower ramp angles and reduced feed.

Plunge



Plunge only in non-ferrous and short-chipping materials using slotting speeds and 25% slotting feeds.

| | |
|--------------------------|---|
| Herramientas | <ul style="list-style-type: none"> • Siempre que sea posible, seleccione la herramienta de mayor diámetro y menor longitud total y de filo para obtener una mayor rigidez. • Las herramientas con filos largos no son recomendadas para operaciones de apertura de cajas en el maquinado, operación de ranurado o perfilado pesado – limitar la profundidad radial (Ae) a .02D • Las herramientas de alto desempeño minimizan el tiempo de ciclo del maquinado y extienden la vida útil de la herramienta |
| Portaherramientas | <ul style="list-style-type: none"> • Los Portaherramientas deberán tener buena presión de amarre para la sujeción de la herramienta y una concetricidad máxima indicada (TIR) • Se recomienda usar portaherramientas de amarre directo cortos, o de boquilla con longitud cero para lograr un máximo arranque de viruta • Cuando se utilicen portaherramientas de amarre directo, no se recomienda hacer manualmente el plano para la sujeción del tornillo en el zanco de la herramienta |
| Pieza a maquinar | <ul style="list-style-type: none"> • La buena sujeción de la pieza a maquinar reducirá la vibración y la desviación de la herramienta |
| Máquina | <ul style="list-style-type: none"> • El husillo de la maquina debe estar en condiciones optimas, para asegurar la concetricidad de giro (TIR) y asegurar el máximo rendimiento de la herramienta • Para lograr los avances y velocidades recomendados, se necesita suficiente potencia (HP) en la maquina • Reducir los parámetros de corte en maquinas de baja potencia (HP) para prevenir el daño en la herramienta o pieza de trabajo |
| Refrigeración | <ul style="list-style-type: none"> • Evite el re-maquinado de virutas usando aire a presión o líquido refrigeración según sea necesario • Mantener limpio la refrigeración con su concentración adecuada • Recomendaciones generales: <ul style="list-style-type: none"> –Para el maquinado de aceros de herramienta, para Moldes y Dados o Aleaciones de Bajo Carbón, utilice Aceite Soluble en Agua o aire a presión –Para el maquinado de Aleaciones Inoxidables, Aleaciones Termorresistentes, Titanio y Aleaciones No Ferrosas, utilice solamente Aceite Soluble en Agua |
| Métodos | <ul style="list-style-type: none"> • Se recomienda el maquinado en sentido ascendente o trepado • El cuidado en los detalles de la programación, la concetricidad de giro (TIR) el balance de los portaherramientas, la sujeción de la pieza a maquinar, etc. son factores que contribuyen a prolongar la vida de la herramienta |

GUÍAS DE FRESADO



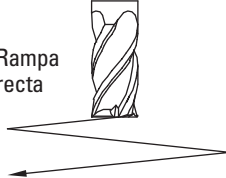

D_1 = diámetro de corte L_2 = largo de filo

Las velocidades y avances para cortes están basados en la profundidad radial (A_e), y profundidad axial (A_p)

Reducciones en velocidades y avances serán necesarias cuando:

- Ae y Ap exceda las recomendaciones
- Se utilicen filos largos o herramientas de largo alcance
- Se utilicen portaherramientas largos
- Se maquinen materiales más duros que los recomendados

MÉTODOS DE ENTRADA

| | | |
|---|---|--|
| <p>Barreno previo</p>  <p>Preferentemente usar un barreno previo como método de entrada para la mayor parte de las aplicaciones.</p> | <p>Rampa helicoidal</p>  <p>Rampa recta</p>  <p>Los métodos alternativos son las rampas helicoidales y rectas. Un ángulo elevado de rampa necesita un avance reducido. Un ángulo de rampa inferior permitirá tasas de avance más elevadas y una mayor duración de la herramienta. Usar velocidades y alcances de ranurado para ángulos de rampa de 1° a 2°. Disminuir el avance un 25% cuando los ángulos de rampa se aproximan a 6°. Las herramientas de uso general y/o materiales difíciles de mecanizar precisarán ángulos de rampa inferiores y un avance reducido.</p> | <p>Agujero o Barrenado</p>  <p>Este método se puede utilizar únicamente en materiales no ferrosos y materiales de formación de virutas cortas, usando la velocidad de ranurado y el 25% de su avance.</p> |
|---|---|--|

Conseils relatifs à l'application

| | |
|-----------------------------------|--|
| Outil | <ul style="list-style-type: none"> • Chaque fois que possible, choisissez une fraise de plus grand diamètre possible, la plus courte possible, elle garantira la meilleure rigidité • Les outils longs ne sont pas optimum pour l'ébauche, le pocketing, le rainurage – Ae limité à 0,02 D • Les outils Haute performance optimisent les temps de cycle et de augmentent la durée de vie |
| Porte-outils | <ul style="list-style-type: none"> • Des attachements à serrage puissant et à faux rond précis sont recommandés • Attachements à méplats ou pinces à serrage nominale sont recommandées pour les ébauches • Lorsque vous utilisez des attachement rigides, les serrage de l'outil par vis ne sont pas recommandés |
| Pièce | <ul style="list-style-type: none"> • Le système de fixation et de bridage de la pièce devra permettre de réduire les vibrations et la déformation |
| Machine | <ul style="list-style-type: none"> • Broche doit être en bon état optimal au niveau de son faux rond • Suffisamment puissance est nécessaire pour effectuer à des vitesses recommandées et se nourrit • Réduire les efforts pour les machines de faible puissance pour éviter l'endommagement de la pièce et / ou de l'outil |
| Liquide de refroidissement | <ul style="list-style-type: none"> • Évitez les recyclage de copeaux par l'utilisation de soufflage d'air comprimé ou de liquide de refroidissement. • Maintenir le lubrifiant propre à la concentration appropriée • Recommandations générales – <ul style="list-style-type: none"> –Huile soluble ou Air comprimé: aciers à outils, aciers pour moules, aciers au carbone ou alliés –Huile soluble: aciers inoxydables, titane, alliages à haute température, alliages non ferreux |
| Méthodes | <ul style="list-style-type: none"> • L'usinage en avalant est généralement préconisé • Attention à la programmation, porte-outils, faux rond, équilibrage, fixation, etc améliorent les performances de l'outil en coupe et prolonge la durée de vie |

GUIDE DU FRAISAGE

D_1 = diamètre de coupe L_2 = longueur de coupe


Vitesses & avances pour ces cas d'usinage sont basées sur l'engagement radial (A_e), et axial (A_p)

La réduction de la vitesse et de l'avance doit être nécessaire quand:

- Les engagements A_e et A_p sont importants
- Des dentures longues ou des séries longues sont utilisées
- Des attachement longs sont utilisés
- Lors d'usinage de matériaux durs


TYPES D'ENTREE MATIERE

Preperçage

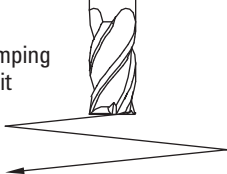


Le préperçage est la méthode préférable dans la plupart de applications.

Ramping hélicoïdal




Ramping droit



Les autres méthodes sont un ramping hélicoïdal et un ramping droit. Les angles de ramping élevés exigent une avance inférieure. Les angles de ramping inférieurs permettent les taux d'avance supérieurs et prolongeront la vie de l'outil. Utilisez des avances et vitesses de mortaisage pour les angles de ramping de 1° à 2°. Réduisez l'avance à 25 % lorsque les angles de ramping avoisinent 6°. Les outils tout usage et/ou les matériaux difficiles à usiner exigeront des angles de ramping inférieurs et une charge réduite.

Plongée



Plongée uniquement dans les non ferreux. Vitesse rainurage et avances réduites de 25%.

| | |
|-------------------------|--|
| Werkzeug | <ul style="list-style-type: none"> • Wählen Sie möglichst immer den Schafffräser mit dem größten Durchmesser, der kürzesten Schneide und Gesamtlänge, um eine hohe Steifigkeit zu erhalten • Langlochschaftfräser sind nicht zum Taschen-, Schlitz- oder Profilfräsen bestimmt – die Dehnung auf A_e 0,2 der Streckgrenze nicht überschreiten • Hochleistungswerkzeuge minimieren die Bearbeitungszeit und verlängern die Werkzeugstandzeit |
| Werkzeughalter | <ul style="list-style-type: none"> • Es werden Spannzangen mit genauem Rundlauf benötigt • Steilkegel oder bündige Spannfutter werden bei hohem Materialabtrag empfohlen • Von der Verwendung fester handverschraubter Halterungen wird abgeraten |
| Werkstück | <ul style="list-style-type: none"> • Sicheres Werkzeugspannen verringert Vibrationen und das Auswandern aus der Spannvorrichtung |
| Werkzeugmaschine | <ul style="list-style-type: none"> • Die Spindel muss in optimalem Zustand sein, um einen genauen Rundlauf und maximale Standzeit zu erzielen • Für die empfohlenen Drehzahlen und Vorschubgeschwindigkeiten ist genügend Leistung bereitzustellen • Bei leistungsschwachen Antrieben sind die Werte zu verringern, um Beschädigungen am Werkstück und/oder Werkzeug zu vermeiden |
| Kühlmittel | <ul style="list-style-type: none"> • Das Stauen der Späne durch Luftstrahl oder flüssige Kühlmittel möglichst verhindern • Kühlmittel in geeigneter Konzentration verwenden • Allgemeine Empfehlungen: <ul style="list-style-type: none"> – Wasser-Öl-Emulsionen oder Luftstrahl: Werkzeugstähle, Form- und Schneidstähle, unlegierte oder legierte Stähle – Wasser-Öl-Emulsion: Nichtrostender Stahl, Titan, Warmfeste Legierungen, Nichteisenlegierungen |
| Verfahren | <ul style="list-style-type: none"> • Vorzugsweise Gleichlaufräsen anwenden • Das Beachten der Fräsparameter, Werkzeughalter, Rundlauf, Auswuchten, Einspannen, usw. verbessert die Schnittleistung und verlängert die Standzeit |

RICHTWERTE ZUM FRÄSEN

D_1 = Fräsdurchmesser L_2 = Schnittlänge


Drehzahl und Vorschub für Fräsarbeiten hängen von Radialbreite (A_e) und Frästiefe (A_p) ab

Drehzahl und Vorschub müssen ggfs. verringert werden wenn:

- die empfohlenen Werte für A_e und A_p überschritten werden
- lange Schneiden oder Langschaftfräser verwendet werden
- lange Werkzeughalter verwendet werden
- die Werkstoffe härter als vorgesehen sind


VORBEREITUNGEN

Vorbohrung




Vorbohren ist in den meisten Fällen ratsam.

Zirkulareintauchfräsen




Schrägeintauchfräsen



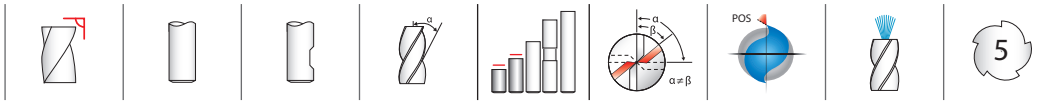
Alternative Verfahren sind Zirkulareintauchen und Schrägeintauchen. Starke Tauchwinkel erfordern verringerte Vorschubgeschwindigkeiten. Geringe Tauchwinkel ermöglichen höhere Vorschubgeschwindigkeiten und verlängern die Standzeit. Verwenden Sie die Drehzahlen und Vorschübe zum Schlitzfräsen für Tauchwinkel von 1° bis 2° . Den Vorschub auf 25 % verringern, wenn der Tauchwinkel 6° erreicht. Standardwerkzeuge und / oder schwer zu bearbeitende Werkstoffe verlangen kleine Tauchwinkel und verringerte Vorschubgeschwindigkeiten.

Stechen

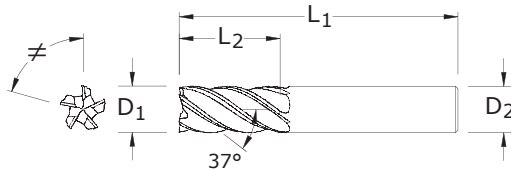


Stechen Sie in Nichteisenmetalle und kurzspanende Werkstoffe nur mit Schlitzfräsdrehzahl und 25 % der Schlitzvorschubgeschwindigkeit ein.

FRACTIONAL Z-Carb-HPR



Z5 FRACTIONAL SERIES



- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter suppression and proprietary edge geometry for shearing and strength
- Chatter-free geometry allows deep cutting and high speed machining
- Central coolant hole delivers coolant effectively to the cutting zone enhancing chip removal when pocketing or slotting
- Excels at roughing, ramping, high speed machining and finishing in a variety of materials
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| inch | | | | EDP NO. | | | | | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|---------------------|-------------------------------|--|---------------------|-------------------------------|--|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | TI-NAMITE-A (TA) | TI-NAMITE-A (TA) W/FLAT | TI-NAMITE-A (TA) W/INTERNAL COOLANT | TI-NAMITE-M (TM) | TI-NAMITE-M (TM) W/FLAT | TI-NAMITE-M (TM) W/INTERNAL COOLANT |
| 1/8 | 1/4 | 1-1/2 | 1/8 | - | - | - | 37000 | - | - |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 37180 | - | - | 37002 | - | - |
| 3/16 | 5/16 | 2 | 3/16 | - | - | - | 37004 | - | - |
| 3/16 | 1/2 | 2 | 3/16 | 37182 | - | - | 37006 | - | - |
| 1/4 | 3/8 | 2-1/2 | 1/4 | 38502 | - | - | 37008 | - | - |
| 1/4 | 1/2 | 2-1/2 | 1/4 | 37184 | - | - | 37011 | - | - |
| 5/16 | 7/16 | 2-1/2 | 5/16 | - | - | - | 37014 | - | - |
| 5/16 | 5/8 | 2-1/2 | 5/16 | 38504 | - | - | 37016 | - | - |
| 3/8 | 1/2 | 2-1/2 | 3/8 | - | - | - | 37018 | - | - |
| 3/8 | 3/4 | 2-1/2 | 3/8 | 37187 | - | - | 37021 | - | - |
| 7/16 | 5/8 | 2-1/2 | 7/16 | 37168 | - | - | 37159 | - | - |
| 7/16 | 7/8 | 2-3/4 | 7/16 | 37170 | - | - | 37169 | - | - |
| 1/2 | 5/8 | 3 | 1/2 | 38506 | 38512 | 37320 | 37024 | 37030 | 37321 |
| 1/2 | 1 | 3 | 1/2 | 38507 | 38513 | 37322 | 37036 | 37042 | 37323 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 37190 | 37194 | 37324 | 37048 | 37054 | 37325 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | 38508 | 38514 | - | 37060 | 37067 | 37260 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 37198 | 37202 | - | 37074 | 37081 | 37267 |
| 3/4 | 7/8 | 4 | 3/4 | - | 38515 | - | 37088 | 37095 | 37274 |
| 3/4 | 1-1/2 | 4 | 3/4 | 37206 | 37210 | - | 37102 | 37109 | 37281 |
| 1 | 1-1/8 | 4 | 1 | - | - | - | 37116 | 37123 | 37288 |
| 1 | 1-1/2 | 4 | 1 | 37214 | 37218 | - | 37130 | 37137 | 37295 |
| 1 | 2 | 4-1/2 | 1 | - | 38517 | - | 37144 | 37151 | 37302 |

TOLERANCES (inch)

1/8-1/4 DIAMETER

D₁ = +0.0000/-0.0012

D₂ = h₆

>1/4-3/8 DIAMETER

D₁ = +0.0000/-0.0016

D₂ = h₆

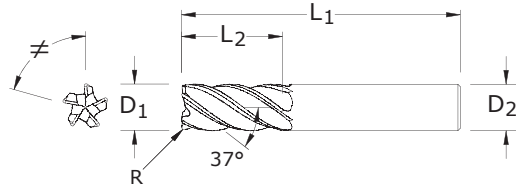
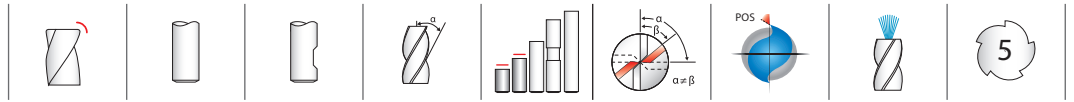
>3/8-1 DIAMETER

D₁ = +0.0000/-0.0020

D₂ = h₆

| |
|------------------|
| STEELS |
| STAINLESS STEELS |
| CAST IRON |
| HIGH TEMP ALLOYS |
| TITANIUM |
| HARDENED STEELS |

For patent information visit www.ksptpatents.com



TOLERANCES (inch)

1/8–1/4 DIAMETER

D₁ = +0.0000/–0.0012

D₂ = h₆

R = +0.0000/–0.0020

>1/4–3/8 DIAMETER

D₁ = +0.0000/–0.0016

D₂ = h₆

R = +0.0000/–0.0020

>3/8–1 DIAMETER

D₁ = +0.0000/–0.0020

D₂ = h₆

R = +0.0000/–0.0020

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

For patent information visit www.ksptpatents.com

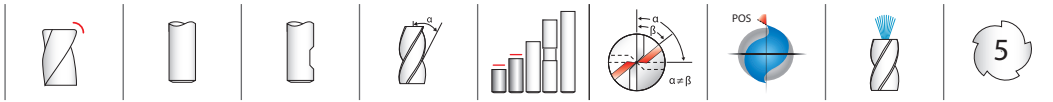
| inch | | | | | | EDP NO. | | | | |
|---------------------------------|------------------------------|-------------------------------|-------------------------------|-----------------|------------------|-------------------------|-------------------------------------|------------------|-------------------------|-------------------------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | TI-NAMITE-A (TA) | TI-NAMITE-A (TA) W/FLAT | TI-NAMITE-A (TA) W/INTERNAL COOLANT | TI-NAMITE-M (TM) | TI-NAMITE-M (TM) W/FLAT | TI-NAMITE-M (TM) W/INTERNAL COOLANT |
| 1/8 | 1/4 | 1-1/2 | 1/8 | .015 | 38525 | – | – | 37001 | – | – |
| 1/8 | 3/8 | 1-1/2 | 1/8 | .015 | 37181 | – | – | 37003 | – | – |
| 3/16 | 5/16 | 2 | 3/16 | .015 | – | – | – | 37005 | – | – |
| 3/16 | 1/2 | 2 | 3/16 | .015 | 37183 | – | – | 37007 | – | – |
| 1/4 | 3/8 | 2-1/2 | 1/4 | .015 | – | – | – | 37009 | – | – |
| 1/4 | 3/8 | 2-1/2 | 1/4 | .030 | 38528 | – | – | 37010 | – | – |
| 1/4 | 1/2 | 2-1/2 | 1/4 | .015 | 37185 | – | – | 37012 | – | – |
| 1/4 | 1/2 | 2-1/2 | 1/4 | .030 | 37186 | – | – | 37013 | – | – |
| 5/16 | 7/16 | 2-1/2 | 5/16 | .015 | 38529 | – | – | 37015 | – | – |
| 5/16 | 5/8 | 2-1/2 | 5/16 | .015 | 38530 | – | – | 37017 | – | – |
| 3/8 | 1/2 | 2-1/2 | 3/8 | .015 | – | – | – | 37019 | – | – |
| 3/8 | 1/2 | 2-1/2 | 3/8 | .030 | 38532 | – | – | 37020 | – | – |
| 3/8 | 3/4 | 2-1/2 | 3/8 | .015 | 37188 | – | – | 37022 | – | – |
| 3/8 | 3/4 | 2-1/2 | 3/8 | .030 | 37189 | – | – | 37023 | 37175 | – |
| 7/16 | 5/8 | 2-1/2 | 7/16 | .015 | 37164 | – | – | 37160 | – | – |
| 7/16 | 5/8 | 2-1/2 | 7/16 | .030 | 37165 | – | – | 37161 | – | – |
| 7/16 | 7/8 | 2-3/4 | 7/16 | .015 | 37166 | – | – | 37162 | – | – |
| 7/16 | 7/8 | 2-3/4 | 7/16 | .030 | 37167 | – | – | 37163 | – | – |
| 1/2 | 5/8 | 3 | 1/2 | .015 | – | 38578 | 37330 | 37025 | 37031 | 37331 |
| 1/2 | 5/8 | 3 | 1/2 | .030 | – | 38579 | 37332 | 37026 | 37032 | 37333 |
| 1/2 | 5/8 | 3 | 1/2 | .060 | – | 38580 | 37334 | 37027 | 37033 | 37335 |
| 1/2 | 5/8 | 3 | 1/2 | .090 | – | 38581 | 37337 | 37028 | 37034 | 37338 |
| 1/2 | 5/8 | 3 | 1/2 | .120 | – | – | 37339 | 37029 | 37035 | 37340 |
| 1/2 | 1 | 3 | 1/2 | .015 | – | 38583 | 37341 | 37037 | 37043 | 37342 |
| 1/2 | 1 | 3 | 1/2 | .030 | 38539 | 38584 | 37343 | 37038 | 37044 | 37344 |
| 1/2 | 1 | 3 | 1/2 | .060 | – | 38585 | 37345 | 37039 | 37045 | 37346 |
| 1/2 | 1 | 3 | 1/2 | .090 | – | – | 37348 | 37040 | 37046 | 37349 |
| 1/2 | 1 | 3 | 1/2 | .120 | – | – | 37350 | 37041 | 37047 | 37351 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .015 | 37191 | 37195 | 37352 | 37049 | 37055 | 37353 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .030 | 37192 | 37196 | 37354 | 37050 | 37056 | 37355 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .060 | 37193 | 37197 | 37356 | 37051 | 37057 | 37357 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .090 | – | – | 37359 | 37052 | 37058 | 37360 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .120 | – | – | 37361 | 37053 | 37059 | 37362 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .015 | – | – | – | 37061 | 37068 | 37261 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .030 | – | 38591 | – | 37062 | 37069 | 37262 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .060 | – | – | – | 37063 | 37070 | 37263 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .090 | – | – | – | 37064 | 37071 | 37264 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .120 | 38549 | – | – | 37065 | 37072 | 37265 |

continued on next page

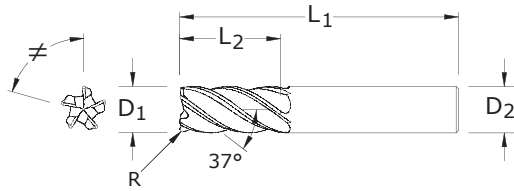
Z5CR
FRACTIONAL SERIES

- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter suppression and proprietary edge geometry for shearing and strength
- Chatter-free geometry allows deep cutting and high speed machining
- Central coolant hole delivers coolant effectively to the cutting zone enhancing chip removal when pocketing or slotting
- Enhanced corner geometry with tight tolerance corner radii
- Excels at roughing, ramping, high speed machining and finishing in a variety of materials
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)

FRACTIONAL Z-Carb-HPR



Z5CR FRACTIONAL SERIES



CONTINUED

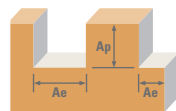
| inch | | | | | EDP NO. | | | | | |
|------------------|---------------|----------------|----------------|---------------|------------------|-------------------------|-------------------------------------|------------------|-------------------------|-------------------------------------|
| CUTTING DIAMETER | LENGTH OF CUT | OVERALL LENGTH | SHANK DIAMETER | CORNER RADIUS | TI-NAMITE-A (TA) | TI-NAMITE-A (TA) W/FLAT | TI-NAMITE-A (TA) W/INTERNAL COOLANT | TI-NAMITE-M (TM) | TI-NAMITE-M (TM) W/FLAT | TI-NAMITE-M (TM) W/INTERNAL COOLANT |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .190 | — | — | — | 37066 | 37073 | 37266 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .015 | 37199 | 37203 | — | 37075 | 37082 | 37268 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .030 | 37200 | 37204 | — | 37076 | 37083 | 37269 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .060 | 37201 | 37205 | — | 37077 | 37084 | 37270 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .090 | — | — | — | 37078 | 37085 | 37271 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .120 | — | — | — | 37079 | 37086 | 37272 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .190 | — | — | — | 37080 | 37087 | 37273 |
| 3/4 | 7/8 | 4 | 3/4 | .030 | — | 38599 | — | 37089 | 37096 | 37275 |
| 3/4 | 7/8 | 4 | 3/4 | .060 | — | — | — | 37090 | 37097 | 37276 |
| 3/4 | 7/8 | 4 | 3/4 | .090 | — | — | — | 37091 | 37098 | 37277 |
| 3/4 | 7/8 | 4 | 3/4 | .120 | — | — | — | 37092 | 37099 | 37278 |
| 3/4 | 7/8 | 4 | 3/4 | .190 | — | — | — | 37093 | 37100 | 37279 |
| 3/4 | 7/8 | 4 | 3/4 | .250 | — | — | — | 37094 | 37101 | 37280 |
| 3/4 | 1-1/2 | 4 | 3/4 | .030 | 37207 | 37211 | — | 37103 | 37110 | 37282 |
| 3/4 | 1-1/2 | 4 | 3/4 | .060 | 37208 | 37212 | — | 37104 | 37111 | 37283 |
| 3/4 | 1-1/2 | 4 | 3/4 | .090 | — | — | — | 37105 | 37112 | 37284 |
| 3/4 | 1-1/2 | 4 | 3/4 | .120 | 37209 | 37213 | — | 37106 | 37113 | 37285 |
| 3/4 | 1-1/2 | 4 | 3/4 | .190 | — | — | — | 37107 | 37114 | 37286 |
| 3/4 | 1-1/2 | 4 | 3/4 | .250 | — | — | — | 37108 | 37115 | 37287 |
| 1 | 1-1/8 | 4 | 1 | .030 | — | 38608 | — | 37117 | 37124 | 37289 |
| 1 | 1-1/8 | 4 | 1 | .060 | — | — | — | 37118 | 37125 | 37290 |
| 1 | 1-1/8 | 4 | 1 | .090 | — | — | — | 37119 | 37126 | 37291 |
| 1 | 1-1/8 | 4 | 1 | .120 | — | — | — | 37120 | 37127 | 37292 |
| 1 | 1-1/8 | 4 | 1 | .190 | — | — | — | 37121 | 37128 | 37293 |
| 1 | 1-1/8 | 4 | 1 | .250 | — | — | — | 37122 | 37129 | 37294 |
| 1 | 1-1/2 | 4 | 1 | .030 | 37215 | 37219 | — | 37131 | 37138 | 37296 |
| 1 | 1-1/2 | 4 | 1 | .060 | 37216 | 37220 | — | 37132 | 37139 | 37297 |
| 1 | 1-1/2 | 4 | 1 | .090 | — | — | — | 37133 | 37140 | 37298 |
| 1 | 1-1/2 | 4 | 1 | .120 | 37217 | 37221 | — | 37134 | 37141 | 37299 |
| 1 | 1-1/2 | 4 | 1 | .190 | — | — | — | 37135 | 37142 | 37300 |
| 1 | 1-1/2 | 4 | 1 | .250 | — | — | — | 37136 | 37143 | 37301 |
| 1 | 2 | 4-1/2 | 1 | .030 | — | 38617 | — | 37145 | 37152 | 37303 |
| 1 | 2 | 4-1/2 | 1 | .060 | — | — | — | 37146 | 37153 | 37304 |
| 1 | 2 | 4-1/2 | 1 | .090 | — | — | — | 37147 | 37154 | 37305 |
| 1 | 2 | 4-1/2 | 1 | .120 | — | — | — | 37148 | 37155 | 37306 |
| 1 | 2 | 4-1/2 | 1 | .190 | — | — | — | 37149 | 37156 | 37307 |
| 1 | 2 | 4-1/2 | 1 | .250 | — | — | — | 37150 | 37157 | 37308 |

TOLERANCES (inch)

- 1/8–1/4 DIAMETER**
 $D_1 = +0.0000/-0.0012$
 $D_2 = h_6$
 $R = +0.0000/-0.0020$
- >1/4–3/8 DIAMETER**
 $D_1 = +0.0000/-0.0016$
 $D_2 = h_6$
 $R = +0.0000/-0.0020$
- >3/8–1 DIAMETER**
 $D_1 = +0.0000/-0.0020$
 $D_2 = h_6$
 $R = +0.0000/-0.0020$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

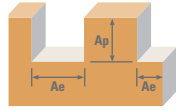
For patent information visit www.kspatents.com



| Series | Z5, Z5CR | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|--------|--|-----------------------------|---------------------|---------------------|------------|-----------------------------------|------------|---------|--------|--------|--------|--------|--------|--------|
| | | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 555 | RPM | 16961 | 8480 | 5654 | 4240 | 3392 | 2827 | 2120 |
| | | | | | | (444-666) | Fz | 0.00046 | 0.0012 | 0.0023 | 0.0031 | 0.0034 | 0.0037 | 0.0043 |
| | | | | | | 440 | Feed (ipm) | 39.0 | 50.9 | 65.0 | 65.7 | 57.7 | 52.3 | 45.6 |
| | | Slot | 1 | ≤ 1 | (352-528) | RPM | 13446 | 6723 | 4482 | 3362 | 2689 | 2241 | 1681 | |
| | | | | | Fz | 0.00046 | 0.0012 | 0.0023 | 0.0031 | 0.0034 | 0.0037 | 0.0043 | | |
| | | | | | Feed (ipm) | 30.9 | 40.3 | 51.5 | 52.1 | 45.7 | 41.5 | 36.1 | | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 315 | RPM | 9626 | 4813 | 3209 | 2407 | 1925 | 1604 | 1203 |
| | | | | | | (252-378) | Fz | 0.00034 | 0.0009 | 0.0017 | 0.0023 | 0.0026 | 0.0028 | 0.0032 |
| | | | | | | 250 | Feed (ipm) | 16.4 | 21.7 | 27.3 | 27.7 | 25.0 | 22.5 | 19.3 |
| | | Slot | 1 | ≤ 1 | (200-300) | RPM | 7640 | 3820 | 2547 | 1910 | 1528 | 1273 | 955 | |
| | | | | | Fz | 0.00034 | 0.0009 | 0.0017 | 0.0023 | 0.0026 | 0.0028 | 0.0032 | | |
| | | | | | Feed (ipm) | 13.0 | 17.2 | 21.6 | 22.0 | 19.9 | 17.8 | 15.3 | | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 185 | RPM | 5654 | 2827 | 1885 | 1413 | 1131 | 942 | 707 |
| | | | | | | (148-222) | Fz | 0.00028 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0026 |
| | | | | | | 145 | Feed (ipm) | 7.9 | 9.9 | 13.2 | 12.7 | 11.3 | 10.4 | 9.2 |
| | | Slot | 1 | ≤ 1 | (116-174) | RPM | 4431 | 2216 | 1477 | 1108 | 886 | 739 | 554 | |
| | | | | | Fz | 0.00028 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0026 | | |
| | | | | | Feed (ipm) | 6.2 | 7.8 | 10.3 | 10.0 | 8.9 | 8.1 | 7.2 | | |
| K | CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 445 | RPM | 13599 | 6800 | 4533 | 3400 | 2720 | 2267 | 1700 |
| | | | | | | (356-534) | Fz | 0.00042 | 0.0011 | 0.0021 | 0.0028 | 0.0031 | 0.0034 | 0.0039 |
| | | | | | | 355 | Feed (ipm) | 28.6 | 37.4 | 47.6 | 47.6 | 42.2 | 38.5 | 33.1 |
| | | Slot | 1 | ≤ 1 | (284-426) | RPM | 10849 | 5424 | 3616 | 2712 | 2170 | 1808 | 1356 | |
| | | | | | Fz | 0.00042 | 0.0011 | 0.0021 | 0.0028 | 0.0031 | 0.0034 | 0.0039 | | |
| | | | | | Feed (ipm) | 22.8 | 29.8 | 38.0 | 38.0 | 33.6 | 30.7 | 26.4 | | |
| M | CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | ≤ 260 Bhn or ≤ 26 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 340 | RPM | 10390 | 5195 | 3463 | 2598 | 2078 | 1732 | 1299 |
| | | | | | | (272-408) | Fz | 0.00031 | 0.0008 | 0.0016 | 0.0021 | 0.0023 | 0.0025 | 0.0029 |
| | | | | | | 270 | Feed (ipm) | 16.1 | 21.8 | 27.7 | 27.3 | 23.9 | 21.6 | 18.8 |
| | | Slot | 1 | ≤ 1 | (216-324) | RPM | 8251 | 4126 | 2750 | 2063 | 1650 | 1375 | 1031 | |
| | | | | | Fz | 0.00031 | 0.0008 | 0.0016 | 0.0021 | 0.0023 | 0.0025 | 0.0029 | | |
| | | | | | Feed (ipm) | 12.8 | 17.3 | 22.0 | 21.7 | 19.0 | 17.2 | 15.0 | | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 490 | RPM | 14974 | 7487 | 4991 | 3744 | 2995 | 2496 | 1872 |
| | | | | | | (392-588) | Fz | 0.00034 | 0.0009 | 0.0017 | 0.0023 | 0.0026 | 0.0028 | 0.0032 |
| | | | | | | 390 | Feed (ipm) | 25.5 | 33.7 | 42.4 | 43.1 | 38.9 | 34.9 | 29.9 |
| | | Slot | 1 | ≤ 1 | (312-468) | RPM | 11918 | 5959 | 3973 | 2980 | 2384 | 1986 | 1490 | |
| | | | | | Fz | 0.00034 | 0.0009 | 0.0017 | 0.0023 | 0.0026 | 0.0028 | 0.0032 | | |
| | | | | | Feed (ipm) | 20.3 | 26.8 | 33.8 | 34.3 | 31.0 | 27.8 | 23.8 | | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 340 | RPM | 10390 | 5195 | 3463 | 2598 | 2078 | 1732 | 1299 |
| | | | | | | (272-408) | Fz | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0025 |
| | | | | | | 270 | Feed (ipm) | 14.0 | 18.2 | 24.2 | 23.4 | 20.8 | 19.0 | 16.2 |
| | | Slot | 1 | ≤ 1 | (216-324) | RPM | 8251 | 4126 | 2750 | 2063 | 1650 | 1375 | 1031 | |
| | | | | | Fz | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0025 | | |
| | | | | | Feed (ipm) | 11.1 | 14.4 | 19.3 | 18.6 | 16.5 | 15.1 | 12.9 | | |

continued on next page

FRACTIONAL Z-Carb-HPR



| Series Z5, Z5CR Fractional | Hardness | Profile Ae x D1 | Ap x D1 | Vc (sfm) | Diameter (D1) (inch) | | | | | | | |
|---|-----------------------------|--------------------|---------|-------------|-------------------------|---------|---------|---------|---------|---------|---------|---------|
| | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | |
| M STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | ≤ 325 Bhn or ≤ 35 HRc | Profile ≤ 0.5 | ≤ 1.5 | 310 | RPM | 9474 | 4737 | 3158 | 2368 | 1895 | 1579 | 1184 |
| | | | | (248-372) | Fz | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0025 |
| | | | | Feed (ipm) | 12.8 | 16.6 | 22.1 | 21.3 | 18.9 | 17.4 | 14.8 | |
| | | Slot 1 | ≤ 1 | 250 | RPM | 7640 | 3820 | 2547 | 1910 | 1528 | 1273 | 955 |
| | | | | (200-300) | Fz | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0025 |
| | | | | Feed (ipm) | 10.3 | 13.4 | 17.8 | 17.2 | 15.3 | 14.0 | 11.9 | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Profile ≤ 0.5 | ≤ 1.5 | 80 | RPM | 2445 | 1222 | 815 | 611 | 489 | 407 | 306 |
| | | | | (64-96) | Fz | 0.00025 | 0.00068 | 0.00128 | 0.00170 | 0.00187 | 0.00204 | 0.00238 |
| | | | | Feed (ipm) | 3.1 | 4.2 | 5.2 | 5.2 | 4.6 | 4.2 | 3.6 | |
| | | Slot 1 | ≤ 1 | 65 | RPM | 1986 | 993 | 662 | 497 | 397 | 331 | 248 |
| | | | | (52-78) | Fz | 0.00025 | 0.00068 | 0.00128 | 0.00170 | 0.00187 | 0.00204 | 0.00238 |
| | | | | Feed (ipm) | 2.5 | 3.4 | 4.2 | 4.2 | 3.7 | 3.4 | 3.0 | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRc | Profile ≤ 0.5 | ≤ 1.5 | 62 | RPM | 1895 | 947 | 632 | 474 | 379 | 316 | 237 |
| | | | | (50-74) | Fz | 0.00018 | 0.00048 | 0.00090 | 0.00120 | 0.00130 | 0.00140 | 0.00170 |
| | | | | Feed (ipm) | 1.7 | 2.3 | 2.8 | 2.8 | 2.5 | 2.2 | 2.0 | |
| | | Slot 1 | ≤ 1 | 50 | RPM | 1528 | 764 | 509 | 382 | 306 | 255 | 191 |
| | | | | (40-60) | Fz | 0.00018 | 0.00048 | 0.00090 | 0.00120 | 0.00130 | 0.00140 | 0.00170 |
| | | | | Feed (ipm) | 1.4 | 1.8 | 2.3 | 2.3 | 2.0 | 1.8 | 1.6 | |
| S TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRc | Profile ≤ 0.5 | ≤ 1.5 | 215 | RPM | 6570 | 3285 | 2190 | 1643 | 1314 | 1095 | 821 |
| | | | | (172-258) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0022 | 0.0024 | 0.0028 |
| | | | | Feed (ipm) | 9.9 | 13.1 | 16.4 | 16.4 | 14.5 | 13.1 | 11.5 | |
| | | Slot 1 | ≤ 1 | 170 | RPM | 5195 | 2598 | 1732 | 1299 | 1039 | 866 | 649 |
| | | | | (136-204) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0022 | 0.0024 | 0.0028 |
| | | | | Feed (ipm) | 7.8 | 10.4 | 13.0 | 13.0 | 11.4 | 10.4 | 9.1 | |
| S TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Profile ≤ 0.5 | ≤ 1.5 | 75 | RPM | 2292 | 1146 | 764 | 573 | 458 | 382 | 287 |
| | | | | (60-90) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0022 | 0.0024 | 0.0028 |
| | | | | Feed (ipm) | 3.4 | 4.6 | 5.7 | 5.7 | 5.0 | 4.6 | 4.0 | |
| | | Slot 1 | ≤ 1 | 60 | RPM | 1834 | 917 | 611 | 458 | 367 | 306 | 229 |
| | | | | (48-72) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0022 | 0.0024 | 0.0028 |
| | | | | Feed (ipm) | 2.8 | 3.7 | 4.6 | 4.6 | 4.0 | 3.7 | 3.2 | |

Bhn (Brinell) HRc (Rockwell C)

$$\text{rpm} = \text{Vc} \times 3.82 / D_1$$

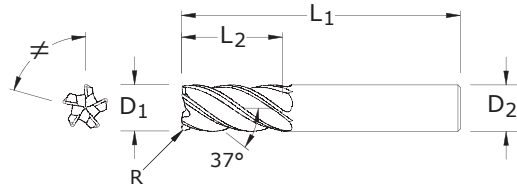
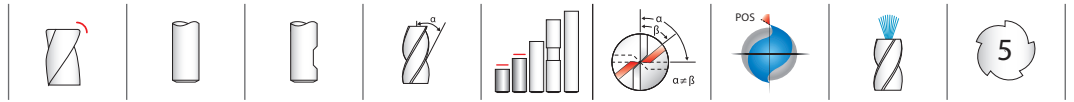
$$\text{ipm} = \text{Fz} \times 5 \times \text{rpm}$$

ramp up to 5 degrees using slotting speed and feed rates. Do not plunge.

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling (.02 x D1 maximum)

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



TOLERANCES (mm)

6 DIAMETER

$D_1 = +0,000/-0,030$

$D_2 = h_6$

$R = +0,000/-0,050$

>6-10 DIAMETER

$D_1 = +0,000/-0,040$

$D_2 = h_6$

$R = +0,000/-0,050$

>10-25 DIAMETER

$D_1 = +0,000/-0,050$

$D_2 = h_6$

$R = +0,000/-0,050$

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

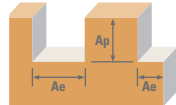
For patent information visit www.ksptpatents.com

| mm | | | | | EDP NO. | | | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|------------------|-------------------------|---|--------------------------|---------------------------------|---|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | TI-NAMITE-A (TA) | TI-NAMITE-A (TA) W/FLAT | TI-NAMITE-A (TA) EDP NO. W/INTERNAL COOLANT | TI-NAMITE-M (TM) EDP NO. | TI-NAMITE-M (TM) EDP NO. W/FLAT | TI-NAMITE-M (TM) EDP NO. W/INTERNAL COOLANT |
| 6,0 | 9,0 | 54,0 | 6,0 | 0,5 | - | - | - | 47000 | - | - |
| 6,0 | 13,0 | 57,0 | 6,0 | 0,3 | - | - | - | 47001 | - | - |
| 6,0 | 13,0 | 57,0 | 6,0 | 0,5 | 47120 | 48002 | - | 47002 | - | - |
| 6,0 | 13,0 | 57,0 | 6,0 | 1,0 | - | - | - | 47003 | - | - |
| 6,0 | 13,0 | 57,0 | 6,0 | 1,5 | 48003 | - | - | 47004 | - | - |
| 8,0 | 11,0 | 58,0 | 8,0 | 0,5 | - | - | - | 47005 | - | - |
| 8,0 | 18,0 | 63,0 | 8,0 | 0,5 | 47121 | - | - | 47006 | - | - |
| 8,0 | 18,0 | 63,0 | 8,0 | 1,0 | 47122 | - | - | 47007 | - | - |
| 8,0 | 18,0 | 63,0 | 8,0 | 1,5 | - | - | - | 47008 | - | - |
| 8,0 | 18,0 | 63,0 | 8,0 | 2,0 | - | - | - | 47009 | - | - |
| 10,0 | 13,0 | 66,0 | 10,0 | 1,0 | - | - | - | 47010 | - | - |
| 10,0 | 22,0 | 72,0 | 10,0 | 0,5 | 47123 | - | - | 47011 | - | - |
| 10,0 | 22,0 | 72,0 | 10,0 | 1,0 | 47124 | - | - | 47012 | - | - |
| 10,0 | 22,0 | 72,0 | 10,0 | 1,5 | - | - | - | 47013 | - | - |
| 10,0 | 22,0 | 72,0 | 10,0 | 2,0 | - | - | - | 47014 | - | - |
| 10,0 | 22,0 | 72,0 | 10,0 | 2,5 | - | - | - | 47015 | - | - |
| 12,0 | 15,0 | 73,0 | 12,0 | 1,0 | - | - | - | 47016 | 47024 | - |
| 12,0 | 26,0 | 83,0 | 12,0 | 0,5 | 47125 | 47128 | 47160 | 47017 | 47025 | 47161 |
| 12,0 | 26,0 | 83,0 | 12,0 | 0,76 | 47126 | 47129 | 47162 | 47018 | 47026 | 47163 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,0 | 47127 | 47130 | 47164 | 47019 | 47027 | 47165 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,5 | 48012 | - | 47166 | 47020 | 47028 | 47167 |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,0 | - | - | 47168 | 47021 | 47029 | 47169 |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,5 | - | - | 47170 | 47022 | 47030 | 47171 |
| 12,0 | 26,0 | 83,0 | 12,0 | 3,0 | - | - | 47172 | 47023 | 47031 | 47173 |
| 16,0 | 19,0 | 82,0 | 16,0 | 1,0 | - | - | - | 47032 | 47039 | 47046 |
| 16,0 | 19,0 | 82,0 | 16,0 | 1,5 | 48070 | - | - | - | - | - |
| 16,0 | 35,0 | 92,0 | 16,0 | 1,0 | 47131 | - | 47134 | 47033 | 47040 | 47047 |
| 16,0 | 35,0 | 92,0 | 16,0 | 1,5 | - | - | - | 47034 | 47041 | 47048 |
| 16,0 | 35,0 | 92,0 | 16,0 | 2,0 | 47132 | - | 47135 | 47035 | 47042 | 47049 |
| 16,0 | 35,0 | 92,0 | 16,0 | 2,5 | - | - | - | 47036 | 47043 | 47050 |
| 16,0 | 35,0 | 92,0 | 16,0 | 3,0 | 47133 | - | 47136 | 47037 | 47044 | 47051 |
| 16,0 | 35,0 | 92,0 | 16,0 | 4,0 | - | - | - | 47038 | 47045 | 47052 |
| 20,0 | 23,0 | 92,0 | 20,0 | 1,0 | 48020 | - | - | 47053 | 47061 | 47069 |
| 20,0 | 43,0 | 104,0 | 20,0 | 1,0 | 47137 | - | 47140 | 47054 | 47062 | 47070 |
| 20,0 | 43,0 | 104,0 | 20,0 | 1,5 | - | - | - | 47055 | 47063 | 47071 |
| 20,0 | 43,0 | 104,0 | 20,0 | 2,0 | 47138 | - | 47141 | 47056 | 47064 | 47072 |
| 20,0 | 43,0 | 104,0 | 20,0 | 2,5 | - | - | - | 47057 | 47065 | 47073 |
| 20,0 | 43,0 | 104,0 | 20,0 | 3,0 | 47139 | - | 47142 | 47058 | 47066 | 47074 |
| 20,0 | 43,0 | 104,0 | 20,0 | 4,0 | - | - | - | 47059 | 47067 | 47075 |
| 20,0 | 43,0 | 104,0 | 20,0 | 5,0 | - | - | - | 47060 | 47068 | 47076 |
| 25,0 | 28,0 | 100,0 | 25,0 | 1,0 | - | - | - | 47077 | 47084 | 47091 |
| 25,0 | 53,0 | 121,0 | 25,0 | 1,0 | 47143 | - | 47146 | 47078 | 47085 | 47092 |
| 25,0 | 53,0 | 121,0 | 25,0 | 2,0 | 47144 | - | 47147 | 47079 | 47086 | 47093 |
| 25,0 | 53,0 | 121,0 | 25,0 | 2,5 | - | - | - | 47080 | 47087 | 47094 |
| 25,0 | 53,0 | 121,0 | 25,0 | 3,0 | 47145 | - | 47148 | 47081 | 47088 | 47095 |
| 25,0 | 53,0 | 121,0 | 25,0 | 4,0 | - | - | - | 47082 | 47089 | 47096 |
| 25,0 | 53,0 | 121,0 | 25,0 | 5,0 | - | - | - | 47083 | 47090 | 47097 |

Z5MCR
METRIC SERIES

- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter suppression and proprietary edge geometry for shearing and strength
- Chatter-free geometry allows deep cutting and high speed machining
- Central coolant hole delivers coolant effectively to the cutting zone enhancing chip removal when pocketing or slotting
- Enhanced corner geometry with tight tolerance corner radii
- Excels at roughing, ramping, high speed machining and finishing in a variety of materials
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)

Z-Carb-HPR



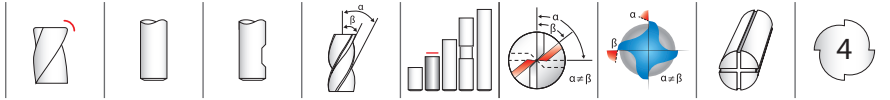
| Series Z5MCR | Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|-----------------|--|-----------------------------|---------------------|---------------------|---------------|------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | | 6 | 8 | 10 | 12 | 16 | 20 | 25 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 169 | RPM | 8967 | 6725 | 5380 | 4484 | 3363 | 2690 | 2152 |
| | | | | | | (135-203) | Fz | 0.029 | 0.049 | 0.061 | 0.074 | 0.087 | 0.099 | 0.108 |
| | | | | | | Feed (mm/min) | 1291 | 1650 | 1650 | 1668 | 1463 | 1327 | 1157 | |
| | | ≤ 275 Bhn or ≤ 28 HRc | Slot | 1 | ≤ 1 | 134 | RPM | 7109 | 5332 | 4265 | 3555 | 2666 | 2133 | 1706 |
| | | | | | | (107-161) | Fz | 0.029 | 0.049 | 0.061 | 0.074 | 0.087 | 0.099 | 0.108 |
| | | | | | | Feed (mm/min) | 1024 | 1308 | 1308 | 1322 | 1160 | 1052 | 917 | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 96 | RPM | 5089 | 3817 | 3054 | 2545 | 1909 | 1527 | 1221 |
| | | | | | | (77-115) | Fz | 0.022 | 0.036 | 0.045 | 0.055 | 0.067 | 0.075 | 0.080 |
| | | | | | | Feed (mm/min) | 550 | 692 | 692 | 702 | 635 | 570 | 489 | |
| | | ≤ 375 Bhn or ≤ 40 HRc | Slot | 1 | ≤ 1 | 76 | RPM | 4039 | 3029 | 2424 | 2020 | 1515 | 1212 | 969 |
| | | | | | | (61-91) | Fz | 0.022 | 0.036 | 0.045 | 0.055 | 0.067 | 0.075 | 0.080 |
| | | | | | | Feed (mm/min) | 436 | 549 | 549 | 557 | 504 | 452 | 388 | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 56 | RPM | 2989 | 2242 | 1793 | 1495 | 1121 | 897 | 717 |
| | | | | | | (45-68) | Fz | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.065 |
| | | | | | | Feed (mm/min) | 251 | 335 | 335 | 323 | 287 | 263 | 233 | |
| | | ≤ 375 Bhn or ≤ 40 HRc | Slot | 1 | ≤ 1 | 44 | RPM | 2343 | 1757 | 1406 | 1171 | 879 | 703 | 562 |
| | | | | | | (35-53) | Fz | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.065 |
| | | | | | | Feed (mm/min) | 197 | 262 | 262 | 253 | 225 | 206 | 183 | |
| K | CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 136 | RPM | 7190 | 5392 | 4314 | 3595 | 2696 | 2157 | 1726 |
| | | | | | | (109-163) | Fz | 0.026 | 0.045 | 0.056 | 0.067 | 0.079 | 0.091 | 0.098 |
| | | | | | | Feed (mm/min) | 949 | 1208 | 1208 | 1208 | 1070 | 978 | 841 | |
| | | ≤ 220 Bhn or ≤ 19 HRc | Slot | 1 | ≤ 1 | 108 | RPM | 5736 | 4302 | 3441 | 2868 | 2151 | 1721 | 1377 |
| | | | | | | (87-130) | Fz | 0.026 | 0.045 | 0.056 | 0.067 | 0.079 | 0.091 | 0.098 |
| | | | | | | Feed (mm/min) | 757 | 964 | 964 | 964 | 853 | 780 | 671 | |
| M | CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | ≤ 260 Bhn or ≤ 26 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 104 | RPM | 5493 | 4120 | 3296 | 2747 | 2060 | 1648 | 1318 |
| | | | | | | (83-124) | Fz | 0.020 | 0.034 | 0.043 | 0.050 | 0.059 | 0.067 | 0.073 |
| | | | | | | Feed (mm/min) | 554 | 703 | 703 | 692 | 606 | 549 | 478 | |
| | | ≤ 260 Bhn or ≤ 26 HRc | Slot | 1 | ≤ 1 | 82 | RPM | 4362 | 3272 | 2617 | 2181 | 1636 | 1309 | 1047 |
| | | | | | | (66-99) | Fz | 0.020 | 0.034 | 0.043 | 0.050 | 0.059 | 0.067 | 0.073 |
| | | | | | | Feed (mm/min) | 440 | 558 | 558 | 550 | 482 | 436 | 380 | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 149 | RPM | 7917 | 5938 | 4750 | 3958 | 2969 | 2375 | 1900 |
| | | | | | | (119-179) | Fz | 0.022 | 0.036 | 0.045 | 0.055 | 0.067 | 0.075 | 0.080 |
| | | | | | | Feed (mm/min) | 855 | 1077 | 1077 | 1092 | 988 | 887 | 760 | |
| | | ≤ 275 Bhn or ≤ 28 HRc | Slot | 1 | ≤ 1 | 119 | RPM | 6301 | 4726 | 3781 | 3151 | 2363 | 1890 | 1512 |
| | | | | | | (95-143) | Fz | 0.022 | 0.036 | 0.045 | 0.055 | 0.067 | 0.075 | 0.080 |
| | | | | | | Feed (mm/min) | 680 | 857 | 857 | 869 | 786 | 706 | 605 | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 104 | RPM | 5493 | 4120 | 3296 | 2747 | 2060 | 1648 | 1318 |
| | | | | | | (83-124) | Fz | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.063 |
| | | | | | | Feed (mm/min) | 461 | 615 | 615 | 593 | 527 | 483 | 412 | |
| | | ≤ 275 Bhn or ≤ 28 HRc | Slot | 1 | ≤ 1 | 82 | RPM | 4362 | 3272 | 2617 | 2181 | 1636 | 1309 | 1047 |
| | | | | | | (66-99) | Fz | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.063 |
| | | | | | | Feed (mm/min) | 366 | 489 | 489 | 471 | 419 | 384 | 327 | |

continued on next page

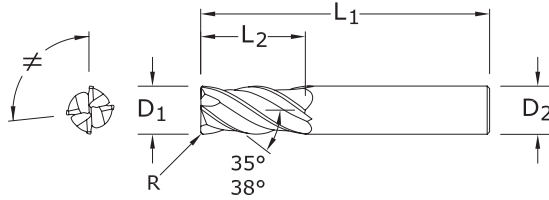
| Series Z5MCR | Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | |
|---|--|--|-----------------------------|---------------------|---------------|------------------------------------|---------------|---------------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | | 6 | 8 | 10 | 12 | 16 | 20 | 25 | | | |
| M | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | ≤ 325 Bhn or ≤ 35 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 94 | RPM | 5009 | 3756 | 3005 | 2504 | 1878 | 1503 | 1202 | |
| | | | | | | (76-113) | Fz | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.063 | |
| | | | | | | | Feed (mm/min) | 421 | 561 | 561 | 541 | 481 | 441 | 376 | |
| | | | Slot | 1 | ≤ 1 | 76 | RPM | 4039 | 3029 | 2424 | 2020 | 1515 | 1212 | 969 | |
| | | | | | | (61-91) | Fz | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.063 | |
| | | | | | | | Feed (mm/min) | 339 | 452 | 452 | 436 | 388 | 355 | 303 | |
| | S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 24 | RPM | 1293 | 969 | 776 | 646 | 485 | 388 | 310 |
| | | | | | | | (20-29) | Fz | 0.0160 | 0.0272 | 0.0340 | 0.0409 | 0.0478 | 0.0531 | 0.0599 |
| | | | | | | | | Feed (mm/min) | 103 | 132 | 132 | 132 | 116 | 103 | 93 |
| | | | | Slot | 1 | ≤ 1 | 20 | RPM | 1050 | 788 | 630 | 525 | 394 | 315 | 252 |
| (16-24) | | | | | | | Fz | 0.0160 | 0.0272 | 0.0340 | 0.0409 | 0.0478 | 0.0531 | 0.0599 | |
| | | | | | | | Feed (mm/min) | 84 | 107 | 107 | 107 | 94 | 84 | 75 | |
| SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspalloy, Hastelloy, Rene | | ≤ 400 Bhn or ≤ 43 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 19 | RPM | 1002 | 751 | 601 | 501 | 376 | 301 | 240 | |
| | | | | | | (15-23) | Fz | 0.0112 | 0.0192 | 0.0239 | 0.0284 | 0.0333 | 0.0371 | 0.0420 | |
| | | | | | | | Feed (mm/min) | 56 | 72 | 72 | 71 | 63 | 56 | 50 | |
| | | | Slot | 1 | ≤ 1 | 15 | RPM | 808 | 606 | 485 | 404 | 303 | 242 | 194 | |
| | (12-18) | | | | | Fz | 0.0112 | 0.0192 | 0.0239 | 0.0284 | 0.0333 | 0.0371 | 0.0420 | | |
| | | | | | | Feed (mm/min) | 45 | 58 | 58 | 57 | 50 | 45 | 41 | | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 66 | RPM | 3474 | 2605 | 2084 | 1737 | 1303 | 1042 | 834 | | |
| | | | | | (52-79) | Fz | 0.019 | 0.032 | 0.040 | 0.048 | 0.056 | 0.064 | 0.070 | | |
| | | | | | | Feed (mm/min) | 333 | 417 | 417 | 417 | 367 | 333 | 292 | | |
| | | Slot | 1 | ≤ 1 | 52 | RPM | 2747 | 2060 | 1648 | 1373 | 1030 | 824 | 659 | | |
| | | | | | (41-62) | Fz | 0.019 | 0.032 | 0.040 | 0.048 | 0.056 | 0.064 | 0.070 | | |
| | | | | | | Feed (mm/min) | 264 | 330 | 330 | 330 | 290 | 264 | 231 | | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 23 | RPM | 1212 | 909 | 727 | 606 | 454 | 364 | 291 | | |
| | | | | | (18-27) | Fz | 0.019 | 0.032 | 0.040 | 0.048 | 0.056 | 0.064 | 0.071 | | |
| | | | | | | Feed (mm/min) | 116 | 145 | 145 | 145 | 128 | 116 | 103 | | |
| | | Slot | 1 | ≤ 1 | 18 | RPM | 969 | 727 | 582 | 485 | 364 | 291 | 233 | | |
| | | | | | (15-22) | Fz | 0.019 | 0.032 | 0.040 | 0.048 | 0.056 | 0.064 | 0.071 | | |
| | | | | | | Feed (mm/min) | 93 | 116 | 116 | 116 | 102 | 93 | 83 | | |

Bhn (Brinell) HRc (Rockwell C)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 5 \times rpm$
 ramp up to 5 degrees using slotting speed and feed rates. Do not plunge.
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

FRACTIONAL Z-Carb-AP



Z1PCR FRACTIONAL SERIES



- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design changes the cutting angle to improve harmonics
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|--------------------|-------------|--------------------|-----------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | Ti-NAMITE-X | Ti-NAMITE-X W/FLAT | JetStream |
| 1/64 | 1/32 | 1-1/2 | 1/8 | .002 | 36874 | — | — |
| 1/32 | 5/64 | 1-1/2 | 1/8 | .005 | 36875 | — | — |
| 3/64 | 7/64 | 1-1/2 | 1/8 | .005 | 36876 | — | — |
| 1/16 | 3/16 | 1-1/2 | 1/8 | .005 | 36872 | — | — |
| 5/64 | 3/16 | 1-1/2 | 1/8 | .005 | 36877 | — | — |
| 3/32 | 9/32 | 1-1/2 | 1/8 | .010 | 36873 | — | — |
| 7/64 | 3/8 | 1-1/2 | 1/8 | .010 | 36878 | — | — |
| 1/8 | 3/8 | 1-1/2 | 1/8 | .010 | 36370 | — | — |
| 1/8 | 3/8 | 1-1/2 | 1/8 | .015 | 36851 | — | — |
| 3/16 | 7/16 | 2 | 3/16 | .010 | 36371 | — | — |
| 3/16 | 7/16 | 2 | 3/16 | .015 | 36852 | — | — |
| 3/16 | 7/16 | 2 | 3/16 | .030 | 36722 | — | — |
| 1/4 | 1/2 | 2-1/2 | 1/4 | .010 | 36372 | — | — |
| 1/4 | 1/2 | 2-1/2 | 1/4 | .015 | 36723 | — | — |
| 1/4 | 1/2 | 2-1/2 | 1/4 | .020 | 36853 | — | — |
| 1/4 | 1/2 | 2-1/2 | 1/4 | .030 | 36373 | — | — |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .010 | 36599 | — | — |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .015 | 36600 | — | — |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .020 | 36854 | — | — |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .030 | 36601 | — | — |
| 5/16 | 13/16 | 2-1/2 | 5/16 | .015 | 36724 | — | — |
| 5/16 | 13/16 | 2-1/2 | 5/16 | .020 | 36855 | — | — |
| 5/16 | 13/16 | 2-1/2 | 5/16 | .030 | 36374 | — | — |
| 3/8 | 7/8 | 2-1/2 | 3/8 | .010 | 36375 | 36701 | — |
| 3/8 | 7/8 | 2-1/2 | 3/8 | .015 | 36725 | 36736 | — |
| 3/8 | 7/8 | 2-1/2 | 3/8 | .020 | 36856 | 36864 | — |
| 3/8 | 7/8 | 2-1/2 | 3/8 | .030 | 36376 | 36702 | — |
| 3/8 | 7/8 | 2-1/2 | 3/8 | .060 | 36727 | 36738 | — |

TOLERANCES (inch)

<1/8 DIAMETER

$D_1 = +0.0005/-0.0005$

$D_2 = h_6$

$R = +0.000/-0.0010$

1/8-1/4 DIAMETER

$D_1 = +0.000/-0.0012$

$D_2 = h_6$

$R = +0.000/-0.0020$

>1/4-3/8 DIAMETER

$D_1 = +0.000/-0.0016$

$D_2 = h_6$

$R = +0.000/-0.0020$

>3/8-1 DIAMETER

$D_1 = +0.000/-0.0020$

$D_2 = h_6$

$R = +0.000/-0.0020$

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

For patent information visit www.ksptpatents.com

continued on next page

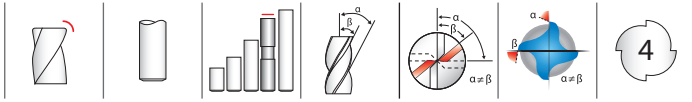


Z1PCR
FRACTIONAL SERIES

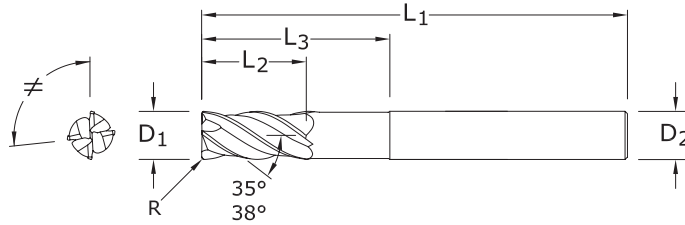
CONTINUED

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | inch | | | EDP NO. | | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------|-------------|--------------------|-----------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | Ti-NAMITE-X | Ti-NAMITE-X W/FLAT | JetStream |
| 7/16 | 1 | 2-3/4 | 7/16 | .020 | 36857 | 36865 | — |
| 1/2 | 1 | 3 | 1/2 | .010 | 36378 | 36704 | 36804 |
| 1/2 | 1 | 3 | 1/2 | .015 | 36729 | 36740 | 36810 |
| 1/2 | 1 | 3 | 1/2 | .030 | 36858 | 36866 | 36805 |
| 1/2 | 1 | 3 | 1/2 | .060 | 36380 | 36706 | 36811 |
| 1/2 | 1 | 3 | 1/2 | .090 | 36381 | 36707 | 36812 |
| 1/2 | 1 | 3 | 1/2 | .125 | 36731 | 36742 | 36813 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .010 | 36602 | 36603 | — |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .015 | 36604 | 36605 | — |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .030 | 36859 | 36867 | — |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .060 | 36610 | 36611 | — |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .090 | 36612 | 36613 | — |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .125 | 36614 | 36615 | — |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | .030 | 36860 | 36868 | 36806 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .030 | 36383 | 36709 | 36814 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .040 | 36861 | 36869 | 36807 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .060 | 36384 | 36710 | 36815 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .090 | 36385 | 36711 | 36816 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .125 | 36733 | 36744 | 36817 |
| 3/4 | 1-1/2 | 4 | 3/4 | .030 | 36386 | 36712 | 36818 |
| 3/4 | 1-1/2 | 4 | 3/4 | .040 | 36862 | 36870 | 36808 |
| 3/4 | 1-1/2 | 4 | 3/4 | .060 | 36387 | 36713 | 36819 |
| 3/4 | 1-1/2 | 4 | 3/4 | .090 | 36388 | 36714 | 36820 |
| 3/4 | 1-1/2 | 4 | 3/4 | .125 | 36389 | 36715 | 36821 |
| 1 | 1-1/2 | 4 | 1 | .030 | 36390 | 36716 | 36822 |
| 1 | 1-1/2 | 4 | 1 | .040 | 36863 | 36871 | 36809 |
| 1 | 1-1/2 | 4 | 1 | .060 | 36391 | 36717 | 36823 |
| 1 | 1-1/2 | 4 | 1 | .090 | 36392 | 36718 | 36824 |
| 1 | 1-1/2 | 4 | 1 | .125 | 36393 | 36719 | 36825 |

FRACTIONAL Z-Carb-AP



Z1PLC FRACTIONAL SERIES



- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design changes the cutting angle to improve harmonics
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Long reach design allows for deeper and faster cuts
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| inch | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|-------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | Ti-NAMITE-X |
| 1/4 | 1/2 | 2-1/2 | 1/4 | 1-1/8 | .020 | 36447 |
| 1/4 | 1/2 | 3-1/2 | 1/4 | 1-5/8 | .020 | 36448 |
| 1/4 | 1/2 | 4 | 1/4 | 1-1/4 | .020 | 36450 |
| 1/4 | 1/2 | 4 | 1/4 | 2-1/8 | .020 | 36449 |
| 5/16 | 13/16 | 3 | 5/16 | 1-3/8 | .020 | 36453 |
| 5/16 | 13/16 | 4 | 5/16 | 2 | .020 | 36454 |
| 5/16 | 13/16 | 4 | 5/16 | 1-5/8 | .020 | 36452 |
| 3/8 | 7/8 | 3 | 3/8 | 1-5/8 | .020 | 36457 |
| 3/8 | 7/8 | 5 | 3/8 | 1-7/8 | .020 | 36456 |
| 3/8 | 7/8 | 4 | 3/8 | 2-3/8 | .020 | 36458 |
| 7/16 | 1 | 6 | 7/16 | 2 | .020 | 36460 |
| 1/2 | 1 | 4 | 1/2 | 2 | .030 | 36463 |
| 1/2 | 1 | 5 | 1/2 | 3 | .030 | 36464 |
| 1/2 | 1 | 6 | 1/2 | 2-1/4 | .030 | 36462 |
| 9/16 | 1-1/8 | 6 | 9/16 | 2-1/2 | .030 | 36466 |
| 5/8 | 1-1/4 | 5 | 5/8 | 2-1/2 | .040 | 36468 |
| 5/8 | 1-1/4 | 6 | 5/8 | 3-3/4 | .040 | 36469 |
| 5/8 | 1-1/4 | 6 | 5/8 | 3 | .040 | 36470 |
| 3/4 | 1-1/2 | 6 | 3/4 | 3-1/2 | .040 | 36472 |
| 1 | 1-1/2 | 6 | 1 | 3 | .040 | 36475 |
| 1 | 1-1/2 | 6 | 1 | 4 | .040 | 36474 |

TOLERANCES (inch)

1/4 DIAMETER

$D_1 = +0.0000/-0.0012$
 $D_2 = h_6$
 $R = +0.0000/-0.0020$

>1/4-3/8 DIAMETER

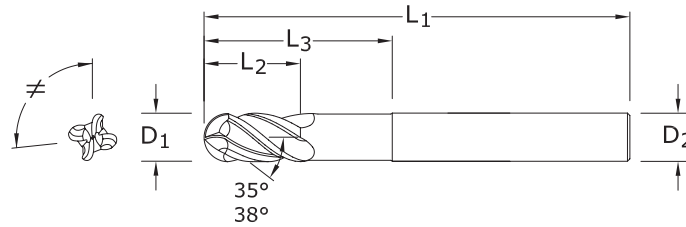
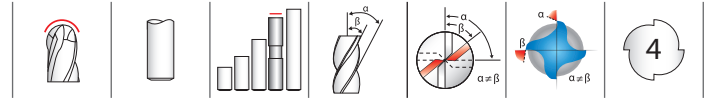
$D_1 = +0.0000/-0.0016$
 $D_2 = h_6$
 $R = +0.0000/-0.0020$

>3/8-1 DIAMETER

$D_1 = +0.0000/-0.0020$
 $D_2 = h_6$
 $R = +0.0000/-0.0020$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



TOLERANCES (inch)

1/4 DIAMETER

$D_1 = +0.0000/-0.0012$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0006$

>1/4-3/8 DIAMETER

$D_1 = +0.0000/-0.0016$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0008$

>3/8-1 DIAMETER

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0010$

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

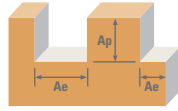
For patent information visit www.ksptpatents.com

Z1PLB
FRACTIONAL SERIES

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | EDP NO. Ti-NAMITE-X |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|------------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | |
| 1/4 | 1/2 | 4 | 1/4 | 1-1/4 | 36480 |
| 5/16 | 13/16 | 4 | 5/16 | 1-5/8 | 36482 |
| 3/8 | 7/8 | 5 | 3/8 | 1-7/8 | 36486 |
| 7/16 | 1 | 6 | 7/16 | 2 | 38490 |
| 1/2 | 1 | 6 | 1/2 | 2-1/4 | 38492 |
| 9/16 | 1-1/8 | 6 | 9/16 | 2-1/2 | 38496 |
| 5/8 | 1-1/4 | 6 | 5/8 | 3 | 36500 |
| 3/4 | 1-1/2 | 6 | 3/4 | 3-1/2 | 36502 |
| 1 | 1-1/2 | 6 | 1 | 4 | 36504 |

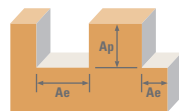
- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design changes the cutting angle to improve harmonics
- Long reach design allows for deeper and faster cuts
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

FRACTIONAL Z-Carb-AP



| Series Z1PCR, Z1PLC, Z1PLB Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | |
|---|-----------------------------|---------------------|---------------------|-------------|--------------------------------------|------------|---------|---------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/64 | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 555 | RPM | 135904 | 16961 | 8480 | 5654 | 4240 | 3392 | 2827 | 2120 |
| | | | | | (444-666) | Fz | 0.00005 | 0.00046 | 0.0012 | 0.0023 | 0.0031 | 0.0034 | 0.0037 | 0.0043 |
| | | | | | | Feed (ipm) | 27.2 | 31.2 | 40.7 | 52.0 | 52.6 | 46.1 | 41.8 | 36.5 |
| | | Slot | 1 | ≤ 1 | 440 | RPM | 107744 | 13446 | 6723 | 4482 | 3362 | 2689 | 2241 | 1681 |
| | | | | | (352-528) | Fz | 0.00005 | 0.00046 | 0.0012 | 0.0023 | 0.0031 | 0.0034 | 0.0037 | 0.0043 |
| | | | | | | Feed (ipm) | 21.5 | 24.7 | 32.3 | 41.2 | 41.7 | 36.6 | 33.2 | 28.9 |
| ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 315 | RPM | 77135 | 9626 | 4813 | 3209 | 2407 | 1925 | 1604 | 1203 |
| | | | | | (252-378) | Fz | 0.00004 | 0.00034 | 0.0009 | 0.0017 | 0.0023 | 0.0026 | 0.0028 | 0.0032 |
| | | | | | | Feed (ipm) | 12.3 | 13.1 | 17.3 | 21.8 | 22.1 | 20.0 | 18.0 | 15.4 |
| | | Slot | 1 | ≤ 1 | 250 | RPM | 61218 | 7640 | 3820 | 2547 | 1910 | 1528 | 1273 | 955 |
| | | | | | (200-300) | Fz | 0.00004 | 0.00034 | 0.0009 | 0.0017 | 0.0023 | 0.0026 | 0.0028 | 0.0032 |
| | | | | | | Feed (ipm) | 9.8 | 10.4 | 13.8 | 17.3 | 17.6 | 15.9 | 14.3 | 12.2 |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 185 | RPM | 45301 | 5654 | 2827 | 1885 | 1413 | 1131 | 942 | 707 |
| | | | | | (148-222) | Fz | 0.00003 | 0.00028 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0026 |
| | | | | | | Feed (ipm) | 5.4 | 6.3 | 7.9 | 10.6 | 10.2 | 9.0 | 8.3 | 7.3 |
| | | Slot | 1 | ≤ 1 | 145 | RPM | 35506 | 4431 | 2216 | 1477 | 1108 | 886 | 739 | 554 |
| | | | | | (116-174) | Fz | 0.00003 | 0.00028 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0026 |
| | | | | | | Feed (ipm) | 4.3 | 5.0 | 6.2 | 8.3 | 8.0 | 7.1 | 6.5 | 5.8 |
| K CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 445 | RPM | 108968 | 13599 | 6800 | 4533 | 3400 | 2720 | 2267 | 1700 |
| | | | | | (356-534) | Fz | 0.00005 | 0.00042 | 0.0011 | 0.0021 | 0.0028 | 0.0031 | 0.0034 | 0.0039 |
| | | | | | | Feed (ipm) | 21.8 | 22.8 | 29.9 | 38.1 | 38.1 | 33.7 | 30.8 | 26.5 |
| | | Slot | 1 | ≤ 1 | 355 | RPM | 86929 | 10849 | 5424 | 3616 | 2712 | 2170 | 1808 | 1356 |
| | | | | | (284-426) | Fz | 0.00005 | 0.00042 | 0.0011 | 0.0021 | 0.0028 | 0.0031 | 0.0034 | 0.0039 |
| | | | | | | Feed (ipm) | 17.4 | 18.2 | 23.9 | 30.4 | 30.4 | 26.9 | 24.6 | 21.2 |
| CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | ≤ 260 Bhn or ≤ 26 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 340 | RPM | 83256 | 10390 | 5195 | 3463 | 2598 | 2078 | 1732 | 1299 |
| | | | | | (272-408) | Fz | 0.00004 | 0.00031 | 0.0008 | 0.0016 | 0.0021 | 0.0023 | 0.0025 | 0.0029 |
| | | | | | | Feed (ipm) | 13.3 | 12.9 | 17.5 | 22.2 | 21.8 | 19.1 | 17.3 | 15.1 |
| | | Slot | 1 | ≤ 1 | 270 | RPM | 66115 | 8251 | 4126 | 2750 | 2063 | 1650 | 1375 | 1031 |
| | | | | | (216-324) | Fz | 0.00004 | 0.00031 | 0.0008 | 0.0016 | 0.0021 | 0.0023 | 0.0025 | 0.0029 |
| | | | | | | Feed (ipm) | 10.6 | 10.2 | 13.9 | 17.6 | 17.3 | 15.2 | 13.8 | 12.0 |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 490 | RPM | 119987 | 14974 | 7487 | 4991 | 3744 | 2995 | 2496 | 1872 |
| | | | | | (392-588) | Fz | 0.00004 | 0.00034 | 0.0009 | 0.0017 | 0.0023 | 0.0026 | 0.0028 | 0.0032 |
| | | | | | | Feed (ipm) | 19.2 | 20.4 | 27.0 | 33.9 | 34.4 | 31.1 | 28.0 | 24.0 |
| | | Slot | 1 | ≤ 1 | 390 | RPM | 95500 | 11918 | 5959 | 3973 | 2980 | 2384 | 1986 | 1490 |
| | | | | | (312-468) | Fz | 0.00004 | 0.00034 | 0.0009 | 0.0017 | 0.0023 | 0.0026 | 0.0028 | 0.0032 |
| | | | | | | Feed (ipm) | 15.3 | 16.2 | 21.5 | 27.0 | 27.4 | 24.8 | 22.2 | 19.1 |

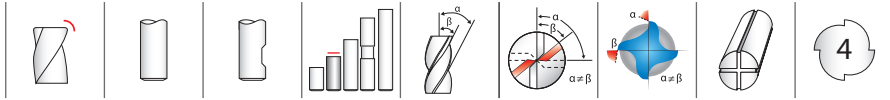
continued on next page



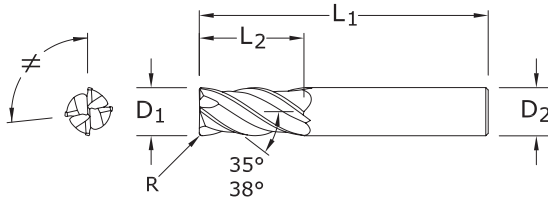
| Series Z1PCR, Z1PLC, Z1PLB Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | | |
|---|--|-----------------------------|---------------------|-------------|--------------------------------------|------------|---------|---------|---------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/64 | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 340 | RPM | 83256 | 10390 | 5195 | 3463 | 2598 | 2078 | 1732 | 1299 |
| | | | | | | (272-408) | Fz | 0.00003 | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0025 |
| | | | | | | Feed (ipm) | 10.0 | 11.2 | 14.5 | 19.4 | 18.7 | 16.6 | 15.2 | 13.0 | |
| | | | Slot | 1 | ≤ 1 | 270 | RPM | 66115 | 8251 | 4126 | 2750 | 2063 | 1650 | 1375 | 1031 |
| | | | | | | (216-324) | Fz | 0.00003 | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0025 |
| | | | | | | Feed (ipm) | 7.9 | 8.9 | 11.6 | 15.4 | 14.9 | 13.2 | 12.1 | 10.3 | |
| | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | ≤ 325 Bhn or ≤ 35 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 310 | RPM | 75910 | 9474 | 4737 | 3158 | 2368 | 1895 | 1579 | 1184 |
| | | | | | | (248-372) | Fz | 0.00003 | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0025 |
| | | | | | | Feed (ipm) | 9.1 | 10.2 | 13.3 | 17.7 | 17.1 | 15.2 | 13.9 | 11.8 | |
| | | | Slot | 1 | ≤ 1 | 250 | RPM | 61218 | 7640 | 3820 | 2547 | 1910 | 1528 | 1273 | 955 |
| | | | | | | (200-300) | Fz | 0.00003 | 0.00027 | 0.0007 | 0.0014 | 0.0018 | 0.0020 | 0.0022 | 0.0025 |
| | | | | | | Feed (ipm) | 7.3 | 8.3 | 10.7 | 14.3 | 13.8 | 12.2 | 11.2 | 9.6 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 80 | RPM | 19590 | 2445 | 1222 | 815 | 611 | 489 | 407 | 306 |
| | | | | | | (64-96) | Fz | 0.00003 | 0.00025 | 0.0007 | 0.0013 | 0.0017 | 0.0019 | 0.0020 | 0.0024 |
| | | | | | | Feed (ipm) | 2.4 | 2.4 | 3.3 | 4.2 | 4.2 | 3.7 | 3.3 | 2.9 | |
| | | | Slot | 1 | ≤ 1 | 65 | RPM | 15917 | 1986 | 993 | 662 | 497 | 397 | 331 | 248 |
| | | | | | | (52-78) | Fz | 0.00003 | 0.00025 | 0.0007 | 0.0013 | 0.0017 | 0.0019 | 0.0020 | 0.0024 |
| | | | | | | Feed (ipm) | 1.9 | 2.0 | 2.7 | 3.4 | 3.4 | 3.0 | 2.7 | 2.4 | |
| | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 62 | RPM | 15182 | 1895 | 947 | 632 | 474 | 379 | 316 | 237 |
| | | | | | | (50-74) | Fz | 0.00002 | 0.00018 | 0.0005 | 0.0009 | 0.0012 | 0.0013 | 0.0014 | 0.0017 |
| | | | | | | Feed (ipm) | 1.2 | 1.4 | 1.8 | 2.3 | 2.3 | 2.0 | 1.8 | 1.6 | |
| | | | Slot | 1 | ≤ 1 | 50 | RPM | 12244 | 1528 | 764 | 509 | 382 | 306 | 255 | 191 |
| | | | | | | (40-60) | Fz | 0.00002 | 0.00018 | 0.0005 | 0.0009 | 0.0012 | 0.0013 | 0.0014 | 0.0017 |
| | | | | | | Feed (ipm) | 1.0 | 1.1 | 1.5 | 1.8 | 1.8 | 1.6 | 1.4 | 1.3 | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 215 | RPM | 52647 | 6570 | 3285 | 2190 | 1643 | 1314 | 1095 | 821 | |
| | | | | | (172-258) | Fz | 0.00003 | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0022 | 0.0024 | 0.0028 | |
| | | | | | Feed (ipm) | 6.3 | 7.9 | 10.5 | 13.1 | 13.1 | 11.6 | 10.5 | 9.2 | | |
| | | Slot | 1 | ≤ 1 | 170 | RPM | 41628 | 5195 | 2598 | 1732 | 1299 | 1039 | 866 | 649 | |
| | | | | | (136-204) | Fz | 0.00003 | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0022 | 0.0024 | 0.0028 | |
| | | | | | Feed (ipm) | 5.0 | 6.2 | 8.3 | 10.4 | 10.4 | 9.1 | 8.3 | 7.3 | | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 75 | RPM | 18365 | 2292 | 1146 | 764 | 573 | 458 | 382 | 287 | |
| | | | | | (60-90) | Fz | 0.00003 | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0022 | 0.0024 | 0.0028 | |
| | | | | | Feed (ipm) | 2.2 | 2.8 | 3.7 | 4.6 | 4.6 | 4.0 | 3.7 | 3.2 | | |
| | | Slot | 1 | ≤ 1 | 60 | RPM | 14692 | 1834 | 917 | 611 | 458 | 367 | 306 | 229 | |
| | | | | | (48-72) | Fz | 0.00003 | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0022 | 0.0024 | 0.0028 | |
| | | | | | Feed (ipm) | 1.8 | 2.2 | 2.9 | 3.7 | 3.7 | 3.2 | 2.9 | 2.6 | | |

Bhn (Brinell) HRc (Rockwell C)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times 4 \times rpm$
 maximum Slotting Ap for Z1PCR <1/8 diameter and all Z1PLC / Z1PLB is .25 x D₁
 maximum Profile Ae for Z1PCR <1/8 diameter and all Z1PLC / Z1PLB is .20 x D₁
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

METRIC Z-Carb-AP



Z1MPCR METRIC SERIES



- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design changes the cutting angle to improve harmonics
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | mm | | | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|--------------------|-------------|--------------------|-----------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | Ti-NAMITE-X | Ti-NAMITE-X W/FLAT | JetStream |
| 1,0 | 3,0 | 57,0 | 6,0 | 0,1 | 46873 | — | — |
| 1,5 | 4,5 | 57,0 | 6,0 | 0,1 | 46849 | — | — |
| 2,0 | 6,0 | 57,0 | 6,0 | 0,2 | 46850 | — | — |
| 2,5 | 7,0 | 57,0 | 6,0 | 0,2 | 46874 | — | — |
| 3,0 | 8,0 | 57,0 | 6,0 | 0,3 | 46851 | — | — |
| 3,0 | 8,0 | 57,0 | 6,0 | 0,5 | 46880 | — | — |
| 4,0 | 11,0 | 57,0 | 6,0 | 0,3 | 46852 | — | — |
| 4,0 | 11,0 | 57,0 | 6,0 | 0,5 | 46881 | — | — |
| 5,0 | 13,0 | 57,0 | 6,0 | 0,3 | 46853 | — | — |
| 6,0 | 13,0 | 57,0 | 6,0 | 0,25 | 46882 | — | — |
| 6,0 | 13,0 | 57,0 | 6,0 | 0,5 | 46854 | — | — |
| 6,0 | 13,0 | 57,0 | 6,0 | 1,0 | 46855 | — | — |
| 6,0 | 13,0 | 57,0 | 6,0 | 1,5 | 46884 | — | — |
| 8,0 | 19,0 | 63,0 | 8,0 | 0,5 | 46856 | — | — |
| 8,0 | 19,0 | 63,0 | 8,0 | 1,0 | 46857 | — | — |
| 8,0 | 19,0 | 63,0 | 8,0 | 1,5 | 46886 | — | — |
| 8,0 | 19,0 | 63,0 | 8,0 | 2,0 | 46887 | — | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 0,5 | 46858 | — | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 1,0 | 46859 | — | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 1,5 | 46889 | — | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 2,0 | 46890 | — | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 2,5 | 46891 | — | — |
| 12,0 | 26,0 | 83,0 | 12,0 | 0,5 | 46860 | 46909 | — |
| 12,0 | 26,0 | 83,0 | 12,0 | 0,75 | 46861 | 46910 | 46493 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,0 | 46893 | 46911 | — |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,5 | 46894 | 46912 | — |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,0 | 46895 | 46913 | — |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,5 | 46896 | 46914 | — |
| 12,0 | 26,0 | 83,0 | 12,0 | 3,0 | 42718 | 46915 | 42719 |
| 14,0 | 26,0 | 83,0 | 14,0 | 1,0 | 46862 | 46916 | 46494 |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,0 | 46863 | 46917 | 46495 |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,5 | 46898 | 46918 | — |
| 16,0 | 32,0 | 92,0 | 16,0 | 2,0 | 46899 | 46919 | — |
| 16,0 | 32,0 | 92,0 | 16,0 | 2,5 | 46900 | 46920 | — |
| 16,0 | 32,0 | 92,0 | 16,0 | 3,0 | 46864 | 46921 | 42721 |
| 16,0 | 32,0 | 92,0 | 16,0 | 4,0 | 46867 | 46944 | — |
| 20,0 | 38,0 | 104,0 | 20,0 | 1,0 | 46865 | 46922 | 46497 |
| 20,0 | 38,0 | 104,0 | 20,0 | 1,5 | 46903 | 46923 | — |
| 20,0 | 38,0 | 104,0 | 20,0 | 2,0 | 46904 | 46924 | — |
| 20,0 | 38,0 | 104,0 | 20,0 | 2,5 | 46905 | 46925 | — |
| 20,0 | 38,0 | 104,0 | 20,0 | 3,0 | 42722 | 46926 | 42723 |
| 20,0 | 38,0 | 104,0 | 20,0 | 4,0 | 46868 | 46945 | — |
| 20,0 | 38,0 | 104,0 | 20,0 | 5,0 | 46869 | 46946 | — |
| 25,0 | 38,0 | 104,0 | 25,0 | 1,0 | 46866 | 46927 | 46498 |

TOLERANCES (mm)

<3 DIAMETER

$D_1 = +0,012/-0,012$
 $D_2 = h_6$
 $R = +0,000/-0,025$

3-6 DIAMETER

$D_1 = +0,000/-0,030$
 $D_2 = h_6$
 $R = +0,000/-0,050$

>6-10 DIAMETER

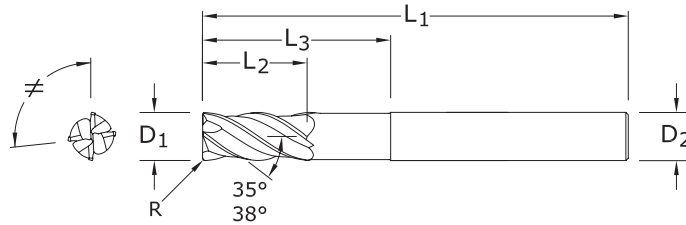
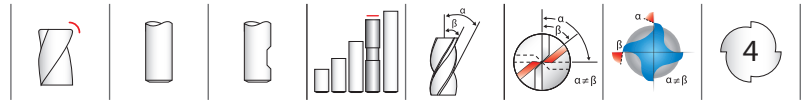
$D_1 = +0,000/-0,040$
 $D_2 = h_6$
 $R = +0,000/-0,050$

>10-25 DIAMETER

$D_1 = +0,000/-0,050$
 $D_2 = h_6$
 $R = +0,000/-0,050$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



TOLERANCES (mm)

>12-20 DIAMETER

$D_1 = +0,000/-0,050$

$D_2 = h_6$

$R = +0,000/-0,050$

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

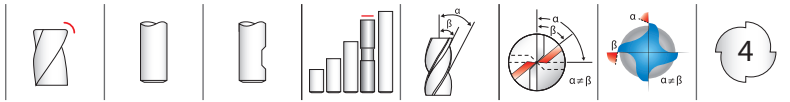
For patent information visit www.ksptpatents.com

Z1MPIC
METRIC SERIES

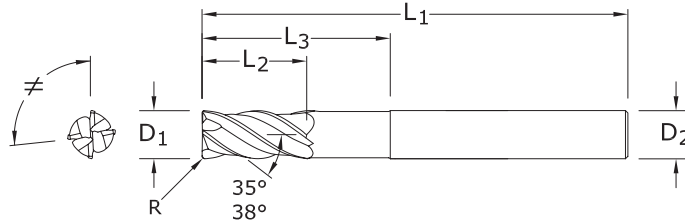
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|--------------------|
| | | | | | | Ti-NAMITE-X W/FLAT |
| 12,0 | 26,0 | 83,0 | 12,0 | 36,0 | 2,5 | 42731 |
| 12,0 | 26,0 | 83,0 | 12,0 | 36,0 | 3,0 | 42732 |
| 12,0 | 26,0 | 83,0 | 12,0 | 36,0 | 4,0 | 42733 |
| 16,0 | 32,0 | 92,0 | 16,0 | 42,0 | 2,5 | 42734 |
| 16,0 | 32,0 | 92,0 | 16,0 | 42,0 | 4,0 | 42735 |
| 16,0 | 32,0 | 92,0 | 16,0 | 42,0 | 6,0 | 42736 |
| 20,0 | 38,0 | 104,0 | 20,0 | 52,0 | 2,5 | 42737 |
| 20,0 | 38,0 | 104,0 | 20,0 | 52,0 | 4,0 | 42738 |
| 20,0 | 38,0 | 104,0 | 20,0 | 52,0 | 6,0 | 42739 |

- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design changes the cutting angle to improve harmonics
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Long reach design allows for deeper and faster cuts
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)

METRIC Z-Carb-AP



Z1MPLC METRIC SERIES



- Variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Unequal helix design changes the cutting angle to improve harmonics
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Long reach design allows for deeper and faster cuts
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | mm | | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|-------------|--------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | Ti-NAMITE-X | Ti-NAMITE-X W/FLAT |
| 6,0 | 8,0 | 75,0 | 6,0 | 24,0 | 0,5 | 46821 | — |
| 8,0 | 10,0 | 75,0 | 8,0 | 32,0 | 1,0 | 46822 | — |
| 8,0 | 10,0 | 75,0 | 8,0 | 32,0 | 2,0 | 46823 | — |
| 10,0 | 12,0 | 100,0 | 10,0 | 40,0 | 1,0 | 46824 | — |
| 10,0 | 12,0 | 100,0 | 10,0 | 40,0 | 2,0 | 46825 | — |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 1,0 | 46826 | 46928 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 1,5 | 46827 | 46929 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 2,0 | 46828 | 46930 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 3,0 | 46829 | 46931 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 1,0 | 46830 | 46932 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 1,5 | 46831 | 46933 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 2,0 | 46832 | 46934 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 3,0 | 46833 | 46935 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 4,0 | 46834 | 46936 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 5,0 | 46835 | 46937 |
| 20,0 | 24,0 | 140,0 | 20,0 | 80,0 | 1,0 | 46836 | 46938 |
| 20,0 | 24,0 | 140,0 | 20,0 | 80,0 | 1,5 | 46837 | 46939 |
| 20,0 | 24,0 | 140,0 | 20,0 | 80,0 | 2,0 | 46838 | 46940 |
| 20,0 | 24,0 | 140,0 | 20,0 | 80,0 | 3,0 | 46839 | 46941 |
| 20,0 | 24,0 | 140,0 | 20,0 | 80,0 | 4,0 | 46840 | 46942 |
| 20,0 | 24,0 | 140,0 | 20,0 | 80,0 | 5,0 | 46841 | 46943 |

TOLERANCES (mm)

6 DIAMETER

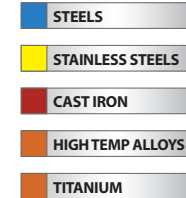
$D_1 = +0,000/-0,030$
 $D_2 = h_6$
 $R = +0,000/-0,050$

>6–10 DIAMETER

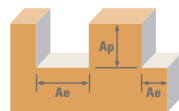
$D_1 = +0,000/-0,040$
 $D_2 = h_6$
 $R = +0,000/-0,050$

>10–20 DIAMETER

$D_1 = +0,000/-0,050$
 $D_2 = h_6$
 $R = +0,000/-0,050$



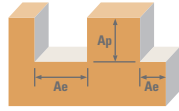
For patent information visit www.ksptpatents.com



| Series Z1MPCR, Z1MPIC, Z1MPLC Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | | | |
|---|--|-----------------------------|---------------------|---------------|------------------------------------|---------------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | 1 | 3 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 169 | RPM | 53803 | 17934 | 8967 | 6725 | 5380 | 4484 | 3363 | 2690 | 2152 | |
| | | | | | (135-203) | Fz | 0.0030 | 0.0109 | 0.029 | 0.049 | 0.061 | 0.074 | 0.087 | 0.099 | 0.108 | |
| | | | | | Feed (mm/min) | 646 | 782 | 1040 | 1318 | 1313 | 1327 | 1170 | 1065 | 930 | | |
| | | | | | 134 | RPM | 42654 | 14218 | 7109 | 5332 | 4265 | 3555 | 2666 | 2133 | 1706 | |
| | | | | | (107-161) | Fz | 0.0030 | 0.0109 | 0.029 | 0.049 | 0.061 | 0.074 | 0.087 | 0.099 | 0.108 | |
| | | | | | Feed (mm/min) | 512 | 620 | 825 | 1045 | 1041 | 1052 | 928 | 845 | 737 | | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 96 | RPM | 30537 | 10179 | 5089 | 3817 | 3054 | 2545 | 1909 | 1527 | 1221 |
| | | | | | | (77-115) | Fz | 0.0023 | 0.0081 | 0.022 | 0.036 | 0.045 | 0.055 | 0.067 | 0.075 | 0.080 |
| | | | | | | Feed (mm/min) | 281 | 330 | 448 | 550 | 550 | 560 | 511 | 458 | 391 | |
| | | | | | | 76 | RPM | 24235 | 8078 | 4039 | 3029 | 2424 | 2020 | 1515 | 1212 | 969 |
| | | | | | | (61-91) | Fz | 0.0023 | 0.0081 | 0.022 | 0.036 | 0.045 | 0.055 | 0.067 | 0.075 | 0.080 |
| | | | | | | Feed (mm/min) | 223 | 262 | 355 | 436 | 436 | 444 | 406 | 364 | 310 | |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 56 | RPM | 17934 | 5978 | 2989 | 2242 | 1793 | 1495 | 1121 | 897 | 717 | |
| | | | | | (45-68) | Fz | 0.0018 | 0.0066 | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.065 | |
| | | | | | Feed (mm/min) | 129 | 158 | 203 | 269 | 265 | 257 | 229 | 212 | 187 | | |
| | | | | | 44 | RPM | 14057 | 4686 | 2343 | 1757 | 1406 | 1171 | 879 | 703 | 562 | |
| | | | | | (35-53) | Fz | 0.0018 | 0.0066 | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.065 | |
| | | | | | Feed (mm/min) | 101 | 124 | 159 | 211 | 208 | 201 | 179 | 166 | 146 | | |
| K CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 136 | RPM | 43139 | 14380 | 7190 | 5392 | 4314 | 3595 | 2696 | 2157 | 1726 | |
| | | | | | (109-163) | Fz | 0.0028 | 0.0099 | 0.026 | 0.045 | 0.056 | 0.067 | 0.079 | 0.091 | 0.098 | |
| | | | | | Feed (mm/min) | 483 | 569 | 748 | 971 | 966 | 963 | 852 | 785 | 676 | | |
| | | | | | 108 | RPM | 34414 | 11471 | 5736 | 4302 | 3441 | 2868 | 2151 | 1721 | 1377 | |
| | | | | | (87-130) | Fz | 0.0028 | 0.0099 | 0.026 | 0.045 | 0.056 | 0.067 | 0.079 | 0.091 | 0.098 | |
| | | | | | Feed (mm/min) | 385 | 454 | 597 | 774 | 771 | 769 | 680 | 626 | 540 | | |
| | CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | ≤ 260 Bhn or ≤ 26 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 104 | RPM | 32960 | 10987 | 5493 | 4120 | 3296 | 2747 | 2060 | 1648 | 1318 |
| | | | | | | (83-124) | Fz | 0.0020 | 0.0074 | 0.020 | 0.034 | 0.043 | 0.050 | 0.059 | 0.067 | 0.074 |
| | | | | | | Feed (mm/min) | 264 | 325 | 439 | 560 | 567 | 549 | 486 | 442 | 390 | |
| | | | | | | 82 | RPM | 26174 | 8725 | 4362 | 3272 | 2617 | 2181 | 1636 | 1309 | 1047 |
| | | | | | | (66-99) | Fz | 0.0020 | 0.0074 | 0.020 | 0.034 | 0.043 | 0.050 | 0.059 | 0.067 | 0.074 |
| | | | | | | Feed (mm/min) | 209 | 258 | 349 | 445 | 450 | 436 | 386 | 351 | 310 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 149 | RPM | 47501 | 15834 | 7917 | 5938 | 4750 | 3958 | 2969 | 2375 | 1900 | |
| | | | | | (119-179) | Fz | 0.0023 | 0.0081 | 0.022 | 0.036 | 0.045 | 0.055 | 0.067 | 0.075 | 0.080 | |
| | | | | | Feed (mm/min) | 437 | 513 | 697 | 855 | 855 | 871 | 796 | 713 | 608 | | |
| | | | | | 119 | RPM | 37807 | 12602 | 6301 | 4726 | 3781 | 3151 | 2363 | 1890 | 1512 | |
| | | | | | (95-143) | Fz | 0.0023 | 0.0081 | 0.022 | 0.036 | 0.045 | 0.055 | 0.067 | 0.075 | 0.080 | |
| | | | | | Feed (mm/min) | 348 | 408 | 555 | 681 | 681 | 693 | 633 | 567 | 484 | | |

continued on next page

Z-Carb-AP



| Series Z1MPCR, Z1MPIC, Z1MPLC Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | | |
|--|---|---------------------|---------------------|---------------|------------------------------------|--------|--------|--------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | 1 | 3 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L ≤ 275 Bhn or ≤ 28 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 104 | RPM | 32960 | 10987 | 5493 | 4120 | 3296 | 2747 | 2060 | 1648 | 1318 |
| | | | | | (83-124) | Fz | 0.0018 | 0.0064 | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.063 |
| | | | | | Feed (mm/min) | 237 | 281 | 374 | 494 | 488 | 472 | 420 | 389 | 332 | |
| | | Slot | 1 | ≤ 1 | 82 | RPM | 26174 | 8725 | 4362 | 3272 | 2617 | 2181 | 1636 | 1309 | 1047 |
| | | | | | (66-99) | Fz | 0.0018 | 0.0064 | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.063 |
| | | | | | Feed (mm/min) | 188 | 223 | 297 | 393 | 387 | 375 | 334 | 309 | 264 | |
| | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 ≤ 325 Bhn or ≤ 35 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 94 | RPM | 30052 | 10017 | 5009 | 3756 | 3005 | 2504 | 1878 | 1503 | 1202 |
| | | | | | (76-113) | Fz | 0.0018 | 0.0064 | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.063 |
| | | | | | Feed (mm/min) | 216 | 256 | 341 | 451 | 445 | 431 | 383 | 355 | 303 | |
| | | Slot | 1 | ≤ 1 | 76 | RPM | 24235 | 8078 | 4039 | 3029 | 2424 | 2020 | 1515 | 1212 | 969 |
| | | | | | (61-91) | Fz | 0.0018 | 0.0064 | 0.017 | 0.030 | 0.037 | 0.043 | 0.051 | 0.059 | 0.063 |
| | | | | | Feed (mm/min) | 174 | 207 | 275 | 364 | 359 | 347 | 309 | 286 | 244 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 ≤ 300 Bhn or ≤ 32 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 24 | RPM | 7755 | 2585 | 1293 | 969 | 776 | 646 | 485 | 388 | 310 |
| | | | | | (20-29) | Fz | 0.0018 | 0.0061 | 0.016 | 0.027 | 0.034 | 0.041 | 0.048 | 0.053 | 0.060 |
| | | | | | Feed (mm/min) | 56 | 63 | 83 | 105 | 105 | 106 | 93 | 82 | 74 | |
| | | Slot | 1 | ≤ 1 | 20 | RPM | 6301 | 2100 | 1050 | 788 | 630 | 525 | 394 | 315 | 252 |
| | | | | | (16-24) | Fz | 0.0018 | 0.0061 | 0.016 | 0.027 | 0.034 | 0.041 | 0.048 | 0.053 | 0.060 |
| | | | | | Feed (mm/min) | 45 | 51 | 67 | 85 | 86 | 86 | 76 | 67 | 60 | |
| | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene ≤ 400 Bhn or ≤ 43 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 19 | RPM | 6010 | 2003 | 1002 | 751 | 601 | 501 | 376 | 301 | 240 |
| | | | | | (15-23) | Fz | 0.0013 | 0.0043 | 0.011 | 0.019 | 0.024 | 0.028 | 0.033 | 0.037 | 0.042 |
| | | | | | Feed (mm/min) | 31 | 34 | 44 | 57 | 58 | 56 | 50 | 44 | 40 | |
| | | Slot | 1 | ≤ 1 | 15 | RPM | 4847 | 1616 | 808 | 606 | 485 | 404 | 303 | 242 | 194 |
| | | | | | (12-18) | Fz | 0.0013 | 0.0043 | 0.011 | 0.019 | 0.024 | 0.028 | 0.033 | 0.037 | 0.042 |
| | | | | | Feed (mm/min) | 25 | 28 | 36 | 46 | 47 | 45 | 40 | 36 | 33 | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si ≤ 350 Bhn or ≤ 38 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 66 | RPM | 20842 | 6947 | 3474 | 2605 | 2084 | 1737 | 1303 | 1042 | 834 | |
| | | | | (52-79) | Fz | 0.0020 | 0.0071 | 0.019 | 0.032 | 0.040 | 0.048 | 0.056 | 0.064 | 0.070 | |
| | | | | Feed (mm/min) | 167 | 197 | 264 | 333 | 333 | 333 | 292 | 267 | 233 | | |
| | Slot | 1 | ≤ 1 | 52 | RPM | 16480 | 5493 | 2747 | 2060 | 1648 | 1373 | 1030 | 824 | 659 | |
| | | | | (41-62) | Fz | 0.0020 | 0.0071 | 0.019 | 0.032 | 0.040 | 0.048 | 0.056 | 0.064 | 0.070 | |
| | | | | Feed (mm/min) | 132 | 156 | 209 | 264 | 264 | 264 | 231 | 211 | 185 | | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al ≤ 440 Bhn or ≤ 47 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 23 | RPM | 7271 | 2424 | 1212 | 909 | 727 | 606 | 454 | 364 | 291 | |
| | | | | (18-27) | Fz | 0.0020 | 0.0071 | 0.019 | 0.032 | 0.040 | 0.048 | 0.056 | 0.064 | 0.070 | |
| | | | | Feed (mm/min) | 58 | 69 | 92 | 116 | 116 | 116 | 102 | 93 | 81 | | |
| | Slot | 1 | ≤ 1 | 18 | RPM | 5816 | 1939 | 969 | 727 | 582 | 485 | 364 | 291 | 233 | |
| | | | | (15-22) | Fz | 0.0020 | 0.0071 | 0.019 | 0.032 | 0.040 | 0.048 | 0.056 | 0.064 | 0.070 | |
| | | | | Feed (mm/min) | 47 | 55 | 74 | 93 | 93 | 93 | 81 | 74 | 65 | | |

Bhn (Brinell) HRC (Rockwell C)

rpm = (Vc x 1000) / (D₁ x 3.14)

mm/min = Fz x 4 x rpm

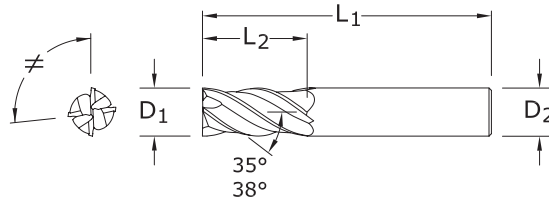
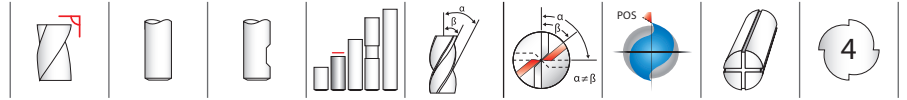
maximum Slotting Ap for Z1PCR <3mm diameter and all Z1MPLC / Z1MPLB is .25 x D₁

maximum Profile Ae for Z1PCR <3mm diameter and all Z1MPLC / Z1MPLB is .20 x D₁

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling (.02 x D₁ maximum)

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



TOLERANCES (inch)

1/8–1/4 DIAMETER

$D_1 = +0.0000/-0.0012$

$D_2 = h_6$

>1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.0016$

$D_2 = h_6$

>3/8–1 DIAMETER

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

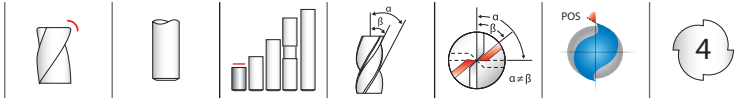
For patent information visit www.ksptpatents.com

Z1 FRACTIONAL SERIES

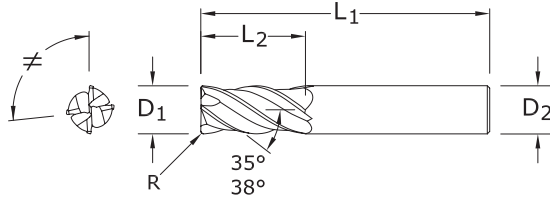
| inch | | | | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|---------------------|----------------------------|-----------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE-A (AlTiN) | Ti-NAMITE-A (AlTiN) W/FLAT | JetStream |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 36404 | — | — |
| 5/32 | 7/16 | 2 | 3/16 | 36406 | — | — |
| 3/16 | 7/16 | 2 | 3/16 | 36408 | — | — |
| 7/32 | 7/16 | 2-1/2 | 1/4 | 36410 | — | — |
| 1/4 | 1/2 | 2-1/2 | 1/4 | 36416 | — | — |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 36596 | — | — |
| 9/32 | 5/8 | 2-1/2 | 5/16 | 36418 | — | — |
| 5/16 | 13/16 | 2-1/2 | 5/16 | 36420 | — | — |
| 11/32 | 13/16 | 2-1/2 | 3/8 | 36422 | — | — |
| 3/8 | 7/8 | 2-1/2 | 3/8 | 36424 | 36530 | — |
| 13/32 | 15/16 | 2-3/4 | 7/16 | 36426 | 36531 | — |
| 7/16 | 1 | 2-3/4 | 7/16 | 36428 | 36532 | — |
| 15/32 | 1 | 3 | 1/2 | 36430 | 36533 | — |
| 1/2 | 1 | 3 | 1/2 | 36432 | 36534 | 36826 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 36597 | 36598 | — |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | 36436 | 36535 | 36827 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 36440 | 36536 | 36828 |
| 3/4 | 1-1/2 | 4 | 3/4 | 36442 | 36537 | 36829 |
| 1 | 1-1/2 | 4 | 1 | 36444 | 36538 | 36830 |

- Unequal helix design aids in damping harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

FRACTIONAL Z-Carb



Z16CR FRACTIONAL SERIES



- Unequal helix design aids in damping harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | CORNER RADIUS R | EDP NO. TI-NAMITE-X |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|------------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | | |
| 1/8 | 1/4 | 1-1/2 | 1/8 | .015 | 36505 |
| 5/32 | 5/16 | 2 | 3/16 | .015 | 36506 |
| 3/16 | 3/8 | 2 | 3/16 | .015 | 36507 |
| 7/32 | 3/8 | 2 | 1/4 | .020 | 36508 |
| 1/4 | 7/16 | 2 | 1/4 | .020 | 36509 |
| 5/16 | 1/2 | 2 | 5/16 | .020 | 36511 |
| 3/8 | 5/8 | 2 | 3/8 | .020 | 36513 |
| 7/16 | 5/8 | 2-1/2 | 7/16 | .020 | 36515 |
| 1/2 | 5/8 | 2-1/2 | 1/2 | .030 | 36517 |
| 5/8 | 3/4 | 3 | 5/8 | .040 | 36519 |
| 3/4 | 1 | 3 | 3/4 | .040 | 36520 |

TOLERANCES (inch)

1/8–1/4 DIAMETER

$D_1 = +0.0000/-0.0012$

$D_2 = h_6$

$R = +0.0000/-0.005$

>1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.0016$

$D_2 = h_6$

$R = +0.0000/-0.005$

>3/8–3/4 DIAMETER

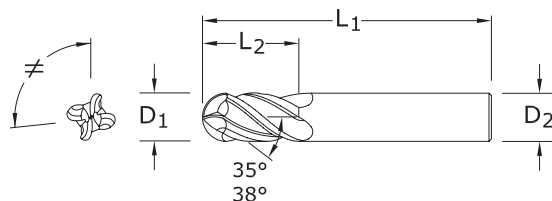
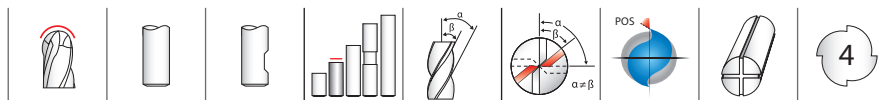
$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

$R = +0.0000/-0.005$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



TOLERANCES (inch)

1/8–1/4 DIAMETER

$D_1 = +0.0000/-0.0012$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0006$

>1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.0016$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0008$

>3/8–1 DIAMETER

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0010$

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

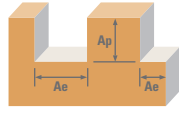
For patent information visit www.ksptpatents.com














Z1B FRACTIONAL SERIES

| inch | | | | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|------------------|-------------------------|-----------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE-X (TX) | Ti-NAMITE-X (TX) W/FLAT | JetStream |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 36358 | — | — |
| 5/32 | 7/16 | 2 | 3/16 | 36357 | — | — |
| 3/16 | 7/16 | 2 | 3/16 | 36359 | — | — |
| 7/32 | 7/16 | 2-1/2 | 1/4 | 36361 | — | — |
| 1/4 | 1/2 | 2-1/2 | 1/4 | 36344 | — | — |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 36590 | — | — |
| 9/32 | 5/8 | 2-1/2 | 5/16 | 36353 | — | — |
| 5/16 | 13/16 | 2-1/2 | 5/16 | 36345 | — | — |
| 11/32 | 13/16 | 2-1/2 | 3/8 | 36354 | — | — |
| 3/8 | 7/8 | 2-1/2 | 3/8 | 36346 | 36539 | — |
| 13/32 | 15/16 | 2-3/4 | 7/16 | 36355 | 36540 | — |
| 7/16 | 1 | 2-3/4 | 7/16 | 36347 | 36541 | — |
| 15/32 | 1 | 3 | 1/2 | 36356 | 36542 | — |
| 1/2 | 1 | 3 | 1/2 | 36348 | 36543 | 36846 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 36591 | 36592 | — |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | 36349 | 36544 | 36847 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 36350 | 36545 | 36848 |
| 3/4 | 1-1/2 | 4 | 3/4 | 36351 | 36546 | 36849 |
| 1 | 1-1/2 | 4 | 1 | 36352 | 36547 | 36850 |

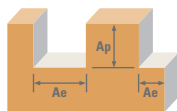
- Unequal helix design aids in damping harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

FRACTIONAL Z-Carb



| Series Z1, Z1B, Z16CR Fractional | Hardness | Profile  | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|---|--|--|---------------------|-------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Profile  | ≤ 0.5 | ≤ 1.5 | 555 | RPM | 16961 | 8480 | 5654 | 4240 | 3392 | 2827 | 2120 | |
| | | | | | (444-666) | Fz | 0.0004 | 0.0010 | 0.0019 | 0.0025 | 0.0031 | 0.0032 | 0.0035 | |
| | | | | | | Feed (ipm) | 25.8 | 33.9 | 43.0 | 42.4 | 42.1 | 36.5 | 29.7 | |
| | | Slot  | 1 | ≤ 1 | 440 | RPM | 13446 | 6723 | 4482 | 3362 | 2689 | 2241 | 1681 | |
| | | | | | (352-528) | Fz | 0.0004 | 0.0010 | 0.0019 | 0.0025 | 0.0031 | 0.0032 | 0.0035 | |
| | | | | | | Feed (ipm) | 20.4 | 26.9 | 34.1 | 33.6 | 33.3 | 29.0 | 23.5 | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 375 Bhn or ≤ 40 HRc | Profile  | ≤ 0.5 | ≤ 1.5 | 315 | RPM | 9626 | 4813 | 3209 | 2407 | 1925 | 1604 | 1203 |
| | | | | | | (252-378) | Fz | 0.0003 | 0.0008 | 0.0014 | 0.0019 | 0.0024 | 0.0025 | 0.0027 |
| | | | | | | | Feed (ipm) | 10.8 | 15.4 | 18.0 | 18.3 | 18.5 | 16.0 | 13.0 |
| | | | Slot  | 1 | ≤ 1 | 250 | RPM | 7640 | 3820 | 2547 | 1910 | 1528 | 1273 | 955 |
| | | | | | | (200-300) | Fz | 0.0003 | 0.0008 | 0.0014 | 0.0019 | 0.0024 | 0.0025 | 0.0027 |
| | | | | | | | Feed (ipm) | 8.6 | 12.2 | 14.3 | 14.5 | 14.7 | 12.7 | 10.3 |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile  | ≤ 0.5 | ≤ 1.5 | 185 | RPM | 5654 | 2827 | 1885 | 1413 | 1131 | 942 | 707 | |
| | | | | | (148-222) | Fz | 0.0002 | 0.0005 | 0.0010 | 0.0013 | 0.0016 | 0.0017 | 0.0018 | |
| | | | | | | Feed (ipm) | 4.5 | 5.7 | 7.5 | 7.3 | 7.2 | 6.4 | 5.1 | |
| | | Slot  | 1 | ≤ 1 | 145 | RPM | 4431 | 2216 | 1477 | 1108 | 886 | 739 | 554 | |
| | | | | | (116-174) | Fz | 0.0002 | 0.0005 | 0.0010 | 0.0013 | 0.0016 | 0.0017 | 0.0018 | |
| | | | | | | Feed (ipm) | 3.5 | 4.4 | 5.9 | 5.8 | 5.7 | 5.0 | 4.0 | |
| | K CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile  | ≤ 0.5 | ≤ 1.5 | 445 | RPM | 13599 | 6800 | 4533 | 3400 | 2720 | 2267 | 1700 |
| | | | | | | (356-534) | Fz | 0.0004 | 0.0010 | 0.0018 | 0.0024 | 0.0030 | 0.0031 | 0.0034 |
| | | | | | | | Feed (ipm) | 19.0 | 27.2 | 32.6 | 32.6 | 32.6 | 28.1 | 23.1 |
| | | | Slot  | 1 | ≤ 1 | 355 | RPM | 10849 | 5424 | 3616 | 2712 | 2170 | 1808 | 1356 |
| | | | | | | (284-426) | Fz | 0.0004 | 0.0010 | 0.0018 | 0.0024 | 0.0030 | 0.0031 | 0.0034 |
| | | | | | | | Feed (ipm) | 15.2 | 21.7 | 26.0 | 26.0 | 26.0 | 22.4 | 18.4 |
| CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | | ≤ 260 Bhn or ≤ 26 HRc | Profile  | ≤ 0.5 | ≤ 1.5 | 340 | RPM | 10390 | 5195 | 3463 | 2598 | 2078 | 1732 | 1299 |
| | | | | | | (272-408) | Fz | 0.0003 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0025 |
| | | | | | | | Feed (ipm) | 12.5 | 14.5 | 19.4 | 18.7 | 19.1 | 16.6 | 13.0 |
| | | | Slot  | 1 | ≤ 1 | 270 | RPM | 8251 | 4126 | 2750 | 2063 | 1650 | 1375 | 1031 |
| | | | | | | (216-324) | Fz | 0.0003 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0025 |
| | | | | | | | Feed (ipm) | 9.9 | 11.6 | 15.4 | 14.9 | 15.2 | 13.2 | 10.3 |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile  | ≤ 0.5 | ≤ 1.5 | 490 | RPM | 14974 | 7487 | 4991 | 3744 | 2995 | 2496 | 1872 | |
| | | | | | (392-588) | Fz | 0.0003 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0025 | |
| | | | | | | Feed (ipm) | 18.0 | 21.0 | 28.0 | 27.0 | 27.6 | 24.0 | 18.7 | |
| | | Slot  | 1 | ≤ 1 | 390 | RPM | 11918 | 5959 | 3973 | 2980 | 2384 | 1986 | 1490 | |
| | | | | | (312-468) | Fz | 0.0003 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0025 | |
| | | | | | | Feed (ipm) | 14.3 | 16.7 | 22.2 | 21.5 | 21.9 | 19.1 | 14.9 | |

continued on next page



| Series Z1, Z1B, Z16CR Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | |
|---|--|-----------------------------|---------------------|-------------|--------------------------------------|------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 340 | RPM | 10390 | 5195 | 3463 | 2598 | 2078 | 1732 | 1299 |
| | | | | | | (272-408) | Fz | 0.0002 | 0.0006 | 0.0011 | 0.0014 | 0.0018 | 0.0019 | 0.0020 |
| | | | | | | | Feed (ipm) | 8.3 | 12.5 | 15.2 | 14.5 | 15.0 | 13.2 | 10.4 |
| | | | | | | 270 | RPM | 8251 | 4126 | 2750 | 2063 | 1650 | 1375 | 1031 |
| | | | | | | (216-324) | Fz | 0.0002 | 0.0006 | 0.0011 | 0.0014 | 0.0018 | 0.0019 | 0.0020 |
| | | | | | | | Feed (ipm) | 6.6 | 9.9 | 12.1 | 11.6 | 11.9 | 10.5 | 8.3 |
| | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | ≤ 325 Bhn or ≤ 35 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 310 | RPM | 9474 | 4737 | 3158 | 2368 | 1895 | 1579 | 1184 |
| | | | | | | (248-372) | Fz | 0.0002 | 0.0006 | 0.0011 | 0.0014 | 0.0018 | 0.0019 | 0.0020 |
| | | | | | | | Feed (ipm) | 7.6 | 11.4 | 13.9 | 13.3 | 13.6 | 12.0 | 9.5 |
| | | | | | | 250 | RPM | 7640 | 3820 | 2547 | 1910 | 1528 | 1273 | 955 |
| | | | | | | (200-300) | Fz | 0.0002 | 0.0006 | 0.0011 | 0.0014 | 0.0018 | 0.0019 | 0.0020 |
| | | | | | | | Feed (ipm) | 6.1 | 9.2 | 11.2 | 10.7 | 11.0 | 9.7 | 7.6 |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 80 | RPM | 2445 | 1222 | 815 | 611 | 489 | 407 | 306 |
| | | | | | | (64-96) | Fz | 0.0002 | 0.0004 | 0.0008 | 0.0010 | 0.0013 | 0.0014 | 0.0015 |
| | | | | | | | Feed (ipm) | 2.2 | 2.0 | 2.6 | 2.4 | 2.5 | 2.3 | 1.8 |
| | | | | | | 65 | RPM | 1986 | 993 | 662 | 497 | 397 | 331 | 248 |
| | | | | | | (52-78) | Fz | 0.0002 | 0.0004 | 0.0008 | 0.0010 | 0.0013 | 0.0014 | 0.0015 |
| | | | | | | | Feed (ipm) | 1.6 | 1.6 | 2.1 | 2.0 | 2.1 | 1.9 | 1.5 |
| | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, 750-X, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 62 | RPM | 1895 | 947 | 632 | 474 | 379 | 316 | 237 |
| | | | | | | (50-74) | Fz | 0.0001 | 0.0003 | 0.0005 | 0.0007 | 0.0008 | 0.0009 | 0.0010 |
| | | | | | | | Feed (ipm) | 0.8 | 1.1 | 1.3 | 1.3 | 1.2 | 1.1 | 0.9 |
| | | | | | | 49 | RPM | 1497 | 749 | 499 | 374 | 299 | 250 | 187 |
| | | | | | | (39-59) | Fz | 0.0001 | 0.0003 | 0.0005 | 0.0007 | 0.0008 | 0.0009 | 0.0010 |
| | | | | | | | Feed (ipm) | 0.6 | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 0.7 |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 215 | RPM | 6570 | 3285 | 2190 | 1643 | 1314 | 1095 | 821 | |
| | | | | | (172-258) | Fz | 0.0002 | 0.0005 | 0.0010 | 0.0013 | 0.0016 | 0.0017 | 0.0018 | |
| | | | | | | Feed (ipm) | 5.3 | 6.6 | 8.8 | 8.5 | 8.4 | 7.4 | 5.9 | |
| | | | | | 170 | RPM | 5195 | 2598 | 1732 | 1299 | 1039 | 866 | 649 | |
| | | | | | (136-204) | Fz | 0.0002 | 0.0005 | 0.0010 | 0.0013 | 0.0016 | 0.0017 | 0.0018 | |
| | | | | | | Feed (ipm) | 4.2 | 5.2 | 6.9 | 6.8 | 6.6 | 5.9 | 4.7 | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 75 | RPM | 2292 | 1146 | 764 | 573 | 458 | 382 | 287 | |
| | | | | | (60-90) | Fz | 0.0002 | 0.0005 | 0.0010 | 0.0013 | 0.0016 | 0.0017 | 0.0018 | |
| | | | | | | Feed (ipm) | 1.8 | 2.3 | 3.1 | 3.0 | 2.9 | 2.6 | 2.1 | |
| | | | | | 60 | RPM | 1834 | 917 | 611 | 458 | 367 | 306 | 229 | |
| | | | | | (48-72) | Fz | 0.0002 | 0.0005 | 0.0010 | 0.0013 | 0.0016 | 0.0017 | 0.0018 | |
| | | | | | | Feed (ipm) | 1.5 | 1.8 | 2.4 | 2.4 | 2.3 | 2.1 | 1.7 | |

Bhn (Brinell) HRc (Rockwell C)

$rpm = Vc \times 3.82 / D_1$

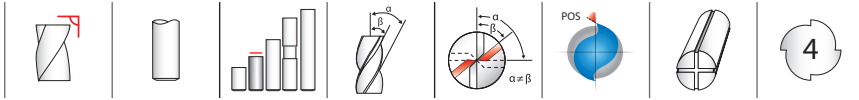
$ipm = Fz \times 4 \times rpm$

reduce speed and feed for materials harder than listed

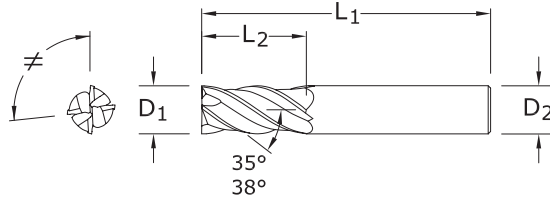
reduce feed and Ae when finish milling (.02 x D₁ maximum)

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

METRIC Z-Carb



Z1M METRIC SERIES



- Unequal helix design aids in damping harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| CUTTING DIAMETER D_1 | mm | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|---------------------|-----------|
| | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE-A (AlTiN) | JetStream |
| 3,0 | 8,0 | 57,0 | 6,0 | 46357 | — |
| 4,0 | 11,0 | 57,0 | 6,0 | 46358 | — |
| 5,0 | 13,0 | 57,0 | 6,0 | 46359 | — |
| 6,0 | 13,0 | 57,0 | 6,0 | 46360 | — |
| 8,0 | 19,0 | 63,0 | 8,0 | 46362 | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 46364 | — |
| 12,0 | 26,0 | 83,0 | 12,0 | 46366 | — |
| 14,0 | 26,0 | 83,0 | 14,0 | 46368 | 46506 |
| 16,0 | 32,0 | 92,0 | 16,0 | 46370 | 46507 |
| 18,0 | 32,0 | 92,0 | 18,0 | 46372 | 46508 |
| 20,0 | 38,0 | 104,0 | 20,0 | 46374 | 46509 |
| 25,0 | 38,0 | 104,0 | 25,0 | 46376 | 46510 |

TOLERANCES (mm)

3–6 DIAMETER

$D_1 = +0,000/-0,030$

$D_2 = h_6$

>6–10 DIAMETER

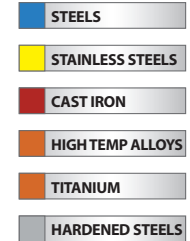
$D_1 = +0,000/-0,040$

$D_2 = h_6$

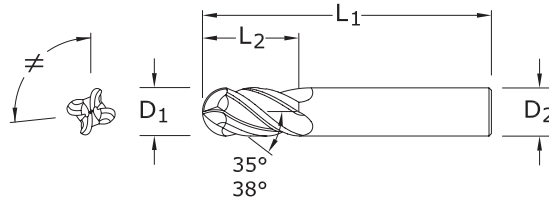
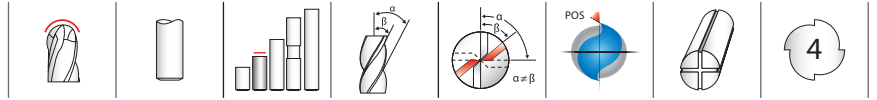
>10–25 DIAMETER

$D_1 = +0,000/-0,050$

$D_2 = h_6$



For patent information visit www.ksptpatents.com



Z1MB
METRIC SERIES

TOLERANCES (mm)

3–6 DIAMETER

$D_1 = +0,000/-0,030$

$D_2 = h_6$

BALL RADIUS

$+0,000/-0,015$

>6–10 DIAMETER

$D_1 = +0,000/-0,040$

$D_2 = h_6$

BALL RADIUS

$+0,000/-0,020$

>10–25 DIAMETER

$D_1 = +0,000/-0,050$

$D_2 = h_6$

BALL RADIUS

$+0,000/-0,025$

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

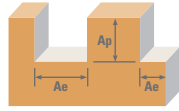
TITANIUM

HARDENED STEELS

| mm | | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|------------------|-----------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE-X (TX) | JetStream |
| 3,0 | 8,0 | 57,0 | 6,0 | 46354 | — |
| 4,0 | 11,0 | 57,0 | 6,0 | 46355 | — |
| 5,0 | 13,0 | 57,0 | 6,0 | 46356 | — |
| 6,0 | 13,0 | 57,0 | 6,0 | 46343 | — |
| 8,0 | 19,0 | 63,0 | 8,0 | 46344 | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 46345 | — |
| 12,0 | 26,0 | 83,0 | 12,0 | 46346 | — |
| 14,0 | 26,0 | 83,0 | 14,0 | 46347 | 46518 |
| 16,0 | 32,0 | 92,0 | 16,0 | 46348 | 46519 |
| 18,0 | 32,0 | 92,0 | 18,0 | 46349 | 46520 |
| 20,0 | 38,0 | 104,0 | 20,0 | 46350 | 46521 |
| 25,0 | 38,0 | 104,0 | 25,0 | 46351 | 46522 |

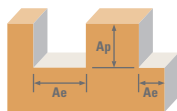
- Unequal helix design aids in damping harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

For patent information visit www.ksptpatents.com



| Series Z1M, Z1MB Metric | Hardness | Profile | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | |
|---|---|-----------------------------|---------------------|---------------------|---------------|------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | | 3 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 169 | RPM | 17934 | 8967 | 6725 | 5380 | 4484 | 3363 | 2690 | 2152 | |
| | | | | | (135-203) | Fz | 0.009 | 0.024 | 0.041 | 0.051 | 0.060 | 0.079 | 0.086 | 0.088 | |
| | | | | | Feed (mm/min) | 654 | 861 | 1091 | 1090 | 1076 | 1067 | 927 | 753 | | |
| | | Slot | 1 | ≤ 1 | 134 | RPM | 14218 | 7109 | 5332 | 4265 | 3555 | 2666 | 2133 | 1706 | |
| | | | | | (107-161) | Fz | 0.009 | 0.024 | 0.041 | 0.051 | 0.060 | 0.079 | 0.086 | 0.088 | |
| | | | | | Feed (mm/min) | 519 | 682 | 865 | 864 | 853 | 846 | 735 | 597 | | |
| | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 96 | RPM | 10179 | 5089 | 3817 | 3054 | 2545 | 1909 | 1527 | 1221 | |
| | | | | | (77-115) | Fz | 0.007 | 0.019 | 0.030 | 0.037 | 0.046 | 0.061 | 0.067 | 0.068 | |
| | | | | | Feed (mm/min) | 274 | 391 | 456 | 456 | 464 | 469 | 407 | 330 | | |
| | | Slot | 1 | ≤ 1 | 76 | RPM | 8078 | 4039 | 3029 | 2424 | 2020 | 1515 | 1212 | 969 | |
| | | | | | (61-91) | Fz | 0.007 | 0.019 | 0.030 | 0.037 | 0.046 | 0.061 | 0.067 | 0.068 | |
| | | | | | Feed (mm/min) | 217 | 310 | 362 | 362 | 368 | 372 | 323 | 262 | | |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 56 | RPM | 5978 | 2989 | 2242 | 1793 | 1495 | 1121 | 897 | 717 | |
| | | | | | (45-68) | Fz | 0.005 | 0.012 | 0.021 | 0.027 | 0.031 | 0.041 | 0.045 | 0.045 | |
| | | | | | Feed (mm/min) | 115 | 143 | 191 | 191 | 186 | 184 | 163 | 129 | | |
| | | Slot | 1 | ≤ 1 | 44 | RPM | 4686 | 2343 | 1757 | 1406 | 1171 | 879 | 703 | 562 | |
| | | | | | (35-53) | Fz | 0.005 | 0.012 | 0.021 | 0.027 | 0.031 | 0.041 | 0.045 | 0.045 | |
| | | | | | Feed (mm/min) | 90 | 112 | 150 | 150 | 146 | 144 | 127 | 101 | | |
| | K CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 136 | RPM | 14380 | 7190 | 5392 | 4314 | 3595 | 2696 | 2157 | 1726 |
| | | | | | | (109-163) | Fz | 0.008 | 0.024 | 0.038 | 0.048 | 0.058 | 0.077 | 0.083 | 0.085 |
| | | | | | | Feed (mm/min) | 483 | 690 | 828 | 828 | 828 | 828 | 713 | 587 | |
| | | | Slot | 1 | ≤ 1 | 108 | RPM | 11471 | 5736 | 4302 | 3441 | 2868 | 2151 | 1721 | 1377 |
| | | | | | | (87-130) | Fz | 0.008 | 0.024 | 0.038 | 0.048 | 0.058 | 0.077 | 0.083 | 0.085 |
| | | | | | | Feed (mm/min) | 385 | 551 | 661 | 661 | 661 | 661 | 569 | 468 | |
| ≤ 260 Bhn or ≤ 26 HRc | | Profile | ≤ 0.5 | ≤ 1.5 | 104 | RPM | 10987 | 5493 | 4120 | 3296 | 2747 | 2060 | 1648 | 1318 | |
| | | | | | (83-124) | Fz | 0.007 | 0.017 | 0.030 | 0.037 | 0.043 | 0.059 | 0.064 | 0.063 | |
| | | | | | Feed (mm/min) | 316 | 369 | 492 | 492 | 475 | 485 | 422 | 330 | | |
| | | Slot | 1 | ≤ 1 | 82 | RPM | 8725 | 4362 | 3272 | 2617 | 2181 | 1636 | 1309 | 1047 | |
| | | | | | (66-99) | Fz | 0.007 | 0.017 | 0.030 | 0.037 | 0.043 | 0.059 | 0.064 | 0.063 | |
| | | | | | Feed (mm/min) | 251 | 293 | 391 | 391 | 377 | 385 | 335 | 262 | | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 149 | RPM | 15834 | 7917 | 5938 | 4750 | 3958 | 2969 | 2375 | 1900 | |
| | | | | | (119-179) | Fz | 0.007 | 0.017 | 0.030 | 0.037 | 0.043 | 0.059 | 0.064 | 0.063 | |
| | | | | | Feed (mm/min) | 456 | 532 | 709 | 709 | 684 | 699 | 608 | 475 | | |
| | | Slot | 1 | ≤ 1 | 119 | RPM | 12602 | 6301 | 4726 | 3781 | 3151 | 2363 | 1890 | 1512 | |
| | | | | | (95-143) | Fz | 0.007 | 0.017 | 0.030 | 0.037 | 0.043 | 0.059 | 0.064 | 0.063 | |
| | | | | | Feed (mm/min) | 363 | 423 | 565 | 565 | 544 | 557 | 484 | 378 | | |

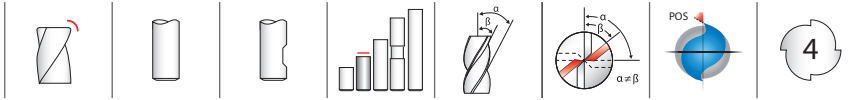
continued on next page



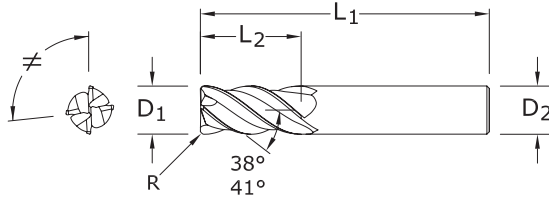
| Series Z1M, Z1MB Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | | |
|---|--|-----------------------------|---------------------|---------------|------------------------------------|---------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | 3 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | | | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | ≤ 275 Bhn or ≤ 28 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 104 | RPM | 10987 | 5493 | 4120 | 3296 | 2747 | 2060 | 1648 | 1318 |
| | | | | | | (83-124) | Fz | 0.005 | 0.014 | 0.023 | 0.029 | 0.034 | 0.046 | 0.051 | 0.050 |
| | | | | | | | Feed (mm/min) | 211 | 316 | 387 | 387 | 369 | 380 | 334 | 264 |
| | | | | | | 82 | RPM | 8725 | 4362 | 3272 | 2617 | 2181 | 1636 | 1309 | 1047 |
| | | | | | | (66-99) | Fz | 0.005 | 0.014 | 0.023 | 0.029 | 0.034 | 0.046 | 0.051 | 0.050 |
| | | | | | | | Feed (mm/min) | 168 | 251 | 307 | 307 | 293 | 302 | 265 | 209 |
| | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | ≤ 325 Bhn or ≤ 35 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 94 | RPM | 10017 | 5009 | 3756 | 3005 | 2504 | 1878 | 1503 | 1202 |
| | | | | | | (76-113) | Fz | 0.005 | 0.014 | 0.023 | 0.029 | 0.034 | 0.046 | 0.051 | 0.050 |
| | | | | | | | Feed (mm/min) | 192 | 288 | 353 | 353 | 337 | 346 | 305 | 240 |
| | | | | | | 76 | RPM | 8078 | 4039 | 3029 | 2424 | 2020 | 1515 | 1212 | 969 |
| | | | | | | (61-91) | Fz | 0.005 | 0.014 | 0.023 | 0.029 | 0.034 | 0.046 | 0.051 | 0.050 |
| | | | | | | | Feed (mm/min) | 155 | 233 | 284 | 284 | 271 | 279 | 246 | 194 |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 24 | RPM | 2585 | 1293 | 969 | 776 | 646 | 485 | 388 | 310 |
| | | | | | | (20-29) | Fz | 0.005 | 0.010 | 0.017 | 0.021 | 0.024 | 0.033 | 0.037 | 0.038 |
| | | | | | | | Feed (mm/min) | 55 | 50 | 66 | 53 | 62 | 65 | 58 | 47 |
| | | | | | | 20 | RPM | 2100 | 1050 | 788 | 630 | 525 | 394 | 315 | 252 |
| | | | | | | (16-24) | Fz | 0.005 | 0.010 | 0.017 | 0.021 | 0.024 | 0.033 | 0.037 | 0.038 |
| | | | | | | | Feed (mm/min) | 40 | 40 | 54 | 54 | 50 | 52 | 47 | 38 |
| | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 19 | RPM | 2003 | 1002 | 751 | 601 | 501 | 376 | 301 | 240 |
| | | | | | | (15-23) | Fz | 0.002 | 0.007 | 0.011 | 0.013 | 0.017 | 0.020 | 0.024 | 0.025 |
| | | | | | | | Feed (mm/min) | 19 | 29 | 32 | 32 | 34 | 31 | 29 | 24 |
| | | | | | | 15 | RPM | 1583 | 792 | 594 | 475 | 396 | 297 | 238 | 190 |
| | | | | | | (12-18) | Fz | 0.002 | 0.007 | 0.011 | 0.013 | 0.017 | 0.020 | 0.024 | 0.025 |
| | | | | | | | Feed (mm/min) | 15 | 23 | 25 | 25 | 27 | 24 | 23 | 19 |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 66 | RPM | 6947 | 3474 | 2605 | 2084 | 1737 | 1303 | 1042 | 834 | |
| | | | | | (52-79) | Fz | 0.005 | 0.012 | 0.021 | 0.027 | 0.031 | 0.041 | 0.045 | 0.045 | |
| | | | | | | Feed (mm/min) | 133 | 167 | 222 | 222 | 217 | 213 | 189 | 150 | |
| | | | | | 52 | RPM | 5493 | 2747 | 2060 | 1648 | 1373 | 1030 | 824 | 659 | |
| | | | | | (41-62) | Fz | 0.005 | 0.012 | 0.021 | 0.027 | 0.031 | 0.041 | 0.045 | 0.045 | |
| | | | | | | Feed (mm/min) | 105 | 132 | 176 | 176 | 171 | 169 | 149 | 119 | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRC | Profile | ≤ 0.5 | ≤ 1.5 | 23 | RPM | 2424 | 1212 | 909 | 727 | 606 | 454 | 364 | 291 | |
| | | | | | (18-27) | Fz | 0.005 | 0.012 | 0.021 | 0.027 | 0.031 | 0.041 | 0.045 | 0.045 | |
| | | | | | | Feed (mm/min) | 47 | 58 | 78 | 78 | 76 | 74 | 66 | 52 | |
| | | | | | 18 | RPM | 1939 | 969 | 727 | 582 | 485 | 364 | 291 | 233 | |
| | | | | | (15-22) | Fz | 0.005 | 0.012 | 0.021 | 0.027 | 0.031 | 0.041 | 0.045 | 0.045 | |
| | | | | | | Feed (mm/min) | 37 | 47 | 62 | 62 | 60 | 60 | 53 | 42 | |

Bhn (Brinell) HRC (Rockwell C)
 rpm = (Vc x 1000) / (D₁ x 3.14)
 mm/min = Fz x 4 x rpm
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

FRACTIONAL Z-Carb-HTA



ZH1CR FRACTIONAL SERIES



- The original Z-Carb design with an enhanced core and higher helix suited for the demands of high temperature alloys
- Unequal helix design aids in damping harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut for difficult to machine materials
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|---------------------|----------------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | Ti-NAMITE-A (AlTiN) | Ti-NAMITE-A (AlTiN) W/FLAT |
| 1/4 | 1/2 | 2-1/2 | 1/4 | .020 | 36570 | — |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .020 | 36616 | — |
| 5/16 | 13/16 | 2-1/2 | 5/16 | .020 | 36571 | — |
| 3/8 | 7/8 | 2-1/2 | 3/8 | .020 | 36572 | 36555 |
| 7/16 | 1 | 2-3/4 | 7/16 | .020 | 36573 | 36556 |
| 1/2 | 1 | 3 | 1/2 | .030 | 36574 | 36557 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .030 | 36618 | 36617 |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | .030 | 36575 | 36558 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .040 | 36576 | 36559 |
| 3/4 | 1-1/2 | 4 | 3/4 | .040 | 36577 | 36560 |
| 1 | 1-1/2 | 4 | 1 | .040 | 36578 | 36561 |

TOLERANCES (inch)

1/4 DIAMETER

$D_1 = +0.0000/-0.0012$

$D_2 = h_6$

$R = +0.0000/-0.0020$

>1/4-3/8 DIAMETER

$D_1 = +0.0000/-0.0016$

$D_2 = h_6$

$R = +0.0000/-0.0020$

>3/8-1 DIAMETER

$D_1 = +0.0000/-0.0020$

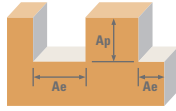
$D_2 = h_6$

$R = +0.0000/-0.0020$

HIGH TEMP ALLOYS

TITANIUM

For patent information visit www.ksptpatents.com



| Series ZH1CR Fractional | Hardness | Profile | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | |
|---|---|-----------------------------|---------------------|---------------------|-------------|--------------------------------------|--------|--------|--------|--------|--------|--------|
| | | | | | | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 85 | RPM | 1299 | 866 | 649 | 433 | 325 | |
| | | | | | (68-102) | Fz | 0.0007 | 0.0012 | 0.0017 | 0.0020 | 0.0023 | |
| | | Slot | 1 | ≤ 1 | 70 | RPM | 1070 | 713 | 535 | 357 | 267 | |
| | | | | | (56-84) | Fz | 0.0007 | 0.0012 | 0.0017 | 0.0020 | 0.0023 | |
| | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 70 | RPM | 1070 | 713 | 535 | 357 | 267 |
| | | | | | | (56-84) | Fz | 0.0005 | 0.0009 | 0.0012 | 0.0014 | 0.0016 |
| | | Slot | 1 | ≤ 1 | 55 | RPM | 840 | 560 | 420 | 280 | 210 | |
| | | | | | (44-66) | Fz | 0.0005 | 0.0009 | 0.0012 | 0.0014 | 0.0016 | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | | ≤ 350 Bhn or ≤ 38 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 215 | RPM | 3285 | 2190 | 1643 | 1095 | 821 |
| | | | | | | (172-258) | Fz | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 |
| | | Slot | 1 | ≤ 1 | 170 | RPM | 2598 | 1732 | 1299 | 866 | 649 | |
| | | | | | (136-204) | Fz | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 | |
| | TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 75 | RPM | 1146 | 764 | 573 | 382 | 287 |
| | | | | | | (60-90) | Fz | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 |
| | | Slot | 1 | ≤ 1 | 60 | RPM | 917 | 611 | 458 | 306 | 229 | |
| | | | | | (48-72) | Fz | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 | |
| | | | | | | Feed (ipm) | 2.9 | 3.7 | 3.7 | 2.9 | 2.6 | |

Bhn (Brinell) HRc (Rockwell C)

rpm = Vc x 3.82 / D₁

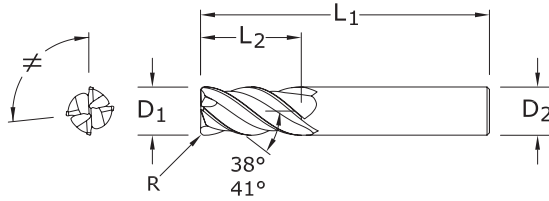
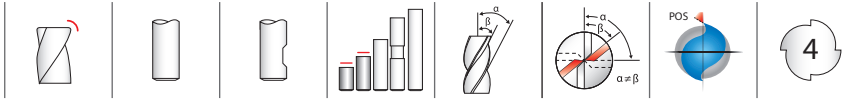
ipm = Fz x 4 x rpm

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling (.02 x D₁ maximum)

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Z-Carb-HTA



ZH1MCRS METRIC SERIES

- The original Z-Carb design with an enhanced core and higher helix suited for the demands of high temperature alloys
- Unequal helix design aids in damaging harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut for difficult to machine materials
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | mm | | | CORNER RADIUS R | EDP NO. Ti-NAMITE-A (AlTiN) |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|------|--------------------|--------------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | | | |
| 6,0 | 10,0 | 54,0 | 6,0 | 0,50 | 42712 | |
| 8,0 | 12,0 | 58,0 | 8,0 | 0,50 | 42713 | |
| 10,0 | 14,0 | 66,0 | 10,0 | 0,50 | 42714 | |
| 12,0 | 16,0 | 73,0 | 12,0 | 0,75 | 42715 | |
| 16,0 | 22,0 | 82,0 | 16,0 | 1,00 | 42716 | |
| 20,0 | 26,0 | 92,0 | 20,0 | 1,00 | 42717 | |

TOLERANCES (mm)

6 DIAMETER

D₁ = +0,000/-0,030
D₂ = h₆
R = +0,000/-0,050

>6-10 DIAMETER

D₁ = +0,000/-0,040
D₂ = h₆
R = +0,000/-0,050

>10-20 DIAMETER

D₁ = +0,000/-0,050
D₂ = h₆
R = +0,000/-0,050

HIGH TEMP ALLOYS

TITANIUM

For patent information visit www.ksptpatents.com

ZH1MCR METRIC SERIES

- The original Z-Carb design with an enhanced core and higher helix suited for the demands of high temperature alloys
- Unequal helix design aids in damaging harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Optimal material removal rates through increased feed and depths of cut for difficult to machine materials
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | mm | | | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------|---------------------|----------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | Ti-NAMITE-A (AlTiN) | Ti-NAMITE-A (AlTiN) W/FLAT |
| 6,0 | 13,0 | 57,0 | 6,0 | 0,5 | 46450 | — |
| 6,0 | 13,0 | 57,0 | 6,0 | 1,0 | 46451 | — |
| 6,0 | 13,0 | 57,0 | 6,0 | 1,5 | 46452 | — |
| 8,0 | 19,0 | 63,0 | 8,0 | 0,5 | 46453 | — |
| 8,0 | 19,0 | 63,0 | 8,0 | 1,0 | 46454 | — |
| 8,0 | 19,0 | 63,0 | 8,0 | 1,5 | 46455 | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 0,5 | 46456 | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 1,0 | 46457 | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 1,5 | 46458 | — |
| 10,0 | 22,0 | 72,0 | 10,0 | 2,0 | 46459 | — |
| 12,0 | 26,0 | 83,0 | 12,0 | 0,5 | 46460 | 46471 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,0 | 46461 | 46472 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,5 | 46462 | 46473 |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,0 | 46463 | 46474 |
| 12,0 | 26,0 | 83,0 | 12,0 | 3,0 | 46464 | 46475 |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,5 | 46465 | 46476 |
| 16,0 | 32,0 | 92,0 | 16,0 | 2,0 | 46466 | 46477 |
| 16,0 | 32,0 | 92,0 | 16,0 | 3,0 | 46467 | 46478 |
| 16,0 | 32,0 | 92,0 | 16,0 | 4,0 | 46482 | 46483 |
| 20,0 | 38,0 | 104,0 | 20,0 | 3,0 | 46468 | 46479 |
| 20,0 | 38,0 | 104,0 | 20,0 | 4,0 | 46469 | 46480 |
| 20,0 | 38,0 | 104,0 | 20,0 | 5,0 | 46470 | 46481 |

TOLERANCES (mm)

6 DIAMETER

D₁ = +0,000/-0,030
D₂ = h₆
R = +0,000/-0,050

>6-10 DIAMETER

D₁ = +0,000/-0,040
D₂ = h₆
R = +0,000/-0,050

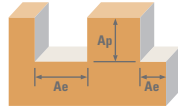
>10-20 DIAMETER





D₁ = +0,000/-0,050
D₂ = h₆
R = +0,000/-0,050

HIGH TEMP ALLOYS

TITANIUM

For patent information visit www.ksptpatents.com



| Series ZH1MCRS, ZH1MCR Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | |
|--|--|--|--|---------------|------------------------------------|---------------|---------------|-------|-------|-------|-------|
| | | | | | 6 | 10 | 12 | 20 | | | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRC | Profile  | ≤ 0.5 | ≤ 1.5 | 26 | RPM | 1373 | 824 | 687 | 412 |
| | | | | | | (21-31) | Fz | 0.017 | 0.032 | 0.041 | 0.053 |
| | | | | | | | Feed (mm/min) | 93 | 105 | 113 | 87 |
| | | | | | | 21 | RPM | 1131 | 679 | 565 | 339 |
| | | | | | | (17-26) | Fz | 0.017 | 0.032 | 0.041 | 0.053 |
| | | | | | | | Feed (mm/min) | 77 | 87 | 93 | 72 |
| | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRC | Profile  | ≤ 0.5 | ≤ 1.5 | 21 | RPM | 1131 | 679 | 565 | 339 |
| | | | | | | (17-26) | Fz | 0.012 | 0.024 | 0.029 | 0.037 |
| | | | | | | | Feed (mm/min) | 54 | 65 | 66 | 50 |
| | | | | | | 17 | RPM | 889 | 533 | 444 | 267 |
| | | | | | | (13-20) | Fz | 0.012 | 0.024 | 0.029 | 0.037 |
| | | | | | | | Feed (mm/min) | 43 | 51 | 52 | 39 |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRC | Profile  | ≤ 0.5 | ≤ 1.5 | 66 | RPM | 3474 | 2084 | 1737 | 1042 | |
| | | | | | (52-79) | Fz | 0.019 | 0.041 | 0.049 | 0.057 | |
| | | | | | | Feed (mm/min) | 264 | 342 | 340 | 238 | |
| | | | | | 52 | RPM | 2747 | 1648 | 1373 | 824 | |
| | | | | | (41-62) | Fz | 0.019 | 0.041 | 0.049 | 0.057 | |
| | | | | | | Feed (mm/min) | 209 | 270 | 269 | 188 | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRC | Profile  | ≤ 0.5 | ≤ 1.5 | 23 | RPM | 1212 | 727 | 606 | 364 | |
| | | | | | (18-27) | Fz | 0.019 | 0.041 | 0.049 | 0.057 | |
| | | | | | | Feed (mm/min) | 92 | 119 | 119 | 83 | |
| | | | | | 18 | RPM | 969 | 582 | 485 | 291 | |
| | | | | | (15-22) | Fz | 0.019 | 0.041 | 0.049 | 0.057 | |
| | | | | | | Feed (mm/min) | 74 | 95 | 95 | 66 | |

Bhn (Brinell) HRC (Rockwell C)

rpm = (Vc x 1000) / (D₁ x 3.14)

ipm = Fz x 4 x rpm

reduce speed and feed for materials harder than listed

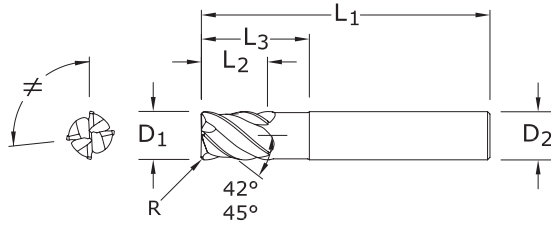
reduce feed and Ae when finish milling (.02 x D₁ maximum)

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

FRACTIONAL Z-Carb-MD



ZD1CR FRACTIONAL SERIES



- The original Z-Carb design with negative rake, heavy core, and higher helix for strength and shearing of hard mold & die materials
- Unequal helix design aids in damping harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials 35-60HRC (327 to 654 Bhn)

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | inch | | | CORNER RADIUS R | EDP NO. Ti-NAMITE-X |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------------------------|------|--------------------|------------------------|
| | | | SHANK DIAMETER D ₂ | REACH L ₃ | | | |
| 1/8 | 5/32 | 2-1/2 | 1/4 | 1/2 | .010 | 36780 | |
| 3/16 | 7/32 | 2-1/2 | 1/4 | 3/4 | .020 | 36781 | |
| 1/4 | 9/32 | 2-1/2 | 1/4 | 3/4 | .020 | 36782 | |
| 5/16 | 13/32 | 2-1/2 | 5/16 | 1 | .040 | 36783 | |
| 3/8 | 15/32 | 2-1/2 | 3/8 | 1 | .040 | 36784 | |
| 7/16 | 9/16 | 2-3/4 | 7/16 | 1 | .040 | 36785 | |
| 1/2 | 5/8 | 3 | 1/2 | 1-1/4 | .040 | 36786 | |
| 1/2 | 5/8 | 4-1/2 | 1/2 | 2-1/4 | .040 | 36787 | |
| 5/8 | 3/4 | 3-1/2 | 5/8 | 1-1/2 | .040 | 36788 | |
| 5/8 | 3/4 | 4-1/2 | 5/8 | 2-1/4 | .040 | 36789 | |
| 5/8 | 3/4 | 5-1/2 | 5/8 | 3-1/4 | .040 | 36790 | |
| 3/4 | 15/16 | 4 | 3/4 | 1-3/4 | .060 | 36791 | |
| 3/4 | 15/16 | 4-1/2 | 3/4 | 2-1/4 | .060 | 36792 | |
| 3/4 | 15/16 | 5-1/2 | 3/4 | 3-1/4 | .060 | 36793 | |

TOLERANCES (inch)

1/8-1/4 DIAMETER

D₁ = +0.0000/-0.0012

D₂ = h₆

R = +0.0000/-0.0020

>1/4-3/8 DIAMETER

D₁ = +0.0000/-0.0016

D₂ = h₆

R = +0.0000/-0.0020

>3/8-3/4 DIAMETER

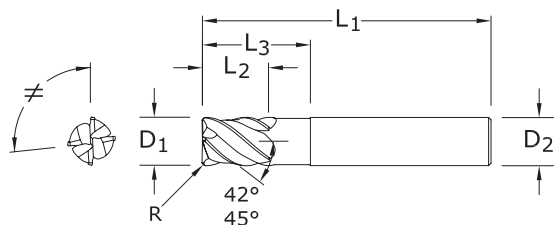
D₁ = +0.0000/-0.0020

D₂ = h₆

R = +0.0000/-0.0020

HARDENED STEELS

For patent information visit
www.ksptpatents.com



ZD1MCR
METRIC SERIES

TOLERANCES (mm)

3–6 DIAMETER

$D_1 = +0,000/-0,030$

$D_2 = h_6$

$R = +0,000/-0,050$

>6–10 DIAMETER

$D_1 = +0,000/-0,040$

$D_2 = h_6$

$R = +0,000/-0,050$

>10–20 DIAMETER

$D_1 = +0,000/-0,050$

$D_2 = h_6$

$R = +0,000/-0,050$

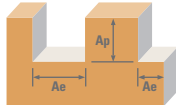
HARDENED STEELS

For patent information visit www.ksptpatents.com

| mm | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|-------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | Ti-NAMITE-X |
| 3,0 | 4,0 | 57,0 | 6,0 | 15,0 | 0,2 | 46560 |
| 4,0 | 5,0 | 57,0 | 6,0 | 15,0 | 0,3 | 46561 |
| 5,0 | 6,0 | 57,0 | 6,0 | 15,0 | 0,5 | 46562 |
| 6,0 | 7,0 | 57,0 | 6,0 | 15,0 | 1,0 | 46563 |
| 8,0 | 10,0 | 63,0 | 8,0 | 25,0 | 1,0 | 46564 |
| 10,0 | 12,0 | 72,0 | 10,0 | 30,0 | 1,0 | 46565 |
| 12,0 | 15,0 | 83,0 | 12,0 | 35,0 | 1,0 | 46566 |
| 16,0 | 20,0 | 92,0 | 16,0 | 45,0 | 1,5 | 46567 |
| 20,0 | 24,0 | 104,0 | 20,0 | 55,0 | 2,0 | 46568 |

- The original Z-Carb design with negative rake, heavy core, and higher helix for strength and shearing of hard mold & die materials
- Unequal helix design aids in damping harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials 35-60HRC (327 to 654 Bhn)

FRACTIONAL & METRIC Z-Carb-MD



| Series ZD1CR Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | |
|--|-----------------------------|---------------------|---------------------|-------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | | |
| TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.4 | ≤ 1 | 405 | RPM | 12377 | 6188 | 4126 | 3094 | 2475 | 2063 |
| | | | | | (324-486) | Fz | 0.0005 | 0.0012 | 0.0023 | 0.0030 | 0.0039 | 0.0042 |
| | | | | | | Feed (ipm) | 24.8 | 29.7 | 38.0 | 37.1 | 38.6 | 34.7 |
| | ≤ 475 Bhn or ≤ 50 HRc | Slot | 1 | ≤ 0.4 | 320 | RPM | 9779 | 4890 | 3260 | 2445 | 1956 | 1630 |
| | | | | | (256-384) | Fz | 0.0005 | 0.0012 | 0.0023 | 0.0030 | 0.0039 | 0.0042 |
| | | | | | | Feed (ipm) | 19.6 | 23.5 | 30.0 | 29.3 | 30.5 | 27.4 |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 475 Bhn or ≤ 50 HRc | Profile | ≤ 0.4 | ≤ 1 | 210 | RPM | 6418 | 3209 | 2139 | 1604 | 1284 | 1070 |
| | | | | | (168-252) | Fz | 0.0004 | 0.0010 | 0.0019 | 0.0025 | 0.0032 | 0.0035 |
| | | | | | | Feed (ipm) | 10.3 | 12.8 | 16.3 | 16.0 | 16.4 | 15.0 |
| | ≤ 655 Bhn or ≤ 60 HRc | Slot | 1 | ≤ 0.4 | 170 | RPM | 5195 | 2598 | 1732 | 1299 | 1039 | 866 |
| | | | | | (136-204) | Fz | 0.0004 | 0.0010 | 0.0019 | 0.0025 | 0.0032 | 0.0035 |
| | | | | | | Feed (ipm) | 8.3 | 10.4 | 13.2 | 13.0 | 13.3 | 12.1 |
| TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 655 Bhn or ≤ 60 HRc | Profile | ≤ 0.4 | ≤ 1 | 90 | RPM | 2750 | 1375 | 917 | 688 | 550 | 458 |
| | | | | | (72-108) | Fz | 0.0002 | 0.0005 | 0.0010 | 0.0013 | 0.0017 | 0.0018 |
| | | | | | | Feed (ipm) | 2.2 | 2.8 | 3.7 | 3.6 | 3.7 | 3.3 |
| TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 655 Bhn or ≤ 60 HRc | Slot | 1 | ≤ 0.4 | 70 | RPM | 2139 | 1070 | 713 | 535 | 428 | 357 |
| | | | | | (56-84) | Fz | 0.0002 | 0.0005 | 0.0010 | 0.0013 | 0.0017 | 0.0018 |
| | | | | | | Feed (ipm) | 1.7 | 2.1 | 2.9 | 2.8 | 2.9 | 2.6 |

Bhn (Brinell) HRc (Rockwell C)

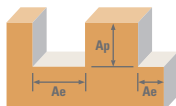
$$\text{rpm} = \text{Vc} \times 3.82 / \text{D}_1$$

$$\text{ipm} = \text{Fz} \times 4 \times \text{rpm}$$

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling (.02 x D₁ maximum)

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



| Series ZD1MCR Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|--|-----------------------------|---------------------|---------------------|---------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | 3 | 6 | 8 | 10 | 12 | 16 | 20 | | |
| TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.4 | ≤ 1 | 123 | RPM | 13087 | 6544 | 4908 | 3926 | 3272 | 2454 | 1963 |
| | | | | | (99-148) | Fz | 0.012 | 0.029 | 0.049 | 0.061 | 0.072 | 0.083 | 0.112 |
| | | | | | | Feed (mm/min) | 628 | 754 | 963 | 963 | 942 | 817 | 879 |
| | ≤ 475 Bhn or ≤ 50 HRc | Slot | 1 | ≤ 0.4 | 98 | RPM | 10340 | 5170 | 3878 | 3102 | 2585 | 1939 | 1551 |
| | | | | | (78-117) | Fz | 0.012 | 0.029 | 0.049 | 0.061 | 0.072 | 0.083 | 0.112 |
| | | | | | | Feed (mm/min) | 496 | 596 | 761 | 761 | 744 | 645 | 695 |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 475 Bhn or ≤ 50 HRc | Profile | ≤ 0.4 | ≤ 1 | 64 | RPM | 6786 | 3393 | 2545 | 2036 | 1696 | 1272 | 1018 |
| | | | | | (51-77) | Fz | 0.010 | 0.024 | 0.041 | 0.051 | 0.060 | 0.068 | 0.093 |
| | | | | | | Feed (mm/min) | 261 | 326 | 413 | 413 | 407 | 347 | 380 |
| | ≤ 655 Bhn or ≤ 60 HRc | Slot | 1 | ≤ 0.4 | 52 | RPM | 5493 | 2747 | 2060 | 1648 | 1373 | 1030 | 824 |
| | | | | | (41-62) | Fz | 0.010 | 0.024 | 0.041 | 0.051 | 0.060 | 0.068 | 0.093 |
| | | | | | | Feed (mm/min) | 211 | 264 | 334 | 334 | 330 | 281 | 308 |
| TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 655 Bhn or ≤ 60 HRc | Profile | ≤ 0.4 | ≤ 1 | 27 | RPM | 2908 | 1454 | 1091 | 872 | 727 | 545 | 436 |
| | | | | | (22-33) | Fz | 0.005 | 0.012 | 0.021 | 0.027 | 0.031 | 0.036 | 0.048 |
| | | | | | | Feed (mm/min) | 56 | 70 | 93 | 93 | 91 | 79 | 84 |
| TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 655 Bhn or ≤ 60 HRc | Slot | 1 | ≤ 0.4 | 21 | RPM | 2262 | 1131 | 848 | 679 | 565 | 424 | 339 |
| | | | | | (17-26) | Fz | 0.005 | 0.012 | 0.021 | 0.027 | 0.031 | 0.036 | 0.048 |
| | | | | | | Feed (mm/min) | 43 | 54 | 72 | 72 | 71 | 62 | 65 |

Bhn (Brinell) HRc (Rockwell C)

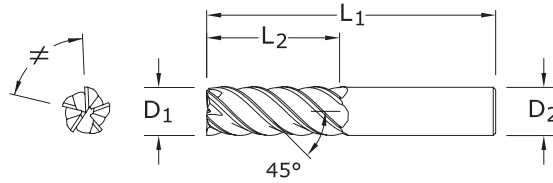
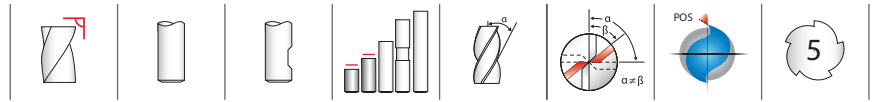
$$\text{rpm} = (\text{Vc} \times 1000) / (\text{D}_1 \times 3.14)$$

$$\text{ipm} = \text{Fz} \times 4 \times \text{rpm}$$

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling (.02 x D₁ maximum)

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

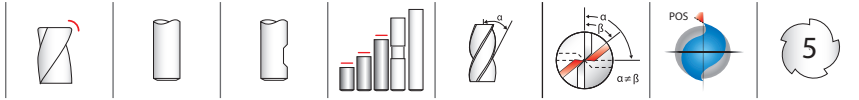
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com

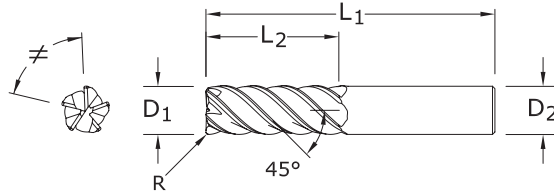
| inch | | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|---------------------|----------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE-A (AITiN) | Ti-NAMITE-A (AITiN) W/FLAT |
| 1/8 | 1/4 | 1-1/2 | 1/8 | 32672 | — |
| 1/8 | 1/2 | 1-1/2 | 1/8 | 32655 | — |
| 5/32 | 9/16 | 2 | 3/16 | 32656 | — |
| 3/16 | 5/16 | 2 | 3/16 | 32673 | — |
| 3/16 | 5/8 | 2 | 3/16 | 32657 | — |
| 7/32 | 3/4 | 2-1/2 | 1/4 | 32658 | — |
| 1/4 | 3/8 | 2 | 1/4 | 32674 | — |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 32659 | — |
| 5/16 | 7/16 | 2 | 5/16 | 32675 | — |
| 5/16 | 13/16 | 2-1/2 | 5/16 | 32660 | — |
| 3/8 | 1/2 | 2 | 3/8 | 32676 | 32677 |
| 3/8 | 1 | 2-1/2 | 3/8 | 32661 | 32662 |
| 7/16 | 1 | 2-3/4 | 7/16 | 32663 | — |
| 1/2 | 5/8 | 2-1/2 | 1/2 | 32678 | 32679 |
| 1/2 | 1-1/4 | 3 | 1/2 | 32664 | 32665 |
| 5/8 | 3/4 | 3 | 5/8 | 32680 | 32681 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | 32666 | 32667 |
| 3/4 | 1 | 3 | 3/4 | 32682 | 32683 |
| 3/4 | 1-5/8 | 4 | 3/4 | 32668 | 32669 |
| 1 | 1-1/2 | 4 | 1 | 32670 | 32671 |

55 FRACTIONAL SERIES

- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)



55CR
FRACTIONAL SERIES



- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | inch | | | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------|------------------------|----------------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | Ti-NAMITE-A (AITiN) | Ti-NAMITE-A (AITiN) W/FLAT |
| 1/8 | 1/4 | 1-1/2 | 1/8 | .010 | 32606 | — |
| 1/8 | 1/2 | 1-1/2 | 1/8 | .010 | 32607 | — |
| 5/32 | 5/16 | 2 | 3/16 | .010 | 32608 | — |
| 5/32 | 9/16 | 2 | 3/16 | .010 | 32609 | — |
| 3/16 | 5/16 | 2 | 3/16 | .010 | 32610 | — |
| 3/16 | 5/8 | 2 | 3/16 | .010 | 32611 | — |
| 7/32 | 3/8 | 2 | 1/4 | .015 | 32612 | — |
| 7/32 | 3/4 | 2-1/2 | 1/4 | .015 | 32613 | — |
| 1/4 | 3/8 | 2 | 1/4 | .015 | 32614 | — |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .015 | 32615 | — |
| 1/4 | 1-1/4 | 4 | 1/4 | .015 | 32616 | — |
| 5/16 | 7/16 | 2 | 5/16 | .015 | 32619 | — |
| 5/16 | 13/16 | 2-1/2 | 5/16 | .015 | 32620 | — |
| 5/16 | 1-1/4 | 4 | 5/16 | .015 | 32621 | — |
| 3/8 | 1/2 | 2 | 3/8 | .015 | 32625 | 32591 |
| 3/8 | 1/2 | 2 | 3/8 | .030 | 32592 | 32593 |
| 3/8 | 1 | 2-1/2 | 3/8 | .015 | 32626 | 32628 |
| 3/8 | 1 | 2-1/2 | 3/8 | .030 | 32573 | 32574 |
| 3/8 | 1-1/2 | 4 | 3/8 | .015 | 32627 | — |
| 3/8 | 1-1/2 | 4 | 3/8 | .030 | 32569 | — |
| 7/16 | 1 | 2-3/4 | 7/16 | .015 | 32632 | — |
| 7/16 | 2 | 4 | 7/16 | .015 | 32633 | — |
| 1/2 | 5/8 | 2-1/2 | 1/2 | .030 | 32594 | 32595 |
| 1/2 | 5/8 | 2-1/2 | 1/2 | .060 | 32596 | 32597 |
| 1/2 | 1-1/4 | 3 | 1/2 | .030 | 32575 | 32576 |
| 1/2 | 1-1/4 | 3 | 1/2 | .060 | 32577 | 32578 |
| 1/2 | 2 | 4 | 1/2 | .030 | 32685 | — |
| 1/2 | 2 | 4 | 1/2 | .060 | 32686 | — |
| 5/8 | 3/4 | 3 | 5/8 | .030 | 32598 | 32599 |
| 5/8 | 3/4 | 3 | 5/8 | .060 | 32600 | 32601 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .030 | 32579 | 32580 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .060 | 32581 | 32582 |
| 5/8 | 2-1/2 | 5 | 5/8 | .030 | 32570 | — |
| 5/8 | 2-1/2 | 5 | 5/8 | .060 | 32687 | — |
| 3/4 | 1 | 3 | 3/4 | .030 | 32602 | 32603 |
| 3/4 | 1 | 3 | 3/4 | .060 | 32604 | 32605 |
| 3/4 | 1-5/8 | 4 | 3/4 | .030 | 32583 | 32584 |
| 3/4 | 1-5/8 | 4 | 3/4 | .060 | 32585 | 32586 |
| 3/4 | 3-1/4 | 6 | 3/4 | .030 | 32571 | — |
| 3/4 | 3-1/4 | 6 | 3/4 | .060 | 32688 | — |
| 1 | 1-1/2 | 4 | 1 | .030 | 32587 | 32588 |
| 1 | 1-1/2 | 4 | 1 | .060 | 32589 | 32590 |
| 1 | 2-5/8 | 6 | 1 | .030 | 32572 | — |
| 1 | 2-5/8 | 6 | 1 | .060 | 32689 | — |

TOLERANCES (inch)

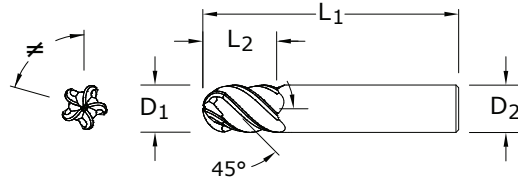
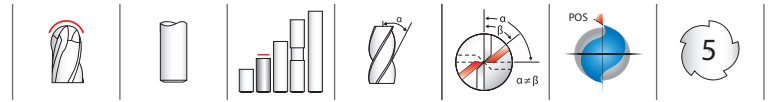
D₁ = +0.0000/-0.0020

D₂ = h₆

R = +0.0000/-0.0020

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



55B FRACTIONAL SERIES

TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

BALL RADIUS

$+0.0005/-0.0010$

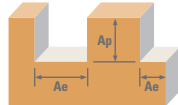
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | SHANK DIAMETER D_2 | EDP NO. Ti-NAMITE-A (AITiN) |
|---------------------------|------------------------|-------------------------|--|-------------------------|--------------------------------|
| | | OVERALL LENGTH L_1 | | | |
| 1/4 | 3/4 | 2-1/2 | | 1/4 | 32500 |
| 5/16 | 13/16 | 2-1/2 | | 5/16 | 32501 |
| 3/8 | 1 | 2-1/2 | | 3/8 | 32502 |
| 1/2 | 1-1/4 | 3 | | 1/2 | 32503 |
| 5/8 | 1-5/8 | 3-1/2 | | 5/8 | 32504 |
| 3/4 | 1-5/8 | 4 | | 3/4 | 32505 |
| 1 | 1-1/2 | 4 | | 1 | 32506 |

- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

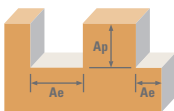
For patent information visit www.ksptpatents.com

FRACTIONAL V-Carb



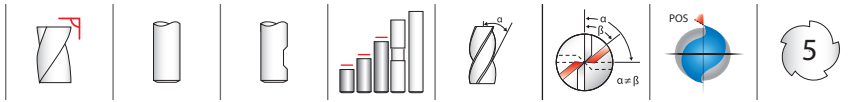
| Series | Hardness | Profile | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|---|-----------------------------|---------------------|---------------------|------------|-----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.25 | ≤ 1.5 | 385 | RPM | 11766 | 5883 | 3922 | 2941 | 2353 | 1961 | 1471 | |
| | | | | | (308-462) | Fz | 0.0004 | 0.0009 | 0.0017 | 0.0023 | 0.0029 | 0.0028 | 0.0032 | |
| | | | | | Feed (ipm) | 20.6 | 26.5 | 33.3 | 33.8 | 34.1 | 27.5 | 23.5 | | |
| | | HSM | ≤ 0.05 | ≤ 2 | 630 | RPM | 19253 | 9626 | 6418 | 4813 | 3851 | 3209 | 2407 | |
| | | | | | (504-756) | Fz | 0.0007 | 0.0018 | 0.0034 | 0.0046 | 0.0057 | 0.0055 | 0.0064 | |
| | | | | | Feed (ipm) | 67.4 | 86.6 | 109.1 | 110.7 | 109.7 | 88.2 | 77.0 | | |
| | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.25 | ≤ 1.5 | 325 | RPM | 9932 | 4966 | 3311 | 2483 | 1986 | 1655 | 1242 | |
| | | | | | (260-390) | Fz | 0.0003 | 0.0007 | 0.0013 | 0.0017 | 0.0022 | 0.0021 | 0.0024 | |
| | | | | | Feed (ipm) | 12.9 | 17.4 | 21.5 | 21.1 | 21.9 | 17.4 | 14.9 | | |
| | | HSM | ≤ 0.05 | ≤ 2 | 530 | RPM | 16197 | 8098 | 5399 | 4049 | 3239 | 2699 | 2025 | |
| | | | | | (424-636) | Fz | 0.0005 | 0.0014 | 0.0026 | 0.0034 | 0.0043 | 0.0041 | 0.0048 | |
| | | | | | Feed (ipm) | 42.1 | 56.7 | 70.2 | 68.8 | 69.6 | 55.3 | 48.6 | | |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.25 | ≤ 1.5 | 175 | RPM | 5348 | 2674 | 1783 | 1337 | 1070 | 891 | 669 | |
| | | | | | (140-210) | Fz | 0.0002 | 0.0005 | 0.0010 | 0.0013 | 0.0016 | 0.0017 | 0.0018 | |
| | | | | | Feed (ipm) | 5.3 | 6.7 | 8.9 | 8.7 | 8.6 | 7.6 | 6.0 | | |
| | | HSM | ≤ 0.05 | ≤ 2 | 290 | RPM | 8862 | 4431 | 2954 | 2216 | 1772 | 1477 | 1108 | |
| | | | | | (232-348) | Fz | 0.0004 | 0.0010 | 0.0019 | 0.0025 | 0.0032 | 0.0033 | 0.0035 | |
| | | | | | Feed (ipm) | 17.7 | 22.2 | 28.1 | 27.7 | 28.4 | 24.4 | 19.4 | | |
| | K CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | ≤ 0.25 | ≤ 1.5 | 470 | RPM | 14363 | 7182 | 4788 | 3591 | 2873 | 2394 | 1795 |
| | | | | | | (376-564) | Fz | 0.0004 | 0.0009 | 0.0017 | 0.0023 | 0.0029 | 0.0030 | 0.0032 |
| | | | | | | Feed (ipm) | 25.1 | 32.3 | 40.7 | 41.3 | 41.7 | 35.9 | 28.7 | |
| | | | HSM | ≤ 0.05 | ≤ 2 | 705 | RPM | 21545 | 10772 | 7182 | 5386 | 4309 | 3591 | 2693 |
| | | | | | | (564-846) | Fz | 0.0007 | 0.0018 | 0.0034 | 0.0046 | 0.0057 | 0.0059 | 0.0064 |
| | | | | | | Feed (ipm) | 75.4 | 97.0 | 122.1 | 123.9 | 122.8 | 105.9 | 86.2 | |
| ≤ 260 Bhn or ≤ 26 HRc | | Profile | ≤ 0.25 | ≤ 1.5 | 360 | RPM | 11002 | 5501 | 3667 | 2750 | 2200 | 1834 | 1375 | |
| | | | | | (288-432) | Fz | 0.0003 | 0.0007 | 0.0013 | 0.0017 | 0.0022 | 0.0023 | 0.0024 | |
| | | | | | Feed (ipm) | 14.3 | 19.3 | 23.8 | 23.4 | 24.2 | 21.1 | 16.5 | | |
| | | HSM | ≤ 0.05 | ≤ 2 | 540 | RPM | 16502 | 8251 | 5501 | 4126 | 3300 | 2750 | 2063 | |
| | | | | | (432-648) | Fz | 0.0005 | 0.0014 | 0.0026 | 0.0034 | 0.0043 | 0.0044 | 0.0048 | |
| | | | | | Feed (ipm) | 42.9 | 57.8 | 71.5 | 70.1 | 71.0 | 60.5 | 49.5 | | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.25 | ≤ 1.5 | 370 | RPM | 11307 | 5654 | 3769 | 2827 | 2261 | 1885 | 1413 | |
| | | | | | (296-444) | Fz | 0.0003 | 0.0007 | 0.0013 | 0.0017 | 0.0022 | 0.0023 | 0.0024 | |
| | | | | | Feed (ipm) | 14.7 | 19.8 | 24.5 | 24.0 | 24.9 | 21.7 | 17.0 | | |
| | | HSM | ≤ 0.05 | ≤ 2 | 560 | RPM | 17114 | 8557 | 5705 | 4278 | 3423 | 2852 | 2139 | |
| | | | | | (448-672) | Fz | 0.0005 | 0.0014 | 0.0026 | 0.0034 | 0.0043 | 0.0044 | 0.0048 | |
| | | | | | Feed (ipm) | 44.5 | 59.9 | 74.2 | 72.7 | 73.6 | 62.7 | 51.3 | | |

continued on next page

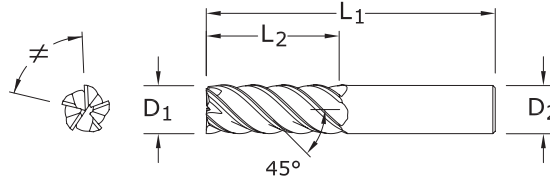


| Series 55, 55CR, 55B Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|--|---------------------|---------------------|-------------|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | Profile | ≤ 0.25 | ≤ 1.5 | 255 | RPM | 7793 | 3896 | 2598 | 1948 | 1559 | 1299 | 974 |
| | | | | | (204-306) | Fz | 0.0002 | 0.0006 | 0.0012 | 0.0016 | 0.0020 | 0.0021 | 0.0023 |
| | | | | | Feed (ipm) | 9.4 | 11.7 | 15.6 | 15.6 | 15.6 | 13.6 | 11.2 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 385 | RPM | 11766 | 5883 | 3922 | 2941 | 2353 | 1961 | 1471 |
| | | | | | (308-462) | Fz | 0.0005 | 0.0013 | 0.0024 | 0.0032 | 0.0040 | 0.0041 | 0.0045 |
| | | | | | Feed (ipm) | 28.2 | 38.2 | 47.1 | 47.1 | 47.1 | 40.2 | 33.1 | |
| | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | Profile | ≤ 0.25 | ≤ 1.5 | 235 | RPM | 7182 | 3591 | 2394 | 1795 | 1436 | 1197 | 898 |
| | | | | | (188-282) | Fz | 0.0002 | 0.0006 | 0.0010 | 0.0014 | 0.0017 | 0.0018 | 0.0019 |
| | | | | | Feed (ipm) | 7.5 | 10.8 | 12.0 | 12.6 | 12.2 | 10.8 | 8.5 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 355 | RPM | 10849 | 5424 | 3616 | 2712 | 2170 | 1808 | 1356 |
| | | | | | (284-426) | Fz | 0.0004 | 0.0011 | 0.0021 | 0.0028 | 0.0034 | 0.0036 | 0.0039 |
| | | | | | Feed (ipm) | 22.2 | 29.8 | 38.0 | 38.0 | 36.9 | 32.5 | 26.4 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | Profile | ≤ 0.25 | ≤ 1.5 | 70 | RPM | 2139 | 1070 | 713 | 535 | 428 | 357 | 267 |
| | | | | | (56-84) | Fz | 0.0002 | 0.0006 | 0.0010 | 0.0014 | 0.0017 | 0.0018 | 0.0019 |
| | | | | | Feed (ipm) | 2.2 | 3.2 | 3.6 | 3.7 | 3.6 | 3.2 | 2.5 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 107 | RPM | 3270 | 1635 | 1090 | 817 | 654 | 545 | 409 |
| | | | | | (86-128) | Fz | 0.0004 | 0.0011 | 0.0021 | 0.0028 | 0.0034 | 0.0036 | 0.0039 |
| | | | | | Feed (ipm) | 6.7 | 9.0 | 11.4 | 11.4 | 11.1 | 9.8 | 8.0 | |
| | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | Profile | ≤ 0.25 | ≤ 1.5 | 55 | RPM | 1681 | 840 | 560 | 420 | 336 | 280 | 210 |
| | | | | | (44-66) | Fz | 0.0002 | 0.0004 | 0.0008 | 0.0010 | 0.0013 | 0.0014 | 0.0015 |
| | | | | | Feed (ipm) | 1.3 | 1.7 | 2.2 | 2.1 | 2.2 | 2.0 | 1.6 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 85 | RPM | 2598 | 1299 | 866 | 649 | 520 | 433 | 325 |
| | | | | | (68-102) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0021 | 0.0026 | 0.0027 | 0.0029 |
| | | | | | Feed (ipm) | 4.0 | 5.2 | 6.5 | 6.8 | 6.8 | 5.8 | 4.7 | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | Profile | ≤ 0.25 | ≤ 1.5 | 235 | RPM | 7182 | 3591 | 2394 | 1795 | 1436 | 1197 | 898 | |
| | | | | (188-282) | Fz | 0.0002 | 0.0006 | 0.0012 | 0.0016 | 0.0020 | 0.0021 | 0.0023 | |
| | | | | Feed (ipm) | 7.2 | 10.8 | 14.4 | 14.4 | 14.4 | 12.6 | 10.3 | | |
| | HSM | ≤ 0.05 | ≤ 2 | 390 | RPM | 11918 | 5959 | 3973 | 2980 | 2384 | 1986 | 1490 | |
| | | | | (312-468) | Fz | 0.0005 | 0.0013 | 0.0024 | 0.0032 | 0.0040 | 0.0041 | 0.0045 | |
| | | | | Feed (ipm) | 29.8 | 38.7 | 47.7 | 47.7 | 47.7 | 40.7 | 33.5 | | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | Profile | ≤ 0.25 | ≤ 1.5 | 85 | RPM | 2598 | 1299 | 866 | 649 | 520 | 433 | 325 | |
| | | | | (68-102) | Fz | 0.0002 | 0.0006 | 0.0012 | 0.0016 | 0.0020 | 0.0021 | 0.0023 | |
| | | | | Feed (ipm) | 2.6 | 3.9 | 5.2 | 5.2 | 5.2 | 4.5 | 3.7 | | |
| | HSM | ≤ 0.05 | ≤ 2 | 140 | RPM | 4278 | 2139 | 1426 | 1070 | 856 | 713 | 535 | |
| | | | | (112-168) | Fz | 0.0005 | 0.0013 | 0.0024 | 0.0032 | 0.0040 | 0.0042 | 0.0045 | |
| | | | | Feed (ipm) | 10.7 | 13.9 | 17.1 | 17.1 | 17.1 | 15.0 | 12.0 | | |

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times 5 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 reduce Ap to 1 x D₁ (maximum) when profile milling with long or extra long flute length tools
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



55M
METRIC SERIES



- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

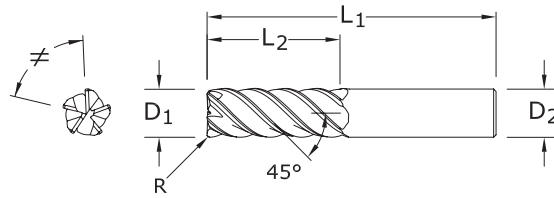
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|---------------------|----------------------------|
| | | | | Ti-NAMITE-A (AlTiN) | Ti-NAMITE-A (AlTiN) W/FLAT |
| 6,0 | 12,0 | 50,0 | 6,0 | 42606 | — |
| 6,0 | 19,0 | 63,0 | 6,0 | 42607 | — |
| 6,0 | 25,0 | 75,0 | 6,0 | 42608 | — |
| 8,0 | 12,0 | 50,0 | 8,0 | 42609 | — |
| 8,0 | 20,0 | 63,0 | 8,0 | 42610 | — |
| 8,0 | 25,0 | 75,0 | 8,0 | 42611 | — |
| 10,0 | 16,0 | 50,0 | 10,0 | 42612 | — |
| 10,0 | 22,0 | 75,0 | 10,0 | 42622 | 42613 |
| 10,0 | 38,0 | 100,0 | 10,0 | 42614 | — |
| 12,0 | 19,0 | 63,0 | 12,0 | 42615 | — |
| 12,0 | 25,0 | 75,0 | 12,0 | 42616 | 42623 |
| 12,0 | 50,0 | 100,0 | 12,0 | 42617 | — |
| 16,0 | 32,0 | 89,0 | 16,0 | 42618 | 42624 |
| 16,0 | 50,0 | 100,0 | 16,0 | 42626 | — |
| 16,0 | 75,0 | 150,0 | 16,0 | 42619 | — |
| 20,0 | 38,0 | 100,0 | 20,0 | 42620 | 42625 |
| 20,0 | 50,0 | 100,0 | 20,0 | 42627 | — |
| 20,0 | 75,0 | 150,0 | 20,0 | 42621 | — |

TOLERANCES (mm)

$D_1 = +0,000/-0,050$
 $D_2 = h_6$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$

$R = +0,000/-0,050$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

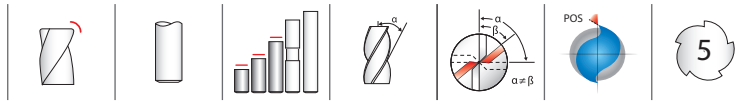
For patent information visit www.kspatents.com

55MCR
METRIC SERIES

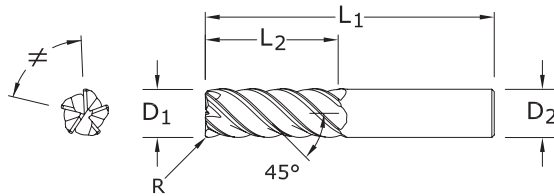
| mm | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | Ti-NAMITE-A (AITiN) |
| 6,0 | 12,0 | 50,0 | 6,0 | 0,5 | 42660 |
| 6,0 | 19,0 | 63,0 | 6,0 | 0,25 | 42661 |
| 6,0 | 19,0 | 63,0 | 6,0 | 0,5 | 42662 |
| 6,0 | 19,0 | 63,0 | 6,0 | 1,0 | 42663 |
| 6,0 | 19,0 | 63,0 | 6,0 | 1,5 | 42664 |
| 6,0 | 25,0 | 75,0 | 6,0 | 0,5 | 42665 |
| 8,0 | 12,0 | 50,0 | 8,0 | 0,5 | 42666 |
| 8,0 | 20,0 | 63,0 | 8,0 | 0,5 | 42667 |
| 8,0 | 20,0 | 63,0 | 8,0 | 1,0 | 42668 |
| 8,0 | 20,0 | 63,0 | 8,0 | 1,5 | 42669 |
| 8,0 | 20,0 | 63,0 | 8,0 | 2,0 | 42670 |
| 8,0 | 25,0 | 75,0 | 8,0 | 0,5 | 42671 |
| 10,0 | 16,0 | 50,0 | 10,0 | 0,5 | 42672 |
| 10,0 | 22,0 | 75,0 | 10,0 | 0,5 | 42673 |
| 10,0 | 22,0 | 75,0 | 10,0 | 1,0 | 42674 |
| 10,0 | 22,0 | 75,0 | 10,0 | 1,5 | 42675 |
| 10,0 | 22,0 | 75,0 | 10,0 | 2,0 | 42676 |
| 10,0 | 22,0 | 75,0 | 10,0 | 2,5 | 42677 |
| 10,0 | 38,0 | 100,0 | 10,0 | 0,5 | 42678 |
| 12,0 | 19,0 | 63,0 | 12,0 | 0,5 | 42679 |
| 12,0 | 25,0 | 75,0 | 12,0 | 0,5 | 42680 |
| 12,0 | 25,0 | 75,0 | 12,0 | 1,0 | 42681 |
| 12,0 | 25,0 | 75,0 | 12,0 | 1,5 | 42682 |
| 12,0 | 25,0 | 75,0 | 12,0 | 2,0 | 42683 |
| 12,0 | 25,0 | 75,0 | 12,0 | 2,5 | 42684 |
| 12,0 | 25,0 | 75,0 | 12,0 | 3,0 | 42685 |
| 12,0 | 50,0 | 100,0 | 12,0 | 0,5 | 42686 |
| 12,0 | 50,0 | 100,0 | 12,0 | 3,0 | 42630 |
| 12,0 | 50,0 | 100,0 | 12,0 | 4,0 | 42631 |
| 16,0 | 32,0 | 89,0 | 16,0 | 1,0 | 42687 |
| 16,0 | 32,0 | 89,0 | 16,0 | 1,5 | 42688 |
| 16,0 | 32,0 | 89,0 | 16,0 | 2,0 | 42689 |

- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)

continued on next page



55MCR
METRIC SERIES



CONTINUED

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | mm | | | CORNER RADIUS R | EDP NO. Ti-NAMITE-A (AITiN) |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-----|--------------------|-----------------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | | | |
| 16,0 | 32,0 | 89,0 | 16,0 | 2,5 | 42690 | |
| 16,0 | 32,0 | 89,0 | 16,0 | 3,0 | 42691 | |
| 16,0 | 32,0 | 89,0 | 16,0 | 4,0 | 42692 | |
| 16,0 | 50,0 | 100,0 | 16,0 | 2,0 | 42656 | |
| 16,0 | 50,0 | 100,0 | 16,0 | 2,5 | 42657 | |
| 16,0 | 50,0 | 100,0 | 16,0 | 3,0 | 42658 | |
| 16,0 | 50,0 | 100,0 | 16,0 | 4,0 | 42659 | |
| 16,0 | 50,0 | 100,0 | 16,0 | 5,0 | 42628 | |
| 16,0 | 75,0 | 150,0 | 16,0 | 1,0 | 42693 | |
| 16,0 | 75,0 | 150,0 | 16,0 | 3,0 | 42632 | |
| 16,0 | 75,0 | 150,0 | 16,0 | 4,0 | 42633 | |
| 20,0 | 38,0 | 100,0 | 20,0 | 1,0 | 42694 | |
| 20,0 | 38,0 | 100,0 | 20,0 | 1,5 | 42695 | |
| 20,0 | 38,0 | 100,0 | 20,0 | 2,0 | 42696 | |
| 20,0 | 38,0 | 100,0 | 20,0 | 2,5 | 42697 | |
| 20,0 | 38,0 | 100,0 | 20,0 | 3,0 | 42698 | |
| 20,0 | 38,0 | 100,0 | 20,0 | 4,0 | 42699 | |
| 20,0 | 38,0 | 100,0 | 20,0 | 5,0 | 42700 | |
| 20,0 | 38,0 | 100,0 | 20,0 | 6,0 | 42648 | |
| 20,0 | 50,0 | 100,0 | 20,0 | 2,0 | 42649 | |
| 20,0 | 50,0 | 100,0 | 20,0 | 2,5 | 42650 | |
| 20,0 | 50,0 | 100,0 | 20,0 | 3,0 | 42651 | |
| 20,0 | 50,0 | 100,0 | 20,0 | 4,0 | 42652 | |
| 20,0 | 50,0 | 100,0 | 20,0 | 5,0 | 42653 | |
| 20,0 | 50,0 | 100,0 | 20,0 | 6,0 | 42654 | |
| 20,0 | 75,0 | 150,0 | 20,0 | 1,0 | 42701 | |
| 20,0 | 75,0 | 150,0 | 20,0 | 2,0 | 42702 | |
| 20,0 | 75,0 | 150,0 | 20,0 | 3,0 | 42703 | |
| 20,0 | 75,0 | 150,0 | 20,0 | 4,0 | 42704 | |
| 20,0 | 75,0 | 150,0 | 20,0 | 5,0 | 42705 | |
| 20,0 | 75,0 | 150,0 | 20,0 | 6,0 | 42655 | |

TOLERANCES (mm)

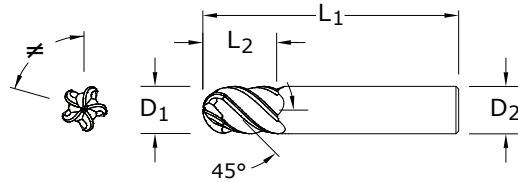
D₁ = +0,000/-0,050

D₂ = h₆

R = +0,000/-0,050

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



55MB
METRIC SERIES

TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$

BALL RADIUS

$+0,000/-0,025$

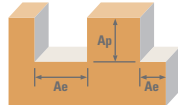
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com

| mm | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE-A (AlTiN) |
| 6,0 | 13,0 | 57,0 | 6,0 | 42750 |
| 8,0 | 19,0 | 63,0 | 8,0 | 42751 |
| 10,0 | 22,0 | 72,0 | 10,0 | 42752 |
| 12,0 | 26,0 | 83,0 | 12,0 | 42753 |
| 16,0 | 32,0 | 92,0 | 16,0 | 42754 |
| 20,0 | 38,0 | 104,0 | 20,0 | 42755 |

- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

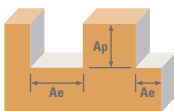
METRIC V-Carb



Series
55M, 55MCR,
55MB
Metric

| Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | |
|--------|--|---------------------|---------------------|---------------|------------------------------------|------|-------|-------|-------|-------|-------|-------|
| | | | | | 6 | 8 | 10 | 12 | 16 | 20 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | Profile | ≤ 0.25 | ≤ 1.5 | 117 | RPM | 6220 | 4665 | 3732 | 3110 | 2333 | 1866 |
| | | | | | (94-141) | Fz | 0.022 | 0.036 | 0.061 | 0.070 | 0.072 | 0.085 |
| | | | | | Feed (mm/min) | 672 | 846 | 1145 | 1082 | 836 | 796 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 192 | RPM | 10179 | 7634 | 6107 | 5089 | 3817 | 3054 |
| | | | | | (154-230) | Fz | 0.043 | 0.073 | 0.123 | 0.137 | 0.141 | 0.154 |
| | | | | | Feed (mm/min) | 2198 | 2769 | 3746 | 3481 | 2687 | 2345 | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | Profile | ≤ 0.25 | ≤ 1.5 | 99 | RPM | 5251 | 3938 | 3151 | 2626 | 1969 | 1575 |
| | | | | | (79-119) | Fz | 0.017 | 0.028 | 0.045 | 0.053 | 0.054 | 0.064 |
| | | | | | Feed (mm/min) | 441 | 546 | 571 | 693 | 529 | 504 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 162 | RPM | 8563 | 6422 | 5138 | 4282 | 3211 | 2569 |
| | | | | | (129-194) | Fz | 0.034 | 0.055 | 0.091 | 0.103 | 0.105 | 0.128 |
| | | | | | Feed (mm/min) | 1438 | 1781 | 2329 | 2209 | 1685 | 1644 | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | Profile | ≤ 0.25 | ≤ 1.5 | 53 | RPM | 2827 | 2121 | 1696 | 1414 | 1060 | 848 |
| | | | | | (43-64) | Fz | 0.012 | 0.021 | 0.035 | 0.038 | 0.044 | 0.048 |
| | | | | | Feed (mm/min) | 170 | 226 | 294 | 271 | 231 | 204 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 88 | RPM | 4686 | 3514 | 2811 | 2343 | 1757 | 1406 |
| | | | | | (71-106) | Fz | 0.024 | 0.041 | 0.067 | 0.077 | 0.084 | 0.093 |
| | | | | | Feed (mm/min) | 562 | 712 | 937 | 900 | 742 | 656 | |
| K | CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | Profile | ≤ 0.25 | ≤ 1.5 | 143 | RPM | 7594 | 5695 | 4556 | 3797 | 2848 | 2278 |
| | | | | | (115-172) | Fz | 0.022 | 0.036 | 0.061 | 0.070 | 0.077 | 0.085 |
| | | | | | Feed (mm/min) | 820 | 1033 | 1397 | 1321 | 1093 | 972 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 215 | RPM | 11391 | 8543 | 6834 | 5695 | 4271 | 3417 |
| | | | | | (172-258) | Fz | 0.043 | 0.073 | 0.123 | 0.137 | 0.151 | 0.171 |
| | | | | | Feed (mm/min) | 2460 | 3099 | 4192 | 3895 | 3226 | 2916 | |
| | CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | Profile | ≤ 0.25 | ≤ 1.5 | 110 | RPM | 5816 | 4362 | 3490 | 2908 | 2181 | 1745 |
| | | | | | (88-132) | Fz | 0.017 | 0.028 | 0.045 | 0.053 | 0.059 | 0.064 |
| | | | | | Feed (mm/min) | 489 | 605 | 791 | 768 | 642 | 558 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 165 | RPM | 8725 | 6544 | 5235 | 4362 | 3272 | 2617 |
| | | | | | (132-198) | Fz | 0.034 | 0.055 | 0.091 | 0.103 | 0.113 | 0.128 |
| | | | | | Feed (mm/min) | 1466 | 1815 | 2373 | 2251 | 1843 | 1675 | |

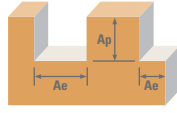
continued on next page







| Series 55M, 55MCR, 55MB Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | |
|---|--|-----------------------------|---------------------|---------------|------------------------------------|---------------|-------|-------|--------|-------|-------|-------|
| | | | | | 6 | 8 | 10 | 12 | 16 | 20 | | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile ≤ 0.25 | ≤ 1.5 | 113 | RPM | 5978 | 4484 | 3587 | 2989 | 2242 | 1793 |
| | | | | | (90-135) | Fz | 0.017 | 0.028 | 0.045 | 0.053 | 0.059 | 0.064 |
| | | | | | | Feed (mm/min) | 502 | 622 | 813 | 789 | 660 | 574 |
| | | | | | 171 | RPM | 9048 | 6786 | 5429 | 4524 | 3393 | 2714 |
| | | | | | (137-205) | Fz | 0.034 | 0.055 | 0.091 | 0.103 | 0.113 | 0.128 |
| | | | | | | Feed (mm/min) | 1520 | 1882 | 2461 | 2334 | 1911 | 1737 |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | ≤ 275 Bhn or ≤ 28 HRc | Profile ≤ 0.25 | ≤ 1.5 | 78 | RPM | 4120 | 3090 | 2472 | 2060 | 1545 | 1236 |
| | | | | | (62-93) | Fz | 0.014 | 0.026 | 0.043 | 0.048 | 0.054 | 0.061 |
| | | | | | | Feed (mm/min) | 297 | 396 | 527 | 494 | 415 | 379 |
| | | | | | 117 | RPM | 6220 | 4665 | 3732 | 3110 | 2333 | 1866 |
| | | | | | (94-141) | Fz | 0.031 | 0.051 | 0.085 | 0.096 | 0.105 | 0.120 |
| | | | | | | Feed (mm/min) | 970 | 1194 | 1592 | 1493 | 1224 | 1120 |
| M | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | ≤ 325 Bhn or ≤ 35 HRc | Profile ≤ 0.25 | ≤ 1.5 | 72 | RPM | 3797 | 2848 | 2278 | 1898 | 1424 | 1139 |
| | | | | | (57-86) | Fz | 0.014 | 0.021 | 0.037 | 0.041 | 0.046 | 0.051 |
| | | | | | | Feed (mm/min) | 273 | 13260 | 425 | 387 | 328 | 289 |
| | | | | | 108 | RPM | 5736 | 4302 | 3441 | 2868 | 2151 | 1721 |
| | | | | | (87-130) | Fz | 0.026 | 0.045 | 0.075 | 0.082 | 0.092 | 0.104 |
| | | | | | | Feed (mm/min) | 757 | 14850 | 1285 | 1170 | 991 | 895 |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Profile ≤ 0.25 | ≤ 1.5 | 21 | RPM | 1131 | 848 | 679 | 565 | 424 | 339 |
| | | | | | (17-26) | Fz | 0.014 | 0.021 | 0.037 | 0.041 | 0.046 | 0.051 |
| | | | | | | Feed (mm/min) | 81 | 16530 | 196792 | 115 | 98 | 86 |
| | | | | | 33 | RPM | 1729 | 1297 | 1037 | 864 | 648 | 519 |
| | | | | | (26-39) | Fz | 0.026 | 0.045 | 0.075 | 0.082 | 0.092 | 0.104 |
| | | | | | | Feed (mm/min) | 228 | 290 | 387 | 353 | 299 | 270 |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRc | Profile ≤ 0.25 | ≤ 1.5 | 17 | RPM | 889 | 666 | 533 | 444 | 333 | 267 |
| | | | | | (13-20) | Fz | 0.010 | 0.017 | 0.027 | 0.031 | 0.036 | 0.040 |
| | | | | | | Feed (mm/min) | 43 | 57 | 71 | 69 | 60 | 53 |
| | | | | | 26 | RPM | 1373 | 1030 | 824 | 687 | 515 | 412 |
| | | | | | (21-31) | Fz | 0.019 | 0.032 | 0.056 | 0.062 | 0.069 | 0.077 |
| | | | | | | Feed (mm/min) | 132 | 165 | 231 | 214 | 178 | 159 |

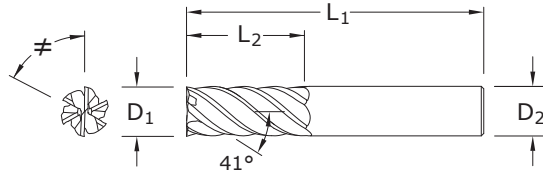
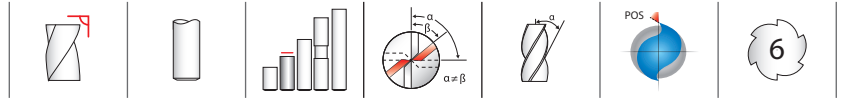
continued on next page

METRIC V-Carb



| Series 55M, 55MCR, 55MB Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | |
|---|--|--|---------------------|---------------|------------------------------------|-----|-------|-------|-------|-------|-------|-------|
| | | | | | 6 | 8 | 10 | 12 | 16 | 20 | | |
| S | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si ≤ 350 Bhn or ≤ 38 HRc | Profile  | ≤ 0.25 | ≤ 1.5 | 72 | RPM | 3797 | 2848 | 2278 | 1898 | 1424 | 1139 |
| | | | | | (57-86) | Fz | 0.014 | 0.026 | 0.043 | 0.048 | 0.054 | 0.061 |
| | | | | | Feed (mm/min) | 273 | 365 | 486 | 456 | 383 | 349 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 119 | RPM | 6301 | 4726 | 3781 | 3151 | 2363 | 1890 |
| | | | | | (95-143) | Fz | 0.031 | 0.051 | 0.085 | 0.096 | 0.105 | 0.120 |
| | | | | | Feed (mm/min) | 983 | 1210 | 1613 | 1512 | 1240 | 1134 | |
| | TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al ≤ 440 Bhn or ≤ 47 HRc | Profile  | ≤ 0.25 | ≤ 1.5 | 26 | RPM | 1373 | 1030 | 824 | 687 | 515 | 412 |
| | | | | | (21-31) | Fz | 0.014 | 0.026 | 0.043 | 0.048 | 0.054 | 0.061 |
| | | | | | Feed (mm/min) | 99 | 132 | 176 | 165 | 138 | 126 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 43 | RPM | 2262 | 1696 | 1357 | 1131 | 848 | 679 |
| | | | | | (34-51) | Fz | 0.031 | 0.051 | 0.085 | 0.096 | 0.108 | 0.120 |
| | | | | | Feed (mm/min) | 353 | 434 | 579 | 543 | 456 | 407 | |

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 5 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce speed and feed when finish milling (.02 x D₁ maximum)
 reduce Ap to 1 x D₁ (maximum) when profile milling with long or extra long flute length tools
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h6$

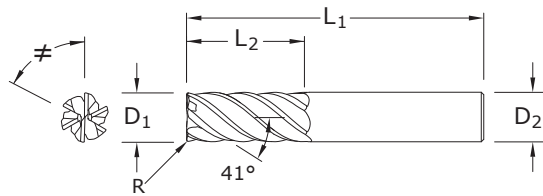
- STEELS
- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com

51
FRACTIONAL SERIES

| inch | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | TI-NAMITE-X (TX) |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 35100 |
| 3/8 | 1 | 2-1/2 | 3/8 | 35101 |
| 1/2 | 1-1/4 | 3 | 1/2 | 35102 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | 35103 |
| 3/4 | 1-5/8 | 4 | 3/4 | 35104 |
| 1 | 2-5/8 | 6 | 1 | 35105 |

- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Eccentric relief provides superior strength and smoother surface finish
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h6$

$R = +0.0000/-0.0020$

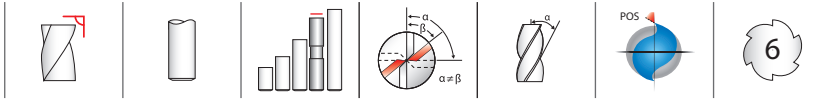
- STEELS
- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com

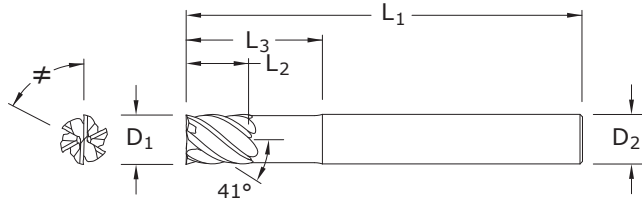
51CR
FRACTIONAL SERIES

| inch | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | TI-NAMITE-X (TX) |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .015 | 35112 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .030 | 35150 |
| 3/8 | 1 | 2-1/2 | 3/8 | .015 | 35113 |
| 3/8 | 1 | 2-1/2 | 3/8 | .030 | 35114 |
| 1/2 | 1-1/4 | 3 | 1/2 | .015 | 35151 |
| 1/2 | 1-1/4 | 3 | 1/2 | .030 | 35115 |
| 1/2 | 1-1/4 | 3 | 1/2 | .060 | 35152 |
| 1/2 | 1-1/4 | 3 | 1/2 | .090 | 35116 |
| 1/2 | 1-1/4 | 3 | 1/2 | .120 | 35117 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .015 | 35153 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .030 | 35118 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .060 | 35154 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .090 | 35119 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .120 | 35120 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .190 | 35155 |
| 3/4 | 1-5/8 | 4 | 3/4 | .030 | 35121 |
| 3/4 | 1-5/8 | 4 | 3/4 | .060 | 35156 |
| 3/4 | 1-5/8 | 4 | 3/4 | .090 | 35122 |
| 3/4 | 1-5/8 | 4 | 3/4 | .120 | 35123 |
| 3/4 | 1-5/8 | 4 | 3/4 | .190 | 35157 |
| 3/4 | 1-5/8 | 4 | 3/4 | .250 | 35158 |
| 1 | 2-5/8 | 6 | 1 | .030 | 35124 |
| 1 | 2-5/8 | 6 | 1 | .060 | 35159 |
| 1 | 2-5/8 | 6 | 1 | .090 | 35125 |
| 1 | 2-5/8 | 6 | 1 | .120 | 35126 |
| 1 | 2-5/8 | 6 | 1 | .190 | 35160 |
| 1 | 2-5/8 | 6 | 1 | .250 | 35161 |

- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Eccentric relief provides superior strength and smoother surface finish
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



51L
FRACTIONAL SERIES



- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Eccentric relief provides superior strength and smoother surface finish
- Necked design with blended diameter transitions provide clearance to reach
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

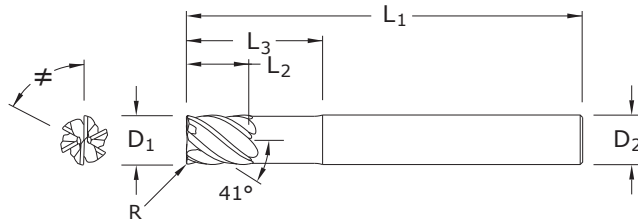
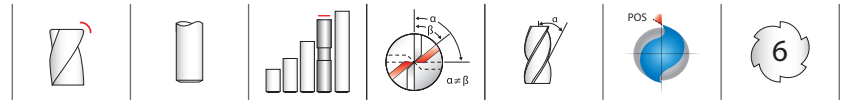
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | REACH L_3 | EDP NO. TI-NAMITE-X (TX) |
|---------------------------|------------------------|-------------------------|-------------------------|-------|----------------|-----------------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | | | |
| 1/4 | 3/8 | 4 | 1/4 | 1-1/8 | 35106 | |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | 35107 | |
| 1/2 | 5/8 | 4 | 1/2 | 2-1/4 | 35108 | |
| 5/8 | 3/4 | 5 | 5/8 | 2-1/2 | 35109 | |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | 35110 | |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | 35111 | |

TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$
 $D_2 = h6$

- STEELS
- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



51LC

FRACTIONAL SERIES

TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h6$

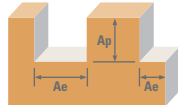
$R = +0.0000/-0.0020$

- STEELS
- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com

| inch | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | TI-NAMITE-X (TX) |
| 1/4 | 3/8 | 4 | 1/4 | 1-1/8 | .015 | 35127 |
| 1/4 | 3/8 | 4 | 1/4 | 1-1/8 | .030 | 35180 |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | .015 | 35128 |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | .030 | 35129 |
| 1/2 | 5/8 | 4 | 1/2 | 2-1/4 | .015 | 35181 |
| 1/2 | 5/8 | 4 | 1/2 | 2-1/4 | .030 | 35130 |
| 1/2 | 5/8 | 4 | 1/2 | 2-1/4 | .060 | 35182 |
| 1/2 | 5/8 | 4 | 1/2 | 2-1/4 | .090 | 35131 |
| 1/2 | 5/8 | 4 | 1/2 | 2-1/4 | .120 | 35132 |
| 5/8 | 3/4 | 5 | 5/8 | 2-1/2 | .015 | 35183 |
| 5/8 | 3/4 | 5 | 5/8 | 2-1/2 | .030 | 35133 |
| 5/8 | 3/4 | 5 | 5/8 | 2-1/2 | .060 | 35184 |
| 5/8 | 3/4 | 5 | 5/8 | 2-1/2 | .090 | 35134 |
| 5/8 | 3/4 | 5 | 5/8 | 2-1/2 | .120 | 35135 |
| 5/8 | 3/4 | 5 | 5/8 | 2-1/2 | .190 | 35185 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .030 | 35136 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .060 | 35186 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .090 | 35137 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .120 | 35138 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .190 | 35187 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .250 | 35188 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .030 | 35139 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .060 | 35189 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .090 | 35140 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .120 | 35141 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .190 | 35190 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .250 | 35191 |

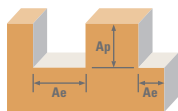
- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Eccentric relief provides superior strength and smoother surface finish
- Necked design with blended diameter transitions provide clearance to reach
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)



Series
51, 51CR, 51L,
51LC

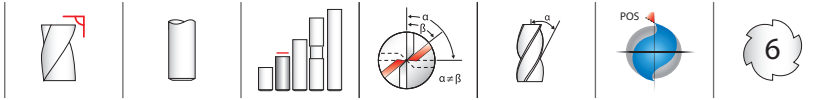
| Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | |
|--|---|---------------------|---------------------|------------|-----------------------------------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | Profile | ≤ 0.1 | ≤ 1 | 720 | RPM | 11002 | 7334 | 5501 | 4401 | 3667 | 2750 |
| | | | | | (576-864) | Fz | 0.0020 | 0.0035 | 0.0050 | 0.0055 | 0.0061 | 0.0071 |
| | | | | | Feed (ipm) | 132 | 154 | 165 | 145 | 134 | 117 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 915 | RPM | 13981 | 9321 | 6991 | 5592 | 4660 | 3495 |
| | | | | | (732-1098) | Fz | 0.0028 | 0.0053 | 0.0070 | 0.0077 | 0.0085 | 0.0100 |
| | | | | | Feed (ipm) | 235 | 296 | 294 | 258 | 238 | 210 | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | Profile | ≤ 0.1 | ≤ 1 | 490 | RPM | 7487 | 4991 | 3744 | 2995 | 2496 | 1872 |
| | | | | | (392-588) | Fz | 0.0015 | 0.0029 | 0.0038 | 0.0042 | 0.0046 | 0.0054 |
| | | | | | Feed (ipm) | 67 | 87 | 85 | 75 | 69 | 61 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 620 | RPM | 9474 | 6316 | 4737 | 3789 | 3158 | 2368 |
| | | | | | (496-744) | Fz | 0.0021 | 0.0039 | 0.0052 | 0.0057 | 0.0062 | 0.0073 |
| | | | | | Feed (ipm) | 119 | 148 | 148 | 130 | 117 | 104 | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | Profile | ≤ 0.1 | ≤ 1 | 240 | RPM | 3667 | 2445 | 1834 | 1467 | 1222 | 917 |
| | | | | | (192-288) | Fz | 0.0012 | 0.0023 | 0.0030 | 0.0034 | 0.0037 | 0.0043 |
| | | | | | Feed (ipm) | 26 | 34 | 33 | 30 | 27 | 24 | |
| | HSM | ≤ 0.05 | ≤ 2 | 305 | RPM | 4660 | 3107 | 2330 | 1864 | 1553 | 1165 | |
| | | | | (244-366) | Fz | 0.0017 | 0.0032 | 0.0042 | 0.0046 | 0.0050 | 0.0059 | |
| | | | | Feed (ipm) | 48 | 60 | 59 | 51 | 47 | 41 | | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | Profile | ≤ 0.1 | ≤ 1 | 510 | RPM | 7793 | 5195 | 3896 | 3117 | 2598 | 1948 |
| | | | | | (459-561) | Fz | 0.0015 | 0.0028 | 0.0038 | 0.0041 | 0.0045 | 0.0053 |
| | | | | | Feed (ipm) | 70 | 87 | 89 | 77 | 70 | 62 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 650 | RPM | 9932 | 6621 | 4966 | 3973 | 3311 | 2483 |
| | | | | | (585-715) | Fz | 0.0021 | 0.0038 | 0.0051 | 0.0056 | 0.0061 | 0.0072 |
| | | | | | Feed (ipm) | 125 | 151 | 152 | 133 | 121 | 107 | |
| | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | Profile | ≤ 0.1 | ≤ 1 | 350 | RPM | 5348 | 3565 | 2674 | 2139 | 1783 | 1337 |
| | | | | | (315-385) | Fz | 0.0012 | 0.0023 | 0.0030 | 0.0033 | 0.0036 | 0.0042 |
| | | | | | Feed (ipm) | 39 | 49 | 48 | 42 | 39 | 34 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 450 | RPM | 6876 | 4584 | 3438 | 2750 | 2292 | 1719 |
| | | | | | (405-495) | Fz | 0.0017 | 0.0032 | 0.0042 | 0.0046 | 0.0050 | 0.0059 |
| | | | | | Feed (ipm) | 70 | 88 | 87 | 76 | 69 | 61 | |
| STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | Profile | ≤ 0.1 | ≤ 1 | 325 | RPM | 4966 | 3311 | 2483 | 1986 | 1655 | 1242 | |
| | | | | (293-358) | Fz | 0.0012 | 0.0023 | 0.0030 | 0.0033 | 0.0036 | 0.0042 | |
| | | | | Feed (ipm) | 36 | 46 | 45 | 39 | 36 | 31 | | |
| | HSM | ≤ 0.05 | ≤ 2 | 410 | RPM | 6265 | 4177 | 3132 | 2506 | 2088 | 1566 | |
| | | | | (369-451) | Fz | 0.0017 | 0.0032 | 0.0042 | 0.0046 | 0.0050 | 0.0059 | |
| | | | | Feed (ipm) | 64 | 80 | 79 | 69 | 63 | 55 | | |

continued on next page

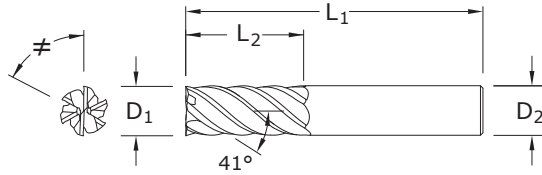


| Series 51, 51CR, 51L, 51LC Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | |
|---|-----------------------------|---------------------|---------------------|-------------|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Profile | ≤ 0.1 | ≤ 1 | 105 | RPM | 1604 | 1070 | 802 | 642 | 535 | 401 |
| | | | | | (84-126) | Fz | 0.0014 | 0.0027 | 0.0036 | 0.0039 | 0.0043 | 0.0050 |
| | | | | | Feed (ipm) | 13 | 17 | 17 | 15 | 14 | 12 | |
| | HSM | ≤ 0.05 | ≤ 2 | 130 | RPM | 1986 | 1324 | 993 | 795 | 662 | 497 | |
| | | | | (104-156) | Fz | 0.0016 | 0.0036 | 0.0048 | 0.0053 | 0.0058 | 0.0067 | |
| | | | | Feed (ipm) | 19 | 29 | 29 | 25 | 23 | 20 | | |
| SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRc | Profile | ≤ 0.1 | ≤ 1 | 80 | RPM | 1222 | 815 | 611 | 489 | 407 | 306 |
| | | | | | (64-96) | Fz | 0.0010 | 0.0018 | 0.0025 | 0.0027 | 0.0029 | 0.0034 |
| | | | | | Feed (ipm) | 7 | 9 | 9 | 8 | 7 | 6 | |
| | HSM | ≤ 0.05 | ≤ 2 | 100 | RPM | 1528 | 1019 | 764 | 611 | 509 | 382 | |
| | | | | (80-120) | Fz | 0.0013 | 0.0025 | 0.0034 | 0.0037 | 0.0041 | 0.0047 | |
| | | | | Feed (ipm) | 12 | 15 | 16 | 14 | 13 | 11 | | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRc | Profile | ≤ 0.1 | ≤ 1 | 280 | RPM | 4278 | 2852 | 2139 | 1711 | 1426 | 1070 |
| | | | | | (224-336) | Fz | 0.0010 | 0.0018 | 0.0025 | 0.0027 | 0.0029 | 0.0034 |
| | | | | | Feed (ipm) | 26 | 31 | 32 | 28 | 25 | 22 | |
| | HSM | ≤ 0.05 | ≤ 2 | 355 | RPM | 5424 | 3616 | 2712 | 2170 | 1808 | 1356 | |
| | | | | (284-426) | Fz | 0.0013 | 0.0025 | 0.0034 | 0.0037 | 0.0041 | 0.0047 | |
| | | | | Feed (ipm) | 42 | 54 | 55 | 48 | 44 | 38 | | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Profile | ≤ 0.1 | ≤ 1 | 155 | RPM | 2368 | 1579 | 1184 | 947 | 789 | 592 |
| | | | | | (124-186) | Fz | 0.0010 | 0.0018 | 0.0025 | 0.0027 | 0.0029 | 0.0034 |
| | | | | | Feed (ipm) | 14 | 17 | 18 | 15 | 14 | 12 | |
| | HSM | ≤ 0.05 | ≤ 2 | 200 | RPM | 3056 | 2037 | 1528 | 1222 | 1019 | 764 | |
| | | | | (160-240) | Fz | 0.0013 | 0.0025 | 0.0034 | 0.0037 | 0.0041 | 0.0047 | |
| | | | | Feed (ipm) | 24 | 31 | 31 | 27 | 25 | 22 | | |

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
 rpm = Vc x 3.82 / D₁
 ipm = Fz x 6 x rpm
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



51M
METRIC SERIES



- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Eccentric relief provides superior strength and smoother surface finish
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

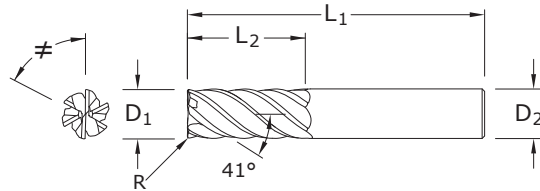
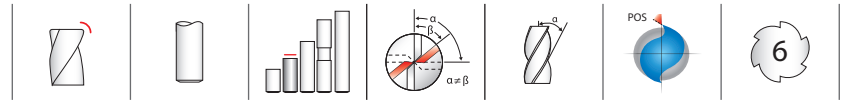
| mm | | | | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | TI-NAMITE-X (TX) |
| 6,0 | 19,0 | 63,0 | 6,0 | 45100 |
| 8,0 | 20,0 | 63,0 | 8,0 | 45101 |
| 10,0 | 22,0 | 75,0 | 10,0 | 45102 |
| 12,0 | 26,0 | 83,0 | 12,0 | 45103 |
| 16,0 | 32,0 | 92,0 | 16,0 | 45104 |
| 20,0 | 38,0 | 104,0 | 20,0 | 45105 |

TOLERANCES (mm)

D₁ = +0,000/-0,050
D₂ = h6

- STEELS
- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



51MCR

METRIC SERIES

TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h6$

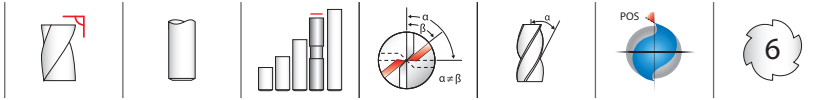
$R = +0,000/-0,050$

- STEELS
- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

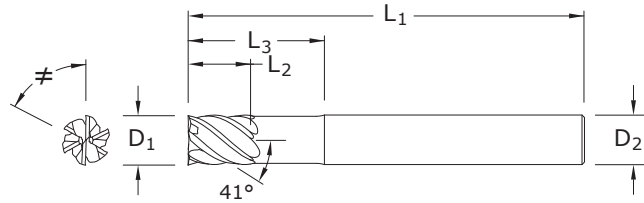
For patent information visit www.ksptpatents.com

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | mm | | CORNER RADIUS R | EDP NO. TI-NAMITE-X (TX) |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|-----------------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | | |
| 6,0 | 19,0 | 63,0 | 6,0 | 0,5 | 45112 |
| 6,0 | 19,0 | 63,0 | 6,0 | 1,0 | 45170 |
| 6,0 | 19,0 | 63,0 | 6,0 | 1,5 | 45171 |
| 8,0 | 20,0 | 63,0 | 8,0 | 0,5 | 45113 |
| 8,0 | 20,0 | 63,0 | 8,0 | 1,0 | 45114 |
| 8,0 | 20,0 | 63,0 | 8,0 | 1,2 | 45150 |
| 8,0 | 20,0 | 63,0 | 8,0 | 1,5 | 45172 |
| 8,0 | 20,0 | 63,0 | 8,0 | 2,0 | 45173 |
| 10,0 | 22,0 | 75,0 | 10,0 | 0,5 | 45174 |
| 10,0 | 22,0 | 75,0 | 10,0 | 1,0 | 45115 |
| 10,0 | 22,0 | 75,0 | 10,0 | 1,5 | 45116 |
| 10,0 | 22,0 | 75,0 | 10,0 | 2,0 | 45117 |
| 10,0 | 22,0 | 75,0 | 10,0 | 2,5 | 45175 |
| 12,0 | 26,0 | 83,0 | 12,0 | 0,5 | 45176 |
| 12,0 | 26,0 | 83,0 | 12,0 | 0,76 | 45177 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,0 | 45118 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,5 | 45119 |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,0 | 45120 |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,5 | 45178 |
| 12,0 | 26,0 | 83,0 | 12,0 | 3,0 | 45179 |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,0 | 45121 |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,5 | 45122 |
| 16,0 | 32,0 | 92,0 | 16,0 | 2,0 | 45123 |
| 16,0 | 32,0 | 92,0 | 16,0 | 2,5 | 45180 |
| 16,0 | 32,0 | 92,0 | 16,0 | 3,0 | 45181 |
| 16,0 | 32,0 | 92,0 | 16,0 | 4,0 | 45182 |
| 20,0 | 38,0 | 104,0 | 20,0 | 1,0 | 45124 |
| 20,0 | 38,0 | 104,0 | 20,0 | 1,5 | 45125 |
| 20,0 | 38,0 | 104,0 | 20,0 | 2,0 | 45126 |
| 20,0 | 38,0 | 104,0 | 20,0 | 2,5 | 45183 |
| 20,0 | 38,0 | 104,0 | 20,0 | 3,0 | 45184 |
| 20,0 | 38,0 | 104,0 | 20,0 | 4,0 | 45185 |
| 20,0 | 38,0 | 104,0 | 20,0 | 5,0 | 45186 |

- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Eccentric relief provides superior strength and smoother surface finish
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



51ML
METRIC SERIES



- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Eccentric relief provides superior strength and smoother surface finish
- Necked design with blended diameter transitions provide clearance to reach
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

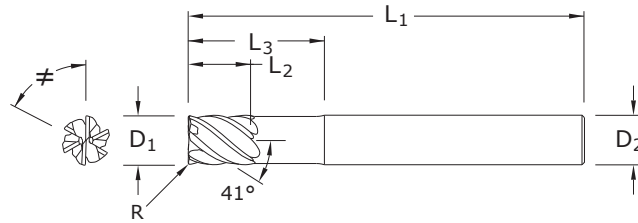
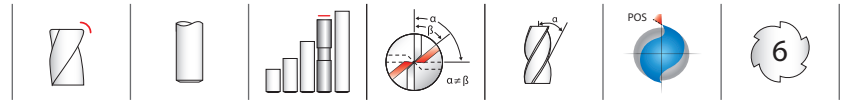
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | mm | | | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------------------------|------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | REACH L ₃ | TI-NAMITE-X (TX) |
| 6,0 | 8,0 | 75,0 | 6,0 | 32,0 | 45106 |
| 8,0 | 10,0 | 75,0 | 8,0 | 32,0 | 45107 |
| 10,0 | 12,0 | 100,0 | 10,0 | 40,0 | 45108 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 45109 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 45110 |
| 20,0 | 24,0 | 150,0 | 20,0 | 80,0 | 45111 |

TOLERANCES (mm)

D₁ = +0,000/-0,050
D₂ = h6

- STEELS
- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



51MLC

METRIC SERIES

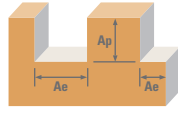
TOLERANCES (mm)
 $D_1 = +0,000/-0,050$
 $D_2 = h6$
 $R = +0,000/-0,050$














- STEELS
- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com

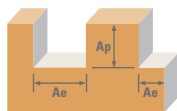
| mm | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | TI-NAMITE-X (TX) |
| 6,0 | 8,0 | 75,0 | 6,0 | 32,0 | 0,5 | 45127 |
| 6,0 | 8,0 | 75,0 | 6,0 | 32,0 | 1,0 | 45187 |
| 6,0 | 8,0 | 75,0 | 6,0 | 32,0 | 1,5 | 45188 |
| 8,0 | 10,0 | 75,0 | 8,0 | 32,0 | 0,5 | 45128 |
| 8,0 | 10,0 | 75,0 | 8,0 | 32,0 | 1,0 | 45129 |
| 8,0 | 10,0 | 75,0 | 8,0 | 32,0 | 1,5 | 45189 |
| 8,0 | 10,0 | 75,0 | 8,0 | 32,0 | 2,0 | 45190 |
| 10,0 | 12,0 | 100,0 | 10,0 | 40,0 | 0,5 | 45191 |
| 10,0 | 12,0 | 100,0 | 10,0 | 40,0 | 1,0 | 45130 |
| 10,0 | 12,0 | 100,0 | 10,0 | 40,0 | 1,5 | 45131 |
| 10,0 | 12,0 | 100,0 | 10,0 | 40,0 | 2,0 | 45132 |
| 10,0 | 12,0 | 100,0 | 10,0 | 40,0 | 2,5 | 45192 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 0,5 | 45193 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 0,76 | 45194 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 1,0 | 45133 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 1,5 | 45134 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 2,0 | 45135 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 2,5 | 45195 |
| 12,0 | 15,0 | 100,0 | 12,0 | 48,0 | 3,0 | 45196 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 1,0 | 45136 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 1,5 | 45137 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 2,0 | 45138 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 2,5 | 45197 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 3,0 | 45198 |
| 16,0 | 20,0 | 115,0 | 16,0 | 65,0 | 4,0 | 45199 |
| 20,0 | 24,0 | 150,0 | 20,0 | 80,0 | 1,0 | 45139 |
| 20,0 | 24,0 | 150,0 | 20,0 | 80,0 | 1,5 | 45140 |
| 20,0 | 24,0 | 150,0 | 20,0 | 80,0 | 2,0 | 45141 |
| 20,0 | 24,0 | 150,0 | 20,0 | 80,0 | 2,5 | 45200 |
| 20,0 | 24,0 | 150,0 | 20,0 | 80,0 | 3,0 | 45201 |
| 20,0 | 24,0 | 150,0 | 20,0 | 80,0 | 4,0 | 45202 |
| 20,0 | 24,0 | 150,0 | 20,0 | 80,0 | 5,0 | 45203 |

- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Eccentric relief provides superior strength and smoother surface finish
- Necked design with blended diameter transitions provide clearance to reach
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)



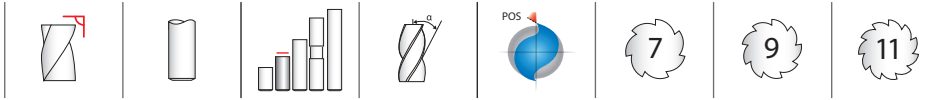
| Series 51M, 51MCR, 51ML, 51MLC Metric | Hardness | Profile  | Ae x D1 | Ap x D1 | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | |
|--|--|--|---------|---------------|---------------|------------------------------------|-------|-------|-------|-------|-------|-------|
| | | | | | | 6 | 8 | 10 | 12 | 16 | 20 | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | Profile  | ≤ 0.1 | ≤ 1 | 219 | RPM | 11633 | 8725 | 6980 | 5816 | 4362 | 3490 |
| | | | | | (176-263) | Fz | 0.048 | 0.081 | 0.101 | 0.121 | 0.142 | 0.158 |
| | | | | | Feed (mm/min) | 3350 | 4240 | 4230 | 4223 | 3717 | 3308 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 279 | RPM | 14784 | 11088 | 8870 | 7392 | 5544 | 4435 |
| | | | | | (223-335) | Fz | 0.066 | 0.113 | 0.141 | 0.169 | 0.197 | 0.220 |
| | | | | | Feed (mm/min) | 5854 | 7517 | 7504 | 7495 | 6553 | 5854 | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | Profile  | ≤ 0.1 | ≤ 1 | 149 | RPM | 7917 | 5938 | 4750 | 3958 | 2969 | 2375 |
| | | | | | (119-179) | Fz | 0.036 | 0.061 | 0.077 | 0.092 | 0.107 | 0.119 |
| | | | | | Feed (mm/min) | 1710 | 2173 | 2195 | 2185 | 1906 | 1696 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 189 | RPM | 10017 | 7513 | 6010 | 5009 | 3756 | 3005 |
| | | | | | (151-227) | Fz | 0.049 | 0.083 | 0.104 | 0.125 | 0.146 | 0.163 |
| | | | | | Feed (mm/min) | 2945 | 3741 | 3750 | 3756 | 3291 | 2939 | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | Profile  | ≤ 0.1 | ≤ 1 | 73 | RPM | 3878 | 2908 | 2327 | 1939 | 1454 | 1163 |
| | | | | | (59-88) | Fz | 0.029 | 0.049 | 0.061 | 0.073 | 0.086 | 0.096 |
| | | | | | Feed (mm/min) | 675 | 855 | 852 | 849 | 750 | 670 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 93 | RPM | 4928 | 3696 | 2957 | 2464 | 1848 | 1478 |
| | | | | | (74-112) | Fz | 0.040 | 0.069 | 0.086 | 0.103 | 0.120 | 0.134 |
| | | | | | Feed (mm/min) | 1183 | 1530 | 1526 | 1523 | 1331 | 1189 | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | Profile  | ≤ 0.1 | ≤ 1 | 155 | RPM | 8240 | 6180 | 4944 | 4120 | 3090 | 2472 |
| | | | | | (140-171) | Fz | 0.035 | 0.060 | 0.075 | 0.090 | 0.105 | 0.117 |
| | | | | | Feed (mm/min) | 1730 | 2225 | 2225 | 2225 | 1947 | 1735 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 198 | RPM | 10502 | 7877 | 6301 | 5251 | 3938 | 3151 |
| | | | | | (178-218) | Fz | 0.048 | 0.082 | 0.102 | 0.122 | 0.143 | 0.159 |
| | | | | | Feed (mm/min) | 3025 | 3875 | 3856 | 3844 | 3379 | 3006 | |
| | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | Profile  | ≤ 0.1 | ≤ 1 | 107 | RPM | 5655 | 4241 | 3393 | 2827 | 2121 | 1696 |
| | | | | | (96-117) | Fz | 0.029 | 0.049 | 0.061 | 0.073 | 0.086 | 0.096 |
| | | | | | Feed (mm/min) | 984 | 1247 | 1242 | 1238 | 1094 | 977 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 137 | RPM | 7271 | 5453 | 4362 | 3635 | 2726 | 2181 |
| | | | | | (123-151) | Fz | 0.040 | 0.069 | 0.086 | 0.103 | 0.120 | 0.134 |
| | | | | | Feed (mm/min) | 1745 | 2258 | 2251 | 2247 | 1963 | 1754 | |
| STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | Profile  | ≤ 0.1 | ≤ 1 | 99 | RPM | 5251 | 3938 | 3151 | 2626 | 1969 | 1575 | |
| | | | | (89-109) | Fz | 0.029 | 0.049 | 0.061 | 0.073 | 0.086 | 0.096 | |
| | | | | Feed (mm/min) | 914 | 1158 | 1153 | 1150 | 1016 | 907 | | |
| | HSM  | ≤ 0.05 | ≤ 2 | 125 | RPM | 6624 | 4968 | 3975 | 3312 | 2484 | 1987 | |
| | | | | (112-137) | Fz | 0.040 | 0.069 | 0.086 | 0.103 | 0.120 | 0.134 | |
| | | | | Feed (mm/min) | 1590 | 2057 | 2051 | 2047 | 1789 | 1598 | | |

continued on next page



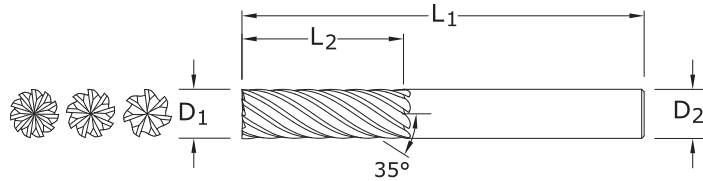
| Series 51M, 51MCR, 51ML, 51MLC Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | |
|---|-----------------------------|---------------------|---------------------|---------------|------------------------------------|------|-------|-------|-------|-------|-------|-------|
| | | | | | 6 | 8 | 10 | 12 | 16 | 20 | | |
| SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Profile | ≤ 0.1 | ≤ 1 | 32 | RPM | 1696 | 1272 | 1018 | 848 | 636 | 509 |
| | | | | | (26-38) | Fz | 0.034 | 0.057 | 0.071 | 0.085 | 0.100 | 0.110 |
| | | | | | Feed (mm/min) | 346 | 435 | 434 | 433 | 382 | 336 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 40 | RPM | 2100 | 1575 | 1260 | 1050 | 788 | 630 |
| | | | | | (32-48) | Fz | 0.046 | 0.077 | 0.097 | 0.120 | 0.140 | 0.150 |
| | | | | | Feed (mm/min) | 580 | 728 | 733 | 756 | 662 | 567 | |
| SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRc | Profile | ≤ 0.1 | ≤ 1 | 24 | RPM | 1293 | 969 | 776 | 646 | 485 | 388 |
| | | | | | (20-29) | Fz | 0.023 | 0.039 | 0.049 | 0.059 | 0.068 | 0.077 |
| | | | | | Feed (mm/min) | 178 | 227 | 228 | 229 | 198 | 179 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 30 | RPM | 1616 | 1212 | 969 | 808 | 606 | 485 |
| | | | | | (24-37) | Fz | 0.032 | 0.054 | 0.068 | 0.081 | 0.095 | 0.110 |
| | | | | | Feed (mm/min) | 310 | 393 | 396 | 393 | 345 | 320 | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRc | Profile | ≤ 0.1 | ≤ 1 | 85 | RPM | 4524 | 3393 | 2714 | 2262 | 1696 | 1357 |
| | | | | | (68-102) | Fz | 0.023 | 0.039 | 0.049 | 0.059 | 0.068 | 0.077 |
| | | | | | Feed (mm/min) | 624 | 794 | 798 | 801 | 692 | 627 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 108 | RPM | 5736 | 4302 | 3441 | 2868 | 2151 | 1721 |
| | | | | | (87-130) | Fz | 0.032 | 0.054 | 0.068 | 0.081 | 0.095 | 0.110 |
| | | | | | Feed (mm/min) | 1101 | 1394 | 1404 | 1394 | 1226 | 1136 | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Profile | ≤ 0.1 | ≤ 1 | 47 | RPM | 2504 | 1878 | 1503 | 1252 | 939 | 751 |
| | | | | | (38-57) | Fz | 0.023 | 0.039 | 0.049 | 0.059 | 0.068 | 0.077 |
| | | | | | Feed (mm/min) | 346 | 440 | 442 | 443 | 383 | 347 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 61 | RPM | 3231 | 2424 | 1939 | 1616 | 1212 | 969 |
| | | | | | (49-73) | Fz | 0.032 | 0.054 | 0.068 | 0.081 | 0.095 | 0.110 |
| | | | | | Feed (mm/min) | 620 | 785 | 791 | 785 | 691 | 640 | |

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 6 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



66
FRACTIONAL SERIES

- Heavy core and rigid design allow for straight walls
- High flute count design results in smoother cutting performance and enhanced tool life in precise finishing applications
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



| inch | | | | | | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|---------------|--|-------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | NO. OF FLUTES | | TI-NAMITE-X |
| 3/16 | 5/8 | 2 | 3/16 | 7 | | 36620 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 7 | | 36621 |
| 3/8 | 1 | 3 | 3/8 | 7 | | 36622 |
| 1/2 | 1-1/4 | 3 | 1/2 | 9 | | 36623 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | 9 | | 36624 |
| 3/4 | 1-5/8 | 4 | 3/4 | 11 | | 36625 |
| 1 | 2 | 6 | 1 | 11 | | 36626 |

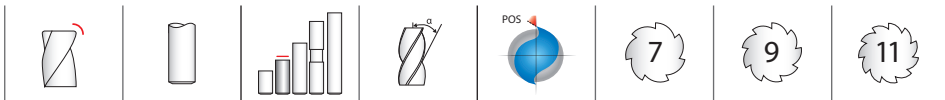
Neck Option Available

TOLERANCES (inch)

D₁ = +0.0000/-0.0020
D₂ = h₆

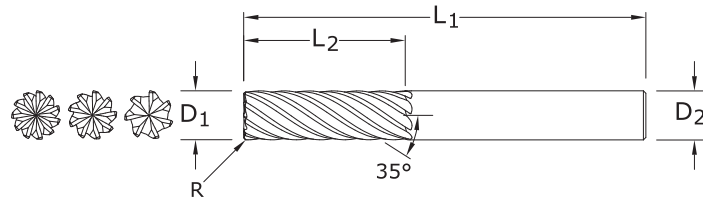
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



66CR
FRACTIONAL SERIES

- Heavy core and rigid design allow for straight walls
- High flute count design results in smoother cutting performance and enhanced tool life in precise finishing applications
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



| inch | | | | | | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------|---------------|-------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | NO. OF FLUTES | TI-NAMITE-X |
| 3/16 | 5/8 | 2 | 3/16 | .010 | 7 | 36627 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .015 | 7 | 36628 |
| 3/8 | 1 | 3 | 3/8 | .015 | 7 | 36629 |
| 1/2 | 1-1/4 | 3 | 1/2 | .030 | 9 | 36630 |
| 1/2 | 1-1/4 | 3 | 1/2 | .090 | 9 | 36631 |
| 1/2 | 1-1/4 | 3 | 1/2 | .120 | 9 | 36632 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .030 | 9 | 36633 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .090 | 9 | 36634 |
| 5/8 | 1-5/8 | 3-1/2 | 5/8 | .120 | 9 | 36635 |
| 3/4 | 1-5/8 | 4 | 3/4 | .030 | 11 | 36636 |
| 3/4 | 1-5/8 | 4 | 3/4 | .090 | 11 | 36637 |
| 3/4 | 1-5/8 | 4 | 3/4 | .120 | 11 | 36638 |
| 1 | 2 | 6 | 1 | .030 | 11 | 36639 |
| 1 | 2 | 6 | 1 | .090 | 11 | 36640 |
| 1 | 2 | 6 | 1 | .120 | 11 | 36641 |

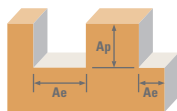
Neck Option Available












TOLERANCES (inch)

D₁ = +0.0000/-0.0020
D₂ = h₆
R = +0.0000/-0.0020

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

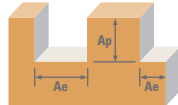
For patent information visit www.ksptpatents.com



| Series | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|----------|--|--|---------------------|-----------|-----------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | Profile  | ≤ 0.05 | ≤ 1 | 635 | RPM | 12937 | 9703 | 6469 | 4851 | 3881 | 3234 | 2426 |
| | | | | | (508-762) | Fz | 0.0008 | 0.0012 | 0.0022 | 0.0030 | 0.0037 | 0.0038 | 0.0042 |
| | | | | | | Feed (ipm) | 72.4 | 81.5 | 99.6 | 131.0 | 129.2 | 135.2 | 112.1 |
| | | Finish  | ≤ 0.02 | ≤ 2 | 762 | RPM | 15524 | 11643 | 7762 | 5822 | 4657 | 3881 | 2911 |
| | | | | | (610-914) | Fz | 0.0006 | 0.0010 | 0.0018 | 0.0024 | 0.0030 | 0.0030 | 0.0034 |
| | | | | | | Feed (ipm) | 69.5 | 78.2 | 95.6 | 125.7 | 124.1 | 129.8 | 107.6 |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | Profile  | ≤ 0.05 | ≤ 1 | 360 | RPM | 7334 | 5501 | 3667 | 2750 | 2200 | 1834 | 1375 |
| | | | | | (288-432) | Fz | 0.0006 | 0.0009 | 0.0017 | 0.0023 | 0.0029 | 0.0030 | 0.0032 |
| | | | | | | Feed (ipm) | 30.8 | 34.7 | 43.6 | 56.9 | 57.4 | 60.5 | 48.4 |
| | | Finish  | ≤ 0.02 | ≤ 2 | 432 | RPM | 8801 | 6601 | 4401 | 3300 | 2640 | 2200 | 1650 |
| | | | | | (346-518) | Fz | 0.0005 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0026 |
| | | | | | | Feed (ipm) | 29.6 | 33.3 | 41.9 | 54.7 | 55.1 | 58.1 | 46.5 |
| H | Profile  | ≤ 0.05 | ≤ 1 | 290 | RPM | 5908 | 4431 | 2954 | 2216 | 1772 | 1477 | 1108 | |
| | | | | (232-348) | Fz | 0.0004 | 0.0006 | 0.0012 | 0.0016 | 0.0020 | 0.0021 | 0.0022 | |
| | | | | | Feed (ipm) | 16.5 | 18.6 | 24.8 | 31.9 | 31.9 | 34.1 | 26.8 | |
| | Finish  | ≤ 0.02 | ≤ 2 | 348 | RPM | 7090 | 5317 | 3545 | 2659 | 2127 | 1772 | 1329 | |
| | | | | (278-418) | Fz | 0.0003 | 0.0005 | 0.0010 | 0.0013 | 0.0016 | 0.0017 | 0.0018 | |
| | | | | | Feed (ipm) | 15.9 | 17.9 | 23.8 | 30.6 | 30.6 | 32.8 | 25.7 | |
| K | CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | Profile  | ≤ 0.05 | ≤ 1 | 705 | RPM | 14363 | 10772 | 7182 | 5386 | 4309 | 3591 | 2693 |
| | | | | | (564-846) | Fz | 0.0008 | 0.0012 | 0.0022 | 0.0030 | 0.0037 | 0.0038 | 0.0042 |
| | | | | | | Feed (ipm) | 80.4 | 90.5 | 110.6 | 145.4 | 143.5 | 150.1 | 124.4 |
| | | Finish  | ≤ 0.02 | ≤ 2 | 846 | RPM | 17236 | 12927 | 8618 | 6463 | 5171 | 4309 | 3232 |
| | | | | | (677-1015) | Fz | 0.0006 | 0.0010 | 0.0018 | 0.0024 | 0.0030 | 0.0030 | 0.0034 |
| | | | | | | Feed (ipm) | 77.2 | 86.9 | 106.2 | 139.6 | 137.7 | 144.1 | 119.4 |
| | CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | Profile  | ≤ 0.05 | ≤ 1 | 540 | RPM | 11002 | 8251 | 5501 | 4126 | 3300 | 2750 | 2063 |
| | | | | | (432-648) | Fz | 0.0006 | 0.0009 | 0.0017 | 0.0023 | 0.0029 | 0.0030 | 0.0032 |
| | | | | | | Feed (ipm) | 46.2 | 52.0 | 65.5 | 85.4 | 86.1 | 90.8 | 72.6 |
| | | Finish  | ≤ 0.02 | ≤ 2 | 648 | RPM | 13202 | 9901 | 6601 | 4951 | 3961 | 3300 | 2475 |
| | | | | | (518-778) | Fz | 0.0005 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0026 |
| | | | | | | Feed (ipm) | 44.4 | 49.9 | 62.8 | 82.0 | 82.7 | 87.1 | 69.7 |
| M | Profile  | ≤ 0.05 | ≤ 1 | 560 | RPM | 11409 | 8557 | 5705 | 4278 | 3423 | 2852 | 2139 | |
| | | | | (448-672) | Fz | 0.0006 | 0.0009 | 0.0017 | 0.0023 | 0.0029 | 0.0030 | 0.0032 | |
| | | | | | Feed (ipm) | 47.9 | 53.9 | 67.9 | 88.6 | 89.3 | 94.1 | 75.3 | |
| | Finish  | ≤ 0.02 | ≤ 2 | 448 | RPM | 9127 | 6845 | 4564 | 3423 | 2738 | 2282 | 1711 | |
| | | | | (358-538) | Fz | 0.0005 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0026 | |
| | | | | | Feed (ipm) | 30.7 | 34.5 | 43.4 | 56.7 | 57.2 | 60.2 | 48.2 | |

continued on next page

FRACTIONAL Multi-Carb



| Series 66, 66CR Fractional | Hardness | Profile Ae x D ₁ | Finish Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | |
|---|-----------------------------|--------------------------------|-------------------------------|-------------|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | |
| M STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | ≤ 275 Bhn or ≤ 28 HRc | Profile ≤ 0.05 | ≤ 1 | 385 | RPM | 7844 | 5883 | 3922 | 2941 | 2353 | 1961 | 1471 |
| | | | | (308-462) | Fz | 0.0005 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0026 |
| | | | | Feed (ipm) | 27.5 | 28.8 | 38.4 | 47.7 | 48.7 | 51.8 | 42.1 | |
| | | Finish ≤ 0.02 | ≤ 2 | 462 | RPM | 9412 | 7059 | 4706 | 3530 | 2824 | 2353 | 1765 |
| | | | | (370-554) | Fz | 0.0004 | 0.0006 | 0.0011 | 0.0014 | 0.0018 | 0.0019 | 0.0021 |
| | | | | Feed (ipm) | 26.4 | 27.7 | 36.9 | 45.7 | 46.8 | 49.7 | 40.4 | |
| | ≤ 325 Bhn or ≤ 35 HRc | Profile ≤ 0.05 | ≤ 1 | 355 | RPM | 7233 | 5424 | 3616 | 2712 | 2170 | 1808 | 1356 |
| | | | | (284-426) | Fz | 0.0005 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0026 |
| | | | | Feed (ipm) | 25.3 | 26.6 | 35.4 | 43.9 | 44.9 | 47.7 | 38.8 | |
| | | Finish ≤ 0.02 | ≤ 2 | 426 | RPM | 8679 | 6509 | 4340 | 3255 | 2604 | 2170 | 1627 |
| | | | | (341-511) | Fz | 0.0004 | 0.0006 | 0.0011 | 0.0014 | 0.0018 | 0.0019 | 0.0021 |
| | | | | Feed (ipm) | 24.3 | 25.5 | 34.0 | 42.2 | 43.1 | 45.8 | 37.2 | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Profile ≤ 0.05 | ≤ 1 | 105 | RPM | 2139 | 1604 | 1070 | 802 | 642 | 535 | 401 |
| | | | | (84-126) | Fz | 0.0005 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0026 |
| | | | | Feed (ipm) | 7.5 | 7.9 | 10.5 | 13.0 | 13.3 | 14.1 | 11.5 | |
| | | Finish ≤ 0.02 | ≤ 2 | 126 | RPM | 2567 | 1925 | 1284 | 963 | 770 | 642 | 481 |
| | | | | (101-151) | Fz | 0.0004 | 0.0006 | 0.0011 | 0.0014 | 0.0018 | 0.0019 | 0.0021 |
| | | | | Feed (ipm) | 7.2 | 7.5 | 10.1 | 12.5 | 12.8 | 13.6 | 11.0 | |
| | ≤ 400 Bhn or ≤ 43 HRc | Profile ≤ 0.05 | ≤ 1 | 85 | RPM | 1732 | 1299 | 866 | 649 | 520 | 433 | 325 |
| | | | | (68-102) | Fz | 0.0003 | 0.0005 | 0.0009 | 0.0011 | 0.0014 | 0.0015 | 0.0016 |
| | | | | Feed (ipm) | 3.6 | 4.5 | 5.5 | 6.4 | 6.5 | 7.1 | 5.7 | |
| | | Finish ≤ 0.02 | ≤ 2 | 102 | RPM | 2078 | 1559 | 1039 | 779 | 623 | 520 | 390 |
| | | | | (82-122) | Fz | 0.0002 | 0.0004 | 0.0007 | 0.0009 | 0.0011 | 0.0012 | 0.0013 |
| | | | | Feed (ipm) | 3.5 | 4.4 | 5.2 | 6.2 | 6.3 | 6.9 | 5.5 | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRc | Profile ≤ 0.05 | ≤ 1 | 390 | RPM | 7946 | 5959 | 3973 | 2980 | 2384 | 1986 | 1490 |
| | | | | (312-468) | Fz | 0.0005 | 0.0008 | 0.0015 | 0.0021 | 0.0026 | 0.0027 | 0.0029 |
| | | | | Feed (ipm) | 27.8 | 33.4 | 41.7 | 56.3 | 55.8 | 59.0 | 47.5 | |
| | | Finish ≤ 0.02 | ≤ 2 | 468 | RPM | 9535 | 7151 | 4767 | 3576 | 2860 | 2384 | 1788 |
| | | | | (374-562) | Fz | 0.0004 | 0.0006 | 0.0012 | 0.0017 | 0.0021 | 0.0022 | 0.0023 |
| | | | | Feed (ipm) | 26.7 | 32.0 | 40.0 | 54.1 | 53.5 | 56.6 | 45.6 | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Profile ≤ 0.05 | ≤ 1 | 140 | RPM | 2852 | 2139 | 1426 | 1070 | 856 | 713 | 535 |
| | | | | (112-168) | Fz | 0.0005 | 0.0008 | 0.0015 | 0.0021 | 0.0026 | 0.0027 | 0.0029 |
| | | | | Feed (ipm) | 10.0 | 12.0 | 15.0 | 20.2 | 20.0 | 21.2 | 17.1 | |
| | | Finish ≤ 0.02 | ≤ 2 | 168 | RPM | 3423 | 2567 | 1711 | 1284 | 1027 | 856 | 642 |
| | | | | (134-202) | Fz | 0.0004 | 0.0006 | 0.0012 | 0.0017 | 0.0021 | 0.0022 | 0.0023 |
| | | | | Feed (ipm) | 9.6 | 11.5 | 14.4 | 19.4 | 19.2 | 20.3 | 16.4 | |

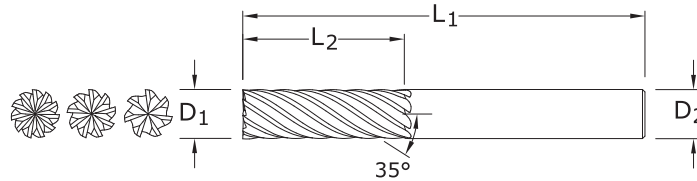
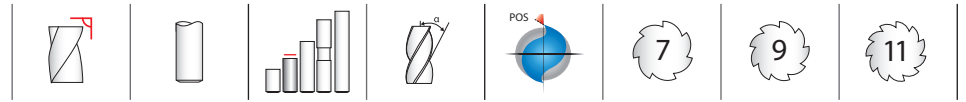
Bhn (Brinell) HRc (Rockwell C)

rpm = Vc x 3.82 / D₁

ipm = Fz x number of flutes x rpm

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



66M
METRIC SERIES

TOLERANCES (mm)

$D_1 = +0,000/-0,050$
 $D_2 = h_6$

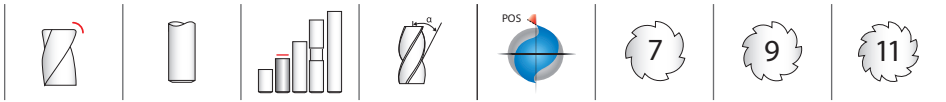
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com

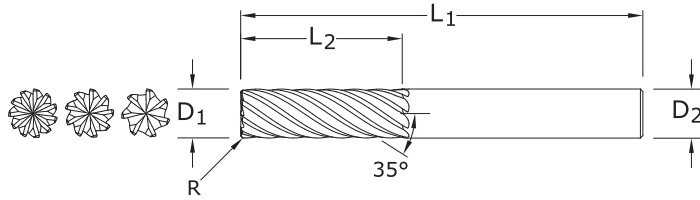
| mm | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|---------------|-------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | NO. OF FLUTES | TI-NAMITE-X |
| 6,0 | 19,0 | 63,0 | 6,0 | 7 | 46620 |
| 8,0 | 20,0 | 63,0 | 8,0 | 7 | 46621 |
| 10,0 | 22,0 | 75,0 | 10,0 | 7 | 46622 |
| 12,0 | 26,0 | 83,0 | 12,0 | 9 | 46623 |
| 16,0 | 32,0 | 92,0 | 16,0 | 9 | 46624 |
| 20,0 | 38,0 | 104,0 | 20,0 | 11 | 46625 |
| 25,0 | 38,0 | 104,0 | 25,0 | 11 | 46626 |

Neck Option Available

- Heavy core and rigid design allow for straight walls
- High flute count design results in smoother cutting performance and enhanced tool life in precise finishing applications
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



66MCR
METRIC SERIES



- Heavy core and rigid design allow for straight walls
- High flute count design results in smoother cutting performance and enhanced tool life in precise finishing applications
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | mm | | | CORNER RADIUS R | NO. OF FLUTES | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------------|--------------------|---------------|---------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | TI-NAMITE-X | | | |
| 6,0 | 19,0 | 63,0 | 6,0 | 0,5 | 7 | 46627 | |
| 6,0 | 19,0 | 63,0 | 6,0 | 1,0 | 7 | 46628 | |
| 8,0 | 20,0 | 63,0 | 8,0 | 0,5 | 7 | 46629 | |
| 8,0 | 20,0 | 63,0 | 8,0 | 1,0 | 7 | 46630 | |
| 8,0 | 20,0 | 63,0 | 8,0 | 1,5 | 7 | 46631 | |
| 10,0 | 22,0 | 75,0 | 10,0 | 0,5 | 7 | 46632 | |
| 10,0 | 22,0 | 75,0 | 10,0 | 1,0 | 7 | 46633 | |
| 10,0 | 22,0 | 75,0 | 10,0 | 1,5 | 7 | 46634 | |
| 10,0 | 22,0 | 75,0 | 10,0 | 2,0 | 7 | 46635 | |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,0 | 9 | 46636 | |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,5 | 9 | 46637 | |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,0 | 9 | 46638 | |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,5 | 9 | 46639 | |
| 12,0 | 26,0 | 83,0 | 12,0 | 3,0 | 9 | 46640 | |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,0 | 9 | 46641 | |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,5 | 9 | 46642 | |
| 16,0 | 32,0 | 92,0 | 16,0 | 2,0 | 9 | 46643 | |
| 16,0 | 32,0 | 92,0 | 16,0 | 2,5 | 9 | 46644 | |
| 16,0 | 32,0 | 92,0 | 16,0 | 3,0 | 9 | 46645 | |
| 16,0 | 32,0 | 92,0 | 16,0 | 4,0 | 9 | 46646 | |

continued on next page

Neck Option Available

TOLERANCES (mm)

D₁ = +0,000/-0,050

D₂ = h₆

R = +0,000/-0,050

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com

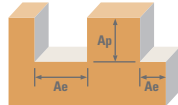
66MCR
METRIC SERIES

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | mm | | | NO. OF FLUTES | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------|---------------|-------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | | TI-NAMITE-X |
| 20,0 | 38,0 | 104,0 | 20,0 | 1,0 | 11 | 46647 |
| 20,0 | 38,0 | 104,0 | 20,0 | 1,5 | 11 | 46648 |
| 20,0 | 38,0 | 104,0 | 20,0 | 2,0 | 11 | 46649 |
| 20,0 | 38,0 | 104,0 | 20,0 | 2,5 | 11 | 46650 |
| 20,0 | 38,0 | 104,0 | 20,0 | 3,0 | 11 | 46651 |
| 20,0 | 38,0 | 104,0 | 20,0 | 4,0 | 11 | 46652 |
| 20,0 | 38,0 | 104,0 | 20,0 | 5,0 | 11 | 46653 |
| 25,0 | 38,0 | 104,0 | 25,0 | 1,0 | 11 | 46654 |
| 25,0 | 38,0 | 104,0 | 25,0 | 1,5 | 11 | 46655 |
| 25,0 | 38,0 | 104,0 | 25,0 | 2,0 | 11 | 46656 |
| 25,0 | 38,0 | 104,0 | 25,0 | 2,5 | 11 | 46657 |
| 25,0 | 38,0 | 104,0 | 25,0 | 3,0 | 11 | 46658 |
| 25,0 | 38,0 | 104,0 | 25,0 | 4,0 | 11 | 46659 |
| 25,0 | 38,0 | 104,0 | 25,0 | 5,0 | 11 | 46660 |

CONTINUED

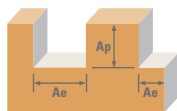
Neck Option Available

Multi-Carb



| Series 66M, 66MCR Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|---|-----------------------------|---------------------|---------------------|---------------|------------------------------------|------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | 6 | 8 | 10 | 12 | 16 | 20 | 25 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.05 | ≤ 1 | 194 | RPM | 10260 | 7695 | 6156 | 5130 | 3847 | 3078 | 2462 |
| | | | | | (155-232) | Fz | 0.029 | 0.047 | 0.059 | 0.072 | 0.095 | 0.101 | 0.105 |
| | | | | | Feed (mm/min) | 2068 | 2528 | 2528 | 3324 | 3280 | 3431 | 2844 | |
| | ≤ 275 Bhn or ≤ 28 HRc | Finish | ≤ 0.02 | ≤ 2 | 232 | RPM | 12312 | 9234 | 7387 | 6156 | 4617 | 3693 | 2955 |
| | | | | | (186-279) | Fz | 0.023 | 0.038 | 0.047 | 0.058 | 0.076 | 0.081 | 0.084 |
| | | | | | Feed (mm/min) | 1985 | 2427 | 2427 | 3191 | 3149 | 3294 | 2730 | |
| H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.05 | ≤ 1 | 110 | RPM | 5816 | 4362 | 3490 | 2908 | 2181 | 1745 | 1396 |
| | | | | | (88-132) | Fz | 0.022 | 0.036 | 0.045 | 0.055 | 0.074 | 0.080 | 0.080 |
| | | | | | Feed (mm/min) | 879 | 1108 | 1107 | 1445 | 1457 | 1536 | 1229 | |
| | ≤ 375 Bhn or ≤ 40 HRc | Finish | ≤ 0.02 | ≤ 2 | 132 | RPM | 6980 | 5235 | 4188 | 3490 | 2617 | 2094 | 1675 |
| | | | | | (105-158) | Fz | 0.017 | 0.029 | 0.036 | 0.044 | 0.059 | 0.064 | 0.064 |
| | | | | | Feed (mm/min) | 844 | 1063 | 1063 | 1387 | 1399 | 1474 | 1179 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.05 | ≤ 1 | 88 | RPM | 4686 | 3514 | 2811 | 2343 | 1757 | 1406 | 1125 |
| | | | | | (71-106) | Fz | 0.014 | 0.026 | 0.032 | 0.038 | 0.051 | 0.056 | 0.055 |
| | | | | | Feed (mm/min) | 472 | 630 | 630 | 810 | 810 | 866 | 680 | |
| | ≤ 375 Bhn or ≤ 40 HRc | Finish | ≤ 0.02 | ≤ 2 | 106 | RPM | 5623 | 4217 | 3374 | 2811 | 2108 | 1687 | 1349 |
| | | | | | (85-127) | Fz | 0.012 | 0.020 | 0.026 | 0.031 | 0.041 | 0.045 | 0.044 |
| | | | | | Feed (mm/min) | 453 | 605 | 605 | 777 | 777 | 831 | 653 | |
| M CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | ≤ 0.05 | ≤ 1 | 215 | RPM | 11391 | 8543 | 6834 | 5695 | 4271 | 3417 | 2734 |
| | | | | | (172-258) | Fz | 0.029 | 0.047 | 0.059 | 0.072 | 0.095 | 0.101 | 0.105 |
| | | | | | Feed (mm/min) | 2296 | 2807 | 2807 | 3690 | 3641 | 3809 | 3158 | |
| | ≤ 220 Bhn or ≤ 19 HRc | Finish | ≤ 0.02 | ≤ 2 | 258 | RPM | 13669 | 10252 | 8201 | 6834 | 5126 | 4101 | 3281 |
| | | | | | (206-309) | Fz | 0.023 | 0.038 | 0.047 | 0.058 | 0.076 | 0.081 | 0.084 |
| | | | | | Feed (mm/min) | 2204 | 2695 | 2694 | 3543 | 3496 | 3657 | 3031 | |
| M CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | ≤ 260 Bhn or ≤ 26 HRc | Profile | ≤ 0.05 | ≤ 1 | 165 | RPM | 8725 | 6544 | 5235 | 4362 | 3272 | 2617 | 2094 |
| | | | | | (132-198) | Fz | 0.022 | 0.036 | 0.045 | 0.055 | 0.074 | 0.080 | 0.080 |
| | | | | | Feed (mm/min) | 1319 | 1661 | 1661 | 2167 | 2186 | 2303 | 1843 | |
| | ≤ 260 Bhn or ≤ 26 HRc | Finish | ≤ 0.02 | ≤ 2 | 198 | RPM | 10470 | 7852 | 6282 | 5235 | 3926 | 3141 | 2513 |
| | | | | | (158-237) | Fz | 0.017 | 0.029 | 0.036 | 0.044 | 0.059 | 0.064 | 0.064 |
| | | | | | Feed (mm/min) | 1266 | 1595 | 1595 | 2080 | 2099 | 2211 | 1769 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.05 | ≤ 1 | 171 | RPM | 9048 | 6786 | 5429 | 4524 | 3393 | 2714 | 2171 |
| | | | | | (137-205) | Fz | 0.022 | 0.036 | 0.045 | 0.055 | 0.074 | 0.080 | 0.080 |
| | | | | | Feed (mm/min) | 1368 | 1723 | 1723 | 2247 | 2267 | 2389 | 1911 | |
| | ≤ 275 Bhn or ≤ 28 HRc | Finish | ≤ 0.02 | ≤ 2 | 137 | RPM | 7238 | 5429 | 4343 | 3619 | 2714 | 2171 | 1737 |
| | | | | | (109-164) | Fz | 0.017 | 0.029 | 0.036 | 0.044 | 0.059 | 0.064 | 0.064 |
| | | | | | Feed (mm/min) | 875 | 1103 | 1103 | 1438 | 1451 | 1529 | 1223 | |

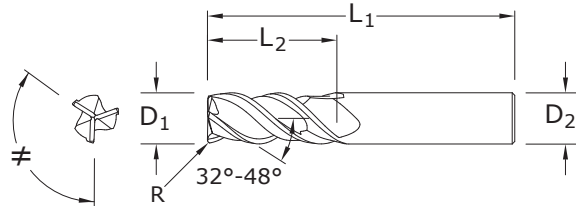
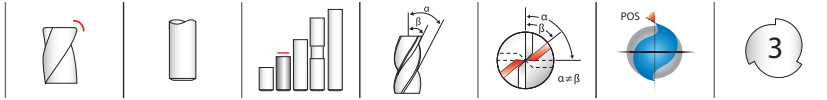
continued on next page



| Series 66M, 66MCR Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|--|---|---------------------|---------------------|---------------|------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | 6 | 8 | 10 | 12 | 16 | 20 | 25 | | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L ≤ 275 Bhn or ≤ 28 HRC | Profile | ≤ 0.05 | ≤ 1 | 117 | RPM | 6220 | 4665 | 3732 | 3110 | 2333 | 1866 | 1493 |
| | | | | | (94-141) | Fz | 0.017 | 0.030 | 0.037 | 0.043 | 0.059 | 0.064 | 0.065 |
| | | | | | Feed (mm/min) | 731 | 975 | 975 | 1209 | 1236 | 1314 | 1067 | |
| | | Finish | ≤ 0.02 | ≤ 2 | 141 | RPM | 7465 | 5598 | 4479 | 3732 | 2799 | 2239 | 1791 |
| | | | | | (113-169) | Fz | 0.013 | 0.024 | 0.030 | 0.035 | 0.047 | 0.051 | 0.052 |
| | | | | | Feed (mm/min) | 702 | 17 | 936 | 1161 | 1187 | 1261 | 1025 | |
| | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 ≤ 325 Bhn or ≤ 35 HRC | Profile | ≤ 0.05 | ≤ 1 | 108 | RPM | 5736 | 4302 | 3441 | 2868 | 2151 | 1721 | 1377 |
| | | | | | (87-130) | Fz | 0.017 | 0.030 | 0.037 | 0.043 | 0.059 | 0.064 | 0.065 |
| | | | | | Feed (mm/min) | 674 | 899 | 899 | 1115 | 1140 | 1211 | 984 | |
| | | Finish | ≤ 0.02 | ≤ 2 | 130 | RPM | 6883 | 5162 | 4130 | 3441 | 2581 | 2065 | 1652 |
| | | | | | (104-156) | Fz | 0.013 | 0.024 | 0.030 | 0.035 | 0.047 | 0.051 | 0.052 |
| | | | | | Feed (mm/min) | 647 | 863 | 863 | 1070 | 1094 | 1163 | 945 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 ≤ 300 Bhn or ≤ 32 HRC | Profile | ≤ 0.05 | ≤ 1 | 32 | RPM | 1696 | 1272 | 1018 | 848 | 636 | 509 | 407 |
| | | | | | (26-38) | Fz | 0.017 | 0.030 | 0.037 | 0.043 | 0.059 | 0.064 | 0.065 |
| | | | | | Feed (mm/min) | 199 | 266 | 213 | 330 | 337 | 358 | 291 | |
| | | Finish | ≤ 0.02 | ≤ 2 | 38 | RPM | 2036 | 1527 | 1221 | 1018 | 763 | 611 | 489 |
| | | | | | (31-46) | Fz | 0.013 | 0.024 | 0.030 | 0.035 | 0.047 | 0.051 | 0.052 |
| | | | | | Feed (mm/min) | 192 | 255 | 255 | 317 | 324 | 344 | 279 | |
| | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene ≤ 400 Bhn or ≤ 43 HRC | Profile | ≤ 0.05 | ≤ 1 | 26 | RPM | 1373 | 1030 | 824 | 687 | 515 | 412 | 330 |
| | | | | | (21-31) | Fz | 0.012 | 0.019 | 0.024 | 0.026 | 0.036 | 0.040 | 0.040 |
| | | | | | Feed (mm/min) | 115 | 138 | 138 | 163 | 166 | 181 | 145 | |
| | | Finish | ≤ 0.02 | ≤ 2 | 31 | RPM | 1648 | 1236 | 989 | 824 | 618 | 494 | 396 |
| | | | | | (25-37) | Fz | 0.010 | 0.015 | 0.019 | 0.021 | 0.029 | 0.032 | 0.032 |
| | | | | | Feed (mm/min) | 111 | 133 | 133 | 157 | 159 | 174 | 139 | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si ≤ 350 Bhn or ≤ 38 HRC | Profile | ≤ 0.05 | ≤ 1 | 119 | RPM | 6301 | 4726 | 3781 | 3151 | 2363 | 1890 | 1512 | |
| | | | | (95-143) | Fz | 0.019 | 0.032 | 0.040 | 0.050 | 0.067 | 0.072 | 0.073 | |
| | | | | Feed (mm/min) | 847 | 1059 | 1059 | 1429 | 1415 | 1497 | 1206 | | |
| | Finish | ≤ 0.02 | ≤ 2 | 143 | RPM | 7561 | 5671 | 4537 | 3781 | 2836 | 2268 | 1815 | |
| | | | | (114-171) | Fz | 0.015 | 0.026 | 0.032 | 0.040 | 0.053 | 0.058 | 0.058 | |
| | | | | Feed (mm/min) | 813 | 1016 | 1016 | 1372 | 1359 | 1437 | 1158 | | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al ≤ 440 Bhn or ≤ 47 HRC | Profile | ≤ 0.05 | ≤ 1 | 43 | RPM | 2262 | 1696 | 1357 | 1131 | 848 | 679 | 543 | |
| | | | | (34-51) | Fz | 0.019 | 0.032 | 0.040 | 0.050 | 0.067 | 0.072 | 0.073 | |
| | | | | Feed (mm/min) | 304 | 380 | 380 | 513 | 508 | 537 | 433 | | |
| | Finish | ≤ 0.02 | ≤ 2 | 51 | RPM | 2714 | 2036 | 1629 | 1357 | 1018 | 814 | 651 | |
| | | | | (41-61) | Fz | 0.015 | 0.026 | 0.032 | 0.040 | 0.053 | 0.058 | 0.058 | |
| | | | | Feed (mm/min) | 292 | 365 | 365 | 492 | 488 | 516 | 416 | | |

Bhn (Brinell) HRC (Rockwell C)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times \text{number of flutes} \times rpm$
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

FRACTIONAL Series 33



33CR FRACTIONAL SERIES

- Specially engineered step core design provides stability for aggressive ramping and rigidity when flutes are completely engaged
- Open design at axial end accommodates material flow and load reduction during machining operations
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRC (≤ 420 Bhn)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | CORNER RADIUS R | EDP NO. TI-NAMITE-A (AITiN) |
|---------------------------|------------------------|-------------------------|-------------------------|------|----------------------|--------------------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | | | |
| 1/8 | 3/8 | 2-1/2 | 1/4 | .015 | 33345 | |
| 3/16 | 9/16 | 2-1/2 | 1/4 | .015 | 33346 | |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .020 | 33347 | |
| 5/16 | 13/16 | 2-1/2 | 5/16 | .020 | 33348 | |
| 3/8 | 1 | 2-1/2 | 3/8 | .020 | 33349 | |
| 7/16 | 1-1/8 | 2-3/4 | 7/16 | .020 | 33350 | |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .030 | 33351 | |
| 5/8 | 1-1/2 | 3-1/2 | 5/8 | .040 | 33352 | |
| 3/4 | 1-3/4 | 4 | 3/4 | .040 | 33353 | |
| 1 | 2-1/4 | 5 | 1 | .040 | 33354 | |

TOLERANCES (inch)

1/8–1/4 DIAMETER

$D_1 = +0.0000/-0.0012$

$D_2 = h6$

$R = +0.0000/-0.0020$

>1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.0016$

$D_2 = h6$

$R = +0.0000/-0.0020$

>3/8–1 DIAMETER

$D_1 = +0.0000/-0.0020$

$D_2 = h6$

$R = +0.0000/-0.0020$

STEELS

STAINLESS STEELS

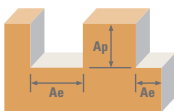
CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

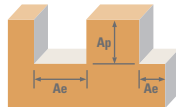
For patent information visit www.ksptpatents.com



| Series 33CR Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | |
|---|--|-----------------------------|---------------------|-------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 550 | RPM | 16808 | 8404 | 5603 | 4202 | 3362 | 2801 | 2101 | |
| | | | | | (440-660) | Fz | 0.0005 | 0.0012 | 0.0023 | 0.0031 | 0.0039 | 0.0040 | 0.0043 | |
| | | | | | Feed (ipm) | 25.2 | 30.3 | 38.7 | 39.1 | 39.3 | 33.6 | 27.1 | | |
| | | Slot | 1 | ≤ 1 | 440 | RPM | 13446 | 6723 | 4482 | 3362 | 2689 | 2241 | 1681 | |
| | | | | | (352-528) | Fz | 0.0005 | 0.0012 | 0.0023 | 0.0031 | 0.0039 | 0.0040 | 0.0043 | |
| | | | | | Feed (ipm) | 20.2 | 24.2 | 30.9 | 31.3 | 31.5 | 26.9 | 21.7 | | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 315 | RPM | 9626 | 4813 | 3209 | 2407 | 1925 | 1604 | 1203 |
| | | | | | | (252-378) | Fz | 0.0004 | 0.0009 | 0.0017 | 0.0023 | 0.0029 | 0.0030 | 0.0032 |
| | | | | | | Feed (ipm) | 11.6 | 13.0 | 16.4 | 16.6 | 16.7 | 14.4 | 11.6 | |
| | | | Slot | 1 | ≤ 1 | 250 | RPM | 7640 | 3820 | 2547 | 1910 | 1528 | 1273 | 955 |
| | | | | | | (200-300) | Fz | 0.0004 | 0.0009 | 0.0017 | 0.0023 | 0.0029 | 0.0030 | 0.0032 |
| | | | | | | Feed (ipm) | 9.2 | 10.3 | 13.0 | 13.2 | 13.3 | 11.5 | 9.2 | |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 185 | RPM | 5654 | 2827 | 1885 | 1413 | 1131 | 942 | 707 | |
| | | | | | (148-222) | Fz | 0.0003 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0025 | |
| | | | | | Feed (ipm) | 5.1 | 5.9 | 7.9 | 7.6 | 7.8 | 6.8 | 5.3 | | |
| | | Slot | 1 | ≤ 1 | 145 | RPM | 4431 | 2216 | 1477 | 1108 | 886 | 739 | 554 | |
| | | | | | (116-174) | Fz | 0.0003 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0025 | |
| | | | | | Feed (ipm) | 4.0 | 4.7 | 6.2 | 6.0 | 6.1 | 5.3 | 4.2 | | |
| K CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 445 | RPM | 13599 | 6800 | 4533 | 3400 | 2720 | 2267 | 1700 | |
| | | | | | (356-534) | Fz | 0.0004 | 0.0011 | 0.0021 | 0.0028 | 0.0035 | 0.0036 | 0.0039 | |
| | | | | | Feed (ipm) | 14.3 | 22.4 | 28.6 | 28.6 | 28.6 | 24.5 | 19.9 | | |
| | | Slot | 1 | ≤ 1 | 355 | RPM | 10849 | 5424 | 3616 | 2712 | 2170 | 1808 | 1356 | |
| | | | | | (284-426) | Fz | 0.0004 | 0.0011 | 0.0021 | 0.0028 | 0.0035 | 0.0036 | 0.0039 | |
| | | | | | Feed (ipm) | 11.4 | 17.9 | 22.8 | 22.8 | 22.8 | 19.5 | 15.9 | | |
| | CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | ≤ 260 Bhn or ≤ 26 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 340 | RPM | 10390 | 5195 | 3463 | 2598 | 2078 | 1732 | 1299 |
| | | | | | | (272-408) | Fz | 0.0003 | 0.0008 | 0.0016 | 0.0021 | 0.0026 | 0.0027 | 0.0029 |
| | | | | | | Feed (ipm) | 9.4 | 12.5 | 16.6 | 16.4 | 16.2 | 14.0 | 11.3 | |
| | | | Slot | 1 | ≤ 1 | 270 | RPM | 8251 | 4126 | 2750 | 2063 | 1650 | 1375 | 1031 |
| | | | | | | (216-324) | Fz | 0.0003 | 0.0008 | 0.0016 | 0.0021 | 0.0026 | 0.0027 | 0.0029 |
| | | | | | | Feed (ipm) | 7.4 | 9.9 | 13.2 | 13.0 | 12.9 | 11.1 | 9.0 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 490 | RPM | 14974 | 7487 | 4991 | 3744 | 2995 | 2496 | 1872 | |
| | | | | | (392-588) | Fz | 0.0004 | 0.0010 | 0.0019 | 0.0025 | 0.0031 | 0.0032 | 0.0035 | |
| | | | | | Feed (ipm) | 17.1 | 22.5 | 28.5 | 28.1 | 27.9 | 24.0 | 19.7 | | |
| | | Slot | 1 | ≤ 1 | 390 | RPM | 11918 | 5959 | 3973 | 2980 | 2384 | 1986 | 1490 | |
| | | | | | (312-468) | Fz | 0.0004 | 0.0010 | 0.0019 | 0.0025 | 0.0031 | 0.0032 | 0.0035 | |
| | | | | | Feed (ipm) | 13.6 | 17.9 | 22.6 | 22.3 | 22.2 | 19.1 | 15.6 | | |

continued on next page

FRACTIONAL Series 33



| Series 33CR Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | |
|---|--|-----------------------------|---------------------|-------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | | |
| M STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 340 | RPM | 10390 | 5195 | 3463 | 2598 | 2078 | 1732 | 1299 | |
| | | | | | (272-408) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0025 | 0.0026 | 0.0028 | |
| | | | | | Feed (ipm) | 9.4 | 12.5 | 15.6 | 15.6 | 15.6 | 13.5 | 10.9 | | |
| | | Slot | 1 | ≤ 1 | 270 | RPM | 8251 | 4126 | 2750 | 2063 | 1650 | 1375 | 1031 | |
| | | | | | (216-324) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0025 | 0.0026 | 0.0028 | |
| | | | | | Feed (ipm) | 7.4 | 9.9 | 12.4 | 12.4 | 12.4 | 10.7 | 8.7 | | |
| | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | ≤ 325 Bhn or ≤ 35 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 310 | RPM | 9474 | 4737 | 3158 | 2368 | 1895 | 1579 | 1184 |
| | | | | | | (248-372) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0025 | 0.0026 | 0.0028 |
| | | | | | | Feed (ipm) | 8.5 | 11.4 | 14.2 | 14.2 | 14.2 | 12.3 | 9.9 | |
| | | | Slot | 1 | ≤ 1 | 250 | RPM | 7640 | 3820 | 2547 | 1910 | 1528 | 1273 | 955 |
| | | | | | | (200-300) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0025 | 0.0026 | 0.0028 |
| | | | | | | Feed (ipm) | 6.9 | 9.2 | 11.5 | 11.5 | 11.5 | 9.9 | 8.0 | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 80 | RPM | 2445 | 1222 | 815 | 611 | 489 | 407 | 306 | |
| | | | | | (64-96) | Fz | 0.0003 | 0.0007 | 0.0013 | 0.0017 | 0.0021 | 0.0022 | 0.0024 | |
| | | | | | Feed (ipm) | 1.9 | 2.6 | 3.2 | 3.1 | 3.1 | 2.7 | 2.2 | | |
| | | Slot | 1 | ≤ 1 | 65 | RPM | 1986 | 993 | 662 | 497 | 397 | 331 | 248 | |
| | | | | | (52-78) | Fz | 0.0003 | 0.0007 | 0.0013 | 0.0017 | 0.0021 | 0.0022 | 0.0024 | |
| | | | | | Feed (ipm) | 1.5 | 2.1 | 2.6 | 2.5 | 2.5 | 2.2 | 1.8 | | |
| | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 62 | RPM | 1895 | 947 | 632 | 474 | 379 | 316 | 237 |
| | | | | | | (50-74) | Fz | 0.0002 | 0.0005 | 0.0009 | 0.0012 | 0.0015 | 0.0016 | 0.0017 |
| | | | | | | Feed (ipm) | 1.1 | 1.4 | 1.7 | 1.7 | 1.7 | 1.5 | 1.2 | |
| | | | Slot | 1 | ≤ 1 | 49 | RPM | 1497 | 749 | 499 | 374 | 299 | 250 | 187 |
| | | | | | | (39-59) | Fz | 0.0002 | 0.0005 | 0.0009 | 0.0012 | 0.0015 | 0.0016 | 0.0017 |
| | | | | | | Feed (ipm) | 0.9 | 1.1 | 1.3 | 1.3 | 1.3 | 1.2 | 1.0 | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 215 | RPM | 6570 | 3285 | 2190 | 1643 | 1314 | 1095 | 821 | |
| | | | | | (172-258) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0025 | 0.0026 | 0.0028 | |
| | | | | | Feed (ipm) | 5.9 | 7.9 | 9.9 | 9.9 | 9.9 | 8.5 | 6.9 | | |
| | | Slot | 1 | ≤ 1 | 170 | RPM | 5195 | 2598 | 1732 | 1299 | 1039 | 866 | 649 | |
| | | | | | (136-204) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0025 | 0.0026 | 0.0028 | |
| | | | | | Feed (ipm) | 4.7 | 6.2 | 7.8 | 7.8 | 7.8 | 6.8 | 5.5 | | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 75 | RPM | 2292 | 1146 | 764 | 573 | 458 | 382 | 287 | |
| | | | | | (60-90) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0025 | 0.0026 | 0.0028 | |
| | | | | | Feed (ipm) | 2.1 | 2.8 | 3.4 | 3.4 | 3.4 | 3.0 | 2.4 | | |
| | | Slot | 1 | ≤ 1 | 60 | RPM | 1834 | 917 | 611 | 458 | 367 | 306 | 229 | |
| | | | | | (48-72) | Fz | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0025 | 0.0026 | 0.0028 | |
| | | | | | Feed (ipm) | 1.7 | 2.2 | 2.8 | 2.8 | 2.8 | 2.4 | 1.9 | | |

Bhn (Brinell) HRc (Rockwell C)

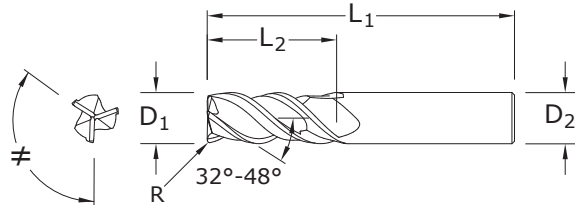
rpm = Vc x 3.82 / D₁

ipm = Fz x 3 x rpm

reduce speed and feed for materials harder than listed

reduce feed and Ae when finish milling (.02 x D₁ maximum)

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



TOLERANCES (mm)

3-6 DIAMETER

$D_1 = +0,000/-0,030$

$D_2 = h_6$

$R = +0,000/-0,050$

>6-10 DIAMETER

$D_1 = +0,000/-0,040$

$D_2 = h_6$

$R = +0,000/-0,050$

>10-20 DIAMETER

$D_1 = +0,000/-0,050$

$D_2 = h_6$

$R = +0,000/-0,050$

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

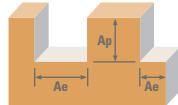
For patent information visit www.ksptpatents.com

33MCR
METRIC SERIES

| mm | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | TI-NAMITE-A (AITiN) |
| 3,0 | 9,0 | 57,0 | 6,0 | 0,3 | 43445 |
| 3,0 | 9,0 | 57,0 | 6,0 | 0,5 | 43470 |
| 4,0 | 12,0 | 57,0 | 6,0 | 0,3 | 43446 |
| 4,0 | 12,0 | 57,0 | 6,0 | 0,5 | 43471 |
| 5,0 | 15,0 | 57,0 | 6,0 | 0,3 | 43447 |
| 5,0 | 15,0 | 57,0 | 6,0 | 0,5 | 43472 |
| 6,0 | 18,0 | 57,0 | 6,0 | 0,5 | 43448 |
| 6,0 | 18,0 | 57,0 | 6,0 | 1,0 | 43473 |
| 6,0 | 18,0 | 57,0 | 6,0 | 1,5 | 43474 |
| 6,0 | 18,0 | 57,0 | 6,0 | 2,0 | 43475 |
| 8,0 | 20,0 | 63,0 | 8,0 | 0,5 | 43449 |
| 8,0 | 20,0 | 63,0 | 8,0 | 1,0 | 43476 |
| 8,0 | 20,0 | 63,0 | 8,0 | 1,5 | 43477 |
| 8,0 | 20,0 | 63,0 | 8,0 | 2,0 | 43478 |
| 10,0 | 27,0 | 72,0 | 10,0 | 0,5 | 43450 |
| 10,0 | 27,0 | 72,0 | 10,0 | 1,0 | 43479 |
| 10,0 | 27,0 | 72,0 | 10,0 | 1,5 | 43480 |
| 10,0 | 27,0 | 72,0 | 10,0 | 2,0 | 43481 |
| 10,0 | 27,0 | 72,0 | 10,0 | 2,5 | 43482 |
| 12,0 | 30,0 | 83,0 | 12,0 | 0,5 | 43451 |
| 12,0 | 30,0 | 83,0 | 12,0 | 1,0 | 43483 |
| 12,0 | 30,0 | 83,0 | 12,0 | 1,5 | 43484 |
| 12,0 | 30,0 | 83,0 | 12,0 | 2,0 | 43485 |
| 12,0 | 30,0 | 83,0 | 12,0 | 2,5 | 43486 |
| 12,0 | 30,0 | 83,0 | 12,0 | 3,0 | 43487 |
| 12,0 | 30,0 | 83,0 | 12,0 | 4,0 | 43488 |
| 16,0 | 38,0 | 92,0 | 16,0 | 1,0 | 43452 |
| 16,0 | 38,0 | 92,0 | 16,0 | 1,5 | 43489 |
| 16,0 | 38,0 | 92,0 | 16,0 | 2,0 | 43490 |
| 16,0 | 38,0 | 92,0 | 16,0 | 2,5 | 43491 |
| 16,0 | 38,0 | 92,0 | 16,0 | 3,0 | 43492 |
| 16,0 | 38,0 | 92,0 | 16,0 | 4,0 | 43493 |
| 20,0 | 46,0 | 104,0 | 20,0 | 1,0 | 43453 |
| 20,0 | 46,0 | 104,0 | 20,0 | 2,0 | 43494 |
| 20,0 | 46,0 | 104,0 | 20,0 | 2,5 | 43495 |
| 20,0 | 46,0 | 104,0 | 20,0 | 3,0 | 43496 |
| 20,0 | 46,0 | 104,0 | 20,0 | 4,0 | 43497 |

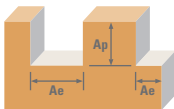
- Specially engineered step core design provides stability for aggressive ramping and rigidity when flutes are completely engaged
- Open design at axial end accommodates material flow and load reduction during machining operations
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

Series 33



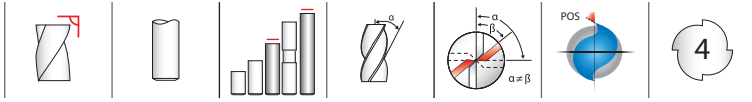
| Series 33/MCR | Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|------------------|--|-----------------------------|---------------------|---------------------|---------------|------------------------------------|-----|-------|-------|-------|-------|-------|-------|-------|
| | | | | | | 3 | 6 | 8 | 10 | 12 | 16 | 20 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 168 | RPM | 17773 | 8886 | 6665 | 5332 | 4443 | 3332 | 2666 |
| | | | | | | (134-201) | Fz | 0.012 | 0.029 | 0.049 | 0.061 | 0.074 | 0.100 | 0.107 |
| | | | | | | Feed (mm/min) | 640 | 768 | 981 | 981 | 992 | 998 | 853 | |
| | | | Slot | 1 | ≤ 1 | 134 | RPM | 14218 | 7109 | 5332 | 4265 | 3555 | 2666 | 2133 |
| | | | | | | (107-161) | Fz | 0.012 | 0.029 | 0.049 | 0.061 | 0.074 | 0.100 | 0.107 |
| | | | | | | Feed (mm/min) | 512 | 614 | 785 | 785 | 793 | 798 | 682 | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 96 | RPM | 10179 | 5089 | 3817 | 3054 | 2545 | 1909 | 1527 |
| | | | | | | (77-115) | Fz | 0.010 | 0.022 | 0.036 | 0.045 | 0.055 | 0.074 | 0.080 |
| | | | | | | Feed (mm/min) | 293 | 330 | 415 | 415 | 421 | 425 | 366 | |
| | | | Slot | 1 | ≤ 1 | 76 | RPM | 8078 | 4039 | 3029 | 2424 | 2020 | 1515 | 1212 |
| | | | | | | (61-91) | Fz | 0.010 | 0.022 | 0.036 | 0.045 | 0.055 | 0.074 | 0.080 |
| | | | | | | Feed (mm/min) | 233 | 262 | 330 | 330 | 334 | 337 | 291 | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 56 | RPM | 5978 | 2989 | 2242 | 1793 | 1495 | 1121 | 897 |
| | | | | | | (45-68) | Fz | 0.007 | 0.017 | 0.030 | 0.037 | 0.043 | 0.059 | 0.064 |
| | | | | | | Feed (mm/min) | 129 | 151 | 201 | 201 | 194 | 198 | 172 | |
| | | | Slot | 1 | ≤ 1 | 44 | RPM | 4686 | 2343 | 1757 | 1406 | 1171 | 879 | 703 |
| | | | | | | (35-53) | Fz | 0.007 | 0.017 | 0.030 | 0.037 | 0.043 | 0.059 | 0.064 |
| | | | | | | Feed (mm/min) | 101 | 118 | 157 | 157 | 152 | 155 | 135 | |
| K | CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 136 | RPM | 14380 | 7190 | 5392 | 4314 | 3595 | 2696 | 2157 |
| | | | | | | (109-163) | Fz | 0.008 | 0.026 | 0.045 | 0.056 | 0.067 | 0.090 | 0.096 |
| | | | | | | Feed (mm/min) | 362 | 569 | 725 | 725 | 725 | 725 | 621 | |
| | | | Slot | 1 | ≤ 1 | 108 | RPM | 11471 | 5736 | 4302 | 3441 | 2868 | 2151 | 1721 |
| | | | | | | (87-130) | Fz | 0.008 | 0.026 | 0.045 | 0.056 | 0.067 | 0.090 | 0.096 |
| | | | | | | Feed (mm/min) | 289 | 454 | 578 | 578 | 578 | 578 | 496 | |
| | CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | ≤ 260 Bhn or ≤ 26 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 104 | RPM | 10987 | 5493 | 4120 | 3296 | 2747 | 2060 | 1648 |
| | | | | | | (83-124) | Fz | 0.007 | 0.019 | 0.034 | 0.043 | 0.050 | 0.067 | 0.072 |
| | | | | | | Feed (mm/min) | 237 | 316 | 422 | 422 | 415 | 411 | 356 | |
| | | | Slot | 1 | ≤ 1 | 82 | RPM | 8725 | 4362 | 3272 | 2617 | 2181 | 1636 | 1309 |
| | | | | | | (66-99) | Fz | 0.007 | 0.019 | 0.034 | 0.043 | 0.050 | 0.067 | 0.072 |
| | | | | | | Feed (mm/min) | 188 | 251 | 335 | 335 | 330 | 327 | 283 | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 149 | RPM | 15834 | 7917 | 5938 | 4750 | 3958 | 2969 | 2375 |
| | | | | | | (119-179) | Fz | 0.009 | 0.024 | 0.041 | 0.051 | 0.060 | 0.079 | 0.085 |
| | | | | | | Feed (mm/min) | 433 | 570 | 722 | 722 | 712 | 707 | 608 | |
| | | | Slot | 1 | ≤ 1 | 119 | RPM | 12602 | 6301 | 4726 | 3781 | 3151 | 2363 | 1890 |
| | | | | | | (95-143) | Fz | 0.009 | 0.024 | 0.041 | 0.051 | 0.060 | 0.079 | 0.085 |
| | | | | | | Feed (mm/min) | 345 | 454 | 575 | 575 | 567 | 563 | 484 | |

continued on next page

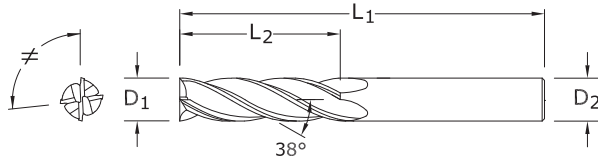


| Series 33MCR Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|---|--|---------------------|---------------------|---------------|------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | 3 | 6 | 8 | 10 | 12 | 16 | 20 | | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | Profile | ≤ 0.5 | ≤ 1.5 | 104 | RPM | 10987 | 5493 | 4120 | 3296 | 2747 | 2060 | 1648 |
| | | | | | (83-124) | Fz | 0.007 | 0.019 | 0.032 | 0.040 | 0.048 | 0.064 | 0.069 |
| | | | | | Feed (mm/min) | 237 | 316 | 396 | 396 | 395 | 396 | 343 | |
| | | Slot | 1 | ≤ 1 | 82 | RPM | 8725 | 4362 | 3272 | 2617 | 2181 | 1636 | 1309 |
| | | | | | (66-99) | Fz | 0.007 | 0.019 | 0.032 | 0.040 | 0.048 | 0.064 | 0.069 |
| | | | | | Feed (mm/min) | 188 | 251 | 314 | 314 | 314 | 314 | 272 | |
| | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | Profile | ≤ 0.5 | ≤ 1.5 | 94 | RPM | 10017 | 5009 | 3756 | 3005 | 2504 | 1878 | 1503 |
| | | | | | (76-113) | Fz | 0.007 | 0.019 | 0.032 | 0.040 | 0.048 | 0.064 | 0.069 |
| | | | | | Feed (mm/min) | 216 | 288 | 361 | 361 | 361 | 361 | 313 | |
| | | Slot | 1 | ≤ 1 | 76 | RPM | 8078 | 4039 | 3029 | 2424 | 2020 | 1515 | 1212 |
| | | | | | (61-91) | Fz | 0.007 | 0.019 | 0.032 | 0.040 | 0.048 | 0.064 | 0.069 |
| | | | | | Feed (mm/min) | 174 | 233 | 291 | 291 | 291 | 291 | 252 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | Profile | ≤ 0.5 | ≤ 1.5 | 24 | RPM | 2585 | 1293 | 969 | 776 | 646 | 485 | 388 |
| | | | | | (20-29) | Fz | 0.006 | 0.017 | 0.028 | 0.035 | 0.041 | 0.054 | 0.059 |
| | | | | | Feed (mm/min) | 48 | 65 | 81 | 65 | 79 | 78 | 68 | |
| | | Slot | 1 | ≤ 1 | 20 | RPM | 2100 | 1050 | 788 | 630 | 525 | 394 | 315 |
| | | | | | (16-24) | Fz | 0.006 | 0.017 | 0.028 | 0.035 | 0.041 | 0.054 | 0.059 |
| | | | | | Feed (mm/min) | 39 | 53 | 66 | 66 | 64 | 64 | 55 | |
| | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | Profile | ≤ 0.5 | ≤ 1.5 | 19 | RPM | 2003 | 1002 | 751 | 601 | 501 | 376 | 301 |
| | | | | | (15-23) | Fz | 0.005 | 0.012 | 0.019 | 0.024 | 0.029 | 0.038 | 0.043 |
| | | | | | Feed (mm/min) | 29 | 36 | 43 | 43 | 43 | 43 | 38 | |
| | | Slot | 1 | ≤ 1 | 15 | RPM | 1583 | 792 | 594 | 475 | 396 | 297 | 238 |
| | | | | | (12-18) | Fz | 0.005 | 0.012 | 0.019 | 0.024 | 0.029 | 0.038 | 0.043 |
| | | | | | Feed (mm/min) | 23 | 28 | 34 | 34 | 34 | 34 | 30 | |
| TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | Profile | ≤ 0.5 | ≤ 1.5 | 66 | RPM | 6947 | 3474 | 2605 | 2084 | 1737 | 1303 | 1042 | |
| | | | | (52-79) | Fz | 0.007 | 0.019 | 0.032 | 0.040 | 0.048 | 0.064 | 0.069 | |
| | | | | Feed (mm/min) | 150 | 200 | 250 | 250 | 250 | 250 | 217 | | |
| | Slot | 1 | ≤ 1 | 52 | RPM | 5493 | 2747 | 2060 | 1648 | 1373 | 1030 | 824 | |
| | | | | (41-62) | Fz | 0.007 | 0.019 | 0.032 | 0.040 | 0.048 | 0.064 | 0.069 | |
| | | | | Feed (mm/min) | 119 | 158 | 198 | 198 | 198 | 198 | 171 | | |
| TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | Profile | ≤ 0.5 | ≤ 1.5 | 23 | RPM | 2424 | 1212 | 909 | 727 | 606 | 454 | 364 | |
| | | | | (18-27) | Fz | 0.007 | 0.019 | 0.032 | 0.040 | 0.048 | 0.064 | 0.069 | |
| | | | | Feed (mm/min) | 52 | 70 | 87 | 87 | 87 | 87 | 76 | | |
| | Slot | 1 | ≤ 1 | 18 | RPM | 1939 | 969 | 727 | 582 | 485 | 364 | 291 | |
| | | | | (15-22) | Fz | 0.007 | 0.019 | 0.032 | 0.040 | 0.048 | 0.064 | 0.069 | |
| | | | | Feed (mm/min) | 42 | 56 | 70 | 70 | 70 | 70 | 60 | | |

Bhn (Brinell) HRc (Rockwell C)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 3 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



7
FRACTIONAL SERIES



- Variable pitch allows for improved chatter suppression along with improved surface finish and enhanced tool life
- Raised land and increased core diameter designed to enhance tool life and decrease tool deflection
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| | inch | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|-------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE-X |
| 1/8 | 3/4 | 2-1/4 | 1/8 | 70470 |
| 1/8 | 1 | 3 | 1/8 | 70471 |
| 3/16 | 3/4 | 2-1/2 | 3/16 | 70472 |
| 3/16 | 1-1/8 | 3 | 3/16 | 70473 |
| 1/4 | 1-1/8 | 3 | 1/4 | 70474 |
| 1/4 | 1-1/2 | 4 | 1/4 | 70475 |
| 5/16 | 1-1/8 | 3 | 5/16 | 70476 |
| 5/16 | 1-5/8 | 4 | 5/16 | 70477 |
| 3/8 | 1-1/8 | 3 | 3/8 | 70478 |
| 3/8 | 1-3/4 | 4 | 3/8 | 70479 |
| 7/16 | 2 | 4-1/2 | 7/16 | 70480 |
| 7/16 | 3 | 6 | 7/16 | 70481 |
| 1/2 | 2 | 4-1/2 | 1/2 | 70482 |
| 1/2 | 3 | 6 | 1/2 | 70483 |
| 5/8 | 2-1/4 | 5 | 5/8 | 70484 |
| 5/8 | 3 | 6 | 5/8 | 70485 |
| 3/4 | 2-1/4 | 5 | 3/4 | 70486 |
| 3/4 | 3 | 6 | 3/4 | 70487 |
| 1 | 2-1/4 | 5 | 1 | 70488 |
| 1 | 3 | 6 | 1 | 70489 |

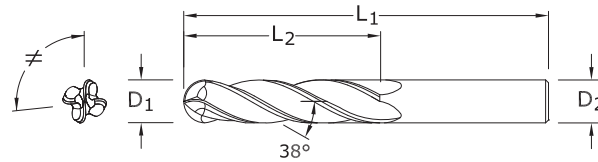
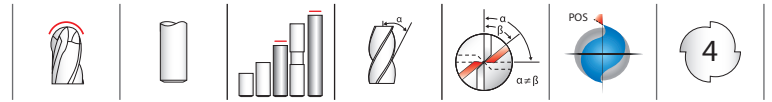
TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0010$

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

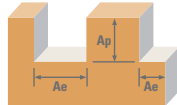
For patent information visit www.ksptpatents.com

| inch | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|-------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE-X |
| 1/8 | 3/4 | 2-1/4 | 1/8 | 70441 |
| 1/8 | 1 | 3 | 1/8 | 70442 |
| 3/16 | 3/4 | 2-1/2 | 3/16 | 70444 |
| 3/16 | 1-1/8 | 3 | 3/16 | 70445 |
| 1/4 | 1-1/8 | 3 | 1/4 | 70447 |
| 1/4 | 1-1/2 | 4 | 1/4 | 70448 |
| 5/16 | 1-1/8 | 3 | 5/16 | 70450 |
| 5/16 | 1-5/8 | 4 | 5/16 | 70451 |
| 3/8 | 1-1/8 | 3 | 3/8 | 70453 |
| 3/8 | 1-3/4 | 4 | 3/8 | 70454 |
| 7/16 | 2 | 4-1/2 | 7/16 | 70456 |
| 7/16 | 3 | 6 | 7/16 | 70457 |
| 1/2 | 2 | 4-1/2 | 1/2 | 70459 |
| 1/2 | 3 | 6 | 1/2 | 70460 |
| 5/8 | 2-1/4 | 5 | 5/8 | 70462 |
| 5/8 | 3 | 6 | 5/8 | 70463 |
| 3/4 | 2-1/4 | 5 | 3/4 | 70465 |
| 3/4 | 3 | 6 | 3/4 | 70466 |
| 1 | 2-1/4 | 5 | 1 | 70468 |
| 1 | 3 | 6 | 1 | 70469 |

7B
FRACTIONAL SERIES

- Variable pitch allows for improved chatter suppression along with improved surface finish and enhanced tool life
- Raised land and increased core diameter designed to enhance tool life and decrease tool deflection
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

FRACTIONAL Series 7



| Series 7, 7B Fractional | Hardness | Finish | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|-------------------------------|---|-----------------------------|---------------------|---------------------|-------------|--------------------------------------|------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Finish | ≤ 0.02 | ≤ 2 | 480 | RPM | 14669 | 7334 | 4890 | 3667 | 2934 | 2445 | 1834 |
| | | | | | | (384-576) | Fz | 0.0004 | 0.0010 | 0.0019 | 0.0025 | 0.0032 | 0.0033 | 0.0035 |
| | | | | | | Feed (ipm) | 23.5 | 29.3 | 37.2 | 36.7 | 37.6 | 32.3 | 25.7 | |
| P | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 375 Bhn or ≤ 40 HRc | Finish | ≤ 0.02 | ≤ 2 | 275 | RPM | 8404 | 4202 | 2801 | 2101 | 1681 | 1401 | 1051 |
| | | | | | | (220-330) | Fz | 0.0003 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0026 |
| | | | | | | Feed (ipm) | 10.1 | 11.8 | 15.7 | 15.1 | 15.5 | 13.4 | 10.9 | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Finish | ≤ 0.02 | ≤ 2 | 230 | RPM | 7029 | 3514 | 2343 | 1757 | 1406 | 1171 | 879 |
| | | | | | | (184-276) | Fz | 0.0002 | 0.0006 | 0.0012 | 0.0016 | 0.0020 | 0.0021 | 0.0022 |
| | | | | | | Feed (ipm) | 5.6 | 8.4 | 11.2 | 11.2 | 11.2 | 9.8 | 7.7 | |
| K | CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Finish | ≤ 0.02 | ≤ 2 | 605 | RPM | 18489 | 9244 | 6163 | 4622 | 3698 | 3081 | 2311 |
| | | | | | | (484-726) | Fz | 0.0006 | 0.0015 | 0.0028 | 0.0037 | 0.0046 | 0.0047 | 0.0051 |
| | | | | | | Feed (ipm) | 44.4 | 55.5 | 69.0 | 68.4 | 68.0 | 57.9 | 47.1 | |
| K | CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | ≤ 260 Bhn or ≤ 26 HRc | Finish | ≤ 0.02 | ≤ 2 | 465 | RPM | 14210 | 7105 | 4737 | 3553 | 2842 | 2368 | 1776 |
| | | | | | | (372-558) | Fz | 0.0004 | 0.0011 | 0.0021 | 0.0028 | 0.0034 | 0.0036 | 0.0039 |
| | | | | | | Feed (ipm) | 22.7 | 31.3 | 39.8 | 39.8 | 38.7 | 34.1 | 27.7 | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Finish | ≤ 0.02 | ≤ 2 | 420 | RPM | 12835 | 6418 | 4278 | 3209 | 2567 | 2139 | 1604 |
| | | | | | | (336-504) | Fz | 0.0004 | 0.0010 | 0.0019 | 0.0025 | 0.0032 | 0.0033 | 0.0035 |
| | | | | | | Feed (ipm) | 20.5 | 25.7 | 32.5 | 32.1 | 32.9 | 28.2 | 22.5 | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | ≤ 275 Bhn or ≤ 28 HRc | Finish | ≤ 0.02 | ≤ 2 | 290 | RPM | 8862 | 4431 | 2954 | 2216 | 1772 | 1477 | 1108 |
| | | | | | | (232-348) | Fz | 0.0003 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0026 |
| | | | | | | Feed (ipm) | 10.6 | 12.4 | 16.5 | 16.0 | 16.3 | 14.2 | 11.5 | |
| M | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | ≤ 325 Bhn or ≤ 35 HRc | Finish | ≤ 0.02 | ≤ 2 | 265 | RPM | 8098 | 4049 | 2699 | 2025 | 1620 | 1350 | 1012 |
| | | | | | | (212-318) | Fz | 0.0003 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0026 |
| | | | | | | Feed (ipm) | 9.7 | 11.3 | 15.1 | 14.6 | 14.9 | 13.0 | 10.5 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Finish | ≤ 0.02 | ≤ 2 | 80 | RPM | 2445 | 1222 | 815 | 611 | 489 | 407 | 306 |
| | | | | | | (64-96) | Fz | 0.0003 | 0.0007 | 0.0014 | 0.0018 | 0.0023 | 0.0024 | 0.0026 |
| | | | | | | Feed (ipm) | 2.9 | 3.4 | 4.6 | 4.4 | 4.5 | 3.9 | 3.2 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRc | Finish | ≤ 0.02 | ≤ 2 | 65 | RPM | 1986 | 993 | 662 | 497 | 397 | 331 | 248 |
| | | | | | | (52-78) | Fz | 0.0002 | 0.0006 | 0.0010 | 0.0014 | 0.0017 | 0.0018 | 0.0019 |
| | | | | | | Feed (ipm) | 1.6 | 2.4 | 2.6 | 2.8 | 2.7 | 2.4 | 1.9 | |
| S | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRc | Finish | ≤ 0.02 | ≤ 2 | 300 | RPM | 9168 | 4584 | 3056 | 2292 | 1834 | 1528 | 1146 |
| | | | | | | (240-360) | Fz | 0.0004 | 0.0011 | 0.0021 | 0.0028 | 0.0034 | 0.0036 | 0.0039 |
| | | | | | | Feed (ipm) | 14.7 | 20.2 | 25.7 | 25.7 | 24.9 | 22.0 | 17.9 | |
| S | TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Finish | ≤ 0.02 | ≤ 2 | 105 | RPM | 3209 | 1604 | 1070 | 802 | 642 | 535 | 401 |
| | | | | | | (84-126) | Fz | 0.0004 | 0.0011 | 0.0021 | 0.0028 | 0.0034 | 0.0036 | 0.0039 |
| | | | | | | Feed (ipm) | 5.1 | 7.1 | 9.0 | 9.0 | 8.7 | 7.7 | 6.3 | |

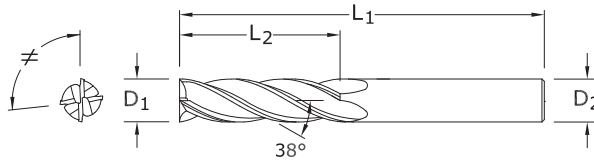
Bhn (Brinell) HRc (Rockwell C)

rpm = Vc x 3.82 / D₁

ipm = Fz x 4 x rpm

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



TOLERANCES (mm)

$D_1 = +0,000/+0,050$
 $D_2 = h_6$

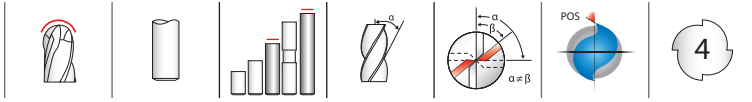
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com

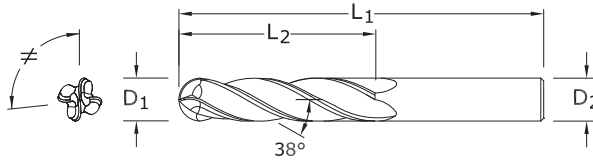
| mm | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|-------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE-X |
| 3,0 | 25,0 | 75,0 | 3,0 | 70551 |
| 4,0 | 25,0 | 75,0 | 4,0 | 70552 |
| 5,0 | 25,0 | 75,0 | 5,0 | 70553 |
| 6,0 | 25,0 | 75,0 | 6,0 | 70554 |
| 8,0 | 25,0 | 75,0 | 8,0 | 70555 |
| 10,0 | 38,0 | 100,0 | 10,0 | 70556 |
| 12,0 | 50,0 | 100,0 | 12,0 | 70557 |
| 12,0 | 75,0 | 150,0 | 12,0 | 70558 |
| 14,0 | 75,0 | 150,0 | 14,0 | 70559 |
| 16,0 | 75,0 | 150,0 | 16,0 | 70560 |
| 18,0 | 75,0 | 150,0 | 18,0 | 70561 |
| 20,0 | 75,0 | 150,0 | 20,0 | 70562 |
| 25,0 | 75,0 | 150,0 | 25,0 | 70563 |

7M
METRIC SERIES

- Variable pitch allows for improved chatter suppression along with improved surface finish and enhanced tool life
- Raised land and increased core diameter designed to enhance tool life and decrease tool deflection
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)



7MB
METRIC SERIES



- Variable pitch allows for improved chatter suppression along with improved surface finish and enhanced tool life
- Raised land and increased core diameter designed to enhance tool life and decrease tool deflection
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

| mm | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|-------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE-X |
| 3,0 | 25,0 | 75,0 | 3,0 | 70527 |
| 4,0 | 25,0 | 75,0 | 4,0 | 70529 |
| 5,0 | 25,0 | 75,0 | 5,0 | 70531 |
| 6,0 | 25,0 | 75,0 | 6,0 | 70533 |
| 8,0 | 25,0 | 75,0 | 8,0 | 70535 |
| 10,0 | 38,0 | 100,0 | 10,0 | 70537 |
| 12,0 | 50,0 | 100,0 | 12,0 | 70539 |
| 12,0 | 75,0 | 150,0 | 12,0 | 70540 |
| 14,0 | 75,0 | 150,0 | 14,0 | 70542 |
| 16,0 | 75,0 | 150,0 | 16,0 | 70544 |
| 18,0 | 75,0 | 150,0 | 18,0 | 70546 |
| 20,0 | 75,0 | 150,0 | 20,0 | 70548 |
| 25,0 | 75,0 | 150,0 | 25,0 | 70550 |

TOLERANCES (mm)

$D_1 = +0,000/+0,050$

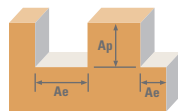
$D_2 = h_6$

BALL RADIUS

$+0,000/-0,025$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

For patent information visit www.ksptpatents.com



| Series 7M, 7MB Metric | Hardness | Finish | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | |
|-----------------------------|---|-----------------------------|---------------------|---------------------|---------------|------------------------------------|------|--------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | | 3 | 6 | 8 | 10 | 12 | 16 | 20 | 25 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 275 Bhn or ≤ 28 HRc | Finish | ≤ 0.02 | ≤ 2 | 146 | RPM | 15511 | 7755 | 5816 | 4653 | 3878 | 2908 | 2327 | 1861 |
| | | | | | | (117-176) | Fz | 0.0166 | 0.043 | 0.075 | 0.093 | 0.110 | 0.125 | 0.147 | 0.160 |
| | | | | | | Feed (mm/min) | 1030 | 1334 | 1745 | 1731 | 1706 | 1454 | 1368 | 1191 | |
| P | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 375 Bhn or ≤ 40 HRc | Finish | ≤ 0.02 | ≤ 2 | 84 | RPM | 8886 | 4443 | 3332 | 2666 | 2222 | 1666 | 1333 | 1066 |
| | | | | | | (67-101) | Fz | 0.0122 | 0.034 | 0.051 | 0.069 | 0.082 | 0.091 | 0.109 | 0.120 |
| | | | | | | Feed (mm/min) | 434 | 604 | 680 | 736 | 729 | 606 | 581 | 512 | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Finish | ≤ 0.02 | ≤ 2 | 70 | RPM | 7432 | 3716 | 2787 | 2230 | 1858 | 1394 | 1115 | 892 |
| | | | | | | (56-84) | Fz | 0.0070 | 0.019 | 0.040 | 0.043 | 0.048 | 0.057 | 0.064 | 0.070 |
| | | | | | | Feed (mm/min) | 208 | 282 | 446 | 384 | 357 | 318 | 285 | 250 | |
| K | CAST IRONS (LOW & MEDIUM ALLOY) Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Finish | ≤ 0.02 | ≤ 2 | 184 | RPM | 19550 | 9775 | 7331 | 5865 | 4887 | 3666 | 2932 | 2346 |
| | | | | | | (148-221) | Fz | 0.0132 | 0.036 | 0.052 | 0.075 | 0.089 | 0.099 | 0.117 | 0.130 |
| | | | | | | Feed (mm/min) | 1032 | 1408 | 1525 | 1759 | 1740 | 1452 | 1372 | 1220 | |
| K | CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile | ≤ 260 Bhn or ≤ 26 HRc | Finish | ≤ 0.02 | ≤ 2 | 142 | RPM | 15026 | 7513 | 5635 | 4508 | 3756 | 2817 | 2254 | 1803 |
| | | | | | | (113-170) | Fz | 0.0132 | 0.036 | 0.052 | 0.075 | 0.089 | 0.099 | 0.117 | 0.130 |
| | | | | | | Feed (mm/min) | 793 | 1082 | 1172 | 1352 | 1337 | 1116 | 1055 | 938 | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Finish | ≤ 0.02 | ≤ 2 | 128 | RPM | 13572 | 6786 | 5089 | 4072 | 3393 | 2545 | 2036 | 1629 |
| | | | | | | (102-154) | Fz | 0.0086 | 0.024 | 0.040 | 0.048 | 0.058 | 0.065 | 0.077 | 0.087 |
| | | | | | | Feed (mm/min) | 467 | 651 | 814 | 782 | 787 | 662 | 627 | 567 | |
| M | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L | ≤ 275 Bhn or ≤ 28 HRc | Finish | ≤ 0.02 | ≤ 2 | 88 | RPM | 9371 | 4686 | 3514 | 2811 | 2343 | 1757 | 1406 | 1125 |
| | | | | | | (71-106) | Fz | 0.0082 | 0.022 | 0.037 | 0.045 | 0.048 | 0.060 | 0.072 | 0.078 |
| | | | | | | Feed (mm/min) | 307 | 412 | 520 | 506 | 450 | 422 | 405 | 351 | |
| M | STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450 | ≤ 325 Bhn or ≤ 35 HRc | Finish | ≤ 0.02 | ≤ 2 | 81 | RPM | 8563 | 4282 | 3211 | 2569 | 2141 | 1606 | 1284 | 1028 |
| | | | | | | (65-97) | Fz | 0.0070 | 0.019 | 0.029 | 0.040 | 0.048 | 0.055 | 0.064 | 0.070 |
| | | | | | | Feed (mm/min) | 240 | 325 | 372 | 411 | 411 | 353 | 329 | 288 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400 | ≤ 300 Bhn or ≤ 32 HRc | Finish | ≤ 0.02 | ≤ 2 | 24 | RPM | 2585 | 1293 | 969 | 776 | 646 | 485 | 388 | 310 |
| | | | | | | (20-29) | Fz | 0.0072 | 0.019 | 0.029 | 0.037 | 0.046 | 0.053 | 0.061 | 0.085 |
| | | | | | | Feed (mm/min) | 74 | 98 | 112 | 90 | 119 | 103 | 95 | 105 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene | ≤ 400 Bhn or ≤ 43 HRc | Finish | ≤ 0.02 | ≤ 2 | 20 | RPM | 2100 | 1050 | 788 | 630 | 525 | 394 | 315 | 252 |
| | | | | | | (16-24) | Fz | 0.0075 | 0.016 | 0.021 | 0.030 | 0.038 | 0.044 | 0.051 | 0.070 |
| | | | | | | Feed (mm/min) | 63 | 67 | 66 | 76 | 80 | 69 | 64 | 71 | |
| S | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si | ≤ 350 Bhn or ≤ 38 HRc | Finish | ≤ 0.02 | ≤ 2 | 91 | RPM | 9694 | 4847 | 3635 | 2908 | 2424 | 1818 | 1454 | 1163 |
| | | | | | | (73-110) | Fz | 0.0091 | 0.024 | 0.004 | 0.005 | 0.060 | 0.070 | 0.080 | 0.088 |
| | | | | | | Feed (mm/min) | 353 | 465 | 51 | 59 | 582 | 509 | 465 | 409 | |
| S | TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al | ≤ 440 Bhn or ≤ 47 HRc | Finish | ≤ 0.02 | ≤ 2 | 32 | RPM | 3393 | 1696 | 1272 | 1018 | 848 | 636 | 509 | 407 |
| | | | | | | (26-38) | Fz | 0.0082 | 0.019 | 0.029 | 0.037 | 0.046 | 0.053 | 0.061 | 0.085 |
| | | | | | | Feed (mm/min) | 111 | 129 | 148 | 151 | 156 | 135 | 124 | 138 | |

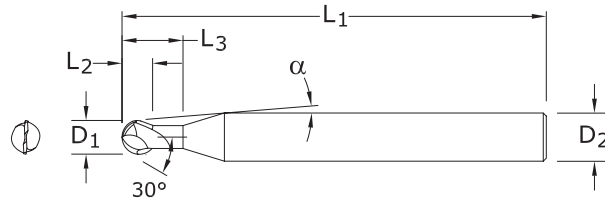
Bhn (Brinell) HRc (Rockwell C)
 rpm = (Vc x 1000) / (D₁ x 3.14)
 mm/min = Fz x 4 x rpm
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

FRACTIONAL Turbo-Carb



56B FRACTIONAL SERIES

- Short flute length and rigid design to reduce deflection
- S-Gash Ball geometry minimizes load and heat produced during the cutting process, ultimately enhancing tool life
- Ideal for machining complex contoured shapes in hardened steels
- Recommended for materials 35 to 60 HRc (327 to 654 Bhn)



| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | inch | | | | REACH L ₃ | EDP NO. Ti-NAMITE-X |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------|--|-------------------------|------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | α | | | |
| 1/32 | 1/32 | 3 | 1/4 | 8°20' | | 1/16 | 93272 |
| 1/16 | 1/16 | 3 | 1/4 | 7°40' | | 1/8 | 93273 |
| 3/32 | 3/32 | 3 | 1/4 | 6°50' | | 3/16 | 93274 |
| 1/8 | 1/8 | 3 | 1/4 | 6° | | 1/4 | 93275 |
| 3/16 | 3/16 | 3 | 1/4 | 3°35' | | 3/8 | 93276 |
| 1/4 | 1/4 | 3-1/2 | 1/4 | - | | 1/2 | 93277 |
| 5/16 | 5/16 | 4 | 5/16 | - | | 5/8 | 93278 |
| 3/8 | 3/8 | 4 | 3/8 | - | | 3/4 | 93279 |
| 1/2 | 1/2 | 4-1/2 | 1/2 | - | | 1 | 93280 |
| 5/8 | 5/8 | 5-1/2 | 5/8 | - | | 1-1/4 | 93281 |
| 3/4 | 3/4 | 6-1/2 | 3/4 | - | | 1-1/2 | 93282 |

Neck Option Available

TOLERANCES (inch)

1/32–3/32 DIAMETER

D₁ = +0.0000/–0.0010

D₂ = h₆

BALL RADIUS

+0.0000/–0.0005

>3/32–1/4 DIAMETER

D₁ = +0.0000/–0.0012

D₂ = h₆

BALL RADIUS

+0.0000/–0.0006

>1/4–3/8 DIAMETER

D₁ = +0.0000/–0.0016

D₂ = h₆

BALL RADIUS

+0.0000/–0.0008

>3/8–3/4 DIAMETER

D₁ = +0.0000/–0.0020

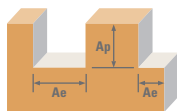
D₂ = h₆

BALL RADIUS

+0.0000/–0.0010

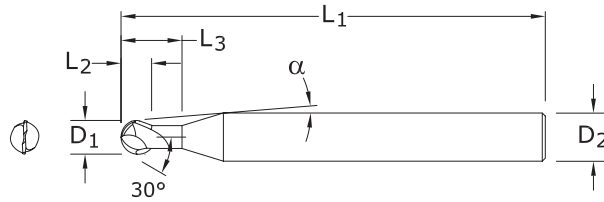
HARDENED STEELS

For patent information visit
www.ksptpatents.com



| Series | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | |
|---|---|---------------------|---------------------|------------|-----------------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/32 | 1/16 | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 3/4 | | |
| Series 56B Fractional | TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 ≤ 375 Bhn or ≤ 40 HRc | Rough | ≤ 0.4 | ≤ 0.1 | 625 | RPM | 76400 | 38200 | 19100 | 12733 | 9550 | 6367 | 4775 | 3183 |
| | | | | | (500-750) | Fz | 0.0006 | 0.0015 | 0.0030 | 0.0040 | 0.0050 | 0.0080 | 0.0100 | 0.0120 |
| | | | | | Feed (ipm) | 92 | 115 | 115 | 102 | 96 | 102 | 96 | 76 | |
| | | HSM | ≤ 0.4 | ≤ 0.03 | 950 | RPM | 116128 | 58064 | 29032 | 19355 | 14516 | 9677 | 7258 | 4839 |
| | | | | | (760-1140) | Fz | 0.0007 | 0.0017 | 0.0033 | 0.0044 | 0.0060 | 0.0088 | 0.0110 | 0.0130 |
| | | | | | Feed (ipm) | 163 | 197 | 192 | 170 | 174 | 170 | 160 | 126 | |
| | TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 ≤ 475 Bhn or ≤ 50 HRc | Rough | ≤ 0.4 | ≤ 0.05 | 750 | RPM | 91680 | 45840 | 22920 | 15280 | 11460 | 7640 | 5730 | 3820 |
| | | | | | (600-900) | Fz | 0.0005 | 0.0011 | 0.0023 | 0.0030 | 0.0038 | 0.0060 | 0.0075 | 0.0085 |
| | | | | | Feed (ipm) | 92 | 101 | 105 | 92 | 87 | 92 | 86 | 65 | |
| | | HSM | ≤ 0.4 | ≤ 0.02 | 1150 | RPM | 140576 | 70288 | 35144 | 23429 | 17572 | 11715 | 8786 | 5857 |
| | | | | | (920-1380) | Fz | 0.0006 | 0.0012 | 0.0025 | 0.0033 | 0.0042 | 0.0066 | 0.0082 | 0.0100 |
| | | | | | Feed (ipm) | 169 | 169 | 176 | 155 | 148 | 155 | 144 | 117 | |
| TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 ≤ 655 Bhn or ≤ 60 HRc | Rough | ≤ 0.4 | ≤ 0.04 | 500 | RPM | 61120 | 30560 | 15280 | 10187 | 7640 | 5093 | 3820 | 2547 | |
| | | | | (400-600) | Fz | 0.0004 | 0.0008 | 0.0017 | 0.0023 | 0.0029 | 0.0045 | 0.0057 | 0.0063 | |
| | | | | Feed (ipm) | 49 | 49 | 52 | 47 | 44 | 46 | 44 | 32 | | |
| | HSM | ≤ 0.4 | ≤ 0.01 | 1000 | RPM | 122240 | 61120 | 30560 | 20373 | 15280 | 10187 | 7640 | 5093 | |
| | | | | (800-1200) | Fz | 0.0005 | 0.0009 | 0.0019 | 0.0025 | 0.0032 | 0.0050 | 0.0063 | 0.0071 | |
| | | | | Feed (ipm) | 122 | 110 | 116 | 102 | 98 | 102 | 96 | 72 | | |

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times 2 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



56MB
METRIC SERIES

- Short flute length and rigid design to reduce deflection
- S-Gash Ball geometry minimizes load and heat produced during the cutting process, ultimately enhancing tool life
- Ideal for machining complex contoured shapes in hardened steels
- Recommended for materials 35 to 60 HRc (327 to 654 Bhn)

| mm | | | | | | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------|-------------------------|-------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | α | REACH L ₃ | Ti-NAMITE-X |
| 1,0 | 1,0 | 76,0 | 6,0 | 8°10' | 2,0 | 91349 |
| 1,5 | 1,5 | 76,0 | 6,0 | 7°45' | 3,0 | 91350 |
| 2,0 | 2,0 | 76,0 | 6,0 | 7°10' | 4,0 | 91351 |
| 2,5 | 2,5 | 76,0 | 6,0 | 6°35' | 5,0 | 91352 |
| 3,0 | 3,0 | 76,0 | 6,0 | 6° | 6,0 | 91353 |
| 4,0 | 4,0 | 76,0 | 6,0 | 4°30' | 8,0 | 91354 |
| 5,0 | 5,0 | 89,0 | 6,0 | 2°30' | 10,0 | 91355 |
| 6,0 | 6,0 | 89,0 | 6,0 | – | 12,0 | 91356 |
| 8,0 | 8,0 | 102,0 | 8,0 | – | 16,0 | 91357 |
| 10,0 | 10,0 | 102,0 | 10,0 | – | 20,0 | 91358 |
| 12,0 | 12,0 | 114,0 | 12,0 | – | 24,0 | 91359 |
| 16,0 | 16,0 | 140,0 | 16,0 | – | 32,0 | 91360 |
| 20,0 | 20,0 | 165,0 | 20,0 | – | 40,0 | 91361 |

Neck Option Available

TOLERANCES (mm)

1–2,5 DIAMETER

D₁ = +0,000/–0,025

D₂ = h₆

BALL RADIUS

+0.0000/–0.0013

>2,5–6 DIAMETER

D₁ = +0,000/–0,030

D₂ = h₆

BALL RADIUS

+0.0000/–0.0015

>6–10 DIAMETER

D₁ = +0,000/–0,040

D₂ = h₆

BALL RADIUS

+0.0000/–0.0020

>10–20 DIAMETER

D₁ = +0,000/–0,050

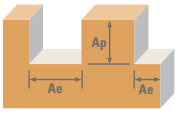
D₂ = h₆







BALL RADIUS

+0.0000/–0.0025

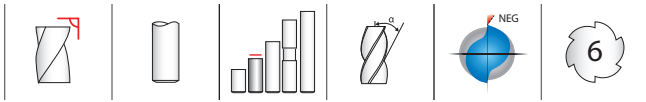
HARDENED STEELS

For patent information visit www.ksptpatents.com



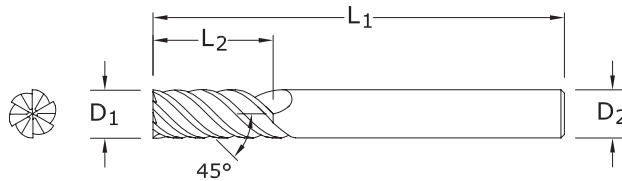
| Series 56MB Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | |
|--|---|--|---------------------|---------------|------------------------------------|-------|--------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | 1 | 1.5 | 3 | 5 | 6 | 10 | 12 | 20 | | |
| H TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 375 Bhn or ≤ 40 HRc | Rough  | ≤ 0.4 | ≤ 0.1 | 191 | RPM | 60748 | 40498 | 20249 | 12150 | 10125 | 6075 | 5062 | 3037 |
| | | | | | (153-229) | Fz | 0.015 | 0.038 | 0.076 | 0.102 | 0.127 | 0.203 | 0.254 | 0.305 |
| | | | | | Feed (mm/min) | 1822 | 3078 | 3078 | 2479 | 2572 | 2466 | 2572 | 1853 | |
| | | HSM  | ≤ 0.4 | ≤ 0.03 | 290 | RPM | 92235 | 61490 | 46117 | 18447 | 15372 | 9223 | 7686 | 4612 |
| | | | | | (232-348) | Fz | 0.018 | 0.043 | 0.084 | 0.112 | 0.117 | 0.224 | 0.279 | 0.330 |
| | | | | | Feed (mm/min) | 3320 | 5288 | 7748 | 4132 | 3597 | 4132 | 4289 | 3044 | |
| | ≤ 475 Bhn or ≤ 50 HRc | Rough  | ≤ 0.4 | ≤ 0.05 | 229 | RPM | 72833 | 48556 | 24278 | 14567 | 12139 | 7283 | 6069 | 3642 |
| | | | | | (183-275) | Fz | 0.013 | 0.028 | 0.058 | 0.076 | 0.097 | 0.152 | 0.191 | 0.216 |
| | | | | | Feed (mm/min) | 1894 | 2719 | 2816 | 2214 | 2355 | 2214 | 2319 | 1573 | |
| | | HSM  | ≤ 0.4 | ≤ 0.02 | 351 | RPM | 111636 | 74424 | 37212 | 22327 | 18606 | 11164 | 9303 | 5582 |
| | | | | | (281-421) | Fz | 0.015 | 0.030 | 0.064 | 0.084 | 0.107 | 0.168 | 0.208 | 0.254 |
| | | | | | Feed (mm/min) | 3349 | 4465 | 4763 | 3751 | 3982 | 3751 | 3870 | 2836 | |
| TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 655 Bhn or ≤ 60 HRc | Rough  | ≤ 0.4 | ≤ 0.04 | 152 | RPM | 48344 | 32229 | 16115 | 9669 | 8057 | 4834 | 4029 | 2417 |
| | | | | | (122-182) | Fz | 0.010 | 0.020 | 0.043 | 0.058 | 0.074 | 0.114 | 0.145 | 0.160 |
| | | | | | Feed (mm/min) | 967 | 1289 | 1386 | 1122 | 1192 | 1102 | 1168 | 773 | |
| | HSM  | ≤ 0.4 | ≤ 0.01 | 305 | RPM | 97005 | 64670 | 32335 | 19401 | 16168 | 9701 | 8084 | 4850 | |
| | | | | (244-366) | Fz | 0.013 | 0.023 | 0.048 | 0.064 | 0.081 | 0.127 | 0.160 | 0.180 | |
| | | | | Feed (mm/min) | 2522 | 2975 | 3104 | 2483 | 2619 | 2464 | 2587 | 1746 | | |

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 2 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



57
FRACTIONAL SERIES

- Ideal in Trochoidal milling applications in hardened steels and dry machining
- Short flute length and large core design to reduce deflection
- Unsurpassed edge strength with extreme negative rake and eccentric relief
- Recommended for materials 45 to 65 HRc (421 to 739 Bhn)



| | inch | | | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | Ti-NAMITE-X |
| 1/4 | 17/32 | 3-1/2 | 1/4 | 36140 |
| 5/16 | 11/16 | 4 | 5/16 | 36141 |
| 3/8 | 13/16 | 4 | 3/8 | 36142 |
| 1/2 | 1-3/32 | 4-1/2 | 1/2 | 36143 |

Neck Option Available

TOLERANCES (inch)

1/4 DIAMETER

D₁ = +0.0000/-0.0012
D₂ = h₆

5/16 DIAMETER

D₁ = +0.0000/-0.0016
D₂ = h₆

3/8 DIAMETER

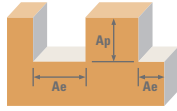
D₁ = +0.0000/-0.0016
D₂ = h₆

1/2 DIAMETER

D₁ = +0.0000/-0.0020
D₂ = h₆

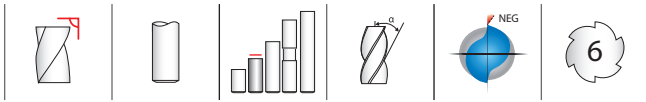
HARDENED STEELS

For patent information visit www.ksptpatents.com

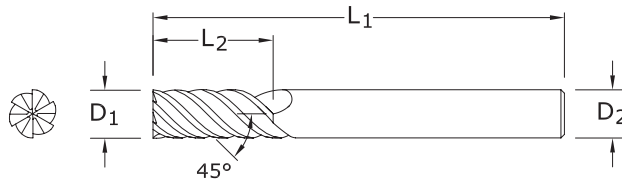


| Series 57 | Fractional | Hardness | | | Vc (sfm) | Diameter (D ₁) (inch) | | | | | |
|--|--|-----------------------------|---------------------|---------------------|-------------|--------------------------------------|------------|--------|--------|--------|--------|
| | | | Ae x D ₁ | Ap x D ₁ | | 1/4 | 5/16 | 3/8 | 1/2 | | |
| TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 420 Bhn or ≤ 45 HRc | Slot | 1 | ≤ 0.3 | 215 | RPM | 3285 | 2628 | 2190 | 1643 | |
| | | | | | (172-258) | Fz | 0.0013 | 0.0019 | 0.0025 | 0.0031 | |
| | | | | | | Feed (ipm) | 26 | 30 | 33 | 31 | |
| | | Profile | ≤ 0.1 | ≤ 1.5 | 265 | RPM | 4049 | 3239 | 2699 | 2025 | |
| | | | | | (212-318) | Fz | 0.0018 | 0.0026 | 0.0035 | 0.0044 | |
| | | | | | | Feed (ipm) | 44 | 51 | 57 | 53 | |
| | HSM | ≤ 0.04 | ≤ 1.5 | 560 | RPM | 8557 | 6845 | 5705 | 4278 | | |
| | | | | (448-672) | Fz | 0.0022 | 0.0033 | 0.0044 | 0.0055 | | |
| | | | | | Feed (ipm) | 113 | 136 | 151 | 141 | | |
| | TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 560 Bhn or ≤ 55 HRc | Slot | 1 | ≤ 0.3 | 120 | RPM | 1834 | 1467 | 1222 | 917 |
| | | | | | | (96-144) | Fz | 0.0010 | 0.0015 | 0.0020 | 0.0025 |
| | | | | | | | Feed (ipm) | 11 | 13 | 15 | 14 |
| Profile | | | ≤ 0.1 | ≤ 1.5 | 150 | RPM | 2292 | 1834 | 1528 | 1146 | |
| | | | | | (120-180) | Fz | 0.0014 | 0.0021 | 0.0028 | 0.0035 | |
| | | | | | | Feed (ipm) | 19 | 23 | 26 | 24 | |
| HSM | | ≤ 0.04 | ≤ 1.5 | 490 | RPM | 7487 | 5990 | 4991 | 3744 | | |
| | | | | (392-588) | Fz | 0.0018 | 0.0026 | 0.0035 | 0.0044 | | |
| | | | | | Feed (ipm) | 81 | 93 | 105 | 99 | | |
| TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 740 Bhn or ≤ 65 HRc | Slot | 1 | ≤ 0.3 | 65 | RPM | 993 | 795 | 662 | 497 |
| | | | | | | (52-78) | Fz | 0.0008 | 0.0011 | 0.0015 | 0.0019 |
| | | | | | | | Feed (ipm) | 5 | 5 | 6 | 6 |
| | Profile | | ≤ 0.1 | ≤ 1.5 | 80 | RPM | 1222 | 978 | 815 | 611 | |
| | | | | | (64-96) | Fz | 0.0011 | 0.0016 | 0.0021 | 0.0026 | |
| | | | | | | Feed (ipm) | 8 | 9 | 10 | 10 | |
| | HSM | ≤ 0.04 | ≤ 1.5 | 250 | RPM | 3820 | 3056 | 2547 | 1910 | | |
| | | | | (200-300) | Fz | 0.0013 | 0.0019 | 0.0025 | 0.0031 | | |
| | | | | | Feed (ipm) | 30 | 35 | 38 | 36 | | |

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
 rpm = Vc x 3.82 / D₁
 ipm = Fz x 6 x rpm
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



57M METRIC SERIES



- Ideal in Trochoidal milling applications in hardened steels and dry machining
- Short flute length and large core design to reduce deflection
- Unsurpassed edge strength with extreme negative rake and eccentric relief
- Recommended for materials 45 to 65 HRc (421 to 739 Bhn)

| | mm | | | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | Ti-NAMITE-X |
| 6,0 | 13,0 | 89,0 | 6,0 | 46140 |
| 8,0 | 18,0 | 102,0 | 8,0 | 46141 |
| 10,0 | 22,0 | 102,0 | 10,0 | 46142 |
| 12,0 | 26,0 | 114,0 | 12,0 | 46143 |
| 16,0 | 32,0 | 140,0 | 16,0 | 46145 |
| 20,0 | 38,0 | 165,0 | 20,0 | 46147 |

Neck Option Available

TOLERANCES (mm)

6 DIAMETER
D₁ = +0,000/-0,030
D₂ = h₆

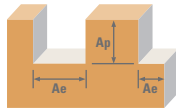
8 DIAMETER
D₁ = +0,000/-0,040
D₂ = h₆

10 DIAMETER
D₁ = +0,000/-0,040
D₂ = h₆

12-20 DIAMETER
D₁ = +0,000/-0,050
D₂ = h₆

HARDENED STEELS

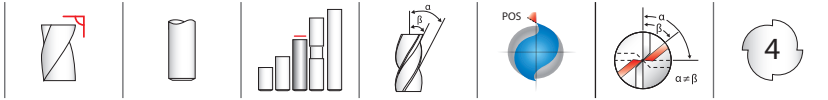
For patent information visit www.ksptpatents.com



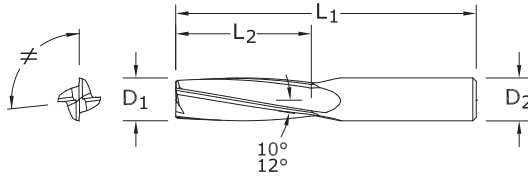
| Series 57M Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | |
|--|-----------------------------|---------------------|---------------------|---------------|------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | 6 | 8 | 10 | 12 | 16 | 20 | | |
| TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 420 Bhn or ≤ 45 HRc | Slot | 1 | ≤ 0.3 | 66 | RPM | 3499 | 2624 | 2099 | 1749 | 1312 | 1050 |
| | | | | | (53-79) | Fz | 0.032 | 0.048 | 0.064 | 0.079 | 0.094 | 0.109 |
| | | | | | Feed (mm/min) | 672 | 756 | 806 | 829 | 740 | 686 | |
| | Profile | ≤ 0.1 | ≤ 1.5 | 81 | RPM | 4294 | 3220 | 2576 | 2147 | 1610 | 1288 | |
| | | | | (65-97) | Fz | 0.046 | 0.066 | 0.089 | 0.112 | 0.132 | 0.152 | |
| | | | | Feed (mm/min) | 1185 | 1275 | 1376 | 1443 | 1275 | 1175 | | |
| | HSM | ≤ 0.04 | ≤ 1.5 | 171 | RPM | 9064 | 6798 | 5439 | 4532 | 3399 | 2719 | |
| | | | | (137-205) | Fz | 0.056 | 0.084 | 0.112 | 0.140 | 0.170 | 0.200 | |
| | | | | Feed (mm/min) | 3046 | 3426 | 3655 | 3807 | 3467 | 3263 | | |
| TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 560 Bhn or ≤ 55 HRc | Slot | 1 | ≤ 0.3 | 37 | RPM | 1961 | 1471 | 1177 | 981 | 735 | 588 |
| | | | | | (30-44) | Fz | 0.025 | 0.038 | 0.051 | 0.064 | 0.077 | 0.090 |
| | | | | | Feed (mm/min) | 294 | 335 | 360 | 377 | 340 | 318 | |
| | Profile | ≤ 0.1 | ≤ 1.5 | 46 | RPM | 2438 | 1829 | 1463 | 1219 | 914 | 732 | |
| | | | | (37-55) | Fz | 0.036 | 0.053 | 0.071 | 0.089 | 0.107 | 0.125 | |
| | | | | Feed (mm/min) | 527 | 582 | 623 | 651 | 587 | 549 | | |
| | HSM | ≤ 0.04 | ≤ 1.5 | 149 | RPM | 7898 | 5924 | 4739 | 3949 | 2962 | 2369 | |
| | | | | (119-179) | Fz | 0.046 | 0.066 | 0.089 | 0.112 | 0.135 | 0.158 | |
| | | | | Feed (mm/min) | 2180 | 2346 | 2531 | 2654 | 2399 | 2246 | | |
| TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 740 Bhn or ≤ 65 HRc | Slot | 1 | ≤ 0.3 | 20 | RPM | 1060 | 795 | 636 | 530 | 398 | 318 |
| | | | | | (16-24) | Fz | 0.020 | 0.028 | 0.038 | 0.048 | 0.058 | 0.068 |
| | | | | | Feed (mm/min) | 127 | 134 | 145 | 153 | 138 | 130 | |
| | Profile | ≤ 0.1 | ≤ 1.5 | 24 | RPM | 1272 | 954 | 763 | 636 | 477 | 382 | |
| | | | | (19-29) | Fz | 0.028 | 0.041 | 0.053 | 0.066 | 0.078 | 0.090 | |
| | | | | Feed (mm/min) | 214 | 235 | 243 | 252 | 223 | 206 | | |
| | HSM | ≤ 0.04 | ≤ 1.5 | 76 | RPM | 4029 | 3021 | 2417 | 2014 | 1511 | 1209 | |
| | | | | (61-91) | Fz | 0.033 | 0.048 | 0.064 | 0.079 | 0.094 | 0.109 | |
| | | | | Feed (mm/min) | 798 | 870 | 928 | 955 | 852 | 790 | | |

Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 6 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

FRACTIONAL
Series 27



27
 FRACTIONAL SERIES



- Slow helix design adds strength to the edge allowing ease for milling highly abrasive materials
- Two levels of chatter suppression: variable helix and indexing
- Excels at roughing (slotting, profiling) and finishing in a variety of plastics and composites

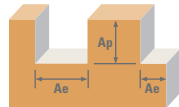
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|----------------------|
| | | | | UNCOATED | Di-NAMITE® (Diamond) |
| 1/4 | 1 | 2-1/2 | 1/4 | 72978 | 72979 |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 72980 | 72981 |
| 1/2 | 1-1/2 | 3-1/2 | 1/2 | 72982 | 72983 |
| 3/4 | 1-3/8 | 4 | 3/4 | 72984 | 72985 |
















TOLERANCES (inch)

D₁ = +0.0000/-0.0030
 D₂ = h₆

PLASTICS/COMPOSITES

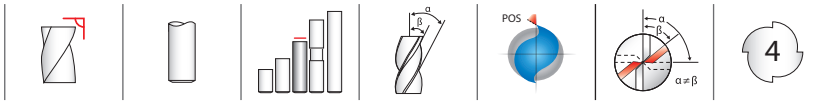
For patent information visit www.ksptpatents.com



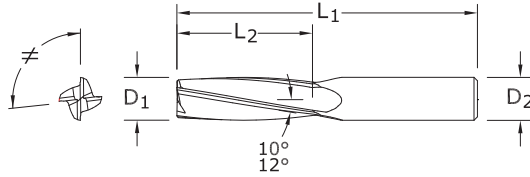
| Series 27 Fractional | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | |
|--|--|---------------------|------------|-----------------------------------|--------|--------|--------|--------|--------|
| | | | | 1/4 | 3/8 | 1/2 | 3/4 | | |
| CFRP, AFRP (CARBON FIBER, ARAMID FIBER) | Slot  | 1 | ≤ 1 | 400 | RPM | 6112 | 4075 | 3056 | 2037 |
| | | | | (320-480) | Fz | 0.0016 | 0.0030 | 0.0040 | 0.0048 |
| | | | | Feed (ipm) | 39 | 49 | 49 | 39 | |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 500 | RPM | 7640 | 5093 | 3820 | 2547 |
| | | | | (400-600) | Fz | 0.0016 | 0.0030 | 0.0040 | 0.0048 |
| | | | | Feed (ipm) | 49 | 61 | 61 | 49 | |
| | HSM  | ≤ 0.5 | ≤ 2 | 825 | RPM | 12606 | 8404 | 6303 | 4202 |
| | | | | (660-990) | Fz | 0.0037 | 0.0069 | 0.0092 | 0.0110 |
| | | | | Feed (ipm) | 187 | 232 | 232 | 185 | |
| GFRP (FIBERGLASS) | Slot  | 1 | ≤ 1 | 320 | RPM | 4890 | 3260 | 2445 | 1630 |
| | | | | (256-384) | Fz | 0.0016 | 0.0030 | 0.0040 | 0.0048 |
| | | | | Feed (ipm) | 31 | 39 | 39 | 31 | |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 400 | RPM | 6112 | 4075 | 3056 | 2037 |
| | | | | (320-480) | Fz | 0.0016 | 0.0030 | 0.0040 | 0.0048 |
| | | | | Feed (ipm) | 39 | 49 | 49 | 39 | |
| | HSM  | ≤ 0.5 | ≤ 2 | 660 | RPM | 10085 | 6723 | 5042 | 3362 |
| | | | | (528-792) | Fz | 0.0037 | 0.0069 | 0.0092 | 0.0110 |
| | | | | Feed (ipm) | 149 | 186 | 186 | 148 | |
| N CARBON, GRAPHITE | Slot  | 1 | ≤ 1 | 480 | RPM | 7334 | 4890 | 3667 | 2445 |
| | | | | (384-576) | Fz | 0.0020 | 0.0038 | 0.0050 | 0.0060 |
| | | | | Feed (ipm) | 59 | 74 | 73 | 59 | |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 600 | RPM | 9168 | 6112 | 4584 | 3056 |
| | | | | (480-720) | Fz | 0.0020 | 0.0038 | 0.0050 | 0.0060 |
| | | | | Feed (ipm) | 73 | 93 | 92 | 73 | |
| | HSM  | ≤ 0.5 | ≤ 2 | 990 | RPM | 15127 | 10085 | 7564 | 5042 |
| | | | | (792-1188) | Fz | 0.0046 | 0.0086 | 0.0115 | 0.0138 |
| | | | | Feed (ipm) | 278 | 347 | 348 | 278 | |
| PLASTICS | Slot  | 1 | ≤ 1 | 800 | RPM | 12224 | 8149 | 6112 | 4075 |
| | | | | (640-690) | Fz | 0.0020 | 0.0038 | 0.0050 | 0.0060 |
| | | | | Feed (ipm) | 98 | 124 | 122 | 98 | |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 1000 | RPM | 15280 | 10187 | 7640 | 5093 |
| | | | | (800-1200) | Fz | 0.0020 | 0.0038 | 0.0050 | 0.0060 |
| | | | | Feed (ipm) | 122 | 155 | 153 | 122 | |
| | HSM  | ≤ 0.5 | ≤ 2 | 1650 | RPM | 25212 | 16808 | 12606 | 8404 |
| | | | | (1320-1980) | Fz | 0.0046 | 0.0086 | 0.0115 | 0.0138 |
| | | | | Feed (ipm) | 464 | 578 | 580 | 464 | |
| MACHINABLE CERAMICS MACHINABLE GLASS | Slot  | 1 | ≤ 1 | 40 | RPM | 611 | 407 | 306 | 204 |
| | | | | (32-48) | Fz | 0.0008 | 0.0015 | 0.0020 | 0.0024 |
| | | | | Feed (ipm) | 2.0 | 2.4 | 2.4 | 2.0 | |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 50 | RPM | 764 | 509 | 382 | 255 |
| | | | | (40-60) | Fz | 0.0008 | 0.0015 | 0.0020 | 0.0024 |
| | | | | Feed (ipm) | 2.4 | 3.1 | 3.1 | 2.4 | |
| HSM  | ≤ 0.5 | ≤ 2 | 85 | RPM | 1299 | 866 | 649 | 433 | |
| | | | (68-102) | Fz | 0.0018 | 0.0034 | 0.0046 | 0.0055 | |
| | | | Feed (ipm) | 9.4 | 11.8 | 11.9 | 9.5 | | |

HSM (High Speed Machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times 4 \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur
 finish cuts typically required reduced feed and cutting depths

rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)



27M METRIC SERIES



- Slow helix design adds strength to the edge allowing ease for milling highly abrasive materials
- Two levels of chatter suppression: variable helix and indexing
- Excels at roughing (slotting, profiling) and finishing in a variety of plastics and composites

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|-------------------------|
| | | | | UNCOATED | Di-NAMITE® (Diamond) |
| 6,0 | 25,0 | 63,0 | 6,0 | 83056 | 83057 |
| 8,0 | 25,0 | 63,0 | 8,0 | 83058 | 83059 |
| 10,0 | 28,0 | 63,0 | 10,0 | 83060 | 83061 |
| 12,0 | 38,0 | 89,0 | 12,0 | 83062 | 83063 |
| 16,0 | 48,0 | 115,0 | 16,0 | 83064 | 83065 |

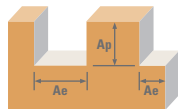
TOLERANCES (mm)

D₁ = +0,000/-0,080

D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.kspatents.com



| Series 27M Metric | Ae x D1 | Ap x D1 | Vc (m/min) | Diameter (D1) (mm) | | | | | | |
|---|-------------|---------|---------------|-----------------------|-------|-------|-------|-------|-------|-------|
| | | | | 6 | 8 | 10 | 12 | 16 | | |
| CFRP, AFRP (CARBON FIBER, ARAMID FIBER) | Slot | 1 | ≤ 1 | 120 | RPM | 6361 | 4771 | 3817 | 3181 | 2385 |
| | | | | (96-164) | Fz | 0.040 | 0.065 | 0.075 | 0.100 | 0.120 |
| | | | | Feed (mm/min) | 1018 | 1240 | 1145 | 1272 | 1145 | |
| | Profile | ≤ 0.5 | ≤ 1.5 | 150 | RPM | 7951 | 5963 | 4771 | 3976 | 2982 |
| | | | | (120-180) | Fz | 0.040 | 0.065 | 0.075 | 0.100 | 0.120 |
| | | | | Feed (mm/min) | 1272 | 1550 | 1431 | 1590 | 1431 | |
| | HSM | ≤ 0.5 | ≤ 2 | 250 | RPM | 13252 | 9939 | 7951 | 6626 | 4970 |
| | | | | (200-300) | Fz | 0.095 | 0.145 | 0.175 | 0.235 | 0.280 |
| | | | | Feed (mm/min) | 5036 | 5765 | 5566 | 6228 | 5566 | |
| GFRP (FIBERGLASS) | Slot | 1 | ≤ 1 | 100 | RPM | 5301 | 3976 | 3181 | 2650 | 1988 |
| | | | | (80-120) | Fz | 0.040 | 0.065 | 0.075 | 0.100 | 0.120 |
| | | | | Feed (mm/min) | 848 | 1034 | 954 | 1060 | 954 | |
| | Profile | ≤ 0.5 | ≤ 1.5 | 120 | RPM | 6361 | 4771 | 3817 | 3181 | 2385 |
| | | | | (96-164) | Fz | 0.040 | 0.065 | 0.075 | 0.100 | 0.120 |
| | | | | Feed (mm/min) | 1018 | 1240 | 1145 | 1272 | 1145 | |
| | HSM | ≤ 0.5 | ≤ 2 | 200 | RPM | 10602 | 7951 | 6361 | 5301 | 3976 |
| | | | | (160-240) | Fz | 0.095 | 0.145 | 0.175 | 0.235 | 0.280 |
| | | | | Feed (mm/min) | 4029 | 4612 | 4453 | 4983 | 4453 | |
| N CARBON, GRAPHITE | Slot | 1 | ≤ 1 | 145 | RPM | 7686 | 5765 | 4612 | 3843 | 2882 |
| | | | | (116-174) | Fz | 0.050 | 0.080 | 0.095 | 0.125 | 0.150 |
| | | | | Feed (mm/min) | 1537 | 1845 | 1752 | 1922 | 1729 | |
| | Profile | ≤ 0.5 | ≤ 1.5 | 185 | RPM | 9807 | 7355 | 5884 | 4903 | 3677 |
| | | | | (148-222) | Fz | 0.050 | 0.080 | 0.095 | 0.125 | 0.150 |
| | | | | Feed (mm/min) | 1961 | 2354 | 2236 | 2452 | 2206 | |
| | HSM | ≤ 0.5 | ≤ 2 | 300 | RPM | 15903 | 11927 | 9542 | 7951 | 5963 |
| | | | | (240-360) | Fz | 0.115 | 0.185 | 0.220 | 0.290 | 0.350 |
| | | | | Feed (mm/min) | 7315 | 8826 | 8397 | 9223 | 8349 | |
| PLASTICS | Slot | 1 | ≤ 1 | 245 | RPM | 12987 | 9740 | 7792 | 6494 | 4870 |
| | | | | (196-294) | Fz | 0.050 | 0.080 | 0.095 | 0.125 | 0.150 |
| | | | | Feed (mm/min) | 2597 | 3117 | 2961 | 3247 | 2922 | |
| | Profile | ≤ 0.5 | ≤ 1.5 | 305 | RPM | 16168 | 12126 | 9701 | 8084 | 6063 |
| | | | | (244-366) | Fz | 0.050 | 0.080 | 0.095 | 0.125 | 0.150 |
| | | | | Feed (mm/min) | 3234 | 3880 | 3686 | 4042 | 3638 | |
| | HSM | ≤ 0.5 | ≤ 2 | 505 | RPM | 26769 | 20077 | 16062 | 13385 | 10038 |
| | | | | (404-606) | Fz | 0.115 | 0.185 | 0.220 | 0.290 | 0.350 |
| | | | | Feed (mm/min) | 12314 | 14857 | 14134 | 15526 | 14054 | |
| MACHINABLE CERAMICS MACHINABLE GLASS | Slot | 1 | ≤ 1 | 10 | RPM | 530 | 398 | 318 | 265 | 199 |
| | | | | (8-12) | Fz | 0.020 | 0.035 | 0.045 | 0.050 | 0.060 |
| | | | | Feed (mm/min) | 42 | 56 | 57 | 53 | 48 | |
| | Profile | ≤ 0.5 | ≤ 1.5 | 15 | RPM | 795 | 596 | 477 | 398 | 298 |
| | | | | (12-18) | Fz | 0.020 | 0.035 | 0.045 | 0.050 | 0.060 |
| | | | | Feed (mm/min) | 64 | 83 | 86 | 80 | 72 | |
| | HSM | ≤ 0.5 | ≤ 2 | 25 | RPM | 1325 | 994 | 795 | 663 | 497 |
| | | | | (20-30) | Fz | 0.045 | 0.075 | 0.085 | 0.115 | 0.140 |
| | | | | Feed (mm/min) | 239 | 298 | 270 | 305 | 278 | |

HSM (High Speed Machining)
 $rpm = Vc \times 3.82 / D_1$
 $mm/min = Fz \times 4 \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur
 finish cuts typically required reduced feed and cutting depths

rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)

High Performance Aluminum End Mills



Milling

| HIGH PERFORMANCE ALUMINUM END MILLS | SERIES | DESCRIPTION | PAGE |
|-------------------------------------|---------|---|------|
| S-Carb APR® & APF® | 43APR | 3 Flute Advanced Productivity Rougher Fractional | 123 |
| | 43APR-3 | 3 Flute Advanced Productivity Rougher Metric | 129 |
| | 43APR-4 | 4 Flute Advanced Productivity Rougher Metric | 130 |
| | 43MAPR | 3 Flute Advanced Productivity Rougher Metric | 127 |
| | 43APF | 4 Flute Advanced Productivity Finisher Fractional | 125 |
| | 43MAPF | 4 Flute Advanced Productivity Finisher Metric | 132 |
| S-Carb® (3 Flute) | 43 | 3 Flute Non-Ferrous Square End Fractional | 134 |
| | 43M | 3 Flute Non-Ferrous Square End Metric (Unpolished Flutes) | 147 |
| | 43M | 3 Flute Non-Ferrous Square End Metric (Polished Flutes) | 147 |
| | 43CR | 3 Flute Non-Ferrous Corner Radius Fractional | 135 |
| | 43MCR | 3 Flute Non-Ferrous Corner Radius Metric (Unpolished Flutes) | 148 |
| | 43MCR | 3 Flute Non-Ferrous Corner Radius Metric (Polished Flutes) | 149 |
| | 43MCR | 3 Flute Non-Ferrous Corner Radius 4xD Metric (Polished Flutes) | 150 |
| | 43LC | 3 Flute Non-Ferrous Long Reach Corner Radius Fractional | 139 |
| | 43MLC | 3 Flute Non-Ferrous Long Reach Corner Radius Metric (Unpolished Flutes) | 152 |
| | 43MLC | 3 Flute Non-Ferrous Long Reach Corner Radius Metric (Polished Flutes) | 153 |
| | 43L | 3 Flute Non-Ferrous Square End Long Reach Fractional | 138 |
| | 43ML | 3 Flute Non-Ferrous Square End Long Reach Metric | 151 |
| | 43EC | 3 Flute Non-Ferrous Square End Extra Long Reach Fractional | 141 |
| | 43B | 3 Flute Non-Ferrous Ball End Fractional | 142 |
| | 43MB | 3 Flute Non-Ferrous Ball End Metric (Polished Flutes) | 154 |
| | 43LB | 3 Flute Non-Ferrous Ball End Long Reach Fractional | 143 |
| | 43EB | 3 Flute Non-Ferrous Ball End Extra Long Reach Fractional | 143 |
| S-Carb® Rougher (3 Flute) | 43CB | 3 Flute Rougher Non-Ferrous Chip Breaker Fractional | 144 |
| | 43MCB | 3 Flute Rougher Non-Ferrous Chip Breaker Metric | 155 |
| | 43LCB | 3 Flute Rougher Non-Ferrous Chip Breaker Long Reach Fractional | 145 |
| S-Carb® (2 Flute) | 47 | 2 Flute Non-Ferrous Square End Fractional | 157 |
| | 47M | 2 Flute Non-Ferrous Square End Metric | 160 |
| | 47B | 2 Flute Non-Ferrous Ball End Fractional | 158 |
| | 47MB | 2 Flute Non-Ferrous Ball End Metric | 162 |
| | 47L | 2 Flute Non-Ferrous Square End Long Reach Fractional | 157 |
| | 47ML | 2 Flute Non-Ferrous Square End Long Reach Metric | 161 |
| | 47LB | 2 Flute Non-Ferrous Ball End Long Reach Fractional | 158 |
| | 47MLB | 2 Flute Non-Ferrous Ball End Long Reach Metric | 162 |
| Ski-Carb | 44 | 2 Flute Non-Ferrous Materials Square End Fractional | 164 |
| | 44M | 2 Flute Non-Ferrous Materials Square End Metric | 166 |
| | 45 | 2 Flute Non-Ferrous Materials Long Reach Corner Radius Fractional | 168 |

Speed & Feed Recommendations listed after each series

| FRESAS DE ALTO RENDIMIENTO PARA ALUMINIO | SERIE | DESCRIPCIÓN | PÁGINA |
|--|---|--|--------|
| S-Carb APR® y APF® | 43APR | 3 filos, productividad avanzada, desbastador, fraccional | 123 |
| | 43APR-3 | 3 filos, productividad avanzada, desbastador, métrico | 129 |
| | 43APR-4 | 4 filos, productividad avanzada, desbastador, métrico | 130 |
| | 43MAPR | 3 filos, productividad avanzada, desbastador, métrico | 127 |
| | 43APF | 4 filos, productividad avanzada, acabador, fraccional | 125 |
| | 43MAPF | 4 filos, productividad avanzada, acabador, métrico | 132 |
| S-Carb® (3 filos) | 43 | 3 filos, no férrico, punta cuadrada, fraccional | 134 |
| | 43M | 3 filos, no férrico, punta cuadrada, métrico (filos no pulidos) | 147 |
| | 43M | 3 filos, no férrico, punta cuadrada, métrico (filos pulidos) | 147 |
| | 43CR | 3 filos, no férrico, radio angulado, fraccional | 135 |
| | 43MCR | 3 filos, no férrico, radio angulado, métrico (filos no pulidos) | 148 |
| | 43MCR | 3 filos, no férrico, radio angulado, métrico (filos pulidos) | 149 |
| | 43MCR | 3 filos, no férrico, radio angulado 4xD, métrico (filos pulidos) | 150 |
| | 43LC | 3 filos, no férricos, largo alcance, radio angulado, fraccional | 139 |
| | 43MLC | 3 filos, no férrico, largo alcance, radio angulado, métrico (filos no pulidos) | 152 |
| | 43MLC | 3 filos, no férrico, largo alcance, radio angulado, métrico (filos pulidos) | 153 |
| | 43L | 3 filos, no férrico, punta cuadrada, largo alcance, fraccional | 138 |
| | 43ML | 3 filos, no férrico, punta cuadrada, largo alcance, métrico | 151 |
| | 43EC | 3 filos, no férrico, punta cuadrada, alcance extralargo, fraccional | 141 |
| | 43B | 3 filos, no férrico, punta esférica, fraccional | 142 |
| | 43MB | 3 filos, no férrico, punta esférica, métrico (filos pulidos) | 154 |
| | 43LB | 3 filos, no férrico, punta esférica, largo alcance, fraccional | 143 |
| 43EB | 3 filos, no férrico, punta esférica, alcance extralargo, fraccional | 143 | |
| Desbastador S-Carb® (3 filos) | 43CB | 3 filos, desbastador, no férrico, rompevirutas, fraccional | 144 |
| | 43MCB | 3 filos, desbastador, no férrico, rompevirutas, métrico | 155 |
| | 43LCB | 3 filos, desbastador, no férrico, rompevirutas, largo alcance, fraccional | 145 |
| S-Carb® (2 filos) | 47 | 2 filos, no férrico, punta cuadrada, fraccional | 157 |
| | 47M | 2 filos, no férrico, punta cuadrada, métrico | 160 |
| | 47B | 2 filos, no férrico, punta esférica, fraccional | 158 |
| | 47MB | 2 filos, no férrico, punta esférica, métrico | 162 |
| | 47L | 2 filos, no férrico, punta cuadrada, largo alcance, fraccional | 157 |
| | 47ML | 2 filos, no férrico, punta cuadrada, largo alcance, métrico | 161 |
| | 47LB | 2 filos, no férrico, punta esférica, largo alcance, fraccional | 158 |
| 47MLB | 2 filos, no férrico, punta esférica, largo alcance, métrico | 162 | |
| Ski-Carb | 44 | 2 filos, materiales no férricos, punta cuadrada, fraccional | 164 |
| | 44M | 2 filos, materiales no férricos, punta cuadrada, métrico | 166 |
| | 45 | 2 filos, materiales no férricos, largo alcance, radio angulado, fraccional | 168 |

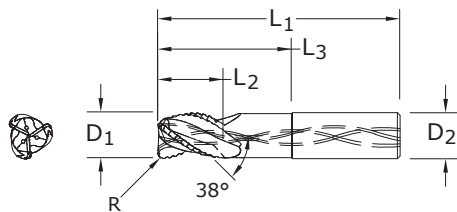
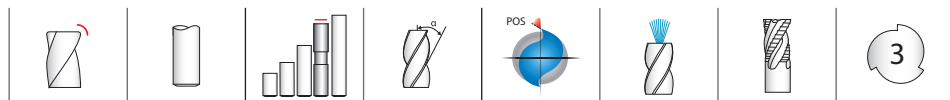
Recomendaciones de velocidades y avances mostradas tras cada serie

| FRAISE HAUTE PERFORMANCE POUR ALUMINIUM | SÉRIES | DESCRIPTION | PAGE |
|---|---------|--|------|
| S-Carb APR®/APF® | 43APR | 3 dents productivité avancée d'ébauche (fractionnel) | 123 |
| | 43APR-3 | 3 dents productivité avancée d'ébauche (métrique) | 129 |
| | 43APR-4 | 4 dents productivité avancée d'ébauche (métrique) | 130 |
| | 43MAPR | 3 dents productivité avancée d'ébauche (métrique) | 127 |
| | 43APF | 4 dents productivité avancée de finition (fractionnel) | 125 |
| | 43MAPF | 4 dents productivité avancée de finition (métrique) | 132 |
| S-Carb® (3 dents) | 43 | 3 dents non-ferreux non rayonné (fractionnel) | 134 |
| | 43M | 3 dents non-ferreux non rayonné (métrique) (goujures non polies) | 147 |
| | 43M | 3 dents non-ferreux non rayonné (métrique) (goujures polies) | 147 |
| | 43CR | 3 dents non-ferreux rayonné (fractionnel) | 135 |
| | 43MCR | 3 dents matériaux non-ferreux rayonné (métrique) (goujures non polies) | 148 |
| | 43MCR | 3 dents matériaux non-ferreux rayonné (métrique) (goujures polies) | 149 |
| | 43MCR | 3 dents matériaux non-ferreux rayonné 4xD (métrique) (goujures polies) | 150 |
| | 43LC | 3 dents non-ferreux longue portée rayonné (fractionnel) | 139 |
| | 43MLC | 3 dents non-ferreux longue portée rayonné (métrique) (goujures non polies) | 152 |
| | 43MLC | 3 dents non-ferreux longue portée rayonné (métrique) (goujures polies) | 153 |
| | 43L | 3 dents non-ferreux non rayonné longue portée (fractionnel) | 138 |
| | 43ML | 3 dents non-ferreux non rayonné longue portée (métrique) | 151 |
| | 43EC | 3 dents non-ferreux non rayonné portée extra-longue (fractionnel) | 141 |
| | 43B | 3 dents non-ferreux à bout hémisphérique (fractionnel) | 142 |
| | 43MB | 3 dents non-ferreux à bout hémisphérique (métrique) (goujures polies) | 154 |
| | 43LB | 3 dents non-ferreux à bout hémisphérique longue portée (fractionnel) | 143 |
| | 43EB | 3 dents non-ferreux à bout hémisphérique portée extra-longue (fractionnel) | 143 |
| S-Carb® d'ébauche (3 dents) | 43CB | 3 dents d'ébauche non-ferreux brise-copeaux (fractionnel) | 144 |
| | 43MCB | 3 dents d'ébauche non-ferreux brise-copeaux (métrique) | 155 |
| | 43LCB | 3 dents d'ébauche non-ferreux brise-copeaux longue portée (fractionnel) | 145 |
| S-Carb® (2 dents) | 47 | 2 dents non-ferreux non rayonné (fractionnel) | 157 |
| | 47M | 2 dents non-ferreux non rayonné (métrique) | 160 |
| | 47B | 2 dents non-ferreux à bout hémisphérique (fractionnel) | 158 |
| | 47MB | 2 dents non-ferreux à bout hémisphérique (métrique) | 162 |
| | 47L | 2 dents non-ferreux non rayonné longue portée (fractionnel) | 157 |
| | 47ML | 2 dents non-ferreux non rayonné longue portée (métrique) | 161 |
| | 47LB | 2 dents non-ferreux à bout hémisphérique longue portée (fractionnel) | 158 |
| | 47MLB | 2 dents non-ferreux à bout hémisphérique longue portée (métrique) | 162 |
| Ski-Carb | 44 | 2 dents matériaux non-ferreux non rayonné (fractionnel) | 164 |
| | 44M | 2 dents matériaux non-ferreux non rayonné (métrique) | 166 |
| | 45 | 2 dents matériaux non-ferreux longue portée rayonné (fractionnel) | 168 |

Recommandations de vitesse et avance indiquées après chaque série

| HOCHLEISTUNGSSCHAFTFRÄSER FÜR ALUMINIUM | SERIE | BESCHREIBUNG | SEITE |
|--|---|--|-------|
| S-Carb APR® & APF® | 43APR | Zölliger Hochleistungs-Schrupfräser mit 3 Schneiden | 123 |
| | 43APR-3 | Hochleistungs-Schrupfräser mit 3 Schneiden (Erweiterung) | 129 |
| | 43APR-4 | Hochleistungs-Schrupfräser mit 4 Schneiden | 130 |
| | 43MAPR | Hochleistungs-Stirnschrupfräser mit 3 Schneiden | 127 |
| | 43APF | Zölliger Hochleistungs-Schlichtfräser mit 4 Schneiden | 125 |
| | 43MAPF | Hochleistungs-Schlichtfräser mit 4 Schneiden | 132 |
| S-Carb® (3 Schneiden) | 43 | Zölliger NE-Schaftfräser mit 3 Schneiden ohne Eckenradien | 134 |
| | 43M | NE-Schaftfräser mit 3 unpolierten Schneiden ohne Eckenradien | 147 |
| | 43M | NE-Schaftfräser mit 3 polierten Schneiden ohne Eckenradien | 147 |
| | 43CR | Zölliger NE-Fräser mit 3 Schneiden und Eckenradien | 135 |
| | 43MCR | NE-Fräser mit 3 unpolierten Schneiden und Eckenradien | 148 |
| | 43MCR | NE-Fräser mit 3 polierten Schneiden und Eckenradien | 149 |
| | 43MCR | NE-Fräser 4xD mit 3 polierten Schneiden und Eckenradien | 150 |
| | 43LC | Zölliger Langlochfräser mit 3 Schneiden und Eckenradien | 139 |
| | 43MLC | NE-Langlochfräser mit 3 unpolierten Schneiden und Eckenradien | 152 |
| | 43MLC | NE-Langlochfräser mit 3 polierten Schneiden und Eckenradien | 153 |
| | 43L | Zölliger NE-Langloch-Schaftfräser mit 3 Schneiden ohne Eckenradien | 138 |
| | 43ML | NE-Langloch-Schaftfräser mit 3 Schneiden ohne Eckenradien | 151 |
| | 43EC | Zölliger NE-Superlangloch-Schaftfräser mit 3 Schneiden ohne Eckenradien | 141 |
| | 43B | Zölliger NE-Radiuschaftfräser mit 3 Schneiden | 142 |
| | 43MB | NE-Radiuschaftfräser mit 3 polierten Schneiden | 154 |
| | 43LB | Zölliger NE-Langloch-Radiuschaftfräser mit 3 Schneiden | 143 |
| 43EB | Zölliger NE-Superlangloch-Radiuschaftfräser mit 3 Schneiden | 143 | |
| S-Carb® Schruffräser (3 Schneiden) | 43CB | Zölliger NE-Schruffräser mit 3 Schneiden und Spanbrechern | 144 |
| | 43MCB | NE-Schruffräser mit 3 Schneiden und Spanbrechern | 155 |
| | 43LCB | Zölliger NE-Langloch-Schruffräser mit 3 Spanteilernuten | 145 |
| S-Carb® (2 Schneiden) | 47 | Zölliger NE-Schaftfräser mit 2 Schneiden ohne Eckenradien | 157 |
| | 47M | NE-Schaftfräser mit 2 Schneiden ohne Eckenradien | 160 |
| | 47B | Zölliger NE-Radiuschaftfräser mit 2 Schneiden | 158 |
| | 47MB | NE-Radiuschaftfräser mit 2 Schneiden | 162 |
| | 47L | Zölliger NE-Langloch-Schaftfräser mit 2 Schneiden ohne Eckenradien | 157 |
| | 47ML | NE-Langloch-Schaftfräser mit 2 Schneiden ohne Eckenradien | 161 |
| | 47LB | Zölliger NE-Langloch-Radiuschaftfräser mit 2 Schneiden | 158 |
| 47MLB | NE-Langloch-Radiuschaftfräser mit 2 Schneiden | 162 | |
| Ski-Carb | 44 | Zölliger NE-Schaftfräser mit 2 Schneiden ohne Eckenradien | 164 |
| | 44M | NE-Schaftfräser mit 2 Schneiden ohne Eckenradien | 166 |
| | 45 | Zölliger Langlochfräser mit 2 Schneidenn und Eckenradien für Nichteisenmetalle | 168 |

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie



TOLERANCES (inch)

3/4-1 DIAMETER

$D_1 = +0.00040/-0.0020$

$D_2 = h_6$

$R = +0.0000/-0.0012$

NON-FERROUS

For patent information visit www.ksptpatents.com

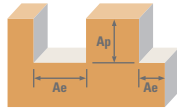
43APR
FRACTIONAL SERIES





| inch | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | Ti-NAMITE-B (TiB ₂) |
| 3/4 | 1-3/8 | 4-1/4 | 3/4 | 2-3/8 | .030 | 34000 |
| 3/4 | 1-3/8 | 4-1/4 | 3/4 | 2-3/8 | .060 | 34001 |
| 3/4 | 1-3/8 | 4-1/4 | 3/4 | 2-3/8 | .090 | 34002 |
| 3/4 | 1-3/8 | 4-1/4 | 3/4 | 2-3/8 | .120 | 34003 |
| 3/4 | 1-1/4 | 4-7/8 | 3/4 | 3 | .030 | 34004 |
| 3/4 | 1-1/4 | 4-7/8 | 3/4 | 3 | .060 | 34005 |
| 3/4 | 1-1/4 | 4-7/8 | 3/4 | 3 | .090 | 34006 |
| 3/4 | 1-1/4 | 4-7/8 | 3/4 | 3 | .120 | 34007 |
| 1 | 1-3/4 | 4-1/2 | 1 | 2-1/2 | .030 | 34008 |
| 1 | 1-3/4 | 4-1/2 | 1 | 2-1/2 | .060 | 34009 |
| 1 | 1-3/4 | 4-1/2 | 1 | 2-1/2 | .090 | 34010 |
| 1 | 1-3/4 | 4-1/2 | 1 | 2-1/2 | .120 | 34011 |
| 1 | 1-1/2 | 5-1/4 | 1 | 3-1/4 | .030 | 34012 |
| 1 | 1-1/2 | 5-1/4 | 1 | 3-1/4 | .060 | 34013 |
| 1 | 1-1/2 | 5-1/4 | 1 | 3-1/4 | .090 | 34014 |
| 1 | 1-1/2 | 5-1/4 | 1 | 3-1/4 | .120 | 34015 |

- Ultra high-productivity rougher for Aluminum alloys, specifically for aircraft components
- Designed for machine tools with capability of 600 in³ per minute material removal rates
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Polished flutes maximize chip evacuation and provides enhanced finish
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

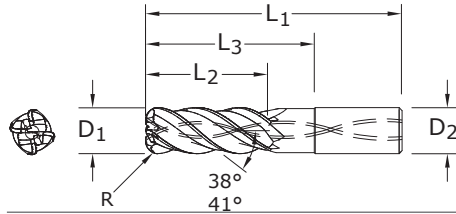
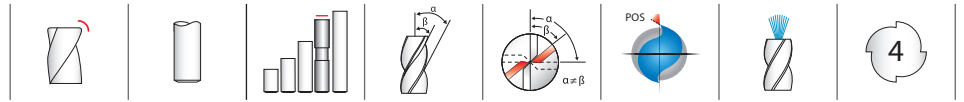
Available on request: • JetStream Technology • Side exit coolant holes

FRACTIONAL
S-Carb APR®



| Series 43APR Fractional | Hardness | | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | |
|--|--|--|----------------------------|---------------------|-------------|--------------------------------------|--------|--------|--------|
| | | | | | | 3/4 | 1 | | |
| N | ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075 | Slot  | 1 | ≤ 1 | 4920 | RPM | 25059 | 18794 | |
| | | | | | (3936-5904) | Fz | 0.0060 | 0.0070 | |
| | | Profile  | ≤ 0.5 | ≤ 1.5 | 6560 | RPM | 33412 | 25059 | |
| | | | | | (5248-7872) | Fz | 0.0060 | 0.0070 | |
| | | Slot  | ≤ 150 Bhn or ≤ 7 HRc | 1 | ≤ 1 | 3940 | RPM | 20068 | 15051 |
| | | | | | | (3152-4728) | Fz | 0.0045 | 0.0053 |
| Profile  | ≤ 150 Bhn or ≤ 7 HRc | ≤ 0.5 | ≤ 1.5 | 4920 | RPM | 25059 | 18794 | | |
| | | | | (3936-5904) | Fz | 0.0045 | 0.0053 | | |
| | | | | | | Feed (in/min) | 338 | 299 | |

Bhn (Brinell) HRc (Rockwell C)
 surface speed is dependent on machine spindle and fixturing
 balancing is recommended at ultra high surface speeds
 tool life may be reduced when machining Lithium Alloys
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times 3 \times rpm$
 maximum recommended depths shown
 reduce speed and feed for materials harder than listed
 ramp angle = 15° (feed rate = 50%)
 plunge depth = 1 x D₁ (feed rate = 30%)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



TOLERANCES (inch)

1/2–3/4 DIAMETER

$D_1 = +0.00040/-0.0020$

$D_2 = h_6$

$R = +0.0000/-0.0012$

NON-FERROUS

For patent information visit www.ksptpatents.com

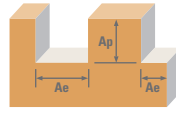
43APF
FRACTIONAL SERIES

| inch | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | Ti-NAMITE-B (TiB ₂) |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 1-5/8 | .030 | 34016 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 1-5/8 | .060 | 34017 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 1-5/8 | .090 | 34018 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 1-5/8 | .120 | 34019 |
| 1/2 | 2 | 4 | 1/2 | 2-3/8 | .030 | 34020 |
| 1/2 | 2 | 4 | 1/2 | 2-3/8 | .060 | 34021 |
| 1/2 | 2 | 4 | 1/2 | 2-3/8 | .090 | 34022 |
| 1/2 | 2 | 4 | 1/2 | 2-3/8 | .120 | 34023 |
| 3/4 | 1-7/8 | 4-1/4 | 3/4 | 2-3/8 | .030 | 34024 |
| 3/4 | 1-7/8 | 4-1/4 | 3/4 | 2-3/8 | .060 | 34025 |
| 3/4 | 1-7/8 | 4-1/4 | 3/4 | 2-3/8 | .090 | 34026 |
| 3/4 | 1-7/8 | 4-1/4 | 3/4 | 2-3/8 | .120 | 34027 |
| 3/4 | 3 | 5-3/8 | 3/4 | 3-1/2 | .030 | 34028 |
| 3/4 | 3 | 5-3/8 | 3/4 | 3-1/2 | .060 | 34029 |
| 3/4 | 3 | 5-3/8 | 3/4 | 3-1/2 | .090 | 34030 |
| 3/4 | 3 | 5-3/8 | 3/4 | 3-1/2 | .120 | 34031 |

- Ultra high-productivity finisher for Aluminum alloys, specifically for aircraft components
- Two levels of chatter suppression: variable helix and indexing
- Designed for single axial pass semi-finishing and finishing
- Polished flutes maximize chip evacuation and provides enhanced finish
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

Available on request: • JetStream Technology

FRACTIONAL
S-Carb APF®



| Series 43APF Fractional | Hardness | Profile | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | |
|--|--|-------------|---------------------|---------------------|-------------|--------------------------------------|--------|--------|
| | | | | | | 1/2 | 3/4 | |
| N | ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075 | Profile | ≤ 0.1 | ≤ 2.5 | 2625 | RPM | 20055 | 13370 |
| | | | | | (2100-3150) | Fz | 0.0030 | 0.0050 |
| | | | | | | Feed (in/min) | 241 | 267 |
| | | Profile | ≤ 0.1 | ≤ 4 | 2625 | RPM | 20055 | 13370 |
| | | | | | (2100-3150) | Fz | 0.0020 | 0.0040 |
| | | | | | | Feed (in/min) | 160 | 214 |
| ALUMINUM ALLOYS (LITHIUM)* 2090, 2091, 2099, 2195, 2199, 2297, 8090 | ≤ 150 Bhn or ≤ 7 HRc | Profile | ≤ 0.1 | ≤ 2.5 | 1970 | RPM | 15051 | 10034 |
| | | | | | (1576-2364) | Fz | 0.0030 | 0.0050 |
| | | | | | | Feed (in/min) | 181 | 201 |
| | | Profile | ≤ 0.1 | ≤ 4 | 1970 | RPM | 15051 | 10034 |
| | | | | | (1576-2364) | Fz | 0.0020 | 0.0040 |
| | | | | | | Feed (in/min) | 120 | 161 |

Bhn (Brinell) HRc (Rockwell C)
 surface speed is dependent on machine spindle and fixturing
 balancing is recommended at ultra high surface speeds
 tool life may be reduced when machining Lithium Alloys
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times 4 \times rpm$
 maximum recommended depths shown
 reduce speed and feed for materials harder than listed
 finish cuts typically require reduced feed and cutting depths of 0.02 X D₁ maximum
 ramp angle = 6° (feed rate = 50%)
 plunging not recommended
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



TOLERANCES (mm)

12–25 DIAMETER

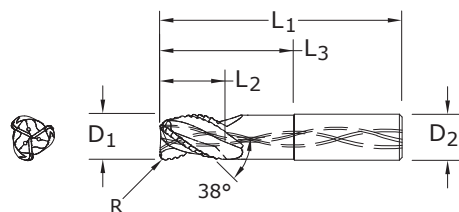
$D_1 = +0,010/-0,050$

$D_2 = h_6$

$R = +0,000/-0,030$

NON-FERROUS

For patent information visit www.ksptpatents.com



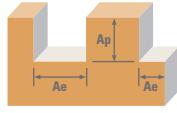
43MAPR
METRIC SERIES



| mm | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | Ti-NAMITE-B (TiB ₂) |
| 12,0 | 18,0 | 83,0 | 12,0 | 38,0 | — | 44650 |
| 12,0 | 18,0 | 83,0 | 12,0 | 38,0 | 2,0 | 44685 |
| 12,0 | 18,0 | 83,0 | 12,0 | 38,0 | 3,0 | 44686 |
| 12,0 | 18,0 | 83,0 | 12,0 | 38,0 | 4,0 | 44687 |
| 16,0 | 24,0 | 92,0 | 16,0 | 51,0 | — | 44652 |
| 16,0 | 24,0 | 92,0 | 16,0 | 51,0 | 2,0 | 44688 |
| 16,0 | 24,0 | 92,0 | 16,0 | 51,0 | 3,0 | 44689 |
| 16,0 | 24,0 | 92,0 | 16,0 | 51,0 | 4,0 | 44690 |
| 20,0 | 30,0 | 86,0 | 20,0 | 45,0 | — | 44646 |
| 20,0 | 30,0 | 86,0 | 20,0 | 45,0 | 3,0 | 44647 |
| 20,0 | 30,0 | 86,0 | 20,0 | 45,0 | 4,0 | 44648 |
| 20,0 | 30,0 | 86,0 | 20,0 | 45,0 | 5,0 | 44649 |
| 20,0 | 35,0 | 104,0 | 20,0 | 64,0 | — | 44653 |
| 20,0 | 35,0 | 104,0 | 20,0 | 64,0 | 3,0 | 44691 |
| 20,0 | 35,0 | 104,0 | 20,0 | 64,0 | 4,0 | 44692 |
| 20,0 | 35,0 | 104,0 | 20,0 | 64,0 | 5,0 | 44693 |
| 25,0 | 35,0 | 108,0 | 25,0 | 55,0 | 3,0 | 44809 |
| 25,0 | 35,0 | 108,0 | 25,0 | 55,0 | 4,0 | 44810 |
| 25,0 | 35,0 | 108,0 | 25,0 | 55,0 | 5,0 | 44811 |
| 25,0 | 35,0 | 140,0 | 25,0 | 80,0 | — | 44654 |
| 25,0 | 35,0 | 140,0 | 25,0 | 80,0 | 3,0 | 44694 |
| 25,0 | 35,0 | 140,0 | 25,0 | 80,0 | 4,0 | 44695 |
| 25,0 | 35,0 | 140,0 | 25,0 | 80,0 | 5,0 | 44696 |
| 25,0 | 35,0 | 140,0 | 25,0 | 90,0 | 3,0 | 44645 |

- Ultra high-productivity rougher for Aluminum alloys, specifically for aircraft components
- Designed for machine tools with capability of 9.83 l³ per minute material removal rates
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Polished flutes maximize chip evacuation and provides enhanced finish
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

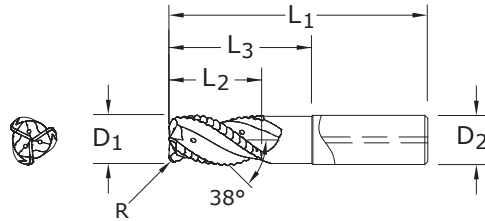
Available on request: • JetStream Technology • Side exit coolant holes

S-Carb APR[®]



| Series 43MAPR Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | |
|----------------------------|--|----------------------------|---|---------------|------------------------------------|---------------------|---------------------|-------|-------|-------|-------|
| | | | | | 12 | 16 | 20 | 25 | | | |
| N | ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075 | ≤ 150 Bhn or ≤ 7 HRc | Slot  | 1 | ≤ 1 | 1500 (1200-1800) | RPM | 39788 | 29841 | 23873 | 19098 |
| | | | | | | | Fz | 0.080 | 0.110 | 0.150 | 0.180 |
| | | | | | | | Feed (mm/min) | 9549 | 9848 | 10743 | 10313 |
| | | | | | | | 2000 (1600-2400) | RPM | 53050 | 39788 | 31830 |
| | Fz | 0.080 | 0.110 | 0.150 | 0.180 | | | | | | |
| | Feed (mm/min) | 12732 | 13130 | 14324 | 13751 | | | | | | |
| | ALUMINUM ALLOYS (LITHIUM)* 2090, 2091, 2099, 2195, 2199, 2297, 8090 | ≤ 150 Bhn or ≤ 7 HRc | Slot  | 1 | ≤ 1 | 1200 (960-1440) | RPM | 31830 | 23873 | 19098 | 15278 |
| | | | | | | | Fz | 0.060 | 0.083 | 0.110 | 0.140 |
| Feed (mm/min) | | | | | | | 11459 | 5944 | 6302 | 6417 | |
| 1500 (1200-1800) | | | | | | | RPM | 39788 | 29841 | 23873 | 19098 |
| Fz | 0.060 | 0.083 | 0.110 | 0.140 | | | | | | | |
| Feed (mm/min) | 7162 | 7430 | 7878 | 8021 | | | | | | | |

Bhn (Brinell) HRc (Rockwell C)
 surface speed is dependent on machine spindle and fixturing
 balancing is recommended at ultra high surface speeds
 tool life may be reduced when machining Lithium Alloys
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 3 \times rpm$
 maximum recommended depths shown
 reduce speed and feed for materials harder than listed
 ramp angle = 15° (feed rate = 50%)
 plunge depth = 1 x D₁ (feed rate = 30%)
 refer to the KYOCERA SGS Tool Wizard[®] for complete technical information (www.kyocera-sgstool.com)



43APR-3
METRIC SERIES

TOLERANCES (mm)

20–25 DIAMETER

$D_1 = -0,01/-0,10$

$D_2 = h_6$

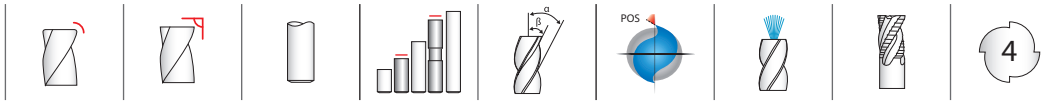
$R = +/-0,05$

NON-FERROUS

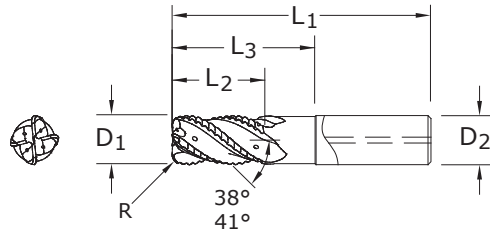
For patent information visit www.ksptpatents.com

| inch | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | Ti-NAMITE-B (TiB ₂) |
| 20,0 | 35,0 | 86,0 | 20,0 | — | — | 44990 |
| 20,0 | 35,0 | 86,0 | 20,0 | 45,0 | 3,0 | 44991 |
| 20,0 | 35,0 | 86,0 | 20,0 | 45,0 | 4,0 | 44992 |
| 20,0 | 35,0 | 106,0 | 20,0 | — | — | 44993 |
| 20,0 | 35,0 | 106,0 | 20,0 | 65,0 | 2,0 | 44994 |
| 20,0 | 35,0 | 106,0 | 20,0 | 65,0 | 3,0 | 44995 |
| 20,0 | 35,0 | 106,0 | 20,0 | 65,0 | 4,0 | 44996 |
| 20,0 | 35,0 | 106,0 | 20,0 | 65,0 | 5,0 | 44997 |
| 25,0 | 43,0 | 108,0 | 25,0 | — | — | 44998 |
| 25,0 | 43,0 | 108,0 | 25,0 | 60,0 | 2,0 | 44999 |
| 25,0 | 43,0 | 108,0 | 25,0 | 60,0 | 3,0 | 45000 |
| 25,0 | 43,0 | 108,0 | 25,0 | 60,0 | 4,0 | 45001 |
| 25,0 | 35,0 | 140,0 | 25,0 | — | — | 45002 |
| 25,0 | 35,0 | 140,0 | 25,0 | 80,0 | 3,0 | 45003 |
| 25,0 | 35,0 | 140,0 | 25,0 | 90,0 | 3,0 | 45004 |

- Ultra high-productivity rougher for Aluminum alloys, specifically for aircraft components
- Designed for machine tools with capability of 12 IP per minute material removal rates
- New 3 flute variable geometry with side exit coolant holes
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)



43APR-4
METRIC SERIES



- Ultra high-productivity rougher for Aluminum alloys, specifically for aircraft components
- Designed for machine tools with capability of 12 l³ per minute material removal rates
- New 4 flute variable geometry with side exit coolant holes
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

| inch | | | | | | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------------------------|--------------------|------------------------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | REACH L ₃ | CORNER RADIUS R | Ti-NAMITE-B (TiB ₂) |
| 20,0 | 35,0 | 86,0 | 20,0 | — | — | 45005 |
| 20,0 | 35,0 | 86,0 | 20,0 | 45,0 | 3,0 | 45006 |
| 20,0 | 35,0 | 86,0 | 20,0 | 45,0 | 4,0 | 45007 |
| 20,0 | 35,0 | 106,0 | 20,0 | — | — | 45008 |
| 20,0 | 35,0 | 106,0 | 20,0 | 65,0 | 2,0 | 45009 |
| 20,0 | 35,0 | 106,0 | 20,0 | 65,0 | 3,0 | 45010 |
| 20,0 | 35,0 | 106,0 | 20,0 | 65,0 | 4,0 | 45011 |
| 20,0 | 35,0 | 106,0 | 20,0 | 65,0 | 5,0 | 45012 |
| 25,0 | 43,0 | 108,0 | 25,0 | — | — | 45013 |
| 25,0 | 43,0 | 108,0 | 25,0 | 60,0 | 2,0 | 45014 |
| 25,0 | 43,0 | 108,0 | 25,0 | 60,0 | 3,0 | 45015 |
| 25,0 | 43,0 | 108,0 | 25,0 | 60,0 | 4,0 | 45016 |
| 25,0 | 35,0 | 140,0 | 25,0 | — | — | 45017 |
| 25,0 | 35,0 | 140,0 | 25,0 | 80,0 | 3,0 | 45018 |
| 25,0 | 35,0 | 140,0 | 25,0 | 90,0 | 3,0 | 45019 |

TOLERANCES (mm)

20–25 DIAMETER

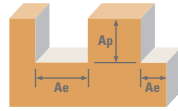
D₁ = -0,01/-0,10

D₂ = h₆

R = +/-0,05

NON-FERROUS

For patent information visit www.ksptpatents.com



| Series 43APR-3 43APR-4 Metric | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | |
|--|---------------------|---------------------|---------------|------------------------------------|-------|-------|-------|-------|-------|
| | | | | APR-3 | | APR-4 | | | |
| | | | | 20 | 25 | 20 | 25 | | |
| N ALUMINIUM ALLOYS 6068, 7075 | Slot | 1 | ≤ 1 | 1600 | RPM | 25461 | 20369 | 25461 | 20369 |
| | | | | (300-2100) | Fz | 0.12 | 0.12 | 0.12 | 0.12 |
| | | | | Feed (mm/min) | 9166 | 7333 | 12222 | 9777 | |
| | Profile | ≤ 0.5 | ≤ 1.5 | 1800 | RPM | 28644 | 22915 | 28644 | 22915 |
| | | | | (300-2100) | Fz | 0.15 | 0.15 | 0.15 | 0.15 |
| | | | | Feed (mm/min) | 12890 | 10312 | 17187 | 13749 | |
| | HSM | ≤ 0.1 | ≤ 2 | 2100 | RPM | 33418 | 26735 | 33418 | 26735 |
| | | | | (300-2100) | Fz | 0.18 | 0.18 | 0.18 | 0.18 |
| | | | | Feed (mm/min) | 18046 | 14437 | 24061 | 19249 | |

For best results use the peak power of the specific machine torque chart.

Typically 10kw is required to remove 1 litre of material (MMR).

Eg. >> (Ae x Ap x Feed) / 1000000 >> Therefore Full slotting Ø25: 25 x 25 x 7333 = 4.58 Litres so it needs a min of 46Kw.

Larger cuts and chip load consume more power.

Review the power chart of each machine to determine MAX power for ultimate performance.

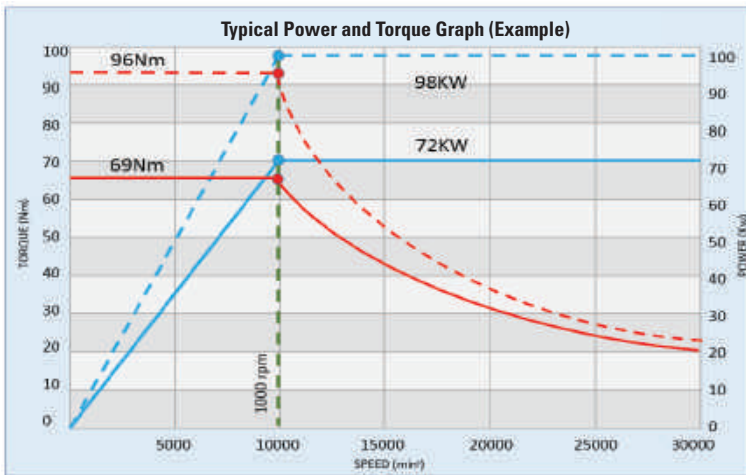
Example below shows peak power @ 10,000 rpm.

The APR-4 design is for ultimate metal removal but typically requires more power, and is also better suited to horizontal machines.

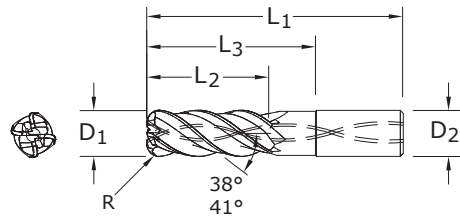
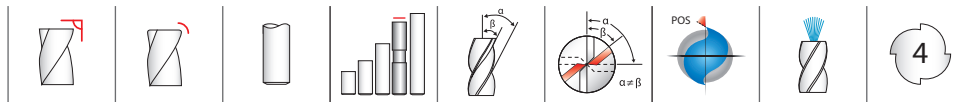
The new coolant supply is designed for MQL as well as normal emulsion coolant on the same data.

Ensure max MQL flow prior to cutting.

Refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com).



S-Carb APF®



43MAPF METRIC SERIES

- Ultra high-productivity finisher for Aluminum alloys, specifically for aircraft components
- Two levels of chatter suppression: variable helix and indexing
- Designed for single axial pass semi-finishing and finishing
- Polished flutes maximize chip evacuation and provides enhanced finish
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| mm | | | | | | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------------------------|--------------------|------------------------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | REACH L ₃ | CORNER RADIUS R | Ti-NAMITE-B (TiB ₂) |
| 6,0 | 24,0 | 58,0 | 6,0 | 30,0 | — | 44627 |
| 8,0 | 32,0 | 64,0 | 8,0 | 40,0 | — | 44628 |
| 10,0 | 40,0 | 80,0 | 10,0 | 50,0 | — | 44629 |
| 12,0 | 30,0 | 83,0 | 12,0 | 40,0 | — | 44630 |
| 12,0 | 30,0 | 83,0 | 12,0 | 40,0 | 2,0 | 44745 |
| 12,0 | 30,0 | 83,0 | 12,0 | 40,0 | 3,0 | 44746 |
| 12,0 | 30,0 | 83,0 | 12,0 | 40,0 | 4,0 | 44747 |
| 12,0 | 30,0 | 83,0 | 12,0 | 50,0 | 0,5 | 44641 |
| 12,0 | 30,0 | 83,0 | 12,0 | 50,0 | 5,0 | 44642 |
| 12,0 | 48,0 | 100,0 | 12,0 | 62,0 | — | 44631 |
| 12,0 | 48,0 | 100,0 | 12,0 | 62,0 | 2,0 | 44748 |
| 12,0 | 48,0 | 100,0 | 12,0 | 62,0 | 3,0 | 44749 |
| 12,0 | 48,0 | 100,0 | 12,0 | 62,0 | 4,0 | 44750 |
| 16,0 | 42,0 | 93,0 | 16,0 | 51,0 | 5,0 | 44643 |
| 16,0 | 40,0 | 92,0 | 16,0 | 51,0 | — | 44634 |
| 16,0 | 40,0 | 92,0 | 16,0 | 51,0 | 2,0 | 44751 |
| 16,0 | 40,0 | 92,0 | 16,0 | 51,0 | 3,0 | 44752 |
| 16,0 | 40,0 | 92,0 | 16,0 | 51,0 | 4,0 | 44753 |
| 16,0 | 64,0 | 125,0 | 16,0 | 82,0 | — | 44635 |
| 16,0 | 64,0 | 125,0 | 16,0 | 82,0 | 2,0 | 44754 |
| 16,0 | 64,0 | 125,0 | 16,0 | 82,0 | 3,0 | 44755 |
| 16,0 | 64,0 | 125,0 | 16,0 | 82,0 | 4,0 | 44756 |
| 20,0 | 50,0 | 108,0 | 20,0 | 63,0 | — | 44636 |
| 20,0 | 50,0 | 108,0 | 20,0 | 63,0 | 3,0 | 44757 |
| 20,0 | 50,0 | 108,0 | 20,0 | 63,0 | 4,0 | 44758 |
| 20,0 | 50,0 | 108,0 | 20,0 | 63,0 | 5,0 | 44759 |
| 20,0 | 80,0 | 150,0 | 20,0 | 102,0 | — | 44637 |
| 20,0 | 80,0 | 150,0 | 20,0 | 102,0 | 3,0 | 44760 |
| 20,0 | 80,0 | 150,0 | 20,0 | 102,0 | 4,0 | 44761 |
| 20,0 | 80,0 | 150,0 | 20,0 | 102,0 | 5,0 | 44762 |
| 25,0 | 63,0 | 130,0 | 25,0 | 79,0 | — | 44638 |
| 25,0 | 63,0 | 130,0 | 25,0 | 79,0 | 3,0 | 44763 |
| 25,0 | 63,0 | 130,0 | 25,0 | 79,0 | 4,0 | 44764 |
| 25,0 | 63,0 | 130,0 | 25,0 | 79,0 | 5,0 | 44765 |
| 25,0 | 100,0 | 175,0 | 25,0 | 120,0 | — | 44639 |
| 25,0 | 100,0 | 175,0 | 25,0 | 120,0 | 3,0 | 44766 |
| 25,0 | 100,0 | 175,0 | 25,0 | 120,0 | 4,0 | 44767 |
| 25,0 | 100,0 | 175,0 | 25,0 | 120,0 | 5,0 | 44768 |

Available on request: • JetStream Technology

TOLERANCES (mm)

6–25 DIAMETER

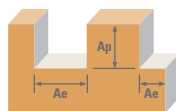
D₁ = +0,010/–0,050

D₂ = h₆

R = +0,000/–0,030

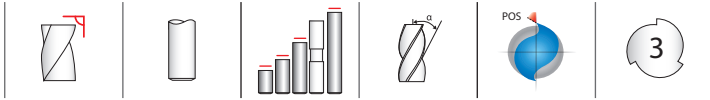
NON-FERROUS

For patent information visit www.ksptpatents.com

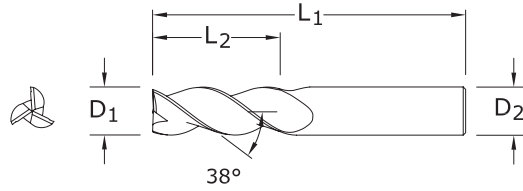


| Series 43MAPF Metric | Hardness | Profile | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|--|--|----------------------------|---------------------|---------------------|---------------|------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | | | | 6 | 8 | 10 | 12 | 16 | 20 | 25 | | |
| N | ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075 | Profile | ≤ 0.1 | ≤ 2.5 | 800 | RPM | 42440 | 31830 | 25464 | 21220 | 15915 | 12732 | 10186 | |
| | | | | | (640-960) | Fz | 0.050 | 0.055 | 0.060 | 0.070 | 0.100 | 0.140 | 0.170 | |
| | | | | | Feed (mm/min) | 8488 | 7003 | 6111 | 5942 | 6366 | 7130 | 6926 | | |
| | ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075 | Profile | ≤ 0.1 | ≤ 4 | 800 | RPM | 42440 | 31830 | 25464 | 21220 | 15915 | 12732 | 10186 | |
| | | | | | (640-960) | Fz | 0.040 | 0.045 | 0.050 | 0.050 | 0.070 | 0.100 | 0.120 | |
| | | | | | Feed (mm/min) | 6790 | 5729 | 5093 | 4244 | 4456 | 5093 | 4889 | | |
| ALUMINUM ALLOYS (LITHIUM)* 2090, 2091, 2099, 2195, 2199, 2297, 8090 | ≤ 150 Bhn or ≤ 7 HRc | Profile | ≤ 0.1 | ≤ 2.5 | 600 | RPM | 31830 | 23873 | 19098 | 15915 | 11936 | 9549 | 7639 | |
| | | | | | (480-720) | Fz | 0.050 | 0.055 | 0.060 | 0.070 | 0.100 | 0.140 | 0.170 | |
| | | | | | Feed (mm/min) | 6366 | 5252 | 4584 | 4456 | 4774 | 5347 | 5195 | | |
| | ALUMINUM ALLOYS (LITHIUM)* 2090, 2091, 2099, 2195, 2199, 2297, 8090 | ≤ 150 Bhn or ≤ 7 HRc | Profile | ≤ 0.1 | ≤ 4 | 600 | RPM | 31830 | 23873 | 19098 | 15915 | 11936 | 9549 | 7639 |
| | | | | | | (480-720) | Fz | 0.040 | 0.045 | 0.050 | 0.050 | 0.070 | 0.100 | 0.120 |
| | | | | | | Feed (mm/min) | 5093 | 4297 | 3820 | 3183 | 3342 | 3820 | 3667 | |

Bhn (Brinell) HRc (Rockwell C)
 surface speed is dependent on machine spindle and fixturing
 balancing is recommended at ultra high surface speeds
 *tool life may be reduced when machining Lithium Alloys
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 4 \times rpm$
 maximum recommended depths shown
 reduce speed and feed for materials harder than listed
 finish cuts typically require reduced feed and cutting depths of 0.02 X D₁ maximum
 ramp angle = 6° (feed rate = 50%)
 plunging not recommended
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



43
FRACTIONAL SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D ₁ | inch | | | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|---------------------------------|
| | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 34701 | 34728 |
| 3/16 | 5/16 | 2-1/2 | 3/16 | 34822 | 34857 |
| 3/16 | 9/16 | 2 | 3/16 | 34702 | 34729 |
| 3/16 | 3/4 | 2-1/2 | 3/16 | 34823 | 34858 |
| 1/4 | 3/8 | 2 | 1/4 | 34703 | 34730 |
| 1/4 | 1/2 | 2-1/2 | 1/4 | 34824 | 34859 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 34704 | 34731 |
| 1/4 | 1 | 3 | 1/4 | 34825 | 34860 |
| 1/4 | 1-1/4 | 3-1/2 | 1/4 | 34705 | 34732 |
| 1/4 | 1-3/4 | 4 | 1/4 | 34826 | 34861 |
| 5/16 | 7/16 | 2 | 5/16 | 34706 | 34733 |
| 5/16 | 5/8 | 2-1/2 | 5/16 | 34707 | 34734 |
| 5/16 | 1-1/4 | 4 | 5/16 | 34708 | 34735 |
| 3/8 | 1/2 | 2 | 3/8 | 34709 | 34736 |
| 3/8 | 1 | 2-1/2 | 3/8 | 34710 | 34737 |
| 3/8 | 1-1/4 | 3-1/2 | 3/8 | 34827 | 34862 |
| 3/8 | 1-1/2 | 3-1/2 | 3/8 | 34711 | 34738 |
| 3/8 | 2 | 4 | 3/8 | 34828 | 34863 |
| 1/2 | 5/8 | 2-1/2 | 1/2 | 34712 | 34739 |
| 1/2 | 1 | 3 | 1/2 | 34830 | 34865 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 34713 | 34740 |
| 1/2 | 1-5/8 | 4 | 1/2 | 34831 | 34866 |
| 1/2 | 2-1/2 | 5 | 1/2 | 34832 | 34867 |
| 1/2 | 2 | 4 | 1/2 | 34714 | 34741 |
| 1/2 | 3-1/8 | 6 | 1/2 | 34715 | 34742 |
| 5/8 | 3/4 | 3 | 5/8 | 34716 | 34743 |
| 5/8 | 1-5/8 | 3-3/4 | 5/8 | 34717 | 34744 |
| 5/8 | 2-1/8 | 4 | 5/8 | 34833 | 34868 |
| 5/8 | 2-1/2 | 5 | 5/8 | 34718 | 34745 |
| 5/8 | 3-1/4 | 6 | 5/8 | 34834 | 34869 |
| 5/8 | 3-3/4 | 6 | 5/8 | 34719 | 34746 |
| 3/4 | 1 | 3 | 3/4 | 34720 | 34747 |
| 3/4 | 1-5/8 | 4 | 3/4 | 34721 | 34748 |
| 3/4 | 2-1/4 | 5 | 3/4 | 34722 | 34749 |
| 3/4 | 3-1/4 | 6 | 3/4 | 34723 | 34750 |
| 1 | 1-1/4 | 4 | 1 | 34724 | 34751 |
| 1 | 2 | 4-1/2 | 1 | 34725 | 34752 |
| 1 | 2-5/8 | 6 | 1 | 34726 | 34753 |
| 1 | 3-1/4 | 6 | 1 | 34727 | 34754 |
| 1 | 4-1/8 | 7 | 1 | 34835 | 34870 |

TOLERANCES (inch)

1/8–3/16 DIAMETER

D₁ = +0.0000/–0.00032

D₂ = h₆

1/4–3/8 DIAMETER

D₁ = +0.0000/–0.00035

D₂ = h₆

1/2–5/8 DIAMETER

D₁ = +0.0000/–0.00043

D₂ = h₆

3/4–1 DIAMETER

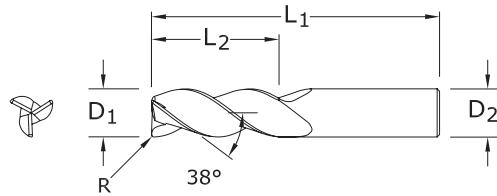
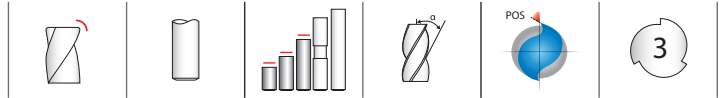
D₁ = +0.0000/–0.00051

D₂ = h₆

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



TOLERANCES (inch)

1/8–3/16 DIAMETER

$D_1 = +0.0000/-0.00032$

$D_2 = h_6$

$R = +0.0000/-0.0020$

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

$R = +0.0000/-0.0020$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

$R = +0.0000/-0.0020$

3/4–1 DIAMETER

$D_1 = +0.0000/-0.00051$

$D_2 = h_6$

$R = +0.0000/-0.0020$

43CR
FRACTIONAL SERIES

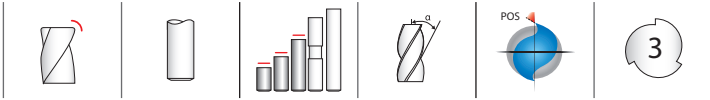
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|----------|---------------------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | UNCOATED | TI-NAMITE-B (TiB ₂) |
| 1/8 | 3/8 | 1-1/2 | 1/8 | .010 | 34771 | 34793 |
| 3/16 | 9/16 | 2 | 3/16 | .010 | 34772 | 34794 |
| 1/4 | 3/8 | 2-1/2 | 1/4 | .010 | 35575 | 35665 |
| 1/4 | 3/8 | 2-1/2 | 1/4 | .015 | 35576 | 35666 |
| 1/4 | 3/8 | 2-1/2 | 1/4 | .030 | 35577 | 35667 |
| 1/4 | 3/8 | 2-1/2 | 1/4 | .060 | 35578 | 35668 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .010 | 34773 | 34795 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .015 | 35579 | 35669 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .030 | 34774 | 34796 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .060 | 35580 | 35670 |
| 1/4 | 1 | 3 | 1/4 | .010 | 35581 | 35671 |
| 1/4 | 1 | 3 | 1/4 | .015 | 35582 | 35672 |
| 1/4 | 1 | 3 | 1/4 | .030 | 35583 | 35673 |
| 1/4 | 1 | 3 | 1/4 | .060 | 35584 | 35674 |
| 5/16 | 5/8 | 2-1/2 | 5/16 | .030 | 34775 | 34797 |
| 3/8 | 1/2 | 3 | 3/8 | .010 | 35585 | 35675 |
| 3/8 | 1/2 | 3 | 3/8 | .015 | 35586 | 35676 |
| 3/8 | 1/2 | 3 | 3/8 | .030 | 35587 | 35677 |
| 3/8 | 1/2 | 3 | 3/8 | .060 | 35588 | 35678 |
| 3/8 | 1/2 | 3 | 3/8 | .090 | 35589 | 35679 |
| 3/8 | 1 | 2-1/2 | 3/8 | .010 | 34776 | 34798 |
| 3/8 | 1 | 2-1/2 | 3/8 | .030 | 34777 | 34799 |
| 3/8 | 1 | 2-1/2 | 3/8 | .060 | 32761 | 32825 |
| 3/8 | 1 | 3 | 3/8 | .015 | 35590 | 35680 |
| 3/8 | 1 | 3 | 3/8 | .090 | 35591 | 35681 |
| 3/8 | 1-1/2 | 4 | 3/8 | .010 | 35592 | 35682 |
| 3/8 | 1-1/2 | 4 | 3/8 | .015 | 35593 | 35683 |
| 3/8 | 1-1/2 | 4 | 3/8 | .030 | 35594 | 35684 |
| 3/8 | 1-1/2 | 4 | 3/8 | .060 | 35595 | 35685 |
| 3/8 | 1-1/2 | 4 | 3/8 | .090 | 35596 | 35686 |
| 1/2 | 5/8 | 3 | 1/2 | .010 | 35597 | 35687 |
| 1/2 | 5/8 | 3 | 1/2 | .015 | 35598 | 35688 |
| 1/2 | 5/8 | 3 | 1/2 | .030 | 35599 | 35689 |
| 1/2 | 5/8 | 3 | 1/2 | .060 | 35600 | 35690 |
| 1/2 | 5/8 | 3 | 1/2 | .090 | 35601 | 35691 |
| 1/2 | 5/8 | 3 | 1/2 | .120 | 35602 | 35692 |

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

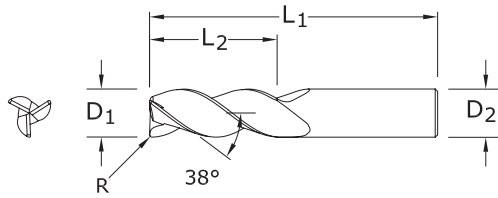
NON-FERROUS
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

continued on next page



43CR
FRACTIONAL SERIES



CONTINUED

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | inch | | | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------|----------|------------------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/2 | 1 | 3 | 1/2 | .010 | 35603 | 35693 |
| 1/2 | 1 | 3 | 1/2 | .015 | 35604 | 35694 |
| 1/2 | 1 | 3 | 1/2 | .030 | 35605 | 35695 |
| 1/2 | 1 | 3 | 1/2 | .060 | 35606 | 35696 |
| 1/2 | 1 | 3 | 1/2 | .090 | 35607 | 35697 |
| 1/2 | 1 | 3 | 1/2 | .120 | 35608 | 35698 |
| 1/2 | 1-1/4 | 3 | 1/2 | .015 | 35609 | 35699 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .010 | 34778 | 34800 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .030 | 34779 | 34801 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .060 | 34780 | 34802 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .090 | 34781 | 34803 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .120 | 32766 | 32830 |
| 1/2 | 1-5/8 | 4 | 1/2 | .010 | 35610 | 35700 |
| 1/2 | 1-5/8 | 4 | 1/2 | .015 | 35611 | 35701 |
| 1/2 | 1-5/8 | 4 | 1/2 | .030 | 35612 | 35702 |
| 1/2 | 1-5/8 | 4 | 1/2 | .060 | 35613 | 35703 |
| 1/2 | 1-5/8 | 4 | 1/2 | .090 | 35614 | 35704 |
| 1/2 | 1-5/8 | 4 | 1/2 | .120 | 35615 | 35705 |
| 1/2 | 2 | 4 | 1/2 | .010 | 35616 | 35706 |
| 1/2 | 2 | 4 | 1/2 | .015 | 35617 | 35707 |
| 1/2 | 2 | 4 | 1/2 | .030 | 35618 | 35708 |
| 1/2 | 2 | 4 | 1/2 | .060 | 35619 | 35709 |
| 1/2 | 2 | 4 | 1/2 | .090 | 35620 | 35710 |
| 1/2 | 2 | 4 | 1/2 | .120 | 35621 | 35711 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .030 | 35622 | 35712 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .060 | 35623 | 35713 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .090 | 35624 | 35714 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .120 | 35625 | 35715 |
| 5/8 | 1-5/8 | 3-3/4 | 5/8 | .030 | 34782 | 34804 |
| 5/8 | 1-5/8 | 3-3/4 | 5/8 | .060 | 34783 | 34805 |
| 5/8 | 1-5/8 | 3-3/4 | 5/8 | .090 | 34784 | 34806 |
| 5/8 | 1-5/8 | 3-3/4 | 5/8 | .120 | 35626 | 35716 |
| 3/4 | 1 | 4 | 3/4 | .030 | 35627 | 35717 |
| 3/4 | 1 | 4 | 3/4 | .060 | 35628 | 35718 |
| 3/4 | 1 | 4 | 3/4 | .090 | 35629 | 35719 |
| 3/4 | 1 | 4 | 3/4 | .120 | 35630 | 35720 |

continued on next page

TOLERANCES (inch)

1/8–3/16 DIAMETER

D₁ = +0.0000/–0.00032

D₂ = h₆

R = +0.0000/–0.0020

1/4–3/8 DIAMETER

D₁ = +0.0000/–0.00035

D₂ = h₆

R = +0.0000/–0.0020

1/2–5/8 DIAMETER

D₁ = +0.0000/–0.00043

D₂ = h₆

R = +0.0000/–0.0020

3/4–1 DIAMETER

D₁ = +0.0000/–0.00051

D₂ = h₆

R = +0.0000/–0.0020

NON-FERROUS

PLASTICS/COMPOSITES

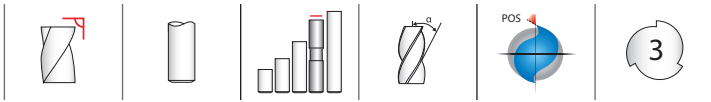
For patent information visit www.ksptpatents.com



43CR
FRACTIONAL SERIES

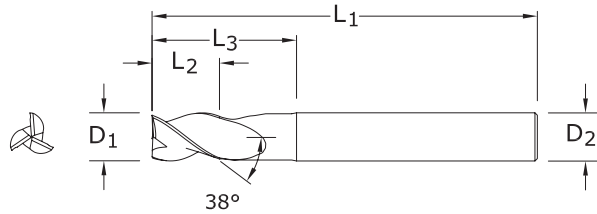
CONTINUED

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | inch | | | EDP NO. | |
|---------------------------------------|------------------------------------|-------------------------------------|-------------------------------------|-----------------------|----------|------------------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 3/4 | 1 | 4 | 3/4 | .190 | 35631 | 35721 |
| 3/4 | 1 | 4 | 3/4 | .250 | 35632 | 35722 |
| 3/4 | 1-5/8 | 4 | 3/4 | .030 | 34785 | 34807 |
| 3/4 | 1-5/8 | 4 | 3/4 | .060 | 34786 | 34808 |
| 3/4 | 1-5/8 | 4 | 3/4 | .090 | 34787 | 34809 |
| 3/4 | 1-5/8 | 4 | 3/4 | .120 | 34815 | 34817 |
| 3/4 | 1-5/8 | 4 | 3/4 | .190 | 35633 | 35723 |
| 3/4 | 1-5/8 | 4 | 3/4 | .250 | 35634 | 35724 |
| 3/4 | 2-1/4 | 5 | 3/4 | .030 | 35635 | 35725 |
| 3/4 | 2-1/4 | 5 | 3/4 | .060 | 35636 | 35726 |
| 3/4 | 2-1/4 | 5 | 3/4 | .090 | 35637 | 35727 |
| 3/4 | 2-1/4 | 5 | 3/4 | .120 | 35638 | 35728 |
| 3/4 | 2-1/4 | 5 | 3/4 | .190 | 35639 | 35729 |
| 3/4 | 2-1/4 | 5 | 3/4 | .250 | 35640 | 35730 |
| 1 | 1-1/4 | 5 | 1 | .030 | 35641 | 35731 |
| 1 | 1-1/4 | 5 | 1 | .060 | 35642 | 35732 |
| 1 | 1-1/4 | 5 | 1 | .090 | 35643 | 35733 |
| 1 | 1-1/4 | 5 | 1 | .120 | 35644 | 35734 |
| 1 | 1-1/4 | 5 | 1 | .190 | 35645 | 35735 |
| 1 | 1-1/4 | 5 | 1 | .250 | 35646 | 35736 |
| 1 | 2 | 5 | 1 | .190 | 35647 | 35737 |
| 1 | 2 | 5 | 1 | .250 | 35648 | 35738 |
| 1 | 2 | 4-1/2 | 1 | .030 | 34789 | 34811 |
| 1 | 2 | 4-1/2 | 1 | .060 | 34790 | 34812 |
| 1 | 2 | 4-1/2 | 1 | .090 | 34791 | 34813 |
| 1 | 2 | 4-1/2 | 1 | .120 | 34816 | 34818 |
| 1 | 3-1/4 | 6 | 1 | .030 | 35649 | 35739 |
| 1 | 3-1/4 | 6 | 1 | .060 | 35650 | 35740 |
| 1 | 3-1/4 | 6 | 1 | .090 | 35651 | 35741 |
| 1 | 3-1/4 | 6 | 1 | .120 | 35652 | 35742 |
| 1 | 3-1/4 | 6 | 1 | .190 | 35653 | 35743 |
| 1 | 3-1/4 | 6 | 1 | .250 | 35654 | 35744 |



43L

FRACTIONAL SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------|---------------------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/8 | 5/32 | 3 | 1/8 | 1/2 | 32700 | 32725 |
| 1/8 | 5/32 | 3 | 1/8 | 3/4 | 32691 | 34888 |
| 3/16 | 7/32 | 3 | 3/16 | 1/2 | 32701 | 32726 |
| 3/16 | 7/32 | 3 | 3/16 | 3/4 | 32692 | 34889 |
| 1/4 | 3/8 | 4 | 1/4 | 3/4 | 32702 | 32727 |
| 1/4 | 3/8 | 4 | 1/4 | 1-1/2 | 32703 | 32728 |
| 1/4 | 3/8 | 4 | 1/4 | 2-1/8 | 32704 | 32729 |
| 5/16 | 7/16 | 4 | 5/16 | 1-1/8 | 32705 | 32730 |
| 5/16 | 7/16 | 4 | 5/16 | 2-1/8 | 32706 | 32731 |
| 3/8 | 1/2 | 4 | 3/8 | 1-1/8 | 32707 | 32732 |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | 32708 | 32733 |
| 1/2 | 5/8 | 4 | 1/2 | 1-3/8 | 32709 | 32734 |
| 1/2 | 5/8 | 6 | 1/2 | 2-1/8 | 32710 | 32735 |
| 1/2 | 5/8 | 6 | 1/2 | 3-3/8 | 32711 | 32736 |
| 1/2 | 5/8 | 6 | 1/2 | 4-1/4 | 32697 | 34894 |
| 5/8 | 3/4 | 4 | 5/8 | 1-3/4 | 32712 | 32737 |
| 5/8 | 3/4 | 4 | 5/8 | 2-3/8 | 32713 | 32738 |
| 5/8 | 3/4 | 6 | 5/8 | 3-3/8 | 32714 | 32739 |
| 5/8 | 3/4 | 6 | 5/8 | 4-3/8 | 32698 | 34895 |
| 3/4 | 1 | 4 | 3/4 | 1-3/4 | 32715 | 32740 |
| 3/4 | 1 | 6 | 3/4 | 2-3/8 | 32716 | 32741 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | 32717 | 32742 |
| 3/4 | 1 | 6 | 3/4 | 4-3/8 | 32699 | 34896 |
| 1 | 1-1/4 | 6 | 1 | 2-3/8 | 32718 | 32743 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | 32719 | 32744 |
| 1 | 1-1/4 | 7 | 1 | 4-3/8 | 32720 | 32745 |

TOLERANCES (inch)

1/8–3/16 DIAMETER

$D_1 = +0.0000/-0.00032$

$D_2 = h_6$

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

3/4–1 DIAMETER

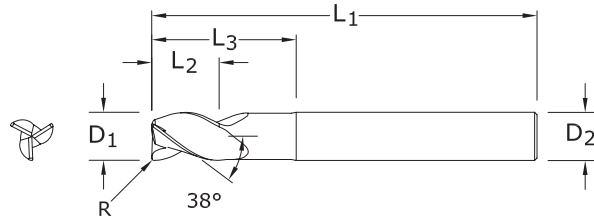
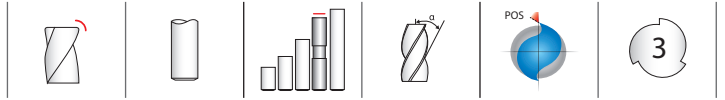
$D_1 = +0.0000/-0.00051$

$D_2 = h_6$

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



TOLERANCES (inch)

1/8–3/16 DIAMETER

D₁ = +0.0000/–0.00032

D₂ = h₆

R = +0.0000/–0.0020

1/4–3/8 DIAMETER

D₁ = +0.0000/–0.00035

D₂ = h₆

R = +0.0000/–0.0020

1/2–5/8 DIAMETER

D₁ = +0.0000/–0.00043

D₂ = h₆

R = +0.0000/–0.0020

3/4–1 DIAMETER

D₁ = +0.0000/–0.00051

D₂ = h₆

R = +0.0000/–0.0020

NON-FERROUS

PLASTICS/COMPOSITES

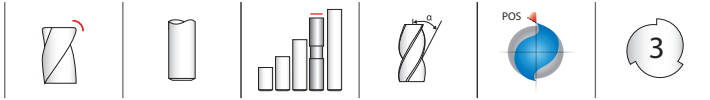
For patent information visit www.ksptpatents.com

43LC
FRACTIONAL SERIES

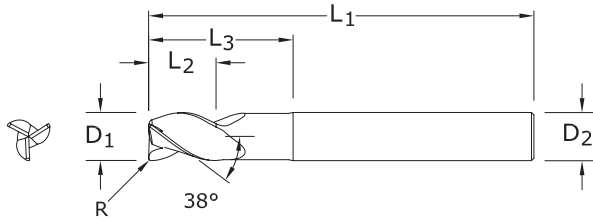
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | inch | | | CORNER RADIUS R | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------------------------|--------------------|----------|---------------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | REACH L ₃ | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/8 | 5/32 | 3 | 1/8 | 1/2 | .010 | 32751 | 32815 |
| 3/16 | 7/32 | 3 | 3/16 | 1/2 | .010 | 32752 | 32816 |
| 1/4 | 3/8 | 2-1/2 | 1/4 | 3/4 | .015 | 35787 | 36235 |
| 1/4 | 3/8 | 2-1/2 | 1/4 | 3/4 | .060 | 35788 | 36236 |
| 1/4 | 3/8 | 4 | 1/4 | 3/4 | .010 | 32753 | 32817 |
| 1/4 | 3/8 | 4 | 1/4 | 3/4 | .030 | 32754 | 32818 |
| 1/4 | 3/8 | 4 | 1/4 | 1-1/2 | .010 | 32755 | 32819 |
| 1/4 | 3/8 | 4 | 1/4 | 1-1/2 | .030 | 32756 | 32820 |
| 1/4 | 3/8 | 4 | 1/4 | 2-1/8 | .010 | 32757 | 32821 |
| 1/4 | 3/8 | 4 | 1/4 | 2-1/8 | .030 | 32758 | 32822 |
| 5/16 | 7/16 | 4 | 5/16 | 1-1/8 | .030 | 32759 | 32823 |
| 5/16 | 7/16 | 4 | 5/16 | 2-1/8 | .030 | 32760 | 32824 |
| 3/8 | 1/2 | 3 | 3/8 | 1-1/8 | .015 | 35791 | 36239 |
| 3/8 | 1/2 | 3 | 3/8 | 1-1/8 | .090 | 35792 | 36240 |
| 3/8 | 1/2 | 4 | 3/8 | 1-1/8 | .030 | 32762 | 32826 |
| 3/8 | 1/2 | 4 | 3/8 | 1-1/8 | .060 | 32763 | 32827 |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | .030 | 32764 | 32828 |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | .060 | 32765 | 32829 |
| 1/2 | 5/8 | 3 | 1/2 | 1-3/8 | .015 | 35795 | 36243 |
| 1/2 | 5/8 | 4 | 1/2 | 1-3/8 | .030 | 32767 | 32831 |
| 1/2 | 5/8 | 4 | 1/2 | 1-3/8 | .060 | 32768 | 32832 |
| 1/2 | 5/8 | 4 | 1/2 | 1-3/8 | .090 | 32769 | 32833 |
| 1/2 | 5/8 | 4 | 1/2 | 1-3/8 | .120 | 32770 | 32834 |
| 1/2 | 5/8 | 4 | 1/2 | 2-1/4 | .015 | 35796 | 36244 |
| 1/2 | 5/8 | 6 | 1/2 | 2-1/8 | .030 | 32771 | 32835 |
| 1/2 | 5/8 | 6 | 1/2 | 2-1/8 | .060 | 32772 | 32836 |
| 1/2 | 5/8 | 6 | 1/2 | 2-1/8 | .090 | 32773 | 32837 |
| 1/2 | 5/8 | 6 | 1/2 | 2-1/8 | .120 | 32774 | 32838 |
| 1/2 | 5/8 | 6 | 1/2 | 3-3/8 | .030 | 32775 | 32839 |
| 1/2 | 5/8 | 6 | 1/2 | 3-3/8 | .060 | 32776 | 32840 |
| 1/2 | 5/8 | 6 | 1/2 | 3-3/8 | .090 | 32777 | 32841 |
| 1/2 | 5/8 | 6 | 1/2 | 3-3/8 | .120 | 32778 | 32842 |
| 5/8 | 3/4 | 4 | 5/8 | 1-3/4 | .030 | 32779 | 32843 |
| 5/8 | 3/4 | 4 | 5/8 | 1-3/4 | .060 | 32780 | 32844 |
| 5/8 | 3/4 | 4 | 5/8 | 1-3/4 | .090 | 32781 | 32845 |
| 5/8 | 3/4 | 4 | 5/8 | 1-3/4 | .120 | 32782 | 32846 |
| 5/8 | 3/4 | 4 | 5/8 | 2-3/8 | .030 | 32783 | 32847 |
| 5/8 | 3/4 | 4 | 5/8 | 2-3/8 | .060 | 32784 | 32848 |

continued on next page

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)



43LC
FRACTIONAL SERIES



CONTINUED

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | inch | | | | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-------------------------|--------------------|----------|------------------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | REACH L ₃ | CORNER RADIUS R | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 5/8 | 3/4 | 4 | 5/8 | 2-3/8 | .090 | 32785 | 32849 |
| 5/8 | 3/4 | 4 | 5/8 | 2-3/8 | .120 | 32786 | 32850 |
| 5/8 | 3/4 | 6 | 5/8 | 3-3/8 | .030 | 32787 | 32851 |
| 5/8 | 3/4 | 6 | 5/8 | 3-3/8 | .060 | 32788 | 32852 |
| 5/8 | 3/4 | 6 | 5/8 | 3-3/8 | .090 | 32789 | 32853 |
| 5/8 | 3/4 | 6 | 5/8 | 3-3/8 | .120 | 32790 | 32854 |
| 3/4 | 1 | 4 | 3/4 | 1-3/4 | .030 | 32791 | 32855 |
| 3/4 | 1 | 4 | 3/4 | 1-3/4 | .060 | 32792 | 32856 |
| 3/4 | 1 | 4 | 3/4 | 1-3/4 | .090 | 32793 | 32857 |
| 3/4 | 1 | 4 | 3/4 | 1-3/4 | .120 | 32794 | 32858 |
| 3/4 | 1 | 4 | 3/4 | 2 | .190 | 35803 | 36251 |
| 3/4 | 1 | 4 | 3/4 | 2 | .250 | 35804 | 36252 |
| 3/4 | 1 | 6 | 3/4 | 2-3/8 | .030 | 32795 | 32859 |
| 3/4 | 1 | 6 | 3/4 | 2-3/8 | .060 | 32796 | 32860 |
| 3/4 | 1 | 6 | 3/4 | 2-3/8 | .090 | 32797 | 32861 |
| 3/4 | 1 | 6 | 3/4 | 2-3/8 | .120 | 32798 | 32862 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .030 | 32799 | 32863 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .060 | 32800 | 32864 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .090 | 32801 | 32865 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .120 | 32802 | 32866 |
| 1 | 1-1/4 | 5 | 1 | 2-5/8 | .190 | 35809 | 36257 |
| 1 | 1-1/4 | 5 | 1 | 2-5/8 | .250 | 35810 | 36258 |
| 1 | 1-1/4 | 6 | 1 | 2-3/8 | .030 | 32803 | 32867 |
| 1 | 1-1/4 | 6 | 1 | 2-3/8 | .060 | 32804 | 32868 |
| 1 | 1-1/4 | 6 | 1 | 2-3/8 | .090 | 32805 | 32869 |
| 1 | 1-1/4 | 6 | 1 | 2-3/8 | .120 | 32806 | 32870 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .030 | 32807 | 32871 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .060 | 32808 | 32872 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .090 | 32809 | 32873 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .120 | 32810 | 32874 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .190 | 35811 | 36259 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .250 | 35812 | 36260 |

TOLERANCES (inch)

1/8–3/16 DIAMETER

D₁ = +0.0000/–0.00032
D₂ = h₆
R = +0.0000/–0.0020

1/4–3/8 DIAMETER

D₁ = +0.0000/–0.00035
D₂ = h₆
R = +0.0000/–0.0020

1/2–5/8 DIAMETER

D₁ = +0.0000/–0.00043
D₂ = h₆
R = +0.0000/–0.0020

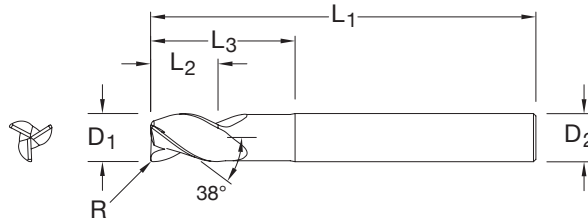
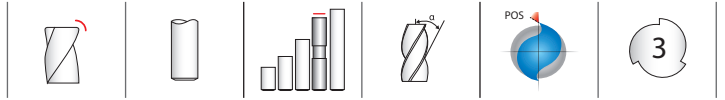
3/4–1 DIAMETER

D₁ = +0.0000/–0.00051
D₂ = h₆
R = +0.0000/–0.0020

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



43EC
FRACTIONAL SERIES

TOLERANCES (inch)

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

$R = +0.0000/-0.0020$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

$R = +0.0000/-0.0020$

3/4–1 DIAMETER

$D_1 = +0.0000/-0.00051$

$D_2 = h_6$

$R = +0.0000/-0.0020$

NON-FERROUS

PLASTICS/COMPOSITES

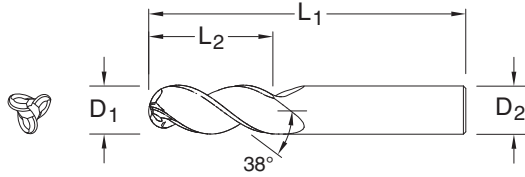
For patent information visit www.ksptpatents.com

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | CORNER RADIUS R | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------------|----------|---------------------------------|
| | | | | | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/4 | 3/8 | 3 | 1/4 | 1-1/8 | .015 | 35789 | 36237 |
| 1/4 | 3/8 | 3 | 1/4 | 1-1/8 | .060 | 35790 | 36238 |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | .015 | 35793 | 36241 |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | .090 | 35794 | 36242 |
| 1/2 | 5/8 | 5 | 1/2 | 3-3/8 | .015 | 35797 | 36245 |
| 1/2 | 5/8 | 6 | 1/2 | 4-1/4 | .015 | 35798 | 36246 |
| 1/2 | 5/8 | 6 | 1/2 | 4-1/4 | .030 | 35799 | 36247 |
| 1/2 | 5/8 | 6 | 1/2 | 4-1/4 | .060 | 35800 | 36248 |
| 1/2 | 5/8 | 6 | 1/2 | 4-1/4 | .090 | 35801 | 36249 |
| 1/2 | 5/8 | 6 | 1/2 | 4-1/4 | .120 | 35802 | 36250 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .190 | 35805 | 36253 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .250 | 35806 | 36254 |
| 1 | 1-1/4 | 7 | 1 | 4-3/8 | .030 | 35813 | 36261 |
| 1 | 1-1/4 | 7 | 1 | 4-3/8 | .060 | 35814 | 36262 |
| 1 | 1-1/4 | 7 | 1 | 4-3/8 | .090 | 35815 | 36263 |
| 1 | 1-1/4 | 7 | 1 | 4-3/8 | .120 | 35816 | 36264 |
| 1 | 1-1/4 | 7 | 1 | 4-3/8 | .190 | 35817 | 36265 |
| 1 | 1-1/4 | 7 | 1 | 4-3/8 | .250 | 35818 | 36266 |

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)



43B
FRACTIONAL SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Open fluting for deep slotting and profiling
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|---------------------------------|
| | | | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/4 | 3/8 | 2 | 1/4 | 34916 | 34972 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 34917 | 34973 |
| 1/4 | 1 | 3 | 1/4 | 34918 | 34974 |
| 3/8 | 1/2 | 2 | 3/8 | 34919 | 34975 |
| 3/8 | 1 | 2-1/2 | 3/8 | 34920 | 34976 |
| 3/8 | 1-1/2 | 3-1/2 | 3/8 | 34921 | 34977 |
| 1/2 | 5/8 | 2-1/2 | 1/2 | 34922 | 34978 |
| 1/2 | 1 | 3 | 1/2 | 34923 | 34979 |
| 1/2 | 1-1/4 | 3 | 1/2 | 34924 | 34980 |
| 1/2 | 1-5/8 | 4 | 1/2 | 34925 | 34981 |
| 1/2 | 2 | 4 | 1/2 | 34926 | 34982 |
| 5/8 | 3/4 | 3 | 5/8 | 34927 | 34983 |
| 5/8 | 1-5/8 | 4 | 5/8 | 34928 | 34984 |
| 3/4 | 1 | 3 | 3/4 | 34929 | 34985 |
| 3/4 | 1-5/8 | 4 | 3/4 | 34930 | 34986 |
| 3/4 | 2-1/4 | 5 | 3/4 | 34931 | 34987 |
| 1 | 1-1/4 | 4 | 1 | 34932 | 34988 |
| 1 | 2 | 5 | 1 | 34933 | 34989 |
| 1 | 3-1/4 | 6 | 1 | 34934 | 34990 |

TOLERANCES (inch)

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

BALL RADIUS

$+0.0005/-0.0005$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

BALL RADIUS

$+0.0005/-0.0005$

3/4–1 DIAMETER

$D_1 = +0.0000/-0.00051$

$D_2 = h_6$

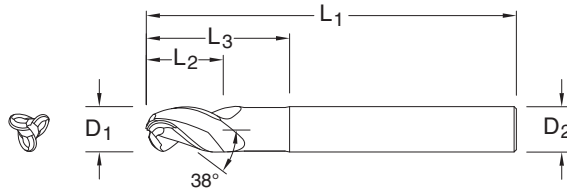
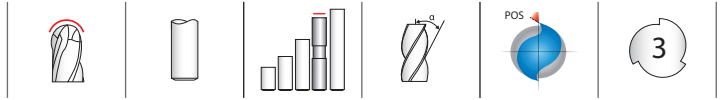
BALL RADIUS

$+0.0005/-0.0005$

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



TOLERANCES (inch)

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

BALL RADIUS

$+0.0005/-0.0005$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

BALL RADIUS

$+0.0005/-0.0005$

3/4–1 DIAMETER

$D_1 = +0.0000/-0.00051$

$D_2 = h_6$

BALL RADIUS

$+0.0005/-0.0005$

43LB
FRACTIONAL SERIES

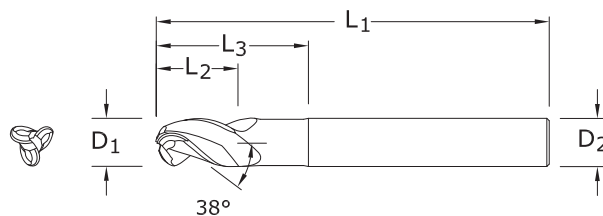
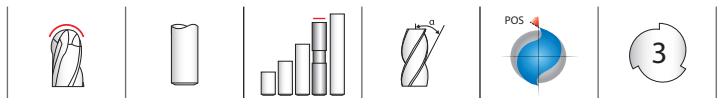
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------|---------------------------------|
| | | | | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/4 | 3/8 | 2-1/2 | 1/4 | 3/4 | 34941 | 35005 |
| 3/8 | 1/2 | 3 | 3/8 | 1-1/8 | 34943 | 35007 |
| 1/2 | 5/8 | 3 | 1/2 | 1-3/8 | 34945 | 35009 |
| 1/2 | 5/8 | 4 | 1/2 | 2-1/4 | 34946 | 35010 |
| 5/8 | 3/4 | 4 | 5/8 | 1-5/8 | 34949 | 35013 |
| 3/4 | 1 | 4 | 3/4 | 2 | 34951 | 35015 |
| 1 | 1-1/4 | 5 | 1 | 2-5/8 | 34954 | 35018 |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | 34955 | 35019 |

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



TOLERANCES (inch)

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

BALL RADIUS

$+0.0005/-0.0005$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

BALL RADIUS

$+0.0005/-0.0005$

3/4–1 DIAMETER

$D_1 = +0.0000/-0.00051$

$D_2 = h_6$

BALL RADIUS

$+0.0005/-0.0005$

43EB
FRACTIONAL SERIES

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------|---------------------------------|
| | | | | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/4 | 3/8 | 3 | 1/4 | 1-1/8 | 34942 | 35006 |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | 34944 | 35008 |
| 1/2 | 5/8 | 5 | 1/2 | 3-3/8 | 34947 | 35011 |
| 1/2 | 5/8 | 6 | 1/2 | 4-1/4 | 34948 | 35012 |
| 5/8 | 3/4 | 6 | 5/8 | 3-3/8 | 34950 | 35014 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | 34952 | 35016 |
| 1 | 1-1/4 | 7 | 1 | 4-3/8 | 34956 | 35020 |

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

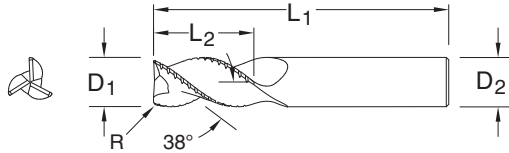
NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



43CB
FRACTIONAL SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Chip breakers reduce machine loads up to 15% for increased roughing feed rate capability
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | inch | | | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------|----------|------------------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/4 | 3/8 | 2-1/2 | 1/4 | .020 | 33390 | 33450 |
| 1/4 | 1/2 | 2-1/2 | 1/4 | .020 | 33391 | 33451 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | .020 | 33392 | 33452 |
| 1/4 | 1 | 3 | 1/4 | .020 | 33393 | 33453 |
| 1/4 | 1-1/4 | 3-1/2 | 1/4 | .020 | 33394 | 33454 |
| 1/4 | 1-3/4 | 4 | 1/4 | .020 | 33395 | 33455 |
| 5/16 | 7/16 | 2-1/2 | 5/16 | .020 | 33396 | 33456 |
| 5/16 | 11/16 | 2-1/2 | 5/16 | .020 | 33397 | 33457 |
| 5/16 | 1 | 3 | 5/16 | .020 | 33398 | 33458 |
| 5/16 | 2-1/8 | 4 | 5/16 | .020 | 33400 | 33460 |
| 3/8 | 1/2 | 3 | 3/8 | .020 | 33401 | 33461 |
| 3/8 | 1 | 2-1/2 | 3/8 | .020 | 33400 | 33405 |
| 3/8 | 1-1/4 | 3-1/2 | 3/8 | .020 | 33402 | 33462 |
| 3/8 | 1-1/2 | 4 | 3/8 | .020 | 33403 | 33463 |
| 3/8 | 2 | 4 | 3/8 | .020 | 33404 | 33464 |
| 1/2 | 5/8 | 3 | 1/2 | .030 | 33406 | 33466 |
| 1/2 | 1 | 3 | 1/2 | .030 | 33407 | 33467 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | .030 | 33401 | 33406 |
| 1/2 | 1-5/8 | 4 | 1/2 | .030 | 33408 | 33468 |
| 1/2 | 2 | 4 | 1/2 | .030 | 33409 | 33469 |
| 1/2 | 2-1/2 | 5 | 1/2 | .030 | 33410 | 33470 |
| 1/2 | 3-1/8 | 6 | 1/2 | .030 | 33411 | 33471 |
| 5/8 | 3/4 | 3-1/2 | 5/8 | .030 | 33412 | 33472 |
| 5/8 | 1-5/8 | 3-3/4 | 5/8 | .030 | 33402 | 33407 |
| 5/8 | 2-1/8 | 4 | 5/8 | .030 | 33413 | 33473 |
| 5/8 | 3-1/4 | 6 | 5/8 | .030 | 33415 | 33475 |
| 5/8 | 3-3/4 | 6 | 5/8 | .030 | 33416 | 33476 |
| 3/4 | 1 | 4 | 3/4 | .030 | 33417 | 33477 |
| 3/4 | 1-5/8 | 4 | 3/4 | .030 | 33403 | 33408 |
| 3/4 | 2-1/4 | 4 | 3/4 | .030 | 33418 | 33478 |
| 3/4 | 3-1/4 | 6 | 3/4 | .030 | 33419 | 33479 |
| 3/4 | 4 | 6 | 3/4 | .030 | 33420 | 33480 |
| 1 | 1-1/4 | 5 | 1 | .030 | 33421 | 33481 |
| 1 | 2 | 4-1/2 | 1 | .030 | 33404 | 33409 |
| 1 | 2-5/8 | 6 | 1 | .030 | 33422 | 33482 |
| 1 | 3-1/4 | 6 | 1 | .030 | 33423 | 33483 |
| 1 | 4-1/8 | 7 | 1 | .030 | 33424 | 33484 |

TOLERANCES (inch)

1/4–3/8 DIAMETER

D₁ = +0.0000/–0.00035

D₂ = h₆

R = +0.0000/–0.0020

1/2–5/8 DIAMETER

D₁ = +0.0000/–0.00043

D₂ = h₆

R = +0.0000/–0.0020

3/4–1 DIAMETER

D₁ = +0.0000/–0.00051

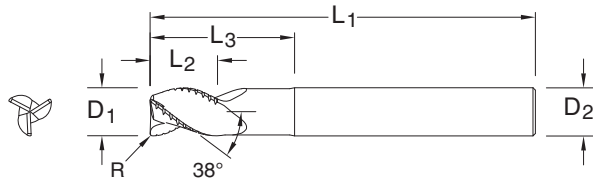
D₂ = h₆

R = +0.0000/–0.0020

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



TOLERANCES (inch)

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

$R = +0.0000/-0.0020$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

$R = +0.0000/-0.0020$

3/4–1 DIAMETER

$D_1 = +0.0000/-0.00051$

$D_2 = h_6$

$R = +0.0000/-0.0020$

43LCB
FRACTIONAL SERIES

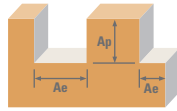
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | | CORNER RADIUS R | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------|----------------------|------------------------------------|--|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | UNCOATED | | Ti-NAMITE-B (TiB ₂) | |
| 1/4 | 3/8 | 4 | 1/4 | 3/4 | .020 | 33500 | 33540 | |
| 1/4 | 3/8 | 4 | 1/4 | 1-1/8 | .020 | 33501 | 33541 | |
| 1/4 | 3/8 | 4 | 1/4 | 2-1/8 | .020 | 33502 | 33542 | |
| 5/16 | 7/16 | 4 | 5/16 | 1-1/8 | .020 | 33503 | 33543 | |
| 5/16 | 7/16 | 4 | 5/16 | 2-1/8 | .020 | 33504 | 33544 | |
| 3/8 | 1/2 | 4 | 3/8 | 1-1/8 | .020 | 33507 | 33547 | |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | .020 | 33508 | 33548 | |
| 1/2 | 5/8 | 4 | 1/2 | 1-3/8 | .030 | 33511 | 33551 | |
| 1/2 | 5/8 | 4 | 1/2 | 2-1/4 | .030 | 33512 | 33552 | |
| 1/2 | 5/8 | 6 | 1/2 | 3-3/8 | .030 | 33513 | 33553 | |
| 1/2 | 5/8 | 6 | 1/2 | 4-1/4 | .030 | 33514 | 33554 | |
| 5/8 | 3/4 | 4 | 5/8 | 1-5/8 | .030 | 33515 | 33555 | |
| 5/8 | 3/4 | 6 | 5/8 | 2-3/8 | .030 | 33516 | 33556 | |
| 5/8 | 3/4 | 6 | 5/8 | 3-3/8 | .030 | 33517 | 33557 | |
| 5/8 | 3/4 | 6 | 5/8 | 4-3/8 | .030 | 33518 | 33558 | |
| 3/4 | 1 | 4 | 3/4 | 2 | .030 | 33519 | 33559 | |
| 3/4 | 1 | 6 | 3/4 | 2-1/2 | .030 | 33520 | 33560 | |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | .030 | 33521 | 33561 | |
| 3/4 | 1 | 6 | 3/4 | 4-3/8 | .030 | 33522 | 33562 | |
| 1 | 1-1/4 | 6 | 1 | 2-5/8 | .030 | 33523 | 33563 | |
| 1 | 1-1/4 | 6 | 1 | 3-3/8 | .030 | 33524 | 33564 | |
| 1 | 1-1/4 | 7 | 1 | 4-3/8 | .030 | 33525 | 33565 | |

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Chip breakers reduce machine loads up to 15% for increased roughing feed rate capability
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

NON-FERROUS
PLASTICS/COMPOSITES

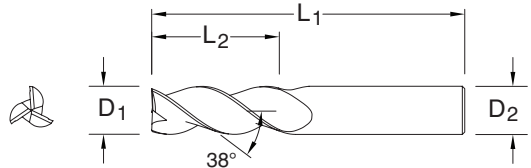
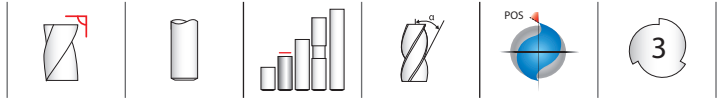
For patent information visit www.ksptpatents.com

Series
43CR, 43CB, 43LC,
43, 43L, 43LCB, 43B,
43LB, 43ELB, 43EC
Fractional



| Material | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | | Diameter (D ₁) (inch) | | | | | | |
|---|-------------|---------------------|---------------------|-------------|------------|-----------------------------------|--------|--------|--------|--------|--------|--------|
| | | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 |
| ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075 | Slot | 1 | ≤ 1 | 1600 | RPM | 48896 | 24448 | 16299 | 12224 | 9779 | 8149 | 6112 |
| | | | | (1280-1920) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | Feed (ipm) | 132 | 183 | 220 | 220 | 191 | 171 | 156 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 2000 | RPM | 61120 | 30560 | 20373 | 15280 | 12224 | 10187 | 7640 |
| | | | | (1600-2400) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | Feed (ipm) | 165 | 229 | 275 | 275 | 238 | 214 | 195 |
| | HSM | ≤ 0.05 | ≤ 2 | 3300 | RPM | 100848 | 50424 | 33616 | 25212 | 20170 | 16808 | 12606 |
| | | | | (2640-3960) | Fz | 0.0021 | 0.0055 | 0.0105 | 0.0140 | 0.0150 | 0.0165 | 0.0195 |
| | | | | | Feed (ipm) | 635 | 832 | 1059 | 1059 | 908 | 832 | 737 |
| ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B-390 | Slot | 1 | ≤ 1 | 600 | RPM | 18336 | 9168 | 6112 | 4584 | 3667 | 3056 | 2292 |
| | | | | (480-720) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | Feed (ipm) | 50 | 69 | 83 | 83 | 72 | 64 | 58 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 750 | RPM | 22920 | 11460 | 7640 | 5730 | 4584 | 3820 | 2865 |
| | | | | (600-900) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | Feed (ipm) | 62 | 86 | 103 | 103 | 89 | 80 | 73 |
| | HSM | ≤ 0.05 | ≤ 2 | 1240 | RPM | 37894 | 18947 | 12631 | 9474 | 7579 | 6316 | 4737 |
| | | | | (992-1488) | Fz | 0.0021 | 0.0055 | 0.0105 | 0.0140 | 0.0150 | 0.0165 | 0.0195 |
| | | | | | Feed (ipm) | 239 | 313 | 398 | 398 | 341 | 313 | 277 |
| COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass | Slot | 1 | ≤ 1 | 865 | RPM | 26434 | 13217 | 8811 | 6609 | 5287 | 4406 | 3304 |
| | | | | (692-1038) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | Feed (ipm) | 63 | 79 | 106 | 99 | 87 | 79 | 69 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 1080 | RPM | 33005 | 16502 | 11002 | 8251 | 6601 | 5501 | 4126 |
| | | | | (864-1296) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | Feed (ipm) | 79 | 99 | 132 | 124 | 109 | 99 | 87 |
| | HSM | ≤ 0.05 | ≤ 2 | 1780 | RPM | 54397 | 27198 | 18132 | 13599 | 10879 | 9066 | 6800 |
| | | | | (1424-2136) | Fz | 0.0017 | 0.0045 | 0.0085 | 0.0115 | 0.0125 | 0.0140 | 0.0160 |
| | | | | | Feed (ipm) | 277 | 367 | 462 | 469 | 408 | 381 | 326 |
| COPPER ALLOYS Beryllium Copper C110, Malleable Bronze, Tin Bronze | Slot | 1 | ≤ 1 | 345 | RPM | 10543 | 5272 | 3514 | 2636 | 2109 | 1757 | 1318 |
| | | | | (276-414) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | Feed (ipm) | 25 | 32 | 42 | 40 | 35 | 32 | 28 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 430 | RPM | 13141 | 6570 | 4380 | 3285 | 2628 | 2190 | 1643 |
| | | | | (344-516) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | Feed (ipm) | 32 | 39 | 53 | 49 | 43 | 39 | 34 |
| | HSM | ≤ 0.05 | ≤ 2 | 710 | RPM | 21698 | 10849 | 7233 | 5424 | 4340 | 3616 | 2712 |
| | | | | (568-852) | Fz | 0.0017 | 0.0045 | 0.0085 | 0.0115 | 0.0125 | 0.0140 | 0.0160 |
| | | | | | Feed (ipm) | 111 | 146 | 184 | 187 | 163 | 152 | 130 |
| PLASTICS ABS, Polycarbonate, PVC, Polypropylene | Slot | 1 | ≤ 1 | 1600 | RPM | 48896 | 24448 | 16299 | 12224 | 9779 | 8149 | 6112 |
| | | | | (1280-1920) | Fz | 0.0015 | 0.0040 | 0.0075 | 0.0100 | 0.0110 | 0.0120 | 0.0140 |
| | | | | | Feed (ipm) | 220 | 293 | 367 | 367 | 323 | 293 | 257 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 2000 | RPM | 61120 | 30560 | 20373 | 15280 | 12224 | 10187 | 7640 |
| | | | | (1600-2400) | Fz | 0.0015 | 0.0040 | 0.0075 | 0.0100 | 0.0110 | 0.0120 | 0.0140 |
| | | | | | Feed (ipm) | 275 | 367 | 458 | 458 | 403 | 367 | 321 |
| | HSM | ≤ 0.05 | ≤ 2 | 3300 | RPM | 100848 | 50424 | 33616 | 25212 | 20170 | 16808 | 12606 |
| | | | | (2640-3960) | Fz | 0.0034 | 0.0090 | 0.0170 | 0.0230 | 0.0250 | 0.0275 | 0.0320 |
| | | | | | Feed (ipm) | 1029 | 1361 | 1714 | 1740 | 1513 | 1387 | 1210 |

Bhn (Brinell) HRC (Rockwell C) HRb (Rockwell B) HSM (High Speed Machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times 3 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce cut depth and feed by 50% for long flute and long reach tools
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



43M
METRIC SERIES

TOLERANCES (mm)

6 DIAMETER

$D_1 = +0,000/-0,008$
 $D_2 = h_6$

>6-10 DIAMETER

$D_1 = +0,000/-0,009$
 $D_2 = h_6$

>10-18 DIAMETER

$D_1 = +0,000/-0,011$
 $D_2 = h_6$

>18-25 DIAMETER

$D_1 = +0,000/-0,013$
 $D_2 = h_6$

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| mm | | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 6,0 | 13,0 | 57,0 | 6,0 | 44701 | 44715 |
| 6,0 | 13,0 | 72,0 | 6,0 | 44702 | 44716 |
| 8,0 | 19,0 | 63,0 | 8,0 | 44703 | 44717 |
| 10,0 | 22,0 | 72,0 | 10,0 | 44705 | 44719 |
| 12,0 | 26,0 | 83,0 | 12,0 | 44708 | 44722 |
| 16,0 | 32,0 | 92,0 | 16,0 | 44711 | 44725 |
| 20,0 | 38,0 | 104,0 | 20,0 | 44714 | 44728 |
| 25,0 | 50,0 | 125,0 | 25,0 | - | 44731 |

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

TOLERANCES (mm)

3 DIAMETER

$D_1 = +0,000/-0,006$
 $D_2 = h_6$

>3-6 DIAMETER

$D_1 = +0,000/-0,008$
 $D_2 = h_6$

>6-10 DIAMETER

$D_1 = +0,000/-0,009$
 $D_2 = h_6$

>10-18 DIAMETER

$D_1 = +0,000/-0,011$
 $D_2 = h_6$

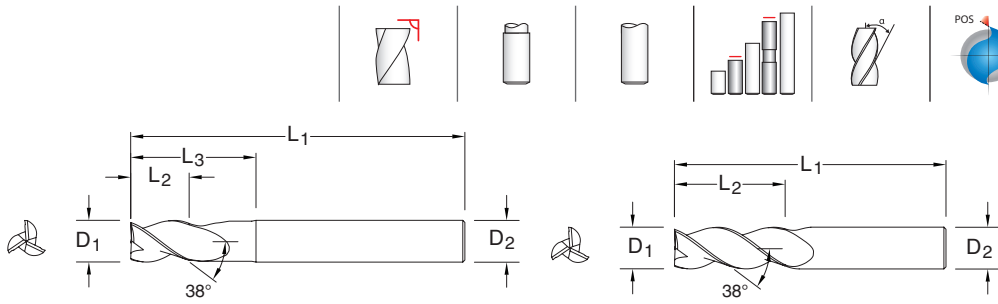
>18-20 DIAMETER

$D_1 = +0,000/-0,013$
 $D_2 = h_6$

NON-FERROUS

PLASTICS/COMPOSITES

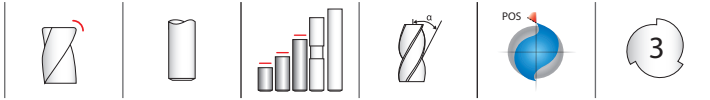
For patent information visit www.ksptpatents.com



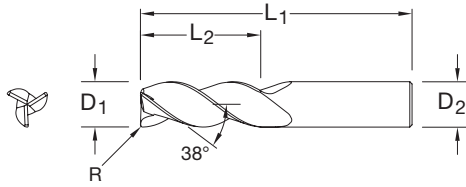
43M
METRIC SERIES

| mm | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | POLISHED FLUTE | Ti-NAMITE-B (TiB ₂) |
| 3,0 | 8,0 | 52,0 | 6,0 | - | • | 44890 |
| 4,0 | 11,0 | 55,0 | 6,0 | - | • | 44891 |
| 5,0 | 13,0 | 57,0 | 6,0 | - | • | 44892 |
| 6,0 | 24,0 | 75,0 | 6,0 | - | • | 44893 |
| 8,0 | 32,0 | 75,0 | 8,0 | - | • | 44895 |
| 10,0 | 40,0 | 100,0 | 10,0 | - | • | 44896 |
| 12,0 | 48,0 | 100,0 | 12,0 | - | • | 44897 |
| 14,0 | 30,0 | 89,0 | 14,0 | - | • | 44898 |
| 14,0 | 18,0 | 125,0 | 14,0 | 45,0 | • | 44899 |
| 16,0 | 64,0 | 125,0 | 16,0 | - | • | 44900 |
| 20,0 | 80,0 | 150,0 | 20,0 | - | • | 44901 |

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Polished flutes maximize chip evacuation and provides enhanced finish
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)



43MCR
METRIC SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

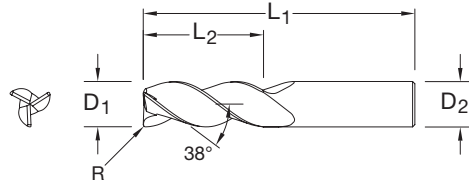
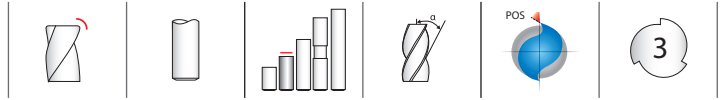
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | mm | | | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------|----------|---------------------------------|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 6,0 | 13,0 | 57,0 | 6,0 | 1,5 | — | 44732 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,5 | 44814 | 44733 |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,0 | 44815 | 44826 |
| 12,0 | 26,0 | 83,0 | 12,0 | 2,5 | 44816 | 44827 |
| 12,0 | 26,0 | 83,0 | 12,0 | 3,0 | 44817 | 44734 |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,5 | 44818 | 44735 |
| 16,0 | 32,0 | 92,0 | 16,0 | 2,0 | 44819 | 44828 |
| 16,0 | 32,0 | 92,0 | 16,0 | 2,5 | 44820 | 44829 |
| 16,0 | 32,0 | 92,0 | 16,0 | 3,0 | 44821 | 44736 |
| 20,0 | 38,0 | 104,0 | 20,0 | 2,0 | 44822 | 44830 |
| 20,0 | 38,0 | 104,0 | 20,0 | 2,5 | 44823 | 44831 |
| 20,0 | 38,0 | 104,0 | 20,0 | 3,0 | 44824 | 44737 |

TOLERANCES (mm)

- 6 DIAMETER**
D₁ = +0,000/-0,008
D₂ = h₆
R = +0,00/-0,05
- >6-10 DIAMETER**
D₁ = +0,000/-0,009
D₂ = h₆
R = +0,00/-0,05
- >10-18 DIAMETER**
D₁ = +0,000/-0,011
D₂ = h₆
R = +0,00/-0,05
- >18-20 DIAMETER**
D₁ = +0,000/-0,013
D₂ = h₆
R = +0,00/-0,05

- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



43MCR
METRIC SERIES

TOLERANCES (mm)

6 DIAMETER

$D_1 = +0,000/-0,008$

$D_2 = h_6$

$R = +0,00/-0,05$

>6-10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

$R = +0,00/-0,05$

>10-18 DIAMETER

$D_1 = +0,000/-0,011$

$D_2 = h_6$

$R = +0,00/-0,05$

>18-20 DIAMETER

$D_1 = +0,000/-0,013$

$D_2 = h_6$

$R = +0,00/-0,05$

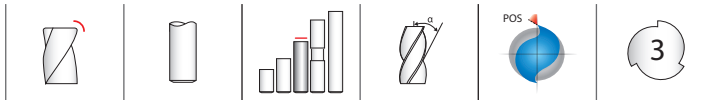
NON-FERROUS

PLASTICS/COMPOSITES

For patent
information visit
www.ksptpatents.com

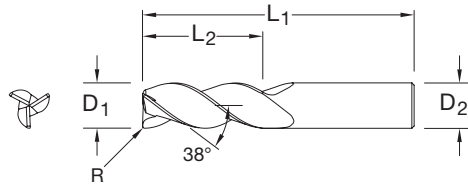
| mm | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|----------------|------------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | POLISHED FLUTE | Ti-NAMITE-B (TiB ₂) |
| 6,0 | 13,0 | 57,0 | 6,0 | 0,5 | • | 44902 |
| 6,0 | 13,0 | 57,0 | 6,0 | 1,0 | • | 44894 |
| 6,0 | 13,0 | 72,0 | 6,0 | 0,8 | • | 44842 |
| 6,0 | 13,0 | 72,0 | 6,0 | 1,2 | • | 44843 |
| 8,0 | 19,0 | 63,0 | 8,0 | 0,3 | • | 44846 |
| 8,0 | 19,0 | 63,0 | 8,0 | 0,5 | • | 44847 |
| 8,0 | 19,0 | 63,0 | 8,0 | 1,0 | • | 44848 |
| 8,0 | 19,0 | 63,0 | 8,0 | 1,5 | • | 44849 |
| 10,0 | 22,0 | 72,0 | 10,0 | 0,3 | • | 44854 |
| 10,0 | 22,0 | 72,0 | 10,0 | 0,5 | • | 44855 |
| 10,0 | 22,0 | 72,0 | 10,0 | 1,0 | • | 44856 |
| 10,0 | 22,0 | 72,0 | 10,0 | 1,5 | • | 44857 |
| 14,0 | 30,0 | 89,0 | 14,0 | 1,0 | • | 44868 |
| 14,0 | 30,0 | 89,0 | 14,0 | 2,0 | • | 44869 |
| 14,0 | 30,0 | 89,0 | 14,0 | 3,0 | • | 44870 |
| 16,0 | 32,0 | 92,0 | 16,0 | 4,0 | • | 44871 |
| 20,0 | 38,0 | 104,0 | 20,0 | 4,0 | • | 44879 |

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Polished flutes maximize chip evacuation and provides enhanced finish
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)



43MCR 4xD

METRIC SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Polished flutes maximize chip evacuation and provides enhanced finish
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | mm | | | CORNER RADIUS R | POLISHED FLUTE | EDP NO. Ti-NAMITE-B (TiB ₂) |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|-----|--------------------|----------------|--|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | | | | |
| 6,0 | 24,0 | 75,0 | 6,0 | 0,5 | • | 44844 | |
| 6,0 | 24,0 | 75,0 | 6,0 | 1,0 | • | 44845 | |
| 8,0 | 32,0 | 75,0 | 8,0 | 0,5 | • | 44850 | |
| 8,0 | 32,0 | 75,0 | 8,0 | 1,0 | • | 44851 | |
| 8,0 | 32,0 | 75,0 | 8,0 | 1,5 | • | 44852 | |
| 8,0 | 32,0 | 75,0 | 8,0 | 2,0 | • | 44853 | |
| 10,0 | 40,0 | 100,0 | 10,0 | 0,5 | • | 44858 | |
| 10,0 | 40,0 | 100,0 | 10,0 | 1,0 | • | 44859 | |
| 10,0 | 40,0 | 100,0 | 10,0 | 1,5 | • | 44860 | |
| 10,0 | 40,0 | 100,0 | 10,0 | 2,0 | • | 44861 | |
| 12,0 | 48,0 | 100,0 | 12,0 | 0,5 | • | 44862 | |
| 12,0 | 48,0 | 100,0 | 12,0 | 1,0 | • | 44863 | |
| 12,0 | 48,0 | 100,0 | 12,0 | 1,5 | • | 44864 | |
| 12,0 | 48,0 | 100,0 | 12,0 | 2,0 | • | 44865 | |
| 12,0 | 48,0 | 100,0 | 12,0 | 2,5 | • | 44866 | |
| 12,0 | 48,0 | 100,0 | 12,0 | 3,0 | • | 44867 | |
| 16,0 | 64,0 | 125,0 | 16,0 | 0,5 | • | 44872 | |
| 16,0 | 64,0 | 125,0 | 16,0 | 1,0 | • | 44873 | |
| 16,0 | 64,0 | 125,0 | 16,0 | 1,5 | • | 44874 | |
| 16,0 | 64,0 | 125,0 | 16,0 | 2,0 | • | 44875 | |
| 16,0 | 64,0 | 125,0 | 16,0 | 2,5 | • | 44876 | |
| 16,0 | 64,0 | 125,0 | 16,0 | 3,0 | • | 44877 | |
| 16,0 | 64,0 | 125,0 | 16,0 | 4,0 | • | 44878 | |
| 20,0 | 80,0 | 150,0 | 20,0 | 0,5 | • | 44880 | |
| 20,0 | 80,0 | 150,0 | 20,0 | 1,0 | • | 44881 | |
| 20,0 | 80,0 | 150,0 | 20,0 | 1,5 | • | 44882 | |
| 20,0 | 80,0 | 150,0 | 20,0 | 2,0 | • | 44883 | |
| 20,0 | 80,0 | 150,0 | 20,0 | 2,5 | • | 44884 | |
| 20,0 | 80,0 | 150,0 | 20,0 | 3,0 | • | 44885 | |
| 20,0 | 80,0 | 150,0 | 20,0 | 4,0 | • | 44886 | |

TOLERANCES (mm)

6 DIAMETER

D₁ = +0,000/-0,008

D₂ = h₆

R = +0,00/-0,05

>6-10 DIAMETER

D₁ = +0,000/-0,009

D₂ = h₆

R = +0,00/-0,05

>10-18 DIAMETER

D₁ = +0,000/-0,011

D₂ = h₆

R = +0,00/-0,05

>18-20 DIAMETER

D₁ = +0,000/-0,013

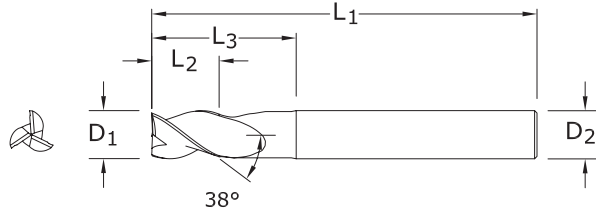
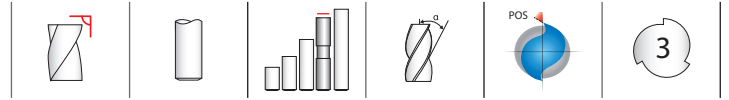
D₂ = h₆

R = +0,00/-0,05

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



43ML
METRIC SERIES

TOLERANCES (mm)

6 DIAMETER

$D_1 = +0,000/-0,008$

$D_2 = h_6$

>6-10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

>10-18 DIAMETER

$D_1 = +0,000/-0,011$

$D_2 = h_6$

>18-20 DIAMETER

$D_1 = +0,000/-0,013$

$D_2 = h_6$

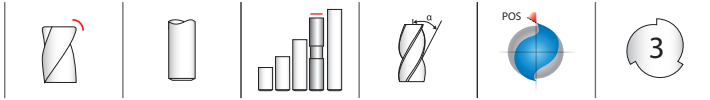
NON-FERROUS

PLASTICS/COMPOSITES

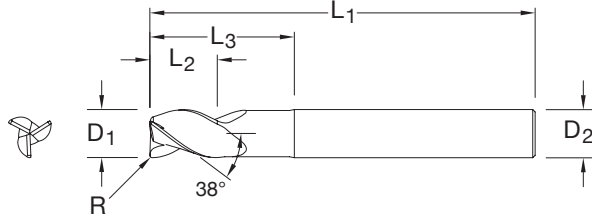
For patent information visit www.ksptpatents.com

| mm | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | Ti-NAMITE-B (TiB ₂) |
| 6,0 | 10,0 | 75,0 | 6,0 | 20,0 | 42706 |
| 8,0 | 12,0 | 75,0 | 8,0 | 25,0 | 42707 |
| 10,0 | 14,0 | 100,0 | 10,0 | 35,0 | 42708 |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 42709 |
| 16,0 | 20,0 | 125,0 | 16,0 | 50,0 | 42710 |
| 20,0 | 25,0 | 150,0 | 20,0 | 65,0 | 42711 |

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)



43MLC
METRIC SERIES



- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance to reach
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | mm | | | | CORNER RADIUS R | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------|----------------------|---------------------------------|--|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | UNCOATED | | Ti-NAMITE-B (TiB ₂) | |
| 6,0 | 10,0 | 63,0 | 6,0 | 20,0 | 0,5 | 44769 | 44789 | |
| 6,0 | 10,0 | 63,0 | 6,0 | 20,0 | 1,0 | 44770 | 44790 | |
| 6,0 | 13,0 | 72,0 | 6,0 | 30,0 | 0,5 | 44771 | 44791 | |
| 6,0 | 13,0 | 72,0 | 6,0 | 30,0 | 1,0 | 44772 | 44792 | |
| 8,0 | 12,0 | 75,0 | 8,0 | 25,0 | 0,3 | 44773 | 44793 | |
| 8,0 | 12,0 | 75,0 | 8,0 | 25,0 | 0,5 | 44774 | 44794 | |
| 8,0 | 12,0 | 75,0 | 8,0 | 25,0 | 1,0 | 44775 | 44795 | |
| 8,0 | 12,0 | 75,0 | 8,0 | 25,0 | 1,5 | 44776 | 44796 | |
| 10,0 | 14,0 | 100,0 | 10,0 | 35,0 | 0,3 | 44777 | 44797 | |
| 10,0 | 14,0 | 100,0 | 10,0 | 35,0 | 0,5 | 44778 | 44798 | |
| 10,0 | 14,0 | 100,0 | 10,0 | 35,0 | 1,0 | 44779 | 44799 | |
| 10,0 | 14,0 | 100,0 | 10,0 | 35,0 | 1,5 | 44780 | 44800 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 0,5 | 44781 | 44801 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 1,0 | 44782 | 44802 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 1,5 | 44783 | 44803 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 2,0 | 44784 | 44804 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 2,5 | 44832 | 44839 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 3,0 | 44833 | 44738 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 4,0 | 44834 | 44741 | |
| 16,0 | 20,0 | 125,0 | 16,0 | 50,0 | 2,0 | 44785 | 44805 | |
| 16,0 | 20,0 | 125,0 | 16,0 | 50,0 | 2,5 | 44835 | 44840 | |
| 16,0 | 20,0 | 125,0 | 16,0 | 50,0 | 3,0 | 44836 | 44739 | |
| 16,0 | 20,0 | 125,0 | 16,0 | 50,0 | 4,0 | 44786 | 44806 | |
| 20,0 | 25,0 | 150,0 | 20,0 | 65,0 | 2,0 | 44787 | 44807 | |
| 20,0 | 25,0 | 150,0 | 20,0 | 65,0 | 2,5 | 44837 | 44841 | |
| 20,0 | 25,0 | 150,0 | 20,0 | 65,0 | 3,0 | 44838 | 44740 | |
| 20,0 | 25,0 | 150,0 | 20,0 | 65,0 | 4,0 | 44788 | 44808 | |

TOLERANCES (mm)

>6–10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

$R = +0,00/-0,05$

>10–18 DIAMETER

$D_1 = +0,000/-0,011$

$D_2 = h_6$

$R = +0,00/-0,05$

>18–20 DIAMETER

$D_1 = +0,000/-0,013$

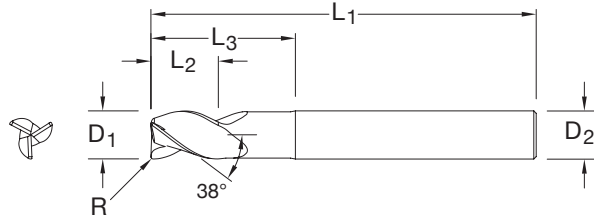
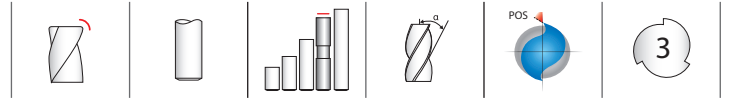
$D_2 = h_6$

$R = +0,00/-0,05$

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



43MLC Aero Radius Range

METRIC SERIES

TOLERANCES (mm)

>6–10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

$R = +0,00/-0,05$

>10–18 DIAMETER

$D_1 = +0,000/-0,011$

$D_2 = h_6$

$R = +0,00/-0,05$

>18–20 DIAMETER

$D_1 = +0,000/-0,013$

$D_2 = h_6$

$R = +0,00/-0,05$

$D_1 = +0,000/-0,013$

$D_2 = h_6$

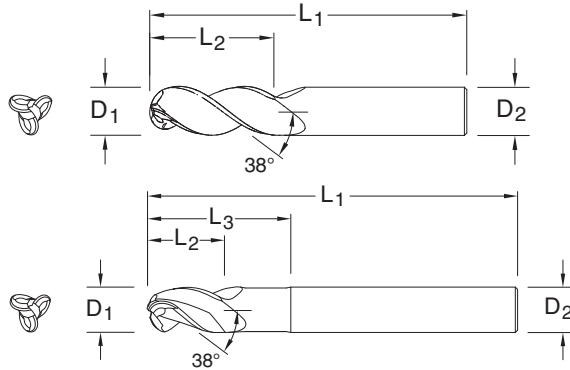
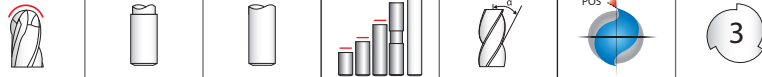
NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit
www.ksptpatents.com

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | mm | | | CORNER RADIUS R | POLISHED FLUTE | EDP NO. Ti-NAMITE-B (TiB ₂) |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|-----|----------------------|----------------|---|
| | | | SHANK DIAMETER D_2 | REACH L_3 | | | | |
| 8,0 | 12,0 | 75,0 | 8,0 | 25,0 | 0,8 | • | 44950 | |
| 8,0 | 12,0 | 75,0 | 8,0 | 25,0 | 1,2 | • | 44951 | |
| 8,0 | 12,0 | 75,0 | 8,0 | 25,0 | 1,6 | • | 44952 | |
| 10,0 | 14,0 | 100,0 | 10,0 | 35,0 | 0,8 | • | 44953 | |
| 10,0 | 14,0 | 100,0 | 10,0 | 35,0 | 1,2 | • | 44954 | |
| 10,0 | 14,0 | 100,0 | 10,0 | 35,0 | 1,6 | • | 44955 | |
| 10,0 | 14,0 | 100,0 | 10,0 | 35,0 | 2,4 | • | 44956 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 0,8 | • | 44957 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 1,2 | • | 44958 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 1,6 | • | 44959 | |
| 12,0 | 16,0 | 100,0 | 12,0 | 40,0 | 2,4 | • | 44960 | |
| 14,0 | 18,0 | 125,0 | 14,0 | 45,0 | 1,0 | • | 44961 | |
| 14,0 | 18,0 | 125,0 | 14,0 | 45,0 | 2,0 | • | 44962 | |
| 14,0 | 18,0 | 125,0 | 14,0 | 45,0 | 3,0 | • | 44963 | |
| 14,0 | 18,0 | 125,0 | 14,0 | 45,0 | 4,0 | • | 44964 | |
| 16,0 | 20,0 | 125,0 | 16,0 | 50,0 | 0,8 | • | 44965 | |
| 16,0 | 20,0 | 125,0 | 16,0 | 50,0 | 1,2 | • | 44966 | |
| 16,0 | 20,0 | 125,0 | 16,0 | 50,0 | 1,6 | • | 44967 | |
| 16,0 | 20,0 | 125,0 | 16,0 | 50,0 | 2,4 | • | 44968 | |
| 16,0 | 20,0 | 125,0 | 16,0 | 50,0 | 3,2 | • | 44969 | |
| 20,0 | 25,0 | 150,0 | 20,0 | 65,0 | 0,8 | • | 44970 | |
| 20,0 | 25,0 | 150,0 | 20,0 | 65,0 | 1,2 | • | 44971 | |
| 20,0 | 25,0 | 150,0 | 20,0 | 65,0 | 1,6 | • | 44972 | |
| 20,0 | 25,0 | 150,0 | 20,0 | 65,0 | 2,4 | • | 44973 | |
| 20,0 | 25,0 | 150,0 | 20,0 | 65,0 | 3,2 | • | 44974 | |

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Polished flutes maximize chip evacuation and provides enhanced finish
- Necked design with blended diameter transitions provide clearance to reach
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)



43MB
METRIC SERIES

- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Open fluting for deep slotting and profiling
- Polished flutes maximize chip evacuation and provides enhanced finish
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| mm | | | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | POLISHED FLUTE | Ti-NAMITE-B (TiB ₂) |
| 3,0 | 4,5 | 57,0 | 6,0 | — | • | 44916 |
| 3,0 | 6,0 | 57,0 | 6,0 | 10,0 | • | 44917 |
| 3,0 | 9,0 | 57,0 | 6,0 | 16,0 | • | 44918 |
| 4,0 | 6,0 | 57,0 | 6,0 | — | • | 44919 |
| 4,0 | 8,0 | 57,0 | 6,0 | 13,0 | • | 44920 |
| 4,0 | 12,0 | 57,0 | 6,0 | 21,0 | • | 44921 |
| 5,0 | 7,5 | 57,0 | 6,0 | — | • | 44922 |
| 5,0 | 10,0 | 63,0 | 6,0 | 16,0 | • | 44923 |
| 5,0 | 15,0 | 63,0 | 6,0 | 26,0 | • | 44924 |
| 6,0 | 9,0 | 57,0 | 6,0 | — | • | 44925 |
| 6,0 | 12,0 | 63,0 | 6,0 | 19,0 | • | 44926 |
| 6,0 | 18,0 | 75,0 | 6,0 | 31,0 | • | 44927 |
| 8,0 | 12,0 | 63,0 | 8,0 | — | • | 44928 |
| 8,0 | 16,0 | 75,0 | 8,0 | 25,0 | • | 44929 |
| 8,0 | 24,0 | 83,0 | 8,0 | 41,0 | • | 44930 |
| 10,0 | 15,0 | 75,0 | 10,0 | — | • | 44931 |
| 10,0 | 20,0 | 83,0 | 10,0 | 31,0 | • | 44932 |
| 10,0 | 30,0 | 100,0 | 10,0 | 51,0 | • | 44933 |
| 12,0 | 18,0 | 83,0 | 12,0 | — | • | 44934 |
| 12,0 | 24,0 | 100,0 | 12,0 | 37,0 | • | 44935 |
| 12,0 | 36,0 | 130,0 | 12,0 | 61,0 | • | 44936 |
| 16,0 | 24,0 | 100,0 | 16,0 | — | • | 44937 |
| 16,0 | 32,0 | 130,0 | 16,0 | 49,0 | • | 44938 |
| 16,0 | 48,0 | 150,0 | 16,0 | 81,0 | • | 44939 |
| 20,0 | 30,0 | 108,0 | 20,0 | — | • | 44940 |
| 20,0 | 40,0 | 130,0 | 20,0 | 61,0 | • | 44941 |
| 20,0 | 60,0 | 150,0 | 20,0 | 101,0 | • | 44942 |
| 25,0 | 37,5 | 127,0 | 25,0 | — | • | 44943 |
| 25,0 | 50,0 | 152,0 | 25,0 | 76,0 | • | 44944 |
| 25,0 | 75,0 | 170,0 | 25,0 | 126,0 | • | 44945 |

TOLERANCES (mm)

3 DIAMETER

$D_1 = +0,000/-0,006$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>3–6 DIAMETER

$D_1 = +0,000/-0,008$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>6–10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>10–18 DIAMETER

$D_1 = +0,000/-0,011$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>18–25 DIAMETER

$D_1 = +0,000/-0,013$

$D_2 = h_6$

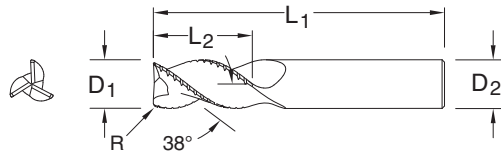
BALL RADIUS

$+0,0127/-0,0127$

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



TOLERANCES (mm)

>6–10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

$R = +0,00/-0,05$

>10–18 DIAMETER

$D_1 = +0,000/-0,011$

$D_2 = h_6$

$R = +0,00/-0,05$

>18–20 DIAMETER

$D_1 = +0,000/-0,013$

$D_2 = h_6$

$R = +0,00/-0,05$

NON-FERROUS

PLASTICS/COMPOSITES

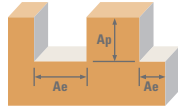
For patent
information visit
www.ksptpatents.com

43MCB
METRIC SERIES

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | EDP NO. | |
|------------------------------|---------------------------|----------------------------|----------------------------|-------------------------|----------|------------------------------------|
| | | | | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 6,0 | 19,0 | 63,0 | 6,0 | 0,3 | — | 44299 |
| 8,0 | 19,0 | 63,0 | 8,0 | 0,3 | 44300 | 44305 |
| 10,0 | 22,0 | 72,0 | 10,0 | 0,3 | 44301 | 44306 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,0 | 44302 | 44307 |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,0 | 44303 | 44308 |
| 20,0 | 38,0 | 104,0 | 20,0 | 1,0 | 44304 | 44309 |

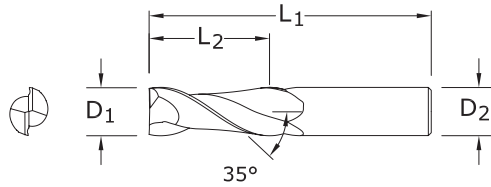
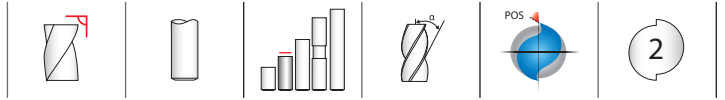
- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Chip breakers reduce machine loads up to 15% for increased roughing feed rate capability
- Open fluting for deep slotting and profiling
- Recommended for materials ≤ 150 Bhn (≤ 7 HRc)

Series
43M, 43MB, 43MCR,
43ML, 43MLC,
43MCB
Metric



| Series Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|---|-----------------------------|---------------------|---------------------|---------------|------------------------------------|-------|--------|-------|-------|-------|-------|-------|-------|
| | | | | | 3 | 6 | 10 | 12 | 16 | 20 | 25 | | |
| ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075 | ≤ 150 Bhn or ≤ 7 HRc | Slot | 1 | ≤ 1 | 490 | RPM | 52022 | 26011 | 15607 | 13005 | 9754 | 7803 | 6243 |
| | | | | | (392-588) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 3371 | 4682 | 5618 | 5618 | 4869 | 4370 | 3980 | |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 610 | RPM | 64762 | 32381 | 19429 | 16190 | 12143 | 9714 | 7771 |
| | | | | | (488-732) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 4196 | 5828 | 6994 | 6994 | 6061 | 5440 | 4955 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 1005 | RPM | 106698 | 53349 | 32009 | 26674 | 20006 | 16005 | 12804 |
| | | | | | (804-1206) | Fz | 0.050 | 0.132 | 0.280 | 0.336 | 0.384 | 0.440 | 0.488 |
| | | | | | Feed (mm/min) | 16131 | 21124 | 26888 | 26885 | 23046 | 21126 | 18726 | |
| ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B-390 | ≤ 125 Bhn or ≤ 77 HRb | Slot | 1 | ≤ 1 | 185 | RPM | 19641 | 9820 | 5892 | 4910 | 3683 | 2946 | 2357 |
| | | | | | (148-222) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 1273 | 1768 | 2121 | 2121 | 1838 | 1650 | 1503 | |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 230 | RPM | 24418 | 12209 | 7326 | 6105 | 4578 | 3663 | 2930 |
| | | | | | (184-276) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 1582 | 2197 | 2637 | 2637 | 2285 | 2051 | 1868 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 380 | RPM | 40343 | 20172 | 12103 | 10086 | 7564 | 6052 | 4841 |
| | | | | | (304-456) | Fz | 0.050 | 0.132 | 0.280 | 0.336 | 0.384 | 0.440 | 0.488 |
| | | | | | Feed (mm/min) | 6099 | 7987 | 10166 | 10166 | 8714 | 7988 | 7081 | |
| COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass | ≤ 140 Bhn or ≤ 3 HRc | Slot | 1 | ≤ 1 | 265 | RPM | 28134 | 14067 | 8440 | 7034 | 5275 | 4220 | 3376 |
| | | | | | (212-318) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 1620 | 2025 | 2701 | 2532 | 2228 | 2026 | 1773 | |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 330 | RPM | 35035 | 17518 | 10511 | 8759 | 6569 | 5255 | 4204 |
| | | | | | (264-396) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 2018 | 2522 | 3363 | 3153 | 2775 | 2523 | 2207 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 545 | RPM | 57861 | 28930 | 17358 | 14465 | 10849 | 8679 | 6943 |
| | | | | | (436-654) | Fz | 0.041 | 0.108 | 0.227 | 0.276 | 0.320 | 0.373 | 0.400 |
| | | | | | Feed (mm/min) | 7082 | 9373 | 11804 | 11976 | 10415 | 9721 | 8332 | |
| COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze | ≤ 200 Bhn or ≤ 23 HRc | Slot | 1 | ≤ 1 | 105 | RPM | 11148 | 5574 | 3344 | 2787 | 2090 | 1672 | 1338 |
| | | | | | (84-126) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 642 | 803 | 1070 | 1003 | 883 | 803 | 702 | |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 130 | RPM | 13802 | 6901 | 4141 | 3450 | 2588 | 2070 | 1656 |
| | | | | | (104-156) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 795 | 994 | 1325 | 1242 | 1093 | 994 | 870 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 215 | RPM | 22826 | 11413 | 6848 | 5706 | 4280 | 3424 | 2739 |
| | | | | | (172-258) | Fz | 0.041 | 0.108 | 0.227 | 0.276 | 0.320 | 0.373 | 0.400 |
| | | | | | Feed (mm/min) | 2794 | 3697 | 4656 | 4725 | 4109 | 3835 | 3287 | |
| PLASTICS ABS, Polycarbonate, PVC, Polypropylene | | Slot | 1 | ≤ 1 | 490 | RPM | 52022 | 26011 | 15607 | 13005 | 9754 | 7803 | 6243 |
| | | | | | (392-588) | Fz | 0.036 | 0.096 | 0.200 | 0.240 | 0.282 | 0.320 | 0.350 |
| | | | | | Feed (mm/min) | 5618 | 7490 | 9364 | 9363 | 8240 | 7491 | 6555 | |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 610 | RPM | 64762 | 32381 | 19429 | 16190 | 12143 | 9714 | 7771 |
| | | | | | (488-732) | Fz | 0.036 | 0.096 | 0.200 | 0.240 | 0.282 | 0.320 | 0.350 |
| | | | | | Feed (mm/min) | 6994 | 9325 | 11657 | 11656 | 10258 | 9326 | 8160 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 1005 | RPM | 106698 | 53349 | 32009 | 26674 | 20006 | 16005 | 12804 |
| | | | | | (804-1206) | Fz | 0.082 | 0.216 | 0.453 | 0.552 | 0.640 | 0.733 | 0.800 |
| | | | | | Feed (mm/min) | 26117 | 34567 | 43532 | 44169 | 38410 | 35210 | 30730 | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B) HSM (High Speed Machining)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 3 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce cut depth and feed by 50% for long flute and long reach tools
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



TOLERANCES (inch)

1/8–3/16 DIAMETER

$D_1 = +0.0000/-0.00032$

$D_2 = h_6$

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

3/4–1 DIAMETER

$D_1 = +0.0000/-0.00051$

$D_2 = h_6$

NON-FERROUS

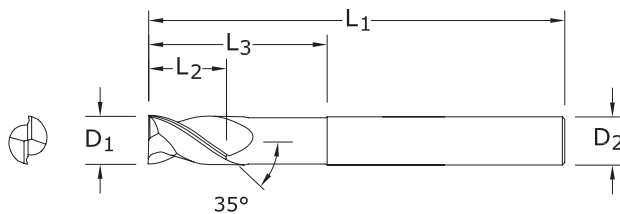
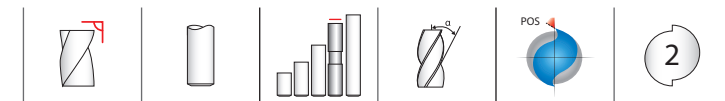
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

47
FRACTIONAL SERIES

| inch | | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 34620 | 34660 |
| 3/16 | 9/16 | 2 | 3/16 | 34621 | 34661 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 34622 | 34662 |
| 5/16 | 13/16 | 2-1/2 | 5/16 | 34623 | 34663 |
| 3/8 | 1 | 2-1/2 | 3/8 | 34624 | 34664 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 34625 | 34665 |
| 5/8 | 1-5/8 | 3-3/4 | 5/8 | 34626 | 34666 |
| 3/4 | 1-5/8 | 4 | 3/4 | 34627 | 34667 |
| 1 | 2 | 4-1/2 | 1 | 34628 | 34668 |

- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)



TOLERANCES (inch)

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

3/4–1 DIAMETER

$D_1 = +0.0000/-0.00051$

$D_2 = h_6$

NON-FERROUS

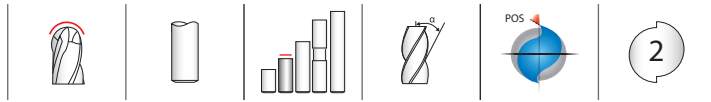
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

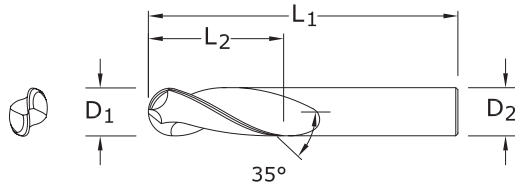
47L
FRACTIONAL SERIES

| inch | | | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/4 | 3/8 | 4 | 1/4 | 2-1/8 | 34640 | 34678 |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | 34641 | 34679 |
| 1/2 | 5/8 | 6 | 1/2 | 2-1/8 | 34642 | 34680 |
| 1/2 | 5/8 | 6 | 1/2 | 3-3/8 | 34643 | 34681 |
| 5/8 | 3/4 | 6 | 5/8 | 2-3/8 | 34644 | 34682 |
| 5/8 | 3/4 | 6 | 5/8 | 3-3/8 | 34645 | 34683 |
| 3/4 | 1 | 6 | 3/4 | 2-1/2 | 34646 | 34684 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | 34647 | 34685 |

- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Necked design with blended diameter transitions provide clearance to reach
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)



47B
FRACTIONAL SERIES



- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|---------------------------------|
| | | | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 34630 | 34669 |
| 3/16 | 9/16 | 2 | 3/16 | 34631 | 34670 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 34632 | 34671 |
| 5/16 | 13/16 | 2-1/2 | 5/16 | 34633 | 34672 |
| 3/8 | 1 | 2-1/2 | 3/8 | 34634 | 34673 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 34635 | 34674 |
| 5/8 | 1-5/8 | 3-3/4 | 5/8 | 34636 | 34675 |
| 3/4 | 1-5/8 | 4 | 3/4 | 34637 | 34676 |
| 1 | 2 | 4-1/2 | 1 | 34638 | 34677 |

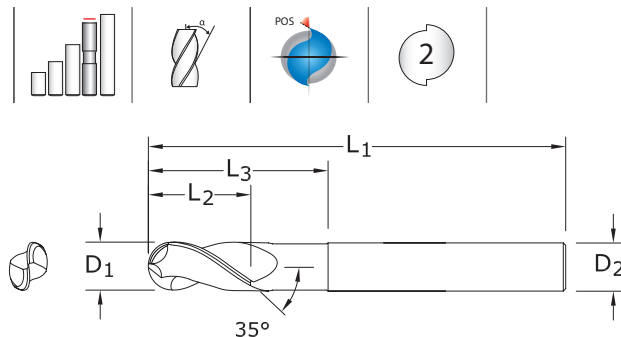
TOLERANCES (inch)

- 1/8–3/16 DIAMETER**
 $D_1 = +0.0000/-0.00032$
 $D_2 = h_6$
BALL RADIUS
 $+0.0005/-0.0005$
- 1/4–3/8 DIAMETER**
 $D_1 = +0.0000/-0.00035$
 $D_2 = h_6$
BALL RADIUS
 $+0.0005/-0.0005$
- 1/2–5/8 DIAMETER**
 $D_1 = +0.0000/-0.00043$
 $D_2 = h_6$
BALL RADIUS
 $+0.0005/-0.0005$
- 3/4–1 DIAMETER**
 $D_1 = +0.0000/-0.00051$
 $D_2 = h_6$
BALL RADIUS
 $+0.0005/-0.0005$

- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

47LB
FRACTIONAL SERIES



- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Necked design with blended diameter transitions provide clearance to reach
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

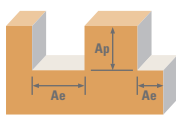
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------|---------------------------------|
| | | | | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/4 | 3/8 | 4 | 1/4 | 2-1/8 | 34650 | 34686 |
| 3/8 | 1/2 | 4 | 3/8 | 2-1/8 | 34651 | 34687 |
| 1/2 | 5/8 | 6 | 1/2 | 2-1/8 | 34652 | 34688 |
| 1/2 | 5/8 | 6 | 1/2 | 3-3/8 | 34653 | 34689 |
| 5/8 | 3/4 | 6 | 5/8 | 2-3/8 | 34655 | 34691 |
| 5/8 | 3/4 | 6 | 5/8 | 3-3/8 | 34654 | 34690 |
| 3/4 | 1 | 6 | 3/4 | 2-1/2 | 34656 | 34693 |
| 3/4 | 1 | 6 | 3/4 | 3-3/8 | 34657 | 34692 |

TOLERANCES (inch)

- 1/4–3/8 DIAMETER**
 $D_1 = +0.0000/-0.00035$
 $D_2 = h_6$
BALL RADIUS
 $+0.0005/-0.0005$
- 1/2–5/8 DIAMETER**
 $D_1 = +0.0000/-0.00043$
 $D_2 = h_6$
BALL RADIUS
 $+0.0005/-0.0005$
- 3/4–1 DIAMETER**
 $D_1 = +0.0000/-0.00051$
 $D_2 = h_6$
BALL RADIUS
 $+0.0005/-0.0005$

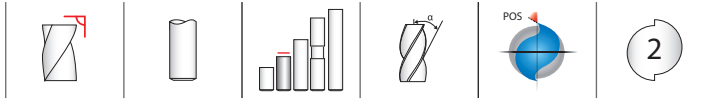
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

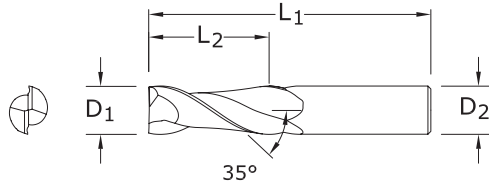


| Series 47, 47B, 47L, 47LB Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|-----------------------------|---------------------|---------------------|-------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075 | ≤ 150 Bhn or ≤ 7 HRc | Slot | 1 | ≤ 1 | 1600 | RPM | 48896 | 24448 | 16299 | 12224 | 9779 | 8149 | 6112 |
| | | | | | (1280-1920) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | | Feed (ipm) | 88 | 122 | 147 | 147 | 127 | 114 | 104 |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 2000 | RPM | 61120 | 30560 | 20373 | 15280 | 12224 | 10187 | 7640 |
| | | | | | (1600-2400) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | | Feed (ipm) | 110 | 153 | 183 | 183 | 159 | 143 | 130 |
| | | HSM | ≤ 0.05 | ≤ 2 | 3300 | RPM | 100848 | 50424 | 33616 | 25212 | 20170 | 16808 | 12606 |
| | | | | | (2640-3960) | Fz | 0.0021 | 0.0055 | 0.0105 | 0.0140 | 0.0150 | 0.0165 | 0.0195 |
| | | | | | | Feed (ipm) | 424 | 555 | 706 | 706 | 605 | 555 | 492 |
| ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B-390 | ≤ 125 Bhn or ≤ 77 HRb | Slot | 1 | ≤ 1 | 600 | RPM | 18336 | 9168 | 6112 | 4584 | 3667 | 3056 | 2292 |
| | | | | | (480-720) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | | Feed (ipm) | 33 | 46 | 55 | 55 | 48 | 43 | 39 |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 750 | RPM | 22920 | 11460 | 7640 | 5730 | 4584 | 3820 | 2865 |
| | | | | | (600-900) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | | Feed (ipm) | 41 | 57 | 69 | 69 | 60 | 53 | 49 |
| | | HSM | ≤ 0.05 | ≤ 2 | 1240 | RPM | 37894 | 18947 | 12631 | 9474 | 7579 | 6316 | 4737 |
| | | | | | (992-1488) | Fz | 0.0021 | 0.0055 | 0.0105 | 0.0140 | 0.0150 | 0.0165 | 0.0195 |
| | | | | | | Feed (ipm) | 159 | 208 | 265 | 265 | 227 | 208 | 185 |
| COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass | ≤ 140 Bhn or ≤ 3 HRc | Slot | 1 | ≤ 1 | 865 | RPM | 26434 | 13217 | 8811 | 6609 | 5287 | 4406 | 3304 |
| | | | | | (692-1038) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | | Feed (ipm) | 42 | 53 | 70 | 66 | 58 | 53 | 46 |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 1080 | RPM | 33005 | 16502 | 11002 | 8251 | 6601 | 5501 | 4126 |
| | | | | | (864-1296) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | | Feed (ipm) | 53 | 66 | 88 | 83 | 73 | 66 | 58 |
| | | HSM | ≤ 0.05 | ≤ 2 | 1780 | RPM | 54397 | 27198 | 18132 | 13599 | 10879 | 9066 | 6800 |
| | | | | | (1424-2136) | Fz | 0.0017 | 0.0045 | 0.0085 | 0.0115 | 0.0125 | 0.0140 | 0.0160 |
| | | | | | | Feed (ipm) | 185 | 245 | 308 | 313 | 272 | 254 | 218 |
| COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze | ≤ 200 Bhn or ≤ 23 HRc | Slot | 1 | ≤ 1 | 345 | RPM | 10543 | 5272 | 3514 | 2636 | 2109 | 1757 | 1318 |
| | | | | | (276-414) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | | Feed (ipm) | 17 | 21 | 28 | 26 | 23 | 21 | 18 |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 430 | RPM | 13141 | 6570 | 4380 | 3285 | 2628 | 2190 | 1643 |
| | | | | | (344-516) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | | Feed (ipm) | 21 | 26 | 35 | 33 | 29 | 26 | 23 |
| | | HSM | ≤ 0.05 | ≤ 2 | 710 | RPM | 21698 | 10849 | 7233 | 5424 | 4340 | 3616 | 2712 |
| | | | | | (568-852) | Fz | 0.0017 | 0.0045 | 0.0085 | 0.0115 | 0.0125 | 0.0140 | 0.0160 |
| | | | | | | Feed (ipm) | 74 | 98 | 123 | 125 | 108 | 101 | 87 |
| PLASTICS ABS, Polycarbonate, PVC, Polypropylene | | Slot | 1 | ≤ 1 | 1600 | RPM | 48896 | 24448 | 16299 | 12224 | 9779 | 8149 | 6112 |
| | | | | | (1280-1920) | Fz | 0.0015 | 0.0040 | 0.0075 | 0.0100 | 0.0110 | 0.0120 | 0.0140 |
| | | | | | | Feed (ipm) | 147 | 196 | 244 | 244 | 215 | 196 | 171 |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 2000 | RPM | 61120 | 30560 | 20373 | 15280 | 12224 | 10187 | 7640 |
| | | | | | (1600-2400) | Fz | 0.0015 | 0.0040 | 0.0075 | 0.0100 | 0.0110 | 0.0120 | 0.0140 |
| | | | | | | Feed (ipm) | 183 | 244 | 306 | 306 | 269 | 244 | 214 |
| | | HSM | ≤ 0.05 | ≤ 2 | 3300 | RPM | 100848 | 50424 | 33616 | 25212 | 20170 | 16808 | 12606 |
| | | | | | (2640-3960) | Fz | 0.0034 | 0.0090 | 0.0170 | 0.0230 | 0.0250 | 0.0275 | 0.0320 |
| | | | | | | Feed (ipm) | 686 | 908 | 1143 | 1160 | 1008 | 924 | 807 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B) HSM (High Speed Machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times 2 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce cut depth and feed by 50% for long flute and long reach tools
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



47M
METRIC SERIES



- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|---------------------------------|
| | | | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 3,0 | 8,0 | 38,0 | 3,0 | 44550 | 44587 |
| 4,0 | 11,0 | 50,0 | 4,0 | 44551 | 44588 |
| 5,0 | 13,0 | 50,0 | 5,0 | 44552 | 44589 |
| 6,0 | 13,0 | 57,0 | 6,0 | 44553 | 44590 |
| 8,0 | 19,0 | 63,0 | 8,0 | 44554 | 44591 |
| 10,0 | 22,0 | 72,0 | 10,0 | 44555 | 44592 |
| 12,0 | 26,0 | 83,0 | 12,0 | 44556 | 44593 |
| 14,0 | 26,0 | 83,0 | 14,0 | 44557 | 44594 |
| 16,0 | 32,0 | 92,0 | 16,0 | 44558 | 44595 |
| 20,0 | 38,0 | 104,0 | 20,0 | 44559 | 44596 |
| 25,0 | 44,0 | 104,0 | 25,0 | 44560 | 44597 |

TOLERANCES (mm)

3 DIAMETER

$D_1 = +0,000/-0,006$

$D_2 = h_6$

>3-6 DIAMETER

$D_1 = +0,000/-0,008$

$D_2 = h_6$

>6-10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

>10-18 DIAMETER

$D_1 = +0,000/-0,012$

$D_2 = h_6$

>18-25 DIAMETER

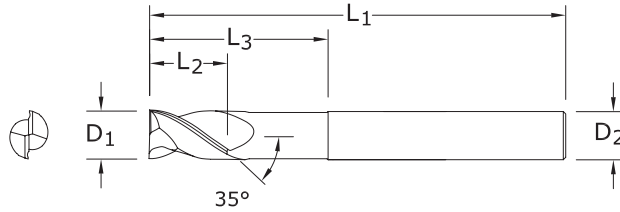
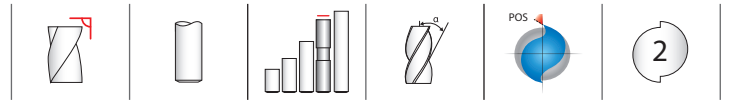
$D_1 = +0,000/-0,013$

$D_2 = h_6$

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



TOLERANCES (mm)

6 DIAMETER

$D_1 = +0,000/-0,008$

$D_2 = h_6$

>6-10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

>10-18 DIAMETER

$D_1 = +0,000/-0,011$

$D_2 = h_6$

>18-20 DIAMETER

$D_1 = +0,000/-0,013$

$D_2 = h_6$

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

47ML
METRIC SERIES

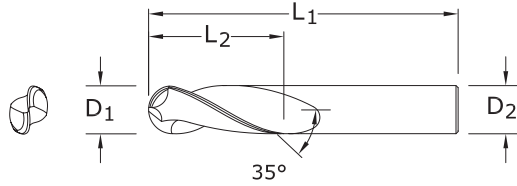
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | mm | | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------|---------------------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 6,0 | 10,0 | 100,0 | 6,0 | 54,0 | 44561 | 44609 |
| 8,0 | 12,0 | 100,0 | 8,0 | 54,0 | 44562 | 44610 |
| 10,0 | 12,0 | 100,0 | 10,0 | 54,0 | 44563 | 44611 |
| 12,0 | 16,0 | 150,0 | 12,0 | 80,0 | 44564 | 44612 |
| 16,0 | 20,0 | 150,0 | 16,0 | 80,0 | 44565 | 44613 |
| 20,0 | 25,0 | 150,0 | 20,0 | 80,0 | 44566 | 44614 |

- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Necked design with blended diameter transitions provide clearance to reach
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)



47MB

METRIC SERIES



- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|---------------------------------|
| | | | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 3,0 | 8,0 | 38,0 | 3,0 | 44570 | 44598 |
| 4,0 | 11,0 | 50,0 | 4,0 | 44571 | 44599 |
| 5,0 | 13,0 | 50,0 | 5,0 | 44572 | 44600 |
| 6,0 | 13,0 | 57,0 | 6,0 | 44573 | 44601 |
| 8,0 | 19,0 | 63,0 | 8,0 | 44574 | 44602 |
| 10,0 | 22,0 | 72,0 | 10,0 | 44575 | 44603 |
| 12,0 | 26,0 | 83,0 | 12,0 | 44576 | 44604 |
| 14,0 | 26,0 | 83,0 | 14,0 | 44577 | 44605 |
| 16,0 | 32,0 | 92,0 | 16,0 | 44578 | 44606 |
| 20,0 | 37,3 | 104,0 | 20,0 | 44579 | 44607 |
| 25,0 | 38,0 | 104,0 | 25,0 | 44580 | 44608 |

TOLERANCES (mm)

3 DIAMETER

$D_1 = +0,000/-0,006$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>3-6 DIAMETER

$D_1 = +0,000/-0,008$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>6-10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>10-18 DIAMETER

$D_1 = +0,000/-0,012$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>18-25 DIAMETER

$D_1 = +0,000/-0,013$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

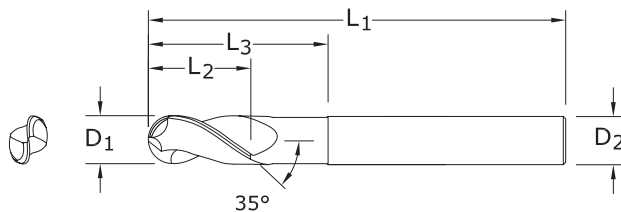
NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

47MLB

METRIC SERIES



- Circular land reduces edge aggressiveness for varied speed and feed rates
- 2 Flutes effectively manage the large size and volume of chips produced during the aggressive machining process
- Excellent balance at high speeds and aggressive plunging capability
- Necked design with blended diameter transitions provide clearance to reach
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH L_3 | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------|----------|---------------------------------|
| | | | | | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 6,0 | 10,0 | 100,0 | 6,0 | 54,0 | 44581 | 44615 |
| 8,0 | 12,0 | 100,0 | 8,0 | 54,0 | 44582 | 44616 |
| 10,0 | 12,0 | 100,0 | 10,0 | 54,0 | 44583 | 44617 |
| 12,0 | 16,0 | 150,0 | 12,0 | 80,0 | 44584 | 44618 |
| 16,0 | 20,0 | 150,0 | 16,0 | 80,0 | 44585 | 44619 |
| 20,0 | 25,0 | 150,0 | 20,0 | 80,0 | 44586 | 44620 |

TOLERANCES (mm)

6 DIAMETER

$D_1 = +0,000/-0,008$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>6-10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>10-18 DIAMETER

$D_1 = +0,000/-0,011$

$D_2 = h_6$

BALL RADIUS

$+0,0127/-0,0127$

>18-20 DIAMETER

$D_1 = +0,000/-0,013$

$D_2 = h_6$

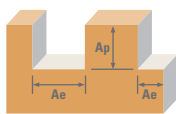
BALL RADIUS

$+0,0127/-0,0127$

NON-FERROUS

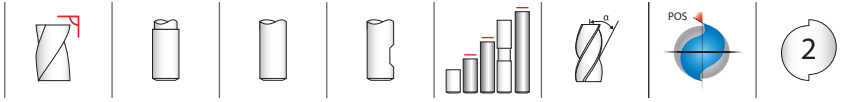
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

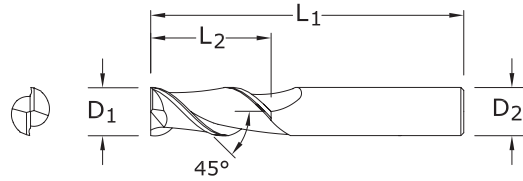


| Series 47M, 47MB, 47ML, 47MLB Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|---|-----------------------------|---------------------|---------------------|---------------|------------------------------------|-------|--------|-------|-------|-------|-------|-------|-------|
| | | | | | 3 | 6 | 10 | 12 | 16 | 20 | 25 | | |
| ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075 | ≤ 150 Bhn or ≤ 7 HRc | Slot | 1 | ≤ 1 | 490 | RPM | 52022 | 26011 | 15607 | 13005 | 9754 | 7803 | 6243 |
| | | | | | (392-588) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 2247 | 3121 | 3746 | 3745 | 3246 | 2913 | 2653 | |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 610 | RPM | 64762 | 32381 | 19429 | 16190 | 12143 | 9714 | 7771 |
| | | | | | (488-732) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 2797 | 3885 | 4663 | 4662 | 4041 | 3627 | 3303 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 1005 | RPM | 106698 | 53349 | 32009 | 26674 | 20006 | 16005 | 12804 |
| | | | | | (804-1206) | Fz | 0.050 | 0.132 | 0.280 | 0.336 | 0.384 | 0.440 | 0.488 |
| | | | | | Feed (mm/min) | 10754 | 14083 | 17925 | 17924 | 15364 | 14084 | 12484 | |
| ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B-390 | ≤ 125 Bhn or ≤ 77 HRb | Slot | 1 | ≤ 1 | 185 | RPM | 19641 | 9820 | 5892 | 4910 | 3683 | 2946 | 2357 |
| | | | | | (148-222) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 848 | 1178 | 1414 | 1414 | 1226 | 1100 | 1002 | |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 230 | RPM | 24418 | 12209 | 7326 | 6105 | 4578 | 3663 | 2930 |
| | | | | | (184-276) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 1055 | 1465 | 1758 | 1758 | 1524 | 1367 | 1245 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 380 | RPM | 40343 | 20172 | 12103 | 10086 | 7564 | 6052 | 4841 |
| | | | | | (304-456) | Fz | 0.050 | 0.132 | 0.280 | 0.336 | 0.384 | 0.440 | 0.488 |
| | | | | | Feed (mm/min) | 4066 | 5325 | 6778 | 6777 | 5809 | 5325 | 4720 | |
| COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass | ≤ 140 Bhn or ≤ 3 HRc | Slot | 1 | ≤ 1 | 265 | RPM | 28134 | 14067 | 8440 | 7034 | 5275 | 4220 | 3376 |
| | | | | | (212-318) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 1080 | 1350 | 1801 | 1688 | 1485 | 1350 | 1182 | |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 330 | RPM | 35035 | 17518 | 10511 | 8759 | 6569 | 5255 | 4204 |
| | | | | | (264-396) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 1345 | 1682 | 2242 | 2102 | 1850 | 1682 | 1472 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 545 | RPM | 57861 | 28930 | 17358 | 14465 | 10849 | 8679 | 6943 |
| | | | | | (436-654) | Fz | 0.041 | 0.108 | 0.227 | 0.276 | 0.320 | 0.373 | 0.400 |
| | | | | | Feed (mm/min) | 4721 | 6248 | 7869 | 7984 | 6943 | 6480 | 5555 | |
| COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze | ≤ 200 Bhn or ≤ 23 HRc | Slot | 1 | ≤ 1 | 105 | RPM | 11148 | 5574 | 3344 | 2787 | 2090 | 1672 | 1338 |
| | | | | | (84-126) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 428 | 535 | 713 | 669 | 589 | 535 | 468 | |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 130 | RPM | 13802 | 6901 | 4141 | 3450 | 2588 | 2070 | 1656 |
| | | | | | (104-156) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 530 | 662 | 883 | 828 | 729 | 662 | 580 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 215 | RPM | 22826 | 11413 | 6848 | 5706 | 4280 | 3424 | 2739 |
| | | | | | (172-258) | Fz | 0.041 | 0.108 | 0.227 | 0.276 | 0.320 | 0.373 | 0.400 |
| | | | | | Feed (mm/min) | 1862 | 2465 | 3104 | 3150 | 2739 | 2556 | 2191 | |
| PLASTICS ABS, Polycarbonate, PVC, Polypropylene | | Slot | 1 | ≤ 1 | 490 | RPM | 52022 | 26011 | 15607 | 13005 | 9754 | 7803 | 6243 |
| | | | | | (392-588) | Fz | 0.036 | 0.096 | 0.200 | 0.240 | 0.282 | 0.320 | 0.350 |
| | | | | | Feed (mm/min) | 3745 | 4994 | 6243 | 6242 | 5493 | 4994 | 4370 | |
| | | Profile | ≤ 0.5 | ≤ 1.5 | 610 | RPM | 64762 | 32381 | 19429 | 16190 | 12143 | 9714 | 7771 |
| | | | | | (488-732) | Fz | 0.036 | 0.096 | 0.200 | 0.240 | 0.282 | 0.320 | 0.350 |
| | | | | | Feed (mm/min) | 4662 | 6217 | 7771 | 7771 | 6839 | 6217 | 5440 | |
| | | HSM | ≤ 0.05 | ≤ 2 | 1005 | RPM | 106698 | 53349 | 32009 | 26674 | 20006 | 16005 | 12804 |
| | | | | | (804-1206) | Fz | 0.082 | 0.216 | 0.453 | 0.552 | 0.640 | 0.733 | 0.800 |
| | | | | | Feed (mm/min) | 17412 | 23045 | 29022 | 29446 | 25607 | 23473 | 20487 | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B) HSM (High Speed Machining)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 2 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce cut depth and feed by 50% for long flute and long reach tools
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



44
FRACTIONAL SERIES



- Polished ski land with primary and secondary flute wall design minimizes chip interference by directing chips away from secondary flute
- Circular land allows for increased control at various speed and feed rates ultimately reducing chatter
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| inch | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|-----------------|--|----------|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED W/FLAT | Ti-NAMITE-B (TiB ₂) W/FLAT | UNCOATED | Ti-NAMITE-B (TiB ₂) |
| 1/4 | 3/4 | 2-7/16 | 3/8 | 34501 | 34502 | 32033 | 32053 |
| 1/4 | 1-1/4 | 3-1/16 | 3/8 | 34503 | 34504 | 32034 | 32054 |
| 1/4 | 1-3/4 | 3-9/16 | 3/8 | 34505 | 34506 | 32035 | 32055 |
| 5/16 | 1-3/8 | 3-1/8 | 3/8 | 34507 | 34508 | 32036 | 32056 |
| 3/8 | 3/4 | 2-1/2 | 3/8 | 34509 | 34510 | 32037 | 32057 |
| 3/8 | 1-1/2 | 3-1/4 | 3/8 | 34511 | 34512 | 32038 | 32058 |
| 3/8 | 2-1/2 | 4-1/4 | 3/8 | 34513 | 34514 | 32039 | 32059 |
| 1/2 | 1-1/4 | 3-1/4 | 1/2 | 34515 | 34516 | 32040 | 32060 |
| 1/2 | 2 | 4 | 1/2 | 34517 | 34518 | 32041 | 32061 |
| 1/2 | 3 | 5 | 1/2 | 34519 | 34520 | 32042 | 32062 |
| 5/8 | 1-5/8 | 3-3/4 | 5/8 | 34521 | 34522 | 32043 | 32063 |
| 5/8 | 2-1/2 | 4-5/8 | 5/8 | 34523 | 34524 | 32044 | 32064 |
| 3/4 | 1-5/8 | 3-7/8 | 3/4 | 34525 | 34526 | 32045 | 32065 |
| 3/4 | 3 | 5-1/4 | 3/4 | 34527 | 34528 | 32046 | 32066 |
| 3/4 | 4 | 6-1/4 | 3/4 | 34529 | 34530 | 32047 | 32067 |
| 1 | 2 | 4-1/2 | 1 | 34531 | 34532 | 32048 | 32068 |
| 1 | 4 | 6-1/2 | 1 | 34533 | 34534 | 32049 | 32069 |

Contact your KSPT Sales Representative for more information on Corner Radius options.

TOLERANCES (inch)

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

3/4–1 DIAMETER

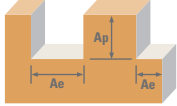
$D_1 = +0.0000/-0.00051$
















$D_2 = h_6$

NON-FERROUS

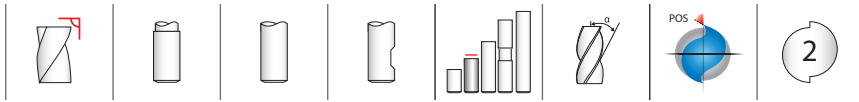
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

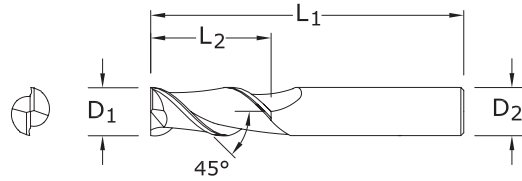


| Series 44 Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|--|--|---|---------------------|-------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075 | ≤ 150 Bhn or ≤ 7 HRc | Slot  | 1 | ≤ 1 | 1600 | RPM | 48896 | 24448 | 16299 | 12224 | 9779 | 8149 | 6112 |
| | | | | | (1280-1920) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | | Feed (ipm) | 88 | 122 | 147 | 147 | 127 | 114 | 104 |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 2000 | RPM | 61120 | 30560 | 20373 | 15280 | 12224 | 10187 | 7640 | |
| | | | | (1600-2400) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 | |
| | | | | | Feed (ipm) | 110 | 153 | 183 | 183 | 159 | 143 | 130 | |
| | HSM  | ≤ 0.05 | ≤ 2 | 3300 | RPM | 100848 | 50424 | 33616 | 25212 | 20170 | 16808 | 12606 | |
| | | | | (2640-3960) | Fz | 0.0021 | 0.0055 | 0.0105 | 0.0140 | 0.0150 | 0.0165 | 0.0195 | |
| | | | | | Feed (ipm) | 424 | 555 | 706 | 706 | 605 | 555 | 492 | |
| ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B-390 | ≤ 125 Bhn or ≤ 77 HRb | Slot  | 1 | ≤ 1 | 600 | RPM | 18336 | 9168 | 6112 | 4584 | 3667 | 3056 | 2292 |
| | | | | | (480-720) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | | Feed (ipm) | 33 | 46 | 55 | 55 | 48 | 43 | 39 |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 750 | RPM | 22920 | 11460 | 7640 | 5730 | 4584 | 3820 | 2865 | |
| | | | | (600-900) | Fz | 0.0009 | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 | |
| | | | | | Feed (ipm) | 41 | 57 | 69 | 69 | 60 | 53 | 49 | |
| | HSM  | ≤ 0.05 | ≤ 2 | 1240 | RPM | 37894 | 18947 | 12631 | 9474 | 7579 | 6316 | 4737 | |
| | | | | (992-1488) | Fz | 0.0021 | 0.0055 | 0.0105 | 0.0140 | 0.0150 | 0.0165 | 0.0195 | |
| | | | | | Feed (ipm) | 159 | 208 | 265 | 265 | 227 | 208 | 185 | |
| COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass | ≤ 140 Bhn or ≤ 3 HRc | Slot  | 1 | ≤ 1 | 865 | RPM | 26434 | 13217 | 8811 | 6609 | 5287 | 4406 | 3304 |
| | | | | | (692-1038) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | | Feed (ipm) | 42 | 53 | 70 | 66 | 58 | 53 | 46 |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 1080 | RPM | 33005 | 16502 | 11002 | 8251 | 6601 | 5501 | 4126 | |
| | | | | (864-1296) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 | |
| | | | | | Feed (ipm) | 53 | 66 | 88 | 83 | 73 | 66 | 58 | |
| | HSM  | ≤ 0.05 | ≤ 2 | 1780 | RPM | 54397 | 27198 | 18132 | 13599 | 10879 | 9066 | 6800 | |
| | | | | (1424-2136) | Fz | 0.0017 | 0.0045 | 0.0085 | 0.0115 | 0.0125 | 0.0140 | 0.0160 | |
| | | | | | Feed (ipm) | 185 | 245 | 308 | 313 | 272 | 254 | 218 | |
| COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze | ≤ 200 Bhn or ≤ 23 HRc | Slot  | 1 | ≤ 1 | 345 | RPM | 10543 | 5272 | 3514 | 2636 | 2109 | 1757 | 1318 |
| | | | | | (276-414) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | | Feed (ipm) | 17 | 21 | 28 | 26 | 23 | 21 | 18 |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 430 | RPM | 13141 | 6570 | 4380 | 3285 | 2628 | 2190 | 1643 | |
| | | | | (344-516) | Fz | 0.0008 | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 | |
| | | | | | Feed (ipm) | 21 | 26 | 35 | 33 | 29 | 26 | 23 | |
| | HSM  | ≤ 0.05 | ≤ 2 | 710 | RPM | 21698 | 10849 | 7233 | 5424 | 4340 | 3616 | 2712 | |
| | | | | (568-852) | Fz | 0.0017 | 0.0045 | 0.0085 | 0.0115 | 0.0125 | 0.0140 | 0.0160 | |
| | | | | | Feed (ipm) | 74 | 98 | 123 | 125 | 108 | 101 | 87 | |
| PLASTICS ABS, Polycarbonate, PVC, Polypropylene | ≤ 150 Bhn or ≤ 7 HRc | Slot  | 1 | ≤ 1 | 1600 | RPM | 48896 | 24448 | 16299 | 12224 | 9779 | 8149 | 6112 |
| | | | | | (1280-1920) | Fz | 0.0015 | 0.0040 | 0.0075 | 0.0100 | 0.0110 | 0.0120 | 0.0140 |
| | | | | | | Feed (ipm) | 147 | 196 | 244 | 244 | 215 | 196 | 171 |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 2000 | RPM | 61120 | 30560 | 20373 | 15280 | 12224 | 10187 | 7640 | |
| | | | | (1600-2400) | Fz | 0.0015 | 0.0040 | 0.0075 | 0.0100 | 0.0110 | 0.0120 | 0.0140 | |
| | | | | | Feed (ipm) | 183 | 244 | 306 | 306 | 269 | 244 | 214 | |
| | HSM  | ≤ 0.05 | ≤ 2 | 3300 | RPM | 100848 | 50424 | 33616 | 25212 | 20170 | 16808 | 12606 | |
| | | | | (2640-3960) | Fz | 0.0034 | 0.0090 | 0.0170 | 0.0230 | 0.0250 | 0.0275 | 0.0320 | |
| | | | | | Feed (ipm) | 686 | 908 | 1143 | 1160 | 1008 | 924 | 807 | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B) HSM (High Speed Machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times 2 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce cut depth and feed by 50% for long flute and long reach tools
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



44M
METRIC SERIES



- Polished ski land with primary and secondary flute wall design minimizes chip interference by directing chips away from secondary flute
- Circular land allows for increased control at various speed and feed rates ultimately reducing chatter
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| CUTTING DIAMETER D_1 | mm | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|-----------------|----------|--|---------------------------------|
| | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED W/FLAT | UNCOATED | Ti-NAMITE-B (TiB ₂) W/FLAT | Ti-NAMITE-B (TiB ₂) |
| 3,0 | 8,0 | 52,0 | 6,0 | 44505 | 49663 | 44506 | 49674 |
| 4,0 | 11,0 | 55,0 | 6,0 | 44509 | 49664 | 44510 | 49675 |
| 5,0 | 13,0 | 57,0 | 6,0 | 44513 | 49665 | 44514 | 49676 |
| 6,0 | 13,0 | 57,0 | 6,0 | 44517 | 49666 | 44518 | 49677 |
| 8,0 | 19,0 | 69,0 | 10,0 | 44521 | 49667 | 44522 | 49678 |
| 10,0 | 22,0 | 72,0 | 10,0 | 44525 | 49668 | 44526 | 49679 |
| 12,0 | 26,0 | 83,0 | 12,0 | 44529 | 49669 | 44530 | 49680 |
| 14,0 | 26,0 | 83,0 | 14,0 | 44533 | 49670 | 44534 | 49681 |
| 16,0 | 32,0 | 92,0 | 16,0 | 44537 | 49671 | 44538 | 49682 |
| 18,0 | 32,0 | 92,0 | 18,0 | 44541 | 49672 | 44542 | 49683 |
| 20,0 | 38,0 | 104,0 | 20,0 | 44545 | 49673 | 44546 | 49684 |

Contact your KSPT Sales Representative for more information on Corner Radius options.

TOLERANCES (mm)

≤3 DIAMETER

$D_1 = +0,000/-0,006$

$D_2 = h_6$

>3-6 DIAMETER

$D_1 = +0,000/-0,008$

$D_2 = h_6$

>6-10 DIAMETER

$D_1 = +0,000/-0,009$

$D_2 = h_6$

>10-18 DIAMETER

$D_1 = +0,000/-0,011$

$D_2 = h_6$

>18-20 DIAMETER

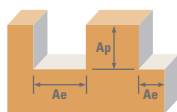
$D_1 = +0,000/-0,013$
















$D_2 = h_6$

NON-FERROUS

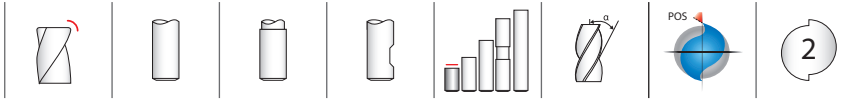
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

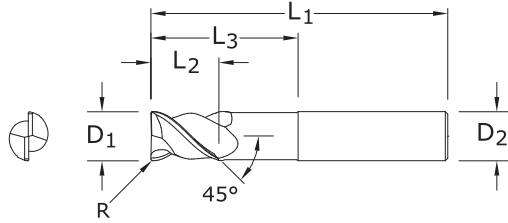


| Series 44M Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|---|-----------------------------|--|---------------------|---------------|------------------------------------|-------|--------|-------|-------|-------|-------|-------|-------|
| | | | | | 3 | 6 | 10 | 12 | 16 | 20 | 25 | | |
| ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075 | ≤ 150 Bhn or ≤ 7HRc | Slot  | 1 | ≤ 1 | 490 | RPM | 52022 | 26011 | 15607 | 13005 | 9754 | 7803 | 6243 |
| | | | | | (392-588) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 2247 | 3121 | 3746 | 3745 | 3246 | 2913 | 2653 | |
| | | Profile  | ≤ 0.5 | ≤ 1.5 | 610 | RPM | 64762 | 32381 | 19429 | 16190 | 12143 | 9714 | 7771 |
| | | | | | (488-732) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 2797 | 3885 | 4663 | 4662 | 4041 | 3627 | 3303 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 1005 | RPM | 106698 | 53349 | 32009 | 26674 | 20006 | 16005 | 12804 |
| | | | | | (804-1206) | Fz | 0.050 | 0.132 | 0.280 | 0.336 | 0.384 | 0.440 | 0.488 |
| | | | | | Feed (mm/min) | 10754 | 14083 | 17925 | 17924 | 15364 | 14084 | 12484 | |
| ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B-390 | ≤ 125 Bhn or ≤ 77 HRb | Slot  | 1 | ≤ 1 | 185 | RPM | 19641 | 9820 | 5892 | 4910 | 3683 | 2946 | 2357 |
| | | | | | (148-222) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 848 | 1178 | 1414 | 1414 | 1226 | 1100 | 1002 | |
| | | Profile  | ≤ 0.5 | ≤ 1.5 | 230 | RPM | 24418 | 12209 | 7326 | 6105 | 4578 | 3663 | 2930 |
| | | | | | (184-276) | Fz | 0.022 | 0.060 | 0.120 | 0.144 | 0.166 | 0.187 | 0.213 |
| | | | | | Feed (mm/min) | 1055 | 1465 | 1758 | 1758 | 1524 | 1367 | 1245 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 380 | RPM | 40343 | 20172 | 12103 | 10086 | 7564 | 6052 | 4841 |
| | | | | | (304-456) | Fz | 0.050 | 0.132 | 0.280 | 0.336 | 0.384 | 0.440 | 0.488 |
| | | | | | Feed (mm/min) | 4066 | 5325 | 6778 | 6777 | 5809 | 5325 | 4720 | |
| COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass | ≤ 140 Bhn or ≤ 3 HRc | Slot  | 1 | ≤ 1 | 265 | RPM | 28134 | 14067 | 8440 | 7034 | 5275 | 4220 | 3376 |
| | | | | | (212-318) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 1080 | 1350 | 1801 | 1688 | 1485 | 1350 | 1182 | |
| | | Profile  | ≤ 0.5 | ≤ 1.5 | 330 | RPM | 35035 | 17518 | 10511 | 8759 | 6569 | 5255 | 4204 |
| | | | | | (264-396) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 1345 | 1682 | 2242 | 2102 | 1850 | 1682 | 1472 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 545 | RPM | 57861 | 28930 | 17358 | 14465 | 10849 | 8679 | 6943 |
| | | | | | (436-654) | Fz | 0.041 | 0.108 | 0.227 | 0.276 | 0.320 | 0.373 | 0.400 |
| | | | | | Feed (mm/min) | 4721 | 6248 | 7869 | 7984 | 6943 | 6480 | 5555 | |
| COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze | ≤ 200 Bhn or ≤ 23 HRc | Slot  | 1 | ≤ 1 | 105 | RPM | 11148 | 5574 | 3344 | 2787 | 2090 | 1672 | 1338 |
| | | | | | (84-126) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 428 | 535 | 713 | 669 | 589 | 535 | 468 | |
| | | Profile  | ≤ 0.5 | ≤ 1.5 | 130 | RPM | 13802 | 6901 | 4141 | 3450 | 2588 | 2070 | 1656 |
| | | | | | (104-156) | Fz | 0.019 | 0.048 | 0.107 | 0.120 | 0.141 | 0.160 | 0.175 |
| | | | | | Feed (mm/min) | 530 | 662 | 883 | 828 | 729 | 662 | 580 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 215 | RPM | 22826 | 11413 | 6848 | 5706 | 4280 | 3424 | 2739 |
| | | | | | (172-258) | Fz | 0.041 | 0.108 | 0.227 | 0.276 | 0.320 | 0.373 | 0.400 |
| | | | | | Feed (mm/min) | 1862 | 2465 | 3104 | 3150 | 2739 | 2556 | 2191 | |
| PLASTICS ABS, Polycarbonate, PVC, Polypropylene | | Slot  | 1 | ≤ 1 | 490 | RPM | 52022 | 26011 | 15607 | 13005 | 9754 | 7803 | 6243 |
| | | | | | (392-588) | Fz | 0.036 | 0.096 | 0.200 | 0.240 | 0.282 | 0.320 | 0.350 |
| | | | | | Feed (mm/min) | 3745 | 4994 | 6243 | 6242 | 5493 | 4994 | 4370 | |
| | | Profile  | ≤ 0.5 | ≤ 1.5 | 610 | RPM | 64762 | 32381 | 19429 | 16190 | 12143 | 9714 | 7771 |
| | | | | | (488-732) | Fz | 0.036 | 0.096 | 0.200 | 0.240 | 0.282 | 0.320 | 0.350 |
| | | | | | Feed (mm/min) | 4662 | 6217 | 7771 | 7771 | 6839 | 6217 | 5440 | |
| | | HSM  | ≤ 0.05 | ≤ 2 | 1005 | RPM | 106698 | 53349 | 32009 | 26674 | 20006 | 16005 | 12804 |
| | | | | | (804-1206) | Fz | 0.082 | 0.216 | 0.453 | 0.552 | 0.640 | 0.733 | 0.800 |
| | | | | | Feed (mm/min) | 17412 | 23045 | 29022 | 29446 | 25607 | 23473 | 20487 | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B) HSM (High Speed Machining)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fz \times 2 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce cut depth and feed by 50% for long flute and long reach tools
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



45
FRACTIONAL SERIES



- Polished ski land with primary and secondary flute wall design minimizes chip interference by directing chips away from secondary flute
- Circular land allows for increased control at various speed and feed rates ultimately reducing chatter
- Recommended for materials ≤ 150 Bhn (≤ 7 HRC)

| inch | | | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|-----------------|----------------------|-----------------|----------|--|---------------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | REACH* L_3 | CORNER RADIUS R | UNCOATED W/FLAT | UNCOATED | Ti-NAMITE-B (TiB ₂) W/FLAT | Ti-NAMITE-B (TiB ₂) |
| 1/4 | 3/8 | 2-1/2 | 3/8 | 1 | .010 | 91257 | 91250 | 91242 | 91235 |
| 5/16 | 7/16 | 2-1/2 | 3/8 | 1-1/8 | .012 | 91258 | 91251 | 91243 | 91236 |
| 3/8 | 9/16 | 2-1/2 | 3/8 | 1-1/8 | .015 | 91259 | 91252 | 91244 | 91237 |
| 1/2 | 3/4 | 3 | 1/2 | 1-1/2 | .020 | 91260 | 91253 | 91245 | 91238 |
| 5/8 | 7/8 | 3-1/2 | 5/8 | 1-3/4 | .025 | 91261 | 91254 | 91246 | 91239 |
| 3/4 | 1 | 4 | 3/4 | 2 | .030 | 91262 | 91255 | 91247 | 91240 |
| 1 | 1-1/4 | 4 | 1 | 2-1/8 | .040 | 91263 | 91256 | 91248 | 91241 |

*Reach (Optional)

TOLERANCES (inch)

1/4–3/8 DIAMETER

$D_1 = +0.0000/-0.00035$

$D_2 = h_6$

$R = +0.0000/-0.0020$

1/2–5/8 DIAMETER

$D_1 = +0.0000/-0.00043$

$D_2 = h_6$

$R = +0.0000/-0.0020$

3/4–1 DIAMETER

$D_1 = +0.0000/-0.00051$

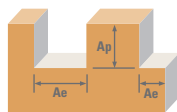
$D_2 = h_6$
















$R = +0.0000/-0.0020$

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



| Series 45 Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | |
|--|--|---|---------------------|-------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | 1 | | |
| ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075 | ≤ 150 Bhn or ≤ 7 HRc | Slot  | 1 | ≤ 1 | 1600 | RPM | 24448 | 16299 | 12224 | 9779 | 8149 | 6112 |
| | | | | | (1280-1920) | Fz | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | | Feed (ipm) | 122 | 147 | 147 | 127 | 114 | 104 |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 2000 | RPM | 30560 | 20373 | 15280 | 12224 | 10187 | 7640 | |
| | | | | (1600-2400) | Fz | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 | |
| | | | | | Feed (ipm) | 153 | 183 | 183 | 159 | 143 | 130 | |
| | HSM  | ≤ 0.05 | ≤ 2 | 3300 | RPM | 50424 | 33616 | 25212 | 20170 | 16808 | 12606 | |
| | | | | (2640-3960) | Fz | 0.0055 | 0.0105 | 0.0140 | 0.0150 | 0.0165 | 0.0195 | |
| | | | | | Feed (ipm) | 555 | 706 | 706 | 605 | 555 | 492 | |
| ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B-390 | ≤ 125 Bhn or ≤ 77 HRb | Slot  | 1 | ≤ 1 | 600 | RPM | 9168 | 6112 | 4584 | 3667 | 3056 | 2292 |
| | | | | | (480-720) | Fz | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 |
| | | | | | | Feed (ipm) | 46 | 55 | 55 | 48 | 43 | 39 |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 750 | RPM | 11460 | 7640 | 5730 | 4584 | 3820 | 2865 | |
| | | | | (600-900) | Fz | 0.0025 | 0.0045 | 0.0060 | 0.0065 | 0.0070 | 0.0085 | |
| | | | | | Feed (ipm) | 57 | 69 | 69 | 60 | 53 | 49 | |
| | HSM  | ≤ 0.05 | ≤ 2 | 1240 | RPM | 18947 | 12631 | 9474 | 7579 | 6316 | 4737 | |
| | | | | (992-1488) | Fz | 0.0055 | 0.0105 | 0.0140 | 0.0150 | 0.0165 | 0.0195 | |
| | | | | | Feed (ipm) | 208 | 265 | 265 | 227 | 208 | 185 | |
| COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass | ≤ 140 Bhn or ≤ 3 HRc | Slot  | 1 | ≤ 1 | 865 | RPM | 13217 | 8811 | 6609 | 5287 | 4406 | 3304 |
| | | | | | (692-1038) | Fz | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | | Feed (ipm) | 53 | 70 | 66 | 58 | 53 | 46 |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 1080 | RPM | 16502 | 11002 | 8251 | 6601 | 5501 | 4126 | |
| | | | | (864-1296) | Fz | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 | |
| | | | | | Feed (ipm) | 66 | 88 | 83 | 73 | 66 | 58 | |
| | HSM  | ≤ 0.05 | ≤ 2 | 1780 | RPM | 27198 | 18132 | 13599 | 10879 | 9066 | 6800 | |
| | | | | (1424-2136) | Fz | 0.0045 | 0.0085 | 0.0115 | 0.0125 | 0.0140 | 0.0160 | |
| | | | | | Feed (ipm) | 245 | 308 | 313 | 272 | 254 | 218 | |
| COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze | ≤ 200 Bhn or ≤ 23 HRc | Slot  | 1 | ≤ 1 | 345 | RPM | 5272 | 3514 | 2636 | 2109 | 1757 | 1318 |
| | | | | | (276-414) | Fz | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 |
| | | | | | | Feed (ipm) | 21 | 28 | 26 | 23 | 21 | 18 |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 430 | RPM | 6570 | 4380 | 3285 | 2628 | 2190 | 1643 | |
| | | | | (344-516) | Fz | 0.0020 | 0.0040 | 0.0050 | 0.0055 | 0.0060 | 0.0070 | |
| | | | | | Feed (ipm) | 26 | 35 | 33 | 29 | 26 | 23 | |
| | HSM  | ≤ 0.05 | ≤ 2 | 710 | RPM | 10849 | 7233 | 5424 | 4340 | 3616 | 2712 | |
| | | | | (568-852) | Fz | 0.0045 | 0.0085 | 0.0115 | 0.0125 | 0.0140 | 0.0160 | |
| | | | | | Feed (ipm) | 98 | 123 | 125 | 108 | 101 | 87 | |
| PLASTICS ABS, Polycarbonate, PVC, Polypropylene | | Slot  | 1 | ≤ 1 | 1600 | RPM | 24448 | 16299 | 12224 | 9779 | 8149 | 6112 |
| | | | | | (1280-1920) | Fz | 0.0040 | 0.0075 | 0.0100 | 0.0110 | 0.0120 | 0.0140 |
| | | | | | | Feed (ipm) | 196 | 244 | 244 | 215 | 196 | 171 |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 2000 | RPM | 30560 | 20373 | 15280 | 12224 | 10187 | 7640 | |
| | | | | (1600-2400) | Fz | 0.0040 | 0.0075 | 0.0100 | 0.0110 | 0.0120 | 0.0140 | |
| | | | | | Feed (ipm) | 244 | 306 | 306 | 269 | 244 | 214 | |
| | HSM  | ≤ 0.05 | ≤ 2 | 3300 | RPM | 50424 | 33616 | 25212 | 20170 | 16808 | 12606 | |
| | | | | (2640-3960) | Fz | 0.0090 | 0.0170 | 0.0230 | 0.0250 | 0.0275 | 0.0320 | |
| | | | | | Feed (ipm) | 908 | 1143 | 1160 | 1008 | 924 | 807 | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B) HSM (High Speed Machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times 2 \times rpm$
 reduce speed and feed for materials harder than listed
 reduce cut depth and feed by 50% for long flute and long reach tools
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

General Purpose End Mills





Milling

| SERIES | GENERAL PURPOSE END MILLS DESCRIPTION | PAGE |
|--------|--|------|
| 16 | 4 Flute Square End Stub Fractional | 192 |
| 16M | 4 Flute Square End Stub Metric | 222 |
| 1 | 4 Flute Square End Standard Length Fractional | 193 |
| 1L | 4 Flute Square End Long Reach Fractional | 193 |
| 1EL | 4 Flute Square End Extended Length Fractional | 193 |
| 1M | 4 Flute Square End Standard Length Metric | 223 |
| 1XLM | 4 Flute Square End Extra Long Reach Metric | 223 |
| 14 | 4 Flute Double End Square Stub Fractional | 197 |
| 14M | 4 Flute Double End Square Stub Metric | 225 |
| 1B | 4 Flute Ball End Standard Length Fractional | 198 |
| 1LB | 4 Flute Ball End Long Reach Fractional | 198 |
| 1ELB | 4 Flute Ball End Extended Length Fractional | 198 |
| 1MB | 4 Flute Ball End Standard Length Metric | 226 |
| 1XLMB | 4 Flute Ball End Extra Long Reach Metric | 226 |
| 14B | 4 Flute Double End Ball Stub Fractional | 200 |
| 14MB | 4 Flute Double End Ball Stub Metric | 227 |
| 1CR | 4 Flute Corner Radius Standard Length Fractional | 195 |
| 1MCR | 4 Flute Corner Radius Standard Length Metric | 224 |
| 54 | 4 Flute High Shear Square End Standard Length Fractional | 209 |
| 54M | 4 Flute High Shear Square End Standard Length Metric | 235 |
| 17 | 2 Flute Square End Stub Fractional | 178 |
| 17M | 2 Flute Square End Stub Metric | 213 |
| 3 | 2 Flute Square End Standard Length Fractional | 179 |
| 3L | 2 Flute Square End Long Reach Fractional | 179 |
| 3EL | 2 Flute Square End Extended Length Fractional | 179 |
| 3M | 2 Flute Square End Standard Length Metric | 214 |
| 3XLM | 2 Flute Square End Extra Long Reach Metric | 214 |
| 59 | 2 Flute Square End Long Reach Fractional | 181 |
| 59M | 2 Flute Square End Long Reach Metric | 215 |
| 15 | 2 Flute Double End Square Stub Fractional | 183 |
| 15M | 2 Flute Double End Square Stub Metric | 216 |
| 3B | 2 Flute Ball End Standard Length Fractional | 184 |
| 3LB | 2 Flute Ball End Long Reach Fractional | 184 |
| 3ELB | 2 Flute Ball End Extended Length Fractional | 184 |
| 3MB | 2 Flute Ball End Standard Length Metric | 217 |
| 3XLMB | 2 Flute Ball End Extra Long Reach Metric | 217 |
| 59B | 2 Flute Ball End Long Reach Fractional | 186 |
| 59MB | 2 Flute Ball End Long Reach Metric | 218 |

Speed & Feed Recommendations listed after each series

| SERIES | GENERAL PURPOSE END MILLS DESCRIPTION | PAGE |
|---------------|--|------|
| 15B | 2 Flute Double End Ball Stub Fractional | 187 |
| 15MB | 2 Flute Double End Ball Stub Metric | 219 |
| 3CR | 2 Flute Corner Radius Standard Length Fractional | 182 |
| 52 | 2 Flute High Shear Square End Standard Length Fractional | 208 |
| 52M | 2 Flute High Shear Square End Standard Length Metric | 234 |
| 5 | 3 Flute Square End Standard Length Fractional | 188 |
| 5M | 3 Flute Square End Standard Length Metric | 220 |
| 5XLM | 3 Flute Square End Extra Long Reach Metric | 220 |
| 5B | 3 Flute Ball End Standard Length Fractional | 189 |
| 5MB | 3 Flute Ball End Standard Length Metric | 221 |
| 5XLMB | 3 Flute Ball End Extra Long Reach Metric | 221 |
| 61 | Multi-Flute Coarse Pitch Rougher Fractional | 206 |
| 61M | Multi-Flute Coarse Pitch Rougher Metric | 232 |
| 62 | Multi-Flute Fine Pitch Rougher Fractional | 204 |
| 62M | Multi-Flute Fine Pitch Rougher Metric | 230 |
| 23 | 3 Flute Tapered Square End Standard Length Fractional | 190 |
| 24 | 3 Flute Tapered Corner Radius Standard Length Fractional | 191 |
| End Mill Sets | 2, 3, & 4 Flute Square End Series 1, 3, 5, 14, 15 | 211 |
| | 2, 3, & 4 Flute Ball End Series 1B, 3B, 5B, 14B, 15B | 212 |

Speed & Feed Recommendations listed after each series

Fresado

| SERIE | DESCRIPCIÓN DE FRESAS DE USO GENERAL | PÁGINA |
|-------|---|--------|
| 16 | 4 filos, pieza de punta cuadrada, fraccional | 192 |
| 16M | 4 filos, pieza de punta cuadrada, métrico | 222 |
| 1 | 4 filos, punta cuadrada, longitud estándar, fraccional | 193 |
| 1L | 4 filos, punta cuadrada, largo alcance, fraccional | 193 |
| 1EL | 4 filos, punta cuadrada, longitud extendida, fraccional | 193 |
| 1M | 4 filos, punta cuadrada, longitud estándar, métrico | 223 |
| 1XLM | 4 filos, punta cuadrada, alcance extralargo, métrico | 223 |
| 14 | 4 filos, pieza doble de punta cuadrada, fraccional | 197 |
| 14M | 4 filos, pieza doble de punta cuadrada, métrico | 225 |
| 1B | 4 filos, punta esférica, longitud estándar, fraccional | 198 |
| 1LB | 4 filos, punta esférica, largo alcance, fraccional | 198 |
| 1ELB | 4 filos, punta esférica, longitud extendida, fraccional | 198 |
| 1MB | 4 filos, punta esférica, longitud estándar, métrico | 226 |
| 1XLMB | 4 filos, punta esférica, alcance extralargo, métrico | 226 |
| 14B | 4 filos, pieza doble de punta esférica, fraccional | 200 |
| 14MB | 4 filos, pieza doble de punta esférica, métrico | 227 |

| SERIE | DESCRIPCIÓN DE FRESAS DE USO GENERAL | PÁGINA |
|------------------|--|--------|
| 1CR | 4 filos, radio angulado, longitud estándar, fraccional | 195 |
| 1MCR | 4 filos, radio angulado, longitud estándar, métrico | 224 |
| 54 | 4 filos, alto rendimiento, punta cuadrada, longitud estándar, fraccional | 209 |
| 54M | 4 filos, alto rendimiento, punta cuadrada, longitud estándar, métrico | 235 |
| 17 | 2 filos, pieza de punta cuadrada, fraccional | 178 |
| 17M | 2 filos, pieza de punta cuadrada, métrico | 213 |
| 3 | 2 filos, punta cuadrada, longitud estándar, fraccional | 179 |
| 3L | 2 filos, punta cuadrada, largo alcance, fraccional | 179 |
| 3EL | 2 filos, punta cuadrada, longitud extendida, fraccional | 179 |
| 3M | 2 filos, punta cuadrada, longitud estándar, métrico | 214 |
| 3XLM | 2 filos, punta cuadrada, alcance extralargo, métrico | 214 |
| 59 | 2 filos, punta cuadrada, largo alcance, fraccional | 181 |
| 59M | 2 filos, punta cuadrada, largo alcance, métrico | 215 |
| 15 | 2 filos, pieza doble de punta cuadrada, fraccional | 183 |
| 15M | 2 filos, pieza doble de punta cuadrada, métrico | 216 |
| 3B | 2 filos, punta esférica, longitud estándar, fraccional | 184 |
| 3LB | 2 filos, punta esférica, largo alcance, fraccional | 184 |
| 3ELB | 2 filos, punta esférica, longitud extendida, fraccional | 184 |
| 3MB | 2 filos, punta esférica, longitud estándar, métrico | 217 |
| 3XLMB | 2 filos, punta esférica, alcance extralargo, métrico | 217 |
| 59B | 2 filos, punta esférica, largo alcance, fraccional | 186 |
| 59MB | 2 filos, punta esférica, largo alcance, métrico | 218 |
| 15B | 2 filos, pieza doble de punta esférica, fraccional | 187 |
| 15MB | 2 filos, pieza doble de punta esférica, métrico | 219 |
| 3CR | 2 filos, radio angulado, longitud estándar, fraccional | 182 |
| 52 | 2 filos, alto rendimiento, punta cuadrada, longitud estándar, fraccional | 208 |
| 52M | 2 filos, alto rendimiento, punta cuadrada, longitud estándar, métrico | 234 |
| 5 | 3 filos, punta cuadrada, longitud estándar, fraccional | 188 |
| 5M | 3 filos, punta cuadrada, longitud estándar, métrico | 220 |
| 5XLM | 3 filos, punta cuadrada, alcance extralargo, métrico | 220 |
| 5B | 3 filos, punta esférica, longitud estándar, fraccional | 189 |
| 5MB | 3 filos, punta esférica, longitud estándar, métrico | 221 |
| 5XLMB | 3 filos, punta esférica, alcance extralargo, métrico | 221 |
| 61 | Filo múltiple, paso grueso, desbastador, fraccional | 206 |
| 61M | Filo múltiple, paso grueso, desbastador, métrico | 232 |
| 62 | Filo múltiple, paso fino, desbastador, fraccional | 204 |
| 62M | Filo múltiple, paso fino, desbastador, métrico | 230 |
| 23 | 3 filos, cónico, punta cuadrada, longitud estándar, fraccional | 190 |
| 24 | 3 filos, cónico, radio angulado, longitud estándar, fraccional | 191 |
| Juegos de fresas | 2, 3 y 4 filos, punta cuadrada, series 1, 3, 5, 14, 15 | 211 |
| | 2, 3 y 4 filos, punta esférica, series 1B, 3B, 5B, 14B, 15B | 212 |

Recomendaciones de velocidades y avances mostradas tras cada serie

Fraissage

| SERIES | DESCRIPTION DE FRAISES À USAGE GÉNÉRAL | PAGE |
|--------|--|------|
| 16 | 4 dents non rayonné court (fractionnel) | 192 |
| 16M | 4 dents non rayonné court (métrique) | 222 |
| 1 | 4 dents non rayonné longueur standard (fractionnel) | 193 |
| 1L | 4 dents non rayonné longue portée (fractionnel) | 193 |
| 1EL | 4 dents non rayonné extra-long (fractionnel) | 193 |
| 1M | 4 dents non rayonné longueur standard (métrique) | 223 |
| 1XLM | 4 dents non rayonné portée extra-longue (métrique) | 223 |
| 14 | 4 dents à double bouts plats court (fractionnel) | 197 |
| 14M | 4 dents à double bouts plats court (métrique) | 225 |
| 1B | 4 dents à bout hémisphérique longueur standard (fractionnel) | 198 |
| 1LB | 4 dents à bout hémisphérique longue portée (fractionnel) | 198 |
| 1ELB | 4 dents à bout hémisphérique extra-long (fractionnel) | 198 |
| 1MB | 4 dents à bout hémisphérique longueur standard (métrique) | 226 |
| 1XLMB | 4 dents à bout hémisphérique portée extra-longue (métrique) | 226 |
| 14B | 4 dents à double bouts hémisphériques court (fractionnel) | 200 |
| 14MB | 4 dents à double bouts hémisphériques court (métrique) | 227 |
| 1CR | 4 dents rayonné longueur standard (fractionnel) | 195 |
| 1MCR | 4 dents rayonné longueur standard (métrique) | 224 |
| 54 | 4 dents cisaillement élevé non rayonné longueur standard (fractionnel) | 209 |
| 54M | 4 dents cisaillement élevé non rayonné longueur standard (métrique) | 235 |
| 17 | 2 dents non rayonné court (fractionnel) | 178 |
| 17M | 2 dents non rayonné court (métrique) | 213 |
| 3 | 2 dents non rayonné longueur standard (fractionnel) | 179 |
| 3L | 2 dents non rayonné longue portée (fractionnel) | 179 |
| 3EL | 2 dents non rayonné extra-long (fractionnel) | 179 |
| 3M | 2 dents non rayonné longueur standard (métrique) | 214 |
| 3XLM | 2 dents non rayonné portée extra-longue (métrique) | 214 |
| 59 | 2 dents non rayonné longue portée (fractionnel) | 181 |
| 59M | 2 dents non rayonné longue portée (métrique) | 215 |
| 15 | 2 dents à double bouts plats court (fractionnel) | 183 |
| 15M | 2 dents à double bouts plats court (métrique) | 216 |
| 3B | 2 dents à bout hémisphérique longueur standard (fractionnel) | 184 |
| 3LB | 2 dents à bout hémisphérique longue portée (fractionnel) | 184 |
| 3ELB | 2 dents à bout hémisphérique extra-long (fractionnel) | 184 |
| 3MB | 2 dents à bout hémisphérique longueur standard (métrique) | 217 |
| 3XLMB | 2 dents à bout hémisphérique portée extra-longue (métrique) | 217 |
| 59B | 2 dents à bout hémisphérique longue portée (fractionnel) | 186 |
| 59MB | 2 dents à bout hémisphérique longue portée (métrique) | 218 |
| 15B | 2 dents à double bouts hémisphériques court (fractionnel) | 187 |
| 15MB | 2 dents à double bouts hémisphériques court (métrique) | 219 |

| SERIES | DESCRIPTION DE FRAISES À USAGE GÉNÉRAL | PAGE |
|-----------------|--|------|
| 3CR | 2 dents rayonné longueur standard (fractionnel) | 182 |
| 52 | 2 dents cisaillement élevé non rayonné longueur standard (fractionnel) | 208 |
| 52M | 2 dents cisaillement élevé non rayonné longueur standard (métrique) | 234 |
| 5 | 3 dents non rayonné longueur standard (fractionnel) | 188 |
| 5M | 3 dents non rayonné longueur standard (métrique) | 220 |
| 5XLM | 3 dents non rayonné portée extra-longue (métrique) | 220 |
| 5B | 3 dents à bout hémisphérique longueur standard (fractionnel) | 189 |
| 5MB | 3 dents à bout hémisphérique longueur standard (métrique) | 221 |
| 5XLMB | 3 dents à bout hémisphérique portée extra-longue (métrique) | 221 |
| 61 | Multi-dents à pas gros d'ébauche (fractionnel) | 206 |
| 61M | Multi-dents à pas gros d'ébauche (métrique) | 232 |
| 62 | Multi-dents à pas fin d'ébauche (fractionnel) | 204 |
| 62M | Multi-dents à pas fin d'ébauche (métrique) | 230 |
| 23 | 3 dents conique non rayonné longueur standard (fractionnel) | 190 |
| 24 | 3 dents conique rayonné longueur standard (fractionnel) | 191 |
| Jeux de fraises | 2, 3, & 4 Série goujure non rayonné 1,3,5,14,15 | 211 |
| | 2, 3, & 4 Série goujure à bout hémisphérique 15B, 15MB, 15B, 15MB, 15B, 15MB | 212 |

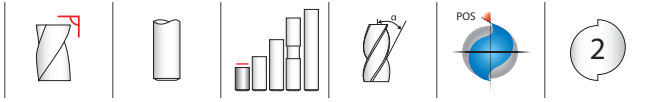
Recommandations de vitesse et avance indiquées après chaque série

| SERIE | BESCHREIBUNG DER STANDARD-SCHAFTFRÄSER | SEITE |
|-------|---|-------|
| 16 | Zölliger Schaftfräser mit 4 Schneiden ohne Eckenradien, kurze Ausführung | 192 |
| 16M | Schaftfräser mit 4 Schneiden ohne Eckenradien, kurze Ausführung | 222 |
| 1 | Zölliger Schaftfräser mit 4 Schneiden ohne Eckenradien, Standardlänge | 193 |
| 1L | Zölliger Langloch-Schaftfräser mit 4 Schneiden ohne Eckenradien | 193 |
| 1EL | Zölliger Schaftfräser mit 4 Schneiden ohne Eckenradien, extra lang | 193 |
| 1M | Schaftfräser mit 4 Schneiden ohne Eckenradien, Standardlänge | 223 |
| 1XLM | Superlangloch-Schaftfräser mit 4 Schneiden ohne Eckenradien | 223 |
| 14 | Zölliger Schaftfräser mit 4 Schneiden, kurze Ausführung | 197 |
| 14M | Schaftfräser mit 4 Schneiden, kurze Ausführung | 225 |
| 1B | Zölliger Schaftfräser mit 4 Schneiden, Standardlänge | 198 |
| 1LB | Zölliger Langloch-Radiuschaftfräser mit 4 Schneiden | 198 |
| 1ELB | Zölliger Schaftfräser mit 4 Schneiden, Extra lang | 198 |
| 1MB | Schaftfräser mit 4 Schneiden, Standardlänge | 226 |
| 1XLMB | Langloch-Radiuschaftfräser mit 4 Schneiden | 226 |
| 14B | Zölliger Doppelend-Radiuschaftfräser mit 4 Schneiden, kurze Ausführung | 200 |
| 14MB | Doppelend-Radiuschaftfräser mit 4 Schneiden, kurze Ausführung | 227 |
| 1CR | Zölliger Schaftfräser mit 4 Schneiden mit Eckenradien, Standardlänge | 195 |
| 1MCR | Schaftfräser mit 4 Schneiden mit Eckenradien, Standardlänge | 224 |
| 54 | Zölliger Schaftfräser hoher Scherfestigkeit mit 4 Schneiden ohne Eckenradien, Standardlänge | 209 |
| 54M | Schaftfräser hoher Scherfestigkeit mit 4 Schneiden ohne Eckenradien, Standardlänge | 235 |
| 17 | Zölliger Schaftfräser mit 2 Schneiden ohne Eckenradien, kurze Ausführung | 178 |
| 17M | Schaftfräser mit 2 Schneiden ohne Eckenradien, kurze Ausführung | 213 |
| 3 | Zölliger Schaftfräser mit 2 Schneiden ohne Eckenradien, Standardlänge | 179 |
| 3L | Zölliger Langloch-Schaftfräser mit 2 Schneiden ohne Eckenradien | 179 |
| 3EL | Zölliger Schaftfräser mit 2 Schneiden ohne Eckenradien, extra lang | 179 |
| 3M | Schaftfräser mit 2 Schneiden ohne Eckenradien, Standardlänge | 214 |
| 3XLM | Langloch-Schaftfräser mit 2 Schneiden ohne Eckenradien | 214 |
| 59 | Zölliger Langloch-Schaftfräser mit 2 Schneiden ohne Eckenradien | 181 |
| 59M | Langloch-Schaftfräser mit 2 Schneiden ohne Eckenradien | 215 |
| 15 | Zölliger Schaftfräser mit 2 Schneiden, kurze Ausführung | 183 |
| 15M | Schaftfräser mit 2 Schneiden, kurze Ausführung | 216 |
| 3B | Zölliger Radiuschaftfräser mit 2 Schneiden, Standardlänge | 184 |
| 3LB | Zölliger Langloch-Radiuschaftfräser mit 2 Schneiden | 184 |
| 3ELB | Zölliger Schaftfräser mit 2 Schneiden, Extra lang | 184 |
| 3MB | Schaftfräser mit 2 Schneiden, Standardlänge | 217 |
| 3XLMB | Superlangloch-Schaftfräser mit 2 Schneiden | 217 |
| 59B | Zölliger Langloch-Radiuschaftfräser mit 2 Schneiden | 186 |
| 59MB | Langloch-Radiuschaftfräser mit 2 Schneiden | 218 |
| 15B | Zölliger Doppelend-Radiuschaftfräser mit 2 Schneiden, kurze Ausführung | 187 |
| 15MB | Doppelend-Radiuschaftfräser mit 2 Schneiden, kurze Ausführung | 219 |

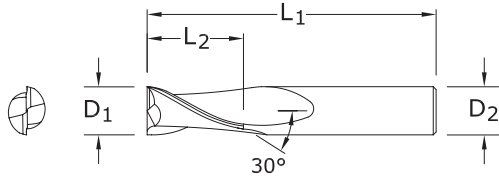
| SERIE | BESCHREIBUNG DER STANDARD-SCHAFTFRÄSER | SEITE |
|--------------------------|---|------------|
| 3CR | Zölliger Schafffräser mit 2 Schneiden mit Eckenradien, Standardlänge | 182 |
| 52 | Zölliger Schafffräser hoher Scherfestigkeit mit 2 Schneiden ohne Eckenradien, Standardlänge | 208 |
| 52M | Schafffräser hoher Scherfestigkeit mit 2 Schneiden ohne Eckenradien, Standardlänge | 234 |
| 5 | Zölliger Schafffräser mit 3 Schneiden ohne Eckenradien, Standardlänge | 188 |
| 5M | Schafffräser mit 3 Schneiden ohne Eckenradien, Standardlänge | 220 |
| 5XLM | Langloch-Schafffräser mit 3 Schneiden ohne Eckenradien | 220 |
| 5B | Zölliger Schafffräser mit 3 Schneiden, Standardlänge | 189 |
| 5MB | Schafffräser mit 3 Schneiden, Standardlänge | 221 |
| 5XLMB | Langloch-Schafffräser mit 3 Schneiden | 221 |
| 61 | Zölliger mehrschneidiger fein verzahnter Schrufffräser | 206 |
| 61M | Mehrschneidiger fein verzahnter Schrufffräser | 232 |
| 62 | Zölliger mehrschneidiger fein verzahnter Schrufffräser | 204 |
| 62M | Mehrschneidiger fein verzahnter Schrufffräser | 230 |
| 23 | Zölliger Schafffräser mit 3 Schneiden ohne Eckenradien, Standardlänge | 190 |
| 24 | Zölliger Schafffräser mit 3 Schneiden mit Eckenradien, Standardlänge | 191 |
| Richtwerte zum Fräsen | Schafffräser mit 2, 3 und 4 Schneiden ohne Eckenradien, Serien 1, 3, 5, 14, 15 Radiuschafffräser mit 2, 3 und 4 Schneiden, Serien 1B, 3B, 5B, 14B, 15B | 211 212 |

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

2 Flute Square End Stub



17
FRACTIONAL SERIES



TOLERANCES (inch)

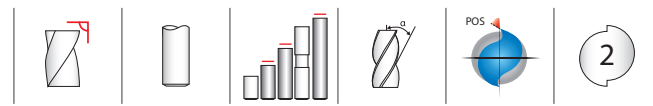
D₁ = +0.0000/-0.0020
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

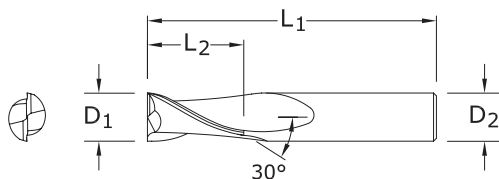
| inch | | | | EDP NO. | | | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/16 | 1/8 | 1-1/2 | 1/8 | 31701 | 31750 | 31303 | 31358 |
| 3/32 | 3/16 | 1-1/2 | 1/8 | 31703 | 31751 | 31304 | 31359 |
| 1/8 | 1/4 | 1-1/2 | 1/8 | 31705 | 31752 | 31305 | 31360 |
| 5/32 | 5/16 | 2 | 3/16 | 31707 | 31753 | 31306 | 31361 |
| 3/16 | 3/8 | 2 | 3/16 | 31709 | 31754 | 31307 | 31362 |
| 7/32 | 7/16 | 2 | 1/4 | 31711 | 31755 | 31308 | 31363 |
| 1/4 | 1/2 | 2 | 1/4 | 31713 | 31756 | 31309 | 31364 |
| 5/16 | 1/2 | 2 | 5/16 | 31715 | 31757 | 31310 | 31365 |
| 3/8 | 5/8 | 2 | 3/8 | 31717 | 31758 | 31311 | 31366 |
| 7/16 | 5/8 | 2-1/2 | 7/16 | 31719 | 31759 | 31312 | 31367 |
| 1/2 | 5/8 | 2-1/2 | 1/2 | 31721 | 31760 | 31313 | 31368 |
| 5/8 | 3/4 | 3 | 5/8 | 31723 | 31761 | 31314 | 31369 |
| 3/4 | 1 | 3 | 3/4 | 31725 | 31762 | 31315 | 31370 |

For patent information visit www.ksptpatents.com

2 Flute Square End



TOLERANCES (inch)
 $D_1 = +0.0000/-0.0020$
 $D_2 = h_6$



3·3L·3EL
 FRACTIONAL SERIES

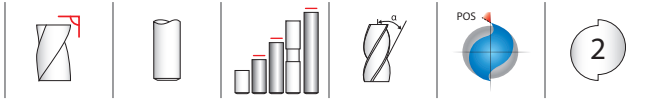
| inch | | | | EDP NO. | | | | | SERIES |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|-----------------|--------------------|---------------------|----------------------|--------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | Di-NAMITE® (Diamond) | |
| 1/64 | 1/32 | 1-1/2 | 1/8 | 30301 | 39301 | 39501 | 30397 | — | 3 |
| 1/32 | 5/64 | 1-1/2 | 1/8 | 30303 | 39303 | 39503 | 30398 | — | 3 |
| 3/64 | 7/64 | 1-1/2 | 1/8 | 30305 | 39305 | 39505 | 30399 | — | 3 |
| 1/16 | 3/16 | 1-1/2 | 1/8 | 30307 | 39307 | 39507 | 30400 | 91266 | 3 |
| 5/64 | 3/16 | 1-1/2 | 1/8 | 30309 | 39309 | 39509 | 30435 | — | 3 |
| 3/32 | 9/32 | 1-1/2 | 1/8 | 30311 | 39311 | 39511 | 30436 | — | 3 |
| 7/64 | 3/8 | 1-1/2 | 1/8 | 30313 | 39313 | 39513 | 30437 | — | 3 |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 30377 | 39377 | 39577 | 30469 | — | 3 |
| *1/8 | 1/2 | 1-1/2 | 1/8 | 30315 | 39315 | 39515 | 30438 | 91270 | 3 |
| 1/8 | 3/4 | 2-1/4 | 1/8 | 33341 | 31800 | 31810 | 31850 | — | 3L |
| 1/8 | 1 | 3 | 1/8 | 33343 | 31938 | 31948 | 31958 | — | 3EL |
| 9/64 | 1/2 | 2 | 3/16 | 30317 | 39317 | 39517 | 30439 | — | 3 |
| 5/32 | 1/2 | 2 | 3/16 | 30319 | 39319 | 39519 | 30440 | — | 3 |
| 11/64 | 5/8 | 2 | 3/16 | 30321 | 39321 | 39521 | 30441 | — | 3 |
| *3/16 | 5/8 | 2 | 3/16 | 30323 | 39323 | 39523 | 30442 | 91274 | 3 |
| 3/16 | 3/4 | 2-1/2 | 3/16 | 33301 | 31820 | 31825 | 31851 | — | 3L |
| 3/16 | 1-1/8 | 3 | 3/16 | 33321 | 31939 | 31949 | 31959 | — | 3EL |
| 13/64 | 5/8 | 2-1/2 | 1/4 | 30325 | 39325 | 39525 | 30443 | — | 3 |
| 7/32 | 5/8 | 2-1/2 | 1/4 | 30327 | 39327 | 39527 | 30444 | — | 3 |
| 15/64 | 3/4 | 2-1/2 | 1/4 | 30329 | 39329 | 39529 | 30445 | — | 3 |
| *1/4 | 3/4 | 2-1/2 | 1/4 | 30331 | 39331 | 39531 | 30446 | 91278 | 3 |
| 1/4 | 1-1/8 | 3 | 1/4 | 33303 | 31802 | 31812 | 31852 | — | 3L |
| 1/4 | 1-1/2 | 4 | 1/4 | 33323 | 31940 | 31950 | 31960 | — | 3EL |
| 17/64 | 3/4 | 2-1/2 | 5/16 | 30333 | 39333 | 39533 | 30447 | — | 3 |
| 9/32 | 3/4 | 2-1/2 | 5/16 | 30335 | 39335 | 39535 | 30448 | — | 3 |
| 19/64 | 13/16 | 2-1/2 | 5/16 | 30337 | 39337 | 39537 | 30449 | — | 3 |
| *5/16 | 13/16 | 2-1/2 | 5/16 | 30339 | 39339 | 39539 | 30450 | 91282 | 3 |
| 5/16 | 1-1/8 | 3 | 5/16 | 33305 | 31821 | 31826 | 31853 | — | 3L |
| 5/16 | 1-5/8 | 4 | 5/16 | 33325 | 31941 | 31951 | 31961 | — | 3EL |
| 21/64 | 1 | 2-1/2 | 3/8 | 30341 | 39341 | 39541 | 30451 | — | 3 |
| 11/32 | 1 | 2-1/2 | 3/8 | 30343 | 39343 | 39543 | 30452 | — | 3 |
| 23/64 | 1 | 2-1/2 | 3/8 | 30345 | 39345 | 39545 | 30453 | — | 3 |
| *3/8 | 1 | 2-1/2 | 3/8 | 30347 | 39347 | 39547 | 30454 | 91286 | 3 |
| 3/8 | 1-1/8 | 3 | 3/8 | 33307 | 31804 | 31814 | 31854 | — | 3L |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

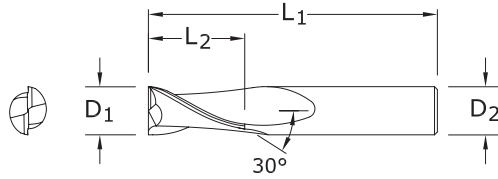
For patent information visit www.ksptpatents.com

continued on next page

2 Flute Square End



3·3L·3EL
FRACTIONAL SERIES



TOLERANCES (inch)

D₁ = +0.0000/-0.0020

D₂ = h₆

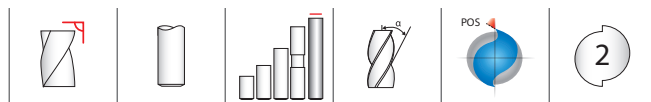
CONTINUED

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| CUTTING DIAMETER D ₁ | inch | | | UNCOATED | EDP NO. | | | | SERIES |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|--------------------|-----------------------|------------------------|-------------------------|--------|
| | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | Di-NAMITE® (Diamond) | |
| 3/8 | 1-3/4 | 4 | 3/8 | 33327 | 31942 | 31952 | 31962 | — | 3EL |
| 25/64 | 1 | 2-3/4 | 7/16 | 30349 | 39349 | 39549 | 30455 | — | 3 |
| 13/32 | 1 | 2-3/4 | 7/16 | 30351 | 39351 | 39551 | 30456 | — | 3 |
| 27/64 | 1 | 2-3/4 | 7/16 | 30353 | 39353 | 39553 | 30457 | — | 3 |
| 7/16 | 1 | 2-3/4 | 7/16 | 30355 | 39355 | 39555 | 30458 | — | 3 |
| 7/16 | 2 | 4-1/2 | 7/16 | 33309 | 31822 | 31827 | 31855 | — | 3L |
| 7/16 | 3 | 6 | 7/16 | 33329 | 31943 | 31953 | 31963 | — | 3EL |
| 29/64 | 1 | 3 | 1/2 | 30357 | 39357 | 39557 | 30459 | — | 3 |
| 15/32 | 1 | 3 | 1/2 | 30359 | 39359 | 39559 | 30460 | — | 3 |
| 31/64 | 1 | 3 | 1/2 | 30361 | 39361 | 39561 | 30461 | — | 3 |
| *1/2 | 1 | 3 | 1/2 | 30363 | 39363 | 39563 | 30462 | 91290 | 3 |
| 1/2 | 2 | 4-1/2 | 1/2 | 33311 | 31806 | 31816 | 31856 | — | 3L |
| 1/2 | 3 | 6 | 1/2 | 33331 | 31944 | 31954 | 31964 | — | 3EL |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | 30365 | 39365 | 39565 | 30463 | — | 3 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 30367 | 39367 | 39567 | 30464 | — | 3 |
| 5/8 | 2-1/4 | 5 | 5/8 | 33313 | 31823 | 31817 | 31857 | — | 3L |
| 5/8 | 3 | 6 | 5/8 | 33333 | 31945 | 31955 | 31965 | — | 3EL |
| 11/16 | 1-3/8 | 4 | 3/4 | 30369 | 39369 | 39569 | 30465 | — | 3 |
| 3/4 | 1-1/2 | 4 | 3/4 | 30371 | 39371 | 39571 | 30466 | — | 3 |
| 3/4 | 2-1/4 | 5 | 3/4 | 33315 | 31808 | 31818 | 31858 | — | 3L |
| 3/4 | 3 | 6 | 3/4 | 33335 | 31946 | 31956 | 31966 | — | 3EL |
| 7/8 | 1-1/2 | 4 | 7/8 | 30373 | 39373 | 39573 | 30467 | — | 3 |
| 1 | 1-1/2 | 4 | 1 | 30375 | 39375 | 39575 | 30468 | — | 3 |
| 1 | 2-1/4 | 5 | 1 | 33317 | 31824 | 31819 | 31859 | — | 3L |
| 1 | 3 | 6 | 1 | 33337 | 31947 | 31957 | 31967 | — | 3EL |
| *Series 3 Set | | | | 30389 | 39389 | 39589 | 30470 | — | 3 |

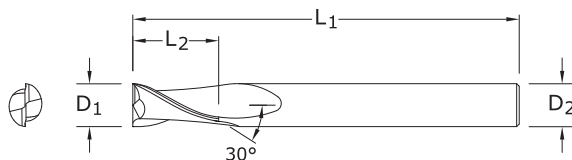
2 Flute Square End Long Reach



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$



59

FRACTIONAL SERIES

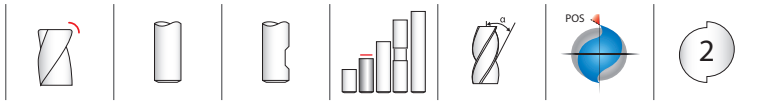
| inch | | | | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/8 | 3/8 | 2-1/2 | 1/4 | 32280 | 32260 | 32270 |
| 3/16 | 9/16 | 3 | 1/4 | 32281 | 32261 | 32271 |
| 1/4 | 5/8 | 3-1/2 | 1/4 | 32282 | 32262 | 32272 |
| 5/16 | 11/16 | 4 | 5/16 | 32283 | 32263 | 32273 |
| 3/8 | 7/8 | 4 | 3/8 | 32284 | 32264 | 32274 |
| 1/2 | 1 | 4-1/2 | 1/2 | 32285 | 32265 | 32275 |
| 5/8 | 1-1/8 | 5 | 5/8 | 32286 | 32266 | 32276 |
| 3/4 | 1-3/8 | 5-1/4 | 3/4 | 32287 | 32267 | 32277 |

Neck Option Available

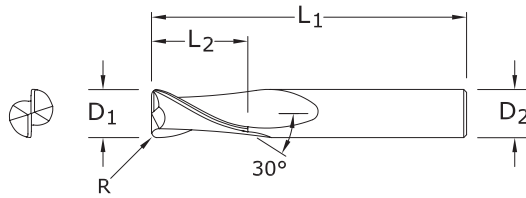
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

2 Flute Corner Radius



3CR
FRACTIONAL SERIES



TOLERANCES (inch)

D₁ = -0.0010/-0.0020
D₂ = h₆
R = +0.0000/-0.0020

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| inch | | | | | EDP NO. | | | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|--------------------|----------|--------------------|-----------------------|------------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | CORNER RADIUS R | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/8* | 1/2 | 1-1/2 | 1/8 | .015 | 38201 | 38202 | 38315 | 38357 |
| 1/8* | 1/2 | 1-1/2 | 1/8 | .020 | 38203 | 38204 | 38316 | 38358 |
| 3/16* | 5/8 | 2 | 3/16 | .015 | 38209 | 38210 | 38317 | 38359 |
| 3/16* | 5/8 | 2 | 3/16 | .020 | 38211 | 38212 | 38318 | 38360 |
| 3/16* | 5/8 | 2 | 3/16 | .030 | 38213 | 38214 | 38319 | 38361 |
| 1/4* | 3/4 | 2-1/2 | 1/4 | .015 | 38219 | 38220 | 38320 | 38362 |
| 1/4* | 3/4 | 2-1/2 | 1/4 | .020 | 38221 | 38222 | 38321 | 38363 |
| 1/4* | 3/4 | 2-1/2 | 1/4 | .030 | 38223 | 38224 | 38322 | 38364 |
| 1/4* | 3/4 | 2-1/2 | 1/4 | .045 | 38225 | 38226 | 38323 | 38365 |
| 5/16* | 13/16 | 2-1/2 | 5/16 | .015 | 38231 | 38232 | 38324 | 38366 |
| 5/16* | 13/16 | 2-1/2 | 5/16 | .020 | 38233 | 38234 | 38325 | 38367 |
| 5/16* | 13/16 | 2-1/2 | 5/16 | .030 | 38235 | 38236 | 38326 | 38368 |
| 5/16* | 13/16 | 2-1/2 | 5/16 | .045 | 38237 | 38238 | 38327 | 38369 |
| 3/8 | 1 | 2-1/2 | 3/8 | .015 | 38245 | 38246 | 38328 | 38370 |
| 3/8 | 1 | 2-1/2 | 3/8 | .020 | 38247 | 38248 | 38329 | 38371 |
| 3/8 | 1 | 2-1/2 | 3/8 | .030 | 38249 | 38250 | 38330 | 38372 |
| 3/8 | 1 | 2-1/2 | 3/8 | .045 | 38251 | 38252 | 38331 | 38373 |
| 1/2 | 1 | 3 | 1/2 | .015 | 38259 | 38260 | 38332 | 38374 |
| 1/2 | 1 | 3 | 1/2 | .020 | 38261 | 38262 | 38333 | 38375 |
| 1/2 | 1 | 3 | 1/2 | .030 | 38263 | 38264 | 38334 | 38376 |
| 1/2 | 1 | 3 | 1/2 | .045 | 38265 | 38266 | 38335 | 38377 |
| 1/2 | 1 | 3 | 1/2 | .060 | 38267 | 38268 | 38336 | 38378 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .015 | 38273 | 38274 | 38337 | 38379 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .020 | 38275 | 38276 | 38338 | 38380 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .030 | 38277 | 38278 | 38339 | 38381 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .045 | 38279 | 38280 | 38340 | 38382 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .060 | 38281 | 38282 | 38341 | 38383 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .090 | 38283 | 38284 | 38342 | 38384 |
| 3/4 | 1-1/2 | 4 | 3/4 | .015 | 38287 | 38288 | 38343 | 38385 |
| 3/4 | 1-1/2 | 4 | 3/4 | .020 | 38289 | 38290 | 38344 | 38386 |
| 3/4 | 1-1/2 | 4 | 3/4 | .030 | 38291 | 38292 | 38345 | 38387 |
| 3/4 | 1-1/2 | 4 | 3/4 | .045 | 38293 | 38294 | 38346 | 38388 |
| 3/4 | 1-1/2 | 4 | 3/4 | .060 | 38295 | 38296 | 38347 | 38389 |
| 3/4 | 1-1/2 | 4 | 3/4 | .090 | 38297 | 38298 | 38348 | 38390 |
| 3/4 | 1-1/2 | 4 | 3/4 | .125 | 38299 | 38300 | 38349 | 38391 |
| 1 | 1-1/2 | 4 | 1 | .015 | 38301 | 38302 | 38350 | 38392 |
| 1 | 1-1/2 | 4 | 1 | .020 | 38303 | 38304 | 38351 | 38393 |
| 1 | 1-1/2 | 4 | 1 | .030 | 38305 | 38306 | 38352 | 38394 |
| 1 | 1-1/2 | 4 | 1 | .045 | 38307 | 38308 | 38353 | 38395 |
| 1 | 1-1/2 | 4 | 1 | .060 | 38309 | 38310 | 38354 | 38396 |
| 1 | 1-1/2 | 4 | 1 | .090 | 38311 | 38312 | 38355 | 38397 |
| 1 | 1-1/2 | 4 | 1 | .125 | 38313 | 38314 | 38356 | 38398 |

*Without Flat

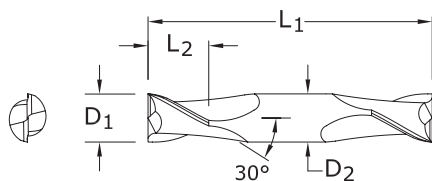
2 Flute Double End Mills



TOLERANCES (inch)

D₁ = +0.0000/-0.0020

D₂ = h₆



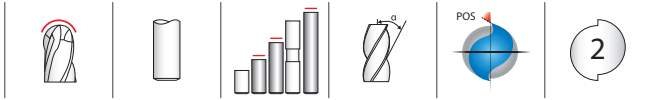
15
FRACTIONAL SERIES

| inch | | | | EDP NO. | | | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/32 | 1/16 | 1-1/2 | 1/8 | 31501 | 31541 | 39651 | 31316 |
| 3/64 | 3/32 | 1-1/2 | 1/8 | 31503 | 31543 | 39653 | 31317 |
| 1/16 | 1/8 | 1-1/2 | 1/8 | 31505 | 31545 | 39655 | 31318 |
| 5/64 | 1/8 | 1-1/2 | 1/8 | 31507 | 31547 | 39657 | 31319 |
| 3/32 | 3/16 | 1-1/2 | 1/8 | 31509 | 31549 | 39659 | 31320 |
| 7/64 | 3/16 | 1-1/2 | 1/8 | 31511 | 31551 | 39661 | 31321 |
| *1/8 | 1/4 | 1-1/2 | 1/8 | 31513 | 31553 | 39663 | 31322 |
| 9/64 | 5/16 | 2 | 3/16 | 31515 | 31555 | 39665 | 31323 |
| 5/32 | 5/16 | 2 | 3/16 | 31517 | 31557 | 39667 | 31324 |
| 11/64 | 5/16 | 2 | 3/16 | 31519 | 31559 | 39669 | 31325 |
| *3/16 | 3/8 | 2 | 3/16 | 31521 | 31561 | 39671 | 31326 |
| 13/64 | 1/2 | 2-1/2 | 1/4 | 31523 | 31563 | 39673 | 31327 |
| 7/32 | 1/2 | 2-1/2 | 1/4 | 31525 | 31565 | 39675 | 31328 |
| 15/64 | 1/2 | 2-1/2 | 1/4 | 31527 | 31567 | 39677 | 31329 |
| *1/4 | 1/2 | 2-1/2 | 1/4 | 31529 | 31569 | 39679 | 31330 |
| 9/32 | 1/2 | 2-1/2 | 5/16 | 31531 | 31571 | 39681 | 31331 |
| *5/16 | 1/2 | 2-1/2 | 5/16 | 31533 | 31573 | 39683 | 31332 |
| *3/8 | 9/16 | 2-1/2 | 3/8 | 31535 | 31575 | 39685 | 31333 |
| 7/16 | 9/16 | 2-3/4 | 7/16 | 31537 | 31577 | 39687 | 31334 |
| *1/2 | 5/8 | 3 | 1/2 | 31539 | 31579 | 39689 | 31335 |
| *Series 15 Set | | | | 31589 | 31581 | 39691 | 31336 |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

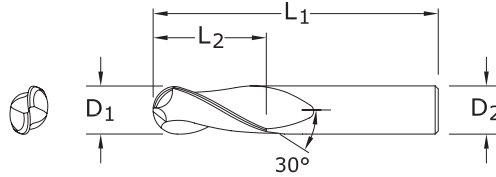
For patent information visit www.ksptpatents.com

2 Flute Ball End



3B•3LB•3ELB

FRACTIONAL SERIES



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0010$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| inch | | | | EDP NO. | | | | SERIES |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|--------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | |
| 1/64 | 1/32 | 1-1/2 | 1/8 | 30302 | 39302 | 39502 | 30471 | 3B |
| 1/32 | 5/64 | 1-1/2 | 1/8 | 30304 | 39304 | 39504 | 30472 | 3B |
| 3/64 | 7/64 | 1-1/2 | 1/8 | 30306 | 39306 | 39506 | 30473 | 3B |
| 1/16 | 3/16 | 1-1/2 | 1/8 | 30308 | 39308 | 39508 | 30474 | 3B |
| 5/64 | 3/16 | 1-1/2 | 1/8 | 30310 | 39310 | 39510 | 30475 | 3B |
| 3/32 | 9/32 | 1-1/2 | 1/8 | 30312 | 39312 | 39512 | 30476 | 3B |
| 7/64 | 3/8 | 1-1/2 | 1/8 | 30314 | 39314 | 39514 | 30477 | 3B |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 30378 | 39378 | 39578 | 30599 | 3B |
| *1/8 | 1/2 | 1-1/2 | 1/8 | 30316 | 39316 | 39516 | 30478 | 3B |
| 1/8 | 3/4 | 2-1/4 | 1/8 | 33342 | 31830 | 31840 | 31890 | 3LB |
| 1/8 | 1 | 3 | 1/8 | 33344 | 31968 | 31978 | 31988 | 3ELB |
| 9/64 | 1/2 | 2 | 3/16 | 30318 | 39318 | 39518 | 30479 | 3B |
| 5/32 | 1/2 | 2 | 3/16 | 30320 | 39320 | 39520 | 30480 | 3B |
| 11/64 | 5/8 | 2 | 3/16 | 30322 | 39322 | 39522 | 30481 | 3B |
| *3/16 | 5/8 | 2 | 3/16 | 30324 | 39324 | 39524 | 30482 | 3B |
| 3/16 | 3/4 | 2-1/2 | 3/16 | 33302 | 31831 | 31841 | 31891 | 3LB |
| 3/16 | 1-1/8 | 3 | 3/16 | 33322 | 31969 | 31979 | 31989 | 3ELB |
| 13/64 | 5/8 | 2-1/2 | 1/4 | 30326 | 39326 | 39526 | 30483 | 3B |
| 7/32 | 5/8 | 2-1/2 | 1/4 | 30328 | 39328 | 39528 | 30484 | 3B |
| 15/64 | 3/4 | 2-1/2 | 1/4 | 30330 | 39330 | 39530 | 30485 | 3B |
| *1/4 | 3/4 | 2-1/2 | 1/4 | 30332 | 39332 | 39532 | 30486 | 3B |
| 1/4 | 1-1/8 | 3 | 1/4 | 33304 | 31832 | 31842 | 31892 | 3LB |
| 1/4 | 1-1/2 | 4 | 1/4 | 33324 | 31970 | 31980 | 31990 | 3ELB |
| 17/64 | 3/4 | 2-1/2 | 5/16 | 30334 | 39334 | 39534 | 30487 | 3B |
| 9/32 | 3/4 | 2-1/2 | 5/16 | 30336 | 39336 | 39536 | 30488 | 3B |
| 19/64 | 13/16 | 2-1/2 | 5/16 | 30338 | 39338 | 39538 | 30489 | 3B |
| *5/16 | 13/16 | 2-1/2 | 5/16 | 30340 | 39340 | 39540 | 30490 | 3B |
| 5/16 | 1-1/8 | 3 | 5/16 | 33306 | 31833 | 31843 | 31893 | 3LB |
| 5/16 | 1-5/8 | 4 | 5/16 | 33326 | 31971 | 31981 | 31991 | 3ELB |
| 21/64 | 1 | 2-1/2 | 3/8 | 30342 | 39342 | 39542 | 30491 | 3B |

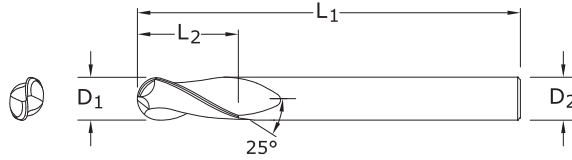
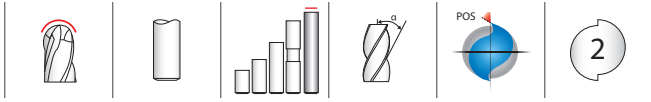
continued on next page

3B•3LB•3ELB
FRACTIONAL SERIES

| inch | | | | EDP NO. | | | | SERIES |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|--------------------|-----------------------|------------------------|--------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | |
| 11/32 | 1 | 2-1/2 | 3/8 | 30344 | 39344 | 39544 | 30492 | 3B |
| 23/64 | 1 | 2-1/2 | 3/8 | 30346 | 39346 | 39546 | 30493 | 3B |
| *3/8 | 1 | 2-1/2 | 3/8 | 30348 | 39348 | 39548 | 30494 | 3B |
| 3/8 | 1-1/8 | 3 | 3/8 | 33308 | 31834 | 31844 | 31894 | 3LB |
| 3/8 | 1-3/4 | 4 | 3/8 | 33328 | 31972 | 31982 | 31992 | 3ELB |
| 25/64 | 1 | 2-3/4 | 7/16 | 30350 | 39350 | 39550 | 30495 | 3B |
| 13/32 | 1 | 2-3/4 | 7/16 | 30352 | 39352 | 39552 | 30496 | 3B |
| 27/64 | 1 | 2-3/4 | 7/16 | 30354 | 39354 | 39554 | 30497 | 3B |
| 7/16 | 1 | 2-3/4 | 7/16 | 30356 | 39356 | 39556 | 30498 | 3B |
| 7/16 | 2 | 4-1/2 | 7/16 | 33310 | 31835 | 31845 | 31895 | 3LB |
| 7/16 | 3 | 6 | 7/16 | 33330 | 31973 | 31983 | 31993 | 3ELB |
| 29/64 | 1 | 3 | 1/2 | 30358 | 39358 | 39558 | 30499 | 3B |
| 15/32 | 1 | 3 | 1/2 | 30360 | 39360 | 39560 | 30500 | 3B |
| 31/64 | 1 | 3 | 1/2 | 30362 | 39362 | 39562 | 30591 | 3B |
| *1/2 | 1 | 3 | 1/2 | 30364 | 39364 | 39564 | 30592 | 3B |
| 1/2 | 2 | 4-1/2 | 1/2 | 33312 | 31836 | 31846 | 31896 | 3LB |
| 1/2 | 3 | 6 | 1/2 | 33332 | 31974 | 31984 | 31994 | 3ELB |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | 30366 | 39366 | 39566 | 30593 | 3B |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 30368 | 39368 | 39568 | 30594 | 3B |
| 5/8 | 2-1/4 | 5 | 5/8 | 33314 | 31837 | 31847 | 31897 | 3LB |
| 5/8 | 3 | 6 | 5/8 | 33334 | 31975 | 31985 | 31995 | 3ELB |
| 11/16 | 1-3/8 | 4 | 3/4 | 30370 | 39370 | 39570 | 30595 | 3B |
| 3/4 | 1-1/2 | 4 | 3/4 | 30372 | 39372 | 39572 | 30596 | 3B |
| 3/4 | 2-1/4 | 5 | 3/4 | 33316 | 31838 | 31848 | 31898 | 3LB |
| 3/4 | 3 | 6 | 3/4 | 33336 | 31976 | 31986 | 31996 | 3ELB |
| 7/8 | 1-1/2 | 4 | 7/8 | 30374 | 39374 | 39574 | 30597 | 3B |
| 1 | 1-1/2 | 4 | 1 | 30376 | 39376 | 39576 | 30598 | 3B |
| 1 | 2-1/4 | 5 | 1 | 33318 | 31839 | 31849 | 31899 | 3LB |
| 1 | 3 | 6 | 1 | 33338 | 31977 | 31987 | 31997 | 3ELB |
| *Series 3B Set | | | | 30390 | 39390 | 39590 | 30600 | 3B |

CONTINUED

2 Flute Ball End Long Reach



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0010$

59B

FRACTIONAL SERIES

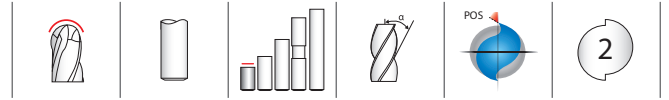
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

| inch | | | | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/8 | 3/8 | 2-1/2 | 1/4 | 32210 | 32290 | 32200 |
| 3/16 | 9/16 | 3 | 1/4 | 32211 | 32291 | 32201 |
| 1/4 | 5/8 | 3-1/2 | 1/4 | 32212 | 32292 | 32202 |
| 5/16 | 11/16 | 4 | 5/16 | 32213 | 32293 | 32203 |
| 3/8 | 7/8 | 4 | 3/8 | 32214 | 32294 | 32204 |
| 1/2 | 1 | 4-1/2 | 1/2 | 32215 | 32295 | 32205 |
| 5/8 | 1-1/8 | 5 | 5/8 | 32216 | 32296 | 32206 |
| 3/4 | 1-3/8 | 5-1/4 | 3/4 | 32217 | 32297 | 32207 |

Neck Option Available

For patent information visit www.ksptpatents.com

FRACTIONAL 2 Flute Double End Ball End



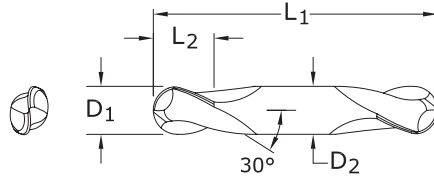
TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0010$



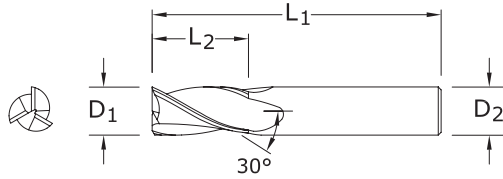
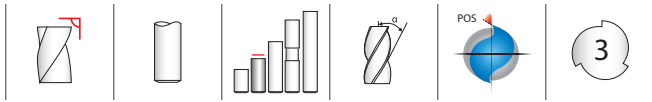
15B
FRACTIONAL SERIES

| inch | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/32 | 1/16 | 1-1/2 | 1/8 | 31502 | 31542 | 39652 | 31337 |
| 3/64 | 3/32 | 1-1/2 | 1/8 | 31504 | 31544 | 39654 | 31338 |
| 1/16 | 1/8 | 1-1/2 | 1/8 | 31506 | 31546 | 39656 | 31339 |
| 5/64 | 1/8 | 1-1/2 | 1/8 | 31508 | 31548 | 39658 | 31340 |
| 3/32 | 3/16 | 1-1/2 | 1/8 | 31510 | 31550 | 39660 | 31341 |
| 7/64 | 3/16 | 1-1/2 | 1/8 | 31512 | 31552 | 39662 | 31342 |
| *1/8 | 1/4 | 1-1/2 | 1/8 | 31514 | 31554 | 39664 | 31343 |
| 9/64 | 5/16 | 2 | 3/16 | 31516 | 31556 | 39666 | 31344 |
| 5/32 | 5/16 | 2 | 3/16 | 31518 | 31558 | 39668 | 31345 |
| 11/64 | 5/16 | 2 | 3/16 | 31520 | 31560 | 39670 | 31346 |
| *3/16 | 3/8 | 2 | 3/16 | 31522 | 31562 | 39672 | 31347 |
| 13/64 | 1/2 | 2-1/2 | 1/4 | 31524 | 31564 | 39674 | 31348 |
| 7/32 | 1/2 | 2-1/2 | 1/4 | 31526 | 31566 | 39676 | 31349 |
| 15/64 | 1/2 | 2-1/2 | 1/4 | 31528 | 31568 | 39678 | 31350 |
| *1/4 | 1/2 | 2-1/2 | 1/4 | 31530 | 31570 | 39680 | 31351 |
| 9/32 | 1/2 | 2-1/2 | 5/16 | 31532 | 31572 | 39682 | 31352 |
| *5/16 | 1/2 | 2-1/2 | 5/16 | 31534 | 31574 | 39684 | 31353 |
| *3/8 | 9/16 | 2-1/2 | 3/8 | 31536 | 31576 | 39686 | 31354 |
| 7/16 | 9/16 | 2-3/4 | 7/16 | 31538 | 31578 | 39688 | 31355 |
| *1/2 | 5/8 | 3 | 1/2 | 31540 | 31580 | 39690 | 31356 |
| *Series 15B Set | | | | 31590 | 31582 | 39692 | 31357 |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

3 Flute Square End



5
FRACTIONAL SERIES

TOLERANCES (inch)

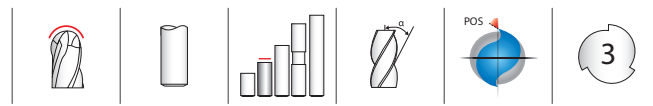
D₁ = +0.0000/-0.0020
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

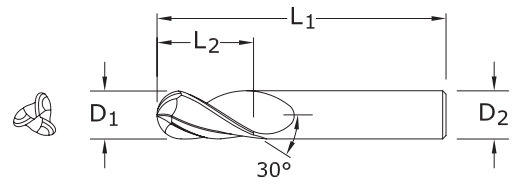
For patent information visit www.ksptpatents.com

| inch | | | | EDP NO. | | | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/64 | 1/32 | 1-1/2 | 1/8 | 30501 | 39701 | 30771 | 30811 |
| 1/32 | 5/64 | 1-1/2 | 1/8 | 30503 | 39703 | 30772 | 30812 |
| 3/64 | 7/64 | 1-1/2 | 1/8 | 30505 | 39705 | 30773 | 30813 |
| 1/16 | 3/16 | 1-1/2 | 1/8 | 30507 | 39707 | 30774 | 30814 |
| 5/64 | 3/16 | 1-1/2 | 1/8 | 30509 | 39709 | 30775 | 30815 |
| 3/32 | 9/32 | 1-1/2 | 1/8 | 30511 | 39711 | 30776 | 30816 |
| 7/64 | 3/8 | 1-1/2 | 1/8 | 30513 | 39713 | 30777 | 30817 |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 30577 | 39777 | 30809 | 30849 |
| 1/8 | 1/2 | 1-1/2 | 1/8 | 30515 | 39715 | 30778 | 30818 |
| 9/64 | 1/2 | 2 | 3/16 | 30517 | 39717 | 30779 | 30819 |
| 5/32 | 1/2 | 2 | 3/16 | 30519 | 39719 | 30780 | 30820 |
| 11/64 | 5/8 | 2 | 3/16 | 30521 | 39721 | 30781 | 30821 |
| 3/16 | 5/8 | 2 | 3/16 | 30523 | 39723 | 30782 | 30822 |
| 13/64 | 5/8 | 2-1/2 | 1/4 | 30525 | 39725 | 30783 | 30823 |
| 7/32 | 5/8 | 2-1/2 | 1/4 | 30527 | 39727 | 30784 | 30824 |
| 15/64 | 3/4 | 2-1/2 | 1/4 | 30529 | 39729 | 30785 | 30825 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 30531 | 39731 | 30786 | 30826 |
| 17/64 | 3/4 | 2-1/2 | 5/16 | 30533 | 39733 | 30787 | 30827 |
| 9/32 | 3/4 | 2-1/2 | 5/16 | 30535 | 39735 | 30788 | 30828 |
| 19/64 | 13/16 | 2-1/2 | 5/16 | 30537 | 39737 | 30789 | 30829 |
| 5/16 | 13/16 | 2-1/2 | 5/16 | 30539 | 39739 | 30790 | 30830 |
| 21/64 | 1 | 2-1/2 | 3/8 | 30541 | 39741 | 30791 | 30831 |
| 11/32 | 1 | 2-1/2 | 3/8 | 30543 | 39743 | 30792 | 30832 |
| 23/64 | 1 | 2-1/2 | 3/8 | 30545 | 39745 | 30793 | 30833 |
| 3/8 | 1 | 2-1/2 | 3/8 | 30547 | 39747 | 30794 | 30834 |
| 25/64 | 1 | 2-3/4 | 7/16 | 30549 | 39749 | 30795 | 30835 |
| 13/32 | 1 | 2-3/4 | 7/16 | 30551 | 39751 | 30796 | 30836 |
| 27/64 | 1 | 2-3/4 | 7/16 | 30553 | 39753 | 30797 | 30837 |
| 7/16 | 1 | 2-3/4 | 7/16 | 30555 | 39755 | 30798 | 30838 |
| 29/64 | 1 | 3 | 1/2 | 30557 | 39757 | 30799 | 30839 |
| 15/32 | 1 | 3 | 1/2 | 30559 | 39759 | 30800 | 30840 |
| 31/64 | 1 | 3 | 1/2 | 30561 | 39761 | 30801 | 30841 |
| 1/2 | 1 | 3 | 1/2 | 30563 | 39763 | 30802 | 30842 |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | 30565 | 39765 | 30803 | 30843 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 30567 | 39767 | 30804 | 30844 |
| 11/16 | 1-3/8 | 4 | 3/4 | 30569 | 39769 | 30805 | 30845 |
| 3/4 | 1-1/2 | 4 | 3/4 | 30571 | 39771 | 30806 | 30846 |
| 7/8 | 1-1/2 | 4 | 7/8 | 30573 | 39773 | 30807 | 30847 |
| 1 | 1-1/2 | 4 | 1 | 30575 | 39775 | 30808 | 30848 |

FRACTIONAL 3 Flute Ball End



TOLERANCES (inch)
 $D_1 = +0.0000/-0.0020$
 $D_2 = h_6$
BALL RADIUS
 $+0.0000/-0.0010$



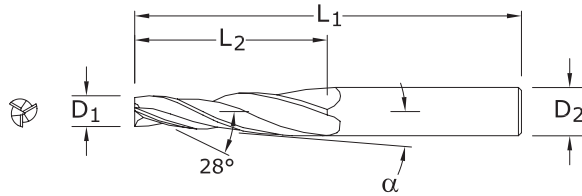
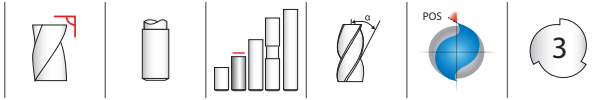
5B
FRACTIONAL SERIES

| inch | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/64 | 1/32 | 1-1/2 | 1/8 | 30502 | 30851 | 30602 | 31130 |
| 1/32 | 5/64 | 1-1/2 | 1/8 | 30504 | 30852 | 30604 | 31131 |
| 3/64 | 7/64 | 1-1/2 | 1/8 | 30506 | 30853 | 30606 | 31132 |
| 1/16 | 3/16 | 1-1/2 | 1/8 | 30508 | 30854 | 30608 | 31133 |
| 5/64 | 3/16 | 1-1/2 | 1/8 | 30510 | 30855 | 30610 | 31134 |
| 3/32 | 9/32 | 1-1/2 | 1/8 | 30512 | 30856 | 30612 | 31135 |
| 7/64 | 3/8 | 1-1/2 | 1/8 | 30514 | 30857 | 30902 | 31136 |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 30578 | 30889 | 30943 | 31168 |
| *1/8 | 1/2 | 1-1/2 | 1/8 | 30516 | 30858 | 30904 | 31137 |
| 9/64 | 1/2 | 2 | 3/16 | 30518 | 30859 | 30906 | 31138 |
| 5/32 | 1/2 | 2 | 3/16 | 30520 | 30860 | 30908 | 31139 |
| 11/64 | 5/8 | 2 | 3/16 | 30522 | 30861 | 30910 | 31140 |
| *3/16 | 5/8 | 2 | 3/16 | 30524 | 30862 | 30912 | 31141 |
| 13/64 | 5/8 | 2-1/2 | 1/4 | 30526 | 30863 | 30914 | 31142 |
| 7/32 | 5/8 | 2-1/2 | 1/4 | 30528 | 30864 | 30916 | 31143 |
| 15/64 | 3/4 | 2-1/2 | 1/4 | 30530 | 30865 | 30918 | 31144 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 30532 | 30866 | 30920 | 31145 |
| 17/64 | 3/4 | 2-1/2 | 5/16 | 30534 | 30867 | 30921 | 31146 |
| 9/32 | 3/4 | 2-1/2 | 5/16 | 30536 | 30868 | 30922 | 31147 |
| 19/64 | 13/16 | 2-1/2 | 5/16 | 30538 | 30869 | 30923 | 31148 |
| *5/16 | 13/16 | 2-1/2 | 5/16 | 30540 | 30870 | 30924 | 31149 |
| 21/64 | 1 | 2-1/2 | 3/8 | 30542 | 30871 | 30925 | 31150 |
| 11/32 | 1 | 2-1/2 | 3/8 | 30544 | 30872 | 30926 | 31151 |
| 23/64 | 1 | 2-1/2 | 3/8 | 30546 | 30873 | 30927 | 31152 |
| *3/8 | 1 | 2-1/2 | 3/8 | 30548 | 30874 | 30928 | 31153 |
| 25/64 | 1 | 2-3/4 | 7/16 | 30550 | 30875 | 30929 | 31154 |
| 13/32 | 1 | 2-3/4 | 7/16 | 30552 | 30876 | 30930 | 31155 |
| 27/64 | 1 | 2-3/4 | 7/16 | 30554 | 30877 | 30931 | 31156 |
| 7/16 | 1 | 2-3/4 | 7/16 | 30556 | 30878 | 30932 | 31157 |
| 29/64 | 1 | 3 | 1/2 | 30558 | 30879 | 30933 | 31158 |
| 15/32 | 1 | 3 | 1/2 | 30560 | 30880 | 30934 | 31159 |
| 31/64 | 1 | 3 | 1/2 | 30562 | 30881 | 30935 | 31160 |
| *1/2 | 1 | 3 | 1/2 | 30564 | 30882 | 30936 | 31161 |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | 30566 | 30883 | 30937 | 31162 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 30568 | 30884 | 30938 | 31163 |
| 11/16 | 1-3/8 | 4 | 3/4 | 30570 | 30885 | 30939 | 31164 |
| 3/4 | 1-1/2 | 4 | 3/4 | 30572 | 30886 | 30940 | 31165 |
| 7/8 | 1-1/2 | 4 | 7/8 | 30574 | 30887 | 30941 | 31166 |
| 1 | 1-1/2 | 4 | 1 | 30576 | 30888 | 30942 | 31167 |
| *Series 5B Set | | | | 30590 | 30900 | 30944 | 31169 |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Tapered Square End



23
FRACTIONAL SERIES

TOLERANCES (inch)

D₁ = +0.0000/-0.0020
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| SHANK DIAMETER D ₂ | CENTER LINE ANGLE α | inch | | | EDP NO. | | | |
|----------------------------------|------------------------|----------------------------------|---------------------------------|----------------------------------|----------|-----------------|--------------------|---------------------|
| | | SMALL DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/4 | 1° | 1/8 | 1-1/2 | 3 | 32301 | 32370 | 32302 | 32345 |
| 1/4 | 1°30' | 1/8 | 1-1/2 | 3 | 32303 | 32371 | 32304 | 32346 |
| 1/4 | 2° | 1/8 | 1-1/4 | 3 | 32305 | 32372 | 32306 | 32347 |
| 1/4 | 3° | 1/8 | 1 | 3 | 32307 | 32373 | 32308 | 32348 |
| 1/4 | 5° | 1/8 | 3/4 | 3 | 32309 | 32374 | 32310 | 32349 |
| 1/4 | 7° | 1/8 | 1/2 | 3 | 32311 | 32375 | 32312 | 32350 |
| 1/4 | 10° | 3/32 | 1/2 | 3 | 32313 | 32376 | 32314 | 32351 |
| 3/8 | 1° | 3/16 | 1-3/4 | 3-1/2 | 32315 | 32377 | 32316 | 32352 |
| 3/8 | 1°30' | 3/16 | 1-3/4 | 3-1/2 | 32317 | 32378 | 32318 | 32353 |
| 3/8 | 2° | 3/16 | 1-3/4 | 3-1/2 | 32319 | 32379 | 32320 | 32354 |
| 3/8 | 3° | 5/32 | 1-3/4 | 3-1/2 | 32321 | 32380 | 32322 | 32355 |
| 3/8 | 5° | 1/8 | 1-1/2 | 3-1/2 | 32323 | 32381 | 32324 | 32356 |
| 3/8 | 7° | 1/8 | 1 | 3-1/2 | 32325 | 32382 | 32326 | 32357 |
| 3/8 | 10° | 1/8 | 3/4 | 3-1/2 | 32327 | 32383 | 32328 | 32358 |
| 1/2 | 1° | 1/4 | 2 | 4 | 32329 | 32384 | 32330 | 32359 |
| 1/2 | 2° | 1/4 | 2 | 4 | 32333 | 32385 | 32334 | 32360 |
| 1/2 | 3° | 1/4 | 2 | 4 | 32335 | 32386 | 32336 | 32361 |
| 1/2 | 5° | 1/4 | 1-1/4 | 4 | 32337 | 32387 | 32338 | 32362 |
| 1/2 | 7° | 3/16 | 1-1/4 | 4 | 32339 | 32388 | 32340 | 32363 |
| 1/2 | 10° | 1/8 | 1 | 4 | 32341 | 32389 | 32342 | 32364 |

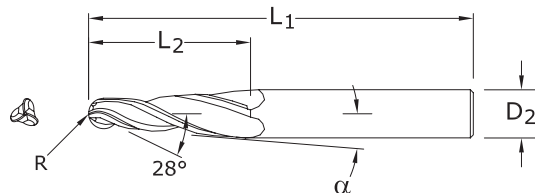
FRACTIONAL Tapered Radius End



TOLERANCES (inch)

$$D_2 = h_6$$

$$R = +0.0005/-0.0010$$



24

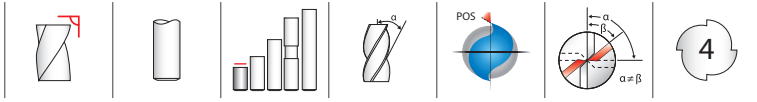
FRACTIONAL SERIES

| SHANK DIAMETER D_2 | CENTER LINE ANGLE α | inch | | | EDP NO. | | | |
|-------------------------|-------------------------------|-------------|------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| | | RADIUS R | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/4 | 1° | 0.062 | 1-1/2 | 3 | 32402 | 32403 | 32445 | 32470 |
| 1/4 | 1°30' | 0.062 | 1-1/2 | 3 | 32404 | 32405 | 32446 | 32471 |
| 1/4 | 2° | 0.062 | 1-1/4 | 3 | 32406 | 32407 | 32447 | 32472 |
| 1/4 | 3° | 0.062 | 1 | 3 | 32408 | 32409 | 32448 | 32473 |
| 1/4 | 5° | 0.062 | 3/4 | 3 | 32410 | 32411 | 32449 | 32474 |
| 1/4 | 7° | 0.062 | 1/2 | 3 | 32412 | 32413 | 32450 | 32475 |
| 1/4 | 10° | 0.047 | 1/2 | 3 | 32414 | 32415 | 32451 | 32476 |
| 3/8 | 1° | 0.093 | 1-3/4 | 3-1/2 | 32416 | 32417 | 32452 | 32477 |
| 3/8 | 1°30' | 0.093 | 1-3/4 | 3-1/2 | 32418 | 32419 | 32453 | 32478 |
| 3/8 | 2° | 0.093 | 1-3/4 | 3-1/2 | 32420 | 32421 | 32454 | 32479 |
| 3/8 | 3° | 0.078 | 1-3/4 | 3-1/2 | 32422 | 32423 | 32455 | 32480 |
| 3/8 | 5° | 0.062 | 1-1/2 | 3-1/2 | 32424 | 32425 | 32456 | 32481 |
| 3/8 | 7° | 0.062 | 1 | 3-1/2 | 32426 | 32427 | 32457 | 32482 |
| 3/8 | 10° | 0.062 | 3/4 | 3-1/2 | 32428 | 32429 | 32458 | 32483 |
| 1/2 | 1° | 0.125 | 2 | 4 | 32430 | 32431 | 32459 | 32484 |
| 1/2 | 2° | 0.125 | 2 | 4 | 32434 | 32435 | 32460 | 32485 |
| 1/2 | 3° | 0.125 | 2 | 4 | 32436 | 32437 | 32461 | 32486 |
| 1/2 | 5° | 0.125 | 1-1/4 | 4 | 32438 | 32439 | 32462 | 32487 |
| 1/2 | 7° | 0.093 | 1-1/4 | 4 | 32440 | 32441 | 32463 | 32488 |
| 1/2 | 10° | 0.062 | 1 | 4 | 32442 | 32443 | 32464 | 32489 |

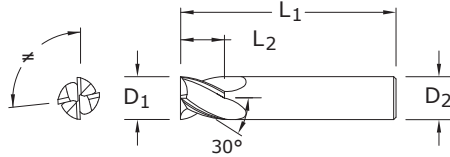
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

4 Flute Square End Stub



16
FRACTIONAL SERIES



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

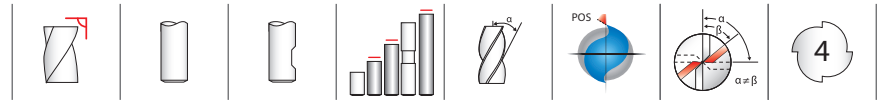
$D_2 = h_6$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

| CUTTING DIAMETER D_1 | inch | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/16 | 1/8 | 1-1/2 | 1/8 | 31601 | 31650 | 31238 | 31251 |
| 3/32 | 3/16 | 1-1/2 | 1/8 | 31603 | 31651 | 31239 | 31252 |
| 1/8 | 1/4 | 1-1/2 | 1/8 | 31605 | 31652 | 31240 | 31253 |
| 5/32 | 5/16 | 2 | 3/16 | 31607 | 31653 | 31241 | 31254 |
| 3/16 | 3/8 | 2 | 3/16 | 31609 | 31654 | 31242 | 31255 |
| 7/32 | 7/16 | 2 | 1/4 | 31611 | 31655 | 31243 | 31256 |
| 1/4 | 1/2 | 2 | 1/4 | 31613 | 31656 | 31244 | 31257 |
| 5/16 | 1/2 | 2 | 5/16 | 31615 | 31657 | 31245 | 31258 |
| 3/8 | 5/8 | 2 | 3/8 | 31617 | 31658 | 31246 | 31259 |
| 7/16 | 5/8 | 2-1/2 | 7/16 | 31619 | 31659 | 31247 | 31260 |
| 1/2 | 5/8 | 2-1/2 | 1/2 | 31621 | 31660 | 31248 | 31261 |
| 5/8 | 3/4 | 3 | 5/8 | 31623 | 31661 | 31249 | 31262 |
| 3/4 | 1 | 3 | 3/4 | 31625 | 31662 | 31250 | 31263 |

For patent information visit www.ksptpatents.com

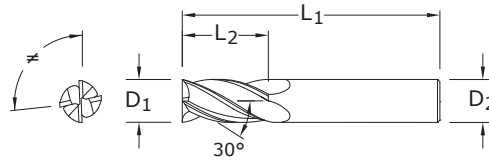
FRACTIONAL 4 Flute End Mills



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$



1·1L·1EL

FRACTIONAL SERIES

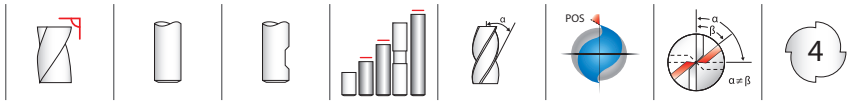
| inch | | | | EDP NO. | | | | | | | SERIES |
|---------------------------|------------------------|-------------------------|-------------------------|----------|---------------------|--------------------|-----------------------|------------------------|----------------------------------|-------------------------|--------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | UNCOATED W/ FLAT | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | Ti-NAMITE-A (AlTiN) W/FLAT | Di-NAMITE® (Diamond) | |
| 1/64 | 1/32 | 1-1/2 | 1/8 | 30101 | — | 39101 | 39001 | 30191 | — | — | 1 |
| 1/32 | 5/64 | 1-1/2 | 1/8 | 30103 | — | 39103 | 39003 | 30192 | — | — | 1 |
| 3/64 | 7/64 | 1-1/2 | 1/8 | 30105 | — | 39105 | 39005 | 30193 | — | — | 1 |
| 1/16 | 3/16 | 1-1/2 | 1/8 | 30107 | — | 39107 | 39007 | 30194 | — | 91268 | 1 |
| 5/64 | 3/16 | 1-1/2 | 1/8 | 30109 | — | 39109 | 39009 | 30195 | — | — | 1 |
| 3/32 | 9/32 | 1-1/2 | 1/8 | 30111 | — | 39111 | 39011 | 30196 | — | — | 1 |
| 7/64 | 3/8 | 1-1/2 | 1/8 | 30113 | — | 39113 | 39013 | 30197 | — | — | 1 |
| 1/8 | 3/8 | 1-1/2 | 1/8 | 30177 | — | 39177 | 39077 | 30029 | — | — | 1 |
| *1/8 | 1/2 | 1-1/2 | 1/8 | 30115 | — | 39115 | 39015 | 30198 | — | 91272 | 1 |
| 1/8 | 3/4 | 2-1/4 | 1/8 | 33141 | — | 31727 | 31737 | 31747 | — | — | 1L |
| 1/8 | 1 | 3 | 1/8 | 33143 | — | 31860 | 31870 | 31880 | — | — | 1EL |
| 9/64 | 1/2 | 2 | 3/16 | 30117 | — | 39117 | 39017 | 30199 | — | — | 1 |
| 5/32 | 1/2 | 2 | 3/16 | 30119 | — | 39119 | 39019 | 30000 | — | — | 1 |
| 11/64 | 5/8 | 2 | 3/16 | 30121 | — | 39121 | 39021 | 30001 | — | — | 1 |
| *3/16 | 5/8 | 2 | 3/16 | 30123 | — | 39123 | 39023 | 30002 | — | 91276 | 1 |
| 3/16 | 3/4 | 2-1/2 | 3/16 | 33101 | — | 31728 | 31738 | 31748 | — | — | 1L |
| 3/16 | 1-1/8 | 3 | 3/16 | 33121 | — | 31861 | 31871 | 31881 | — | — | 1EL |
| 13/64 | 5/8 | 2-1/2 | 1/4 | 30125 | — | 39125 | 39025 | 30003 | — | — | 1 |
| 7/32 | 5/8 | 2-1/2 | 1/4 | 30127 | — | 39127 | 39027 | 30004 | — | — | 1 |
| 15/64 | 3/4 | 2-1/2 | 1/4 | 30129 | — | 39129 | 39029 | 30005 | — | — | 1 |
| *1/4 | 3/4 | 2-1/2 | 1/4 | 30131 | 30300 | 39131 | 39031 | 30006 | — | 91280 | 1 |
| 1/4 | 1-1/8 | 3 | 1/4 | 33103 | — | 31729 | 31739 | 31749 | — | — | 1L |
| 1/4 | 1-1/2 | 4 | 1/4 | 33123 | — | 31862 | 31872 | 31882 | — | — | 1EL |
| 17/64 | 3/4 | 2-1/2 | 5/16 | 30133 | — | 39133 | 39033 | 30007 | — | — | 1 |
| 9/32 | 3/4 | 2-1/2 | 5/16 | 30135 | — | 39135 | 39035 | 30008 | — | — | 1 |
| 19/64 | 13/16 | 2-1/2 | 5/16 | 30137 | — | 39137 | 39037 | 30009 | — | — | 1 |
| *5/16 | 13/16 | 2-1/2 | 5/16 | 30139 | — | 39139 | 39039 | 30010 | — | 91284 | 1 |
| 5/16 | 1-1/8 | 3 | 5/16 | 33105 | — | 31730 | 31740 | 31763 | — | — | 1L |
| 5/16 | 1-5/8 | 4 | 5/16 | 33125 | — | 31863 | 31873 | 31883 | — | — | 1EL |
| 21/64 | 1 | 2-1/2 | 3/8 | 30141 | — | 39141 | 39041 | 30011 | — | — | 1 |

continued on next page

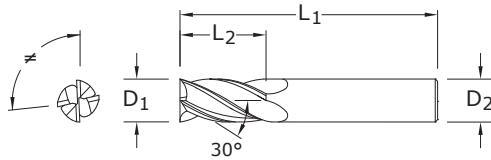
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit
www.ksptpatents.com

4 Flute End Mills



1·1L·1EL
FRACTIONAL SERIES



TOLERANCES (inch)

D₁ = +0.0000/-0.0020
D₂ = h₆

CONTINUED

| inch | | | | EDP NO. | | | | | | | SERIES |
|---------------------------------|------------------------------|-------------------------------|-------------------------------|----------|------------------|-----------------|--------------------|---------------------|----------------------------|----------------------|--------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | UNCOATED W/ FLAT | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | Ti-NAMITE-A (AlTiN) W/FLAT | Di-NAMITE® (Diamond) | |
| 11/32 | 1 | 2-1/2 | 3/8 | 30143 | — | 39143 | 39043 | 30012 | — | — | 1 |
| 23/64 | 1 | 2-1/2 | 3/8 | 30145 | — | 39145 | 39045 | 30013 | — | — | 1 |
| *3/8 | 1 | 2-1/2 | 3/8 | 30147 | 30179 | 39147 | 39047 | 30014 | 30379 | 91288 | 1 |
| 3/8 | 1-1/8 | 3 | 3/8 | 33107 | — | 31731 | 31741 | 31764 | — | — | 1L |
| 3/8 | 1-3/4 | 4 | 3/8 | 33127 | — | 31864 | 31874 | 31884 | — | — | 1EL |
| 25/64 | 1 | 2-3/4 | 7/16 | 30149 | — | 39149 | 39049 | 30015 | — | — | 1 |
| 13/32 | 1 | 2-3/4 | 7/16 | 30151 | — | 39151 | 39051 | 30016 | — | — | 1 |
| 27/64 | 1 | 2-3/4 | 7/16 | 30153 | — | 39153 | 39053 | 30017 | — | — | 1 |
| 7/16 | 1 | 2-3/4 | 7/16 | 30155 | — | 39155 | 39055 | 30018 | — | — | 1 |
| 7/16 | 2 | 4-1/2 | 7/16 | 33109 | — | 31732 | 31742 | 31765 | — | — | 1L |
| 7/16 | 3 | 6 | 7/16 | 33129 | — | 31865 | 31875 | 31885 | — | — | 1EL |
| 29/64 | 1 | 3 | 1/2 | 30157 | — | 39157 | 39057 | 30019 | — | — | 1 |
| 15/32 | 1 | 3 | 1/2 | 30159 | — | 39159 | 39059 | 30020 | — | — | 1 |
| 31/64 | 1 | 3 | 1/2 | 30161 | — | 39161 | 39061 | 30021 | — | — | 1 |
| *1/2 | 1 | 3 | 1/2 | 30163 | 30180 | 39163 | 39063 | 30022 | 30380 | 91292 | 1 |
| 1/2 | 2 | 4-1/2 | 1/2 | 33111 | — | 31733 | 31743 | 31766 | — | — | 1L |
| 1/2 | 3 | 6 | 1/2 | 33131 | — | 31866 | 31876 | 31886 | — | — | 1EL |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | 30165 | — | 39165 | 39065 | 30023 | — | — | 1 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 30167 | 30181 | 39167 | 39067 | 30024 | 30381 | — | 1 |
| 5/8 | 2-1/4 | 5 | 5/8 | 33113 | — | 31734 | 31744 | 31767 | — | — | 1L |
| 5/8 | 3 | 6 | 5/8 | 33133 | — | 31867 | 31877 | 31887 | — | — | 1EL |
| 11/16 | 1-3/8 | 4 | 3/4 | 30169 | — | 39169 | 39069 | 30025 | — | — | 1 |
| 3/4 | 1-1/2 | 4 | 3/4 | 30171 | 30182 | 39171 | 39071 | 30026 | 30382 | — | 1 |
| 3/4 | 2-1/4 | 5 | 3/4 | 33115 | — | 31735 | 31745 | 31768 | — | — | 1L |
| 3/4 | 3 | 6 | 3/4 | 33135 | — | 31868 | 31878 | 31888 | — | — | 1EL |
| 7/8 | 1-1/2 | 4 | 7/8 | 30173 | — | 39173 | 39073 | 30027 | — | — | 1 |
| 1 | 1-1/2 | 4 | 1 | 30175 | 30183 | 39175 | 39075 | 30028 | 30383 | — | 1 |
| 1 | 2-1/4 | 5 | 1 | 33117 | — | 31736 | 31746 | 31769 | — | — | 1L |
| 1 | 3 | 6 | 1 | 33137 | — | 31869 | 31879 | 31889 | — | — | 1EL |
| *Series 1 Set | | | | 30189 | — | 39189 | 39089 | 30030 | — | — | 1 |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

FRACTIONAL 4 Flute Corner Radius

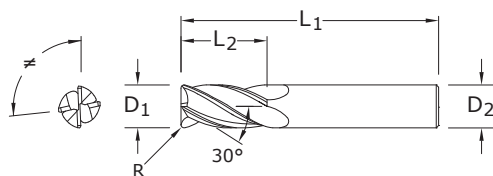


TOLERANCES (inch)

$D_1 = -0.0010/-0.0020$

$D_2 = h_6$

$R = +0.0000/-0.0020$



1CR
FRACTIONAL SERIES

| inch | | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/8* | 1/2 | 1-1/2 | 1/8 | .015 | 38001 | 38002 | 38115 | 38157 |
| 1/8* | 1/2 | 1-1/2 | 1/8 | .020 | 38003 | 38004 | 38116 | 38158 |
| 3/16* | 5/8 | 2 | 3/16 | .015 | 38009 | 38010 | 38117 | 38159 |
| 3/16* | 5/8 | 2 | 3/16 | .020 | 38011 | 38012 | 38118 | 38160 |
| 3/16* | 5/8 | 2 | 3/16 | .030 | 38013 | 38014 | 38119 | 38161 |
| 1/4* | 3/4 | 2-1/2 | 1/4 | .015 | 38019 | 38020 | 38120 | 38162 |
| 1/4* | 3/4 | 2-1/2 | 1/4 | .020 | 38021 | 38022 | 38121 | 38163 |
| 1/4* | 3/4 | 2-1/2 | 1/4 | .030 | 38023 | 38024 | 38122 | 38164 |
| 1/4* | 3/4 | 2-1/2 | 1/4 | .045 | 38025 | 38026 | 38123 | 38165 |
| 5/16* | 13/16 | 2-1/2 | 5/16 | .015 | 38031 | 38032 | 38124 | 38166 |
| 5/16* | 13/16 | 2-1/2 | 5/16 | .020 | 38033 | 38034 | 38125 | 38167 |
| 5/16* | 13/16 | 2-1/2 | 5/16 | .030 | 38035 | 38036 | 38126 | 38168 |
| 5/16* | 13/16 | 2-1/2 | 5/16 | .045 | 38037 | 38038 | 38127 | 38169 |
| 3/8 | 1 | 2-1/2 | 3/8 | .015 | 38045 | 38046 | 38128 | 38170 |
| 3/8 | 1 | 2-1/2 | 3/8 | .020 | 38047 | 38048 | 38129 | 38171 |
| 3/8 | 1 | 2-1/2 | 3/8 | .030 | 38049 | 38050 | 38130 | 38172 |
| 3/8 | 1 | 2-1/2 | 3/8 | .045 | 38051 | 38052 | 38131 | 38173 |
| 1/2 | 1 | 3 | 1/2 | .015 | 38059 | 38060 | 38132 | 38174 |
| 1/2 | 1 | 3 | 1/2 | .020 | 38061 | 38062 | 38133 | 38175 |
| 1/2 | 1 | 3 | 1/2 | .030 | 38063 | 38064 | 38134 | 38176 |
| 1/2 | 1 | 3 | 1/2 | .045 | 38065 | 38066 | 38135 | 38177 |
| 1/2 | 1 | 3 | 1/2 | .060 | 38067 | 38068 | 38136 | 38178 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .015 | 38073 | 38074 | 38137 | 38179 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .020 | 38075 | 38076 | 38138 | 38180 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .030 | 38077 | 38078 | 38139 | 38181 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .045 | 38079 | 38080 | 38140 | 38182 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .060 | 38081 | 38082 | 38141 | 38183 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .090 | 38083 | 38084 | 38142 | 38184 |
| 3/4 | 1-1/2 | 4 | 3/4 | .015 | 38087 | 38088 | 38143 | 38185 |
| 3/4 | 1-1/2 | 4 | 3/4 | .020 | 38089 | 38090 | 38144 | 38186 |

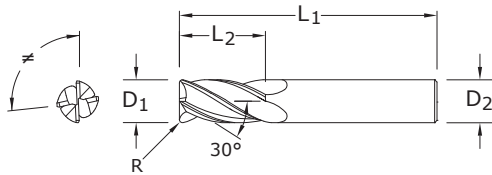
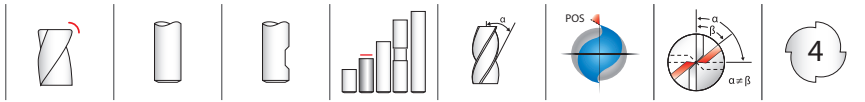
*Without Flat

continued on next page

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit
www.ksptpatents.com

4 Flute Corner Radius



TOLERANCES (inch)

$D_1 = -0.0010/-0.0020$

$D_2 = h_6$

$R = +0.0000/-0.0020$

1CR
FRACTIONAL SERIES

CONTINUED

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|----------|-----------------|--------------------|---------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 3/4 | 1-1/2 | 4 | 3/4 | .030 | 38091 | 38092 | 38145 | 38187 |
| 3/4 | 1-1/2 | 4 | 3/4 | .045 | 38093 | 38094 | 38146 | 38188 |
| 3/4 | 1-1/2 | 4 | 3/4 | .060 | 38095 | 38096 | 38147 | 38189 |
| 3/4 | 1-1/2 | 4 | 3/4 | .090 | 38097 | 38098 | 38148 | 38190 |
| 3/4 | 1-1/2 | 4 | 3/4 | .125 | 38099 | 38100 | 38149 | 38191 |
| 1 | 1-1/2 | 4 | 1 | .015 | 38101 | 38102 | 38150 | 38192 |
| 1 | 1-1/2 | 4 | 1 | .020 | 38103 | 38104 | 38151 | 38193 |
| 1 | 1-1/2 | 4 | 1 | .030 | 38105 | 38106 | 38152 | 38194 |
| 1 | 1-1/2 | 4 | 1 | .045 | 38107 | 38108 | 38153 | 38195 |
| 1 | 1-1/2 | 4 | 1 | .060 | 38109 | 38110 | 38154 | 38196 |
| 1 | 1-1/2 | 4 | 1 | .090 | 38111 | 38112 | 38155 | 38197 |
| 1 | 1-1/2 | 4 | 1 | .125 | 38113 | 38114 | 38156 | 38198 |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

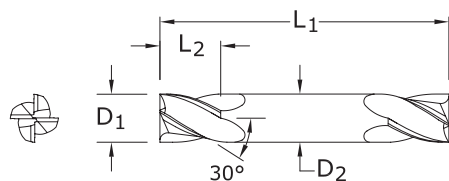
4 Flute Double End Mills



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$



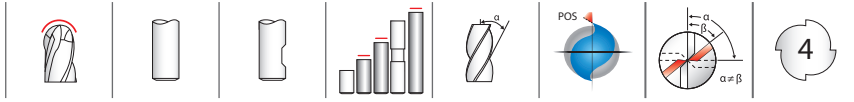
14
FRACTIONAL SERIES

| inch | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/32 | 1/16 | 1-1/2 | 1/8 | 31401 | 31441 | 39601 | 31170 |
| 3/64 | 3/32 | 1-1/2 | 1/8 | 31403 | 31443 | 39603 | 31171 |
| 1/16 | 1/8 | 1-1/2 | 1/8 | 31405 | 31445 | 39605 | 31172 |
| 5/64 | 1/8 | 1-1/2 | 1/8 | 31407 | 31447 | 39607 | 31173 |
| 3/32 | 3/16 | 1-1/2 | 1/8 | 31409 | 31449 | 39609 | 31174 |
| 7/64 | 3/16 | 1-1/2 | 1/8 | 31411 | 31451 | 39611 | 31175 |
| *1/8 | 1/4 | 1-1/2 | 1/8 | 31413 | 31453 | 39613 | 31176 |
| 9/64 | 5/16 | 2 | 3/16 | 31415 | 31455 | 39615 | 31177 |
| 5/32 | 5/16 | 2 | 3/16 | 31417 | 31457 | 39617 | 31178 |
| 11/64 | 5/16 | 2 | 3/16 | 31419 | 31459 | 39619 | 31179 |
| *3/16 | 3/8 | 2 | 3/16 | 31421 | 31461 | 39621 | 31180 |
| 13/64 | 1/2 | 2-1/2 | 1/4 | 31423 | 31463 | 39623 | 31181 |
| 7/32 | 1/2 | 2-1/2 | 1/4 | 31425 | 31465 | 39625 | 31182 |
| 15/64 | 1/2 | 2-1/2 | 1/4 | 31427 | 31467 | 39627 | 31183 |
| *1/4 | 1/2 | 2-1/2 | 1/4 | 31429 | 31469 | 39629 | 31184 |
| 9/32 | 1/2 | 2-1/2 | 5/16 | 31431 | 31471 | 39631 | 31185 |
| *5/16 | 1/2 | 2-1/2 | 5/16 | 31433 | 31473 | 39633 | 31186 |
| *3/8 | 9/16 | 2-1/2 | 3/8 | 31435 | 31475 | 39635 | 31187 |
| 7/16 | 9/16 | 2-3/4 | 7/16 | 31437 | 31477 | 39637 | 31188 |
| *1/2 | 5/8 | 3 | 1/2 | 31439 | 31479 | 39639 | 31189 |
| *Series 14 Set | | | | 31489 | 31481 | 39641 | 31190 |

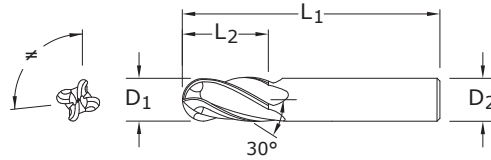
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

4 Flute Ball End



1B•1LB•1ELB
FRACTIONAL SERIES



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0010$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| inch | | | | EDP NO. | | | | | | | SERIES |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|-----------------|--------------------|---------------------|----------------------------|----------------------|--------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | UNCOATED W/FLAT | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | Ti-NAMITE-A (AlTiN) W/FLAT | Di-NAMITE® (Diamond) | |
| 1/64 | 1/32 | 1-1/2 | 1/8 | 30102 | - | 39102 | 39002 | 30031 | - | - | 1B |
| 1/32 | 5/64 | 1-1/2 | 1/8 | 30104 | - | 39104 | 39004 | 30032 | - | - | 1B |
| 3/64 | 7/64 | 1-1/2 | 1/8 | 30106 | - | 39106 | 39006 | 30033 | - | - | 1B |
| 1/16 | 3/16 | 1-1/2 | 1/8 | 30108 | - | 39108 | 39008 | 30034 | - | 91269 | 1B |
| 5/64 | 3/16 | 1-1/2 | 1/8 | 30110 | - | 39110 | 39010 | 30035 | - | - | 1B |
| 3/32 | 9/32 | 1-1/2 | 1/8 | 30112 | - | 39112 | 39012 | 30036 | - | - | 1B |
| 7/64 | 3/8 | 1-1/2 | 1/8 | 30114 | - | 39114 | 39014 | 30037 | - | - | 1B |
| *1/8 | 3/8 | 1-1/2 | 1/8 | 30178 | - | 39178 | 39078 | 30069 | - | - | 1B |
| 1/8 | 1/2 | 1-1/2 | 1/8 | 30116 | - | 39116 | 39016 | 30038 | - | 91273 | 1B |
| 1/8 | 3/4 | 2-1/4 | 1/8 | 33142 | - | 31770 | 31780 | 31790 | - | - | 1LB |
| 1/8 | 1 | 3 | 1/8 | 33144 | - | 31900 | 31918 | 31928 | - | - | 1ELB |
| 9/64 | 1/2 | 2 | 3/16 | 30118 | - | 39118 | 39018 | 30039 | - | - | 1B |
| 5/32 | 1/2 | 2 | 3/16 | 30120 | - | 39120 | 39020 | 30040 | - | - | 1B |
| 11/64 | 5/8 | 2 | 3/16 | 30122 | - | 39122 | 39022 | 30041 | - | - | 1B |
| *3/16 | 5/8 | 2 | 3/16 | 30124 | - | 39124 | 39024 | 30042 | - | 91277 | 1B |
| 3/16 | 3/4 | 2-1/2 | 3/16 | 33102 | - | 31771 | 31781 | 31791 | - | - | 1LB |
| 3/16 | 1-1/8 | 3 | 3/16 | 33122 | - | 31902 | 31919 | 31929 | - | - | 1ELB |
| 13/64 | 5/8 | 2-1/2 | 1/4 | 30126 | - | 39126 | 39026 | 30043 | - | - | 1B |
| 7/32 | 5/8 | 2-1/2 | 1/4 | 30128 | - | 39128 | 39028 | 30044 | - | - | 1B |
| 15/64 | 3/4 | 2-1/2 | 1/4 | 30130 | - | 39130 | 39030 | 30045 | - | - | 1B |
| *1/4 | 3/4 | 2-1/2 | 1/4 | 30132 | - | 39132 | 39032 | 30046 | - | 91281 | 1B |
| 1/4 | 1-1/8 | 3 | 1/4 | 33104 | - | 31772 | 31782 | 31792 | - | - | 1LB |
| 1/4 | 1-1/2 | 4 | 1/4 | 33124 | - | 31904 | 31920 | 31930 | - | - | 1ELB |
| 17/64 | 3/4 | 2-1/2 | 5/16 | 30134 | - | 39134 | 39034 | 30047 | - | - | 1B |
| 9/32 | 3/4 | 2-1/2 | 5/16 | 30136 | - | 39136 | 39036 | 30048 | - | - | 1B |
| 19/64 | 13/16 | 2-1/2 | 5/16 | 30138 | - | 39138 | 39038 | 30049 | - | - | 1B |
| *5/16 | 13/16 | 2-1/2 | 5/16 | 30140 | - | 39140 | 39040 | 30050 | - | 91285 | 1B |
| 5/16 | 1-1/8 | 3 | 5/16 | 33106 | - | 31773 | 31783 | 31793 | - | - | 1LB |
| 5/16 | 1-5/8 | 4 | 5/16 | 33126 | - | 31906 | 31921 | 31931 | - | - | 1ELB |
| 21/64 | 1 | 2-1/2 | 3/8 | 30142 | - | 39142 | 39042 | 30051 | - | - | 1B |

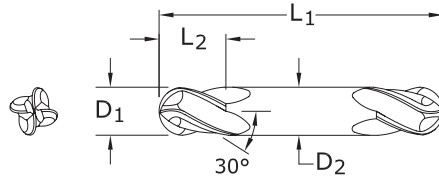
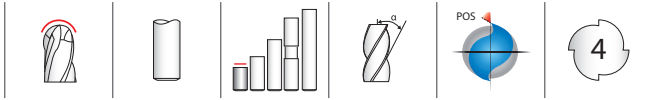
continued on next page

1B•1LB•1ELB
FRACTIONAL SERIES

| inch | | | | EDP NO. | | | | | | | SERIES |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|--------------------|--------------------|-----------------------|------------------------|----------------------------------|-------------------------|--------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | UNCOATED W/FLAT | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | Ti-NAMITE-A (AlTiN) W/FLAT | Di-NAMITE® (Diamond) | |
| 11/32 | 1 | 2-1/2 | 3/8 | 30144 | — | 39144 | 39044 | 30052 | — | — | 1B |
| 23/64 | 1 | 2-1/2 | 3/8 | 30146 | — | 39146 | 39046 | 30053 | — | — | 1B |
| *3/8 | 1 | 2-1/2 | 3/8 | 30148 | 30184 | 39148 | 39048 | 30054 | 30384 | 91289 | 1B |
| 3/8 | 1-1/8 | 3 | 3/8 | 33108 | — | 31774 | 31784 | 31794 | — | — | 1LB |
| 3/8 | 1-3/4 | 4 | 3/8 | 33128 | — | 31908 | 31922 | 31932 | — | — | 1ELB |
| 25/64 | 1 | 2-3/4 | 7/16 | 30150 | — | 39150 | 39050 | 30055 | — | — | 1B |
| 13/32 | 1 | 2-3/4 | 7/16 | 30152 | — | 39152 | 39052 | 30056 | — | — | 1B |
| 27/64 | 1 | 2-3/4 | 7/16 | 30154 | — | 39154 | 39054 | 30057 | — | — | 1B |
| 7/16 | 1 | 2-3/4 | 7/16 | 30156 | — | 39156 | 39056 | 30058 | — | — | 1B |
| 7/16 | 2 | 4-1/2 | 7/16 | 33110 | — | 31775 | 31785 | 31795 | — | — | 1LB |
| 7/16 | 3 | 6 | 7/16 | 33130 | — | 31910 | 31923 | 31933 | — | — | 1ELB |
| 29/64 | 1 | 3 | 1/2 | 30158 | — | 39158 | 39058 | 30059 | — | — | 1B |
| 15/32 | 1 | 3 | 1/2 | 30160 | — | 39160 | 39060 | 30060 | — | — | 1B |
| 31/64 | 1 | 3 | 1/2 | 30162 | — | 39162 | 39062 | 30061 | — | — | 1B |
| *1/2 | 1 | 3 | 1/2 | 30164 | 30185 | 39164 | 39064 | 30062 | 30385 | 91293 | 1B |
| 1/2 | 2 | 4-1/2 | 1/2 | 33112 | — | 31776 | 31786 | 31796 | — | — | 1LB |
| 1/2 | 3 | 6 | 1/2 | 33132 | — | 31912 | 31924 | 31934 | — | — | 1ELB |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | 30166 | — | 39166 | 39066 | 30063 | — | — | 1B |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 30168 | 30186 | 39168 | 39068 | 30064 | 30386 | — | 1B |
| 5/8 | 2-1/4 | 5 | 5/8 | 33114 | — | 31777 | 31787 | 31797 | — | — | 1LB |
| 5/8 | 3 | 6 | 5/8 | 33134 | — | 31914 | 31925 | 31935 | — | — | 1ELB |
| 11/16 | 1-3/8 | 4 | 3/4 | 30170 | — | 39170 | 39070 | 30065 | — | — | 1B |
| 3/4 | 1-1/2 | 4 | 3/4 | 30172 | 30187 | 39172 | 39072 | 30066 | 30387 | — | 1B |
| 3/4 | 2-1/4 | 5 | 3/4 | 33116 | — | 31778 | 31788 | 31798 | — | — | 1LB |
| 3/4 | 3 | 6 | 3/4 | 33136 | — | 31916 | 31926 | 31936 | — | — | 1ELB |
| 7/8 | 1-1/2 | 4 | 7/8 | 30174 | — | 39174 | 39074 | 30067 | — | — | 1B |
| 1 | 1-1/2 | 4 | 1 | 30176 | 30188 | 39176 | 39076 | 30068 | 30388 | — | 1B |
| 1 | 2-1/4 | 5 | 1 | 33118 | — | 31779 | 31789 | 31799 | — | — | 1LB |
| 1 | 3 | 6 | 1 | 33138 | — | 31917 | 31927 | 31937 | — | — | 1ELB |
| *Series 1B Set | | | | 30190 | — | 39190 | 39090 | 30070 | — | — | 1B |

CONTINUED

4 Flute Double End Ball End



TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

BALL RADIUS

$+0.0000/-0.0010$

14B

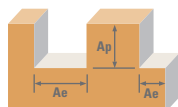
FRACTIONAL SERIES

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| inch | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/32 | 1/16 | 1-1/2 | 1/8 | 31402 | 31442 | 39602 | 31218 |
| 3/64 | 3/32 | 1-1/2 | 1/8 | 31404 | 31444 | 39604 | 31219 |
| 1/16 | 1/8 | 1-1/2 | 1/8 | 31406 | 31446 | 39606 | 31220 |
| 5/64 | 1/8 | 1-1/2 | 1/8 | 31408 | 31448 | 39608 | 31221 |
| 3/32 | 3/16 | 1-1/2 | 1/8 | 31410 | 31450 | 39610 | 31222 |
| 7/64 | 3/16 | 1-1/2 | 1/8 | 31412 | 31452 | 39612 | 31223 |
| *1/8 | 1/4 | 1-1/2 | 1/8 | 31414 | 31454 | 39614 | 31224 |
| 9/64 | 5/16 | 2 | 3/16 | 31416 | 31456 | 39616 | 31225 |
| 5/32 | 5/16 | 2 | 3/16 | 31418 | 31458 | 39618 | 31226 |
| 11/64 | 5/16 | 2 | 3/16 | 31420 | 31460 | 39620 | 31227 |
| *3/16 | 3/8 | 2 | 3/16 | 31422 | 31462 | 39622 | 31228 |
| 13/64 | 1/2 | 2-1/2 | 1/4 | 31424 | 31464 | 39624 | 31229 |
| 7/32 | 1/2 | 2-1/2 | 1/4 | 31426 | 31466 | 39626 | 31230 |
| 15/64 | 1/2 | 2-1/2 | 1/4 | 31428 | 31468 | 39628 | 31231 |
| *1/4 | 1/2 | 2-1/2 | 1/4 | 31430 | 31470 | 39630 | 31232 |
| 9/32 | 1/2 | 2-1/2 | 5/16 | 31432 | 31472 | 39632 | 31233 |
| *5/16 | 1/2 | 2-1/2 | 5/16 | 31434 | 31474 | 39634 | 31234 |
| *3/8 | 9/16 | 2-1/2 | 3/8 | 31436 | 31476 | 39636 | 31235 |
| 7/16 | 9/16 | 2-3/4 | 7/16 | 31438 | 31478 | 39638 | 31236 |
| *1/2 | 5/8 | 3 | 1/2 | 31440 | 31480 | 39640 | 31237 |
| *Series 14B Set | | | | 31490 | 31482 | 39642 | 31217 |

2 Flute: Square & Ball End 4 Flute: Square & Ball End



| Material | Profile | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | |
|---------------------------------------|----------------------------------|------------------------------|--|---------------------|-----------------------------------|-----------|-----------|------------|--------|--------|--------|--------|--------|--------|
| | | | | | 1/8 | 1/4 | 5/16 | 3/8 | 1/2 | | | | | |
| Diamond 1, 1B, 3, 3B Fractional | Profile | ≤ 0.25 | ≤ 1.5 | 720 | RPM | 22003 | 11002 | 8801 | 7334 | 5501 | | | | |
| | | | | (576-864) | Fz | 0.0009 | 0.0023 | 0.0036 | 0.0043 | 0.0058 | | | | |
| | | | | | Feed 2 flutes (ipm) | 38.3 | 50.6 | 63.4 | 63.1 | 63.8 | | | | |
| | | | | | Feed 3 flutes (ipm) | 76.6 | 101.2 | 126.7 | 126.2 | 127.6 | | | | |
| | | | | Slot | ≤ 1 | ≤ 1 | 580 | RPM | 17725 | 8862 | 7090 | 5908 | 4431 | |
| | | | | | | | (464-696) | Fz | 0.0075 | 0.0020 | 0.0031 | 0.0038 | 0.0050 | |
| | Feed 2 flutes (ipm) | 265.9 | 35.4 | | | | | 44.0 | 44.9 | 44.3 | | | | |
| | Feed 3 flutes (ipm) | 531.7 | 70.9 | | | | | 87.9 | 89.8 | 88.6 | | | | |
| | GRAPHITE Ultrafine, Superfine | Profile | ≤ 0.25 | | | | ≤ 1.5 | 385 | RPM | 11766 | 5883 | 4706 | 3922 | 2941 |
| | | | | | | | | (308-462) | Fz | 0.0005 | 0.0014 | 0.0022 | 0.0026 | 0.0035 |
| | | | | Feed 2 flutes (ipm) | 12.2 | 16.5 | | | 20.7 | 20.4 | 20.6 | | | |
| | | | | Feed 3 flutes (ipm) | 24.5 | 32.9 | | | 41.4 | 40.8 | 41.2 | | | |
| Slot | | | | ≤ 1 | ≤ 1 | 350 | | RPM | 10696 | 5348 | 4278 | 3565 | 2674 | |
| | | | | | | (280-420) | | Fz | 0.0005 | 0.0012 | 0.0019 | 0.0023 | 0.0030 | |
| | | Feed 2 flutes (ipm) | 9.6 | | | | 12.8 | 16.3 | 16.4 | 16.0 | | | | |
| | | Feed 3 flutes (ipm) | 19.3 | | | | 25.7 | 32.5 | 32.8 | 32.1 | | | | |
| | | COMPOSITES FRP, CFRP, GRP | Profile | | | ≤ 0.25 | ≤ 1.5 | 1200 | RPM | 36672 | 18336 | 14669 | 12224 | 9168 |
| | | | | | | | | (960-1440) | Fz | 0.0009 | 0.0023 | 0.0036 | 0.0043 | 0.0058 |
| Feed 2 flutes (ipm) | | | | 63.8 | 84.3 | | | | 105.6 | 105.1 | 106.3 | | | |
| Feed 3 flutes (ipm) | | | | 127.6 | 168.7 | | | | 211.2 | 210.3 | 212.7 | | | |
| Slot | ≤ 1 | | | ≤ 1 | 960 | | | RPM | 29338 | 14669 | 11735 | 9779 | 7334 | |
| | | | | | (768-1152) | | | Fz | 0.0008 | 0.0020 | 0.0031 | 0.0038 | 0.0050 | |
| | | | Feed 2 flutes (ipm) | | | 44.0 | 58.7 | 72.8 | 74.3 | 73.3 | | | | |
| | | | Feed 3 flutes (ipm) | | | 88.0 | 117.4 | 145.5 | 148.6 | 146.7 | | | | |
| | | | PLASTICS Polycarbonate, PVC, Polypropylene | | Profile | ≤ 0.25 | ≤ 1.5 | 1200 | RPM | 36672 | 18336 | 14669 | 12224 | 9168 |
| | | | | | | | | (960-1440) | Fz | 0.0009 | 0.0023 | 0.0036 | 0.0043 | 0.0058 |
| Feed 2 flutes (ipm) | 63.8 | | | 84.3 | | | | | 105.6 | 105.1 | 106.3 | | | |
| Feed 3 flutes (ipm) | 127.6 | | | 168.7 | | | | | 211.2 | 210.3 | 212.7 | | | |
| Slot | ≤ 1 | ≤ 1 | | 960 | | | | RPM | 29338 | 14669 | 11735 | 9779 | 7334 | |
| | | | | (768-1152) | | | | Fz | 0.0008 | 0.0020 | 0.0031 | 0.0038 | 0.0050 | |
| | | | | | Feed 2 flutes (ipm) | 44.0 | 58.7 | 72.8 | 74.3 | 73.3 | | | | |
| | | | | | Feed 3 flutes (ipm) | 88.0 | 117.4 | 145.5 | 148.6 | 146.7 | | | | |

rpm = (Vc x 3.82) / D₁
 ipm = Fz x number of flutes x rpm
 finish cuts typically require reduced feed and cut depths (.02 x D maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

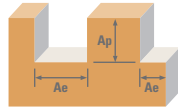
FRACTIONAL

2 Flute: Square, Double, Stub, Long, Ball, Corner Radius

3 Flute: Square, Ball, Tapered

4 Flute: Square, Double, Stub, Ball, Corner Radius

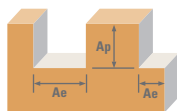
Tapered: Square, Radius



| Series | Hardness | Flutes | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | | | |
|---|---|-----------------------------|---------------------|---------------------|------------|-----------------------------------|------------|------------|---------|---------|---------|--------|--------|--------|--------|--------|--------|
| | | | | | | 1/64 | 1/32 | 1/16 | 1/8 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | Profile | 2 | ≤ 0.50 | ≤ 1.5 | 460 | RPM | 112461 | 56230 | 28115 | 14058 | 7029 | 4686 | 3514 | 2343 | 1757 | |
| | | | | | | | Fz | 0.00003 | 0.00006 | 0.00013 | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 | |
| | | | | | | | Feed (ipm) | 6.7 | 6.7 | 7.3 | 8.4 | 11.2 | 14.1 | 14.1 | 11.2 | 9.8 | |
| | | 3 | ≤ 0.25 | ≤ 1.5 | (368-552) | RPM | 10.1 | 10.1 | 11.0 | 12.7 | 16.9 | 21.1 | 21.1 | 16.9 | 14.8 | | |
| | | | | | | Fz | 13.5 | 13.5 | 14.6 | 16.9 | 22.5 | 28.1 | 28.1 | 22.5 | 19.7 | | |
| | | | | | | Feed (ipm) | 4.9 | 4.9 | 5.3 | 6.1 | 8.2 | 10.2 | 10.2 | 8.2 | 7.2 | | |
| | 4 | ≤ 0.25 | ≤ 1.5 | (268-402) | RPM | 7.4 | 7.4 | 8.0 | 9.2 | 12.3 | 15.4 | 15.4 | 12.3 | 10.7 | | | |
| | | | | | Fz | 9.8 | 9.8 | 10.6 | 12.3 | 16.4 | 20.5 | 20.5 | 16.4 | 14.3 | | | |
| | | | | | Feed (ipm) | 3.3 | 3.3 | 3.7 | 4.1 | 6.1 | 7.5 | 7.7 | 6.1 | 5.4 | | | |
| | H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 275 Bhn or ≤ 28 HRc | Profile | 2 | ≤ 0.50 | ≤ 1.5 | 335 | RPM | 81901 | 40950 | 20475 | 10238 | 5119 | 3413 | 2559 | 1706 | 1280 |
| | | | | | | | | Fz | 0.00002 | 0.00005 | 0.00009 | 0.0002 | 0.0006 | 0.0011 | 0.0015 | 0.0018 | 0.0021 |
| | | | | | | | | Feed (ipm) | 3.3 | 4.1 | 3.7 | 4.1 | 6.1 | 7.5 | 7.7 | 6.1 | 5.4 |
| 3 | | | ≤ 0.25 | ≤ 1.5 | (268-402) | RPM | 4.9 | 6.1 | 5.5 | 6.1 | 9.2 | 11.3 | 11.5 | 9.2 | 8.1 | | |
| | | | | | | Fz | 6.6 | 8.2 | 7.4 | 8.2 | 12.3 | 15.0 | 15.4 | 12.3 | 10.7 | | |
| | | | | | | Feed (ipm) | 2.4 | 3.0 | 2.7 | 3.0 | 4.5 | 5.5 | 5.6 | 4.5 | 3.9 | | |
| 4 | | ≤ 0.25 | ≤ 1.5 | (196-294) | RPM | 3.6 | 4.5 | 4.0 | 4.5 | 6.7 | 8.2 | 8.4 | 6.7 | 5.9 | | | |
| | | | | | Fz | 4.8 | 6.0 | 5.4 | 6.0 | 9.0 | 11.0 | 11.2 | 9.0 | 7.9 | | | |
| | | | | | Feed (ipm) | 3.1 | 3.9 | 3.5 | 3.9 | 5.8 | 7.1 | 7.2 | 5.8 | 5.1 | | | |
| K CAST IRONS Gray, Malleable, Ductile | | ≤ 250 Bhn or ≤ 24 HRc | Profile | 2 | ≤ 0.50 | ≤ 1.5 | 315 | RPM | 77011 | 38506 | 19253 | 9626 | 4813 | 3209 | 2407 | 1604 | 1203 |
| | | | | | | | | Fz | 0.00002 | 0.00005 | 0.00009 | 0.0002 | 0.0006 | 0.0011 | 0.0015 | 0.0018 | 0.0021 |
| | | | | | | | | Feed (ipm) | 4.6 | 5.8 | 5.2 | 5.8 | 8.7 | 10.6 | 10.8 | 8.7 | 7.6 |
| | 3 | | ≤ 0.25 | ≤ 1.5 | (252-378) | RPM | 6.2 | 7.7 | 6.9 | 7.7 | 11.6 | 14.1 | 14.4 | 11.6 | 10.1 | | |
| | | | | | | Fz | 8.2 | 10.2 | 10.2 | 8.2 | 12.3 | 15.4 | 15.4 | 12.3 | 10.7 | | |
| | | | | | | Feed (ipm) | 2.2 | 2.8 | 2.5 | 2.8 | 4.2 | 5.2 | 5.3 | 4.2 | 3.7 | | |
| | 4 | ≤ 0.25 | ≤ 1.5 | (184-276) | RPM | 3.4 | 4.2 | 3.8 | 4.2 | 6.3 | 7.7 | 7.9 | 6.3 | 5.5 | | | |
| | | | | | Fz | 4.5 | 5.6 | 5.1 | 5.6 | 8.4 | 10.3 | 10.5 | 8.4 | 7.4 | | | |
| | | | | | Feed (ipm) | 2.2 | 2.8 | 2.5 | 2.8 | 4.2 | 5.2 | 5.3 | 4.2 | 3.7 | | | |
| | M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile | 2 | ≤ 0.50 | ≤ 1.5 | 335 | RPM | 81901 | 40950 | 20475 | 10238 | 5119 | 3413 | 2559 | 1706 | 1280 |
| | | | | | | | | Fz | 0.00003 | 0.00006 | 0.00013 | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 |
| | | | | | | | | Feed (ipm) | 4.9 | 4.9 | 5.3 | 6.1 | 8.2 | 10.2 | 10.2 | 8.2 | 7.2 |
| 3 | | | ≤ 0.25 | ≤ 1.5 | (268-402) | RPM | 7.4 | 7.4 | 8.0 | 9.2 | 12.3 | 15.4 | 15.4 | 12.3 | 10.7 | | |
| | | | | | | Fz | 9.8 | 9.8 | 10.6 | 12.3 | 16.4 | 20.5 | 20.5 | 16.4 | 14.3 | | |
| | | | | | | Feed (ipm) | 3.6 | 3.6 | 3.9 | 4.5 | 6.0 | 7.5 | 7.5 | 6.0 | 5.2 | | |
| 4 | | ≤ 0.25 | ≤ 1.5 | (196-294) | RPM | 5.4 | 5.4 | 5.8 | 6.7 | 9.0 | 11.2 | 11.2 | 9.0 | 7.9 | | | |
| | | | | | Fz | 7.2 | 7.2 | 7.8 | 9.0 | 12.0 | 15.0 | 15.0 | 12.0 | 10.5 | | | |
| | | | | | Feed (ipm) | 3.6 | 4.5 | 4.1 | 4.5 | 6.8 | 8.3 | 8.5 | 6.8 | 5.9 | | | |
| M STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4 PH, 15-5, 13-4, Custom 450 | | ≤ 275 Bhn or ≤ 28 HRc | Profile | 2 | ≤ 0.50 | ≤ 1.5 | 370 | RPM | 90458 | 45229 | 22614 | 11307 | 5654 | 3769 | 2827 | 1885 | 1413 |
| | | | | | | | | Fz | 0.00002 | 0.00005 | 0.00009 | 0.0002 | 0.0006 | 0.0011 | 0.0015 | 0.0018 | 0.0021 |
| | | | | | | | | Feed (ipm) | 3.6 | 4.5 | 4.1 | 4.5 | 6.8 | 8.3 | 8.5 | 6.8 | 5.9 |
| | 3 | | ≤ 0.25 | ≤ 1.5 | (296-444) | RPM | 5.4 | 6.8 | 6.1 | 6.8 | 10.2 | 12.4 | 12.7 | 10.2 | 8.9 | | |
| | | | | | | Fz | 7.2 | 9.0 | 8.1 | 9.0 | 13.6 | 16.6 | 17.0 | 13.6 | 11.9 | | |
| | | | | | | Feed (ipm) | 2.6 | 3.3 | 3.0 | 3.3 | 5.0 | 6.1 | 6.2 | 5.0 | 4.3 | | |
| | 4 | ≤ 0.25 | ≤ 1.5 | (216-324) | RPM | 4.0 | 5.0 | 4.5 | 5.0 | 7.4 | 9.1 | 9.3 | 7.4 | 6.5 | | | |
| | | | | | Fz | 5.3 | 6.6 | 5.9 | 6.6 | 9.9 | 12.1 | 12.4 | 9.9 | 8.7 | | | |
| | | | | | Feed (ipm) | 2.5 | 2.5 | 2.5 | 2.6 | 3.9 | 4.7 | 4.7 | 3.6 | 3.3 | | | |
| | M STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4 PH, 15-5, 13-4, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | Profile | 2 | ≤ 0.50 | ≤ 1.5 | 255 | RPM | 62342 | 31171 | 15586 | 7793 | 3896 | 2598 | 1948 | 1299 | 974 |
| | | | | | | | | Fz | 0.00002 | 0.00004 | 0.00008 | 0.0002 | 0.0005 | 0.0009 | 0.0012 | 0.0014 | 0.0017 |
| | | | | | | | | Feed (ipm) | 2.5 | 2.5 | 2.5 | 2.6 | 3.9 | 4.7 | 4.7 | 3.6 | 3.3 |
| 3 | | | ≤ 0.25 | ≤ 1.5 | (204-306) | RPM | 3.7 | 3.7 | 3.7 | 4.0 | 5.8 | 7.0 | 7.0 | 5.5 | 5.0 | | |
| | | | | | | Fz | 5.0 | 5.0 | 5.0 | 5.3 | 7.8 | 9.4 | 9.4 | 7.3 | 6.6 | | |
| | | | | | | Feed (ipm) | 1.8 | 1.8 | 1.8 | 1.9 | 2.8 | 3.4 | 3.4 | 2.6 | 2.4 | | |
| 4 | | ≤ 0.25 | ≤ 1.5 | (148-222) | RPM | 2.7 | 2.7 | 2.7 | 2.9 | 4.2 | 5.1 | 5.1 | 4.0 | 3.6 | | | |
| | | | | | Fz | 3.6 | 3.6 | 3.6 | 3.8 | 5.7 | 6.8 | 6.8 | 5.3 | 4.8 | | | |
| | | | | | Feed (ipm) | 1.8 | 1.8 | 1.8 | 1.9 | 2.8 | 3.4 | 3.4 | 2.6 | 2.4 | | | |

continued on next page

2 Flute: Square, Double, Stub, Long, Ball, Corner Radius
 3 Flute: Square, Ball, Tapered
 4 Flute: Square, Double, Stub, Ball, Corner Radius
 Tapered: Square, Radius



Series
 1, 3, 5, 14, 15, 16,
 17, 23, 24, 59
 Fractional

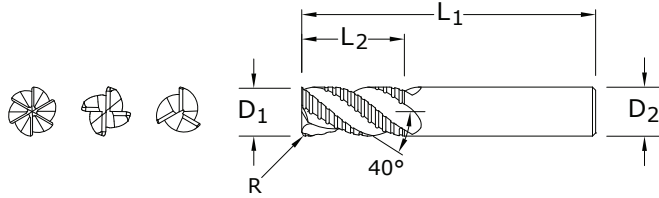
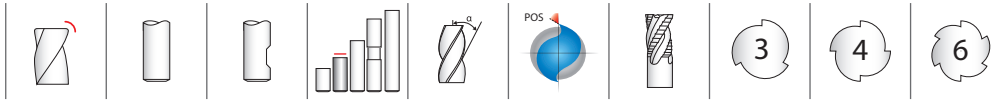
Diameter (D₁)
 (inch)

| Series | Hardness | Flutes | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | | | |
|---|---|-----------------------------|---------------------|---------------------|----------------|-----------------------------------|------------|------------|---------|---------|---------|--------|--------|--------|--------|--------|--------|
| | | | | | | 1/64 | 1/32 | 1/16 | 1/8 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, 718, Incoloy 800, Monel 400, Rene, Waspalloy | ≤ 300 Bhn or ≤ 32 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 65 | RPM | 15891 | 7946 | 3973 | 1986 | 993 | 662 | 497 | 331 | 248 | | |
| | | | | | | Fz | 0.00002 | 0.00003 | 0.00006 | 0.0002 | 0.0004 | 0.0008 | 0.0010 | 0.0012 | 0.0014 | | |
| | | | | | | Feed (ipm) | 0.6 | 0.5 | 0.5 | 0.7 | 0.7 | 1.1 | 1.0 | 1.6 | 1.5 | 1.2 | 1.0 |
| | | Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 45 | RPM | 11002 | 5501 | 2750 | 1375 | 688 | 458 | 344 | 229 | 172 | |
| | | | | | | | Fz | 0.00002 | 0.00003 | 0.00006 | 0.0002 | 0.0004 | 0.0008 | 0.0010 | 0.0012 | 0.0014 | |
| | | | | | | | Feed (ipm) | 0.4 | 0.3 | 0.3 | 0.5 | 0.5 | 0.7 | 1.1 | 1.0 | 0.8 | 0.7 |
| | TITANIUM ALLOYS Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti10Al2Fe3Al, Ti5Al53Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti152Cr3Sn3Al | ≤ 350 Bhn or ≤ 38 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 180 | RPM | 44006 | 22003 | 11002 | 5501 | 2750 | 1834 | 1375 | 917 | 688 | |
| | | | | | | | Fz | 0.00002 | 0.00004 | 0.00008 | 0.0002 | 0.0005 | 0.0009 | 0.0012 | 0.0014 | 0.0017 | |
| | | | | | | | Feed (ipm) | 1.8 | 1.8 | 1.8 | 2.2 | 2.8 | 3.3 | 3.3 | 2.6 | 2.3 | |
| | | | Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 130 | RPM | 31782 | 15891 | 7946 | 3973 | 1986 | 1324 | 993 | 662 | 497 |
| | | | | | | | | Fz | 0.00002 | 0.00004 | 0.00008 | 0.0002 | 0.0005 | 0.0009 | 0.0012 | 0.0014 | 0.0017 |
| | | | | | | | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.6 | 2.0 | 2.4 | 2.4 | 1.9 | 1.7 |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | ≤ 150 Bhn or ≤ 7 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 880 | RPM | 215142 | 107571 | 53786 | 26893 | 13446 | 8964 | 6723 | 4482 | 3362 | | |
| | | | | | | Fz | 0.00006 | 0.00013 | 0.00025 | 0.0006 | 0.0016 | 0.0030 | 0.0040 | 0.0048 | 0.0056 | | |
| | | | | | | Feed (ipm) | 25.8 | 28.0 | 26.9 | 32.3 | 43.0 | 53.8 | 53.8 | 43.0 | 37.6 | | |
| | | Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 640 | RPM | 156467 | 78234 | 39117 | 19558 | 9779 | 6519 | 4890 | 3260 | 2445 | |
| | | | | | | | Fz | 0.00006 | 0.00013 | 0.00025 | 0.0006 | 0.0016 | 0.0030 | 0.0040 | 0.0048 | 0.0056 | |
| | | | | | | | Feed (ipm) | 18.8 | 20.3 | 19.6 | 23.5 | 31.3 | 39.1 | 39.1 | 31.3 | 27.4 | |
| | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 485 | RPM | 118573 | 59286 | 29643 | 14822 | 7411 | 4941 | 3705 | 2470 | 1853 | |
| | | | | | | | Fz | 0.00003 | 0.00006 | 0.00013 | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 | |
| | | | | | | | Feed (ipm) | 7.1 | 7.1 | 7.7 | 8.9 | 11.9 | 14.8 | 14.8 | 11.9 | 10.4 | |
| | | | Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 350 | RPM | 85568 | 42784 | 21392 | 10696 | 5348 | 3565 | 2674 | 1783 | 1337 |
| | | | | | | | | Fz | 0.00003 | 0.00006 | 0.00013 | 0.0003 | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 |
| | | | | | | | | Feed (ipm) | 5.1 | 5.1 | 5.6 | 6.4 | 8.6 | 10.7 | 10.7 | 8.6 | 7.5 |
| N PLASTICS Polycarbonate, PVC, Polypropylene | ≤ 140 Bhn or ≤ 3 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 880 | RPM | 215142 | 107571 | 53786 | 26893 | 13446 | 8964 | 6723 | 4482 | 3362 | | |
| | | | | | | Fz | 0.00006 | 0.00013 | 0.00025 | 0.0006 | 0.0016 | 0.0030 | 0.0040 | 0.0048 | 0.0056 | | |
| | | | | | | Feed (ipm) | 25.8 | 28.0 | 26.9 | 32.3 | 43.0 | 53.8 | 53.8 | 43.0 | 37.6 | | |
| | | Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 640 | RPM | 156467 | 78234 | 39117 | 19558 | 9779 | 6519 | 4890 | 3260 | 2445 | |
| | | | | | | | Fz | 0.00006 | 0.00013 | 0.00025 | 0.0006 | 0.0016 | 0.0030 | 0.0040 | 0.0048 | 0.0056 | |
| | | | | | | | Feed (ipm) | 18.8 | 20.3 | 19.6 | 23.5 | 31.3 | 39.1 | 39.1 | 31.3 | 27.4 | |
| | GRAPHITE | ≤ 140 Bhn or ≤ 3 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 660 | RPM | 161357 | 80678 | 40339 | 20170 | 10085 | 6723 | 5042 | 3362 | 2521 | |
| | | | | | | | Fz | 0.00006 | 0.00013 | 0.00025 | 0.0006 | 0.0016 | 0.0030 | 0.0040 | 0.0048 | 0.0056 | |
| | | | | | | | Feed (ipm) | 19.4 | 21.0 | 20.2 | 24.2 | 32.3 | 40.3 | 40.3 | 32.3 | 28.2 | |
| | | | Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 480 | RPM | 117350 | 58675 | 29338 | 14669 | 7334 | 4890 | 3667 | 2445 | 1834 |
| | | | | | | | | Fz | 0.00006 | 0.00013 | 0.00025 | 0.0006 | 0.0016 | 0.0030 | 0.0040 | 0.0048 | 0.0056 |
| | | | | | | | | Feed (ipm) | 14.1 | 15.3 | 14.7 | 17.6 | 23.5 | 29.3 | 29.3 | 23.5 | 20.5 |

Bhn (Brinell) HRc (Rockwell C)
 rpm = (Vc x 3.82) / D₁
 ipm = Fz x number of flutes x rpm
 reduce speed and feed for materials harder than listed
 for tapered end mills, base the speed on the largest diameter contacting
 the workpiece and the feed on the smallest diameter

limit cut depths of long and extra long flute mills to .05 x D₁ when slotting
 or profiling
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)

Single End Roughers (Fine Pitch)



62
FRACTIONAL SERIES

TOLERANCES (inch)

$D_1 = +0.0000/-0.0040$

$D_2 = h_6$

$R = +0.0050/-0.0050$

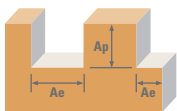
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | NO. OF FLUTES | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|---------------|-----------------|--------------------|---------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1/4* | 3/4 | 2-1/2 | 1/4 | .045 | 3 | 36207 | 36206 | 36210 |
| 5/16* | 3/4 | 2-1/2 | 5/16 | .045 | 3 | 36209 | 36208 | 36211 |
| 3/8 | 7/8 | 2-1/2 | 3/8 | .060 | 3 | 36213 | 36212 | 36214 |
| 1/2 | 1 | 3 | 1/2 | .060 | 4 | 36217 | 36216 | 36218 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .060 | 4 | 36221 | 36220 | 36222 |
| 3/4 | 1-5/8 | 4 | 3/4 | .060 | 4 | 36225 | 36224 | 36226 |
| 1 | 1-3/4 | 4 | 1 | .060 | 6 | 36229 | 36228 | 36230 |

*Without Flat

- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM

For patent information visit www.ksptpatents.com

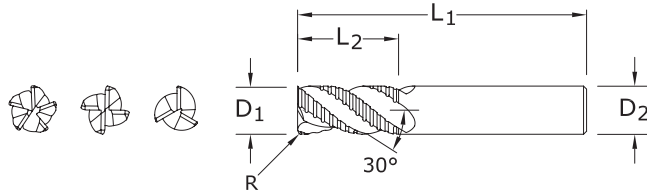
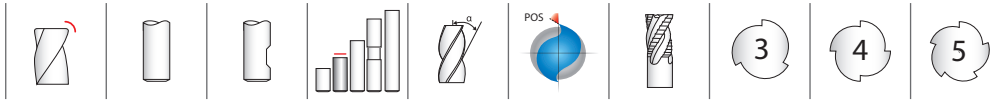
Single End Roughers (Fine Pitch)



| Series 62 Fractional | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | |
|----------------------------|---|---------------------|---------------------|-------------|--------------------------------------|------|--------|--------|--------|--------|--------|
| | | | | | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | Profile | ≤ 0.5 | ≤ 1.5 | 405 | RPM | 6188 | 4126 | 3094 | 2063 | 1547 |
| | | | | | (324-486) | Fz | 0.0006 | 0.0011 | 0.0015 | 0.0019 | 0.0021 |
| | | | | | Feed (ipm) | 11.1 | 13.6 | 18.6 | 15.7 | 19.5 | |
| | | Slot | 1 | ≤ 1 | 325 | RPM | 4966 | 3311 | 2483 | 1655 | 1242 |
| | | | | | (260-390) | Fz | 0.0006 | 0.0011 | 0.0015 | 0.0019 | 0.0021 |
| | | | | | Feed (ipm) | 8.9 | 10.9 | 14.9 | 12.6 | 15.6 | |
| | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4PH, 15-5PH, 13-4PH, Custom 450 | Profile | ≤ 0.5 | ≤ 1.5 | 280 | RPM | 4278 | 2852 | 2139 | 1426 | 1070 |
| | | | | | (224-336) | Fz | 0.0005 | 0.0009 | 0.0012 | 0.0015 | 0.0017 |
| | | | | | Feed (ipm) | 6.4 | 7.7 | 10.3 | 8.6 | 10.9 | |
| | | Slot | 1 | ≤ 1 | 225 | RPM | 3438 | 2292 | 1719 | 1146 | 860 |
| | | | | | (180-270) | Fz | 0.0005 | 0.0009 | 0.0012 | 0.0015 | 0.0017 |
| | | | | | Feed (ipm) | 5.2 | 6.2 | 8.3 | 6.9 | 8.8 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspalloy | Profile | ≤ 0.5 | ≤ 1.5 | 70 | RPM | 1070 | 713 | 535 | 357 | 267 |
| | | | | | (56-84) | Fz | 0.0004 | 0.0008 | 0.0010 | 0.0013 | 0.0014 |
| | | | | | Feed (ipm) | 1.3 | 1.7 | 2.1 | 1.9 | 2.2 | |
| | | Slot | 1 | ≤ 1 | 56 | RPM | 856 | 570 | 428 | 285 | 214 |
| | | | | | (45-67) | Fz | 0.0004 | 0.0008 | 0.0010 | 0.0013 | 0.0014 |
| | | | | | Feed (ipm) | 1.0 | 1.4 | 1.7 | 1.5 | 1.8 | |
| | TITANIUM ALLOYS Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti10Al2Fe3Al, Ti5Al3Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al | Profile | ≤ 0.5 | ≤ 1.5 | 155 | RPM | 2368 | 1579 | 1184 | 789 | 592 |
| | | | | | (124-186) | Fz | 0.0005 | 0.0009 | 0.0012 | 0.0015 | 0.0017 |
| | | | | | Feed (ipm) | 3.6 | 4.3 | 5.7 | 4.7 | 6.0 | |
| | | Slot | 1 | ≤ 1 | 195 | RPM | 2980 | 1986 | 1490 | 993 | 745 |
| | | | | | (156-234) | Fz | 0.0005 | 0.0009 | 0.0012 | 0.0015 | 0.0017 |
| | | | | | Feed (ipm) | 4.5 | 5.4 | 7.2 | 6.0 | 7.6 | |

Bhn (Brinell) HRc (Rockwell C)
 rpm = (Vc x 3.82) / D₁
 ipm = Fz x number of flutes x rpm
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Single End Roughers (Coarse Pitch)



61 FRACTIONAL SERIES

TOLERANCES (inch)

$D_1 = +0.0000/-0.0040$

$D_2 = h_6$

$R = +0.0050/-0.0050$

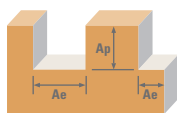
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | | NO. OF FLUTES | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|-----------------|---------------|--------------------|---------------------|--|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | Ti-NAMITE (TiN) | | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | |
| 1/4* | 3/4 | 2-1/2 | 1/4 | .045 | 3 | 36107 | 36106 | 36110 | |
| 5/16* | 3/4 | 2-1/2 | 5/16 | .045 | 3 | 36109 | 36108 | 36111 | |
| 3/8 | 7/8 | 2-1/2 | 3/8 | .060 | 3 | 36113 | 36112 | 36114 | |
| 1/2 | 1 | 3 | 1/2 | .060 | 4 | 36117 | 36116 | 36118 | |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | .060 | 4 | 36121 | 36120 | 36122 | |
| 3/4 | 1-5/8 | 4 | 3/4 | .060 | 4 | 36125 | 36124 | 36126 | |
| 1 | 1-3/4 | 4 | 1 | .060 | 5 | 36129 | 36128 | 36130 | |

*Without Flat

- STEELS
- CAST IRON
- HARDENED STEELS

For patent information visit www.ksptpatents.com

Single End Roughers (Coarse Pitch)



| Series 61 | Fractional | Hardness | Ae x D1 | Ap x D1 | Vc (sfm) | Diameter (D1) (inch) | | | | | | |
|--------------|--|-----------------------------|-------------|---------|-------------|-------------------------|------------|--------|--------|--------|--------|--------|
| | | | | | | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 500 | RPM | 7640 | 5093 | 3820 | 2547 | 1910 |
| | | | | | | (400-600) | Fz | 0.0006 | 0.0011 | 0.0014 | 0.0017 | 0.0020 |
| | | | | | | | Feed (ipm) | 13.8 | 16.8 | 21.4 | 17.3 | 19.1 |
| | | | Slot | 1 | ≤ 1 | 400 | RPM | 6112 | 4075 | 3056 | 2037 | 1528 |
| | | | | | | (320-480) | Fz | 0.0006 | 0.0011 | 0.0014 | 0.0017 | 0.0020 |
| | | | | | | | Feed (ipm) | 11.0 | 13.4 | 17.1 | 13.9 | 15.3 |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HR | Profile | ≤ 0.5 | ≤ 1.5 | 365 | RPM | 5577 | 3718 | 2789 | 1859 | 1394 |
| | | | | | | (292-438) | Fz | 0.0004 | 0.0008 | 0.0011 | 0.0013 | 0.0015 |
| | | | | | | | Feed (ipm) | 6.7 | 8.9 | 12.3 | 9.7 | 10.5 |
| | | | Slot | 1 | ≤ 1 | 295 | RPM | 4508 | 3005 | 2254 | 1503 | 1127 |
| | | | | | | (236-354) | Fz | 0.0004 | 0.0008 | 0.0011 | 0.0013 | 0.0015 |
| | | | | | | | Feed (ipm) | 5.4 | 7.2 | 9.9 | 7.8 | 8.5 |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 250 Bhn or ≤ 24 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 345 | RPM | 5272 | 3514 | 2636 | 1757 | 1318 |
| | | | | | | (276-414) | Fz | 0.0006 | 0.0009 | 0.0015 | 0.0018 | 0.0021 |
| | | | | | | | Feed (ipm) | 9.5 | 9.5 | 15.8 | 12.7 | 13.8 |
| | | | Slot | 1 | ≤ 1 | 275 | RPM | 4202 | 2801 | 2101 | 1401 | 1051 |
| | | | | | | (220-330) | Fz | 0.0006 | 0.0009 | 0.0015 | 0.0018 | 0.0021 |
| | | | | | | | Feed (ipm) | 7.6 | 7.6 | 12.6 | 10.1 | 11.0 |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | ≤ 0.5 | ≤ 1.5 | 365 | RPM | 5577 | 3718 | 2789 | 1859 | 1394 |
| | | | | | | (292-438) | Fz | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 |
| | | | | | | | Feed (ipm) | 13.4 | 16.7 | 22.3 | 17.8 | 19.5 |
| | | | Slot | 1 | ≤ 1 | 295 | RPM | 4508 | 3005 | 2254 | 1503 | 1127 |
| | | | | | | (236-354) | Fz | 0.0008 | 0.0015 | 0.0020 | 0.0024 | 0.0028 |
| | | | | | | | Feed (ipm) | 10.8 | 13.5 | 18.0 | 14.4 | 15.8 |

Bhn (Brinell) HRc (Rockwell C)

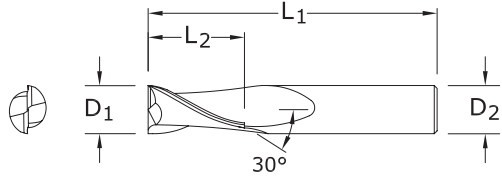
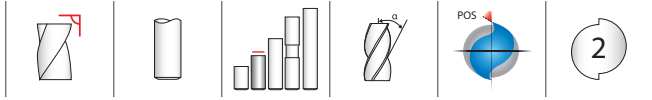
$rpm = (Vc \times 3.82) / D_1$

$ipm = Fz \times \text{number of flutes} \times rpm$

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

2 Flute High Shear End Mills



52
FRACTIONAL SERIES

TOLERANCES (inch)

$D_1 = +0.0000/-0.0020$

$D_2 = h_6$

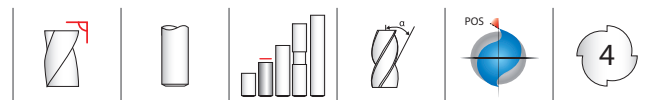
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|--------------------|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE-C (TiCN) |
| 1/16 | 3/16 | 1-1/2 | 1/8 | 35273 | 35300 |
| 3/32 | 3/8 | 1-1/2 | 1/8 | 35275 | 35301 |
| 1/8 | 7/16 | 1-1/2 | 1/8 | 35277 | 35302 |
| 5/32 | 9/16 | 2 | 3/16 | 35278 | 35303 |
| 3/16 | 9/16 | 2 | 3/16 | 35279 | 35304 |
| 7/32 | 5/8 | 2-1/2 | 1/4 | 35280 | 35305 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 35281 | 35306 |
| 9/32 | 3/4 | 2-1/2 | 5/16 | 35282 | 35307 |
| 5/16 | 13/16 | 2-1/2 | 5/16 | 35283 | 35308 |
| 3/8 | 7/8 | 2-1/2 | 3/8 | 35285 | 35309 |
| 7/16 | 1 | 2-3/4 | 7/16 | 35287 | 35310 |
| 1/2 | 1 | 3 | 1/2 | 35289 | 35311 |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | 35291 | 35312 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 35293 | 35313 |
| 3/4 | 1-1/2 | 4 | 3/4 | 35295 | 35314 |
| 1 | 1-1/2 | 4 | 1 | 35297 | 35315 |

NON-FERROUS

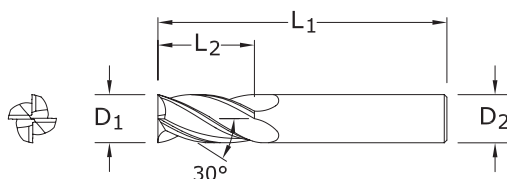
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

4 Flute High Shear End Mills



TOLERANCES (inch)
D1 = +0.0000/-0.0020
D2 = h₆



54
FRACTIONAL SERIES

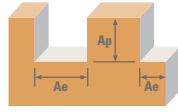
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|--------------------|
| | | | | UNCOATED | Ti-NAMITE-C (TiCN) |
| 1/16 | 3/16 | 1-1/2 | 1/8 | 35473 | 35500 |
| 3/32 | 3/8 | 1-1/2 | 1/8 | 35475 | 35501 |
| 1/8 | 7/16 | 1-1/2 | 1/8 | 35477 | 35502 |
| 5/32 | 9/16 | 2 | 3/16 | 35478 | 35503 |
| 3/16 | 9/16 | 2 | 3/16 | 35479 | 35504 |
| 7/32 | 5/8 | 2-1/2 | 1/4 | 35480 | 35505 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 35481 | 35506 |
| 9/32 | 3/4 | 2-1/2 | 5/16 | 35482 | 35507 |
| 5/16 | 13/16 | 2-1/2 | 5/16 | 35483 | 35508 |
| 3/8 | 7/8 | 2-1/2 | 3/8 | 35485 | 35509 |
| 7/16 | 1 | 2-3/4 | 7/16 | 35487 | 35510 |
| 1/2 | 1 | 3 | 1/2 | 35489 | 35511 |
| 9/16 | 1-1/8 | 3-1/2 | 9/16 | 35491 | 35512 |
| 5/8 | 1-1/4 | 3-1/2 | 5/8 | 35493 | 35513 |
| 3/4 | 1-1/2 | 4 | 3/4 | 35495 | 35514 |
| 1 | 1-1/2 | 4 | 1 | 35497 | 35515 |

NON-FERROUS
 PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

2 Flute: High Shear End Mills

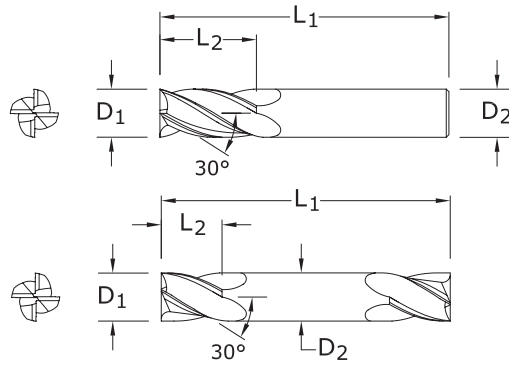
4 Flute: High Shear End Mills



| Series 52, 54 Fractional | Hardness | Flutes | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | |
|---|-----------------------------|-------------|---------------------|---------------------|-------------|--------------------------------------|---------|---------|--------|--------|--------|--------|--------|
| | | | | | | 1/8 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075 | ≤ 150 Bhn or ≤ 7 HRc | Profile | 2 | ≤ 0.3 | ≤ 1.5 | 1360 | RPM | 41562 | 20781 | 13854 | 10390 | 6927 | 5195 |
| | | | | | | (1088-1632) | Fz | 0.00069 | 0.0018 | 0.0034 | 0.0046 | 0.0055 | 0.0064 |
| | | | | | | Feed (ipm) | 57.4 | 74.8 | 94.2 | 95.6 | 76.2 | 66.5 | |
| | | 4 | ≤ 0.3 | ≤ 1.5 | 1090 | RPM | 33310 | 16655 | 11103 | 8328 | 5552 | 4164 | |
| | | | | | (872-1308) | Fz | 0.00063 | 0.0017 | 0.0032 | 0.0042 | 0.0050 | 0.0059 | |
| | | | | | Feed (ipm) | 42.0 | 56.6 | 71.1 | 70.0 | 55.5 | 49.1 | | |
| | Slot | 2 | 1 | ≤ 1 | 410 | RPM | 12530 | 6265 | 4177 | 3132 | 2088 | 1566 | |
| | | | | | (328-492) | Fz | 0.00063 | 0.0017 | 0.0032 | 0.0042 | 0.0050 | 0.0059 | |
| | | | | | Feed (ipm) | 15.8 | 21.3 | 26.7 | 26.3 | 20.9 | 18.5 | | |
| | | 4 | 1 | ≤ 0.25 | 590 | RPM | 18030 | 9015 | 6010 | 4508 | 3005 | 2254 | |
| | | | | | (472-708) | Fz | 0.00039 | 0.0010 | 0.0020 | 0.0026 | 0.0031 | 0.0037 | |
| | | | | | Feed (ipm) | 14.1 | 18.0 | 24.0 | 23.4 | 18.6 | 16.7 | | |
| COPPER ALLOYS Aluminum Bronze, Muntz Brass, Naval, Brass, Red Brass | ≤ 140 Bhn or ≤ 3 HRc | Profile | 2 | ≤ 0.3 | ≤ 1.5 | 475 | RPM | 14516 | 7258 | 4839 | 3629 | 2419 | 1815 |
| | | | | | | (380-570) | Fz | 0.00036 | 0.0010 | 0.0018 | 0.0024 | 0.0029 | 0.0034 |
| | | | | | | Feed (ipm) | 10.5 | 14.5 | 17.4 | 17.4 | 14.0 | 12.3 | |
| | | 4 | 1 | ≤ 0.25 | 235 | RPM | 7182 | 3591 | 2394 | 1795 | 1197 | 898 | |
| | | | | | (188-282) | Fz | 0.00039 | 0.0010 | 0.0020 | 0.0026 | 0.0031 | 0.0037 | |
| | | | | | Feed (ipm) | 5.6 | 7.2 | 9.6 | 9.3 | 7.4 | 6.6 | | |
| | Slot | 2 | 1 | ≤ 1 | 190 | RPM | 5806 | 2903 | 1935 | 1452 | 968 | 726 | |
| | | | | | (152-228) | Fz | 0.00036 | 0.0010 | 0.0018 | 0.0024 | 0.0029 | 0.0034 | |
| | | | | | Feed (ipm) | 4.2 | 5.8 | 7.0 | 7.0 | 5.6 | 4.9 | | |
| | | 4 | 1 | ≤ 0.25 | 1600 | RPM | 48896 | 24448 | 16299 | 12224 | 8149 | 6112 | |
| | | | | | (1280-1920) | Fz | 0.00110 | 0.0030 | 0.0056 | 0.0074 | 0.0089 | 0.0100 | |
| | | | | | Feed (ipm) | 107.6 | 146.7 | 182.5 | 180.9 | 145.1 | 122.2 | | |
| PLASTICS ABS, Polycarbonate, PVC, Polypropylene | ≤ 200 Bhn or ≤ 23 HRc | Profile | 2 | ≤ 0.3 | ≤ 1.5 | 1280 | RPM | 39117 | 19558 | 13039 | 9779 | 6519 | 4890 |
| | | | | | | (1024-1536) | Fz | 0.00100 | 0.0027 | 0.0051 | 0.0068 | 0.0082 | 0.0095 |
| | | | | | | Feed (ipm) | 78.2 | 105.6 | 133.0 | 133.0 | 106.9 | 92.9 | |
| | | 4 | 1 | ≤ 0.25 | 720 | RPM | 22003 | 11002 | 7334 | 5501 | 3667 | 2750 | |
| | | | | | (576-864) | Fz | 0.00082 | 0.0022 | 0.0041 | 0.0055 | 0.0065 | 0.0076 | |
| | | | | | Feed (ipm) | 36.1 | 48.4 | 60.1 | 60.5 | 47.7 | 41.8 | | |
| | Slot | 2 | 1 | ≤ 1 | 575 | RPM | 17572 | 8786 | 5857 | 4393 | 2929 | 2197 | |
| | | | | | (460-690) | Fz | 0.00075 | 0.0020 | 0.0037 | 0.0050 | 0.0060 | 0.0070 | |
| | | | | | Feed (ipm) | 26.4 | 35.1 | 43.3 | 43.9 | 35.1 | 30.8 | | |
| | | 4 | 1 | ≤ 0.25 | 720 | RPM | 22003 | 11002 | 7334 | 5501 | 3667 | 2750 | |
| | | | | | (576-864) | Fz | 0.00082 | 0.0022 | 0.0041 | 0.0055 | 0.0065 | 0.0076 | |
| | | | | | Feed (ipm) | 36.1 | 48.4 | 60.1 | 60.5 | 47.7 | 41.8 | | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
 rpm = (Vc x 3.82) / D₁
 ipm = Fz x number of flutes x rpm
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

FRACTIONAL End Mills Sets



Pictured:
Series 14 Flute
Single End Square
Endmill Set

| CUTTING DIAMETER D_1 | SINGLE END LENGTH OF CUT L_2 | DOUBLE END LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 |
|---------------------------|-----------------------------------|-----------------------------------|-------------------------|-------------------------|
| 1/8 | 1/2 | 1/4 | 1-1/2 | 1/8 |
| 3/16 | 5/8 | 3/8 | 2 | 3/16 |
| 1/4 | 3/4 | 1/2 | 2-1/2 | 1/4 |
| 5/16 | 13/16 | 1/2 | 2-1/2 | 5/16 |
| 3/8 | 1 | 9/16 | 2-1/2 | 3/8 |
| 1/2 | 1 | 5/8 | 3 | 1/2 |

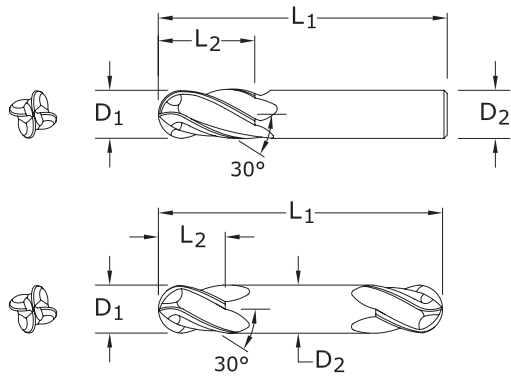
Square End FRACTIONAL SERIES

| DESCRIPTION | EDP NO. | | | |
|---------------------------------|----------|-----------------|--------------------|---------------------|
| | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| Series 1 – 4 Flute, Single End | 30189 | 39189 | 39089 | 30030 |
| Series 3 – 2 Flute, Single End | 30389 | 39389 | 39589 | 30470 |
| Series 5 – 3 Flute, Single End | 30589 | 39789 | 30810 | 30850 |
| Series 14 – 4 Flute, Double End | 31489 | 31481 | 39641 | 31190 |
| Series 15 – 2 Flute, Double End | 31589 | 31581 | 39691 | 31336 |



For patent information visit
www.ksptpatents.com

End Mills Sets



Pictured:
Series 1 4 Flute Single
End Ball Endmill Set

| CUTTING DIAMETER D ₁ | SINGLE END LENGTH OF CUT L ₂ | DOUBLE END LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ |
|------------------------------------|--|--|----------------------------------|----------------------------------|
| 1/8 | 1/2 | 1/4 | 1-1/2 | 1/8 |
| 3/16 | 5/8 | 3/8 | 2 | 3/16 |
| 1/4 | 3/4 | 1/2 | 2-1/2 | 1/4 |
| 5/16 | 13/16 | 1/2 | 2-1/2 | 5/16 |
| 3/8 | 1 | 9/16 | 2-1/2 | 3/8 |
| 1/2 | 1 | 5/8 | 3 | 1/2 |

Ball End

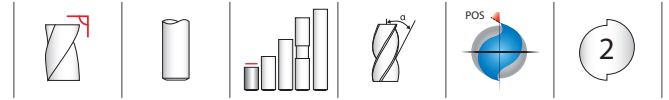
FRACTIONAL SERIES



For patent information visit
www.ksptpatents.com

| DESCRIPTION | EDP NO. | | | |
|----------------------------------|----------|-----------------|--------------------|---------------------|
| | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| Series 1B – 4 Flute, Single End | 30190 | 39190 | 39090 | 30070 |
| Series 3B – 2 Flute, Single End | 30390 | 39390 | 39590 | 30600 |
| Series 5B – 3 Flute, Single End | 30590 | 30900 | 30944 | 31169 |
| Series 14B – 4 Flute, Double End | 31490 | 31482 | 39642 | 31217 |
| Series 15B – 2 Flute, Double End | 31590 | 31582 | 39692 | 31357 |

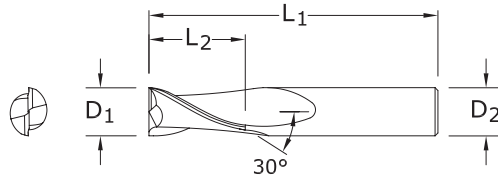
2 Flute Square End Stub



TOLERANCES (mm)

D₁ = +0,000/-0,050

D₂ = h₆



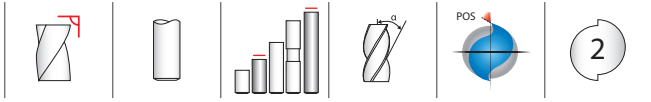
17M
METRIC SERIES

| mm | | | | EDP NO. | | | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1,0 | 2,0 | 38,0 | 3,0 | 41705 | 49262 | 49283 | 49304 |
| 1,5 | 3,0 | 38,0 | 3,0 | 41709 | 49263 | 49284 | 49305 |
| 2,0 | 4,0 | 38,0 | 3,0 | 41713 | 49264 | 49285 | 49306 |
| 2,5 | 5,0 | 38,0 | 3,0 | 41717 | 49265 | 49286 | 49307 |
| 3,0 | 6,0 | 38,0 | 3,0 | 41721 | 49266 | 49287 | 49308 |
| 3,5 | 7,0 | 50,0 | 4,0 | 41725 | 49267 | 49288 | 49309 |
| 4,0 | 8,0 | 50,0 | 4,0 | 41729 | 49268 | 49289 | 49310 |
| 4,5 | 9,5 | 50,0 | 4,5 | 41733 | 49269 | 49290 | 49311 |
| 5,0 | 10,0 | 50,0 | 5,0 | 41737 | 49270 | 49291 | 49312 |
| 6,0 | 12,0 | 50,0 | 6,0 | 41741 | 49271 | 49292 | 49313 |
| 7,0 | 12,0 | 50,0 | 8,0 | 41745 | 49272 | 49293 | 49314 |
| 8,0 | 12,0 | 50,0 | 8,0 | 41749 | 49273 | 49294 | 49315 |
| 9,0 | 14,0 | 50,0 | 9,0 | 41753 | 49274 | 49295 | 49316 |
| 10,0 | 16,0 | 50,0 | 10,0 | 41757 | 49275 | 49296 | 49317 |
| 11,0 | 19,0 | 63,0 | 12,0 | 41761 | 49276 | 49297 | 49318 |
| 12,0 | 19,0 | 63,0 | 12,0 | 41765 | 49277 | 49298 | 49319 |

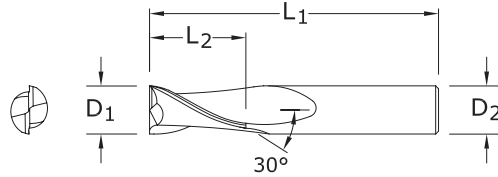
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

2 Flute Square End



3M•3XLM
METRIC SERIES



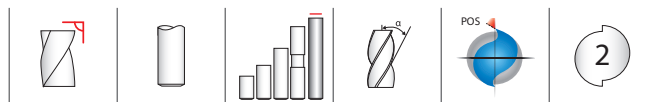
TOLERANCES (mm)
D₁ = +0,000/-0,050
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| mm | | | | EDP NO. | | | | SERIES |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|-----------------|--------------------|---------------------|--------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | |
| 1,0 | 4,0 | 38,0 | 3,0 | 40305 | 48628 | 48650 | 48671 | 3M |
| 1,5 | 4,5 | 38,0 | 3,0 | 40309 | 48629 | 48651 | 48672 | 3M |
| 2,0 | 6,3 | 38,0 | 3,0 | 40313 | 48630 | 48652 | 48673 | 3M |
| 2,5 | 9,5 | 38,0 | 3,0 | 40317 | 48631 | 48653 | 48674 | 3M |
| 3,0 | 12,0 | 38,0 | 3,0 | 40321 | 48632 | 48654 | 48675 | 3M |
| 3,0 | 25,0 | 75,0 | 3,0 | 43301 | 49427 | 49440 | 49453 | 3XLM |
| 3,5 | 12,0 | 50,0 | 4,0 | 40325 | 48633 | 48655 | 48676 | 3M |
| 4,0 | 14,0 | 50,0 | 4,0 | 40329 | 48634 | 48656 | 48677 | 3M |
| 4,0 | 25,0 | 75,0 | 4,0 | 43303 | 49428 | 49441 | 49454 | 3XLM |
| 4,5 | 16,0 | 50,0 | 6,0 | 40333 | 48635 | 48657 | 48678 | 3M |
| 5,0 | 16,0 | 50,0 | 6,0 | 40337 | 48636 | 48658 | 48679 | 3M |
| 5,0 | 25,0 | 75,0 | 5,0 | 43307 | 49430 | 49443 | 49456 | 3XLM |
| 6,0 | 19,0 | 50,0 | 6,0 | 40341 | 48637 | 48659 | 48680 | 3M |
| 6,0 | 25,0 | 75,0 | 6,0 | 43305 | 49429 | 49442 | 49455 | 3XLM |
| 7,0 | 19,0 | 63,0 | 8,0 | 40345 | 48638 | 48660 | 48681 | 3M |
| 8,0 | 20,0 | 63,0 | 8,0 | 40349 | 48639 | 48661 | 48682 | 3M |
| 8,0 | 25,0 | 75,0 | 8,0 | 43315 | 49431 | 49444 | 49457 | 3XLM |
| 9,0 | 22,0 | 75,0 | 10,0 | 40353 | 48640 | 48662 | 48683 | 3M |
| 10,0 | 22,0 | 75,0 | 10,0 | 40357 | 48641 | 48663 | 48684 | 3M |
| 10,0 | 38,0 | 100,0 | 10,0 | 43325 | 49432 | 49445 | 49458 | 3XLM |
| 11,0 | 25,0 | 75,0 | 12,0 | 40361 | 48642 | 48664 | 48685 | 3M |
| 12,0 | 25,0 | 75,0 | 12,0 | 40365 | 48643 | 48665 | 48686 | 3M |
| 12,0 | 50,0 | 100,0 | 12,0 | 43335 | 49433 | 49446 | 49459 | 3XLM |
| 12,0 | 75,0 | 150,0 | 12,0 | 43345 | 49434 | 49447 | 49460 | 3XLM |
| 14,0 | 32,0 | 89,0 | 14,0 | 40369 | 48644 | 48666 | 48687 | 3M |
| 14,0 | 75,0 | 150,0 | 14,0 | 43355 | 49435 | 49448 | 49461 | 3XLM |
| 16,0 | 32,0 | 89,0 | 16,0 | 40373 | 48645 | 48667 | 48688 | 3M |
| 16,0 | 75,0 | 150,0 | 16,0 | 43365 | 49436 | 49449 | 49462 | 3XLM |
| 18,0 | 38,0 | 100,0 | 18,0 | 40377 | 48646 | 48668 | 48689 | 3M |
| 18,0 | 75,0 | 150,0 | 18,0 | 43375 | 49437 | 49450 | 49463 | 3XLM |
| 20,0 | 38,0 | 100,0 | 20,0 | 40381 | 48647 | 48669 | 48690 | 3M |
| 20,0 | 75,0 | 150,0 | 20,0 | 43385 | 49438 | 49451 | 49464 | 3XLM |
| 25,0 | 38,0 | 100,0 | 25,0 | 40385 | 48648 | 48670 | 48691 | 3M |
| 25,0 | 75,0 | 150,0 | 25,0 | 43395 | 49439 | 49452 | 49465 | 3XLM |

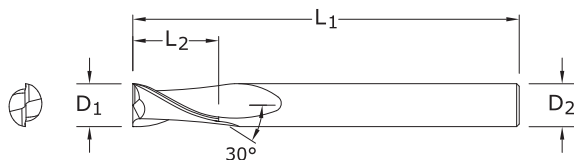
2 Flute Square End Long Reach



TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$



59M
METRIC SERIES

| mm | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 3,0 | 9,0 | 60,0 | 6,0 | 43910 | 43920 | 43930 | 43950 |
| 4,0 | 12,0 | 70,0 | 6,0 | 43911 | 43921 | 43931 | 43951 |
| 6,0 | 15,0 | 80,0 | 6,0 | 43912 | 43922 | 43932 | 43952 |
| 8,0 | 20,0 | 89,0 | 8,0 | 43913 | 43923 | 43933 | 43953 |
| 10,0 | 25,0 | 100,0 | 10,0 | 43914 | 43924 | 43934 | 43954 |
| 12,0 | 30,0 | 110,0 | 12,0 | 43915 | 43925 | 43935 | 43955 |
| 14,0 | 35,0 | 120,0 | 16,0 | 43916 | 43926 | 43936 | 43956 |
| 16,0 | 40,0 | 120,0 | 16,0 | 43917 | 43927 | 43937 | 43957 |
| 18,0 | 40,0 | 130,0 | 20,0 | 43918 | 43928 | 43938 | 43958 |
| 20,0 | 45,0 | 130,0 | 20,0 | 43919 | 43929 | 43939 | 43959 |

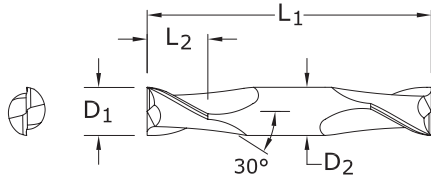
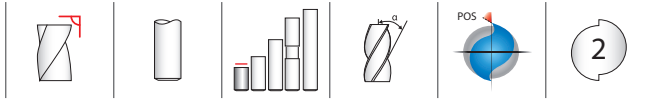
Neck Option Available

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

METRIC

2 Flute Double End Mills



15M
METRIC SERIES

TOLERANCES (mm)

$D_1 = +0,000/-0,050$

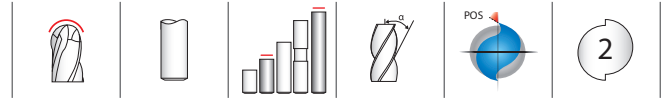
$D_2 = h_6$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

| mm | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1,0 | 2,0 | 38,0 | 3,0 | 41505 | 49010 | 49031 | 49052 |
| 1,5 | 3,0 | 38,0 | 3,0 | 41509 | 49011 | 49032 | 49053 |
| 2,0 | 4,0 | 38,0 | 3,0 | 41513 | 49012 | 49033 | 49054 |
| 2,5 | 5,0 | 38,0 | 3,0 | 41517 | 49013 | 49034 | 49055 |
| 3,0 | 6,0 | 38,0 | 3,0 | 41521 | 49014 | 49035 | 49056 |
| 3,5 | 7,0 | 50,0 | 4,0 | 41525 | 49015 | 49036 | 49057 |
| 4,0 | 8,0 | 50,0 | 4,0 | 41529 | 49016 | 49037 | 49058 |
| 4,5 | 9,5 | 63,0 | 4,5 | 41533 | 49017 | 49038 | 49059 |
| 5,0 | 10,0 | 63,0 | 5,0 | 41537 | 49018 | 49039 | 49060 |
| 6,0 | 12,0 | 63,0 | 6,0 | 41541 | 49019 | 49040 | 49061 |
| 7,0 | 12,0 | 63,0 | 8,0 | 41545 | 49020 | 49041 | 49062 |
| 8,0 | 12,0 | 63,0 | 8,0 | 41549 | 49021 | 49042 | 49063 |
| 9,0 | 14,0 | 75,0 | 9,0 | 41553 | 49022 | 49043 | 49064 |
| 10,0 | 14,0 | 75,0 | 10,0 | 41557 | 49023 | 49044 | 49065 |
| 11,0 | 14,0 | 75,0 | 12,0 | 41561 | 49024 | 49045 | 49066 |
| 12,0 | 16,0 | 75,0 | 12,0 | 41565 | 49025 | 49046 | 49067 |

For patent information visit www.ksptpatents.com

2 Flute Ball End



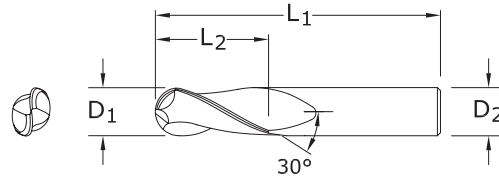
TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$

BALL RADIUS

$+0,000/-0,025$



3MB•3XLMB

METRIC SERIES

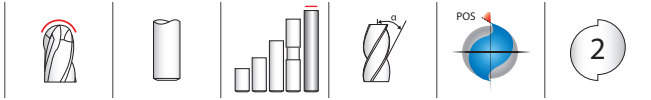
| mm | | | | EDP NO. | | | | SERIES |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|--------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | |
| 1,0 | 4,0 | 38,0 | 3,0 | 40306 | 48692 | 48714 | 48735 | 3MB |
| 1,5 | 4,5 | 38,0 | 3,0 | 40310 | 48693 | 48715 | 48736 | 3MB |
| 2,0 | 6,3 | 38,0 | 3,0 | 40314 | 48694 | 48716 | 48737 | 3MB |
| 2,5 | 9,5 | 38,0 | 3,0 | 40318 | 48695 | 48717 | 48738 | 3MB |
| 3,0 | 12,0 | 38,0 | 3,0 | 40322 | 48696 | 48718 | 48739 | 3MB |
| 3,0 | 25,0 | 75,0 | 3,0 | 43302 | 49544 | 49557 | 49570 | 3XLMB |
| 3,5 | 12,0 | 50,0 | 4,0 | 40326 | 48697 | 48719 | 48740 | 3MB |
| 4,0 | 14,0 | 50,0 | 4,0 | 40330 | 48698 | 48720 | 48741 | 3MB |
| 4,0 | 25,0 | 75,0 | 4,0 | 43304 | 49545 | 49558 | 49571 | 3XLMB |
| 4,5 | 16,0 | 50,0 | 6,0 | 40334 | 48699 | 48721 | 48742 | 3MB |
| 5,0 | 16,0 | 50,0 | 6,0 | 40338 | 48700 | 48722 | 48743 | 3MB |
| 5,0 | 25,0 | 75,0 | 5,0 | 43308 | 49547 | 49560 | 49573 | 3XLMB |
| 6,0 | 19,0 | 50,0 | 6,0 | 40342 | 48701 | 48723 | 48744 | 3MB |
| 6,0 | 25,0 | 75,0 | 6,0 | 43306 | 49546 | 49559 | 49572 | 3XLMB |
| 7,0 | 19,0 | 63,0 | 8,0 | 40346 | 48702 | 48724 | 48745 | 3MB |
| 8,0 | 20,0 | 63,0 | 8,0 | 40350 | 48703 | 48725 | 48746 | 3MB |
| 8,0 | 25,0 | 75,0 | 8,0 | 43316 | 49548 | 49561 | 49574 | 3XLMB |
| 9,0 | 22,0 | 75,0 | 10,0 | 40354 | 48704 | 48726 | 48747 | 3MB |
| 10,0 | 22,0 | 75,0 | 10,0 | 40358 | 48705 | 48727 | 48748 | 3MB |
| 10,0 | 38,0 | 100,0 | 10,0 | 43326 | 49549 | 49562 | 49575 | 3XLMB |
| 11,0 | 25,0 | 75,0 | 12,0 | 40362 | 48706 | 48728 | 48749 | 3MB |
| 12,0 | 25,0 | 75,0 | 12,0 | 40366 | 48707 | 48729 | 48750 | 3MB |
| 12,0 | 50,0 | 100,0 | 12,0 | 43336 | 49550 | 49563 | 49576 | 3XLMB |
| 12,0 | 75,0 | 150,0 | 12,0 | 43346 | 49551 | 49564 | 49577 | 3XLMB |
| 14,0 | 32,0 | 89,0 | 14,0 | 40370 | 48708 | 48730 | 48751 | 3MB |
| 14,0 | 75,0 | 150,0 | 14,0 | 43356 | 49552 | 49565 | 49578 | 3XLMB |
| 16,0 | 32,0 | 89,0 | 16,0 | 40374 | 48709 | 48731 | 48752 | 3MB |
| 16,0 | 75,0 | 150,0 | 16,0 | 43366 | 49553 | 49566 | 49579 | 3XLMB |
| 18,0 | 38,0 | 100,0 | 18,0 | 40378 | 48710 | 48732 | 48753 | 3MB |
| 18,0 | 75,0 | 150,0 | 18,0 | 43376 | 49554 | 49567 | 49580 | 3XLMB |
| 20,0 | 38,0 | 100,0 | 20,0 | 40382 | 48711 | 48733 | 48754 | 3MB |
| 20,0 | 75,0 | 150,0 | 20,0 | 43386 | 49555 | 49568 | 49581 | 3XLMB |
| 25,0 | 38,0 | 100,0 | 25,0 | 40386 | 48712 | 48734 | 48755 | 3MB |
| 25,0 | 75,0 | 150,0 | 25,0 | 43396 | 49556 | 49569 | 49582 | 3XLMB |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

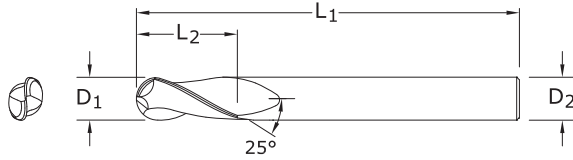
For patent information visit www.ksptpatents.com

METRIC

2 Flute Ball End Long Reach



59MB
METRIC SERIES



TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$

BALL RADIUS
 $+0,000/-0,025$

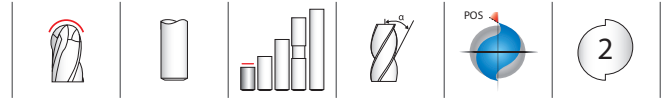
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

| mm | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 3,0 | 9,0 | 60,0 | 6,0 | 43900 | 49622 | 49632 | 49642 |
| 4,0 | 12,0 | 70,0 | 6,0 | 43901 | 49623 | 49633 | 49643 |
| 6,0 | 15,0 | 80,0 | 6,0 | 43902 | 49624 | 49634 | 49644 |
| 8,0 | 20,0 | 89,0 | 8,0 | 43903 | 49625 | 49635 | 49645 |
| 10,0 | 25,0 | 100,0 | 10,0 | 43904 | 49626 | 49636 | 49646 |
| 12,0 | 30,0 | 110,0 | 12,0 | 43905 | 49627 | 49637 | 49647 |
| 14,0 | 35,0 | 120,0 | 16,0 | 43906 | 49628 | 49638 | 49648 |
| 16,0 | 40,0 | 120,0 | 16,0 | 43907 | 49629 | 49639 | 49649 |
| 18,0 | 40,0 | 130,0 | 20,0 | 43908 | 49630 | 49640 | 49650 |
| 20,0 | 45,0 | 130,0 | 20,0 | 43909 | 49631 | 49641 | 49651 |

Neck Option Available

For patent information visit www.ksptpatents.com

2 Flute Double End Ball End



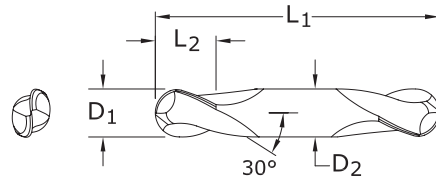
TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$

BALL RADIUS

$+0,000/-0,025$



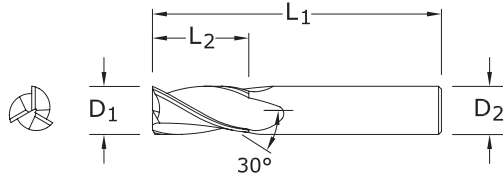
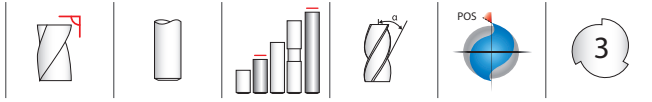
15MB
METRIC SERIES

| mm | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1,0 | 2,0 | 38,0 | 3,0 | 41506 | 49073 | 49094 | 49115 |
| 1,5 | 3,0 | 38,0 | 3,0 | 41510 | 49074 | 49095 | 49116 |
| 2,0 | 4,0 | 38,0 | 3,0 | 41514 | 49075 | 49096 | 49117 |
| 2,5 | 5,0 | 38,0 | 3,0 | 41518 | 49076 | 49097 | 49118 |
| 3,0 | 6,0 | 38,0 | 3,0 | 41522 | 49077 | 49098 | 49119 |
| 3,5 | 7,0 | 50,0 | 4,0 | 41526 | 49078 | 49099 | 49120 |
| 4,0 | 8,0 | 50,0 | 4,0 | 41530 | 49079 | 49100 | 49121 |
| 4,5 | 9,5 | 63,0 | 4,5 | 41534 | 49080 | 49101 | 49122 |
| 5,0 | 10,0 | 63,0 | 5,0 | 41538 | 49081 | 49102 | 49123 |
| 6,0 | 12,0 | 63,0 | 6,0 | 41542 | 49082 | 49103 | 49124 |
| 7,0 | 12,0 | 63,0 | 8,0 | 41546 | 49083 | 49104 | 49125 |
| 8,0 | 12,0 | 63,0 | 8,0 | 41550 | 49084 | 49105 | 49126 |
| 9,0 | 14,0 | 75,0 | 9,0 | 41554 | 49085 | 49106 | 49127 |
| 10,0 | 14,0 | 75,0 | 10,0 | 41558 | 49086 | 49107 | 49128 |
| 11,0 | 14,0 | 75,0 | 12,0 | 41562 | 49087 | 49108 | 49129 |
| 12,0 | 16,0 | 75,0 | 12,0 | 41566 | 49088 | 49109 | 49130 |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

3 Flute Square End



5M•5XLM
METRIC SERIES

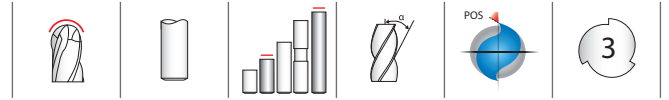
TOLERANCES (mm)
D₁ = +0,000/-0,050
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| mm | | | | EDP NO. | | | | SERIES |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|-----------------|--------------------|---------------------|--------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | |
| 1,0 | 4,0 | 38,0 | 3,0 | 40505 | 48756 | 48778 | 48799 | 5M |
| 1,5 | 4,5 | 38,0 | 3,0 | 40509 | 48757 | 48779 | 48800 | 5M |
| 2,0 | 6,3 | 38,0 | 3,0 | 40513 | 48758 | 48780 | 48801 | 5M |
| 2,5 | 9,5 | 38,0 | 3,0 | 40517 | 48759 | 48781 | 48802 | 5M |
| 3,0 | 12,0 | 38,0 | 3,0 | 40521 | 48760 | 48782 | 48803 | 5M |
| 3,0 | 25,0 | 75,0 | 3,0 | 43501 | 49466 | 49479 | 49492 | 5XLM |
| 3,5 | 12,0 | 50,0 | 4,0 | 40525 | 48761 | 48783 | 48804 | 5M |
| 4,0 | 14,0 | 50,0 | 4,0 | 40529 | 48762 | 48784 | 48805 | 5M |
| 4,0 | 25,0 | 75,0 | 4,0 | 43503 | 49467 | 49480 | 49493 | 5XLM |
| 4,5 | 16,0 | 50,0 | 6,0 | 40533 | 48763 | 48785 | 48806 | 5M |
| 5,0 | 16,0 | 50,0 | 6,0 | 40537 | 48764 | 48786 | 48807 | 5M |
| 5,0 | 25,0 | 75,0 | 5,0 | 43507 | 49469 | 49482 | 49495 | 5XLM |
| 6,0 | 19,0 | 50,0 | 6,0 | 40541 | 48765 | 48787 | 48808 | 5M |
| 6,0 | 25,0 | 75,0 | 6,0 | 43505 | 49468 | 49481 | 49494 | 5XLM |
| 7,0 | 19,0 | 63,0 | 8,0 | 40545 | 48766 | 48788 | 48809 | 5M |
| 8,0 | 20,0 | 63,0 | 8,0 | 40549 | 48767 | 48789 | 48810 | 5M |
| 8,0 | 25,0 | 75,0 | 8,0 | 43515 | 49470 | 49483 | 49496 | 5XLM |
| 9,0 | 22,0 | 75,0 | 10,0 | 40553 | 48768 | 48790 | 48811 | 5M |
| 10,0 | 22,0 | 75,0 | 10,0 | 40557 | 48769 | 48791 | 48812 | 5M |
| 10,0 | 38,0 | 100,0 | 10,0 | 43525 | 49471 | 49484 | 49497 | 5XLM |
| 11,0 | 25,0 | 75,0 | 12,0 | 40561 | 48770 | 48792 | 48813 | 5M |
| 12,0 | 25,0 | 75,0 | 12,0 | 40565 | 48771 | 48793 | 48814 | 5M |
| 12,0 | 50,0 | 100,0 | 12,0 | 43535 | 49472 | 49485 | 49498 | 5XLM |
| 12,0 | 75,0 | 150,0 | 12,0 | 43545 | 49473 | 49486 | 49499 | 5XLM |
| 14,0 | 32,0 | 89,0 | 14,0 | 40569 | 48772 | 48794 | 48815 | 5M |
| 14,0 | 75,0 | 150,0 | 14,0 | 43555 | 49474 | 49487 | 49500 | 5XLM |
| 16,0 | 32,0 | 89,0 | 16,0 | 40573 | 48773 | 48795 | 48816 | 5M |
| 16,0 | 75,0 | 150,0 | 16,0 | 43565 | 49475 | 49488 | 49501 | 5XLM |
| 18,0 | 38,0 | 100,0 | 18,0 | 40577 | 48774 | 48796 | 48817 | 5M |
| 18,0 | 75,0 | 150,0 | 18,0 | 43575 | 49476 | 49489 | 49502 | 5XLM |
| 20,0 | 38,0 | 100,0 | 20,0 | 40581 | 48775 | 48797 | 48818 | 5M |
| 20,0 | 75,0 | 150,0 | 20,0 | 43585 | 49477 | 49490 | 49503 | 5XLM |
| 25,0 | 38,0 | 100,0 | 25,0 | 40585 | 48776 | 48798 | 48819 | 5M |
| 25,0 | 75,0 | 150,0 | 25,0 | 43595 | 49478 | 49491 | 49504 | 5XLM |

3 Flute Ball End

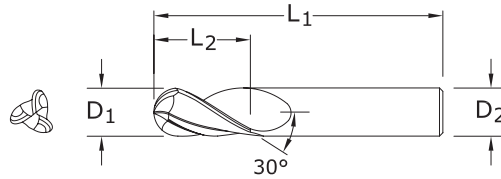


TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$

BALL RADIUS
+0,000/-0,025



5MB • 5XLMB

METRIC SERIES

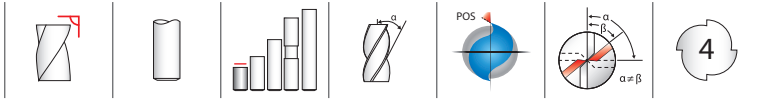
| mm | | | | EDP NO. | | | | SERIES |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|--------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | |
| 1,0 | 4,0 | 38,0 | 3,0 | 40506 | 48820 | 48842 | 48863 | 5MB |
| 1,5 | 4,5 | 38,0 | 3,0 | 40510 | 48821 | 48843 | 48864 | 5MB |
| 2,0 | 6,3 | 38,0 | 3,0 | 40514 | 48822 | 48844 | 48865 | 5MB |
| 2,5 | 9,5 | 38,0 | 3,0 | 40518 | 48823 | 48845 | 48866 | 5MB |
| 3,0 | 12,0 | 38,0 | 3,0 | 40522 | 48824 | 48846 | 48867 | 5MB |
| 3,0 | 25,0 | 75,0 | 3,0 | 43502 | 49583 | 49596 | 49609 | 5XLMB |
| 3,5 | 12,0 | 50,0 | 4,0 | 40526 | 48825 | 48847 | 48868 | 5MB |
| 4,0 | 14,0 | 50,0 | 4,0 | 40530 | 48826 | 48848 | 48869 | 5MB |
| 4,0 | 25,0 | 75,0 | 4,0 | 43504 | 49584 | 49597 | 49610 | 5XLMB |
| 4,5 | 16,0 | 50,0 | 6,0 | 40534 | 48827 | 48849 | 48870 | 5MB |
| 5,0 | 16,0 | 50,0 | 6,0 | 40538 | 48828 | 48850 | 48871 | 5MB |
| 5,0 | 25,0 | 75,0 | 5,0 | 43508 | 49586 | 49599 | 49612 | 5XLMB |
| 6,0 | 19,0 | 50,0 | 6,0 | 40542 | 48829 | 48851 | 48872 | 5MB |
| 6,0 | 25,0 | 75,0 | 6,0 | 43506 | 49585 | 49598 | 49611 | 5XLMB |
| 7,0 | 19,0 | 63,0 | 8,0 | 40546 | 48830 | 48852 | 48873 | 5MB |
| 8,0 | 20,0 | 63,0 | 8,0 | 40550 | 48831 | 48853 | 48874 | 5MB |
| 8,0 | 25,0 | 75,0 | 8,0 | 43516 | 49587 | 49600 | 49613 | 5XLMB |
| 9,0 | 22,0 | 75,0 | 10,0 | 40554 | 48832 | 48854 | 48875 | 5MB |
| 10,0 | 22,0 | 75,0 | 10,0 | 40558 | 48833 | 48855 | 48876 | 5MB |
| 10,0 | 38,0 | 100,0 | 10,0 | 43526 | 49588 | 49601 | 49614 | 5XLMB |
| 11,0 | 25,0 | 75,0 | 12,0 | 40562 | 48834 | 48856 | 48877 | 5MB |
| 12,0 | 25,0 | 75,0 | 12,0 | 40566 | 48835 | 48857 | 48878 | 5MB |
| 12,0 | 50,0 | 100,0 | 12,0 | 43536 | 49589 | 49602 | 49615 | 5XLMB |
| 12,0 | 75,0 | 150,0 | 12,0 | 43546 | 49590 | 49603 | 49616 | 5XLMB |
| 14,0 | 32,0 | 89,0 | 14,0 | 40570 | 48836 | 48858 | 48879 | 5MB |
| 14,0 | 75,0 | 150,0 | 14,0 | 43556 | 49591 | 49604 | 49617 | 5XLMB |
| 16,0 | 32,0 | 89,0 | 16,0 | 40574 | 48837 | 48859 | 48880 | 5MB |
| 16,0 | 75,0 | 150,0 | 16,0 | 43566 | 49592 | 49605 | 49618 | 5XLMB |
| 18,0 | 38,0 | 100,0 | 18,0 | 40578 | 48838 | 48860 | 48881 | 5MB |
| 18,0 | 75,0 | 150,0 | 18,0 | 43576 | 49593 | 49606 | 49619 | 5XLMB |
| 20,0 | 38,0 | 100,0 | 20,0 | 40582 | 48839 | 48861 | 48882 | 5MB |
| 20,0 | 75,0 | 150,0 | 20,0 | 43586 | 49594 | 49607 | 49620 | 5XLMB |
| 25,0 | 38,0 | 100,0 | 25,0 | 40586 | 48840 | 48862 | 48883 | 5MB |
| 25,0 | 75,0 | 150,0 | 25,0 | 43596 | 49595 | 49608 | 49621 | 5XLMB |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

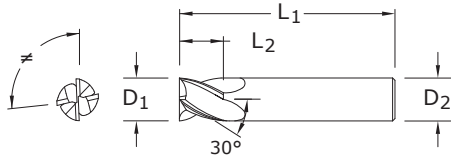
For patent information visit www.ksptpatents.com

METRIC

4 Flute Square End Stub



16M
METRIC SERIES



TOLERANCES (mm)

$D_1 = +0,000/-0,050$

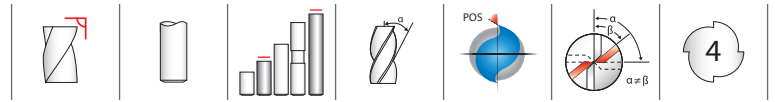
$D_2 = h_6$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

| CUTTING DIAMETER D_1 | mm | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1,0 | 2,0 | 38,0 | 3,0 | 41605 | 49136 | 49157 | 49178 |
| 1,5 | 3,0 | 38,0 | 3,0 | 41609 | 49137 | 49158 | 49179 |
| 2,0 | 4,0 | 38,0 | 3,0 | 41613 | 49138 | 49159 | 49180 |
| 2,5 | 5,0 | 38,0 | 3,0 | 41617 | 49139 | 49160 | 49181 |
| 3,0 | 6,0 | 38,0 | 3,0 | 41621 | 49140 | 49161 | 49182 |
| 3,5 | 7,0 | 50,0 | 4,0 | 41625 | 49141 | 49162 | 49183 |
| 4,0 | 8,0 | 50,0 | 4,0 | 41629 | 49142 | 49163 | 49184 |
| 4,5 | 9,5 | 50,0 | 4,5 | 41633 | 49143 | 49164 | 49185 |
| 5,0 | 10,0 | 50,0 | 5,0 | 41637 | 49144 | 49165 | 49186 |
| 6,0 | 12,0 | 50,0 | 6,0 | 41641 | 49145 | 49166 | 49187 |
| 7,0 | 12,0 | 50,0 | 8,0 | 41645 | 49146 | 49167 | 49188 |
| 8,0 | 12,0 | 50,0 | 8,0 | 41649 | 49147 | 49168 | 49189 |
| 9,0 | 14,0 | 50,0 | 9,0 | 41653 | 49148 | 49169 | 49190 |
| 10,0 | 16,0 | 50,0 | 10,0 | 41657 | 49149 | 49170 | 49191 |
| 11,0 | 19,0 | 63,0 | 12,0 | 41661 | 49150 | 49171 | 49192 |
| 12,0 | 19,0 | 63,0 | 12,0 | 40165 | 49151 | 49172 | 49193 |

For patent information visit www.ksptpatents.com

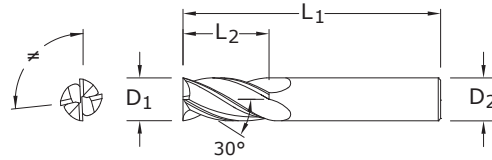
METRIC 4 Flute End Mills



TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$



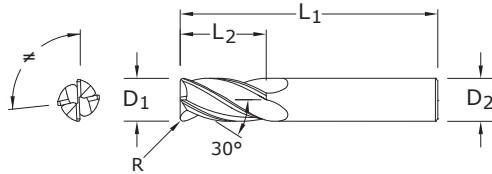
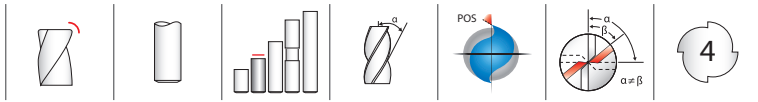
1M • 1XLM METRIC SERIES

| mm | | | | EDP NO. | | | | SERIES |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|--------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | |
| 1,0 | 4,0 | 38,0 | 3,0 | 40105 | 48500 | 48522 | 48543 | 1M |
| 1,5 | 4,5 | 38,0 | 3,0 | 40109 | 48501 | 48523 | 48544 | 1M |
| 2,0 | 6,3 | 38,0 | 3,0 | 40113 | 48502 | 48524 | 48545 | 1M |
| 2,5 | 9,5 | 38,0 | 3,0 | 40117 | 48503 | 48525 | 48546 | 1M |
| 3,0 | 12,0 | 38,0 | 3,0 | 40121 | 48504 | 48526 | 48547 | 1M |
| 3,0 | 25,0 | 75,0 | 3,0 | 43101 | 49388 | 49401 | 49414 | 1XLM |
| 3,5 | 12,0 | 50,0 | 4,0 | 40125 | 48505 | 48527 | 48548 | 1M |
| 4,0 | 14,0 | 50,0 | 4,0 | 40129 | 48506 | 48528 | 48549 | 1M |
| 4,0 | 25,0 | 75,0 | 4,0 | 43103 | 49389 | 49402 | 49415 | 1XLM |
| 4,5 | 16,0 | 50,0 | 6,0 | 40133 | 48507 | 48529 | 48550 | 1M |
| 5,0 | 16,0 | 50,0 | 6,0 | 40137 | 48508 | 48530 | 48551 | 1M |
| 5,0 | 25,0 | 75,0 | 5,0 | 43107 | 49391 | 49404 | 49417 | 1XLM |
| 6,0 | 19,0 | 50,0 | 6,0 | 40141 | 48509 | 48531 | 48552 | 1M |
| 6,0 | 25,0 | 75,0 | 6,0 | 43105 | 49390 | 49403 | 49416 | 1XLM |
| 7,0 | 19,0 | 63,0 | 8,0 | 40145 | 48510 | 48532 | 48553 | 1M |
| 8,0 | 20,0 | 63,0 | 8,0 | 40149 | 48511 | 48533 | 48554 | 1M |
| 8,0 | 25,0 | 75,0 | 8,0 | 43115 | 49392 | 49405 | 49418 | 1XLM |
| 9,0 | 22,0 | 75,0 | 10,0 | 40153 | 48512 | 48534 | 48555 | 1M |
| 10,0 | 22,0 | 75,0 | 10,0 | 40157 | 48513 | 48535 | 48556 | 1M |
| 10,0 | 38,0 | 100,0 | 10,0 | 43125 | 49393 | 49406 | 49419 | 1XLM |
| 11,0 | 25,0 | 75,0 | 12,0 | 40161 | 48514 | 48536 | 48557 | 1M |
| 12,0 | 25,0 | 75,0 | 12,0 | 41665 | 48515 | 48537 | 48558 | 1M |
| 12,0 | 50,0 | 100,0 | 12,0 | 43135 | 49394 | 49407 | 49420 | 1XLM |
| 12,0 | 75,0 | 150,0 | 12,0 | 43145 | 49395 | 49408 | 49421 | 1XLM |
| 14,0 | 32,0 | 89,0 | 14,0 | 40169 | 48516 | 48538 | 48559 | 1M |
| 14,0 | 75,0 | 150,0 | 14,0 | 43155 | 49396 | 49409 | 49422 | 1XLM |
| 16,0 | 32,0 | 89,0 | 16,0 | 40173 | 48517 | 48539 | 48560 | 1M |
| 16,0 | 75,0 | 150,0 | 16,0 | 43165 | 49397 | 49410 | 49423 | 1XLM |
| 18,0 | 38,0 | 100,0 | 18,0 | 40177 | 48518 | 48540 | 48561 | 1M |
| 18,0 | 75,0 | 150,0 | 18,0 | 43175 | 49398 | 49411 | 49424 | 1XLM |
| 20,0 | 38,0 | 100,0 | 20,0 | 40181 | 48519 | 48541 | 48562 | 1M |
| 20,0 | 75,0 | 150,0 | 20,0 | 43185 | 49399 | 49412 | 49425 | 1XLM |
| 25,0 | 38,0 | 100,0 | 25,0 | 40185 | 48520 | 48542 | 48563 | 1M |
| 25,0 | 75,0 | 150,0 | 25,0 | 43195 | 49400 | 49413 | 49426 | 1XLM |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

4 Flute Corner Radius



1MCR
METRIC SERIES

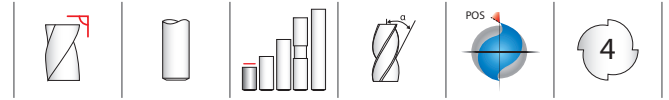
TOLERANCES (mm)
 $D_1 = +0,000/-0,050$
 $D_2 = h_6$
 $R = +0,000/-0,050$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

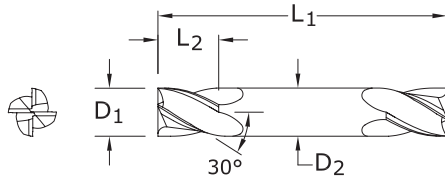
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | mm | | CORNER RADIUS R | SHANK DIAMETER D_2 | EDP NO. |
|---------------------------|------------------------|-------------------------|--|----------------------|-------------------------|---------------------|
| | | OVERALL LENGTH L_1 | | | | Ti-NAMITE-A (AITiN) |
| 4,0 | 14,0 | 50,0 | | 0,25 | 4,0 | 40000 |
| 4,0 | 14,0 | 50,0 | | 0,50 | 4,0 | 40001 |
| 4,0 | 14,0 | 50,0 | | 1,00 | 4,0 | 40003 |
| 5,0 | 16,0 | 50,0 | | 0,25 | 6,0 | 40004 |
| 5,0 | 16,0 | 50,0 | | 0,50 | 6,0 | 40005 |
| 5,0 | 16,0 | 50,0 | | 1,00 | 6,0 | 40007 |
| 6,0 | 19,0 | 50,0 | | 0,25 | 6,0 | 40009 |
| 6,0 | 19,0 | 50,0 | | 0,50 | 6,0 | 40010 |
| 6,0 | 19,0 | 50,0 | | 0,75 | 6,0 | 40011 |
| 6,0 | 19,0 | 50,0 | | 1,00 | 6,0 | 40012 |
| 8,0 | 20,0 | 63,0 | | 0,50 | 8,0 | 40015 |
| 8,0 | 20,0 | 63,0 | | 0,75 | 8,0 | 40016 |
| 8,0 | 20,0 | 63,0 | | 1,00 | 8,0 | 40017 |
| 8,0 | 20,0 | 63,0 | | 1,50 | 8,0 | 40019 |
| 8,0 | 20,0 | 63,0 | | 2,00 | 8,0 | 40020 |
| 10,0 | 22,0 | 75,0 | | 0,50 | 10,0 | 40021 |
| 10,0 | 22,0 | 75,0 | | 1,00 | 10,0 | 40023 |
| 10,0 | 22,0 | 75,0 | | 1,50 | 10,0 | 40024 |
| 10,0 | 22,0 | 75,0 | | 2,00 | 10,0 | 40025 |
| 12,0 | 25,0 | 75,0 | | 0,50 | 12,0 | 40028 |
| 12,0 | 25,0 | 75,0 | | 1,00 | 12,0 | 40030 |
| 12,0 | 25,0 | 75,0 | | 1,50 | 12,0 | 40031 |
| 12,0 | 25,0 | 75,0 | | 2,00 | 12,0 | 40032 |
| 16,0 | 32,0 | 89,0 | | 0,50 | 16,0 | 40035 |
| 16,0 | 32,0 | 89,0 | | 1,00 | 16,0 | 40037 |
| 16,0 | 32,0 | 89,0 | | 1,50 | 16,0 | 40038 |
| 16,0 | 32,0 | 89,0 | | 2,00 | 16,0 | 40039 |

4 Flute Double End Mills



TOLERANCES (mm)

$D_1 = +0,000/-0,050$
 $D_2 = h_6$



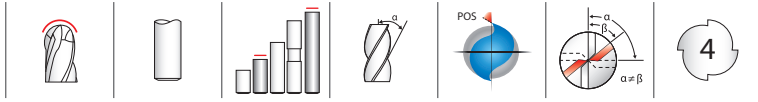
14M
 METRIC SERIES

| mm | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1,0 | 2,0 | 38,0 | 3,0 | 41405 | 48884 | 48905 | 48926 |
| 1,5 | 3,0 | 38,0 | 3,0 | 41409 | 48885 | 48906 | 48927 |
| 2,0 | 4,0 | 38,0 | 3,0 | 41413 | 48886 | 48907 | 48928 |
| 2,5 | 5,0 | 38,0 | 3,0 | 41417 | 48887 | 48908 | 48929 |
| 3,0 | 6,0 | 38,0 | 3,0 | 41421 | 48888 | 48909 | 48930 |
| 3,5 | 7,0 | 50,0 | 4,0 | 41425 | 48889 | 48910 | 48931 |
| 4,0 | 8,0 | 50,0 | 4,0 | 41429 | 48890 | 48911 | 48932 |
| 4,5 | 9,5 | 63,0 | 4,5 | 41433 | 48891 | 48912 | 48933 |
| 5,0 | 10,0 | 63,0 | 5,0 | 41437 | 48892 | 48913 | 48934 |
| 6,0 | 12,0 | 63,0 | 6,0 | 41441 | 48893 | 48914 | 48935 |
| 7,0 | 12,0 | 63,0 | 8,0 | 41445 | 48894 | 48915 | 48936 |
| 8,0 | 12,0 | 63,0 | 8,0 | 41449 | 48895 | 48916 | 48937 |
| 9,0 | 14,0 | 75,0 | 9,0 | 41453 | 48896 | 48917 | 48938 |
| 10,0 | 14,0 | 75,0 | 10,0 | 41457 | 48897 | 48918 | 48939 |
| 11,0 | 14,0 | 75,0 | 12,0 | 41461 | 48898 | 48919 | 48940 |
| 12,0 | 16,0 | 75,0 | 12,0 | 41465 | 48899 | 48920 | 48941 |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

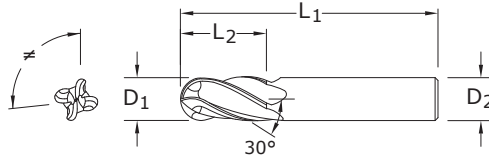
For patent information visit www.ksptpatents.com

4 Flute Ball End



1MB•1XLMB

METRIC SERIES



TOLERANCES (mm)

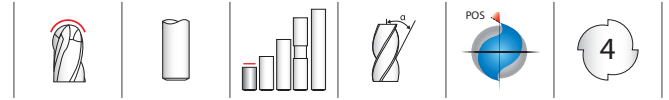
$D_1 = +0,000/-0,050$
 $D_2 = h_6$
BALL RADIUS
 $+0,000/-0,025$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| mm | | | | EDP NO. | | | | SERIES |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|--------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) | |
| 1,0 | 4,0 | 38,0 | 3,0 | 40106 | 48564 | 48586 | 48607 | 1MB |
| 1,5 | 4,5 | 38,0 | 3,0 | 40110 | 48565 | 48587 | 48608 | 1MB |
| 2,0 | 6,3 | 38,0 | 3,0 | 40114 | 48566 | 48588 | 48609 | 1MB |
| 2,5 | 9,5 | 38,0 | 3,0 | 40118 | 48567 | 48589 | 48610 | 1MB |
| 3,0 | 12,0 | 38,0 | 3,0 | 40122 | 48568 | 48590 | 48611 | 1MB |
| 3,0 | 25,0 | 75,0 | 3,0 | 43102 | 49505 | 49518 | 49531 | 1XLMB |
| 3,5 | 12,0 | 50,0 | 4,0 | 40126 | 48569 | 48591 | 48612 | 1MB |
| 4,0 | 14,0 | 50,0 | 4,0 | 40130 | 48570 | 48592 | 48613 | 1MB |
| 4,0 | 25,0 | 75,0 | 4,0 | 43104 | 49506 | 49519 | 49532 | 1XLMB |
| 4,5 | 16,0 | 50,0 | 6,0 | 40134 | 48571 | 48593 | 48614 | 1MB |
| 5,0 | 16,0 | 50,0 | 6,0 | 40138 | 48572 | 48594 | 48615 | 1MB |
| 5,0 | 25,0 | 75,0 | 5,0 | 43108 | 49508 | 49521 | 49534 | 1XLMB |
| 6,0 | 19,0 | 50,0 | 6,0 | 40142 | 48573 | 48595 | 48616 | 1MB |
| 6,0 | 25,0 | 75,0 | 6,0 | 43106 | 49507 | 49520 | 49533 | 1XLMB |
| 7,0 | 19,0 | 63,0 | 8,0 | 40146 | 48574 | 48596 | 48617 | 1MB |
| 8,0 | 20,0 | 63,0 | 8,0 | 40150 | 48575 | 48597 | 48618 | 1MB |
| 8,0 | 25,0 | 75,0 | 8,0 | 43116 | 49509 | 49522 | 49535 | 1XLMB |
| 9,0 | 22,0 | 75,0 | 10,0 | 40154 | 48576 | 48598 | 48619 | 1MB |
| 10,0 | 22,0 | 75,0 | 10,0 | 40158 | 48577 | 48599 | 48620 | 1MB |
| 10,0 | 38,0 | 100,0 | 10,0 | 43126 | 49510 | 49523 | 49536 | 1XLMB |
| 11,0 | 25,0 | 75,0 | 12,0 | 40162 | 48578 | 48600 | 48621 | 1MB |
| 12,0 | 25,0 | 75,0 | 12,0 | 40166 | 48579 | 48601 | 48622 | 1MB |
| 12,0 | 50,0 | 100,0 | 12,0 | 43136 | 49511 | 49524 | 49537 | 1XLMB |
| 12,0 | 75,0 | 150,0 | 12,0 | 43146 | 49512 | 49525 | 49538 | 1XLMB |
| 14,0 | 32,0 | 89,0 | 14,0 | 40170 | 48580 | 48602 | 48623 | 1MB |
| 14,0 | 75,0 | 150,0 | 14,0 | 43156 | 49513 | 49526 | 49539 | 1XLMB |
| 16,0 | 32,0 | 89,0 | 16,0 | 40174 | 48581 | 48603 | 48624 | 1MB |
| 16,0 | 75,0 | 150,0 | 16,0 | 43166 | 49514 | 49527 | 49540 | 1XLMB |
| 18,0 | 38,0 | 100,0 | 18,0 | 40178 | 48582 | 48604 | 48625 | 1MB |
| 18,0 | 75,0 | 150,0 | 18,0 | 43176 | 49515 | 49528 | 49541 | 1XLMB |
| 20,0 | 38,0 | 100,0 | 20,0 | 40182 | 48583 | 48605 | 48626 | 1MB |
| 20,0 | 75,0 | 150,0 | 20,0 | 43186 | 49516 | 49529 | 49542 | 1XLMB |
| 25,0 | 38,0 | 100,0 | 25,0 | 40186 | 48584 | 48606 | 48627 | 1MB |
| 25,0 | 75,0 | 150,0 | 25,0 | 43196 | 49517 | 49530 | 49543 | 1XLMB |

4 Flute Double End Ball End



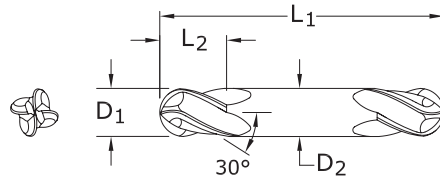
TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$

BALL RADIUS

$+0,000/-0,025$



14MB
METRIC SERIES

| mm | | | | EDP NO. | | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 1,0 | 2,0 | 38,0 | 3,0 | 41406 | 48947 | 48968 | 48989 |
| 1,5 | 3,0 | 38,0 | 3,0 | 41410 | 48948 | 48969 | 48990 |
| 2,0 | 4,0 | 38,0 | 3,0 | 41414 | 48949 | 48970 | 48991 |
| 2,5 | 5,0 | 38,0 | 3,0 | 41418 | 48950 | 48971 | 48992 |
| 3,0 | 6,0 | 38,0 | 3,0 | 41422 | 48951 | 48972 | 48993 |
| 3,5 | 7,0 | 50,0 | 4,0 | 41426 | 48952 | 48973 | 48994 |
| 4,0 | 8,0 | 50,0 | 4,0 | 41430 | 48953 | 48974 | 48995 |
| 4,5 | 9,5 | 63,0 | 4,5 | 41434 | 48954 | 48975 | 48996 |
| 5,0 | 10,0 | 63,0 | 5,0 | 41438 | 48955 | 48976 | 48997 |
| 6,0 | 12,0 | 63,0 | 6,0 | 41442 | 48956 | 48977 | 48998 |
| 7,0 | 12,0 | 63,0 | 8,0 | 41446 | 48957 | 48978 | 48999 |
| 8,0 | 12,0 | 63,0 | 8,0 | 41450 | 48958 | 48979 | 49000 |
| 9,0 | 14,0 | 75,0 | 9,0 | 41454 | 48959 | 48980 | 49001 |
| 10,0 | 14,0 | 75,0 | 10,0 | 41458 | 48960 | 48981 | 49002 |
| 11,0 | 14,0 | 75,0 | 12,0 | 41462 | 48961 | 48982 | 49003 |
| 12,0 | 16,0 | 75,0 | 12,0 | 41466 | 48962 | 48983 | 49004 |

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

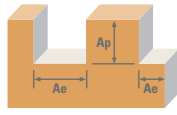
For patent information visit www.ksptpatents.com

METRIC

2 Flute: Square, Double, Stub, Long Reach, Ball

3 Flute: Square, Long Reach, Ball

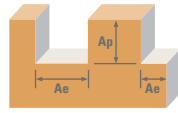
4 Flute: Square, Double, Stub, Long Reach, Ball, Corner Radius



| Series | Hardness | Flutes | Ae x D ₁ | Ap x D ₁ | V _c (m/min) | Diameter (D ₁) (mm) | | | | | | | | | | | |
|---|----------------------------|---|-----------------------------|--|--|---------------------------------|--|-----------------------------|-----------|----------------|----------------|-------|-------|-------|-------|-------|-------|
| | | | | | | 0.4 | 0.75 | 1.5 | 3 | 6 | 10 | 12 | 20 | 25 | | | |
| CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 140 | RPM | 111483 | 59458 | 29729 | 14864 | 7432 | 4459 | 3716 | 2230 | 1784 | | |
| | | | | | | Fz | 0.0008 | 0.0015 | 0.0031 | 0.007 | 0.019 | 0.040 | 0.048 | 0.064 | 0.070 | | |
| | | | | | | Feed (mm/min) | 178 | 178 | 184 | 208 | 282 | 357 | 357 | 285 | 250 | | |
| | | | | | | | 268 | 268 | 276 | 312 | 424 | 535 | 535 | 428 | 375 | | |
| | | | | | | | 357 | 357 | 369 | 416 | 565 | 713 | 713 | 571 | 499 | | |
| | | | | | | Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 102 | RPM | 81189 | 43301 | 21650 | 10825 | 5413 | 3248 |
| | | Fz | 0.0008 | 0.0015 | 0.0031 | | | | | | 0.007 | 0.019 | 0.040 | 0.048 | 0.064 | 0.070 | |
| | | Feed (mm/min) | 130 | 130 | 134 | | | | | | 152 | 206 | 260 | 260 | 208 | 182 | |
| | | | 195 | 195 | 201 | | | | | | 227 | 309 | 390 | 390 | 312 | 273 | |
| | | | 260 | 260 | 268 | | | | | | 303 | 411 | 520 | 520 | 416 | 364 | |
| | | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | | | | | | 3 ≤ 0.25 ≤ 1.5 | 102 | RPM | 81189 | 43301 | 21650 | 10825 |
| | | | | | | Fz | 0.0005 | 0.0012 | 0.0022 | 0.006 | | | 0.014 | 0.029 | 0.036 | 0.048 | 0.052 |
| Feed (mm/min) | 81 | | | | | 104 | 95 | 130 | 152 | 188 | | | 195 | 156 | 135 | | |
| | 122 | | | | | 156 | 143 | 195 | 227 | 283 | | | 292 | 234 | 203 | | |
| | 162 | | | | | 208 | 191 | 260 | 303 | 377 | | | 390 | 312 | 270 | | |
| Slot | 2 1 ≤ 1 | | | | | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 75 | RPM | 59377 | | | 31668 | 15834 | 7917 | 3958 | 2375 |
| | | | | Fz | 0.0005 | | | | 0.0012 | 0.0022 | 0.006 | 0.014 | 0.029 | 0.036 | 0.048 | 0.052 | |
| | | | | Feed (mm/min) | 59 | | | | 76 | 70 | 95 | 111 | 138 | 143 | 114 | 99 | |
| | | | | | 119 | | | | 152 | 139 | 190 | 222 | 276 | 285 | 228 | 198 | |
| | | | | | 119 | | | | 152 | 139 | 190 | 222 | 276 | 285 | 228 | 198 | |
| | | | | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 250 Bhn or ≤ 24 HRc | | | | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 96 | RPM | 76342 | 40715 | 20358 | 10179 |
| Fz | 0.0005 | | | | | 0.0012 | 0.0022 | 0.006 | | | | | 0.014 | 0.029 | 0.036 | 0.048 | 0.052 |
| Feed (mm/min) | 76 | 98 | 90 | | | 122 | 143 | 177 | | | | | 183 | 147 | 127 | | |
| | 115 | 147 | 134 | | | 183 | 214 | 266 | | | | | 275 | 220 | 191 | | |
| | 153 | 195 | 179 | | | 244 | 285 | 354 | | | | | 366 | 293 | 254 | | |
| Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | | | 70 | RPM | 55741 | | | | | 29729 | 14864 | 7432 | 3716 | 2230 |
| | | | | | | | Fz | 0.0005 | 0.0012 | 0.0022 | 0.006 | 0.014 | 0.029 | 0.036 | 0.048 | 0.052 | |
| | | | | | | | Feed (mm/min) | 56 | 71 | 65 | 89 | 104 | 129 | 134 | 107 | 93 | |
| | | | | | | | | 84 | 107 | 98 | 134 | 156 | 194 | 201 | 161 | 139 | |
| | | | | | | | | 111 | 143 | 131 | 178 | 208 | 259 | 268 | 214 | 186 | |
| | | | | | | | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 102 | RPM | 81189 | 43301 | 21650 | 10825 |
| Fz | 0.0008 | 0.0015 | 0.0031 | | | 0.007 | | | | | | | 0.019 | 0.040 | 0.048 | 0.064 | 0.070 |
| Feed (mm/min) | 130 | 130 | 134 | 152 | 206 | 260 | | | | | | | 260 | 208 | 182 | | |
| | 195 | 195 | 201 | 227 | 309 | 390 | | | | | | | 390 | 312 | 273 | | |
| | 260 | 260 | 268 | 303 | 411 | 520 | | | | | | | 520 | 416 | 364 | | |
| Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 75 | RPM | 59377 | | | | | | | 31668 | 15834 | 7917 | 3958 | 2375 |
| | | | | | Fz | 0.0008 | | | 0.0015 | 0.0031 | 0.007 | 0.019 | 0.040 | 0.048 | 0.064 | 0.070 | |
| | | | | | Feed (mm/min) | 95 | | | 95 | 98 | 111 | 150 | 190 | 190 | 152 | 133 | |
| | | | | | | 143 | | | 143 | 147 | 166 | 226 | 285 | 285 | 228 | 200 | |
| | | | | | | 190 | | | 190 | 196 | 222 | 301 | 380 | 380 | 304 | 266 | |
| | | | | | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | ≤ 275 Bhn or ≤ 28 HRc | | | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 113 | RPM | 89671 | 47825 | 23912 | 11956 |
| Fz | 0.0005 | 0.0012 | 0.0022 | 0.006 | | | | | | | | | 0.014 | 0.029 | 0.036 | 0.048 | 0.052 |
| Feed (mm/min) | 90 | 115 | 105 | 143 | | | 167 | 208 | | | | | 215 | 172 | 149 | | |
| | 135 | 172 | 158 | 215 | | | 251 | 312 | | | | | 323 | 258 | 224 | | |
| | 179 | 230 | 210 | 287 | | | 335 | 416 | | | | | 430 | 344 | 298 | | |
| Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 82 | | | RPM | 65436 | | | | | 34899 | 17449 | 8725 | 4362 | 2617 |
| | | | | | | | Fz | 0.0005 | 0.0012 | 0.0022 | 0.006 | 0.014 | 0.029 | 0.036 | 0.048 | 0.052 | |
| | | | | | | | Feed (mm/min) | 65 | 84 | 77 | 105 | 122 | 152 | 157 | 126 | 109 | |
| | | | | | | | | 98 | 126 | 115 | 157 | 183 | 228 | 236 | 188 | 163 | |
| | | | | | | | | 131 | 168 | 154 | 209 | 244 | 304 | 314 | 251 | 218 | |
| | | | | | | | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4 PH, 15-5, 13-4, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 78 | RPM | 61800 | 32960 | 16480 | 8240 |
| Fz | 0.0005 | 0.0010 | 0.0019 | 0.004 | | | | | | | | | 0.012 | 0.024 | 0.029 | 0.037 | 0.042 |
| Feed (mm/min) | 62 | 66 | 63 | 66 | 99 | 119 | | | | | | | 119 | 91 | 83 | | |
| | 93 | 99 | 94 | 99 | 148 | 178 | | | | | | | 179 | 137 | 125 | | |
| | 124 | 132 | 125 | 132 | 198 | 237 | | | | | | | 239 | 183 | 166 | | |
| Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 56 | RPM | 44836 | | | | | | | 23912 | 11956 | 5978 | 2989 | 1793 |
| | | | | | Fz | 0.0005 | | | 0.0010 | 0.0019 | 0.004 | 0.012 | 0.024 | 0.029 | 0.037 | 0.042 | |
| | | | | | Feed (mm/min) | 45 | | | 48 | 45 | 48 | 72 | 86 | 87 | 66 | 60 | |
| | | | | | | 67 | | | 72 | 68 | 72 | 108 | 129 | 130 | 100 | 90 | |
| | | | | | | 90 | | | 96 | 91 | 96 | 143 | 172 | 173 | 133 | 121 | |

continued on next page

2 Flute: Square, Double, Stub, Long Reach, Ball 3 Flute: Square, Long Reach, Ball 4 Flute: Square, Double, Stub, Long Reach, Ball, Corner Radius



Series
1M, 3M, 5M,
14M, 15M, 16M,
17M, 59M
Metric

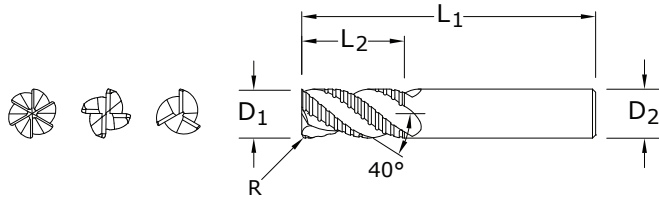
| Series | Hardness | Flutes | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | | | |
|---|-----------------------------|--|-----------------------------|---|--|---------------------------------|--|----------------------------|-----------|----------------|----------------|-------|-------|--------|--------|-------|-------|
| | | | | | | 0.4 | 0.75 | 1.5 | 3 | 6 | 10 | 12 | 20 | 25 | | | |
| SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, 718, Incoloy 800, Monel 400, Rene, Waspalloy | ≤ 300 Bhn or ≤ 32 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 20 | RPM | 15753 | 8402 | 4201 | 2100 | 1050 | 630 | 525 | 315 | 252 | | |
| | | | | | | Fz | 0.0005 | 0.0007 | 0.0014 | 0.004 | 0.010 | 0.021 | 0.024 | 0.032 | 0.035 | | |
| | | | | | | Feed (mm/min) | 16 | 12 | 12 | 17 | 21 | 26 | 25 | 20 | 18 | | |
| | | | | | | | 24 | 18 | 18 | 25 | 32 | 40 | 38 | 30 | 26 | | |
| | | | | | | | 32 | 24 | 24 | 34 | 42 | 53 | 50 | 40 | 35 | | |
| | | | | | | Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 14 | RPM | 10906 | 5816 | 2908 | 1454 | 727 | 436 |
| | | Fz | 0.0005 | 0.0007 | 0.0014 | | | | | | 0.004 | 0.010 | 0.021 | 0.024 | 0.032 | 0.035 | |
| | | Feed (mm/min) | 11 | 8 | 8 | | | | | | 12 | 15 | 18 | 17 | 14 | 12 | |
| | | | 16 | 12 | 12 | | | | | | 17 | 22 | 27 | 26 | 21 | 18 | |
| | | | 22 | 16 | 16 | | | | | | 23 | 29 | 37 | 35 | 28 | 24 | |
| | | TITANIUM ALLOYS Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti10Al2Fe3Al, Ti5Al3Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al | ≤ 350 Bhn or ≤ 38 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | | | | | | 3 ≤ 0.25 ≤ 1.5 | 55 | RPM | 43624 | 23266 | 11633 | 5816 |
| | | | | | | Fz | 0.0005 | 0.0010 | 0.0019 | 0.004 | | | 0.012 | 0.024 | 0.029 | 0.037 | 0.042 |
| Feed (mm/min) | 44 | | | | | 47 | 44 | 47 | 70 | 84 | | | 84 | 65 | 59 | | |
| | 65 | | | | | 70 | 66 | 70 | 105 | 126 | | | 127 | 97 | 88 | | |
| | 87 | | | | | 93 | 88 | 93 | 140 | 168 | | | 169 | 129 | 117 | | |
| Slot | 2 1 ≤ 1 | | | | | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 40 | RPM | 31506 | | | 16803 | 8402 | 4201 | 2100 | 1260 |
| | | | | Fz | 0.0005 | | | | 0.0010 | 0.0019 | 0.004 | 0.012 | 0.024 | 0.029 | 0.037 | 0.042 | |
| | | | | Feed (mm/min) | 32 | | | | 34 | 32 | 34 | 50 | 60 | 61 | 47 | 42 | |
| | | | | | 47 | | | | 50 | 48 | 50 | 76 | 91 | 91 | 70 | 64 | |
| | | | | | 63 | | | | 67 | 64 | 67 | 101 | 121 | 122 | 93 | 85 | |
| | | | | ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | ≤ 150 Bhn or ≤ 7 HRc | | | | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 268 | RPM | 213272 | 113745 | 56872 | 28436 |
| Fz | 0.0015 | | | | | 0.0032 | 0.0060 | 0.014 | | | | | 0.038 | 0.080 | 0.096 | 0.128 | 0.140 |
| Feed (mm/min) | 640 | 728 | 682 | | | 796 | 1081 | 1365 | | | | | 1365 | 1092 | 955 | | |
| | 960 | 1092 | 1024 | | | 1194 | 1621 | 2047 | | | | | 2047 | 1638 | 1433 | | |
| | 1280 | 1456 | 1365 | | | 1592 | 2161 | 2730 | | | | | 2730 | 2184 | 1911 | | |
| Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | | | 195 | RPM | 155107 | | | | | 82724 | 41362 | 20681 | 10340 | 6204 |
| | | | | | | | Fz | 0.0015 | 0.0032 | 0.0060 | 0.014 | 0.038 | 0.080 | 0.096 | 0.128 | 0.140 | |
| | | | | | | | Feed (mm/min) | 465 | 529 | 496 | 579 | 786 | 993 | 993 | 794 | 695 | |
| | | | | | | | | 698 | 794 | 745 | 869 | 1179 | 1489 | 1489 | 1191 | 1042 | |
| | | | | | | | | 931 | 1059 | 993 | 1158 | 1572 | 1985 | 1985 | 1588 | 1390 | |
| | | | | | | | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 148 | RPM | 117542 | 62689 | 31344 | 15672 |
| Fz | 0.0008 | 0.0015 | 0.0031 | | | 0.007 | | | | | | | 0.019 | 0.040 | 0.048 | 0.064 | 0.070 |
| Feed (mm/min) | 188 | 188 | 194 | 219 | 298 | 376 | | | | | | | 376 | 301 | 263 | | |
| | 282 | 282 | 292 | 329 | 447 | 564 | | | | | | | 564 | 451 | 395 | | |
| | 376 | 376 | 389 | 439 | 596 | 752 | | | | | | | 752 | 602 | 527 | | |
| Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 195 | RPM | 84824 | | | | | | | 45239 | 22620 | 11310 | 5655 | 3393 |
| | | | | | Fz | 0.0008 | | | 0.0015 | 0.0031 | 0.007 | 0.019 | 0.040 | 0.048 | 0.064 | 0.070 | |
| | | | | | Feed (mm/min) | 136 | | | 136 | 140 | 158 | 215 | 271 | 271 | 217 | 190 | |
| | | | | | | 204 | | | 204 | 210 | 238 | 322 | 407 | 407 | 326 | 285 | |
| | | | | | | 271 | | | 271 | 280 | 317 | 430 | 543 | 543 | 434 | 380 | |
| | | | | | PLASTICS Polycarbonate, PVC, Polypropylene | | | | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 268 | RPM | 213272 | 113745 | 56872 | 28436 |
| Fz | 0.0015 | 0.0032 | 0.0060 | 0.014 | | | | | | | | | 0.038 | 0.080 | 0.096 | 0.128 | 0.140 |
| Feed (mm/min) | 640 | 728 | 682 | 796 | | | 1081 | 1365 | | | | | 1365 | 1092 | 955 | | |
| | 960 | 1092 | 1024 | 1194 | | | 1621 | 2047 | | | | | 2047 | 1638 | 1433 | | |
| | 1280 | 1456 | 1365 | 1592 | | | 2161 | 2730 | | | | | 2730 | 2184 | 1911 | | |
| Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 195 | | | RPM | 155107 | | | | | 82724 | 41362 | 20681 | 10340 | 6204 |
| | | | | | | | Fz | 0.0015 | 0.0032 | 0.0060 | 0.014 | 0.038 | 0.080 | 0.096 | 0.128 | 0.140 | |
| | | | | | | | Feed (mm/min) | 465 | 529 | 496 | 579 | 786 | 993 | 993 | 794 | 695 | |
| | | | | | | | | 698 | 794 | 745 | 869 | 1179 | 1489 | 1489 | 1191 | 1042 | |
| | | | | | | | | 931 | 1059 | 993 | 1158 | 1572 | 1985 | 1985 | 1588 | 1390 | |
| | | | | | | | GRAPHITE | | Profile | 2 ≤ 0.50 ≤ 1.5 | 3 ≤ 0.25 ≤ 1.5 | 201 | RPM | 159954 | 85309 | 42654 | 21327 |
| Fz | 0.0015 | 0.0032 | 0.0060 | 0.014 | | | | | | | | | 0.038 | 0.080 | 0.096 | 0.128 | 0.140 |
| Feed (mm/min) | 480 | 546 | 512 | 597 | 810 | 1024 | | | | | | | 1024 | 819 | 717 | | |
| | 720 | 819 | 768 | 896 | 1216 | 1536 | | | | | | | 1536 | 1228 | 1075 | | |
| | 960 | 1092 | 1024 | 1194 | 1621 | 2047 | | | | | | | 2047 | 1638 | 1433 | | |
| Slot | 2 1 ≤ 1 | 3 1 ≤ 0.5 | 4 1 ≤ 0.4 | 146 | RPM | 116330 | | | | | | | 62043 | 31021 | 15511 | 7755 | 4653 |
| | | | | | Fz | 0.0015 | | | 0.0032 | 0.0060 | 0.014 | 0.038 | 0.080 | 0.096 | 0.128 | 0.140 | |
| | | | | | Feed (mm/min) | 349 | | | 397 | 372 | 434 | 589 | 745 | 745 | 596 | 521 | |
| | | | | | | 523 | | | 596 | 558 | 651 | 884 | 1117 | 1117 | 893 | 782 | |
| | | | | | | 698 | | | 794 | 745 | 869 | 1179 | 1489 | 1489 | 1191 | 1042 | |

Bhn (Brinell) HRc (Rockwell C)
rpm = (Vc x 1000) / (D₁ x 3.14)
mm/min = Fz x number of flutes x rpm
reduce speed and feed for materials harder than listed

limit cut depths of long and extra long flute mills to .05 x D₁ when slotting or profiling
reduce feed and Ae when finish milling (.02 x D₁ maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information
(www.kyocera-sgstool.com)

METRIC

Single End Roughers (Fine Pitch)



62M
METRIC SERIES

TOLERANCES h10 (mm)

$D_1 = +0,000 / -0,100$

$D_2 = h_6$

$R = +0,127 / -0,127$

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | mm | | | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|--------------------|---------------|-----------------|--------------------|---------------------|
| | | | SHANK DIAMETER D_2 | CORNER RADIUS R | NO. OF FLUTES | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 6,0 | 19,0 | 63,0 | 6,0 | 1,14 | 3 | 46207 | 46206 | 46210 |
| 8,0 | 19,0 | 63,0 | 8,0 | 1,14 | 3 | 46209 | 46208 | 46211 |
| 10,0 | 22,0 | 72,0 | 10,0 | 1,52 | 3 | 46213 | 46212 | 46214 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,52 | 4 | 46217 | 46216 | 46218 |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,52 | 4 | 46221 | 46220 | 46222 |
| 20,0 | 38,0 | 104,0 | 20,0 | 1,52 | 4 | 46229 | 46228 | 46232 |
| 25,0 | 44,0 | 104,0 | 25,0 | 1,52 | 5 | 46231 | 46230 | 46233 |

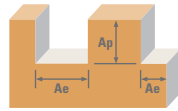
STAINLESS STEELS









HIGH TEMP ALLOYS

TITANIUM

For patent information visit www.ksptpatents.com

Single End Roughers (Fine Pitch)

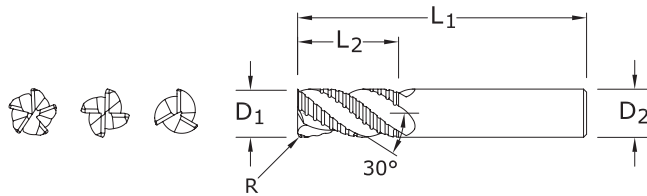


| Series 62M Metric | Hardness | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | |
|-------------------------|--|-----------------------------|--|---------------|------------------------------------|---------------|-----|-------|-------|-------|-------|-------|
| | | | | | 6 | 10 | 12 | 20 | 25 | | | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 275 Bhn or ≤ 28 HRc | Profile  | ≤ 0.5 | ≤ 1.5 | 123 | RPM | 6544 | 3926 | 3272 | 1963 | 1570 |
| | | | | | | (99-148) | Fz | 0.014 | 0.029 | 0.036 | 0.051 | 0.053 |
| | | | | | | Feed (mm/min) | 283 | 345 | 471 | 398 | 495 | |
| | | | Slot  | 1 | ≤ 1 | 99 | RPM | 5251 | 3151 | 2626 | 1575 | 1260 |
| | | | | | | (79-119) | Fz | 0.014 | 0.029 | 0.036 | 0.051 | 0.053 |
| | | | | | | Feed (mm/min) | 227 | 277 | 378 | 319 | 397 | |
| | STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4PH, 15-5PH, 13-4PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | Profile  | ≤ 0.5 | ≤ 1.5 | 85 | RPM | 4524 | 2714 | 2262 | 1357 | 1086 |
| | | | | | | (68-102) | Fz | 0.012 | 0.024 | 0.029 | 0.040 | 0.043 |
| | | | | | | Feed (mm/min) | 163 | 195 | 261 | 217 | 277 | |
| | | | Slot  | 1 | ≤ 1 | 69 | RPM | 3635 | 2181 | 1818 | 1091 | 872 |
| | | | | | | (55-82) | Fz | 0.012 | 0.024 | 0.029 | 0.040 | 0.043 |
| | | | | | | Feed (mm/min) | 131 | 157 | 209 | 174 | 222 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspalloy | ≤ 300 Bhn or ≤ 32 HRc | Profile  | ≤ 0.5 | ≤ 1.5 | 21 | RPM | 1131 | 679 | 565 | 339 | 271 |
| | | | | | | (17-26) | Fz | 0.010 | 0.021 | 0.024 | 0.035 | 0.035 |
| | | | | | | Feed (mm/min) | 33 | 43 | 54 | 47 | 57 | |
| | | | Slot  | 1 | ≤ 1 | 17 | RPM | 905 | 543 | 452 | 271 | 217 |
| | | | | | | (14-20) | Fz | 0.010 | 0.021 | 0.024 | 0.035 | 0.035 |
| | | | | | | Feed (mm/min) | 26 | 35 | 43 | 38 | 46 | |
| | TITANIUM ALLOYS Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti10Al2Fe3Al, Ti5Al53Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al | ≤ 350 Bhn or ≤ 38 HRc | Profile  | ≤ 0.5 | ≤ 1.5 | 47 | RPM | 2504 | 1503 | 1252 | 751 | 601 |
| | | | | | | (38-57) | Fz | 0.012 | 0.024 | 0.029 | 0.040 | 0.043 |
| | | | | | | Feed (mm/min) | 90 | 108 | 144 | 120 | 153 | |
| | | | Slot  | 1 | ≤ 1 | 59 | RPM | 3151 | 1890 | 1575 | 945 | 756 |
| | | | | | | (48-71) | Fz | 0.012 | 0.024 | 0.029 | 0.040 | 0.043 |
| | | | | | | Feed (mm/min) | 113 | 136 | 181 | 151 | 193 | |

Bhn (Brinell) HRc (Rockwell C)
 rpm = (Vc x 1000) / (D₁ x 3.14)
 mm/min = Fz x number of flutes x rpm
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

METRIC

Single End Roughers (Coarse Pitch)



61M
METRIC SERIES

TOLERANCES h10 (mm)

$D_1 = +0,000 / -0,100$

$D_2 = h_6$

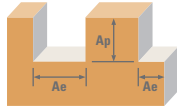
$R = +0,127 / -0,127$

| mm | | | | | | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|----------------------|---------------|-----------------|--------------------|---------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | CORNER RADIUS R | NO. OF FLUTES | Ti-NAMITE (TiN) | Ti-NAMITE-C (TiCN) | Ti-NAMITE-A (AlTiN) |
| 6,0 | 19,0 | 63,0 | 6,0 | 1,14 | 3 | 46107 | 46106 | 46110 |
| 8,0 | 19,0 | 63,0 | 8,0 | 1,14 | 3 | 46109 | 46108 | 46111 |
| 10,0 | 22,0 | 72,0 | 10,0 | 1,52 | 3 | 46113 | 46112 | 46114 |
| 12,0 | 26,0 | 83,0 | 12,0 | 1,52 | 4 | 46117 | 46116 | 46118 |
| 16,0 | 32,0 | 92,0 | 16,0 | 1,52 | 4 | 46121 | 46120 | 46122 |
| 20,0 | 38,0 | 104,0 | 20,0 | 1,52 | 4 | 46129 | 46128 | 46132 |
| 25,0 | 44,0 | 104,0 | 25,0 | 1,52 | 5 | 46131 | 46130 | 46133 |

- STEELS
- CAST IRON
- HARDENED STEELS

For patent information visit www.ksptpatents.com

Single End Roughers (Coarse Pitch)

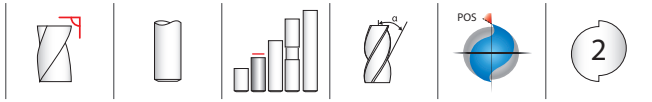


| Series 61M Metric | Hardness | Ae x D1 | Ap x D1 | Vc (m/min) | Diameter (D1) (mm) | | | | | | |
|-------------------------|--|---------|---------|---------------|-----------------------|-------|-------|-------|-------|-------|-------|
| | | | | | 6 | 10 | 12 | 20 | 25 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | Profile | ≤ 0.5 | ≤ 1.5 | 152 | RPM | 8078 | 4847 | 4039 | 2424 | 1939 |
| | | | | | (122-183) | Fz | 0.014 | 0.029 | 0.034 | 0.045 | 0.050 |
| | | | | | Feed (mm/min) | 339 | 422 | 549 | 436 | 485 | |
| | | Slot | 1 | ≤ 1 | 122 | RPM | 6463 | 3878 | 3231 | 1939 | 1551 |
| | | | | | (98-146) | Fz | 0.014 | 0.029 | 0.034 | 0.045 | 0.050 |
| | | | | | Feed (mm/min) | 271 | 337 | 439 | 349 | 388 | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | Profile | ≤ 0.5 | ≤ 1.5 | 111 | RPM | 5897 | 3538 | 2949 | 1769 | 1415 |
| | | | | | (89-134) | Fz | 0.010 | 0.021 | 0.026 | 0.035 | 0.038 |
| | | | | | Feed (mm/min) | 177 | 223 | 307 | 248 | 269 | |
| | | Slot | 1 | ≤ 1 | 90 | RPM | 4766 | 2860 | 2383 | 1430 | 1144 |
| | | | | | (72-108) | Fz | 0.010 | 0.021 | 0.026 | 0.035 | 0.038 |
| | | | | | Feed (mm/min) | 143 | 180 | 248 | 200 | 217 | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | Profile | ≤ 0.5 | ≤ 1.5 | 105 | RPM | 5574 | 3344 | 2787 | 1672 | 1338 |
| | | | | | (84-126) | Fz | 0.014 | 0.024 | 0.036 | 0.048 | 0.053 |
| | | | | | Feed (mm/min) | 234 | 241 | 401 | 321 | 355 | |
| | Slot | 1 | ≤ 1 | 84 | RPM | 4443 | 2666 | 2222 | 1333 | 1066 | |
| | | | | (67-101) | Fz | 0.014 | 0.024 | 0.036 | 0.048 | 0.053 | |
| | | | | Feed (mm/min) | 187 | 192 | 320 | 256 | 283 | | |
| K | CAST IRONS Gray, Malleable, Ductile | Profile | ≤ 0.5 | ≤ 1.5 | 111 | RPM | 5897 | 3538 | 2949 | 1769 | 1415 |
| | | | | | (89-134) | Fz | 0.019 | 0.040 | 0.048 | 0.064 | 0.070 |
| | | | | | Feed (mm/min) | 336 | 425 | 566 | 453 | 495 | |
| | Slot | 1 | ≤ 1 | 90 | RPM | 4766 | 2860 | 2383 | 1430 | 1144 | |
| | | | | (72-108) | Fz | 0.019 | 0.040 | 0.048 | 0.064 | 0.070 | |
| | | | | Feed (mm/min) | 272 | 343 | 458 | 366 | 400 | | |

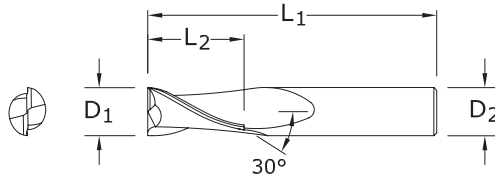
Bhn (Brinell) HRC (Rockwell C)
 rpm = (Vc x 1000) / (D1 x 3.14)
 mm/min = Fz x number of flutes x rpm
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

METRIC

2 Flute High Shear End Mills



52M
METRIC SERIES



TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$

NON-FERROUS

PLASTICS/COMPOSITES

For patent
information visit
www.ksptpatents.com

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | EDP NO. | |
|------------------------------|---------------------------|----------------------------|----------------------------|----------|-----------------------|
| | | | | UNCOATED | Ti-NAMITE-C (TiCN) |
| 3,0 | 7,0 | 38,0 | 3,0 | 45277 | 49829 |
| 3,5 | 7,0 | 57,0 | 6,0 | 45279 | 49830 |
| 4,0 | 8,0 | 57,0 | 6,0 | 45281 | 49831 |
| 4,5 | 8,0 | 57,0 | 6,0 | 45283 | 49832 |
| 5,0 | 10,0 | 57,0 | 6,0 | 45285 | 49833 |
| 6,0 | 10,0 | 57,0 | 6,0 | 45287 | 49834 |
| 8,0 | 16,0 | 63,0 | 8,0 | 45289 | 49835 |
| 10,0 | 19,0 | 72,0 | 10,0 | 45291 | 49836 |
| 12,0 | 22,0 | 83,0 | 12,0 | 45293 | 49837 |
| 14,0 | 22,0 | 83,0 | 14,0 | 45295 | 49838 |
| 16,0 | 26,0 | 92,0 | 16,0 | 45297 | 49839 |
| 20,0 | 32,0 | 104,0 | 20,0 | 45299 | 49840 |

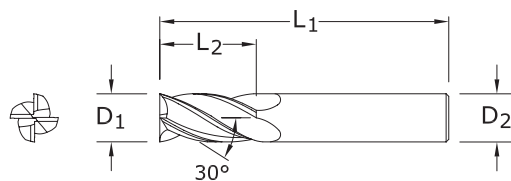
4 Flute High Shear End Mills



TOLERANCES (mm)

$D_1 = +0,000/-0,050$

$D_2 = h_6$



54M
METRIC SERIES

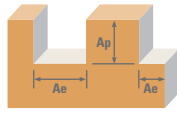
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|----------|--------------------|
| | | | | UNCOATED | Ti-NAMITE-C (TiCN) |
| 3,0 | 8,0 | 38,0 | 3,0 | 45477 | 45478 |
| 3,5 | 10,0 | 57,0 | 6,0 | 45479 | 45480 |
| 4,0 | 11,0 | 57,0 | 6,0 | 45481 | 45482 |
| 4,5 | 11,0 | 57,0 | 6,0 | 45483 | 45484 |
| 5,0 | 13,0 | 57,0 | 6,0 | 45485 | 45486 |
| 6,0 | 13,0 | 57,0 | 6,0 | 45487 | 45488 |
| 8,0 | 19,0 | 63,0 | 8,0 | 45489 | 45490 |
| 10,0 | 22,0 | 72,0 | 10,0 | 45491 | 45492 |
| 12,0 | 26,0 | 83,0 | 12,0 | 45493 | 45494 |
| 14,0 | 26,0 | 83,0 | 14,0 | 45495 | 45496 |
| 16,0 | 32,0 | 92,0 | 16,0 | 45497 | 45498 |
| 20,0 | 38,0 | 104,0 | 20,0 | 45499 | 45500 |

- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

2 Flute: High Shear End Mills

4 Flute: High Shear End Mills

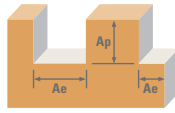






| Series 52M, 54M Metric | Hardness | Flutes | Ae x D ₁ | Ap x D ₁ | V _c (m/min) | Diameter (D ₁) (mm) | | | | | | | | | | |
|---|----------------------------|--|-----------------------------|---------------------|---------------------------|------------------------------------|-------|-----------|-----------|--------|--------|-------|-------|-------|-------|-------|
| | | | | | | 3 | 6 | 10 | 12 | 20 | 25 | | | | | |
| ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075 | ≤ 150 Bhn or ≤ 7 HRc | Profile | 2 | ≤ 0.3 | ≤ 1.5 | 415 | RPM | 43947 | 21973 | 13184 | 10987 | 6592 | 5274 | | | |
| | | | | | | (332-497) | Fz | 0.0166 | 0.043 | 0.091 | 0.110 | 0.147 | 0.160 | | | |
| | | | 4 | ≤ 0.3 | ≤ 1.5 | 332 | RPM | 35222 | 17611 | 10567 | 8806 | 5283 | 4227 | | | |
| | | | | | | (266-399) | Fz | 0.0151 | 0.041 | 0.085 | 0.101 | 0.133 | 0.148 | | | |
| | | Slot | 2 | 1 | ≤ 1 | 4 | 1 | ≤ 0.25 | 332 | RPM | 35222 | 17611 | 10567 | 8806 | 5283 | 4227 |
| | | | | | | | | | (266-399) | Fz | 0.0151 | 0.041 | 0.085 | 0.101 | 0.133 | 0.148 |
| | | | 4 | 1 | ≤ 0.25 | 332 | RPM | 35222 | 17611 | 10567 | 8806 | 5283 | 4227 | | | |
| | | | | | | (266-399) | Fz | 0.0151 | 0.041 | 0.085 | 0.101 | 0.133 | 0.148 | | | |
| | | ALUMINUM DIE CAST ALLOYS (HIGH SILICON) A-390, A-392, B-390 | ≤ 125 Bhn or ≤ 77 HRb | Profile | 2 | ≤ 0.3 | ≤ 1.5 | 155 | RPM | 16480 | 8240 | 4944 | 4120 | 2472 | 1978 | |
| | | | | | | | | (124-187) | Fz | 0.0166 | 0.043 | 0.091 | 0.110 | 0.147 | 0.160 | |
| 4 | ≤ 0.3 | | | | ≤ 1.5 | 155 | RPM | 16480 | 8240 | 4944 | 4120 | 2472 | 1978 | | | |
| | | | | | | (124-187) | Fz | 0.0166 | 0.043 | 0.091 | 0.110 | 0.147 | 0.160 | | | |
| Slot | 2 | | | 1 | ≤ 1 | 4 | 1 | ≤ 0.25 | 125 | RPM | 13249 | 6624 | 3975 | 3312 | 1987 | 1590 |
| | | | | | | | | | (100-150) | Fz | 0.0151 | 0.041 | 0.085 | 0.101 | 0.133 | 0.148 |
| | 4 | | | 1 | ≤ 0.25 | 125 | RPM | 13249 | 6624 | 3975 | 3312 | 1987 | 1590 | | | |
| | | | | | | (100-150) | Fz | 0.0151 | 0.041 | 0.085 | 0.101 | 0.133 | 0.148 | | | |
| COPPER ALLOYS Aluminum Bronze, Muntz Brass, Naval, Brass, Red Brass | ≤ 140 Bhn or ≤ 3 HRc | | | Profile | 2 | ≤ 0.3 | ≤ 1.5 | 180 | RPM | 19065 | 9533 | 5720 | 4766 | 2860 | 2288 | |
| | | | | | | | | (144-216) | Fz | 0.0094 | 0.024 | 0.053 | 0.062 | 0.083 | 0.093 | |
| | | 4 | ≤ 0.3 | | ≤ 1.5 | 180 | RPM | 19065 | 9533 | 5720 | 4766 | 2860 | 2288 | | | |
| | | | | | | (144-216) | Fz | 0.0094 | 0.024 | 0.053 | 0.062 | 0.083 | 0.093 | | | |
| | | Slot | 2 | 1 | ≤ 1 | 4 | 1 | ≤ 0.25 | 145 | RPM | 15349 | 7675 | 4605 | 3837 | 2302 | 1842 |
| | | | | | | | | | (116-174) | Fz | 0.0086 | 0.024 | 0.048 | 0.058 | 0.077 | 0.085 |
| | | | 4 | 1 | ≤ 0.25 | 145 | RPM | 15349 | 7675 | 4605 | 3837 | 2302 | 1842 | | | |
| | | | | | | (116-174) | Fz | 0.0086 | 0.024 | 0.048 | 0.058 | 0.077 | 0.085 | | | |
| | | COPPER ALLOYS Beryllium Copper, C110, Manganese Bronze, Tin Bronze | ≤ 200 Bhn or ≤ 23 HRc | Profile | 2 | ≤ 0.3 | ≤ 1.5 | 72 | RPM | 7594 | 3797 | 2278 | 1898 | 1139 | 911 | |
| | | | | | | | | (57-86) | Fz | 0.0094 | 0.024 | 0.053 | 0.062 | 0.083 | 0.093 | |
| 4 | ≤ 0.3 | | | | ≤ 1.5 | 72 | RPM | 7594 | 3797 | 2278 | 1898 | 1139 | 911 | | | |
| | | | | | | (57-86) | Fz | 0.0094 | 0.024 | 0.053 | 0.062 | 0.083 | 0.093 | | | |
| Slot | 2 | | | 1 | ≤ 1 | 4 | 1 | ≤ 0.25 | 58 | RPM | 6140 | 3070 | 1842 | 1535 | 921 | 737 |
| | | | | | | | | | (46-69) | Fz | 0.0086 | 0.024 | 0.048 | 0.058 | 0.077 | 0.085 |
| | 4 | | | 1 | ≤ 0.25 | 58 | RPM | 6140 | 3070 | 1842 | 1535 | 921 | 737 | | | |
| | | | | | | (46-69) | Fz | 0.0086 | 0.024 | 0.048 | 0.058 | 0.077 | 0.085 | | | |

continued on next page

2 Flute: High Shear End Mills

4 Flute: High Shear End Mills



| Series 52M, 54M Metric | Hardness | Flutes | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | |
|------------------------------|--|--|---------------------|---------------------|---------------|------------------------------------|------------------|--------|-------|-------|-------|-------|-------|
| | | | | | | 3 | 6 | 10 | 12 | 20 | 25 | | |
| N | PLASTICS ABS, Polycarbonate, PVC, Polypropylene | Profile  | 2 | ≤ 0.3 | ≤ 1.5 | 488 | RPM | 51702 | 25851 | 15511 | 12926 | 7755 | 6204 |
| | | | | | | (390-585) | Fz | 0.0264 | 0.072 | 0.149 | 0.178 | 0.237 | 0.250 |
| | | | | | | | Feed (mm/min) | 2730 | 3723 | 4622 | 4601 | 3676 | 3102 |
| | | Slot  | 2 | 1 | ≤ 1 | 390 | RPM | 41362 | 20681 | 12409 | 10340 | 6204 | 4963 |
| | | | | | | (312-468) | Fz | 0.0240 | 0.065 | 0.136 | 0.163 | 0.210 | 0.238 |
| | | | | | | | Feed (mm/min) | 1985 | 2689 | 3375 | 3371 | 2606 | 2363 |
| | PLASTICS Fiberglass, Glass Filled | Profile  | 2 | ≤ 0.3 | ≤ 1.5 | 219 | RPM | 23266 | 11633 | 6980 | 5816 | 3490 | 2792 |
| | | | | | | (176-263) | Fz | 0.0197 | 0.053 | 0.109 | 0.132 | 0.173 | 0.190 |
| | | | | | | | Feed (mm/min) | 917 | 1233 | 1522 | 1536 | 1208 | 1061 |
| | | Slot  | 2 | 1 | ≤ 1 | 175 | RPM | 18580 | 9290 | 5574 | 4645 | 2787 | 2230 |
| | | | | | | (140-210) | Fz | 0.0180 | 0.048 | 0.101 | 0.120 | 0.160 | 0.175 |
| | | | | | | | Feed (mm/min) | 669 | 892 | 1126 | 1115 | 892 | 780 |
| | 4 | 1 | ≤ 0.25 | | | 1338 | 1784 | 2252 | 2230 | 1784 | 1561 | | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
 rpm = (Vc x 1000) / (D₁ x 3.14)
 mm/min = Fz x number of flutes x rpm
 reduce speed and feed for materials harder than listed
 reduce feed and Ae when finish milling (.02 x D₁ maximum)
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

High Performance Drills



Hole Making

| HIGH PERFORMANCE DRILLS | SERIES | DESCRIPTION | PAGE |
|-------------------------|------------|---|------|
| Hi-PerCarb | 135 (3xD) | 2 Flute External Coolant Double Margin 3xD | 245 |
| | 135 (5xD) | 2 Flute External Coolant Double Margin 5xD | 254 |
| | 131N (3xD) | 3 Flute External Coolant Triple Margin 3xD | 264 |
| | 131N (5xD) | 3 Flute External Coolant Triple Margin 5xD | 268 |
| | 141K (5xD) | 3 Flute Internal Coolant Triple Margin 5xD | 274 |
| Ice-Carb® | 140 (5xD) | 2 Flute Internal Coolant 5xD | 280 |
| | 140 (8xD) | 2 Flute Internal Coolant 8xD | 288 |
| CFRP 8 Facet | 120 | 2 Flute External Coolant Double Margin CFRP | 296 |

Speed & Feed Recommendations listed after each series

Taladrado

| BROCAS DE ALTO RENDIMIENTO | SERIE | DESCRIPCIÓN | PÁGINA |
|----------------------------|------------|--|--------|
| Hi-PerCarb | 135 (3xD) | 2 filos, refrigeración externa, doble margen, 3xD | 245 |
| | 135 (5xD) | 2 filos, refrigeración externa, doble margen, 5xD | 254 |
| | 131N (3xD) | 3 filos, refrigeración externa, triple margen, 3xD | 264 |
| | 131N (5xD) | 3 filos, refrigeración externa, triple margen, 5xD | 268 |
| | 141K (5xD) | 3 filos, refrigeración interna, triple margen, 5xD | 274 |
| Ice-Carb® | 140 (5xD) | 2 filos, refrigeración interna, 5xD | 280 |
| | 140 (8xD) | 2 filos, refrigeración interna, 8xD | 288 |
| De 8 caras CFRP | 120 | 2 filos, refrigeración externa, doble margen, CFRP | 296 |

Recomendaciones de velocidades y avances mostradas tras cada serie

Outils de perçage

| FORETS HAUTE PERFORMANCE | SÉRIES | DESCRIPTION | PAGE |
|--------------------------|------------|--|------|
| Hi-PerCarb | 135 (3xD) | 2 dents refroidissement externe à double listel 3xD | 245 |
| | 135 (5xD) | 2 dents refroidissement externe à double listel 5xD | 254 |
| | 131N (3xD) | 3 dents refroidissement externe à triple listel 3xD | 264 |
| | 131N (5xD) | 3 dents refroidissement externe à triple listel 5xD | 268 |
| | 141K (5xD) | 3 dents refroidissement interne à triple listel 5xD | 274 |
| Ice-Carb® | 140 (5xD) | 2 dents refroidissement interne 5xD | 280 |
| | 140 (8xD) | 2 dents refroidissement interne 8xD | 288 |
| CFRP à 8 facettes | 120 | 2 dents refroidissement externe à double listel CFRP | 296 |

Recommandations de vitesse et avance indiquées après chaque série

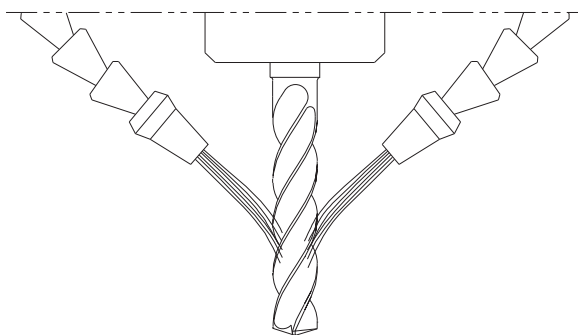
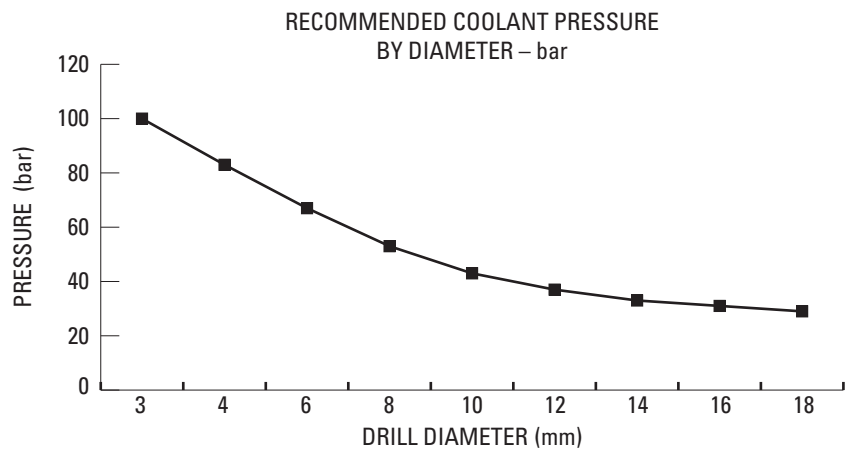
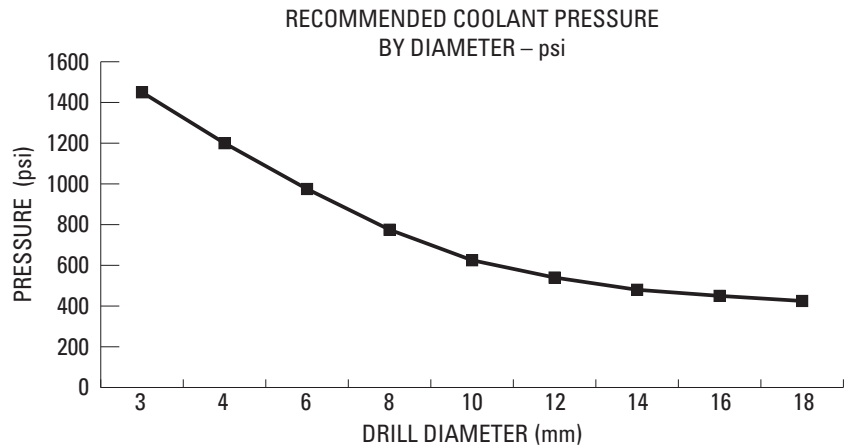
Bohren

| HOCHLEISTUNGS-BOHRER | SERIE | BESCHREIBUNG | SEITE |
|----------------------|------------|---|-------|
| Hi-PerCarb | 135 (3xD) | Doppelfasenbohrer 3xD mit 2 Schneiden und Außenkühlung | 245 |
| | 135 (5xD) | Doppelfasenbohrer 5xD mit 2 Schneiden und Außenkühlung | 254 |
| | 131N (3xD) | Dreifasenbohrer 3xD mit 3 Schneiden und Außenkühlung | 264 |
| | 131N (5xD) | Dreifasenbohrer 5xD mit 3 Schneiden und Außenkühlung | 268 |
| | 141K (5xD) | Dreifasenbohrer 5xD mit 3 Schneiden und Innenkühlung | 274 |
| Ice-Carb® | 140 (5xD) | Bohrer 5xD mit 2 Schneiden und Innenkühlung | 280 |
| | 140 (8xD) | Bohrer 8xD mit 2 Schneiden und Innenkühlung | 288 |
| CFRP 8 Facet | 120 | Doppelfasenbohrer CFRP mit 2 Schneiden und Außenkühlung | 296 |

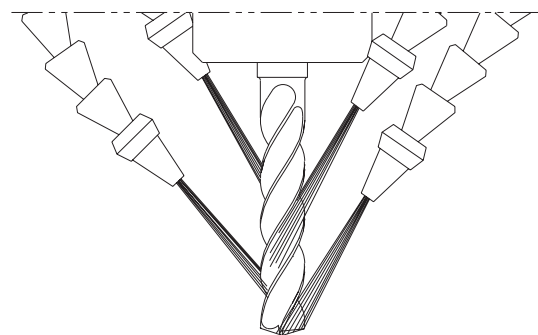
Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

Drilling Operations Coolant Recommendations

- Coolant works to mobilize chips away from the cut zone, reduce the heat created during the cutting process and minimize friction.
- It is important to optimize the coolant pressure and position in order to gain the full benefits coolant offers the cutting process.
- Proper coolant application promotes greater operating parameters, greater material removal rates, improved surface finishes, predictable tool life, reduced power consumption and reduced cycle times.
- Pressure is important, but more importantly is consistency of the pressure and application onto the tool; intermittent cooling of carbide leads to thermal stressing of the material and the formation of “microcracks.”
- Proper cleanliness and filtration of coolants is important in order for the coolant to maintain its beneficial properties, and also to avoid a reduction in coolant pressure or the possibility of clogging the coolant channels in coolant through drills.



LARGE TIP – LOW VELOCITY
NO COVERAGE AT MAXIMUM DEPTH

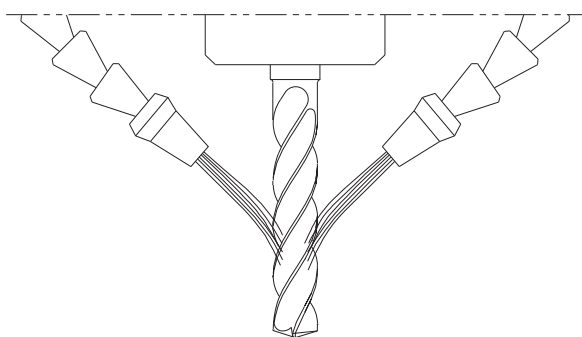
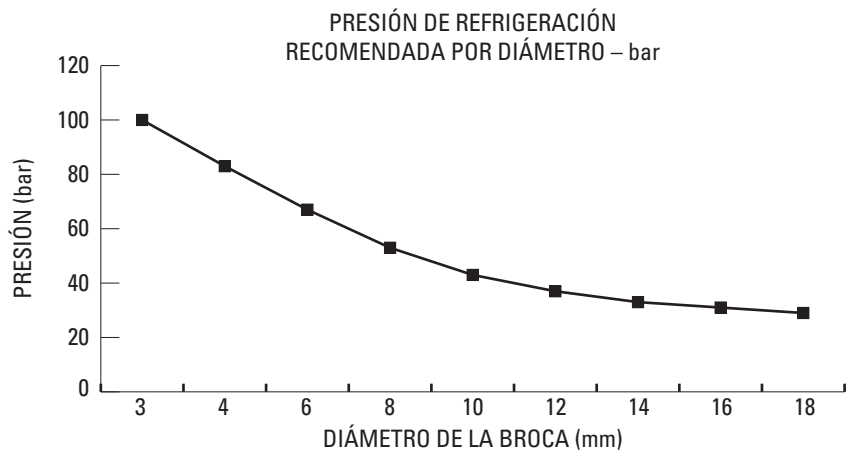
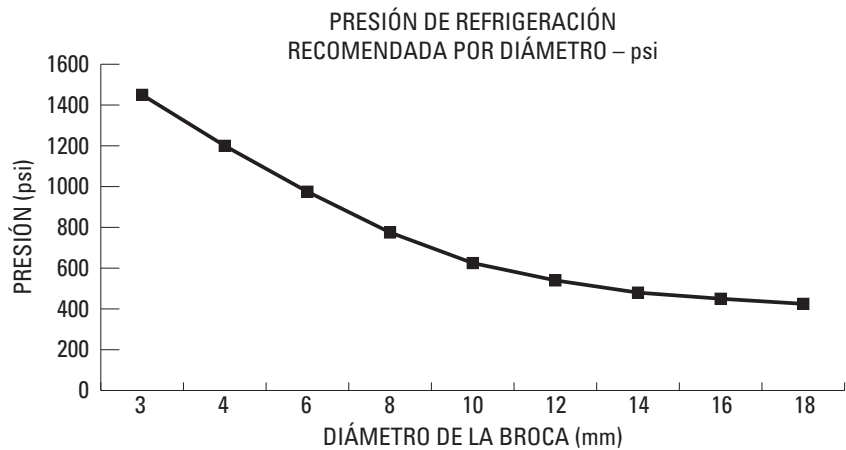


SMALL TIP – HIGH VELOCITY
COMPLETE COVERAGE

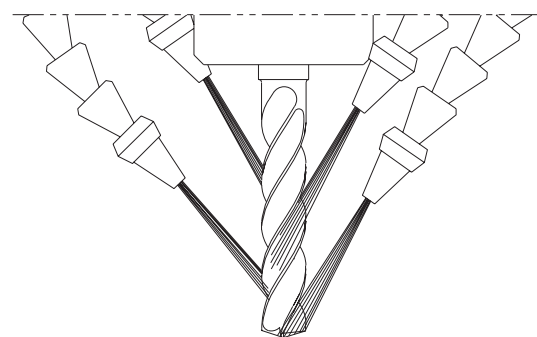
- Reducing the nozzle size helps maximize the cooling benefits of the unique double margin design on the Hi-PerCarb drill by increasing velocity. Aim the nozzles in line with the secondary flute located between the two margins as well as the flute for best results.

Recomendaciones en operación de taladrado

- El líquido de refrigeración actúa movilizándolo fuera de la zona de corte, disminuyendo el calor generado durante el proceso de corte y minimizando la fricción.
- Es importante optimizar la presión de la refrigeración y la posición para poder obtener todos los beneficios del refrigerante durante el proceso de corte.
- Una aplicación apropiada de la refrigeración fomenta mayores parámetros de operación, mayores índices de eliminación de material, acabados de superficie mejorados, una duración de la herramienta más predecible, bajo consumo de energía y un tiempo de ciclo reducido.
- La presión del refrigerante es importante, pero lo es más el flujo continuo aplicado a la herramienta; una refrigeración intermitente en el carburo puede ocasionar un estrés térmico en el material y la formación de "micro-fisuras".
- Una limpieza y filtración adecuadas son importantes para que el refrigerante mantenga sus propiedades y beneficios; por otra parte, se evita la reducción de la presión o la posibilidad de obstruir los canales de refrigeración de la broca.



PUNTA GRANDE – BAJA VELOCIDAD
SIN ALCANCE A PROFUNDIDAD MÁXIMA



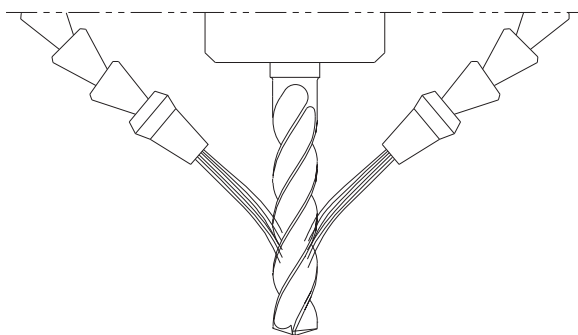
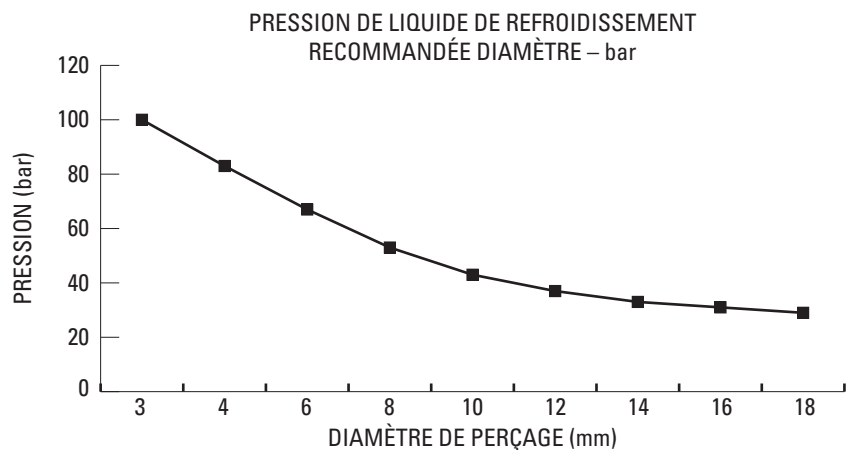
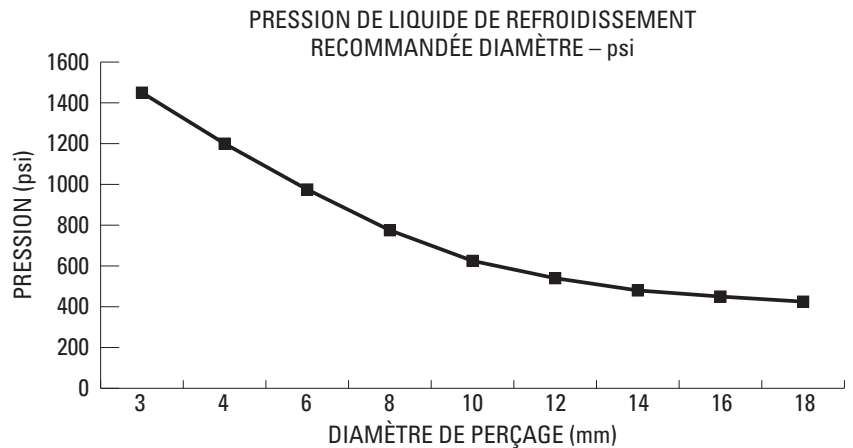
PUNTA PEQUEÑA – ALTA VELOCIDAD
COMPLETO ALCANCE

- Reducir el tamaño de la boquilla ayuda a maximizar los beneficios de refrigeración del exclusivo diseño de doble margen de la broca. Hi-PerCarb aumentando la velocidad. Coloque las boquillas en línea con el segundo filo que se encuentra entre los dos márgenes y también el filo para obtener mejores resultados.

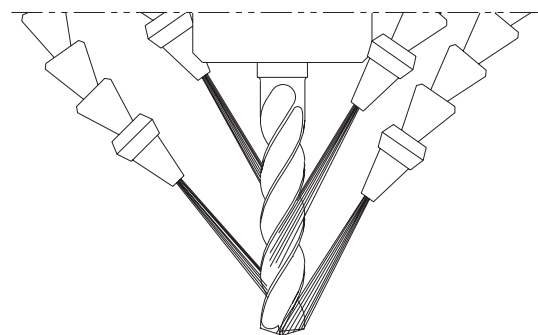
Opérations de perçage

Recommandations en matière de refroidissement

- Le liquide de refroidissement sert à éloigner les copeaux de la zone de coupe, à réduire la chaleur dégagée durant la coupe et à minimiser la friction.
- Il est important d'optimiser la pression et la position du réfrigérant pour en retirer les bénéfices maximums durant la coupe.
- L'application adéquate de réfrigérant se traduit par des paramètres opératoires supérieurs, des taux d'élimination supérieurs des matériaux, de plus belles finitions des surfaces, une durée de vie des outils prévisible, moins de consommation d'énergie et des temps de cycle réduits.
- La pression est importante, mais une pression régulière et l'application sur l'outil sont des facteurs encore plus importants ; le refroidissement intermittent du carbure se traduit par des contraintes thermiques pour le matériau et la formation de microfissures.
- La propreté et le filtrage adéquats des réfrigérants sont importants pour qu'ils conservent leur propriétés, mais aussi pour éviter la réduction de pression du réfrigérant ou le risque d'obturation des conduits à réfrigérant dans les perceuses à réfrigérant intégré.



POINTE LARGE – BASSE VITESSE
PAS DE COUVERTURE À LA PROFONDEUR MAXIMUM



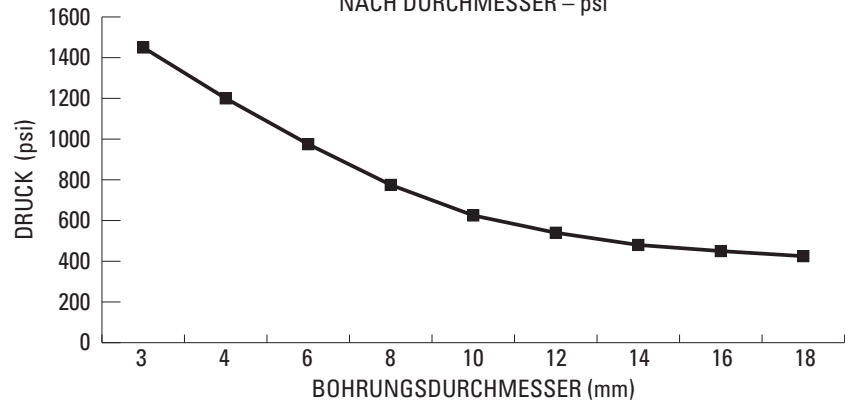
POINTE FINE – GRANDE VITESSE
COUVERTURE COMPLÈTE

- La réduction de la taille de l'embout permet de maximiser les bienfaits du refroidissement du concept à double listel original de la perceuse Hi-PerCarb en augmentant la vitesse. Pour les meilleurs résultats, orientez les embouts dans l'axe de la goujure secondaire située entre les deux listels, de même que la goujure primaire.

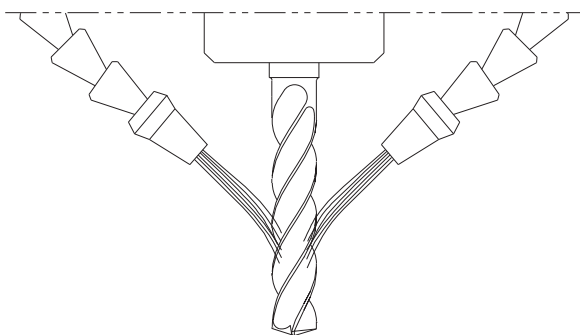
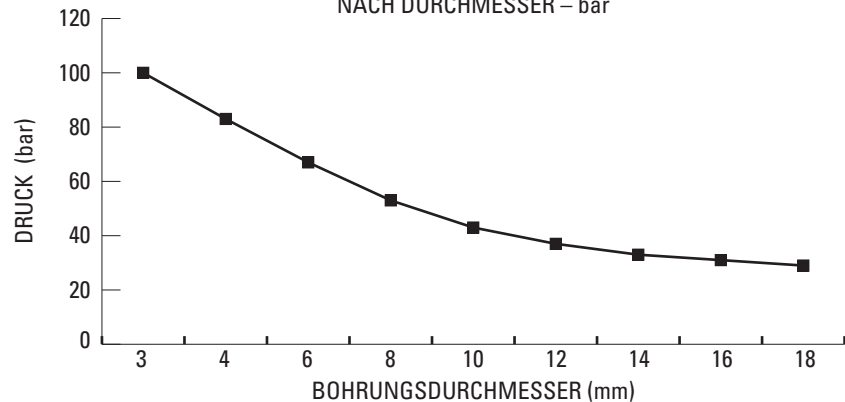
Bohrarbeiten Kühlmittelempfehlungen

- Kühlmittel dienen dazu, die Späne aus dem Schneidenbereich zu entfernen, die beim Schneiden erzeugte Wärme abzutransportieren und die Reibung zu verringern.
- Es kommt darauf an, den Kühlschmiermitteldruck und die Zufuhr zu optimieren, um alle Vorteile beim Bohren nutzen zu können.
- Der richtige Kühlschmiermitteleinsatz ermöglicht höhere Schnittparameter, höheren Materialabtrag, bessere Oberflächengüte, vorhersehbare Standzeiten und geringere Leistungsaufnahme und Laufzeiten.
- Der Druck ist wichtig, aber wichtiger ist dessen Konstanz und die Zufuhr zum Werkzeug. Unterbrochene Kühlung des Hartmetalls führt zur thermischen Belastung und Bildung von "Mikrorissen".
- Kühlmittel sind sauber zu halten und zu filtern, damit die Qualität des Kühlmittels erhalten bleibt und der Kühlmitteldruck durch Verstopfung der Kühlmittelkanäle im Bohrer nicht absinkt.

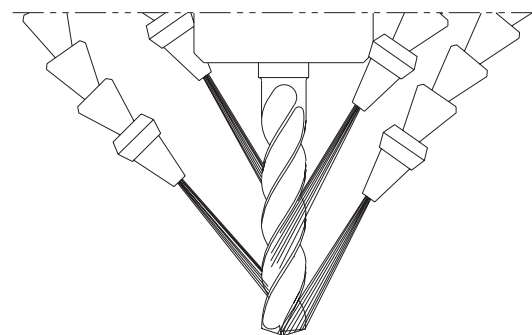
EMPFOHLENER KÜHLSCHMIERMITTELDRUCK
NACH DURCHMESSER – psi



EMPFOHLENER KÜHLMITTELDRUCK
NACH DURCHMESSER – bar

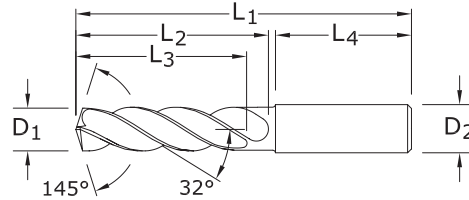


BREITE QUERSCHNEIDE – GERINGE DREHZAHL
KEINE VOLLSTÄNDIGE BENETZUNG BEI MAX. BOHRUNGSTIEFE



SCHMALE QUERSCHNEIDE – HOHE DREHZAHL
VOLLSTÄNDIGE BENETZUNG

- Durch Verringern der Düsengröße können die vorteilhaften Eigenschaften der Doppelfase genutzt werden, um die Drehzahl des Hi-PerCarb-Bohrers zu steigern. Richten Sie die Düsen auf die Nebennut zwischen beiden Fasen sowie auf die Schneiden aus, um beste Ergebnisse zu erzielen.



TOLERANCES (inch)

<.1181 DIAMETER

D₁ = +.00008/+0.00047

D₂ = h₆

>.1181-.2362 DIAMETER

D₁ = +.00016/+0.00063

D₂ = h₆

>.2362-.3937 DIAMETER

D₁ = +.00024/+0.00083

D₂ = h₆

>.3937-.7087 DIAMETER

D₁ = +.00028/+0.00098

D₂ = h₆

>.7087-1.1811 DIAMETER

D₁ = +.00031/+0.00114

D₂ = h₆

TOLERANCES (mm)

≤3 DIAMETER

D₁ = +0,002/+0,012

D₂ = h₆

>3-6 DIAMETER

D₁ = +0,004/+0,016

D₂ = h₆

>6-10 DIAMETER

D₁ = +0,006/+0,021

D₂ = h₆

>10-18 DIAMETER

D₁ = +0,007/+0,025

D₂ = h₆

>18-30 DIAMETER

D₁ = +0,008/+0,029

D₂ = h₆

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

NON-FERROUS

HARDENED STEELS

For patent information visit
www.ksptpatents.com

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITiN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 1/64 | 0.0156 | 0.40 | | 1/8 | 1-1/2 | 1/8 | 5/64 | 1 | 51752* |
| 1/32 | 0.0312 | 0.79 | | 1/8 | 1-1/2 | 1/4 | 3/16 | 1 | 51269* |
| 3/64 | 0.0469 | 1.19 | 1/16-64 | 1/8 | 1-1/2 | 3/8 | 5/16 | 1 | 51270* |
| 1,25 mm | 0.0492 | | | 3,0 | 38,0 | 9,5 | 8,0 | 25,0 | 64500* |
| 1,45 mm | 0.0571 | | | 3,0 | 38,0 | 9,5 | 8,0 | 25,0 | 64501* |
| #53 | 0.0595 | 1.51 | | 1/8 | 1-1/2 | 3/8 | 5/16 | 1 | 64502* |
| 1/16 | 0.0625 | 1.59 | 5/64-60 | 1/8 | 2 | 7/16 | 3/8 | 1-1/4 | 51271* |
| 1,6 mm | 0.0630 | | | 3,0 | 50,0 | 11,0 | 9,0 | 32,0 | 64503* |
| 1,75 mm | 0.0689 | | | 3,0 | 50,0 | 11,0 | 9,0 | 32,0 | 64504* |
| #50 | 0.0700 | 1.78 | | 1/8 | 2 | 7/16 | 3/8 | 1-1/4 | 64505* |
| 5/64 | 0.0781 | 1.98 | | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 51272* |
| #47 | 0.0785 | 1.99 | | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 64506* |
| 2,05 mm | 0.0807 | | | 3,0 | 50,0 | 12,0 | 11,0 | 32,0 | 64507* |
| #46 | 0.0810 | 2.06 | | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 64508* |
| #43 | 0.0890 | 2.26 | | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 64509* |
| #42 | 0.0935 | 2.37 | | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 64510* |
| 3/32 | 0.0938 | 2.38 | 1/8-32 | 1/8 | 2 | 1/2 | 7/16 | 1-1/4 | 51273 |
| #40 | 0.0980 | 2.49 | | 1/8 | 2 | 9/16 | 1/2 | 1-1/4 | 51274 |
| 2,5 mm | 0.0984 | | | 3,0 | 50,0 | 14,0 | 12,0 | 32,0 | 64511 |
| #39 | 0.0995 | 2.53 | | 1/8 | 2 | 9/16 | 1/2 | 1-1/4 | 51753 |
| #38 | 0.1015 | 2.58 | 5-40 | 1/8 | 2 | 9/16 | 1/2 | 1-1/4 | 51754 |
| #37 | 0.1040 | 2.64 | 5-44 | 1/8 | 2 | 9/16 | 1/2 | 1-1/4 | 51755 |
| #36 | 0.1065 | 2.71 | 6-32 | 1/8 | 2 | 9/16 | 1/2 | 1-1/4 | 51756 |
| 7/64 | 0.1094 | 2.78 | | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51275 |
| #35 | 0.1100 | 2.79 | | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51276 |
| #34 | 0.1110 | 2.82 | | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51277 |
| #33 | 0.1130 | 2.87 | 6-40 | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51757 |
| 2,9 mm | 0.1142 | | | 3,0 | 50,0 | 16,0 | 14,0 | 32,0 | 64512 |
| #32 | 0.1160 | 2.95 | | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51758 |
| 3,0 mm | 0.1181 | | | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63155 |
| #31 | 0.1200 | 3.05 | | 1/8 | 2 | 5/8 | 9/16 | 1-1/4 | 51759 |
| 3,1 mm | 0.1220 | | | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63741 |
| 1/8 | 0.1250 | 3.18 | | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51330 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63156 |
| #30 | 0.1285 | 3.26 | | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51278 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63157 |
| 3,4 mm | 0.1339 | | | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63158 |
| #29 | 0.1360 | 3.45 | 8-32,8-36 | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51331 |
| 3,5 mm | 0.1378 | | M4 X 0,5 | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63159 |
| #28 | 0.1405 | 3.57 | 8-40 | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51760 |
| 9/64 | 0.1406 | 3.57 | | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51332 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63160 |
| #27 | 0.1440 | 3.66 | | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51761 |
| 3,7 mm | 0.1457 | | M4.5 X 0,75 | 6,0 | 62,0 | 20,0 | 17,0 | 36,0 | 63161 |
| #26 | 0.1470 | 3.73 | 3/16-24 | 1/4 | 2-1/2 | 3/4 | 21/32 | 1-7/16 | 51762 |
| #25 | 0.1495 | 3.80 | 10-24 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51333 |

*Single Margin

continued on next page

135 3xD
FRACTIONAL & METRIC SERIES

- Double margin design improves accuracy and surface finish along with increased strength for aggressive drilling
- Specialized self-centering notched point eliminates the need for spot drilling decreasing thrust and deflection
- Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
- Recommended for materials ≤ 56 HRC (≤ 577 Bhn)

Hi-PerCarb

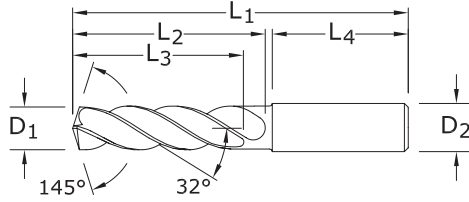


3xD



135 3xD

FRACTIONAL & METRIC SERIES



- Double margin design improves accuracy and surface finish along with increased strength for aggressive drilling
- Specialized self-centering notched point eliminates the need for spot drilling decreasing thrust and deflection
- Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
- Recommended for materials ≤ 56 HRc (≤ 577 Bhn)

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITiN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 3,8 mm | 0.1496 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63742 |
| #24 | 0.1520 | 3.86 | 10-28 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51763 |
| 3,9 mm | 0.1535 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63743 |
| #23 | 0.1540 | 3.91 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51764 |
| 5/32 | 0.1562 | 3.97 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51334 |
| #22 | 0.1570 | 3.99 | 10-30 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51765 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63162 |
| #21 | 0.1590 | 4.04 | 10-32 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51335 |
| #20 | 0.1610 | 4.09 | 13/64-24 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51279 |
| 4,1 mm | 0.1614 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63744 |
| 4,2 mm | 0.1654 | | M5 / M5 X 0,75 | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63163 |
| #19 | 0.1660 | 4.22 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51766 |
| 4,3 mm | 0.1693 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63164 |
| #18 | 0.1695 | 4.31 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51767 |
| 11/64 | 0.1719 | 4.37 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51336 |
| #17 | 0.1730 | 4.39 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51768 |
| 4,4 mm | 0.1732 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63745 |
| #16 | 0.1770 | 4.50 | 12-24 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51769 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63165 |
| #15 | 0.1800 | 4.57 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51770 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63166 |
| #14 | 0.1820 | 4.62 | | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51771 |
| #13 | 0.1850 | 4.70 | 12-32 | 1/4 | 2-5/8 | 7/8 | 23/32 | 1-7/16 | 51772 |
| 4,7 mm | 0.1850 | | | 6,0 | 66,0 | 24,0 | 21,0 | 36,0 | 63746 |
| 3/16 | 0.1875 | 4.76 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51337 |
| #12 | 0.1890 | 4.80 | 7/32-32 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51773 |
| 4,8 mm | 0.1890 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63167 |
| #11 | 0.1910 | 4.85 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51774 |
| 4,9 mm | 0.1929 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63747 |
| #10 | 0.1935 | 4.91 | 14-20 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51775 |
| #9 | 0.1960 | 4.98 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51776 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63168 |
| #8 | 0.1990 | 5.05 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51777 |
| 5,1 mm | 0.2008 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63748 |
| #7 | 0.2010 | 5.11 | 1/4-20 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51338 |
| 13/64 | 0.2031 | 5.16 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51339 |
| #6 | 0.2040 | 5.18 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51778 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63749 |
| #5 | 0.2055 | 5.22 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51779 |
| 5,25 mm | 0.2067 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63169 |
| 5,3 mm | 0.2087 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63170 |
| #4 | 0.2090 | 5.31 | 1/4-24 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51780 |
| 5,4 mm | 0.2126 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63750 |
| #3 | 0.2130 | 5.41 | 1/4-28 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51340 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | 63171 |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | 51341 |

TOLERANCES (inch)

≤.1181 DIAMETER
D₁ = +.00008/+0.00047
D₂ = h₆

>.1181-.2362 DIAMETER
D₁ = +.00016/+0.00063
D₂ = h₆

>.2362-.3937 DIAMETER
D₁ = +.00024/+0.00083
D₂ = h₆

>.3937-.7087 DIAMETER
D₁ = +.00028/+0.00098
D₂ = h₆

>.7087-1.1811 DIAMETER
D₁ = +.00031/+0.00114
D₂ = h₆

TOLERANCES (mm)

≤3 DIAMETER
D₁ = +0,002/+0,012
D₂ = h₆

>3-6 DIAMETER
D₁ = +0,004/+0,016
D₂ = h₆

>6-10 DIAMETER
D₁ = +0,006/+0,021
D₂ = h₆

>10-18 DIAMETER
D₁ = +0,007/+0,025
D₂ = h₆

>18-30 DIAMETER
D₁ = +0,008/+0,029
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com

continued on next page



135 3xD

FRACTIONAL & METRIC SERIES

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITiN) | EDP NO. |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|---------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | | |
| 5,6 mm | 0.2205 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | | 63751 |
| #2 | 0.2210 | 5.61 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | | 51781 |
| 5,7 mm | 0.2244 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | | 63752 |
| #1 | 0.2280 | 5.79 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | | 51782 |
| 5,8 mm | 0.2283 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | | 63172 |
| 5,9 mm | 0.2323 | | | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | | 63753 |
| A | 0.2340 | 5.94 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | | 51601 |
| 15/64 | 0.2344 | 5.95 | | 1/4 | 2-5/8 | 1 | 53/64 | 1-7/16 | | 51342 |
| 6,0 | 0.2362 | 6.00 | M7 X 1 | 6,0 | 66,0 | 28,0 | 24,0 | 36,0 | | 63173 |
| B | 0.2380 | 6.05 | | 1/4 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51602 |
| 6,1 mm | 0.2402 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63754 |
| C | 0.2420 | 6.15 | | 1/4 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51603 |
| 6,2 mm | 0.2441 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63755 |
| D | 0.2460 | 6.25 | | 1/4 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51604 |
| 6,25 mm | 0.2461 | | M7 X 0,75 | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63174 |
| 6,3 mm | 0.2480 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63756 |
| 1/4 | 0.2500 | 6.35 | | 1/4 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51343 |
| E | 0.2500 | 6.35 | | 1/4 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51605 |
| 6,4 mm | 0.2520 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63175 |
| 6,5 mm | 0.2559 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63213 |
| F | 0.2570 | 6.53 | 5/16-18 | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51344 |
| 6,6 mm | 0.2598 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63757 |
| G | 0.2610 | 6.63 | | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51606 |
| 6,7 mm | 0.2638 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63758 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51345 |
| H | 0.2660 | 6.76 | | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51607 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63176 |
| 6,9 mm | 0.2717 | | | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63759 |
| I | 0.2720 | 6.91 | 5/16-24 | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51346 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 79,0 | 34,0 | 28,0 | 36,0 | | 63177 |
| J | 0.2770 | 7.04 | | 5/16 | 3-1/8 | 1-5/16 | 1-3/64 | 1-7/16 | | 51608 |
| 7,1 mm | 0.2795 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63760 |
| K | 0.2810 | 7.14 | | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | | 51609 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | | 51347 |
| 7,2 mm | 0.2835 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63761 |
| 7,25 mm | 0.2854 | | M8 X 0,75 | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63178 |
| 7,3 mm | 0.2874 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63762 |
| L | 0.2900 | 7.37 | | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | | 51610 |
| 7,4 mm | 0.2913 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63763 |
| M | 0.2950 | 7.49 | | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | | 51611 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63179 |
| 19/64 | 0.2969 | 7.54 | | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | | 51348 |
| 7,6 mm | 0.2992 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63764 |
| N | 0.3020 | 7.67 | | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | | 51612 |
| 7,7 mm | 0.3031 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63765 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63180 |
| 7,9 mm | 0.3110 | | | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63766 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 5/16 | 3-1/8 | 1-9/16 | 1-3/16 | 1-7/16 | | 51349 |
| 8,0 mm | 0.3150 | | M9 x 1 | 8,0 | 79,0 | 41,0 | 34,0 | 36,0 | | 63181 |
| O | 0.3160 | 8.03 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | | 51613 |
| 8,1 mm | 0.3189 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | | 63767 |
| 8,2 mm | 0.3228 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | | 63768 |
| P | 0.3230 | 8.20 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | | 51614 |
| 8,3 mm | 0.3268 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | | 63769 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | | 51350 |
| 8,4 mm | 0.3307 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | | 63182 |
| Q | 0.3320 | 8.43 | 3/8-24 | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | | 51351 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | | 63183 |

CONTINUED

continued on next page

Hi-PerCarb



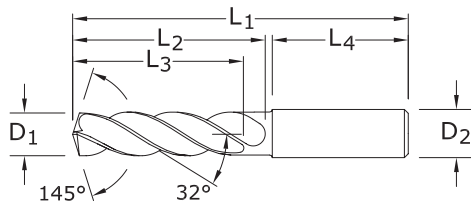
3xD



2

135 3xD

FRACTIONAL & METRIC SERIES



- Double margin design improves accuracy and surface finish along with increased strength for aggressive drilling
- Specialized self-centering notched point eliminates the need for spot drilling decreasing thrust and deflection
- Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
- Recommended for materials ≤ 56 HRc (≤ 577 Bhn)

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITiN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 8,6 mm | 0.3386 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63770 |
| R | 0.3390 | 8.61 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51615 |
| 8,7 mm | 0.3425 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63771 |
| 11/32 | 0.3438 | 8.73 | 3/8-32 | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51352 |
| 8,8 mm | 0.3465 | | M10 X 1,25 | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63184 |
| S | 0.3480 | 8.84 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51616 |
| 8,9 mm | 0.3504 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63772 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63185 |
| T | 0.3580 | 9.09 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51617 |
| 9,1 mm | 0.3583 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63773 |
| 23/64 | 0.3594 | 9.13 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51353 |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63774 |
| 9,25 mm | 0.3642 | 9.25 | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63186 |
| 9,3 mm | 0.3661 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63775 |
| U | 0.3680 | 9.35 | 7/16-14 | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51354 |
| 9,4 mm | 0.3701 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63776 |
| 9,5 mm | 0.3740 | | M10 X 0,5 | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63187 |
| 3/8 | 0.3750 | 9.53 | | 3/8 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51355 |
| V | 0.3770 | 9.58 | | 1/2 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51618 |
| 9,6 mm | 0.3780 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63777 |
| 9,7 mm | 0.3819 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63778 |
| 9,8 mm | 0.3858 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63779 |
| W | 0.3860 | | | 1/2 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51619 |
| 9,9 mm | 0.3898 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63780 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 1/2 | 3-1/2 | 1-27/32 | 1-37/64 | 1-9/16 | 51356 |
| 10,0 mm | 0.3937 | | | 10,0 | 89,0 | 47,0 | 40,0 | 40,0 | 63188 |
| X | 0.3970 | 10.08 | 7/16-24 | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51620 |
| 10,1 mm | 0.3976 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63781 |
| 10,2 mm | 0.4016 | | M12 X 1,75 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63189 |
| Y | 0.4040 | 10.26 | 7/16-28 | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51621 |
| 10,3 mm | 0.4055 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63782 |
| 13/32 | 0.4062 | 10.32 | | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51357 |
| 10,4 mm | 0.4094 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63783 |
| Z | 0.4130 | 10.49 | | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51622 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63190 |
| 10,6 mm | 0.4173 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63784 |
| 10,7 mm | 0.4213 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63785 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51358 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63191 |
| 10,9 mm | 0.4291 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63786 |
| 11,0 mm | 0.4331 | | M12 X 1 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63192 |
| 11,1 mm | 0.4370 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63787 |
| 7/16 | 0.4375 | 11.11 | 1/4-18 NPT | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51359 |
| 11,2 mm | 0.4409 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63788 |
| 11,25 mm | 0.4429 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63193 |
| 11,3 mm | 0.4449 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63789 |
| 11,4 mm | 0.4488 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63790 |

TOLERANCES (inch)

- $\leq .1181$ DIAMETER
D₁ = +.0008/+0.0047
D₂ = h₆
- $>.1181-.2362$ DIAMETER
D₁ = +.00016/+0.00063
D₂ = h₆
- $>.2362-.3937$ DIAMETER
D₁ = +.00024/+0.00083
D₂ = h₆
- $>.3937-.7087$ DIAMETER
D₁ = +.00028/+0.00098
D₂ = h₆
- $>.7087-1.1811$ DIAMETER
D₁ = +.00031/+0.00114
D₂ = h₆

TOLERANCES (mm)

- ≤ 3 DIAMETER
D₁ = +0,002/+0,012
D₂ = h₆
- $>3-6$ DIAMETER
D₁ = +0,004/+0,016
D₂ = h₆
- $>6-10$ DIAMETER
D₁ = +0,006/+0,021
D₂ = h₆
- $>10-18$ DIAMETER
D₁ = +0,007/+0,025
D₂ = h₆
- $>18-30$ DIAMETER
D₁ = +0,008/+0,029
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com

continued on next page



| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITIN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63194 |
| 29/64 | 0.4531 | 11.51 | 1/2-20 | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51360 |
| 11,6 mm | 0.4567 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63791 |
| 11,7 mm | 0.4606 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63792 |
| 11,8 mm | 0.4646 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63793 |
| 11,9 mm | 0.4685 | | | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63794 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 1/2 | 4-1/16 | 2-3/16 | 1-51/64 | 1-49/64 | 51361 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 102,0 | 55,0 | 45,0 | 45,0 | 63195 |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 1/2 | 4-1/4 | 2-5/16 | 1-7/8 | 1-49/64 | 51362 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 107,0 | 60,0 | 49,0 | 45,0 | 63196 |
| 1/2 | 0.5000 | 12.70 | | 1/2 | 4-1/4 | 2-5/16 | 1-7/8 | 1-49/64 | 51363 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 107,0 | 60,0 | 49,0 | 45,0 | 63197 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 107,0 | 60,0 | 49,0 | 45,0 | 63198 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 5/8 | 4-1/4 | 2-5/16 | 1-7/8 | 1-49/64 | 51364 |
| 17/32 | 0.5312 | 13.49 | 5/8-11 | 5/8 | 4-1/4 | 2-5/16 | 1-7/8 | 1-49/64 | 51365 |
| 13,5 mm | 0.5315 | | | 14,0 | 107,0 | 60,0 | 49,0 | 45,0 | 63199 |
| 35/64 | 0.5469 | 13.89 | 5/8-12 | 5/8 | 4-1/4 | 2-5/16 | 1-7/8 | 1-49/64 | 51783 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 107,0 | 60,0 | 49,0 | 45,0 | 63200 |
| 9/16 | 0.5625 | 14.29 | | 5/8 | 4-9/16 | 2-1/2 | 2 | 1-57/64 | 51366 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 115,0 | 65,0 | 51,0 | 48,0 | 63201 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 5/8 | 4-9/16 | 2-1/2 | 2 | 1-57/64 | 51367 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 115,0 | 65,0 | 51,0 | 48,0 | 63202 |
| 19/32 | 0.5938 | 15.08 | 11/16-11 | 5/8 | 4-9/16 | 2-1/2 | 2 | 1-57/64 | 51784 |
| 39/64 | 0.6094 | 15.48 | 11/16-12 | 5/8 | 4-9/16 | 2-1/2 | 2 | 1-57/64 | 51785 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 115,0 | 65,0 | 51,0 | 48,0 | 63203 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 5/8 | 4-9/16 | 2-1/2 | 2 | 1-57/64 | 51368 |
| 16,0 mm | 0.6299 | | | 16,0 | 115,0 | 65,0 | 51,0 | 48,0 | 63204 |
| 41/64 | 0.6406 | 16.27 | 11/16-24 | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51786 |
| 16,5 mm | 0.6496 | | M18 X 1,5 | 18,0 | 123,0 | 73,0 | 58,0 | 48,0 | 63205 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51369 |
| 17,0 mm | 0.6693 | | | 18,0 | 123,0 | 73,0 | 58,0 | 48,0 | 63206 |
| 43/64 | 0.6719 | 17.07 | 3/4-12 | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51787 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51370 |
| 17,5 mm | 0.6890 | | M20 X 2,5 | 18,0 | 123,0 | 73,0 | 58,0 | 48,0 | 63207 |
| 45/64 | 0.7031 | 17.86 | 3/4-20, 1/2-14 NPT | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51788 |
| 18,0 mm | 0.7087 | | | 18,0 | 123,0 | 73,0 | 58,0 | 48,0 | 63208 |
| 23/32 | 0.7188 | 18.26 | | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51789 |
| 18,5 mm | 0.7283 | | M20 X 1,5 | 20,0 | 131,0 | 79,0 | 63,0 | 50,0 | 63209 |
| 47/64 | 0.7344 | 18.65 | 13/16-12 | 3/4 | 4-7/8 | 2-3/4 | 2-5/16 | 1-57/64 | 51790 |
| 19,0 mm | 0.7480 | | | 20,0 | 131,0 | 79,0 | 63,0 | 50,0 | 63210 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 3/4 | 5-1/4 | 3-1/16 | 2-7/16 | 1-31/32 | 51371 |
| 49/64 | 0.7656 | 19.45 | 7/8-9 | 7/8 | 5-1/4 | 3-1/16 | 2-7/16 | 1-31/32 | 51372 |
| 19,5 mm | 0.7677 | | M22 X 2,5 | 20,0 | 131,0 | 79,0 | 63,0 | 50,0 | 63211 |
| 25/32 | 0.7812 | 19.84 | | 7/8 | 6 | 3-11/16 | 2-11/16 | 2-1/8 | 51791 |
| 20,0 mm | 0.7874 | | | 20,0 | 131,0 | 79,0 | 63,0 | 50,0 | 63212 |
| 51/64 | 0.7969 | 20.24 | 7/8-12 | 7/8 | 6 | 3-11/16 | 2-11/16 | 2-1/8 | 51792 |
| 20,5 mm | 0.8071 | | | 22,0 | 150,0 | 93,0 | 73,0 | 53,0 | 64513 |
| 13/16 | 0.8125 | 20.64 | 7/8-14 | 7/8 | 6 | 3-11/16 | 2-11/16 | 2-1/8 | 51373 |
| 21,0 mm | 0.8268 | | | 22,0 | 150,0 | 93,0 | 73,0 | 53,0 | 64514 |
| 22,0 mm | 0.8661 | | | 22,0 | 150,0 | 93,0 | 73,0 | 53,0 | 64515 |
| 7/8 | 0.8750 | 22.23 | 15/16-16, 1-8 | 7/8 | 6 | 3-11/16 | 2-11/16 | 2-1/8 | 51374 |
| 59/64 | 0.9219 | 23.42 | 1-12 | 1 | 6 | 3-11/16 | 2-11/16 | 2-1/8 | 51375 |

CONTINUED

FRACTIONAL Hi-PerCarb

| Series 135 3D Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|--|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/32 | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 7/8 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 385 | RPM | 47062 | 11766 | 5883 | 3922 | 2941 | 2353 | 1681 | |
| | | (308-462) | Fr | 0.0010 | 0.0038 | 0.0076 | 0.0115 | 0.0153 | 0.0191 | 0.0268 | |
| | | | Feed (ipm) | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | |
| | ≤ 275 Bhn or ≤ 28 HRc | 350 | RPM | 42784 | 10696 | 5348 | 3565 | 2674 | 2139 | 1528 | |
| | | (280-420) | Fr | 0.0009 | 0.0036 | 0.0071 | 0.0107 | 0.0142 | 0.0178 | 0.0249 | |
| | | | Feed (ipm) | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 200 | RPM | 24448 | 6112 | 3056 | 2037 | 1528 | 1222 | 873 | |
| | | (160-240) | Fr | 0.0007 | 0.0029 | 0.0059 | 0.0088 | 0.0118 | 0.0147 | 0.0206 | |
| | | | Feed (ipm) | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 300 | RPM | 36672 | 9168 | 4584 | 3056 | 2292 | 1834 | 1310 |
| | | | (240-360) | Fr | 0.0007 | 0.0029 | 0.0059 | 0.0088 | 0.0118 | 0.0147 | 0.0206 |
| | | | | Feed (ipm) | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 |
| ≤ 375 Bhn or ≤ 40 HRc | | 185 | RPM | 22614 | 5654 | 2827 | 1885 | 1413 | 1131 | 808 | |
| | | (148-222) | Fr | 0.0006 | 0.0026 | 0.0051 | 0.0077 | 0.0103 | 0.0128 | 0.0180 | |
| | | | Feed (ipm) | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | 14.5 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 130 | RPM | 15891 | 3973 | 1986 | 1324 | 993 | 795 | 568 | |
| | | (104-156) | Fr | 0.0004 | 0.0018 | 0.0035 | 0.0053 | 0.0070 | 0.0088 | 0.0123 | |
| | | | Feed (ipm) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 200 Bhn or ≤ 13 HRc | 130 | RPM | 15891 | 3973 | 1986 | 1324 | 993 | 795 | 568 |
| | | | (104-156) | Fr | 0.0007 | 0.0026 | 0.0053 | 0.0079 | 0.0106 | 0.0132 | 0.0185 |
| | | | | Feed (ipm) | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| | ≤ 375 Bhn or ≤ 40 HRc | 90 | RPM | 11002 | 2750 | 1375 | 917 | 688 | 550 | 393 | |
| | | (72-108) | Fr | 0.0003 | 0.0012 | 0.0023 | 0.0035 | 0.0047 | 0.0058 | 0.0081 | |
| | | | Feed (ipm) | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | 3.2 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 75 | RPM | 9168 | 2292 | 1146 | 764 | 573 | 458 | 327 | |
| | | (60-90) | Fr | 0.0002 | 0.0008 | 0.0016 | 0.0024 | 0.0031 | 0.0039 | 0.0055 | |
| | | | Feed (ipm) | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | |
| | M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 320 | RPM | 39117 | 9779 | 4890 | 3260 | 2445 | 1956 | 1397 |
| | | | (256-384) | Fr | 0.0012 | 0.0046 | 0.0092 | 0.0138 | 0.0184 | 0.0230 | 0.0322 |
| | | | | Feed (ipm) | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 |
| ≤ 260 Bhn or ≤ 26 HRc | | 285 | RPM | 34838 | 8710 | 4355 | 2903 | 2177 | 1742 | 1244 | |
| | | (228-342) | Fr | 0.0011 | 0.0046 | 0.0092 | 0.0138 | 0.0184 | 0.0230 | 0.0321 | |
| | | | Feed (ipm) | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | | ≤ 185 Bhn or ≤ 9 HRc | 275 | RPM | 33616 | 8404 | 4202 | 2801 | 2101 | 1681 | 1201 |
| | | | (220-330) | Fr | 0.0006 | 0.0026 | 0.0051 | 0.0077 | 0.0102 | 0.0128 | 0.0179 |
| | | | | Feed (ipm) | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 | 21.5 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 170 | RPM | 20781 | 5195 | 2598 | 1732 | 1299 | 1039 | 742 |
| | | | (136-204) | Fr | 0.0005 | 0.0020 | 0.0040 | 0.0061 | 0.0081 | 0.0101 | 0.0141 |
| | | | | Feed (ipm) | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 90 | RPM | 11002 | 2750 | 1375 | 917 | 688 | 550 | 393 |
| | | | (72-108) | Fr | 0.0005 | 0.0020 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0140 |
| | | | | Feed (ipm) | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 65 | RPM | 7946 | 1986 | 993 | 662 | 497 | 397 | 284 |
| | | | (52-78) | Fr | 0.0004 | 0.0018 | 0.0035 | 0.0053 | 0.0070 | 0.0088 | 0.0123 |
| | | | | Feed (ipm) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 |

continued on next page

| Series 135 3D Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|---|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/32 | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 7/8 | | |
| SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy | ≤ 300 Bhn or ≤ 32 HRc | 55 | RPM | 6723 | 1681 | 840 | 560 | 420 | 336 | 240 | |
| | | (44-66) | Fr | 0.0002 | 0.0008 | 0.0015 | 0.0023 | 0.0031 | 0.0039 | 0.0054 | |
| | | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | |
| | ≤ 400 Bhn or ≤ 43 HRc | 30 | RPM | 3667 | 917 | 458 | 306 | 229 | 183 | 131 | |
| | | (24-36) | Fr | 0.0002 | 0.0007 | 0.0013 | 0.0020 | 0.0026 | 0.0033 | 0.0046 | |
| | | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 135 | RPM | 16502 | 4126 | 2063 | 1375 | 1031 | 825 | 589 |
| | | | (108-162) | Fr | 0.0004 | 0.0018 | 0.0035 | 0.0053 | 0.0071 | 0.0088 | 0.0124 |
| | | | | Feed (ipm) | 7.3 | 7.3 | 7.3 | 7.3 | 7.3 | 7.3 | 7.3 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 100 | RPM | 12224 | 3056 | 1528 | 1019 | 764 | 611 | 437 |
| | | | (80-120) | Fr | 0.0004 | 0.0016 | 0.0033 | 0.0049 | 0.0065 | 0.0082 | 0.0115 |
| | | | | Feed (ipm) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| ≤ 440 Bhn or ≤ 47 HRc | | 55 | RPM | 6723 | 1681 | 840 | 560 | 420 | 336 | 240 | |
| | | (44-66) | Fr | 0.0003 | 0.0012 | 0.0024 | 0.0036 | 0.0048 | 0.0059 | 0.0083 | |
| | | | Feed (ipm) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 700 | RPM | 85568 | 21392 | 10696 | 7131 | 5348 | 4278 | 3056 |
| | | | (560-840) | Fr | 0.0012 | 0.0049 | 0.0098 | 0.0147 | 0.0196 | 0.0245 | 0.0344 |
| | | | | Feed (ipm) | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 | 105.0 |
| | ≤ 150 Bhn or ≤ 7 HRc | 600 | RPM | 73344 | 18336 | 9168 | 6112 | 4584 | 3667 | 2619 | |
| | | (480-720) | Fr | 0.0012 | 0.0050 | 0.0099 | 0.0149 | 0.0199 | 0.0248 | 0.0347 | |
| | | | Feed (ipm) | 91.0 | 91.0 | 91.0 | 91.0 | 91.0 | 91.0 | 91.0 | |
| | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 500 | RPM | 61120 | 15280 | 7640 | 5093 | 3820 | 3056 | 2183 |
| | | | (400-600) | Fr | 0.0005 | 0.0020 | 0.0039 | 0.0059 | 0.0079 | 0.0098 | 0.0137 |
| | | | | Feed (ipm) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 400 | RPM | 48896 | 12224 | 6112 | 4075 | 3056 | 2445 | 1746 |
| | | | (320-480) | Fr | 0.0005 | 0.0020 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0140 |
| | | | | Feed (ipm) | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 | 24.5 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fr \times rpm$
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Hi-PerCarb

| Series 135 3D Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | |
|---|--|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | 1.5 | 3 | 6 | 8 | 10 | 12 | 16 | 20 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 117 | RPM | 24882 | 12441 | 6220 | 4665 | 3732 | 3110 | 2333 | 1866 | |
| | | (94-141) | Fr | 0.047 | 0.094 | 0.189 | 0.252 | 0.315 | 0.378 | 0.504 | 0.630 | |
| | | | Feed (mm/min) | 1175 | 1175 | 1175 | 1175 | 1175 | 1175 | 1175 | 1175 | |
| | ≤ 275 Bhn or ≤ 28 HRc | 107 | RPM | 22620 | 11310 | 5655 | 4241 | 3393 | 2827 | 2121 | 1696 | |
| | | (85-128) | Fr | 0.043 | 0.086 | 0.172 | 0.229 | 0.286 | 0.343 | 0.457 | 0.572 | |
| | | | Feed (mm/min) | 970 | 970 | 970 | 970 | 970 | 970 | 970 | 970 | |
| | ≤ 475 Bhn or ≤ 45 HRc | 61 | RPM | 12926 | 6463 | 3231 | 2424 | 1939 | 1616 | 1212 | 969 | |
| | | (49-73) | Fr | 0.036 | 0.071 | 0.142 | 0.190 | 0.237 | 0.285 | 0.380 | 0.475 | |
| | | | Feed (mm/min) | 460 | 460 | 460 | 460 | 460 | 460 | 460 | 460 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 91 | RPM | 19388 | 9694 | 4847 | 3635 | 2908 | 2424 | 1818 | 1454 |
| | | | (73-110) | Fr | 0.036 | 0.071 | 0.142 | 0.190 | 0.237 | 0.285 | 0.380 | 0.475 |
| | | | | Feed (mm/min) | 690 | 690 | 690 | 690 | 690 | 690 | 690 | 690 |
| ≤ 375 Bhn or ≤ 40 HRc | | 56 | RPM | 11956 | 5978 | 2989 | 2242 | 1793 | 1495 | 1121 | 897 | |
| | | (45-68) | Fr | 0.031 | 0.061 | 0.122 | 0.163 | 0.204 | 0.244 | 0.326 | 0.407 | |
| | | | Feed (mm/min) | 365 | 365 | 365 | 365 | 365 | 365 | 365 | 365 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 40 | RPM | 8402 | 4201 | 2100 | 1575 | 1260 | 1050 | 788 | 630 | |
| | | (32-48) | Fr | 0.021 | 0.042 | 0.083 | 0.111 | 0.139 | 0.167 | 0.222 | 0.278 | |
| | | | Feed (mm/min) | 175 | 175 | 175 | 175 | 175 | 175 | 175 | 175 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 200 Bhn or ≤ 13 HRc | 40 | RPM | 8402 | 4201 | 2100 | 1575 | 1260 | 1050 | 788 | 630 |
| | | | (32-48) | Fr | 0.032 | 0.063 | 0.126 | 0.168 | 0.210 | 0.252 | 0.336 | 0.421 |
| | | | | Feed (mm/min) | 265 | 265 | 265 | 265 | 265 | 265 | 265 | 265 |
| | ≤ 375 Bhn or ≤ 40 HRc | 27 | RPM | 5816 | 2908 | 1454 | 1091 | 872 | 727 | 545 | 436 | |
| | | (22-33) | Fr | 0.014 | 0.028 | 0.055 | 0.073 | 0.092 | 0.110 | 0.147 | 0.183 | |
| | | | Feed (mm/min) | 80 | 80 | 80 | 80 | 80 | 80 | 80 | 80 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 23 | RPM | 4847 | 2424 | 1212 | 909 | 727 | 606 | 454 | 364 | |
| | | (18-27) | Fr | 0.009 | 0.019 | 0.037 | 0.050 | 0.062 | 0.074 | 0.099 | 0.124 | |
| | | | Feed (mm/min) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| | M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 98 | RPM | 20681 | 10340 | 5170 | 3878 | 3102 | 2585 | 1939 | 1551 |
| | | | (78-117) | Fr | 0.055 | 0.110 | 0.220 | 0.293 | 0.366 | 0.439 | 0.585 | 0.732 |
| | | | | Feed (mm/min) | 1135 | 1135 | 1135 | 1135 | 1135 | 1135 | 1135 | 1135 |
| ≤ 260 Bhn or ≤ 26 HRc | | 87 | RPM | 18419 | 9209 | 4605 | 3454 | 2763 | 2302 | 1727 | 1381 | |
| | | (69-104) | Fr | 0.055 | 0.110 | 0.219 | 0.292 | 0.366 | 0.439 | 0.585 | 0.731 | |
| | | | Feed (mm/min) | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | 1010 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | | ≤ 185 Bhn or ≤ 9 HRc | 84 | RPM | 17773 | 8886 | 4443 | 3332 | 2666 | 2222 | 1666 | 1333 |
| | | | (67-101) | Fr | 0.031 | 0.061 | 0.123 | 0.164 | 0.204 | 0.245 | 0.327 | 0.409 |
| | | | | Feed (mm/min) | 545 | 545 | 545 | 545 | 545 | 545 | 545 | 545 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 52 | RPM | 10987 | 5493 | 2747 | 2060 | 1648 | 1373 | 1030 | 824 |
| | | | (41-62) | Fr | 0.024 | 0.047 | 0.095 | 0.126 | 0.158 | 0.189 | 0.252 | 0.316 |
| | | | | Feed (mm/min) | 260 | 260 | 260 | 260 | 260 | 260 | 260 | 260 |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 27 | RPM | 5816 | 2908 | 1454 | 1091 | 872 | 727 | 545 | 436 |
| | | | (22-33) | Fr | 0.023 | 0.046 | 0.093 | 0.124 | 0.155 | 0.186 | 0.248 | 0.309 |
| | | | | Feed (mm/min) | 135 | 135 | 135 | 135 | 135 | 135 | 135 | 135 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 20 | RPM | 4201 | 2100 | 1050 | 788 | 630 | 525 | 394 | 315 |
| | | | (16-24) | Fr | 0.020 | 0.040 | 0.081 | 0.108 | 0.135 | 0.162 | 0.216 | 0.270 |
| | | | | Feed (mm/min) | 85 | 85 | 85 | 85 | 85 | 85 | 85 | 85 |

continued on next page

| Series 135 3D Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | |
|---|---|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | 1.5 | 3 | 6 | 8 | 10 | 12 | 16 | 20 | | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy | ≤ 300 Bhn or ≤ 32 HRc | 17 | RPM | 3555 | 1777 | 889 | 666 | 533 | 444 | 333 | 267 | |
| | | (13-20) | Fr | 0.010 | 0.020 | 0.039 | 0.053 | 0.066 | 0.079 | 0.105 | 0.131 | |
| | | | Feed (mm/min) | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 | |
| | ≤ 400 Bhn or ≤ 43 HRc | 9 | RPM | 1939 | 969 | 485 | 364 | 291 | 242 | 182 | 145 | |
| | | (7-11) | Fr | 0.008 | 0.015 | 0.031 | 0.041 | 0.052 | 0.062 | 0.083 | 0.103 | |
| | | | Feed (mm/min) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 41 | RPM | 8725 | 4362 | 2181 | 1636 | 1309 | 1091 | 818 | 654 |
| | | | (33-49) | Fr | 0.021 | 0.042 | 0.085 | 0.113 | 0.141 | 0.170 | 0.226 | 0.283 |
| | | | | Feed (mm/min) | 185 | 185 | 185 | 185 | 185 | 185 | 185 | 185 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 30 | RPM | 6463 | 3231 | 1616 | 1212 | 969 | 808 | 606 | 485 |
| | | | (24-37) | Fr | 0.019 | 0.039 | 0.077 | 0.103 | 0.129 | 0.155 | 0.206 | 0.258 |
| | | | | Feed (mm/min) | 125 | 125 | 125 | 125 | 125 | 125 | 125 | 125 |
| ≤ 440 Bhn or ≤ 47 HRc | | 17 | RPM | 3555 | 1777 | 889 | 666 | 533 | 444 | 333 | 267 | |
| | | (13-20) | Fr | 0.014 | 0.028 | 0.056 | 0.075 | 0.094 | 0.113 | 0.150 | 0.188 | |
| | | | Feed (mm/min) | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 213 | RPM | 45239 | 22620 | 11310 | 8482 | 6786 | 5655 | 4241 | 3393 |
| | | | (171-256) | Fr | 0.059 | 0.119 | 0.238 | 0.317 | 0.396 | 0.476 | 0.634 | 0.793 |
| | | | | Feed (mm/min) | 2690 | 2690 | 2690 | 2690 | 2690 | 2690 | 2690 | 2690 |
| | ≤ 150 Bhn or ≤ 7 HRc | 183 | RPM | 38777 | 19388 | 9694 | 7271 | 5816 | 4847 | 3635 | 2908 | |
| | | (146-219) | Fr | 0.060 | 0.120 | 0.240 | 0.320 | 0.400 | 0.480 | 0.640 | 0.799 | |
| | | | Feed (mm/min) | 2325 | 2325 | 2325 | 2325 | 2325 | 2325 | 2325 | 2325 | |
| | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 152 | RPM | 32314 | 16157 | 8078 | 6059 | 4847 | 4039 | 3029 | 2424 |
| | | | (122-183) | Fr | 0.024 | 0.048 | 0.096 | 0.128 | 0.160 | 0.192 | 0.256 | 0.320 |
| | | | | Feed (mm/min) | 776 | 776 | 776 | 776 | 776 | 776 | 776 | 776 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 122 | RPM | 25851 | 12926 | 6463 | 4847 | 3878 | 3231 | 2424 | 1939 |
| | | | (98-146) | Fr | 0.024 | 0.049 | 0.097 | 0.130 | 0.162 | 0.195 | 0.260 | 0.325 |
| | | | | Feed (mm/min) | 630 | 630 | 630 | 630 | 630 | 630 | 630 | 630 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = (Vc x 1000) / (D₁ x 3.14)

mm/min = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Hi-PerCarb

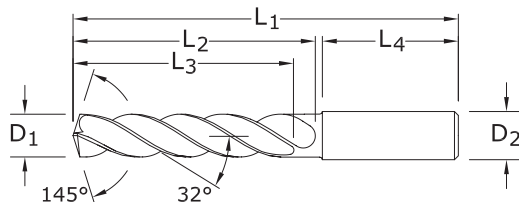


5xD



135 5xD

FRACTIONAL & METRIC SERIES



- Double margin design improves accuracy and surface finish along with increased strength for aggressive drilling
- Specialized self-centering notched point eliminates the need for spot drilling decreasing thrust and deflection
- Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
- Recommended for materials ≤ 56 HRc (≤ 577 Bhn)

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITiN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 1/64 | 0.0156 | 0.40 | | 1/8 | 1 1/2 | 5/32 | 7/64 | 1 | 52300* |
| 1/32 | 0.0312 | 0.79 | | 1/8 | 1 1/2 | 5/16 | 7/32 | 1 | 52301* |
| 3/64 | 0.0469 | 1.19 | 1/16-64 | 1/8 | 1 1/2 | 25/64 | 19/64 | 1 | 52302* |
| 1,25 mm | 0.0492 | | | 3,0 | 38,0 | 10,0 | 7,5 | 25,0 | 64520* |
| 1,45 mm | 0.0571 | | | 3,0 | 38,0 | 10,0 | 7,5 | 25,0 | 64521* |
| #53 | 0.0595 | 1.51 | | 1/8 | 1-1/2 | 25/64 | 19/64 | 1 | 64522* |
| 1/16 | 0.0625 | 1.59 | 5/64-60 | 1/8 | 2 | 15/32 | 23/64 | 1-1/4 | 52303* |
| 1,6 mm | 0.0630 | | | 3,0 | 50,0 | 12,0 | 9,0 | 32,0 | 64523* |
| 1,75 mm | 0.0689 | | | 3,0 | 50,0 | 12,0 | 9,0 | 32,0 | 64524* |
| #50 | 0.0700 | 1.78 | | 1/8 | 2 | 15/32 | 23/64 | 1-1/4 | 64525* |
| 5/64 | 0.0781 | 1.98 | | 1/8 | 2 | 35/64 | 27/64 | 1-1/4 | 52304* |
| #47 | 0.0785 | 1.99 | | 1/8 | 2 | 35/64 | 27/64 | 1-1/4 | 64526* |
| 2,05 mm | 0.0807 | | | 3,0 | 50,0 | 14,0 | 11,0 | 32,0 | 64527* |
| #46 | 0.0810 | 2.06 | | 1/8 | 2 | 35/64 | 27/64 | 1-1/4 | 64528* |
| #43 | 0.0890 | 2.26 | | 1/8 | 2 | 19/32 | 15/32 | 1-1/4 | 64529* |
| #42 | 0.0935 | 2.37 | | 1/8 | 2 | 5/8 | 1/2 | 1-1/4 | 64530* |
| 3/32 | 0.0938 | 2.38 | 1/8-32 | 1/8 | 2 | 5/8 | 1/2 | 1-1/4 | 52305 |
| #40 | 0.0980 | 2.49 | | 1/8 | 2 | 43/64 | 17/32 | 1-1/4 | 52306 |
| 2,5 mm | 0.0984 | | | 3,0 | 50,0 | 17,0 | 13,0 | 32,0 | 64531 |
| #39 | 0.0995 | 2.53 | | 1/8 | 2 | 43/64 | 17/32 | 1-1/4 | 52307 |
| #38 | 0.1015 | 2.58 | 5-40 | 1/8 | 2 | 43/64 | 17/32 | 1-1/4 | 52308 |
| #37 | 0.1040 | 2.64 | 5-44 | 1/8 | 2 | 45/64 | 9/16 | 1-1/4 | 52309 |
| #36 | 0.1065 | 2.71 | 6-32 | 1/8 | 2 | 45/64 | 9/16 | 1-1/4 | 52310 |
| 7/64 | 0.1094 | 2.78 | | 1/8 | 2 | 3/4 | 19/32 | 1-1/4 | 52311 |
| #35 | 0.1100 | 2.79 | | 1/8 | 2 | 3/4 | 19/32 | 1-1/4 | 52312 |
| #34 | 0.1110 | 2.82 | | 1/8 | 2 | 3/4 | 19/32 | 1-1/4 | 52313 |
| #33 | 0.1130 | 2.87 | 6-40 | 1/8 | 2 | 3/4 | 19/32 | 1-1/4 | 52314 |
| 2,9 mm | 0.1142 | | | 3,0 | 50,0 | 19,0 | 15,0 | 32,0 | 64532 |
| #32 | 0.1160 | 2.95 | | 1/8 | 2 | 3/4 | 39/64 | 1-1/4 | 52315 |
| 3,0 mm | 0.1181 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64100 |
| #31 | 0.1200 | 3.05 | | 1/8 | 2 | 3/4 | 39/64 | 1-1/4 | 52316 |
| 3,1 mm | 0.1220 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64101 |
| 1/8 | 0.1250 | 3.18 | | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 51580 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64102 |
| #30 | 0.1285 | 3.26 | | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 51581 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64103 |
| 3,4 mm | 0.1339 | | 8-32,8-36 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64104 |
| #29 | 0.1360 | 3.45 | | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 51582 |

*Single Margin

continued on next page

TOLERANCES (inch)

$\leq .1181$ DIAMETER
 $D_1 = +.00008/+0.00047$
 $D_2 = h_6$

$>.1181-.2362$ DIAMETER
 $D_1 = +.00016/+0.00063$
 $D_2 = h_6$

$>.2362-.3937$ DIAMETER
 $D_1 = +.00024/+0.00083$
 $D_2 = h_6$

$>.3937-.7087$ DIAMETER
 $D_1 = +.00028/+0.00098$
 $D_2 = h_6$

$>.7087-1.1811$ DIAMETER
 $D_1 = +.00031/+0.00114$
 $D_2 = h_6$

TOLERANCES (mm)

≤ 3 DIAMETER
 $D_1 = +0,002/+0,012$
 $D_2 = h_6$

$>3-6$ DIAMETER
 $D_1 = +0,004/+0,016$
 $D_2 = h_6$

$>6-10$ DIAMETER
 $D_1 = +0,006/+0,021$
 $D_2 = h_6$

$>10-18$ DIAMETER
 $D_1 = +0,007/+0,025$
 $D_2 = h_6$

$>18-30$ DIAMETER
 $D_1 = +0,008/+0,029$
 $D_2 = h_6$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com



135 5xD

FRACTIONAL & METRIC SERIES

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITIN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 3,5 mm | 0.1378 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64105 |
| #28 | 0.1405 | 3.57 | 8-40 | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 52317 |
| 9/64 | 0.1406 | 3.57 | | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 51583 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64106 |
| #27 | 0.1440 | 3.66 | | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 52318 |
| 3,7 mm | 0.1457 | | M4.5 X 0,75 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 64107 |
| #26 | 0.1470 | 3.73 | 3/16-24 | 1/4 | 3 | 1 | 53/64 | 1-7/16 | 52319 |
| #25 | 0.1495 | 3.80 | 10-24 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 51584 |
| 3,8 mm | 0.1496 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64108 |
| #24 | 0.1520 | 3.86 | 10-28 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52321 |
| 3,9 mm | 0.1535 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64109 |
| #23 | 0.1540 | 3.91 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52322 |
| 5/32 | 0.1562 | 3.97 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 51585 |
| #22 | 0.1570 | 3.99 | 10-30 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52323 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64110 |
| #21 | 0.1590 | 4.04 | 10-32 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 51586 |
| #20 | 0.1610 | 4.09 | 13/64-24 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 51587 |
| 4,1 mm | 0.1614 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64111 |
| 4,2 mm | 0.1654 | | M5 / M5 X 0,75 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64112 |
| #19 | 0.1660 | 4.22 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52324 |
| 4,3 mm | 0.1693 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64113 |
| #18 | 0.1695 | 4.31 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52325 |
| 11/64 | 0.1719 | 4.37 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 51588 |
| #17 | 0.1730 | 4.39 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52326 |
| 4,4 mm | 0.1732 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64114 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64115 |
| #15 | 0.1800 | 4.57 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52327 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64116 |
| #14 | 0.1820 | 4.62 | | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52328 |
| #13 | 0.1850 | 4.70 | 12-32 | 1/4 | 3-1/4 | 1-1/4 | 1-5/64 | 1-7/16 | 52329 |
| 4,7 mm | 0.1850 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 64117 |
| 3/16 | 0.1875 | 4.76 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51589 |
| #12 | 0.1890 | 4.80 | 7/32-32 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52330 |
| 4,8 mm | 0.1890 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64118 |
| 4,9 mm | 0.1929 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64119 |
| #10 | 0.1935 | 4.91 | 14-20 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52331 |
| #9 | 0.1960 | 4.98 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52332 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64120 |
| #8 | 0.1990 | 5.05 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52333 |
| 5,1 mm | 0.2008 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64121 |
| #7 | 0.2010 | 5.11 | 1/4-20 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51506 |
| 13/64 | 0.2031 | 5.16 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51507 |
| #6 | 0.2040 | 5.18 | | 1/4 | 3 1/4 | 1 3/4 | 1 37/64 | 1 7/16 | 52334 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64122 |
| #5 | 0.2055 | 5.22 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51590 |
| 5,25 mm | 0.2067 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64123 |
| 5,3 mm | 0.2087 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64124 |
| #4 | 0.2090 | 5.31 | 1/4-24 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51508 |

CONTINUED

continued on next page

Hi-PerCarb



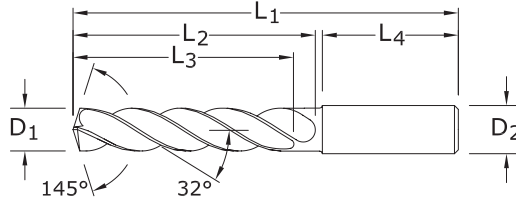
5xD



2

135 5xD

FRACTIONAL & METRIC SERIES



- Double margin design improves accuracy and surface finish along with increased strength for aggressive drilling
- Specialized self-centering notched point eliminates the need for spot drilling decreasing thrust and deflection
- Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
- Recommended for materials ≤ 56 HRc (≤ 577 Bhn)

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITiN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 5,4 mm | 0.2126 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64125 |
| #3 | 0.2130 | 5.41 | 1/4-28 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51509 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64126 |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51510 |
| 5,6 mm | 0.2205 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64127 |
| #2 | 0.2210 | 5.61 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52335 |
| 5,7 mm | 0.2244 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64128 |
| #1 | 0.2280 | 5.79 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52336 |
| 5,8 mm | 0.2283 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64129 |
| A | 0.2340 | 5.94 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 52337 |
| 15/64 | 0.2344 | 5.95 | | 1/4 | 3-1/4 | 1-3/4 | 1-37/64 | 1-7/16 | 51591 |
| 6,0 mm | 0.2362 | | M7 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 64131 |
| B | 0.2380 | 6.05 | | 1/4 | 3 5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52338 |
| 6,1 mm | 0.2402 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64132 |
| C | 0.2420 | 6.15 | | 1/4 | 3 5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52339 |
| 6,2 mm | 0.2441 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64133 |
| D | 0.2460 | 6.25 | | 1/4 | 3 5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52340 |
| 6,25 mm | 0.2461 | | M7 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64134 |
| 6,3 mm | 0.2480 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64135 |
| 1/4 | 0.2500 | 6.35 | | 1/4 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51511 |
| 6,4 mm | 0.2520 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64136 |
| 6,5 mm | 0.2559 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64137 |
| F | 0.2570 | 6.53 | 5/16-18 | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51512 |
| 6,6 mm | 0.2598 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64138 |
| G | 0.2610 | 6.63 | | 5/16 | 3 5/8 | 2 5/64 | 1 51/64 | 1 7/16 | 52341 |
| 6,7 mm | 0.2638 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64139 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51513 |
| H | 0.2660 | 6.76 | | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52342 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64140 |
| 6,9 mm | 0.2717 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64141 |
| I | 0.2720 | 6.91 | 5/16-24 | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51514 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64142 |
| J | 0.2770 | 7.04 | | 5/16 | 3 5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52343 |
| 7,1 mm | 0.2795 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64143 |
| K | 0.2810 | 7.14 | | 5/16 | 3 5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52344 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51515 |
| 7,2 mm | 0.2835 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64144 |

TOLERANCES (inch)

- $\leq .1181$ DIAMETER
D₁ = +.00008/+0.00047
D₂ = h₆
- >.1181-.2362 DIAMETER
D₁ = +.00016/+0.00063
D₂ = h₆
- >.2362-.3937 DIAMETER
D₁ = +.00024/+0.00083
D₂ = h₆
- >.3937-.7087 DIAMETER
D₁ = +.00028/+0.00098
D₂ = h₆
- >.7087-1.1811 DIAMETER
D₁ = +.00031/+0.0114
D₂ = h₆

TOLERANCES (mm)

- ≤ 3 DIAMETER
D₁ = +0,002/+0,012
D₂ = h₆
- >3-6 DIAMETER
D₁ = +0,004/+0,016
D₂ = h₆
- >6-10 DIAMETER
D₁ = +0,006/+0,021
D₂ = h₆
- >10-18 DIAMETER
D₁ = +0,007/+0,025
D₂ = h₆
- >18-30 DIAMETER
D₁ = +0,008/+0,029
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com

continued on next page



135 5xD

FRACTIONAL & METRIC SERIES

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITIN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 7,25 mm | 0.2854 | | M8 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64145 |
| 7,3 mm | 0.2874 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64146 |
| L | 0.2900 | 7.37 | | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52345 |
| 7,4 mm | 0.2913 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64147 |
| M | 0.2950 | 7.49 | | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52346 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64148 |
| 19/64 | 0.2969 | 7.54 | | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51516 |
| 7,6 mm | 0.2992 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64149 |
| N | 0.3020 | 7.67 | | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 52347 |
| 7,7 mm | 0.3031 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64150 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64151 |
| 7,9 mm | 0.3110 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64152 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 5/16 | 3-5/8 | 2-5/64 | 1-51/64 | 1-7/16 | 51517 |
| 8,0 mm | 0.3150 | | M9 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 64153 |
| O | 0.3160 | 8.03 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 52348 |
| 8,1 mm | 0.3189 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64154 |
| 8,2 mm | 0.3228 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64155 |
| P | 0.3230 | 8.20 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51518 |
| 8,3 mm | 0.3268 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64156 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51519 |
| 8,4 mm | 0.3307 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64157 |
| Q | 0.3320 | 8.43 | 3/8-24 | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51520 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64158 |
| 8,6 mm | 0.3386 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64159 |
| R | 0.3390 | 8.61 | 3/8-32 | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 52349 |
| 8,7 mm | 0.3425 | | M10 X 1,25 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64160 |
| 11/32 | 0.3438 | 8.73 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51521 |
| 8,8 mm | 0.3465 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64161 |
| S | 0.3480 | 8.84 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51522 |
| 8,9 mm | 0.3504 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64162 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64163 |
| T | 0.3580 | 9.09 | | 3/8 | 4 | 2 13/32 | 2 1/8 | 1 9/16 | 52350 |
| 9,1 mm | 0.3583 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64164 |
| 23/64 | 0.3594 | 9.13 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51523 |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64165 |
| 9,25 mm | 0.3642 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64166 |
| 9,3 mm | 0.3661 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64167 |
| U | 0.3680 | 9.35 | 7/16-14 | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51524 |
| 9,4 mm | 0.3701 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64168 |
| 9,5 mm | 0.3740 | | M10 X 0,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64169 |
| 3/8 | 0.3750 | 9.53 | | 3/8 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51525 |
| V | 0.3770 | 9.58 | | 1/2 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 52351 |
| 9,6 mm | 0.3780 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64170 |
| 9,7 mm | 0.3819 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64171 |
| 9,8 mm | 0.3858 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64172 |
| W | 0.3860 | 9.80 | | 1/2 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51526 |
| 9,9 mm | 0.3898 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64173 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 1/2 | 4 | 2-13/32 | 2-1/8 | 1-9/16 | 51527 |

CONTINUED

continued on next page

Hi-PerCarb



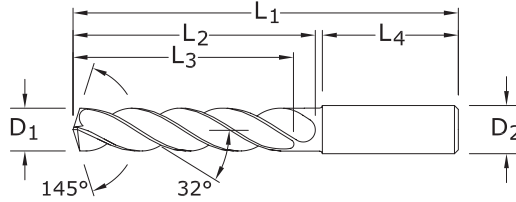
5xD



2

135 5xD

FRACTIONAL & METRIC SERIES



- Double margin design improves accuracy and surface finish along with increased strength for aggressive drilling
- Specialized self-centering notched point eliminates the need for spot drilling decreasing thrust and deflection
- Engineered edge protection improves edge strength and reduces edge fatigue allowing for increased feed rates
- Recommended for materials ≤ 56 HRc (≤ 577 Bhn)

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITiN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 10,0 mm | 0.3937 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 64174 |
| X | 0.3970 | 10.08 | 7/16-24 | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 52352 |
| 10,1 mm | 0.3976 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64175 |
| 10,2 mm | 0.4016 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64176 |
| Y | 0.4040 | 10.26 | 7/16-28 | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 52353 |
| 10,3 mm | 0.4055 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64177 |
| 13/32 | 0.4062 | 10.32 | | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 51528 |
| 10,4 mm | 0.4095 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64178 |
| Z | 0.4130 | 10.49 | | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 52354 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64179 |
| 10,6 mm | 0.4173 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64180 |
| 10,7 mm | 0.4213 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64181 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 51529 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64182 |
| 10,9 mm | 0.4291 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64183 |
| 11,0 mm | 0.4331 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64184 |
| 11,1 mm | 0.4370 | | M12 X 1 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64185 |
| 7/16 | 0.4375 | 11.11 | 1/4-18 NPT | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 51530 |
| 11,2 mm | 0.4409 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64186 |
| 11,25 mm | 0.4429 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64187 |
| 11,3 mm | 0.4449 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64188 |
| 11,4 mm | 0.4488 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64189 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64190 |
| 29/64 | 0.4531 | 11.51 | 1/2-20 | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 51531 |
| 11,6 mm | 0.4567 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64191 |
| 11,7 mm | 0.4606 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64192 |
| 11,8 mm | 0.4646 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64193 |
| 11,9 mm | 0.4685 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64194 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 1/2 | 4-11/16 | 2-3/4 | 2-23/64 | 1-49/64 | 51532 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64195 |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 1/2 | 4-7/8 | 3-1/32 | 2-19/32 | 1-49/64 | 51533 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64196 |
| 1/2 | 0.5000 | 12.70 | | 1/2 | 4-7/8 | 3-1/32 | 2-19/32 | 1-49/64 | 51534 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64197 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64198 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 5/8 | 4-7/8 | 3-1/32 | 2-19/32 | 1-49/64 | 51535 |
| 17/32 | 0.5312 | 13.49 | 5/8-11 | 5/8 | 4-7/8 | 3-1/32 | 2-19/32 | 1-49/64 | 51536 |
| 13,5 mm | 0.5315 | | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64199 |

TOLERANCES (inch)

- $\leq .1181$ DIAMETER
D₁ = +.0008/+0.0047
D₂ = h₆
- $>.1181-.2362$ DIAMETER
D₁ = +.00016/+0.00063
D₂ = h₆
- $>.2362-.3937$ DIAMETER
D₁ = +.00024/+0.00083
D₂ = h₆
- $>.3937-.7087$ DIAMETER
D₁ = +.00028/+0.00098
D₂ = h₆
- $>.7087-1.1811$ DIAMETER
D₁ = +.00031/+0.0114
D₂ = h₆

TOLERANCES (mm)

- ≤ 3 DIAMETER
D₁ = +0,002/+0,012
D₂ = h₆
- $>3-6$ DIAMETER
D₁ = +0,004/+0,016
D₂ = h₆
- $>6-10$ DIAMETER
D₁ = +0,006/+0,021
D₂ = h₆
- $>10-18$ DIAMETER
D₁ = +0,007/+0,025
D₂ = h₆
- $>18-30$ DIAMETER
D₁ = +0,008/+0,029
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com

continued on next page



135 5xD

FRACTIONAL & METRIC SERIES

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-A (AITiN) | EDP NO. |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|---------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | | |
| 35/64 | 0.5469 | 13.89 | 5/8-12 | 5/8 | 4-7/8 | 3-1/32 | 2-19/32 | 1-49/64 | | 51537 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | | 64200 |
| 9/16 | 0.5625 | 14.29 | | 5/8 | 5-1/4 | 3-1/4 | 2-3/4 | 1-57/64 | | 51538 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | | 64201 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 5/8 | 5-1/4 | 3-1/4 | 2-3/4 | 1-57/64 | | 51539 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | | 64202 |
| 19/32 | 0.5938 | 15.08 | 11/16-11 | 5/8 | 5-1/4 | 3-1/4 | 2-3/4 | 1-57/64 | | 51592 |
| 39/64 | 0.6094 | 15.48 | 11/16-12 | 5/8 | 5-1/4 | 3-1/4 | 2-3/4 | 1-57/64 | | 51593 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | | 64203 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 5/8 | 5-1/4 | 3-1/4 | 2-3/4 | 1-57/64 | | 51540 |
| 16,0 mm | 0.6299 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | | 64204 |
| 41/64 | 0.6406 | 16.27 | 11/16-24 | 3/4 | 5-5/8 | 3-5/8 | 3-3/16 | 1-57/64 | | 51594 |
| 16,5 mm | 0.6496 | | M18 X 1,5 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | | 64205 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 3/4 | 5-5/8 | 3-5/8 | 3-3/16 | 1-57/64 | | 51541 |
| 17,0 mm | 0.6693 | | | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | | 64206 |
| 43/64 | 0.6719 | 17.07 | 3/4-12 | 3/4 | 5-5/8 | 3-5/8 | 3-3/16 | 1-57/64 | | 51595 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 3/4 | 5-5/8 | 3-5/8 | 3-3/16 | 1-57/64 | | 51542 |
| 17,5 mm | 0.6890 | | M20 X 2,5 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | | 64207 |
| 45/64 | 0.7031 | 17.86 | 3/4-20, 1/2-14 NPT | 3/4 | 5-5/8 | 3-5/8 | 3-3/16 | 1-57/64 | | 51543 |
| 18,0 mm | 0.7087 | | | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | | 64208 |
| 23/32 | 0.7188 | 18.26 | | 3/4 | 6 | 4 | 3-3/8 | 1-31/32 | | 51596 |
| 18,5 mm | 0.7283 | | M20 X 1,5 | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | | 64209 |
| 47/64 | 0.7344 | 18.65 | 13/16-12 | 3/4 | 6 | 4 | 3-3/8 | 1-31/32 | | 51544 |
| 19,0 mm | 0.7480 | | | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | | 64210 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 3/4 | 6 | 4 | 3-3/8 | 1-31/32 | | 51545 |
| 49/64 | 0.7656 | 19.45 | 7/8-9 | 7/8 | 6 | 4 | 3-3/8 | 1-31/32 | | 52355 |
| 19,5 mm | 0.7677 | | M22 X 2,5 | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | | 64211 |
| 25/32 | 0.7812 | 19.84 | | 7/8 | 6 | 4 | 3-3/8 | 1-31/32 | | 52356 |
| 20,0 mm | 0.7874 | | | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | | 64212 |
| 51/64 | 0.7969 | 20.24 | 7/8-12 | 7/8 | 6 | 4 | 3-3/8 | 1-31/32 | | 52357 |
| 20,5 mm | 0.8071 | | | 22,0 | 153,0 | 101,0 | 77,0 | 50,0 | | 64533 |
| 13/16 | 0.8125 | 20.64 | 7/8-14 | 7/8 | 6-1/2 | 4-1/2 | 3-7/8 | 1-31/32 | | 52358 |
| 21,0 mm | 0.8268 | | | 22,0 | 153,0 | 101,0 | 77,0 | 50,0 | | 64534 |
| 22,0 mm | 0.8661 | | | 22,0 | 178,0 | 127,0 | 108,0 | 50,0 | | 64535 |
| 7/8 | 0.8750 | 22.23 | 15/16-16, 1-8 | 7/8 | 6-1/2 | 4-1/2 | 3-7/8 | 1-31/32 | | 52359 |
| 59/64 | 0.9219 | 23.42 | 1-12 | 1 | 7 | 5 | 4-3/8 | 2-1/8 | | 52360 |

CONTINUED

FRACTIONAL Hi-PerCarb

| Series 135 5D Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|--|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/32 | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 7/8 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 345 | RPM | 42173 | 10543 | 5272 | 3514 | 2636 | 2109 | 1506 | |
| | | (276-414) | Fr | 0.0010 | 0.0040 | 0.0080 | 0.0120 | 0.0159 | 0.0199 | 0.0279 | |
| | | | Feed (ipm) | 42.0 | 42.0 | 42.0 | 42.0 | 42.0 | 42.0 | 42.0 | |
| | ≤ 275 Bhn or ≤ 28 HRc | 310 | RPM | 37894 | 9474 | 4737 | 3158 | 2368 | 1895 | 1353 | |
| | | (248-372) | Fr | 0.0009 | 0.0036 | 0.0072 | 0.0108 | 0.0144 | 0.0179 | 0.0251 | |
| | | | Feed (ipm) | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 180 | RPM | 22003 | 5501 | 2750 | 1834 | 1375 | 1100 | 786 | |
| | | (144-216) | Fr | 0.0007 | 0.0030 | 0.0060 | 0.0090 | 0.0120 | 0.0150 | 0.0210 | |
| | | | Feed (ipm) | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 270 | RPM | 33005 | 8251 | 4126 | 2750 | 2063 | 1650 | 1179 |
| | | | (216-324) | Fr | 0.0008 | 0.0030 | 0.0061 | 0.0091 | 0.0121 | 0.0151 | 0.0212 |
| | | | | Feed (ipm) | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| ≤ 375 Bhn or ≤ 40 HRc | | 165 | RPM | 20170 | 5042 | 2521 | 1681 | 1261 | 1008 | 720 | |
| | | (132-198) | Fr | 0.0006 | 0.0026 | 0.0052 | 0.0077 | 0.0103 | 0.0129 | 0.0180 | |
| | | | Feed (ipm) | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 115 | RPM | 14058 | 3514 | 1757 | 1171 | 879 | 703 | 502 | |
| | | (92-138) | Fr | 0.0004 | 0.0018 | 0.0035 | 0.0053 | 0.0071 | 0.0088 | 0.0123 | |
| | | | Feed (ipm) | 6.2 | 6.2 | 6.2 | 6.2 | 6.2 | 6.2 | 6.2 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 200 Bhn or ≤ 13 HRc | 120 | RPM | 14669 | 3667 | 1834 | 1222 | 917 | 733 | 524 |
| | | | (96-144) | Fr | 0.0006 | 0.0026 | 0.0051 | 0.0077 | 0.0103 | 0.0128 | 0.0179 |
| | | | | Feed (ipm) | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 | 9.4 |
| | ≤ 375 Bhn or ≤ 40 HRc | 80 | RPM | 9779 | 2445 | 1222 | 815 | 611 | 489 | 349 | |
| | | (64-96) | Fr | 0.0003 | 0.0012 | 0.0024 | 0.0036 | 0.0047 | 0.0059 | 0.0083 | |
| | | | Feed (ipm) | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 70 | RPM | 8557 | 2139 | 1070 | 713 | 535 | 428 | 306 | |
| | | (56-84) | Fr | 0.0002 | 0.0008 | 0.0016 | 0.0024 | 0.0032 | 0.0040 | 0.0056 | |
| | | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | |
| | M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 300 | RPM | 36672 | 9168 | 4584 | 3056 | 2292 | 1834 | 1310 |
| | | | (240-360) | Fr | 0.0011 | 0.0045 | 0.0089 | 0.0134 | 0.0179 | 0.0224 | 0.0313 |
| | | | | Feed (ipm) | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 |
| ≤ 260 Bhn or ≤ 26 HRc | | 265 | RPM | 32394 | 8098 | 4049 | 2699 | 2025 | 1620 | 1157 | |
| | | (212-318) | Fr | 0.0011 | 0.0046 | 0.0091 | 0.0137 | 0.0183 | 0.0228 | 0.0320 | |
| | | | Feed (ipm) | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | | ≤ 185 Bhn or ≤ 9 HRc | 250 | RPM | 30560 | 7640 | 3820 | 2547 | 1910 | 1528 | 1091 |
| | | | (200-300) | Fr | 0.0006 | 0.0026 | 0.0051 | 0.0077 | 0.0102 | 0.0128 | 0.0179 |
| | | | | Feed (ipm) | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 | 19.5 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 150 | RPM | 18336 | 4584 | 2292 | 1528 | 1146 | 917 | 655 |
| | | | (120-180) | Fr | 0.0005 | 0.0020 | 0.0039 | 0.0059 | 0.0079 | 0.0098 | 0.0137 |
| | | | | Feed (ipm) | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 80 | RPM | 9779 | 2445 | 1222 | 815 | 611 | 489 | 349 |
| | | | (64-96) | Fr | 0.0005 | 0.0020 | 0.0039 | 0.0059 | 0.0079 | 0.0098 | 0.0137 |
| | | | | Feed (ipm) | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 | 4.8 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 55 | RPM | 6723 | 1681 | 840 | 560 | 420 | 336 | 240 |
| | | | (44-66) | Fr | 0.0004 | 0.0018 | 0.0036 | 0.0054 | 0.0071 | 0.0089 | 0.0125 |
| | | | | Feed (ipm) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 |

continued on next page

| Series 135 5D Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|--|---|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/32 | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 7/8 | | |
| S SUPER ALLOYS (Nickel , Cobalt, Iron Base) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy | ≤ 300 Bhn or ≤ 32 HRc | 40 | RPM | 4890 | 1222 | 611 | 407 | 306 | 244 | 175 | |
| | | (32-48) | Fr | 0.0002 | 0.0008 | 0.0016 | 0.0025 | 0.0033 | 0.0041 | 0.0057 | |
| | | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| | ≤ 400 Bhn or ≤ 43 HRc | 20 | RPM | 2445 | 611 | 306 | 204 | 153 | 122 | 87 | |
| | | (16-24) | Fr | 0.0002 | 0.0007 | 0.0013 | 0.0020 | 0.0026 | 0.0033 | 0.0046 | |
| | | | Feed (ipm) | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 105 | RPM | 12835 | 3209 | 1604 | 1070 | 802 | 642 | 458 |
| | | | (84-126) | Fr | 0.0005 | 0.0018 | 0.0036 | 0.0054 | 0.0072 | 0.0090 | 0.0127 |
| | | | | Feed (ipm) | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 | 5.8 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 80 | RPM | 9779 | 2445 | 1222 | 815 | 611 | 489 | 349 |
| | | | (64-96) | Fr | 0.0004 | 0.0016 | 0.0032 | 0.0048 | 0.0064 | 0.0080 | 0.0112 |
| | | | | Feed (ipm) | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 |
| ≤ 440 Bhn or ≤ 47 HRc | | 42 | RPM | 5134 | 1284 | 642 | 428 | 321 | 257 | 183 | |
| | | (34-50) | Fr | 0.0003 | 0.0012 | 0.0025 | 0.0037 | 0.0050 | 0.0062 | 0.0087 | |
| | | | Feed (ipm) | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | 1.6 | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 635 | RPM | 77622 | 19406 | 9703 | 6469 | 4851 | 3881 | 2772 |
| | | | (508-762) | Fr | 0.0012 | 0.0049 | 0.0099 | 0.0148 | 0.0198 | 0.0247 | 0.0346 |
| | | | | Feed (ipm) | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 | 96.0 |
| | ≤ 150 Bhn or ≤ 7 HRc | 540 | RPM | 66010 | 16502 | 8251 | 5501 | 4126 | 3300 | 2357 | |
| | | (432-648) | Fr | 0.0012 | 0.0050 | 0.0099 | 0.0149 | 0.0199 | 0.0248 | 0.0348 | |
| | | | Feed (ipm) | 82.0 | 82.0 | 82.0 | 82.0 | 82.0 | 82.0 | 82.0 | |
| | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 450 | RPM | 55008 | 13752 | 6876 | 4584 | 3438 | 2750 | 1965 |
| | | | (360-540) | Fr | 0.0005 | 0.0020 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0140 |
| | | | | Feed (ipm) | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 | 27.5 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 360 | RPM | 44006 | 11002 | 5501 | 3667 | 2750 | 2200 | 1572 |
| | | | (288-432) | Fr | 0.0005 | 0.0020 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0140 |
| | | | | Feed (ipm) | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 | 22.0 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

$rpm = Vc \times 3.82 / D_1$

$ipm = Fr \times rpm$

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Hi-PerCarb

| Series 135M 5D Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | |
|---|--|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | 1.5 | 3 | 6 | 8 | 10 | 12 | 16 | 20 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 105 | RPM | 22297 | 11148 | 5574 | 4181 | 3344 | 2787 | 2090 | 1672 | |
| | | (84-126) | Fr | 0.048 | 0.095 | 0.190 | 0.254 | 0.317 | 0.380 | 0.507 | 0.634 | |
| | | | Feed (mm/min) | 1060 | 1060 | 1060 | 1060 | 1060 | 1060 | 1060 | 1060 | |
| | ≤ 275 Bhn or ≤ 28 HRc | 94 | RPM | 20035 | 10017 | 5009 | 3756 | 3005 | 2504 | 1878 | 1503 | |
| | | (76-113) | Fr | 0.043 | 0.085 | 0.171 | 0.228 | 0.285 | 0.341 | 0.455 | 0.569 | |
| | | | Feed (mm/min) | 855 | 855 | 855 | 855 | 855 | 855 | 855 | 855 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 55 | RPM | 11633 | 5816 | 2908 | 2181 | 1745 | 1454 | 1091 | 872 | |
| | | (44-66) | Fr | 0.036 | 0.071 | 0.143 | 0.190 | 0.238 | 0.285 | 0.381 | 0.476 | |
| | | | Feed (mm/min) | 415 | 415 | 415 | 415 | 415 | 415 | 415 | 415 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 82 | RPM | 17449 | 8725 | 4362 | 3272 | 2617 | 2181 | 1636 | 1309 |
| | | | (66-99) | Fr | 0.036 | 0.072 | 0.143 | 0.191 | 0.239 | 0.287 | 0.382 | 0.478 |
| | | | | Feed (mm/min) | 625 | 625 | 625 | 625 | 625 | 625 | 625 | 625 |
| ≤ 375 Bhn or ≤ 40 HRc | | 50 | RPM | 10664 | 5332 | 2666 | 1999 | 1600 | 1333 | 1000 | 800 | |
| | | (40-60) | Fr | 0.031 | 0.062 | 0.124 | 0.165 | 0.206 | 0.248 | 0.330 | 0.413 | |
| | | | Feed (mm/min) | 330 | 330 | 330 | 330 | 330 | 330 | 330 | 330 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 35 | RPM | 7432 | 3716 | 1858 | 1394 | 1115 | 929 | 697 | 557 | |
| | | (28-42) | Fr | 0.022 | 0.043 | 0.086 | 0.115 | 0.144 | 0.172 | 0.230 | 0.287 | |
| | | | Feed (mm/min) | 160 | 160 | 160 | 160 | 160 | 160 | 160 | 160 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 200 Bhn or ≤ 13 HRc | 37 | RPM | 7755 | 3878 | 1939 | 1454 | 1163 | 969 | 727 | 582 |
| | | | (29-44) | Fr | 0.031 | 0.062 | 0.124 | 0.165 | 0.206 | 0.248 | 0.330 | 0.413 |
| | | | | Feed (mm/min) | 240 | 240 | 240 | 240 | 240 | 240 | 240 | 240 |
| | ≤ 375 Bhn or ≤ 40 HRc | 24 | RPM | 5170 | 2585 | 1293 | 969 | 776 | 646 | 485 | 388 | |
| | | (20-29) | Fr | 0.015 | 0.029 | 0.058 | 0.077 | 0.097 | 0.116 | 0.155 | 0.193 | |
| | | | Feed (mm/min) | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 21 | RPM | 4524 | 2262 | 1131 | 848 | 679 | 565 | 424 | 339 | |
| | | (17-26) | Fr | 0.010 | 0.020 | 0.040 | 0.053 | 0.066 | 0.080 | 0.106 | 0.133 | |
| | | | Feed (mm/min) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| | M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 91 | RPM | 19388 | 9694 | 4847 | 3635 | 2908 | 2424 | 1818 | 1454 |
| | | | (73-110) | Fr | 0.054 | 0.108 | 0.217 | 0.289 | 0.361 | 0.433 | 0.578 | 0.722 |
| | | | | Feed (mm/min) | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 |
| ≤ 260 Bhn or ≤ 26 HRc | | 81 | RPM | 17126 | 8563 | 4282 | 3211 | 2569 | 2141 | 1606 | 1284 | |
| | | (65-97) | Fr | 0.055 | 0.109 | 0.218 | 0.291 | 0.364 | 0.437 | 0.582 | 0.728 | |
| | | | Feed (mm/min) | 935 | 935 | 935 | 935 | 935 | 935 | 935 | 935 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | | ≤ 185 Bhn or ≤ 9 HRc | 76 | RPM | 16157 | 8078 | 4039 | 3029 | 2424 | 2020 | 1515 | 1212 |
| | | | (61-91) | Fr | 0.031 | 0.061 | 0.123 | 0.163 | 0.204 | 0.245 | 0.327 | 0.408 |
| | | | | Feed (mm/min) | 495 | 495 | 495 | 495 | 495 | 495 | 495 | 495 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 46 | RPM | 9694 | 4847 | 2424 | 1818 | 1454 | 1212 | 909 | 727 |
| | | | (37-55) | Fr | 0.024 | 0.047 | 0.095 | 0.127 | 0.158 | 0.190 | 0.253 | 0.316 |
| | | | | Feed (mm/min) | 230 | 230 | 230 | 230 | 230 | 230 | 230 | 230 |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 24 | RPM | 5170 | 2585 | 1293 | 969 | 776 | 646 | 485 | 388 |
| | | | (20-29) | Fr | 0.023 | 0.046 | 0.093 | 0.124 | 0.155 | 0.186 | 0.248 | 0.309 |
| | | | | Feed (mm/min) | 120 | 120 | 120 | 120 | 120 | 120 | 120 | 120 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 17 | RPM | 3555 | 1777 | 889 | 666 | 533 | 444 | 333 | 267 |
| | | | (13-20) | Fr | 0.021 | 0.042 | 0.084 | 0.113 | 0.141 | 0.169 | 0.225 | 0.281 |
| | | | | Feed (mm/min) | 75 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |

continued on next page

| Series 135M 5D Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | |
|---|---|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | 1.5 | 3 | 6 | 8 | 10 | 12 | 16 | 20 | | |
| SUPER ALLOYS (Nickel, Cobalt, Iron Base) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy | ≤ 300 Bhn or ≤ 32 HRc | 12 | RPM | 2585 | 1293 | 646 | 485 | 388 | 323 | 242 | 194 | |
| | | (10-15) | Fr | 0.010 | 0.019 | 0.039 | 0.052 | 0.064 | 0.077 | 0.103 | 0.129 | |
| | | | Feed (mm/min) | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | |
| | ≤ 400 Bhn or ≤ 43 HRc | 6 | RPM | 1293 | 646 | 323 | 242 | 194 | 162 | 121 | 97 | |
| | | (5-7) | Fr | 0.007 | 0.014 | 0.028 | 0.037 | 0.046 | 0.056 | 0.074 | 0.093 | |
| | | | Feed (mm/min) | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 32 | RPM | 6786 | 3393 | 1696 | 1272 | 1018 | 848 | 636 | 509 |
| | | | (26-38) | Fr | 0.021 | 0.043 | 0.085 | 0.114 | 0.142 | 0.171 | 0.228 | 0.285 |
| | | | | Feed (mm/min) | 145 | 145 | 145 | 145 | 145 | 145 | 145 | 145 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 24 | RPM | 5170 | 2585 | 1293 | 969 | 776 | 646 | 485 | 388 |
| | | | (20-29) | Fr | 0.019 | 0.039 | 0.077 | 0.103 | 0.129 | 0.155 | 0.206 | 0.258 |
| | | | | Feed (mm/min) | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| ≤ 440 Bhn or ≤ 47 HRc | | 13 | RPM | 2714 | 1357 | 679 | 509 | 407 | 339 | 254 | 204 | |
| | | (10-15) | Fr | 0.015 | 0.029 | 0.059 | 0.079 | 0.098 | 0.118 | 0.157 | 0.196 | |
| | | | Feed (mm/min) | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 | |
| ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 194 | RPM | 41039 | 20519 | 10260 | 7695 | 6156 | 5130 | 3847 | 3078 |
| | | | (155-232) | Fr | 0.059 | 0.118 | 0.237 | 0.316 | 0.395 | 0.474 | 0.632 | 0.790 |
| | | | | Feed (mm/min) | 2430 | 2430 | 2430 | 2430 | 2430 | 2430 | 2430 | 2430 |
| | ≤ 150 Bhn or ≤ 7 HRc | 165 | RPM | 34899 | 17449 | 8725 | 6544 | 5235 | 4362 | 3272 | 2617 | |
| | | (132-198) | Fr | 0.059 | 0.118 | 0.237 | 0.316 | 0.394 | 0.473 | 0.631 | 0.789 | |
| | | | Feed (mm/min) | 2065 | 2065 | 2065 | 2065 | 2065 | 2065 | 2065 | 2065 | |
| | Copper Alloys Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 137 | RPM | 29082 | 14541 | 7271 | 5453 | 4362 | 3635 | 2726 | 2181 |
| | | | (110-165) | Fr | 0.027 | 0.053 | 0.107 | 0.142 | 0.178 | 0.213 | 0.284 | 0.355 |
| | | | | Feed (mm/min) | 775 | 775 | 775 | 775 | 775 | 775 | 775 | 775 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 110 | RPM | 23266 | 11633 | 5816 | 4362 | 3490 | 2908 | 2181 | 1745 |
| | | | (88-132) | Fr | 0.027 | 0.054 | 0.108 | 0.144 | 0.181 | 0.217 | 0.289 | 0.361 |
| | | | | Feed (mm/min) | 630 | 630 | 630 | 630 | 630 | 630 | 630 | 630 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fr \times rpm$
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Hi-PerCarb

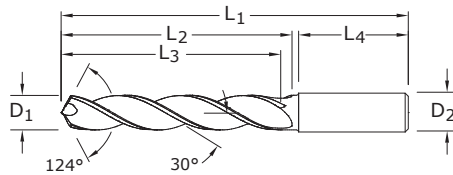


3xD



131N 3xD

FRACTIONAL & METRIC SERIES



- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 175 Bhn (≤ 16 HRC)

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | UNCOATED | Ti-NAMITE-B (TiB ₂) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------|---------------------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. | EDP NO. |
| 3,0 mm | 0.1181 | | | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 64600 | 67600 |
| 3,1 mm | 0.1220 | | | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 64601 | 67601 |
| 1/8 | 0.1250 | 3.18 | | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 54600 | 54700 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 64602 | 67602 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 64603 | 67603 |
| 3,4 mm | 0.1339 | | | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 64604 | 67604 |
| #29 | 0.1360 | 3.45 | 8-32,8-36 | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 54601 | 54701 |
| 3,5 mm | 0.1378 | | M4 X 0,5 | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 64605 | 67605 |
| 9/64 | 0.1406 | 3.57 | | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 54602 | 54702 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 64606 | 67606 |
| 3,7 mm | 0.1457 | | M4,5 X 0,75 | 6,0 | 62,0 | 20,0 | 14,0 | 36,0 | 64607 | 67607 |
| 3,8 mm | 0.1496 | | 10-24 | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 64608 | 67608 |
| 3,9 mm | 0.1535 | | | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 64609 | 67609 |
| 5/32 | 0.1562 | 3.97 | | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 54603 | 54703 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 64610 | 67610 |
| #21 | 0.1590 | 4.04 | 10-32 | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 54604 | 54704 |
| 4,1 mm | 0.1614 | | | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 64611 | 67611 |
| 4,2 mm | 0.1654 | | M5 / M5 x 0,75 | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 64612 | 67612 |
| 4,3 mm | 0.1693 | | | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 64613 | 67613 |
| 11/64 | 0.1719 | 4.37 | | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 54605 | 54705 |
| 4,4 mm | 0.1732 | | 12-24 | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 64614 | 67614 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 64615 | 67615 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 64616 | 67616 |
| 4,7 mm | 0.1850 | | 12-32 | 6,0 | 66,0 | 24,0 | 17,0 | 36,0 | 64617 | 67617 |
| 3/16 | 0.1875 | 4.76 | | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 54606 | 54706 |
| 4,8 mm | 0.1890 | | 7/32-32 | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64618 | 67618 |
| 4,9 mm | 0.1929 | | | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64619 | 67619 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64620 | 67620 |
| 5,1 mm | 0.2008 | | 1/4-20 | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64621 | 67621 |
| 13/64 | 0.2031 | 5.16 | | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 54607 | 54707 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64622 | 67622 |
| 5,3 mm | 0.2087 | | | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64623 | 67623 |
| 5,4 mm | 0.2126 | | | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64624 | 67624 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64625 | 67625 |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 54608 | 54708 |
| 5,6 mm | 0.2205 | | | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64626 | 67626 |

TOLERANCES (inch)

- ≤.1181 DIAMETER**
D₁ = +.0008/+0.0047
D₂ = h₆
- >.1181-.2362 DIAMETER**
D₁ = +.00016/+0.00063
D₂ = h₆
- >.2362-.3937 DIAMETER**
D₁ = +.00024/+0.00083
D₂ = h₆
- >.3937-.7087 DIAMETER**
D₁ = +.00028/+0.00098
D₂ = h₆
- >.7087-1.1811 DIAMETER**
D₁ = +.00031/+0.00114
D₂ = h₆

TOLERANCES (mm)

- ≤3 DIAMETER**
D₁ = +0,002/+0,012
D₂ = h₆
- >3-6 DIAMETER**
D₁ = +0,004/+0,016
D₂ = h₆
- >6-10 DIAMETER**
D₁ = +0,006/+0,021
D₂ = h₆
- >10-18 DIAMETER**
D₁ = +0,007/+0,025
D₂ = h₆

- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

continued on next page



131N 3xD

FRACTIONAL & METRIC SERIES

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | UNCOATED | Ti-NAMITE-B (TiB ₂) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------|---------------------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. | EDP NO. |
| 5,7 mm | 0.2244 | | | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64627 | 67627 |
| 5,8 mm | 0.2283 | | | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64628 | 67628 |
| 5,9 mm | 0.2323 | | | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64629 | 67629 |
| 15/64 | 0.2344 | 5.95 | | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 54609 | 54709 |
| 6,0 mm | 0.2362 | | M7 X 1 | 6,0 | 66,0 | 28,0 | 20,0 | 36,0 | 64630 | 67630 |
| 6,1 mm | 0.2402 | | | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 64631 | 67631 |
| 6,2 mm | 0.2441 | | M7 X 0,75 | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 64632 | 67632 |
| 6,3 mm | 0.2480 | | | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 64633 | 67633 |
| 1/4 | 0.2500 | 6.35 | | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 54610 | 54710 |
| 6,4 mm | 0.2520 | | | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 64634 | 67634 |
| 6,5 mm | 0.2559 | | | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 64635 | 67635 |
| F | 0.2570 | 6.53 | 5/16-18 | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 54611 | 54711 |
| 6,6 mm | 0.2598 | | | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 64636 | 67636 |
| 6,7 mm | 0.2638 | | | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 64637 | 67637 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 54612 | 54712 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 64638 | 67638 |
| 6,9 mm | 0.2717 | | 5/16-24 | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 64639 | 67639 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 79,0 | 34,0 | 24,0 | 36,0 | 64640 | 67640 |
| 7,1 mm | 0.2795 | | | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 64641 | 67641 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 54613 | 54713 |
| 7,2 mm | 0.2835 | | M8 X 0,75 | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 64642 | 67642 |
| 7,3 mm | 0.2874 | | | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 64643 | 67643 |
| 7,4 mm | 0.2913 | | | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 64644 | 67644 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 64645 | 67645 |
| 19/64 | 0.2969 | 7.54 | | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 54614 | 54714 |
| 7,6 mm | 0.2992 | | | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 64646 | 67646 |
| 7,7 mm | 0.3031 | | | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 64647 | 67647 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 64648 | 67648 |
| 7,9 mm | 0.3110 | | | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 64649 | 67649 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 54615 | 54715 |
| 8,0 mm | 0.3150 | | M9 X 1 | 8,0 | 79,0 | 41,0 | 29,0 | 36,0 | 64650 | 67650 |
| 8,1 mm | 0.3189 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64651 | 67651 |
| 8,2 mm | 0.3228 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64652 | 67652 |
| 8,3 mm | 0.3268 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64653 | 67653 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 54616 | 54716 |
| 8,4 mm | 0.3307 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64654 | 67654 |
| Q | 0.3320 | 8.43 | 3/8-24 | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 54617 | 54717 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64655 | 67655 |
| 8,6 mm | 0.3386 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64656 | 67656 |
| 8,7 mm | 0.3425 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64657 | 67657 |
| 11/32 | 0.3438 | 8.73 | 3/8-32 | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 54618 | 54718 |
| 8,8 mm | 0.3465 | | M10 X 1,25 | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64658 | 67658 |
| 8,9 mm | 0.3504 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64659 | 67659 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64660 | 67660 |
| 9,1 mm | 0.3583 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64661 | 67661 |
| 23/64 | 0.3594 | 9.13 | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 54619 | 54719 |

continued on next page

CONTINUED

Hi-PerCarb

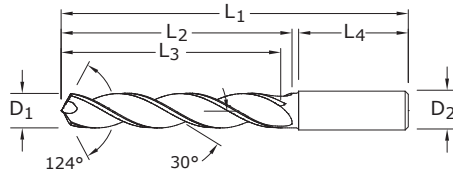


3xD



131N 3xD

FRACTIONAL & METRIC SERIES



- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 175 Bhn (≤ 16 HRc)

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | UNCOATED | Ti-NAMITE-B (TiB ₂) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------|---------------------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. | EDP NO. |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64662 | 67662 |
| 9,3 mm | 0.3661 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64663 | 67663 |
| U | 0.3680 | 9.35 | 7/16-14 | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 54620 | 54720 |
| 9,4 mm | 0.3701 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64664 | 67664 |
| 9,5 mm | 0.3740 | | M11 / M10 X 0,5 | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64665 | 67665 |
| 3/8 | 0.3750 | 9.53 | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 54621 | 54721 |
| 9,6 mm | 0.3780 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64666 | 67666 |
| 9,7 mm | 0.3819 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64667 | 67667 |
| 9,8 mm | 0.3858 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64668 | 67668 |
| 9,9 mm | 0.3898 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64669 | 67669 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 54622 | 54722 |
| 10,0 mm | 0.3937 | | | 10,0 | 89,0 | 47,0 | 35,0 | 40,0 | 64670 | 67670 |
| 10,1 mm | 0.3976 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64671 | 67671 |
| 10,2 mm | 0.4016 | | M12 X 1,75 | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64672 | 67672 |
| 10,3 mm | 0.4055 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64673 | 67673 |
| 13/32 | 0.4062 | 10.32 | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 54623 | 54723 |
| 10,4 mm | 0.4094 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64674 | 67674 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64675 | 67675 |
| 10,6 mm | 0.4173 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64676 | 67676 |
| 10,7 mm | 0.4213 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64677 | 67677 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 54624 | 54724 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64678 | 67678 |
| 10,9 mm | 0.4291 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64679 | 67679 |
| 11,0 mm | 0.4331 | | M12 X 1 | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64680 | 67680 |
| 11,1 mm | 0.4370 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64681 | 67681 |
| 7/16 | 0.4375 | 11.11 | 1/4-18NPT | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 54625 | 54725 |
| 11,2 mm | 0.4409 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64682 | 67682 |
| 11,3 mm | 0.4449 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64683 | 67683 |
| 11,4 mm | 0.4488 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64684 | 67684 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64685 | 67685 |
| 11,6 mm | 0.4567 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64686 | 67686 |
| 11,7 mm | 0.4606 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64687 | 67687 |
| 11,8 mm | 0.4646 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64688 | 67688 |
| 11,9 mm | 0.4685 | | | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64689 | 67689 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 54626 | 54726 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 102,0 | 55,0 | 40,0 | 45,0 | 64690 | 67690 |

TOLERANCES (inch)

- ≤.1181 DIAMETER**
D₁ = +.0008/+0.0047
D₂ = h₆
- >.1181-.2362 DIAMETER**
D₁ = +.00016/+0.00063
D₂ = h₆
- >.2362-.3937 DIAMETER**
D₁ = +.00024/+0.00083
D₂ = h₆
- >.3937-.7087 DIAMETER**
D₁ = +.00028/+0.00098
D₂ = h₆
- >.7087-1.1811 DIAMETER**
D₁ = +.00031/+0.00114
D₂ = h₆

TOLERANCES (mm)

- ≤3 DIAMETER**
D₁ = +0,002/+0,012
D₂ = h₆
- >3-6 DIAMETER**
D₁ = +0,004/+0,016
D₂ = h₆
- >6-10 DIAMETER**
D₁ = +0,006/+0,021
D₂ = h₆
- >10-18 DIAMETER**
D₁ = +0,007/+0,025
D₂ = h₆

- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

continued on next page



131N 3xD
FRACTIONAL & METRIC SERIES

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | UNCOATED | Ti-NAMITE-B (TiB ₂) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------|---------------------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. | EDP NO. |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 14,0 | 107,0 | 60,0 | 43,0 | 45,0 | 54627 | 54727 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 107,0 | 60,0 | 43,0 | 45,0 | 64691 | 67691 |
| 1/2 | 0.5000 | 12.70 | | 14,0 | 107,0 | 60,0 | 43,0 | 45,0 | 54628 | 54728 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 107,0 | 60,0 | 43,0 | 45,0 | 64692 | 67692 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 107,0 | 60,0 | 43,0 | 45,0 | 64693 | 67693 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 14,0 | 107,0 | 60,0 | 43,0 | 45,0 | 54629 | 54729 |
| 13,5 mm | 0.5315 | | 5/8-11 | 14,0 | 107,0 | 60,0 | 43,0 | 45,0 | 64694 | 67694 |
| 13,8 mm | 0.5433 | | | 14,0 | 107,0 | 60,0 | 43,0 | 45,0 | 64695 | 67695 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 107,0 | 60,0 | 43,0 | 45,0 | 64696 | 67696 |
| 9/16 | 0.5625 | 14.29 | | 16,0 | 115,0 | 65,0 | 45,0 | 48,0 | 54630 | 54730 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 115,0 | 65,0 | 45,0 | 48,0 | 64697 | 67697 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 16,0 | 115,0 | 65,0 | 45,0 | 48,0 | 54631 | 54731 |
| 14,8 mm | 0.5827 | | | 16,0 | 115,0 | 65,0 | 45,0 | 48,0 | 64698 | 67698 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 115,0 | 65,0 | 45,0 | 48,0 | 64699 | 67699 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 115,0 | 65,0 | 45,0 | 48,0 | 64700 | 67700 |
| 15,8 mm | 0.6220 | | | 16,0 | 115,0 | 65,0 | 45,0 | 48,0 | 64701 | 67701 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 16,0 | 115,0 | 65,0 | 45,0 | 48,0 | 54632 | 54732 |
| 16,0 mm | 0.6299 | | | 16,0 | 115,0 | 65,0 | 45,0 | 48,0 | 64702 | 67702 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 18,0 | 123,0 | 73,0 | 51,0 | 48,0 | 54633 | 54733 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 18,0 | 123,0 | 73,0 | 51,0 | 48,0 | 54634 | 54734 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 20,0 | 131,0 | 79,0 | 55,0 | 50,0 | 54635 | 54735 |

CONTINUED

Hi-PerCarb

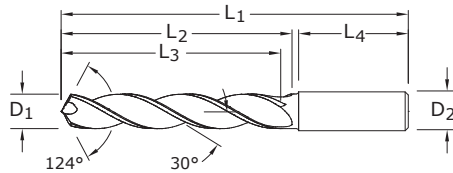


5xD



131N 5xD

FRACTIONAL & METRIC SERIES



- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 175 Bhn (≤ 16 HRC)

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | UNCOATED | Ti-NAMITE-B (TiB ₂) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------|---------------------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. | EDP NO. |
| 3,0 mm | 0.1181 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65000 | 64800 |
| 3,1 mm | 0.1220 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65001 | 64801 |
| 1/8 | 0.1250 | 3.18 | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 55000 | 54800 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65002 | 64802 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65003 | 64803 |
| 3,4 mm | 0.1339 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65004 | 64804 |
| #29 | 0.1360 | 3.45 | 8-32,8-36 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 55001 | 54801 |
| 3,5 mm | 0.1378 | | M4 X 0,5 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65005 | 64805 |
| 9/64 | 0.1406 | 3.57 | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 55002 | 54802 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65006 | 64806 |
| 3,7 mm | 0.1457 | | M4,5 X 0,75 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65007 | 64807 |
| 3,8 mm | 0.1496 | | 10-24 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65008 | 64808 |
| 3,9 mm | 0.1535 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65009 | 64809 |
| 5/32 | 0.1562 | 3.97 | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 55003 | 54803 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65010 | 64810 |
| #21 | 0.1590 | 4.04 | 10-32 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 55004 | 54804 |
| 4,1 mm | 0.1614 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65011 | 64811 |
| 4,2 mm | 0.1654 | | M5 / M5 x 0,75 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65012 | 64812 |
| 4,3 mm | 0.1693 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65013 | 64813 |
| 11/64 | 0.1719 | 4.37 | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 55005 | 54805 |
| 4,4 mm | 0.1732 | | 12-24 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65014 | 64814 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65015 | 64815 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65016 | 64816 |
| 4,7 mm | 0.1850 | | 12-32 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65017 | 64817 |
| 3/16 | 0.1875 | 4.76 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 55006 | 54806 |
| 4,8 mm | 0.1890 | | 7/32-32 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65018 | 64818 |
| 4,9 mm | 0.1929 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65019 | 64819 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65020 | 64820 |
| 5,1 mm | 0.2008 | | 1/4-20 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65021 | 64821 |
| 13/64 | 0.2031 | 5.16 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 55007 | 54807 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65022 | 64822 |
| 5,3 mm | 0.2087 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65023 | 64823 |
| 5,4 mm | 0.2126 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65024 | 64824 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65025 | 64825 |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 55008 | 54808 |
| 5,6 mm | 0.2205 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65026 | 64826 |

TOLERANCES (inch)

- ≤.1181 DIAMETER**
D₁ = +.0008/+0.0047
D₂ = h₆
- >.1181-.2362 DIAMETER**
D₁ = +.00016/+0.00063
D₂ = h₆
- >.2362-.3937 DIAMETER**
D₁ = +.00024/+0.00083
D₂ = h₆
- >.3937-.7087 DIAMETER**
D₁ = +.00028/+0.00098
D₂ = h₆
- >.7087-1.1811 DIAMETER**
D₁ = +.00031/+0.0114
D₂ = h₆

TOLERANCES (mm)

- ≤3 DIAMETER**
D₁ = +0,002/+0,012
D₂ = h₆
- >3-6 DIAMETER**
D₁ = +0,004/+0,016
D₂ = h₆
- >6-10 DIAMETER**
D₁ = +0,006/+0,021
D₂ = h₆
- >10-18 DIAMETER**
D₁ = +0,007/+0,025
D₂ = h₆

- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

continued on next page



131N 5xD
FRACTIONAL & METRIC SERIES

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | UNCOATED | Ti-NAMITE-B (TiB ₂) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------|---------------------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. | EDP NO. |
| 5,7 mm | 0.2244 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65027 | 64827 |
| 5,8 mm | 0.2283 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65028 | 64828 |
| 5,9 mm | 0.2323 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65029 | 64829 |
| 15/64 | 0.2344 | 5.95 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 55009 | 54809 |
| 6,0 mm | 0.2362 | | M7 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65030 | 64830 |
| 6,1 mm | 0.2402 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65031 | 64831 |
| 6,2 mm | 0.2441 | | M7 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65032 | 64832 |
| 6,3 mm | 0.2480 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65033 | 64833 |
| 1/4 | 0.2500 | 6.35 | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55010 | 54810 |
| 6,4 mm | 0.2520 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65034 | 64834 |
| 6,5 mm | 0.2559 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65035 | 64835 |
| F | 0.2570 | 6.53 | 5/16-18 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55011 | 54811 |
| 6,6 mm | 0.2598 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65036 | 64836 |
| 6,7 mm | 0.2638 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65037 | 64837 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55012 | 54812 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65038 | 64838 |
| 6,9 mm | 0.2717 | | 5/16-24 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65039 | 64839 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65040 | 64840 |
| 7,1 mm | 0.2795 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65041 | 64841 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55013 | 54813 |
| 7,2 mm | 0.2835 | | M8 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65042 | 64842 |
| 7,3 mm | 0.2874 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65043 | 64843 |
| 7,4 mm | 0.2913 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65044 | 64844 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65045 | 64845 |
| 19/64 | 0.2969 | 7.54 | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55014 | 54814 |
| 7,6 mm | 0.2992 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65046 | 64846 |
| 7,7 mm | 0.3031 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65047 | 64847 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65048 | 64848 |
| 7,9 mm | 0.3110 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65049 | 64849 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55015 | 54815 |
| 8,0 mm | 0.3150 | | M9 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65050 | 64850 |
| 8,1 mm | 0.3189 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65051 | 64851 |
| 8,2 mm | 0.3228 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65052 | 64852 |
| 8,3 mm | 0.3268 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65053 | 64853 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55016 | 54816 |
| 8,4 mm | 0.3307 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65054 | 64854 |
| Q | 0.3320 | 8.43 | 3/8-24 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55017 | 54817 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65055 | 64855 |
| 8,6 mm | 0.3386 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65056 | 64856 |
| 8,7 mm | 0.3425 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65057 | 64857 |
| 11/32 | 0.3438 | 8.73 | 3/8-32 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55018 | 54818 |
| 8,8 mm | 0.3465 | | M10 X 1,25 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65058 | 64858 |
| 8,9 mm | 0.3504 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65059 | 64859 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65060 | 64860 |
| 9,1 mm | 0.3583 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65061 | 64861 |
| 23/64 | 0.3594 | 9.13 | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55019 | 54819 |

CONTINUED

continued on next page

Hi-PerCarb

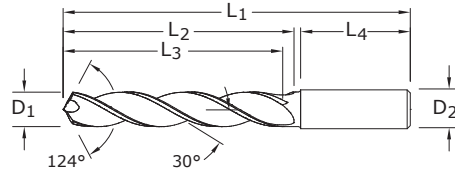


5xD



131N 5xD

FRACTIONAL & METRIC SERIES



- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 175 Bhn (≤ 16 HRC)

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | UNCOATED | Ti-NAMITE-B (TiB ₂) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------|---------------------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. | EDP NO. |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65062 | 64862 |
| 9,3 mm | 0.3661 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65063 | 64863 |
| U | 0.3680 | 9.35 | 7/16-14 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55020 | 54820 |
| 9,4 mm | 0.3701 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65064 | 64864 |
| 9,5 mm | 0.3740 | | M11 / M10 X 0,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65065 | 64865 |
| 3/8 | 0.3750 | 9.53 | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55021 | 54821 |
| 9,6 mm | 0.3780 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65066 | 64866 |
| 9,7 mm | 0.3819 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65067 | 64867 |
| 9,8 mm | 0.3858 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65068 | 64868 |
| 9,9 mm | 0.3898 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65069 | 64869 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55022 | 54822 |
| 10,0 mm | 0.3937 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65070 | 64870 |
| 10,1 mm | 0.3976 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65071 | 64871 |
| 10,2 mm | 0.4016 | | M12 X 1,75 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65072 | 64872 |
| 10,3 mm | 0.4055 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65073 | 64873 |
| 13/32 | 0.4062 | 10.32 | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 55023 | 54823 |
| 10,4 mm | 0.4094 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65074 | 64874 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65075 | 64875 |
| 10,6 mm | 0.4173 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65076 | 64876 |
| 10,7 mm | 0.4213 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65077 | 64877 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 55024 | 54824 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65078 | 64878 |
| 10,9 mm | 0.4291 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65079 | 64879 |
| 11,0 mm | 0.4331 | | M12 X 1 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65080 | 64880 |
| 11,1 mm | 0.4370 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65081 | 64881 |
| 7/16 | 0.4375 | 11.11 | 1/4-18NPT | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 55025 | 54825 |
| 11,2 mm | 0.4409 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65082 | 64882 |
| 11,3 mm | 0.4449 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65083 | 64883 |
| 11,4 mm | 0.4488 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65084 | 64884 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65085 | 64885 |
| 11,6 mm | 0.4567 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65086 | 64886 |
| 11,7 mm | 0.4606 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65087 | 64887 |
| 11,8 mm | 0.4646 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65088 | 64888 |
| 11,9 mm | 0.4685 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65089 | 64889 |

TOLERANCES (inch)

- ≤.1181 DIAMETER**
D₁ = +.0008/+0.0047
D₂ = h₆
- >.1181-.2362 DIAMETER**
D₁ = +.00016/+0.00063
D₂ = h₆
- >.2362-.3937 DIAMETER**
D₁ = +.00024/+0.00083
D₂ = h₆
- >.3937-.7087 DIAMETER**
D₁ = +.00028/+0.00098
D₂ = h₆
- >.7087-1.1811 DIAMETER**
D₁ = +.00031/+0.0114
D₂ = h₆

TOLERANCES (mm)

- ≤3 DIAMETER**
D₁ = +0,002/+0,012
D₂ = h₆
- >3-6 DIAMETER**
D₁ = +0,004/+0,016
D₂ = h₆
- >6-10 DIAMETER**
D₁ = +0,006/+0,021
D₂ = h₆
- >10-18 DIAMETER**
D₁ = +0,007/+0,025
D₂ = h₆

- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

continued on next page



131N 5xD
FRACTIONAL & METRIC SERIES

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | UNCOATED | Ti-NAMITE-B (TiB ₂) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|----------|---------------------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. | EDP NO. |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 55026 | 54826 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65090 | 64890 |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 55027 | 54827 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65091 | 64891 |
| 1/2 | 0.5000 | 12.70 | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 55028 | 54828 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65092 | 64892 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65093 | 64893 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 55029 | 54829 |
| 13,5 mm | 0.5315 | | 5/8-11 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65094 | 64894 |
| 13,8 mm | 0.5433 | | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65095 | 64895 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65096 | 64896 |
| 9/16 | 0.5625 | 14.29 | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 55030 | 54830 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65097 | 64897 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 55031 | 54831 |
| 14,8 mm | 0.5827 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65098 | 64898 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65099 | 64899 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65100 | 64900 |
| 15,8 mm | 0.6220 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65101 | 64901 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 55032 | 54832 |
| 16,0 mm | 0.6299 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65102 | 64902 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 55033 | 54833 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 55034 | 54834 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | 55035 | 54835 |

CONTINUED

Hi-PerCarb

| Series 131N 3D & 5D Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | |
|--|-----------------------------|-------------|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | |
| ALUMINUM ALLOYS < 12% SI 6061, 2024, 7075 | ≤ 150 Bhn or ≤ 7 HRc | 800 | RPM | 24448 | 16299 | 12224 | 8149 | 6112 | 4890 | 4075 |
| | | (640-960) | Fr | 0.0055 | 0.0083 | 0.0110 | 0.0166 | 0.0221 | 0.0276 | 0.0331 |
| | | | Feed (ipm) | 135 | 135 | 135 | 135 | 135 | 135 | 135 |
| ALUMINUM ALLOYS > 12% SI A356.0, 390.0, 319.0 | ≤ 125 Bhn or ≤ 77 HRb | 600 | RPM | 18336 | 12224 | 9168 | 6112 | 4584 | 3667 | 3056 |
| | | (480-720) | Fr | 0.0055 | 0.0082 | 0.0109 | 0.0164 | 0.0218 | 0.0273 | 0.0327 |
| | | | Feed (ipm) | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| COPPER ALLOYS Alum Bronze, Muntz Brass, Naval Brass | ≤ 175 Bhn or ≤ 16 HRc | 550 | RPM | 16808 | 11205 | 8404 | 5603 | 4202 | 3362 | 2801 |
| | | (440-660) | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0061 | 0.0081 | 0.0101 | 0.0121 |
| | | | Feed (ipm) | 34 | 34 | 34 | 34 | 34 | 34 | 34 |
| PLASTICS Acrylic, PVC, Polypropylene | | 450 | RPM | 13752 | 9168 | 6876 | 4584 | 3438 | 2750 | 2292 |
| | | (360-540) | Fr | 0.0025 | 0.0037 | 0.0049 | 0.0074 | 0.0099 | 0.0124 | 0.0148 |
| | | | Feed (ipm) | 34 | 34 | 34 | 34 | 34 | 34 | 34 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fr \times rpm$
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

| Series 131N 3D & 5D Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | |
|--|-----------------------------|---------------|------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| | | | 3 | 6 | 8 | 10 | 12 | 14 | 16 | |
| ALUMINUM ALLOYS < 12% SI 6061, 2024, 7075 | ≤ 150 Bhn or ≤ 7 HRc | 244 | RPM | 25851 | 12926 | 9694 | 7755 | 6463 | 5540 | 4847 |
| | | (195-293) | Fr | 0.133 | 0.265 | 0.354 | 0.442 | 0.531 | 0.619 | 0.708 |
| | | | Feed (mm/min) | 3430 | 3430 | 3430 | 3430 | 3430 | 3430 | 3430 |
| ALUMINUM ALLOYS > 12% SI A356.0, 390.0, 319.0 | ≤ 125 Bhn or ≤ 77 HRb | 183 | RPM | 19388 | 9694 | 7271 | 5816 | 4847 | 4155 | 3635 |
| | | (146-219) | Fr | 0.131 | 0.262 | 0.349 | 0.437 | 0.524 | 0.611 | 0.699 |
| | | | Feed (mm/min) | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 |
| COPPER ALLOYS Alum Bronze, Muntz Brass, Naval Brass | ≤ 175 Bhn or ≤ 16 HRc | 168 | RPM | 17773 | 8886 | 6665 | 5332 | 4443 | 3808 | 3332 |
| | | (134-201) | Fr | 0.049 | 0.097 | 0.130 | 0.162 | 0.194 | 0.227 | 0.259 |
| | | | Feed (mm/min) | 864 | 864 | 864 | 864 | 864 | 864 | 864 |
| PLASTICS Acrylic, PVC, Polypropylene | | 137 | RPM | 14541 | 7271 | 5453 | 4362 | 3635 | 3116 | 2726 |
| | | (110-165) | Fr | 0.059 | 0.119 | 0.158 | 0.198 | 0.238 | 0.277 | 0.317 |
| | | | Feed (mm/min) | 864 | 864 | 864 | 864 | 864 | 864 | 864 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fr \times rpm$
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

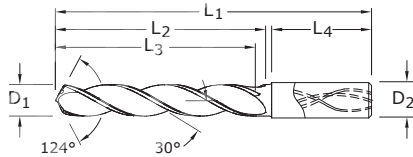
Hi-PerCarb



5xD



3



141K 5xD

FRACTIONAL & METRIC SERIES

- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 400 Bhn (≤ 43 HRC)

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-M (TM) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 3,0 mm | 0.1181 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65160 |
| 3,1 mm | 0.1220 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65161 |
| 1/8 | 0.1250 | 3.18 | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 55160 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65162 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65163 |
| 3,4 mm | 0.1339 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65164 |
| #29 | 0.1360 | 3.45 | 8-32,8-36 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 55161 |
| 3,5 mm | 0.1378 | | M4 X 0,5 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65165 |
| 9/64 | 0.1406 | 3.57 | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 55162 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65166 |
| 3,7 mm | 0.1457 | | M4,5 X 0,75 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 65167 |
| 3,8 mm | 0.1496 | | 10-24 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65168 |
| 3,9 mm | 0.1535 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65169 |
| 5/32 | 0.1562 | 3.97 | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 55163 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65170 |
| #21 | 0.1590 | 4.04 | 10-32 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 55164 |
| 4,1 mm | 0.1614 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65171 |
| 4,2 mm | 0.1654 | | M5 / M5 x 0,75 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65172 |
| 4,3 mm | 0.1693 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65173 |
| 11/64 | 0.1719 | 4.37 | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 55165 |
| 4,4 mm | 0.1732 | | 12-24 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65174 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65175 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65176 |
| 4,7 mm | 0.1850 | | 12-32 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 65177 |
| 3/16 | 0.1875 | 4.76 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 55166 |
| 4,8 mm | 0.1890 | | 7/32-32 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65178 |
| 4,9 mm | 0.1929 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65179 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65180 |
| 5,1 mm | 0.2008 | | 1/4-20 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65181 |
| 13/64 | 0.2031 | 5.16 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 55167 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65182 |
| 5,3 mm | 0.2087 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65183 |
| 5,4 mm | 0.2126 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65184 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65185 |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 55168 |
| 5,6 mm | 0.2205 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65186 |

TOLERANCES (inch)

≤.1181 DIAMETER

D₁ = +.00008/+0.00047

D₂ = h₆

>.1181-.2362 DIAMETER

D₁ = +.00016/+0.00063

D₂ = h₆

>.2362-.3937 DIAMETER

D₁ = +.00024/+0.00083

D₂ = h₆

>.3937-.7087 DIAMETER

D₁ = +.00028/+0.00098

D₂ = h₆

>.7087-1.1811 DIAMETER

D₁ = +.00031/+0.00114

D₂ = h₆

TOLERANCES (mm)

≤3 DIAMETER

D₁ = +0,002/+0,012

D₂ = h₆

>3-6 DIAMETER

D₁ = +0,004/+0,016

D₂ = h₆

>6-10 DIAMETER

D₁ = +0,006/+0,021

D₂ = h₆

>10-18 DIAMETER

D₁ = +0,007/+0,025

D₂ = h₆

CAST IRON

For patent information visit www.ksptpatents.com

continued on next page



141K 5xD

FRACTIONAL & METRIC SERIES

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-M (TM) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 5,7 mm | 0.2244 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65187 |
| 5,8 mm | 0.2283 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65188 |
| 5,9 mm | 0.2323 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65189 |
| 15/64 | 0.2344 | 5.95 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 55169 |
| 6,0 mm | 0.2362 | | M7 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 65190 |
| 6,1 mm | 0.2402 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65191 |
| 6,2 mm | 0.2441 | | M7 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65192 |
| 6,3 mm | 0.2480 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65193 |
| 1/4 | 0.2500 | 6.35 | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55170 |
| 6,4 mm | 0.2520 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65194 |
| 6,5 mm | 0.2559 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65195 |
| F | 0.2570 | 6.53 | 5/16-18 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55171 |
| 6,6 mm | 0.2598 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65196 |
| 6,7 mm | 0.2638 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65197 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55172 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65198 |
| 6,9 mm | 0.2717 | | 5/16-24 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65199 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65200 |
| 7,1 mm | 0.2795 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65201 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55173 |
| 7,2 mm | 0.2835 | | M8 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65202 |
| 7,3 mm | 0.2874 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65203 |
| 7,4 mm | 0.2913 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65204 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65205 |
| 19/64 | 0.2969 | 7.54 | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55174 |
| 7,6 mm | 0.2992 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65206 |
| 7,7 mm | 0.3031 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65207 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65208 |
| 7,9 mm | 0.3110 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65209 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 55175 |
| 8,0 mm | 0.3150 | | M9 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 65210 |
| 8,1 mm | 0.3189 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65211 |
| 8,2 mm | 0.3228 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65212 |
| 8,3 mm | 0.3268 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65213 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55176 |
| 8,4 mm | 0.3307 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65214 |
| Q | 0.3320 | 8.43 | 3/8-24 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55177 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65215 |
| 8,6 mm | 0.3386 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65216 |
| 8,7 mm | 0.3425 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65217 |
| 11/32 | 0.3438 | 8.73 | 3/8-32 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55178 |
| 8,8 mm | 0.3465 | | M10 X 1,25 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65218 |
| 8,9 mm | 0.3504 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65219 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65220 |
| 9,1 mm | 0.3583 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65221 |
| 23/64 | 0.3594 | 9.13 | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55179 |

CONTINUED

continued on next page

Hi-PerCarb

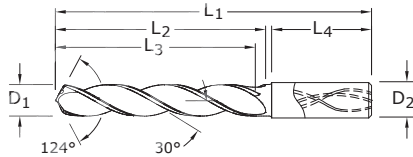


5xD



141K 5xD

FRACTIONAL & METRIC SERIES



- Triple margin design improves hole stability and size control while providing superior finish, roundness and cylindricity
- Self-stabilizing pyramid point design stabilizes the drill on contact with the workpiece
- Open flute structure efficiently transports chips while maintaining strength at high feed rates
- Sculpted gash allows chips to easily flow away from the drill center
- Recommended for materials ≤ 400 Bhn (≤ 43 HRC)

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-M (TM) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65222 |
| 9,3 mm | 0.3661 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65223 |
| U | 0.3680 | 9.35 | 7/16-14 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55180 |
| 9,4 mm | 0.3701 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65224 |
| 9,5 mm | 0.3740 | | M11 / M10 X 0,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65225 |
| 3/8 | 0.3750 | 9.53 | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55181 |
| 9,6 mm | 0.3780 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65226 |
| 9,7 mm | 0.3819 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65227 |
| 9,8 mm | 0.3858 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65228 |
| 9,9 mm | 0.3898 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65229 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 55182 |
| 10,0 mm | 0.3937 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 65230 |
| 10,1 mm | 0.3976 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65231 |
| 10,2 mm | 0.4016 | | M12 X 1,75 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65232 |
| 10,3 mm | 0.4055 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65233 |
| 13/32 | 0.4062 | 10.32 | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 55183 |
| 10,4 mm | 0.4094 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65234 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65235 |
| 10,6 mm | 0.4173 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65236 |
| 10,7 mm | 0.4213 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65237 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 55184 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65238 |
| 10,9 mm | 0.4291 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65239 |
| 11,0 mm | 0.4331 | | M12 X 1 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65240 |
| 11,1 mm | 0.4370 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65241 |
| 7/16 | 0.4375 | 11.11 | 1/4-18NPT | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 55185 |
| 11,2 mm | 0.4409 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65242 |
| 11,3 mm | 0.4449 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65243 |
| 11,4 mm | 0.4488 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65244 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65245 |
| 11,6 mm | 0.4567 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65246 |
| 11,7 mm | 0.4606 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65247 |
| 11,8 mm | 0.4646 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65248 |
| 11,9 mm | 0.4685 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65249 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 55186 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 65250 |

TOLERANCES (inch)

- ≤.1181 DIAMETER**
D₁ = +.0008/+0.0047
D₂ = h₆
- >.1181-.2362 DIAMETER**
D₁ = +.00016/+0.00063
D₂ = h₆
- >.2362-.3937 DIAMETER**
D₁ = +.00024/+0.00083
D₂ = h₆
- >.3937-.7087 DIAMETER**
D₁ = +.00028/+0.00098
D₂ = h₆
- >.7087-1.1811 DIAMETER**
D₁ = +.00031/+0.00114
D₂ = h₆

TOLERANCES (mm)

- ≤3 DIAMETER**
D₁ = +0,002/+0,012
D₂ = h₆
- >3-6 DIAMETER**
D₁ = +0,004/+0,016
D₂ = h₆
- >6-10 DIAMETER**
D₁ = +0,006/+0,021
D₂ = h₆
- >10-18 DIAMETER**
D₁ = +0,007/+0,025
D₂ = h₆

CAST IRON

For patent information visit www.ksptpatents.com

continued on next page



141K 5xD
 FRACTIONAL & METRIC SERIES

| CUTTING DIA. | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | SHANK DIA. | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | Ti-NAMITE-M (TM) |
|----------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|------------------|
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 55187 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65251 |
| 1/2 | 0.5000 | 12.70 | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 55188 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65252 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65253 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 55189 |
| 13,5 mm | 0.5315 | | 5/8-11 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65254 |
| 13,8 mm | 0.5433 | | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65255 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 65256 |
| 9/16 | 0.5625 | 14.29 | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 55190 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65257 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 55191 |
| 14,8 mm | 0.5827 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65258 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65259 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65260 |
| 15,8 mm | 0.6220 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65261 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 55192 |
| 16,0 mm | 0.6299 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 65262 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 55193 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 55194 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | 55195 |

CONTINUED

FRACTIONAL Hi-PerCarb

| Series 141K 5D Fractional | Hardness | Vc (sfm) | | Diameter (D ₁) (inch) | | | | | | |
|--|-----------------------------|------------------|-------------------|--------------------------------------|--------|--------|--------|--------|--------|--------|
| | | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 |
| GRAY CAST IRON FERRITIC ASTM A48: CLASS 20 SAE J431C: GRADE 1800 | ≤ 150 Bhn or ≤ 80 HRb | 450 (360-540) | RPM | 13752 | 9168 | 6876 | 4584 | 3438 | 2750 | 2292 |
| | | | Fr | 0.0049 | 0.0074 | 0.0099 | 0.0148 | 0.0198 | 0.0247 | 0.0297 |
| | | | Feed (ipm) | 68 | 68 | 68 | 68 | 68 | 68 | 68 |
| GRAY CAST IRON PEARLITIC ASTM A48: CLASS 30, 35, 40 SAE J431C: GRADE 3000 | ≤ 220 Bhn or ≤ 19 HRc | 375 (300-450) | RPM | 11460 | 7640 | 5730 | 3820 | 2865 | 2292 | 1910 |
| | | | Fr | 0.0039 | 0.0059 | 0.0079 | 0.0118 | 0.0157 | 0.0196 | 0.0236 |
| | | | Feed (ipm) | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| COMPACTED GRAPHITE IRON | ≤ 250 Bhn or ≤ 25 HRc | 325 (260-390) | RPM | 9932 | 6621 | 4966 | 3311 | 2483 | 1986 | 1655 |
| | | | Fr | 0.0039 | 0.0059 | 0.0079 | 0.0118 | 0.0157 | 0.0196 | 0.0236 |
| | | | Feed (ipm) | 39 | 39 | 39 | 39 | 39 | 39 | 39 |
| MALLEABLE CAST IRON FERRITIC ASTM A220: GRADE 40010 SAE J158: GRADE M4504 | ≤ 160 Bhn or ≤ 3 HRc | 450 (360-540) | RPM | 13752 | 9168 | 6876 | 4584 | 3438 | 2750 | 2292 |
| | | | Fr | 0.0049 | 0.0074 | 0.0099 | 0.0148 | 0.0198 | 0.0247 | 0.0297 |
| | | | Feed (ipm) | 68 | 68 | 68 | 68 | 68 | 68 | 68 |
| MALLEABLE CAST IRON MARTENSITE ASTM A220: GRADE 90001 SAE J158: GRADE M8501 | ≤ 320 Bhn or ≤ 34 HRc | 250 (200-300) | RPM | 7640 | 5093 | 3820 | 2547 | 1910 | 1528 | 1273 |
| | | | Fr | 0.0031 | 0.0047 | 0.0063 | 0.0094 | 0.0126 | 0.0157 | 0.0188 |
| | | | Feed (mm/ min) | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

$rpm = Vc \times 3.82 / D_1$

$ipm = Fr \times rpm$

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

| Series 141K 5D Metric | Hardness | Vc (m/min) | | Diameter (D ₁) (mm) | | | | | | |
|--|--|--|---------------|------------------------------------|-------|-------|-------|-------|-------|-------|
| | | | | 3 | 6 | 8 | 10 | 12 | 14 | 16 |
| K | GRAY CAST IRON FERRITIC ASTM A48: CLASS 20 SAE J431C: GRADE 1800 | ≤ 150 Bhn or ≤ 80 HRb (110-165) | RPM | 14541 | 7271 | 5453 | 4362 | 3635 | 3116 | 2726 |
| | | | Fr | 0.119 | 0.237 | 0.316 | 0.395 | 0.475 | 0.554 | 0.633 |
| | | | Feed (mm/min) | 1725 | 1725 | 1725 | 1725 | 1725 | 1725 | 1725 |
| | GRAY CAST IRON PEARLITIC ASTM A48: CLASS 30, 35, 40 SAE J431C: GRADE 3000 | ≤ 220 Bhn or ≤ 19 HRc (91-137) | RPM | 12118 | 6059 | 4544 | 3635 | 3029 | 2597 | 2272 |
| | | | Fr | 0.094 | 0.189 | 0.252 | 0.315 | 0.378 | 0.441 | 0.504 |
| | | | Feed (mm/min) | 1145 | 1145 | 1145 | 1145 | 1145 | 1145 | 1145 |
| | COMPACTED GRAPHITE IRON | ≤ 250 Bhn or ≤ 25 HRc (79-119) | RPM | 10502 | 5251 | 3938 | 3151 | 2626 | 2250 | 1969 |
| | | | Fr | 0.094 | 0.189 | 0.251 | 0.314 | 0.377 | 0.440 | 0.503 |
| | | | Feed (mm/min) | 990 | 990 | 990 | 990 | 990 | 990 | 990 |
| MALLEABLE CAST IRON FERRITIC ASTM A220: GRADE 40010 SAE J158: GRADE M4504 | ≤ 160 Bhn or ≤ 3 HRc (110-165) | RPM | 14541 | 7271 | 5453 | 4362 | 3635 | 3116 | 2726 | |
| | | Fr | 0.119 | 0.237 | 0.316 | 0.395 | 0.475 | 0.554 | 0.633 | |
| | | Feed (mm/min) | 1725 | 1725 | 1725 | 1725 | 1725 | 1725 | 1725 | |
| MALLEABLE CAST IRON MARTENSITE ASTM A220: GRADE 90001 SAE J158: GRADE M8501 | ≤ 320 Bhn or ≤ 34 HRc (61-91) | RPM | 8078 | 4039 | 3029 | 2424 | 2020 | 1731 | 1515 | |
| | | Fr | 0.076 | 0.151 | 0.201 | 0.252 | 0.302 | 0.352 | 0.403 | |
| | | Feed (mm/min) | 610 | 610 | 610 | 610 | 610 | 610 | 610 | |

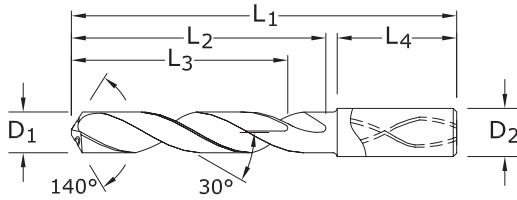
(Brinell) HRc (Rockwell C) HRb (Rockwell B)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fr \times rpm$
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



5xD



2



140 5xD

FRACTIONAL & METRIC SERIES

- Coolant through design promotes controlled and consistent operating temperatures improving coolant flow to the cut while maintaining strength
- Split point geometry for improved drill penetration and accuracy
- Controlled edge honing for longevity
- Negative corner position strengthens and protects
- Recommended for materials ≤ 60 HRc (≤ 654 Bhn)

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | mm | | | | | Ti-NAMITE-A (AlTiN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| | | | | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | |
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 3,0 mm | 0.1181 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63901 |
| 3,1 mm | 0.1220 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63902 |
| 1/8 | 0.1250 | 3.18 | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 51901 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63903 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63904 |
| 3,4 mm | 0.1339 | | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63905 |
| #29 | 0.1360 | 3.45 | 8-32,8-36 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 51902 |
| 3,5 mm | 0.1378 | | M4 X 0,5 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63906 |
| 9/64 | 0.1406 | 3.57 | | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 51903 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63907 |
| 3,7 mm | 0.1457 | | M4,5 X 0,75 | 6,0 | 66,0 | 28,0 | 23,0 | 36,0 | 63908 |
| 3,8 mm | 0.1496 | | 10-24 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 51904 |
| 3,9 mm | 0.1535 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63909 |
| 5/32 | 0.1562 | 3.97 | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 51905 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63910 |
| #21 | 0.1590 | 4.04 | 10-32 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 51906 |
| 4,1 mm | 0.1614 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63911 |
| 4,2 mm | 0.1654 | | M5 / M5 x 0,75 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63912 |
| 4,3 mm | 0.1693 | | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63913 |
| 11/64 | 0.1719 | 4.37 | | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 51907 |
| 4,4 mm | 0.1732 | | 12-24 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63914 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63915 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63916 |
| 4,7 mm | 0.1850 | | 12-32 | 6,0 | 74,0 | 36,0 | 29,0 | 36,0 | 63917 |
| 3/16 | 0.1875 | 4.76 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 51908 |
| 4,8 mm | 0.1890 | | 7/32-32 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63918 |
| 4,9 mm | 0.1929 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63919 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63920 |
| 5,1 mm | 0.2008 | | 1/4-20 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63900 |
| 13/64 | 0.2031 | 5.16 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 51910 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63921 |
| 5,3 mm | 0.2087 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63922 |
| 5,4 mm | 0.2126 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63998 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63923 |

TOLERANCES (inch)

- ≤.1181 DIAMETER
D₁ = +.00008/+0.00047
D₂ = h₆
- >.1181-.2362 DIAMETER
D₁ = +.00016/+0.00063
D₂ = h₆
- >.2362-.3937 DIAMETER
D₁ = +.00024/+0.00083
D₂ = h₆
- >.3937-.7087 DIAMETER
D₁ = +.00028/+0.00098
D₂ = h₆
- >.7087-1.1811 DIAMETER
D₁ = +.00031/+0.00114
D₂ = h₆

TOLERANCES (mm)

- ≤3 DIAMETER
D₁ = +0,002/+0,012
D₂ = h₆
- >3-6 DIAMETER
D₁ = +0,004/+0,016
D₂ = h₆
- >6-10 DIAMETER
D₁ = +0,006/+0,021
D₂ = h₆
- >10-18 DIAMETER
D₁ = +0,007/+0,025
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com

continued on next page

140 5xD

FRACTIONAL & METRIC SERIES

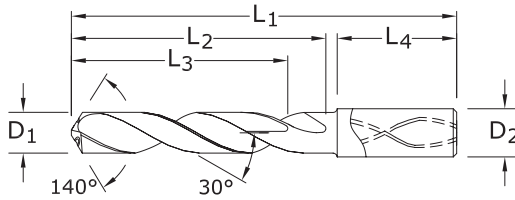
CONTINUED

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | mm | | | | | Ti-NAMITE-A (AlTiN) | EDP NO. |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|---------|
| | | | | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | | |
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | | |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 51912 | |
| 5,6 mm | 0.2205 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63924 | |
| 5,7 mm | 0.2244 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63925 | |
| 5,8 mm | 0.2283 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63926 | |
| 5,9 mm | 0.2323 | | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63927 | |
| 15/64 | 0.2344 | 5.95 | | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 51913 | |
| 6,0 mm | 0.2362 | | M7 X 1 | 6,0 | 82,0 | 44,0 | 35,0 | 36,0 | 63928 | |
| 6,1 mm | 0.2402 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63929 | |
| 6,2 mm | 0.2441 | | M7 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63930 | |
| 6,3 mm | 0.2480 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63931 | |
| 1/4 | 0.2500 | 6.35 | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51914 | |
| 6,4 mm | 0.2520 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63932 | |
| 6,5 mm | 0.2559 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63933 | |
| F | 0.2570 | 6.53 | 5/16-18 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51915 | |
| 6,6 mm | 0.2598 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63934 | |
| 6,7 mm | 0.2638 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63935 | |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51916 | |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63936 | |
| 6,9 mm | 0.2717 | | 5/16-24 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63999 | |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63937 | |
| 7,1 mm | 0.2795 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63938 | |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51918 | |
| 7,2 mm | 0.2835 | | M8 X 0,75 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63939 | |
| 7,3 mm | 0.2874 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63940 | |
| 7,4 mm | 0.2913 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63941 | |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63942 | |
| 19/64 | 0.2969 | 7.54 | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51919 | |
| 7,6 mm | 0.2992 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63943 | |
| 7,7 mm | 0.3031 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63944 | |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63945 | |
| 7,9 mm | 0.3110 | | | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63946 | |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 51920 | |
| 8,0 mm | 0.3150 | | M9 X 1 | 8,0 | 91,0 | 53,0 | 43,0 | 36,0 | 63947 | |
| 8,1 mm | 0.3189 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63948 | |
| 8,2 mm | 0.3228 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63949 | |
| 8,3 mm | 0.3268 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63950 | |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51921 | |
| 8,4 mm | 0.3307 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63951 | |
| Q | 0.3320 | 8.43 | 3/8-24 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51922 | |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63952 | |
| 8,6 mm | 0.3386 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63953 | |
| 8,7 mm | 0.3425 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63954 | |

continued on next page



5xD



140 5xD

FRACTIONAL & METRIC SERIES

- Coolant through design promotes controlled and consistent operating temperatures improving coolant flow to the cut while maintaining strength
- Split point geometry for improved drill penetration and accuracy
- Controlled edge honing for longevity
- Negative corner position strengthens and protects
- Recommended for materials ≤ 60 HRc (≤ 654 Bhn)

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | mm | | | | | Ti-NAMITE-A (AlTiN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| | | | | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | |
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 11/32 | 0.3438 | 8.73 | 3/8-32 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51923 |
| 8,8 mm | 0.3465 | | M10 X 1,25 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63955 |
| 8,9 mm | 0.3504 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63956 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63957 |
| 9,1 mm | 0.3583 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63958 |
| 23/64 | 0.3594 | 9.13 | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51924 |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63959 |
| 9,3 mm | 0.3661 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63960 |
| U | 0.3680 | 9.35 | 7/16-14 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51925 |
| 9,4 mm | 0.3701 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63961 |
| 9,5 mm | 0.3740 | | M11 / M10 X 0,5 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63962 |
| 3/8 | 0.3750 | 9.53 | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51926 |
| 9,6 mm | 0.3780 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63963 |
| 9,7 mm | 0.3819 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63964 |
| 9,8 mm | 0.3858 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63965 |
| 9,9 mm | 0.3898 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63966 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 51927 |
| 10,0 mm | 0.3937 | | | 10,0 | 103,0 | 61,0 | 49,0 | 40,0 | 63967 |
| 10,1 mm | 0.3976 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63968 |
| 10,2 mm | 0.4016 | | M12 X 1,75 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63969 |
| 10,3 mm | 0.4055 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63970 |
| 13/32 | 0.4062 | 10.32 | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 51928 |
| 10,4 mm | 0.4094 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63971 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63972 |
| 10,6 mm | 0.4173 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63973 |
| 10,7 mm | 0.4213 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63974 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 51929 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63975 |
| 10,9 mm | 0.4291 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63976 |
| 11,0 mm | 0.4331 | | M12 X 1 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63977 |
| 11,1 mm | 0.4370 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63978 |
| 7/16 | 0.4375 | 11.11 | 1/4-18NPT | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 51930 |
| 11,2 mm | 0.4409 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63979 |
| 11,3 mm | 0.4449 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63980 |

TOLERANCES (inch)

- ≤.1181 DIAMETER
D₁ = +.00008/+0.00047
D₂ = h₆
- >.1181-.2362 DIAMETER
D₁ = +.00016/+0.00063
D₂ = h₆
- >.2362-.3937 DIAMETER
D₁ = +.00024/+0.00083
D₂ = h₆
- >.3937-.7087 DIAMETER
D₁ = +.00028/+0.00098
D₂ = h₆
- >.7087-1.1811 DIAMETER
D₁ = +.00031/+0.00114
D₂ = h₆

TOLERANCES (mm)

- ≤3 DIAMETER
D₁ = +0,002/+0,012
D₂ = h₆
- >3-6 DIAMETER
D₁ = +0,004/+0,016
D₂ = h₆
- >6-10 DIAMETER
D₁ = +0,006/+0,021
D₂ = h₆
- >10-18 DIAMETER
D₁ = +0,007/+0,025
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com

continued on next page

140 5xD

FRACTIONAL & METRIC SERIES

CONTINUED

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | mm | | | | | Ti-NAMITE-A (AITiN) EDP NO. |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|--------------------------------|
| | | | | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | |
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | |
| 11,4 mm | 0.4488 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63981 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 64000 |
| 11,6 mm | 0.4567 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63982 |
| 11,7 mm | 0.4606 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63983 |
| 11,8 mm | 0.4646 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63984 |
| 11,9 mm | 0.4685 | | | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63985 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 51932 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 118,0 | 71,0 | 56,0 | 45,0 | 63986 |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 51933 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 63987 |
| 1/2 | 0.5000 | 12.70 | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 51934 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 63988 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 63989 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 51935 |
| 13,5 mm | 0.5315 | | 5/8-11 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 64001 |
| 13,8 mm | 0.5433 | | | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 63990 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 124,0 | 77,0 | 60,0 | 45,0 | 63991 |
| 9/16 | 0.5625 | 14.29 | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 51937 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63992 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 51938 |
| 14,8 mm | 0.5827 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63993 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63994 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63995 |
| 15,8 mm | 0.6220 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63996 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 51939 |
| 16,0 mm | 0.6299 | | | 16,0 | 133,0 | 83,0 | 63,0 | 48,0 | 63997 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 51940 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 18,0 | 143,0 | 93,0 | 71,0 | 48,0 | 51941 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 20,0 | 153,0 | 101,0 | 77,0 | 50,0 | 51942 |

| Series 140 5D Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|--|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 425 (340-510) | RPM | 12988 | 8659 | 6494 | 4329 | 3247 | 2598 | 2165 | |
| | | | Fr | 0.0039 | 0.0059 | 0.0079 | 0.0118 | 0.0157 | 0.0196 | 0.0236 | |
| | | | Feed (ipm) | 51.0 | 51.0 | 51.0 | 51.0 | 51.0 | 51.0 | 51.0 | |
| | ≤ 275 Bhn or ≤ 28 HRc | 380 (304-456) | RPM | 11613 | 7742 | 5806 | 3871 | 2903 | 2323 | 1935 | |
| | | | Fr | 0.0035 | 0.0053 | 0.0071 | 0.0106 | 0.0141 | 0.0177 | 0.0212 | |
| | | | Feed (ipm) | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | 41.0 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 220 (176-264) | RPM | 6723 | 4482 | 3362 | 2241 | 1681 | 1345 | 1121 | |
| | | | Fr | 0.0030 | 0.0045 | 0.0059 | 0.0089 | 0.0119 | 0.0149 | 0.0178 | |
| | | | Feed (ipm) | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 330 (264-396) | RPM | 10085 | 6723 | 5042 | 3362 | 2521 | 2017 | 1681 |
| | | | | Fr | 0.0030 | 0.0045 | 0.0059 | 0.0089 | 0.0119 | 0.0149 | 0.0178 |
| | | | | Feed (ipm) | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 | 30.0 |
| ≤ 375 Bhn or ≤ 40 HRc | | 200 (160-240) | RPM | 6112 | 4075 | 3056 | 2037 | 1528 | 1222 | 1019 | |
| | | | Fr | 0.0025 | 0.0038 | 0.0051 | 0.0076 | 0.0101 | 0.0127 | 0.0152 | |
| | | | Feed (ipm) | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 140 (112-168) | RPM | 4278 | 2852 | 2139 | 1426 | 1070 | 856 | 713 | |
| | | | Fr | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0072 | 0.0090 | 0.0108 | |
| | | | Feed (ipm) | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 200 Bhn or ≤ 13 HRc | 145 (116-174) | RPM | 4431 | 2954 | 2216 | 1477 | 1108 | 886 | 739 |
| | | | | Fr | 0.0026 | 0.0039 | 0.0052 | 0.0078 | 0.0104 | 0.0130 | 0.0156 |
| | | | | Feed (ipm) | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | ≤ 375 Bhn or ≤ 40 HRc | 95 (76-114) | RPM | 2903 | 1935 | 1452 | 968 | 726 | 581 | 484 | |
| | | | Fr | 0.0012 | 0.0018 | 0.0024 | 0.0036 | 0.0048 | 0.0060 | 0.0072 | |
| | | | Feed (ipm) | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 85 (68-102) | RPM | 2598 | 1732 | 1299 | 866 | 649 | 520 | 433 | |
| | | | Fr | 0.0008 | 0.0012 | 0.0015 | 0.0023 | 0.0031 | 0.0038 | 0.0046 | |
| | | | Feed (ipm) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| | M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 360 (288-432) | RPM | 11002 | 7334 | 5501 | 3667 | 2750 | 2200 | 1834 |
| | | | | Fr | 0.0045 | 0.0068 | 0.0091 | 0.0136 | 0.0182 | 0.0227 | 0.0273 |
| | | | | Feed (ipm) | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| ≤ 260 Bhn or ≤ 26 HRc | | 335 (268-402) | RPM | 10238 | 6825 | 5119 | 3413 | 2559 | 2048 | 1706 | |
| | | | Fr | 0.0045 | 0.0068 | 0.0091 | 0.0136 | 0.0182 | 0.0227 | 0.0273 | |
| | | | Feed (ipm) | 46.5 | 46.5 | 46.5 | 46.5 | 46.5 | 46.5 | 46.5 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | | ≤ 185 Bhn or ≤ 9 HRc | 305 (244-366) | RPM | 9321 | 6214 | 4660 | 3107 | 2330 | 1864 | 1553 |
| | | | | Fr | 0.0026 | 0.0039 | 0.0051 | 0.0077 | 0.0103 | 0.0129 | 0.0154 |
| | | | | Feed (ipm) | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 | 24.0 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 195 (156-234) | RPM | 5959 | 3973 | 2980 | 1986 | 1490 | 1192 | 993 |
| | | | | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0081 | 0.0101 | 0.0121 |
| | | | | Feed (ipm) | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 150 (120-180) | RPM | 4584 | 3056 | 2292 | 1528 | 1146 | 917 | 764 |
| | | | | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0079 | 0.0099 | 0.0119 |
| | | | | Feed (ipm) | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 | 9.1 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 110 (88-132) | RPM | 3362 | 2241 | 1681 | 1121 | 840 | 672 | 560 |
| | | | | Fr | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0071 | 0.0089 | 0.0107 |
| | | | | Feed (ipm) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 |

continued on next page

| Series | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|---|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy | ≤ 300 Bhn or ≤ 32 HRc | 95 | RPM | 2903 | 1935 | 1452 | 968 | 726 | 581 | 484 | |
| | | (76-114) | Fr | 0.0008 | 0.0012 | 0.0016 | 0.0024 | 0.0032 | 0.0040 | 0.0048 | |
| | | | Feed (ipm) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | |
| | ≤ 400 Bhn or ≤ 43 HRc | 50 | RPM | 1528 | 1019 | 764 | 509 | 382 | 306 | 255 | |
| | | (40-60) | Fr | 0.0007 | 0.0010 | 0.0013 | 0.0020 | 0.0026 | 0.0033 | 0.0039 | |
| | | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| | S TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 215 | RPM | 6570 | 4380 | 3285 | 2190 | 1643 | 1314 | 1095 |
| | | | (172-258) | Fr | 0.0018 | 0.0026 | 0.0035 | 0.0053 | 0.0070 | 0.0088 | 0.0105 |
| | | | | Feed (ipm) | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 160 | RPM | 4890 | 3260 | 2445 | 1630 | 1222 | 978 | 815 |
| | | | (128-192) | Fr | 0.0016 | 0.0024 | 0.0032 | 0.0048 | 0.0064 | 0.0080 | 0.0096 |
| | | | | Feed (ipm) | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 |
| ≤ 440 Bhn or ≤ 47 HRc | | 85 | RPM | 2598 | 1732 | 1299 | 866 | 649 | 520 | 433 | |
| | | (68-102) | Fr | 0.0012 | 0.0018 | 0.0024 | 0.0036 | 0.0048 | 0.0060 | 0.0072 | |
| | | | Feed (ipm) | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 770 | RPM | 23531 | 15687 | 11766 | 7844 | 5883 | 4706 | 3922 |
| | | | (616-924) | Fr | 0.0049 | 0.0073 | 0.0098 | 0.0147 | 0.0195 | 0.0244 | 0.0293 |
| | | | | Feed (ipm) | 115.0 | 115.0 | 115.0 | 115.0 | 115.0 | 115.0 | 115.0 |
| | ≤ 150 Bhn or ≤ 7 HRc | 660 | RPM | 20170 | 13446 | 10085 | 6723 | 5042 | 4034 | 3362 | |
| | | (528-792) | Fr | 0.0050 | 0.0074 | 0.0099 | 0.0149 | 0.0198 | 0.0248 | 0.0297 | |
| | | | Feed (ipm) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | |
| | N COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 550 | RPM | 16808 | 11205 | 8404 | 5603 | 4202 | 3362 | 2801 |
| | | | (440-660) | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0120 |
| | | | | Feed (ipm) | 33.5 | 33.5 | 33.5 | 33.5 | 33.5 | 33.5 | 33.5 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 440 | RPM | 13446 | 8964 | 6723 | 4482 | 3362 | 2689 | 2241 |
| | | | (352-528) | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0080 | 0.0100 | 0.0120 |
| | | | | Feed (ipm) | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 | 27.0 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = Vc x 3.82 / D₁

ipm = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

| Series 140M 5D Metric | Hardness | Vc (m/min) | Diameter (D1) (mm) | | | | | | | | |
|---|--|-----------------------------|-----------------------|---------------|-------|-------|-------|-------|-------|-------|-------|
| | | | 3 | 6 | 8 | 10 | 12 | 14 | 16 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 130 (104-155) | RPM | 13733 | 6867 | 5150 | 4120 | 3433 | 2943 | 2575 | |
| | | | Fr | 0.095 | 0.189 | 0.252 | 0.316 | 0.379 | 0.442 | 0.505 | |
| | | | Feed (mm/min) | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | 1300 | |
| | ≤ 275 Bhn or ≤ 28 HRc | 116 (93-139) | RPM | 12279 | 6140 | 4605 | 3684 | 3070 | 2631 | 2302 | |
| | | | Fr | 0.086 | 0.171 | 0.228 | 0.285 | 0.342 | 0.399 | 0.456 | |
| | | | Feed (mm/min) | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 | 1050 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 67 (54-80) | RPM | 7109 | 3555 | 2666 | 2133 | 1777 | 1523 | 1333 | |
| | | | Fr | 0.071 | 0.142 | 0.189 | 0.237 | 0.284 | 0.332 | 0.379 | |
| | | | Feed (mm/min) | 505 | 505 | 505 | 505 | 505 | 505 | 505 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 101 (80-121) | RPM | 10664 | 5332 | 3999 | 3199 | 2666 | 2285 | 1999 |
| | | | | Fr | 0.071 | 0.143 | 0.190 | 0.238 | 0.285 | 0.333 | 0.380 |
| | | | | Feed (mm/min) | 760 | 760 | 760 | 760 | 760 | 760 | 760 |
| ≤ 375 Bhn or ≤ 40 HRc | | 61 (49-73) | RPM | 6463 | 3231 | 2424 | 1939 | 1616 | 1385 | 1212 | |
| | | | Fr | 0.062 | 0.124 | 0.165 | 0.206 | 0.248 | 0.289 | 0.330 | |
| | | | Feed (mm/min) | 400 | 400 | 400 | 400 | 400 | 400 | 400 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 43 (34-51) | RPM | 4524 | 2262 | 1696 | 1357 | 1131 | 969 | 848 | |
| | | | Fr | 0.043 | 0.086 | 0.115 | 0.144 | 0.172 | 0.201 | 0.230 | |
| | | | Feed (mm/min) | 195 | 195 | 195 | 195 | 195 | 195 | 195 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 200 Bhn or ≤ 13 HRc | 44 (35-53) | RPM | 4686 | 2343 | 1757 | 1406 | 1171 | 1004 | 879 |
| | | | | Fr | 0.061 | 0.122 | 0.162 | 0.203 | 0.243 | 0.284 | 0.324 |
| | | | | Feed (mm/min) | 285 | 285 | 285 | 285 | 285 | 285 | 285 |
| | ≤ 375 Bhn or ≤ 40 HRc | 29 (23-35) | RPM | 3070 | 1535 | 1151 | 921 | 767 | 658 | 576 | |
| | | | Fr | 0.029 | 0.059 | 0.078 | 0.098 | 0.117 | 0.137 | 0.156 | |
| | | | Feed (mm/min) | 90 | 90 | 90 | 90 | 90 | 90 | 90 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 26 (21-31) | RPM | 2747 | 1373 | 1030 | 824 | 687 | 589 | 515 | |
| | | | Fr | 0.018 | 0.036 | 0.049 | 0.061 | 0.073 | 0.085 | 0.097 | |
| | | | Feed (mm/min) | 50 | 50 | 50 | 50 | 50 | 50 | 50 | |
| | M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 110 (88-132) | RPM | 11633 | 5816 | 4362 | 3490 | 2908 | 2493 | 2181 |
| | | | | Fr | 0.109 | 0.218 | 0.291 | 0.364 | 0.437 | 0.509 | 0.582 |
| | | | | Feed (mm/min) | 1270 | 1270 | 1270 | 1270 | 1270 | 1270 | 1270 |
| ≤ 260 Bhn or ≤ 26 HRc | | 102 (82-123) | RPM | 10825 | 5413 | 4059 | 3248 | 2706 | 2320 | 2030 | |
| | | | Fr | 0.109 | 0.218 | 0.291 | 0.363 | 0.436 | 0.509 | 0.581 | |
| | | | Feed (mm/min) | 1180 | 1180 | 1180 | 1180 | 1180 | 1180 | 1180 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | | ≤ 185 Bhn or ≤ 9 HRc | 93 (74-112) | RPM | 9856 | 4928 | 3696 | 2957 | 2464 | 2112 | 1848 |
| | | | | Fr | 0.061 | 0.123 | 0.164 | 0.205 | 0.246 | 0.286 | 0.327 |
| | | | | Feed (mm/min) | 605 | 605 | 605 | 605 | 605 | 605 | 605 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 59 (48-71) | RPM | 6301 | 3151 | 2363 | 1890 | 1575 | 1350 | 1181 |
| | | | | Fr | 0.048 | 0.095 | 0.127 | 0.159 | 0.190 | 0.222 | 0.254 |
| | | | | Feed (mm/min) | 300 | 300 | 300 | 300 | 300 | 300 | 300 |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 46 (37-55) | RPM | 4847 | 2424 | 1818 | 1454 | 1212 | 1039 | 909 |
| | | | | Fr | 0.047 | 0.095 | 0.127 | 0.158 | 0.190 | 0.221 | 0.253 |
| | | | | Feed (mm/min) | 230 | 230 | 230 | 230 | 230 | 230 | 230 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 34 (27-40) | RPM | 3555 | 1777 | 1333 | 1066 | 889 | 762 | 666 |
| | | | | Fr | 0.042 | 0.084 | 0.113 | 0.141 | 0.169 | 0.197 | 0.225 |
| | | | | Feed (mm/min) | 150 | 150 | 150 | 150 | 150 | 150 | 150 |

continued on next page

| Series 140M 5D Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|---|---|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|
| | | | 3 | 6 | 8 | 10 | 12 | 14 | 16 | | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy | ≤ 300 Bhn or ≤ 32 HRc | 29 | RPM | 3070 | 1535 | 1151 | 921 | 767 | 658 | 576 | |
| | | (23-35) | Fr | 0.020 | 0.039 | 0.052 | 0.065 | 0.078 | 0.091 | 0.104 | |
| | | | Feed (mm/min) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| | ≤ 400 Bhn or ≤ 43 HRc | 15 | RPM | 1616 | 808 | 606 | 485 | 404 | 346 | 303 | |
| | | (12-18) | Fr | 0.015 | 0.031 | 0.041 | 0.052 | 0.062 | 0.072 | 0.083 | |
| | | | Feed (mm/min) | 25 | 25 | 25 | 25 | 25 | 25 | 25 | |
| | N TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 66 | RPM | 6947 | 3474 | 2605 | 2084 | 1737 | 1489 | 1303 |
| | | | (52-79) | Fr | 0.040 | 0.079 | 0.106 | 0.132 | 0.158 | 0.185 | 0.211 |
| | | | | Feed (mm/min) | 275 | 275 | 275 | 275 | 275 | 275 | 275 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 49 | RPM | 5170 | 2585 | 1939 | 1551 | 1293 | 1108 | 969 |
| | | | (39-59) | Fr | 0.039 | 0.077 | 0.103 | 0.129 | 0.155 | 0.181 | 0.206 |
| | | | | Feed (mm/min) | 200 | 200 | 200 | 200 | 200 | 200 | 200 |
| ≤ 440 Bhn or ≤ 47 HRc | | 26 | RPM | 2747 | 1373 | 1030 | 824 | 687 | 589 | 515 | |
| | | (21-31) | Fr | 0.029 | 0.058 | 0.078 | 0.097 | 0.117 | 0.136 | 0.155 | |
| | | | Feed (mm/min) | 80 | 80 | 80 | 80 | 80 | 80 | 80 | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 235 | RPM | 24882 | 12441 | 9331 | 7465 | 6220 | 5332 | 4665 |
| | | | (188-282) | Fr | 0.118 | 0.237 | 0.316 | 0.395 | 0.473 | 0.552 | 0.631 |
| | | | | Feed (mm/min) | 2945 | 2945 | 2945 | 2945 | 2945 | 2945 | 2945 |
| | ≤ 150 Bhn or ≤ 7 HRc | 201 | RPM | 21327 | 10664 | 7998 | 6398 | 5332 | 4570 | 3999 | |
| | | (161-241) | Fr | 0.119 | 0.238 | 0.318 | 0.397 | 0.476 | 0.556 | 0.635 | |
| | | | Feed (mm/min) | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 | |
| | N COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 168 | RPM | 17773 | 8886 | 6665 | 5332 | 4443 | 3808 | 3332 |
| | | | (134-201) | Fr | 0.048 | 0.096 | 0.128 | 0.159 | 0.191 | 0.223 | 0.255 |
| | | | | Feed (mm/min) | 850 | 850 | 850 | 850 | 850 | 850 | 850 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 134 | RPM | 14218 | 7109 | 5332 | 4265 | 3555 | 3047 | 2666 |
| | | | (107-161) | Fr | 0.048 | 0.096 | 0.128 | 0.161 | 0.193 | 0.225 | 0.257 |
| | | | | Feed (mm/min) | 685 | 685 | 685 | 685 | 685 | 685 | 685 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = (Vc x 1000) / (D₁ x 3.14)

mm/min = Fr x rpm

reduce speed and feed for materials harder than listed

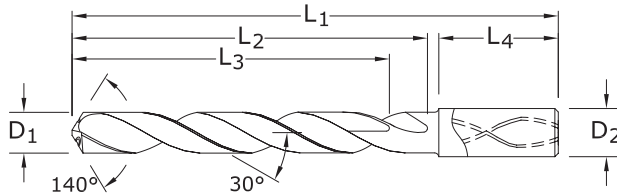
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



8xD



2



140 8xD

FRACTIONAL & METRIC SERIES

- Coolant through design promotes controlled and consistent operating temperatures improving coolant flow to the cut while maintaining strength
- Split point geometry for improved drill penetration and accuracy
- Controlled edge honing for longevity
- Negative corner position strengthens and protects
- Recommended for materials ≤ 60 HRc (≤ 654 Bhn)

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | mm | | | | | Ti-NAMITE-A (AlTiN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| | | | | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | |
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 3,0 mm | 0.1181 | | | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63575 |
| 3,1 mm | 0.1220 | | | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63576 |
| 1/8 | 0.1250 | 3.18 | | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 51801 |
| 3,2 mm | 0.1260 | | M3,5 X 0,35 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63577 |
| 3,3 mm | 0.1299 | | M4 X 0,7 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63578 |
| 3,4 mm | 0.1339 | | | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63579 |
| #29 | 0.1360 | 3.45 | 8-32,8-36 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 51802 |
| 3,5 mm | 0.1378 | | M4 X 0,5 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63580 |
| 9/64 | 0.1406 | 3.57 | | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 51803 |
| 3,6 mm | 0.1417 | | M4 X 0,35 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63581 |
| 3,7 mm | 0.1457 | | M4,5 X 0,75 | 6,0 | 72,0 | 34,0 | 29,0 | 36,0 | 63582 |
| 3,8 mm | 0.1496 | | 10-24 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63583 |
| 3,9 mm | 0.1535 | | | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63584 |
| 5/32 | 0.1562 | 3.97 | | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 51804 |
| 4,0 mm | 0.1575 | | M4,5 X 0,5 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63585 |
| #21 | 0.1590 | 4.04 | 10-32 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 51805 |
| 4,1 mm | 0.1614 | | | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63586 |
| 4,2 mm | 0.1654 | | M5 / M5 X 0,75 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63587 |
| 4,3 mm | 0.1693 | | | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63588 |
| 11/64 | 0.1719 | 4.37 | | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 51806 |
| 4,4 mm | 0.1732 | | 12-24 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63589 |
| 4,5 mm | 0.1772 | | M5 X 0,5 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63590 |
| 4,6 mm | 0.1811 | | 12-28 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63591 |
| 4,7 mm | 0.1850 | | 12-32 | 6,0 | 81,0 | 43,0 | 36,0 | 36,0 | 63592 |
| 3/16 | 0.1875 | 4.76 | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 51807 |
| 4,8 mm | 0.1890 | | 7/32-32 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63593 |
| 4,9 mm | 0.1929 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63594 |
| 5,0 mm | 0.1969 | | M6 X 1 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63595 |
| 5,1 mm | 0.2008 | | 1/4-20 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63596 |
| 13/64 | 0.2031 | 5.16 | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 51808 |
| 5,2 mm | 0.2047 | | M6 X 0,75 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63597 |
| 5,3 mm | 0.2087 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63598 |
| 5,4 mm | 0.2126 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63599 |
| 5,5 mm | 0.2165 | | M6 X 0,5 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63600 |

TOLERANCES (inch)

- ≤.1181 DIAMETER
D₁ = +.00008/+0.00047
D₂ = h₆
- >.1181-.2362 DIAMETER
D₁ = +.00016/+0.00063
D₂ = h₆
- >.2362-.3937 DIAMETER
D₁ = +.00024/+0.00083
D₂ = h₆
- >.3937-.7087 DIAMETER
D₁ = +.00028/+0.00098
D₂ = h₆
- >.7087-1.1811 DIAMETER
D₁ = +.00031/+0.00114
D₂ = h₆

TOLERANCES (mm)

- ≤3 DIAMETER
D₁ = +0,002/+0,012
D₂ = h₆
- >3-6 DIAMETER
D₁ = +0,004/+0,016
D₂ = h₆
- >6-10 DIAMETER
D₁ = +0,006/+0,021
D₂ = h₆
- >10-18 DIAMETER
D₁ = +0,007/+0,025
D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com

continued on next page

140 8xD

FRACTIONAL & METRIC SERIES

CONTINUED

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | mm | | | | | Ti-NAMITE-A (AITiN) EDP NO. |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|--------------------------------|
| | | | | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | |
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | |
| 7/32 | 0.2188 | 5.56 | 1/4-32 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 51809 |
| 5,6 mm | 0.2205 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63601 |
| 5,7 mm | 0.2244 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63602 |
| 5,8 mm | 0.2283 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63603 |
| 5,9 mm | 0.2323 | | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63604 |
| 15/64 | 0.2344 | 5.95 | | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 51810 |
| 6,0 mm | 0.2362 | | M7 X 1 | 6,0 | 95,0 | 57,0 | 48,0 | 36,0 | 63605 |
| 6,1 mm | 0.2402 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63606 |
| 6,2 mm | 0.2441 | | M7 X 0,75 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63607 |
| 6,3 mm | 0.2480 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63608 |
| 1/4 | 0.2500 | 6.35 | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51811 |
| 6,4 mm | 0.2520 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63609 |
| 6,5 mm | 0.2559 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63610 |
| F | 0.2570 | 6.53 | 5/16-18 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51812 |
| 6,6 mm | 0.2598 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63611 |
| 6,7 mm | 0.2638 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63612 |
| 17/64 | 0.2656 | 6.75 | 5/16-20 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51813 |
| 6,8 mm | 0.2677 | | M8 X 1,25 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63613 |
| 6,9 mm | 0.2717 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63614 |
| 7,0 mm | 0.2756 | | M8 X 1 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63615 |
| 7,1 mm | 0.2795 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63616 |
| 9/32 | 0.2812 | 7.14 | 5/16-32 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51814 |
| 7,2 mm | 0.2835 | | M8 X 0,75 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63617 |
| 7,3 mm | 0.2874 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63618 |
| 7,4 mm | 0.2913 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63619 |
| 7,5 mm | 0.2953 | | M8 X 0,5 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63620 |
| 19/64 | 0.2969 | 7.54 | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51815 |
| 7,6 mm | 0.2992 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63621 |
| 7,7 mm | 0.3031 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63622 |
| 7,8 mm | 0.3071 | | M9 X 1,25 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63623 |
| 7,9 mm | 0.3110 | | | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63624 |
| 5/16 | 0.3125 | 7.94 | 3/8-16 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 51816 |
| 8,0 mm | 0.3150 | | M9 X 1 | 8,0 | 114,0 | 76,0 | 64,0 | 36,0 | 63625 |
| 8,1 mm | 0.3189 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63626 |
| 8,2 mm | 0.3228 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63627 |
| 8,3 mm | 0.3268 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63628 |
| 21/64 | 0.3281 | 8.33 | 3/8-20 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51817 |
| 8,4 mm | 0.3307 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63629 |
| Q | 0.3320 | 8.43 | 3/8-24 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51818 |
| 8,5 mm | 0.3346 | | M10 X 1,5 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63630 |
| 8,6 mm | 0.3386 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63631 |
| 8,7 mm | 0.3425 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63632 |

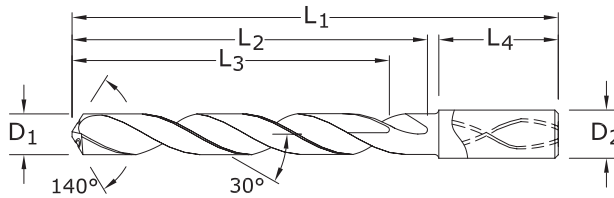
continued on next page



8xD



2



140 8xD

FRACTIONAL & METRIC SERIES

- Coolant through design promotes controlled and consistent operating temperatures improving coolant flow to the cut while maintaining strength
- Split point geometry for improved drill penetration and accuracy
- Controlled edge honing for longevity
- Negative corner position strengthens and protects
- Recommended for materials ≤ 60 HRc (≤ 654 Bhn)

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | mm | | | | | Ti-NAMITE-A (AITiN) |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|---------------------|
| | | | | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | |
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | EDP NO. |
| 11/32 | 0.3438 | 8.73 | 3/8-32 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51819 |
| 8,8 mm | 0.3465 | | M10 X 1,25 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63633 |
| 8,9 mm | 0.3504 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63634 |
| 9,0 mm | 0.3543 | | M10 X 1 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63635 |
| 9,1 mm | 0.3583 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63636 |
| 23/64 | 0.3594 | 9.13 | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51820 |
| 9,2 mm | 0.3622 | | M10 X 0,75 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63637 |
| 9,3 mm | 0.3661 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63638 |
| U | 0.3680 | 9.35 | 7/16-14 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51821 |
| 9,4 mm | 0.3701 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63639 |
| 9,5 mm | 0.3740 | | M11 / M10 X 0,5 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63640 |
| 3/8 | 0.3750 | 9.53 | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51822 |
| 9,6 mm | 0.3780 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63641 |
| 9,7 mm | 0.3819 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63642 |
| 9,8 mm | 0.3858 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63643 |
| 9,9 mm | 0.3898 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63644 |
| 25/64 | 0.3906 | 9.92 | 7/16-20 | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 51823 |
| 10,0 mm | 0.3937 | | | 10,0 | 142,0 | 95,0 | 80,0 | 40,0 | 63645 |
| 10,1 mm | 0.3976 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63646 |
| 10,2 mm | 0.4016 | | M12 X 1,75 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63647 |
| 10,3 mm | 0.4055 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63648 |
| 13/32 | 0.4062 | 10.32 | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 51824 |
| 10,4 mm | 0.4094 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63649 |
| 10,5 mm | 0.4134 | | M12 X 1,5 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63650 |
| 10,6 mm | 0.4173 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63651 |
| 10,7 mm | 0.4213 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63652 |
| 27/64 | 0.4219 | 10.72 | 1/2-13 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 51825 |
| 10,8 mm | 0.4252 | | M12 X 1,25 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63653 |
| 10,9 mm | 0.4291 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63654 |
| 11,0 mm | 0.4331 | | M12 X 1 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63655 |
| 11,1 mm | 0.4370 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63656 |
| 7/16 | 0.4375 | 11.11 | 1/4-18NPT | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 51826 |

continued on next page

TOLERANCES (inch)

≤.1181 DIAMETER

D₁ = +.00008/+0.00047

D₂ = h₆

>.1181-.2362 DIAMETER

D₁ = +.00016/+0.00063

D₂ = h₆

>.2362-.3937 DIAMETER

D₁ = +.00024/+0.00083

D₂ = h₆

>.3937-.7087 DIAMETER

D₁ = +.00028/+0.00098

D₂ = h₆

>.7087-1.1811 DIAMETER

D₁ = +.00031/+0.00114

D₂ = h₆

TOLERANCES (mm)

≤3 DIAMETER

D₁ = +0,002/+0,012

D₂ = h₆

>3-6 DIAMETER

D₁ = +0,004/+0,016

D₂ = h₆

>6-10 DIAMETER

D₁ = +0,006/+0,021

D₂ = h₆

>10-18 DIAMETER

D₁ = +0,007/+0,025

D₂ = h₆

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

NON-FERROUS

HARDENED STEELS

For patent information visit www.ksptpatents.com

140 8xD

FRACTIONAL & METRIC SERIES

CONTINUED

| CUTTING DIAMETER | DECIMAL EQUIV. | METRIC EQUIV. | TAP SIZE REFERENCE ONLY | mm | | | | | Ti-NAMITE-A (AITiN) EDP NO. |
|------------------|----------------|---------------|-------------------------|----------------|----------------|----------------|----------------|----------------|--------------------------------|
| | | | | SHANK DIAMETER | OVERALL LENGTH | FLUTE LENGTH | CLEARED LENGTH | SHANK LENGTH | |
| D ₁ | | | | D ₂ | L ₁ | L ₂ | L ₃ | L ₄ | |
| 11,2 mm | 0.4409 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63657 |
| 11,3 mm | 0.4449 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63658 |
| 11,4 mm | 0.4488 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63659 |
| 11,5 mm | 0.4528 | | M12 X 0,5 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63660 |
| 11,6 mm | 0.4567 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63661 |
| 11,7 mm | 0.4606 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63662 |
| 11,8 mm | 0.4646 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63663 |
| 11,9 mm | 0.4685 | | | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63664 |
| 15/32 | 0.4688 | 11.91 | 1/2-28 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 51827 |
| 12,0 mm | 0.4724 | | M14 X 2 | 12,0 | 162,0 | 114,0 | 96,0 | 45,0 | 63665 |
| 31/64 | 0.4844 | 12.30 | 9/16-12 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 51828 |
| 12,5 mm | 0.4921 | | M14 X 1,5 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63666 |
| 1/2 | 0.5000 | 12.70 | | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 51829 |
| 12,8 mm | 0.5039 | | M14 X 1,25 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63667 |
| 13,0 mm | 0.5118 | | M14 X 1 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63668 |
| 33/64 | 0.5156 | 13.10 | 9/16-18 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 51830 |
| 13,5 mm | 0.5315 | | 5/8-11 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63669 |
| 13,8 mm | 0.5433 | | | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63670 |
| 14,0 mm | 0.5512 | | M16 X 2 | 14,0 | 178,0 | 133,0 | 112,0 | 45,0 | 63671 |
| 9/16 | 0.5625 | 14.29 | | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 51831 |
| 14,5 mm | 0.5709 | | M16 X 1,5 | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63672 |
| 37/64 | 0.5781 | 14.68 | 5/8-18 | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 51832 |
| 14,8 mm | 0.5827 | | | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63673 |
| 15,0 mm | 0.5906 | | M16 X 1 | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63674 |
| 15,5 mm | 0.6102 | | M18 X 2,5 | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63675 |
| 15,8 mm | 0.6220 | | | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63676 |
| 5/8 | 0.6250 | 15.88 | 11/16-16 | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 51833 |
| 16,0 mm | 0.6299 | | | 16,0 | 203,0 | 152,0 | 128,0 | 48,0 | 63677 |
| 21/32 | 0.6562 | 16.67 | 3/4-10 | 18,0 | 222,0 | 171,0 | 144,0 | 48,0 | 51834 |
| 11/16 | 0.6875 | 17.46 | 3/4-16 | 18,0 | 222,0 | 171,0 | 144,0 | 48,0 | 51835 |
| 3/4 | 0.7500 | 19.05 | 13/16-16 | 20,0 | 243,0 | 190,0 | 160,0 | 50,0 | 51836 |

| Series 140 8D Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|--|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 405 (324-486) | RPM | 12377 | 8251 | 6188 | 4126 | 3094 | 2475 | 2063 | |
| | | | Fr | 0.0036 | 0.0053 | 0.0071 | 0.0107 | 0.0142 | 0.0178 | 0.0213 | |
| | | | Feed (ipm) | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 | 44.0 | |
| | ≤ 275 Bhn or ≤ 28 HRc | 370 (296-444) | RPM | 11307 | 7538 | 5654 | 3769 | 2827 | 2261 | 1885 | |
| | | | Fr | 0.0030 | 0.0045 | 0.0060 | 0.0090 | 0.0120 | 0.0150 | 0.0180 | |
| | | | Feed (ipm) | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | 34.0 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 210 (168-252) | RPM | 6418 | 4278 | 3209 | 2139 | 1604 | 1284 | 1070 | |
| | | | Fr | 0.0026 | 0.0039 | 0.0051 | 0.0077 | 0.0103 | 0.0129 | 0.0154 | |
| | | | Feed (ipm) | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 320 (256-384) | RPM | 9779 | 6519 | 4890 | 3260 | 2445 | 1956 | 1630 |
| | | | | Fr | 0.0026 | 0.0038 | 0.0051 | 0.0077 | 0.0102 | 0.0128 | 0.0153 |
| | | | | Feed (ipm) | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| ≤ 375 Bhn or ≤ 40 HRc | | 190 (152-228) | RPM | 5806 | 3871 | 2903 | 1935 | 1452 | 1161 | 968 | |
| | | | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0059 | 0.0079 | 0.0099 | 0.0119 | |
| | | | Feed (ipm) | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | 11.5 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 135 (108-162) | RPM | 4126 | 2750 | 2063 | 1375 | 1031 | 825 | 688 | |
| | | | Fr | 0.0016 | 0.0024 | 0.0032 | 0.0047 | 0.0063 | 0.0079 | 0.0095 | |
| | | | Feed (ipm) | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 200 Bhn or ≤ 13 HRc | 140 (112-168) | RPM | 4278 | 2852 | 2139 | 1426 | 1070 | 856 | 713 |
| | | | | Fr | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0079 | 0.0099 | 0.0119 |
| | | | | Feed (ipm) | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 |
| | ≤ 375 Bhn or ≤ 40 HRc | 90 (72-108) | RPM | 2750 | 1834 | 1375 | 917 | 688 | 550 | 458 | |
| | | | Fr | 0.0011 | 0.0016 | 0.0022 | 0.0033 | 0.0044 | 0.0055 | 0.0065 | |
| | | | Feed (ipm) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 80 (64-96) | RPM | 2445 | 1630 | 1222 | 815 | 611 | 489 | 407 | |
| | | | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0018 | 0.0025 | 0.0031 | 0.0037 | |
| | | | Feed (ipm) | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | 1.5 | |
| | M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 350 (280-420) | RPM | 10696 | 7131 | 5348 | 3565 | 2674 | 2139 | 1783 |
| | | | | Fr | 0.0037 | 0.0056 | 0.0075 | 0.0112 | 0.0150 | 0.0187 | 0.0224 |
| | | | | Feed (ipm) | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| ≤ 260 Bhn or ≤ 26 HRc | | 310 (248-372) | RPM | 9474 | 6316 | 4737 | 3158 | 2368 | 1895 | 1579 | |
| | | | Fr | 0.0039 | 0.0059 | 0.0078 | 0.0117 | 0.0156 | 0.0195 | 0.0234 | |
| | | | Feed (ipm) | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | 37.0 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | | ≤ 185 Bhn or ≤ 9 HRc | 290 (232-348) | RPM | 8862 | 5908 | 4431 | 2954 | 2216 | 1772 | 1477 |
| | | | | Fr | 0.0020 | 0.0030 | 0.0039 | 0.0059 | 0.0079 | 0.0099 | 0.0118 |
| | | | | Feed (ipm) | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 |
| | | ≤ 275 Bhn or ≤ 28 HRc | 180 (144-216) | RPM | 5501 | 3667 | 2750 | 1834 | 1375 | 1100 | 917 |
| | | | | Fr | 0.0018 | 0.0027 | 0.0036 | 0.0055 | 0.0073 | 0.0091 | 0.0109 |
| | | | | Feed (ipm) | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 | 10.0 |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 130 (104-156) | RPM | 3973 | 2649 | 1986 | 1324 | 993 | 795 | 662 |
| | | | | Fr | 0.0018 | 0.0026 | 0.0035 | 0.0053 | 0.0070 | 0.0088 | 0.0106 |
| | | | | Feed (ipm) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 95 (76-114) | RPM | 2903 | 1935 | 1452 | 968 | 726 | 581 | 484 |
| | | | | Fr | 0.0016 | 0.0023 | 0.0031 | 0.0047 | 0.0062 | 0.0078 | 0.0093 |
| | | | | Feed (ipm) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |

continued on next page

| Series 140 8D Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|---|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy | ≤ 300 Bhn or ≤ 32 HRc | 65 | RPM | 1986 | 1324 | 993 | 662 | 497 | 397 | 331 | |
| | | (52-78) | Fr | 0.0009 | 0.0013 | 0.0017 | 0.0026 | 0.0034 | 0.0043 | 0.0051 | |
| | | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | |
| | ≤ 400 Bhn or ≤ 43 HRc | 35 | RPM | 1070 | 713 | 535 | 357 | 267 | 214 | 178 | |
| | | (28-42) | Fr | 0.0006 | 0.0008 | 0.0011 | 0.0017 | 0.0022 | 0.0028 | 0.0034 | |
| | | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 185 | RPM | 5654 | 3769 | 2827 | 1885 | 1413 | 1131 | 942 |
| | | | (148-222) | Fr | 0.0016 | 0.0024 | 0.0032 | 0.0048 | 0.0064 | 0.0080 | 0.0096 |
| | | | | Feed (ipm) | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 | 9.0 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 140 | RPM | 4278 | 2852 | 2139 | 1426 | 1070 | 856 | 713 |
| | | | (112-168) | Fr | 0.0012 | 0.0018 | 0.0023 | 0.0035 | 0.0047 | 0.0058 | 0.0070 |
| | | | | Feed (ipm) | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| ≤ 440 Bhn or ≤ 47 HRc | | 75 | RPM | 2292 | 1528 | 1146 | 764 | 573 | 458 | 382 | |
| | | (60-90) | Fr | 0.0010 | 0.0015 | 0.0020 | 0.0030 | 0.0040 | 0.0050 | 0.0060 | |
| | | | Feed (ipm) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 730 | RPM | 22309 | 14873 | 11154 | 7436 | 5577 | 4462 | 3718 |
| | | | (584-876) | Fr | 0.0045 | 0.0067 | 0.0090 | 0.0134 | 0.0179 | 0.0224 | 0.0269 |
| | | | | Feed (ipm) | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| | ≤ 150 Bhn or ≤ 7 HRc | 635 | RPM | 19406 | 12937 | 9703 | 6469 | 4851 | 3881 | 3234 | |
| | | (508-762) | Fr | 0.0046 | 0.0070 | 0.0093 | 0.0139 | 0.0186 | 0.0232 | 0.0278 | |
| | | | Feed (ipm) | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | |
| | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 255 | RPM | 7793 | 5195 | 3896 | 2598 | 1948 | 1559 | 1299 |
| | | | (204-306) | Fr | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0072 | 0.0090 | 0.0108 |
| | | | | Feed (ipm) | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 | 14.0 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 235 | RPM | 7182 | 4788 | 3591 | 2394 | 1795 | 1436 | 1197 |
| | | | (188-282) | Fr | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0072 | 0.0091 | 0.0109 |
| | | | | Feed (ipm) | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 | 13.0 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

$rpm = Vc \times 3.82 / D_1$

$ipm = Fr \times rpm$

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

| Series 140M 8D Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|---|--|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|
| | | | 3 | 6 | 8 | 10 | 12 | 14 | 16 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 123 | RPM | 13087 | 6544 | 4908 | 3926 | 3272 | 2804 | 2454 | |
| | | (100-170) | Fr | 0.085 | 0.171 | 0.228 | 0.285 | 0.342 | 0.399 | 0.455 | |
| | | | Feed (mm/min) | 1118 | 1118 | 1118 | 1118 | 1118 | 1118 | 1118 | |
| | ≤ 275 Bhn or ≤ 28 HRc | 113 | RPM | 11956 | 5978 | 4484 | 3587 | 2989 | 2562 | 2242 | |
| | | (90-135) | Fr | 0.072 | 0.144 | 0.193 | 0.241 | 0.289 | 0.337 | 0.385 | |
| | | | Feed (mm/min) | 864 | 864 | 864 | 864 | 864 | 864 | 864 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 64 | RPM | 6786 | 3393 | 2545 | 2036 | 1696 | 1454 | 1272 | |
| | | (51-77) | Fr | 0.062 | 0.124 | 0.165 | 0.206 | 0.247 | 0.288 | 0.329 | |
| | | | Feed (mm/min) | 419 | 419 | 419 | 419 | 419 | 419 | 419 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 98 | RPM | 10340 | 5170 | 3878 | 3102 | 2585 | 2216 | 1939 |
| | | | (78-117) | Fr | 0.061 | 0.123 | 0.164 | 0.205 | 0.246 | 0.287 | 0.328 |
| | | | | Feed (mm/min) | 635 | 635 | 635 | 635 | 635 | 635 | 635 |
| ≤ 375 Bhn or ≤ 40 HRc | | 58 | RPM | 6140 | 3070 | 2302 | 1842 | 1535 | 1316 | 1151 | |
| | | (46-69) | Fr | 0.048 | 0.095 | 0.127 | 0.159 | 0.190 | 0.222 | 0.254 | |
| | | | Feed (mm/min) | 292 | 292 | 292 | 292 | 292 | 292 | 292 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 41 | RPM | 4362 | 2181 | 1636 | 1309 | 1091 | 935 | 818 | |
| | | (33-49) | Fr | 0.038 | 0.076 | 0.101 | 0.126 | 0.151 | 0.177 | 0.202 | |
| | | | Feed (mm/min) | 165 | 165 | 165 | 165 | 165 | 165 | 165 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 200 Bhn or ≤ 13 HRc | 43 | RPM | 4524 | 2262 | 1696 | 1357 | 1131 | 969 | 848 |
| | | | (34-51) | Fr | 0.048 | 0.095 | 0.127 | 0.159 | 0.191 | 0.223 | 0.255 |
| | | | | Feed (mm/min) | 216 | 216 | 216 | 216 | 216 | 216 | 216 |
| | ≤ 375 Bhn or ≤ 40 HRc | 27 | RPM | 2908 | 1454 | 1091 | 872 | 727 | 623 | 545 | |
| | | (22-33) | Fr | 0.026 | 0.052 | 0.070 | 0.087 | 0.105 | 0.122 | 0.140 | |
| | | | Feed (mm/min) | 76 | 76 | 76 | 76 | 76 | 76 | 76 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 24 | RPM | 2585 | 1293 | 969 | 776 | 646 | 554 | 485 | |
| | | (20-29) | Fr | 0.015 | 0.029 | 0.039 | 0.049 | 0.059 | 0.069 | 0.079 | |
| | | | Feed (mm/min) | 38 | 38 | 38 | 38 | 38 | 38 | 38 | |
| | M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 107 | RPM | 11310 | 5655 | 4241 | 3393 | 2827 | 2424 | 2121 |
| | | | (85-128) | Fr | 0.090 | 0.180 | 0.240 | 0.299 | 0.359 | 0.419 | 0.479 |
| | | | | Feed (mm/min) | 1016 | 1016 | 1016 | 1016 | 1016 | 1016 | 1016 |
| ≤ 260 Bhn or ≤ 26 HRc | | 94 | RPM | 10017 | 5009 | 3756 | 3005 | 2504 | 2147 | 1878 | |
| | | (76-113) | Fr | 0.094 | 0.188 | 0.250 | 0.313 | 0.375 | 0.438 | 0.500 | |
| | | | Feed (mm/min) | 940 | 940 | 940 | 940 | 940 | 940 | 940 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F | ≤ 185 Bhn or ≤ 9 HRc | 88 | RPM | 9371 | 4686 | 3514 | 2811 | 2343 | 2008 | 1757 | |
| | | (71-106) | Fr | 0.047 | 0.095 | 0.126 | 0.158 | 0.190 | 0.221 | 0.253 | |
| | | | Feed (mm/min) | 445 | 445 | 445 | 445 | 445 | 445 | 445 | |
| | ≤ 275 Bhn or ≤ 28 HRc | 55 | RPM | 5816 | 2908 | 2181 | 1745 | 1454 | 1246 | 1091 | |
| | | (44-66) | Fr | 0.044 | 0.087 | 0.116 | 0.146 | 0.175 | 0.204 | 0.233 | |
| | | | Feed (mm/min) | 254 | 254 | 254 | 254 | 254 | 254 | 254 | |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 40 | RPM | 4201 | 2100 | 1575 | 1260 | 1050 | 900 | 788 |
| | | | (32-48) | Fr | 0.042 | 0.085 | 0.113 | 0.141 | 0.169 | 0.198 | 0.226 |
| | | | | Feed (mm/min) | 178 | 178 | 178 | 178 | 178 | 178 | 178 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 29 | RPM | 3070 | 1535 | 1151 | 921 | 767 | 658 | 576 |
| | | | (23-35) | Fr | 0.037 | 0.074 | 0.099 | 0.124 | 0.149 | 0.174 | 0.199 |
| | | | | Feed (mm/min) | 114 | 114 | 114 | 114 | 114 | 114 | 114 |

continued on next page

| Series 140M 8D Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|---|---|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|
| | | | 3 | 6 | 8 | 10 | 12 | 14 | 16 | | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy | ≤ 300 Bhn or ≤ 32 HRc | 20 | RPM | 2100 | 1050 | 788 | 630 | 525 | 450 | 394 | |
| | | (16-24) | Fr | 0.021 | 0.041 | 0.055 | 0.069 | 0.082 | 0.096 | 0.110 | |
| | | | Feed (mm/min) | 43 | 43 | 43 | 43 | 43 | 43 | 43 | |
| | ≤ 400 Bhn or ≤ 43 HRc | 11 | RPM | 1131 | 565 | 424 | 339 | 283 | 242 | 212 | |
| | | (9-13) | Fr | 0.013 | 0.027 | 0.036 | 0.045 | 0.054 | 0.063 | 0.072 | |
| | | | Feed (mm/min) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 56 | RPM | 5978 | 2989 | 2242 | 1793 | 1495 | 1281 | 1121 |
| | | | (45-68) | Fr | 0.038 | 0.076 | 0.102 | 0.127 | 0.153 | 0.178 | 0.204 |
| | | | | Feed (mm/min) | 229 | 229 | 229 | 229 | 229 | 229 | 229 |
| | | ≤ 350 Bhn or ≤ 38 HRc | 43 | RPM | 4524 | 2262 | 1696 | 1357 | 1131 | 969 | 848 |
| | | | (34-51) | Fr | 0.028 | 0.056 | 0.075 | 0.094 | 0.112 | 0.131 | 0.150 |
| | | | | Feed (mm/min) | 127 | 127 | 127 | 127 | 127 | 127 | 127 |
| ≤ 440 Bhn or ≤ 47 HRc | | 23 | RPM | 2424 | 1212 | 909 | 727 | 606 | 519 | 454 | |
| | | (18-27) | Fr | 0.024 | 0.048 | 0.064 | 0.080 | 0.096 | 0.112 | 0.129 | |
| | | | Feed (mm/min) | 58 | 58 | 58 | 58 | 58 | 58 | 58 | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 223 | RPM | 23589 | 11795 | 8846 | 7077 | 5897 | 5055 | 4423 |
| | | | (178-267) | Fr | 0.108 | 0.215 | 0.287 | 0.359 | 0.431 | 0.502 | 0.574 |
| | | | | Feed (mm/min) | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 | 2540 |
| | ≤ 150 Bhn or ≤ 7 HRc | 194 | RPM | 20519 | 10260 | 7695 | 6156 | 5130 | 4397 | 3847 | |
| | | (155-232) | Fr | 0.111 | 0.223 | 0.297 | 0.371 | 0.446 | 0.520 | 0.594 | |
| | | | Feed (mm/min) | 2286 | 2286 | 2286 | 2286 | 2286 | 2286 | 2286 | |
| | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 78 | RPM | 8240 | 4120 | 3090 | 2472 | 2060 | 1766 | 1545 |
| | | | (62-93) | Fr | 0.043 | 0.086 | 0.115 | 0.144 | 0.173 | 0.201 | 0.230 |
| | | | | Feed (mm/min) | 356 | 356 | 356 | 356 | 356 | 356 | 356 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 72 | RPM | 7594 | 3797 | 2848 | 2278 | 1898 | 1627 | 1424 |
| | | | (57-86) | Fr | 0.043 | 0.087 | 0.116 | 0.145 | 0.174 | 0.203 | 0.232 |
| | | | | Feed (mm/min) | 330 | 330 | 330 | 330 | 330 | 330 | 330 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = (Vc x 1000) / (D₁ x 3.14)

mm/min = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Series 120



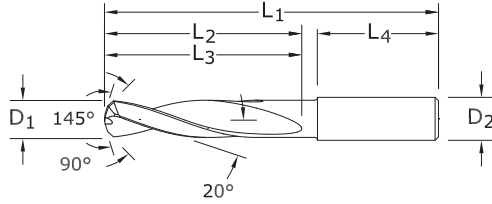
3xD



120

FRACTIONAL & METRIC SERIES

- Double margin construction design stabilizes the drill for greater hole accuracy and improved surface finish
- Notched point reduces thrust force over conventional designs
- 8 facet point reduces fiber breakout and delamination on exit



| CUTTING DIAMETER D ₁ | DECIMAL EQUIV. | METRIC EQUIV. | SHANK DIAMETER D ₂ | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ /L ₃ | SHANK LENGTH L ₄ | Di-NAMITE® (Diamond) EDP NO. |
|------------------------------------|----------------|---------------|----------------------------------|----------------------------------|--|--------------------------------|------------------------------------|
| #40 | 0.0980 | 2.49 | 1/8 | 2 | 9/16 | 1-1/4 | 50000 |
| 2,7 mm | 0.1063 | | 6,0 | 63,0 | 20,0 | 32,0 | 50001 |
| 3,0 mm | 0.1181 | | 6,0 | 63,0 | 20,0 | 36,0 | 50002 |
| 1/8 | 0.1250 | 3.18 | 1/4 | 2-1/2 | 3/4 | 1-7/16 | 50003 |
| 3,2 mm | 0.1260 | | 6,0 | 63,0 | 20,0 | 36,0 | 50004 |
| #30 | 0.1285 | 3.26 | 1/4 | 2-1/2 | 3/4 | 1-7/16 | 50005 |
| #28 | 0.1405 | 3.57 | 1/4 | 2-1/2 | 3/4 | 1-7/16 | 50006 |
| #22 | 0.1570 | 3.99 | 1/4 | 2-5/8 | 7/8 | 1-7/16 | 50007 |
| #21 | 0.1590 | 4.04 | 1/4 | 2-5/8 | 7/8 | 1-7/16 | 50008 |
| 4,1 mm | 0.1614 | | 6,0 | 66,0 | 24,0 | 36,0 | 50009 |
| #19 | 0.1660 | 4.22 | 1/4 | 2-5/8 | 7/8 | 1-7/16 | 50010 |
| 11/64 | 0.1719 | 4.37 | 1/4 | 2-5/8 | 7/8 | 1-7/16 | 50011 |
| 3/16 | 0.1875 | 4.76 | 1/4 | 2-5/8 | 1 | 1-7/16 | 50012 |
| #11 | 0.1910 | 4.85 | 1/4 | 2-5/8 | 1 | 1-7/16 | 50013 |
| #8 | 0.1990 | 5.05 | 1/4 | 2-5/8 | 1 | 1-7/16 | 50014 |
| #7 | 0.2010 | 5.11 | 1/4 | 2-5/8 | 1 | 1-7/16 | 50015 |
| #2 | 0.2210 | 5.61 | 1/4 | 2-5/8 | 1 | 1-7/16 | 50016 |
| 6,0 mm | 0.2362 | | 6,0 | 66,0 | 28,0 | 36,0 | 50017 |
| 1/4 | 0.2500 | 6.35 | 1/4 | 3-1/8 | 1-5/16 | 1-7/16 | 50018 |
| .2510 | 0.2510 | 6.38 | 5/16 | 3-1/8 | 1-5/16 | 1-7/16 | 50019 |
| F | 0.2570 | 6.53 | 5/16 | 3-1/8 | 1-5/16 | 1-7/16 | 50020 |
| I | 0.2720 | 6.91 | 5/16 | 3-1/8 | 1-5/16 | 1-7/16 | 50021 |
| J | 0.2770 | 7.04 | 5/16 | 3-1/8 | 1-5/16 | 1-7/16 | 50022 |
| K | 0.2810 | 7.14 | 5/16 | 3-1/8 | 1-9/16 | 1-7/16 | 50023 |
| 5/16 | 0.3125 | 7.94 | 5/16 | 3-1/8 | 1-9/16 | 1-7/16 | 50024 |
| 8,0 mm | 0.3150 | | 8,0 | 79,0 | 41,0 | 36,0 | 50025 |
| 3/8 | 0.3750 | 9.53 | 3/8 | 3-1/2 | 1-27/32 | 1-9/16 | 50026 |
| V | 0.3770 | 9.58 | 1/2 | 3-1/2 | 1-27/32 | 1-9/16 | 50027 |
| 10,0 mm | 0.3937 | | 10,0 | 89,0 | 47,0 | 40,0 | 50028 |
| 7/16 | 0.4375 | 11.11 | 1/2 | 4-1/16 | 2-3/16 | 1-9/16 | 50029 |
| 12,0 mm | 0.4724 | | 12,0 | 102,0 | 55,0 | 45,0 | 50030 |
| 1/2 | 0.5000 | 12.70 | 1/2 | 4-1/4 | 2-5/16 | 1-3/4 | 50031 |

TOLERANCES (inch)

D₁ = +.0000/--.0005

D₂ = h₆

TOLERANCES (mm)

D₁ = +0,000/-0,013

D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| Series 120 Fractional | Vc (sfm) | | Diameter (D ₁) (inch) | | | | | | |
|---|------------------|------------|-----------------------------------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 5/16 | 3/8 | 7/16 | 1/2 |
| CFRP, AFRP (Carbon Fiber, Aramid Fiber) | 320 (256-384) | RPM | 9779 | 6519 | 4890 | 3912 | 3260 | 2794 | 2445 |
| | | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0015 | 0.0018 | 0.0021 | 0.0024 |
| | | Feed (ipm) | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 | 5.9 |
| GFRP (Fiberglass) | 240 (192-288) | RPM | 7334 | 4890 | 3667 | 2934 | 2445 | 2096 | 1834 |
| | | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0015 | 0.0018 | 0.0021 | 0.0024 |
| | | Feed (ipm) | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 |
| CARBON, GRAPHITE | 400 (320-480) | RPM | 12224 | 8149 | 6112 | 4890 | 4075 | 3493 | 3056 |
| | | Fr | 0.0008 | 0.0012 | 0.0016 | 0.0020 | 0.0024 | 0.0028 | 0.0032 |
| | | Feed (ipm) | 9.8 | 9.8 | 9.8 | 9.8 | 9.8 | 9.8 | 9.8 |

rpm = Vc x 3.82 / D₁
 ipm = Fr x rpm
 adjust speed and / or feed based on resin type and / or fiber structure
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

| Series 120 Metric | Vc (m/min) | | Diameter (D ₁) (mm) | | | | | | |
|---|-----------------|---------------|---------------------------------|-------|-------|-------|-------|-------|-------|
| | | | 2.5 | 3 | 4 | 6 | 8 | 10 | 12 |
| CFRP, AFRP (Carbon Fiber, Aramid Fiber) | 100 (80-120) | RPM | 12722 | 10602 | 7951 | 5301 | 3976 | 3181 | 2650 |
| | | Fr | 0.012 | 0.014 | 0.019 | 0.028 | 0.038 | 0.047 | 0.057 |
| | | Feed (mm/min) | 150 | 150 | 150 | 150 | 150 | 150 | 150 |
| GFRP (Fiberglass) | 75 (65-90) | RPM | 9542 | 7951 | 5963 | 3976 | 2982 | 2385 | 1988 |
| | | Fr | 0.012 | 0.014 | 0.019 | 0.029 | 0.039 | 0.048 | 0.058 |
| | | Feed (mm/min) | 115 | 115 | 115 | 115 | 115 | 115 | 115 |
| CARBON, GRAPHITE | 120 (96-144) | RPM | 15266 | 12722 | 9542 | 6361 | 4771 | 3817 | 3181 |
| | | Fr | 0.015 | 0.018 | 0.025 | 0.037 | 0.049 | 0.062 | 0.074 |
| | | Feed (mm/min) | 235 | 235 | 235 | 235 | 235 | 235 | 235 |

rpm = (Vc x 1000) / (D₁ x 3.14)
 mm/min = Fr x rpm
 adjust speed and / or feed based on resin type and / or fiber structure
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



General Purpose Drills



Hole Making

| GENERAL PURPOSE DRILLS | SERIES | DESCRIPTION | PAGE |
|---------------------------------------|-----------|-----------------------------------|------|
| 2 Flute | 101 | 2 Flute Slow Spiral | 302 |
| Short Length Self Centering (DIN6539) | 108M Plus | 2 Flute Short Length DIN 6539 | 307 |
| Straight Flute | 106 | Straight Flute 140 Point Geometry | 314 |
| 3 Flute with 150 Point Geometry | 103 | 3 Flute 150 Point Geometry | 318 |

| GENERAL PURPOSE COUNTERSINKS | SERIES | DESCRIPTION | PAGE |
|------------------------------|--------|--|------|
| Combined Drill & Countersink | 301 | 2 Flute Straight Flute Combined Drill and Countersink Fractional | 324 |
| | 301M | 2 Flute Straight Flute Combined Drill and Countersink Metric | 325 |
| Single Flute Countersink | 601 | Single Flute Fractional | 330 |
| 3 Flute Countersink | 603 | 3 Flute Fractional | 333 |
| 6 Flute Countersink | 606 | 6 Flute Fractional | 336 |

| GENERAL PURPOSE REAMERS | SERIES | DESCRIPTION | PAGE |
|----------------------------|--------|---------------|------|
| Straight Flute Accu-Reamer | 200 | Accu-Reamer | 340 |
| Straight Flute Reamer | 201M | Metric Reamer | 344 |

Speed & Feed Recommendations listed after each series

Taladrado

| BROCAS DE USO GENERAL | SERIE | DESCRIPCIÓN | PÁGINA |
|---|-----------|-------------------------------------|--------|
| 2 filos | 101 | 2 filos, espiral de avance lento | 302 |
| Autocentrante de longitud corta (DIN6539) | 108M Plus | 2 filos, longitud corta, DIN 6539 | 307 |
| Filo recto | 106 | Filo recto, geometría de 140 puntos | 314 |
| 3 filos con geometría de 150 puntos | 103 | 3 filos, geometría de 150 puntos | 318 |

| BROCAS DE USO AVELLANADORES | SERIE | DESCRIPCIÓN | PÁGINA |
|--------------------------------|-------|---|--------|
| Broca y avellanador combinados | 301 | 2 filos, filo recto, broca y avellanador combinados, fraccional | 324 |
| | 301M | 2 filos, filo recto, broca y avellanador combinados, métrico | 325 |
| Avellanador de filo único | 601 | Filo único, fraccional | 330 |
| Avellanador de 3 filos | 603 | 3 filos, fraccional | 333 |
| Avellanador de 6 filos | 606 | 6 filos, fraccional | 336 |

| BROCAS DE USO ESCARIADORES | SERIE | DESCRIPCIÓN | PÁGINA |
|-------------------------------|-------|--------------------|--------|
| Escariador Accu de filo recto | 200 | Escariador Accu | 340 |
| Escariador de filo recto | 201M | Escariador métrico | 344 |

Recomendaciones de velocidades y avances mostradas tras cada serie

Outils de perçage

| FORETS UNIVERSELS | SERIES | DESCRIPTION | PAGE |
|--------------------------------|-----------|---------------------------------------|------|
| 2 dents | 101 | 2 dents à spirale lente | 302 |
| Court autocentrant (DIN 6539) | 108M Plus | 2 dents court DIN 6539 | 307 |
| Denture droite | 106 | Denture droite à angle de pointe 140° | 314 |
| 3 dents à angle de pointe 150° | 103 | 3 dents à angle de pointe 150° | 318 |

| FORETS À FRAISER | SERIES | DESCRIPTION | PAGE |
|-----------------------------------|--------|--|------|
| Foret et foret à fraiser combinés | 301 | 2 dents denture droite foret et foret à fraiser combinés (fractionnel) | 324 |
| | 301M | 2 dents denture droite foret et foret à fraiser combinés (métrique) | 325 |
| Foret à fraiser à dent simple | 601 | Foret à dent simple (fractionnel) | 330 |
| Foret à fraiser 3 dents | 603 | 3 dents (fractionnel) | 333 |
| Foret à fraiser 6 dents | 606 | 6 dents (fractionnel) | 336 |

| FORETS À ALÉSOIRS | SERIES | DESCRIPTION | PAGE |
|------------------------------------|--------|---------------------|------|
| Alésoir denture droite Accu-Reamer | 200 | Alésoir Accu-Reamer | 340 |
| Alésoir denture droite | 201M | Alésoir (métrique) | 344 |

Recommandations de vitesse et avance indiquées après chaque série

| STANDARD-BOHRER | SERIE | BESCHREIBUNG | SEITE |
|--|-----------|---------------------------------------|-------|
| 2 Schneiden | 101 | 2 Schneiden mit kleinem Spanwinkel | 302 |
| Kurze Bauform Selbstzentrierung (DIN 6539) | 108M Plus | 2 Schneiden Kurze Bauform DIN 6539 | 307 |
| Gerade Schneiden | 106 | Gerade Schneiden Spitzengeometrie 140 | 314 |
| 3 Schneiden mit Spitzengeometrie 150 | 103 | 3 Schneiden Spitzengeometrie 150 | 318 |

| STANDARD-BOHRER | SERIE | BESCHREIBUNG | SEITE |
|----------------------------|-------|---|-------|
| Senkbohrer | 301 | Zölliger Senkbohrer mit 2 geraden Schneiden | 324 |
| | 301M | Metrischer Senkbohrer mit 2 geraden Schneiden | 325 |
| Senker mit 1 Schneide | 601 | Zölliger Bohrer mit 1 Schneide | 330 |
| Senkbohrer mit 1 Schneide | 603 | Zölliger Bohrer mit 3 Schneiden | 333 |
| Senkbohrer mit 6 Schneiden | 606 | Zölliger Bohrer mit 6 Schneiden | 336 |

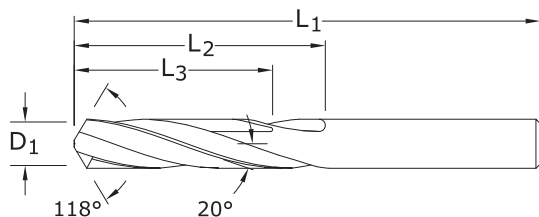
| STANDARD-BOHRER | SERIE | BESCHREIBUNG | SEITE |
|--------------------------------|-------|--------------------|-------|
| Reibahlen mit gerader Schneide | 200 | Accu-Reamer | 340 |
| Reibahle mit gerader Schneide | 201M | Metrische Reibahle | 344 |

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

2 Flute Drills • Metric: DIN 338



5xD



101

FRACTIONAL & METRIC SERIES



Pictured:
Series 101 Drill Set

| CUTTING DIAMETER D ₁ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|------------------------------------|----------------|---------------|----------------------------------|--------------------------------|----------------------------------|----------|---------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AlTiN) |
| #80 | 0.0135 | 0.34 | 3/4 | 3/16 | — | 51080 | 57076 |
| #79 | 0.0145 | 0.37 | 3/4 | 3/16 | — | 51079 | 57077 |
| 1/64 | 0.0156 | 0.40 | 3/4 | 3/16 | — | 51101 | 57078 |
| #78 | 0.0160 | 0.41 | 3/4 | 3/16 | — | 51078 | 57079 |
| #77 | 0.0180 | 0.46 | 3/4 | 3/16 | — | 51077 | 57080 |
| #76 | 0.0200 | 0.51 | 7/8 | 1/4 | — | 51076 | 57081 |
| #75 | 0.0210 | 0.53 | 7/8 | 1/4 | — | 51075 | 57082 |
| #74 | 0.0225 | 0.57 | 7/8 | 1/4 | — | 51074 | 57083 |
| #73 | 0.0240 | 0.61 | 7/8 | 1/4 | — | 51073 | 57084 |
| #72 | 0.0250 | 0.64 | 1 | 5/16 | — | 51072 | 57085 |
| #71 | 0.0260 | 0.66 | 1 | 5/16 | — | 51071 | 57086 |
| 0,7 mm | 0.0276 | | 28,0 | 9,0 | — | 61001 | 68268 |
| #70 | 0.0280 | 0.71 | 1-1/4 | 1/2 | — | 51070 | 57087 |
| #69 | 0.0292 | 0.74 | 1-1/4 | 1/2 | — | 51069 | 57088 |
| #68 | 0.0310 | 0.79 | 1-1/4 | 1/2 | — | 51068 | 57089 |
| 1/32 | 0.0312 | 0.79 | 1-1/4 | 1/2 | — | 51102 | 57090 |
| 0,8 mm | 0.0315 | | 30,0 | 10,0 | — | 61003 | 68269 |
| #67 | 0.0320 | 0.81 | 1-1/4 | 1/2 | — | 51067 | 57091 |
| #66 | 0.0330 | 0.84 | 1-1/4 | 1/2 | — | 51066 | 57092 |
| #65 | 0.0350 | 0.89 | 1-3/8 | 5/8 | 1/2 | 51065 | 57093 |
| 0,9 mm | 0.0354 | | 32,0 | 11,0 | 8,0 | 61005 | 68270 |
| #64 | 0.0360 | 0.91 | 1-3/8 | 5/8 | 1/2 | 51064 | 57094 |
| #63 | 0.0370 | 0.94 | 1-3/8 | 5/8 | 1/2 | 51063 | 57095 |
| #62 | 0.0380 | 0.97 | 1-3/8 | 5/8 | 1/2 | 51062 | 57096 |
| #61 | 0.0390 | 0.99 | 1-3/8 | 5/8 | 1/2 | 51061 | 57097 |
| 1,0 mm | 0.0394 | | 34,0 | 12,0 | 9,0 | 61007 | 68271 |
| #60 | 0.0400 | 1.02 | 1-1/2 | 3/4 | 39/64 | 51060 | 57098 |
| #59 | 0.0410 | 1.04 | 1-1/2 | 3/4 | 39/64 | 51059 | 57099 |
| #58 | 0.0420 | 1.07 | 1-1/2 | 3/4 | 39/64 | 51058 | 57100 |
| #57 | 0.0430 | 1.09 | 1-1/2 | 3/4 | 39/64 | 51057 | 57101 |
| 1,1 mm | 0.0433 | | 36,0 | 14,0 | 11,0 | 61052 | 68294 |
| #56 | 0.0465 | 1.18 | 1-1/2 | 3/4 | 39/64 | 51056 | 57102 |
| 3/64 | 0.0469 | 1.19 | 1-1/2 | 3/4 | 39/64 | 51103 | 57103 |
| 1,2 mm | 0.0472 | | 38,0 | 16,0 | 12,0 | 61053 | 68295 |
| 1,3 mm | 0.0512 | | 38,0 | 16,0 | 12,0 | 61054 | 68296 |
| #55 | 0.0520 | 1.32 | 1-1/2 | 3/4 | 39/64 | 51055 | 57104 |
| #54 | 0.0550 | 1.40 | 1-1/2 | 3/4 | 39/64 | 51054 | 57105 |
| 1,4 mm | 0.0551 | | 40,0 | 18,0 | 14,0 | 61055 | 68297 |
| 1,5 mm | 0.0591 | | 40,0 | 18,0 | 14,0 | 61009 | 68272 |
| #53 | 0.0595 | 1.51 | 1-1/2 | 3/4 | 39/64 | 51053 | 57106 |
| *1/16 | 0.0625 | 1.59 | 1-1/2 | 3/4 | 39/64 | 51104 | 57107 |
| 1,6 mm | 0.0630 | | 43,0 | 20,0 | 16,0 | 61056 | 68298 |
| #52 | 0.0635 | 1.61 | 1-1/2 | 3/4 | 39/64 | 51052 | 57108 |
| 1,7 mm | 0.0669 | | 43,0 | 20,0 | 17,0 | 61057 | 68299 |
| #51 | 0.0670 | 1.70 | 1-1/2 | 3/4 | 39/64 | 51051 | 57109 |

TOLERANCES (inch)

D₁ = +.0000/-.0005

TOLERANCES (mm)

D₁ = +0,0000/-0,0127

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

continued on next page

2 Flute Drills • Metric: DIN 338

101

FRACTIONAL & METRIC SERIES

CONTINUED

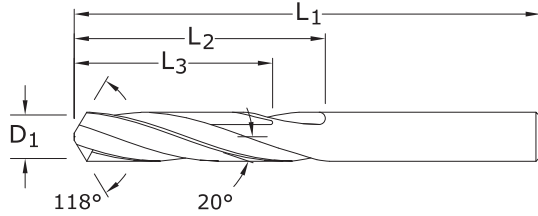
| CUTTING DIAMETER D ₁ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|---------------------------------------|-------------------|------------------|-------------------------------------|-----------------------------------|-------------------------------------|----------|------------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AITIN) |
| #50 | 0.0700 | 1.78 | 1-3/4 | 7/8 | 45/64 | 51050 | 57110 |
| 1,8 mm | 0.0709 | | 46,0 | 22,0 | 17,0 | 61058 | 68300 |
| #49 | 0.0730 | 1.85 | 1-3/4 | 7/8 | 45/64 | 51049 | 57111 |
| 1,9 mm | 0.0748 | | 46,0 | 22,0 | 17,0 | 61059 | 68301 |
| #48 | 0.0760 | 1.93 | 1-3/4 | 7/8 | 45/64 | 51048 | 57112 |
| 5/64 | 0.0781 | 1.98 | 1-3/4 | 7/8 | 45/64 | 51105 | 57113 |
| #47 | 0.0785 | 1.99 | 1-3/4 | 7/8 | 45/64 | 51047 | 57114 |
| 2,0 mm | 0.0787 | | 49,0 | 24,0 | 19,0 | 61011 | 68273 |
| #46 | 0.0810 | 2.06 | 1-3/4 | 7/8 | 45/64 | 51046 | 57115 |
| #45 | 0.0820 | 2.08 | 1-3/4 | 7/8 | 45/64 | 51045 | 57116 |
| 2,1 mm | 0.0827 | | 49,0 | 24,0 | 19,0 | 61060 | 68302 |
| #44 | 0.0860 | 2.18 | 2 | 1 | 51/64 | 51044 | 57117 |
| 2,2 mm | 0.0866 | | 53,0 | 27,0 | 21,0 | 61061 | 68303 |
| #43 | 0.0890 | 2.26 | 2 | 1 | 51/64 | 51043 | 57118 |
| 2,3 mm | 0.0906 | | 53,0 | 27,0 | 21,0 | 61062 | 68304 |
| #42 | 0.0935 | 2.37 | 2 | 1 | 51/64 | 51042 | 57119 |
| 3/32 | 0.0938 | 2.38 | 2 | 1 | 51/64 | 51106 | 57120 |
| 2,4 mm | 0.0945 | | 57,0 | 30,0 | 24,0 | 61063 | 68305 |
| #41 | 0.0960 | 2.44 | 2 | 1 | 51/64 | 51041 | 57121 |
| #40 | 0.0980 | 2.49 | 2 | 1 | 51/64 | 51040 | 57122 |
| 2,5 mm | 0.0984 | | 57,0 | 30,0 | 24,0 | 61013 | 68274 |
| #39 | 0.0995 | 2.53 | 2-1/4 | 1-1/4 | 1 | 51039 | 57123 |
| #38 | 0.1015 | 2.58 | 2-1/4 | 1-1/4 | 1 | 51038 | 57124 |
| 2,6 mm | 0.1024 | | 57,0 | 30,0 | 24,0 | 61064 | 68306 |
| #37 | 0.1040 | 2.64 | 2-1/4 | 1-1/4 | 1 | 51037 | 57125 |
| 2,7 mm | 0.1063 | | 61,0 | 33,0 | 26,0 | 61065 | 68307 |
| #36 | 0.1065 | 2.71 | 2-1/4 | 1-1/4 | 1 | 51036 | 57126 |
| 7/64 | 0.1094 | 2.78 | 2-1/4 | 1-1/4 | 1 | 51107 | 57127 |
| #35 | 0.1100 | 2.79 | 2-1/4 | 1-1/4 | 1 | 51035 | 57128 |
| 2,8 mm | 0.1102 | | 61,0 | 33,0 | 26,0 | 61066 | 68308 |
| #34 | 0.1110 | 2.82 | 2-1/4 | 1-1/4 | 1 | 51034 | 57129 |
| #33 | 0.1130 | 2.87 | 2-1/4 | 1-1/4 | 1 | 51033 | 57130 |
| 2,9 mm | 0.1142 | | 61,0 | 33,0 | 26,0 | 61067 | 68309 |
| #32 | 0.1160 | 2.95 | 2-1/4 | 1-1/4 | 1 | 51032 | 57131 |
| 3,0 mm | 0.1181 | | 61,0 | 33,0 | 26,0 | 61015 | 68275 |
| #31 | 0.1200 | 3.05 | 2-1/4 | 1-1/4 | 1 | 51031 | 57132 |
| 3,1 mm | 0.1220 | | 65,0 | 36,0 | 28,0 | 61068 | 68310 |
| *1/8 | 0.1250 | 3.18 | 2-1/4 | 1-1/4 | 1 | 51108 | 57133 |
| 3,2 mm | 0.1260 | | 65,0 | 36,0 | 28,0 | 61069 | 68311 |
| #30 | 0.1285 | 3.26 | 2-1/4 | 1-1/4 | 1 | 51030 | 57134 |
| 3,3 mm | 0.1299 | | 65,0 | 36,0 | 28,0 | 61070 | 68312 |
| 3,4 mm | 0.1339 | | 70,0 | 39,0 | 31,0 | 61071 | 68313 |
| #29 | 0.1360 | 3.45 | 2-1/2 | 1-3/8 | 1-7/64 | 51029 | 57135 |
| 3,5 mm | 0.1378 | | 70,0 | 39,0 | 31,0 | 61017 | 68276 |
| #28 | 0.1405 | 3.57 | 2-1/2 | 1-3/8 | 1-7/64 | 51028 | 57136 |
| 9/64 | 0.1406 | 3.57 | 2-1/2 | 1-3/8 | 1-7/64 | 51109 | 57137 |
| 3,6 mm | 0.1417 | | 70,0 | 39,0 | 31,0 | 61072 | 68314 |
| #27 | 0.1440 | 3.66 | 2-1/2 | 1-3/8 | 1-7/64 | 51027 | 57138 |
| 3,7 mm | 0.1457 | | 70,0 | 39,0 | 31,0 | 61073 | 68315 |
| #26 | 0.1470 | 3.73 | 2-1/2 | 1-3/8 | 1-7/64 | 51026 | 57139 |
| #25 | 0.1495 | 3.80 | 2-1/2 | 1-3/8 | 1-7/64 | 51025 | 57140 |
| 3,8 mm | 0.1496 | | 75,0 | 43,0 | 34,0 | 61074 | 68316 |
| #24 | 0.1520 | 3.86 | 2-1/2 | 1-3/8 | 1-7/64 | 51024 | 57141 |
| 3,9 mm | 0.1535 | | 75,0 | 43,0 | 34,0 | 61075 | 68317 |

continued on next page

2 Flute Drills • Metric: DIN 338



5xD



Pictured:
Series 101 Drill Set

101

FRACTIONAL & METRIC SERIES

| CUTTING DIAMETER D ₁ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|------------------------------------|----------------|---------------|----------------------------------|--------------------------------|----------------------------------|----------|---------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AlTiN) |
| #23 | 0.1540 | 3.91 | 2-1/2 | 1-3/8 | 1-7/64 | 51023 | 57142 |
| 5/32 | 0.1562 | 3.97 | 2-1/2 | 1-3/8 | 1-7/64 | 51110 | 57143 |
| #22 | 0.1570 | 3.99 | 2-1/2 | 1-3/8 | 1-7/64 | 51022 | 57144 |
| 4,0 mm | 0.1575 | | 75,0 | 43,0 | 34,0 | 61019 | 68277 |
| #21 | 0.1590 | 4.04 | 2-1/2 | 1-3/8 | 1-7/64 | 51021 | 57145 |
| #20 | 0.1610 | 4.09 | 2-1/2 | 1-3/8 | 1-7/64 | 51020 | 57146 |
| 4,1 mm | 0.1614 | | 75,0 | 43,0 | 34,0 | 61076 | 68318 |
| 4,2 mm | 0.1654 | | 75,0 | 43,0 | 34,0 | 61077 | 68319 |
| #19 | 0.1660 | 4.22 | 2-1/2 | 1-5/8 | 1-19/64 | 51019 | 57147 |
| 4,3 mm | 0.1693 | | 80,0 | 47,0 | 37,0 | 61078 | 68320 |
| #18 | 0.1695 | 4.31 | 2-3/4 | 1-5/8 | 1-19/64 | 51018 | 57148 |
| 11/64 | 0.1719 | 4.37 | 2-3/4 | 1-5/8 | 1-19/64 | 51111 | 57149 |
| #17 | 0.1730 | 4.39 | 2-3/4 | 1-5/8 | 1-19/64 | 51017 | 57150 |
| 4,4 mm | 0.1732 | | 80,0 | 47,0 | 37,0 | 61079 | 68321 |
| #16 | 0.1770 | 4.50 | 2-3/4 | 1-5/8 | 1-19/64 | 51016 | 57151 |
| 4,5 mm | 0.1772 | | 80,0 | 47,0 | 37,0 | 61021 | 68278 |
| #15 | 0.1800 | 4.57 | 2-3/4 | 1-5/8 | 1-19/64 | 51015 | 57152 |
| 4,6 mm | 0.1811 | | 80,0 | 47,0 | 37,0 | 61080 | 68322 |
| #14 | 0.1820 | 4.62 | 2-3/4 | 1-5/8 | 1-19/64 | 51014 | 57153 |
| 4,7 mm | 0.1850 | | 80,0 | 47,0 | 37,0 | 61081 | 68323 |
| #13 | 0.1850 | 4.70 | 2-3/4 | 1-5/8 | 1-19/64 | 51013 | 57154 |
| *3/16 | 0.1875 | 4.76 | 2-3/4 | 1-5/8 | 1-19/64 | 51112 | 57155 |
| 4,8 mm | 0.1890 | | 86,0 | 52,0 | 41,0 | 61082 | 68324 |
| #12 | 0.1890 | 4.80 | 2-3/4 | 1-5/8 | 1-19/64 | 51012 | 57156 |
| #11 | 0.1910 | 4.85 | 2-3/4 | 1-5/8 | 1-19/64 | 51011 | 57157 |
| 4,9 mm | 0.1929 | | 86,0 | 52,0 | 41,0 | 61083 | 68325 |
| #10 | 0.1935 | 4.91 | 2-3/4 | 1-5/8 | 1-19/64 | 51010 | 57158 |
| #9 | 0.1960 | 4.98 | 3 | 1-3/4 | 1-13/32 | 51009 | 57159 |
| 5,0 mm | 0.1969 | | 86,0 | 52,0 | 41,0 | 61023 | 68279 |
| #8 | 0.1990 | 5.05 | 3 | 1-3/4 | 1-13/32 | 51008 | 57160 |
| 5,1 mm | 0.2008 | | 86,0 | 52,0 | 41,0 | 61084 | 68326 |
| #7 | 0.2010 | 5.11 | 3 | 1-3/4 | 1-13/32 | 51007 | 57161 |
| 13/64 | 0.2031 | 5.16 | 3 | 1-3/4 | 1-13/32 | 51113 | 57162 |
| #6 | 0.2040 | 5.18 | 3 | 1-3/4 | 1-13/32 | 51006 | 57163 |
| 5,2 mm | 0.2047 | | 86,0 | 52,0 | 41,0 | 61085 | 68327 |
| #5 | 0.2055 | 5.22 | 3 | 1-3/4 | 1-13/32 | 51005 | 57164 |
| 5,3 mm | 0.2087 | | 86,0 | 52,0 | 41,0 | 61086 | 68328 |
| #4 | 0.2090 | 5.31 | 3 | 1-3/4 | 1-13/32 | 51004 | 57165 |
| 5,4 mm | 0.2126 | | 93,0 | 57,0 | 45,0 | 61087 | 68329 |
| #3 | 0.2130 | 5.41 | 3 | 1-3/4 | 1-13/32 | 51003 | 57166 |
| 5,5 mm | 0.2165 | | 93,0 | 57,0 | 45,0 | 61025 | 68280 |
| 7/32 | 0.2188 | 5.56 | 3 | 1-3/4 | 1-13/32 | 51114 | 57167 |
| 5,6 mm | 0.2205 | | 93,0 | 57,0 | 45,0 | 61088 | 68330 |
| #2 | 0.2210 | 5.61 | 3 | 1-3/4 | 1-13/32 | 51002 | 57168 |

continued on next page

TOLERANCES (inch)

D₁ = +.0000/- .0005

TOLERANCES (mm)

D₁ = +0,0000/-0,0127

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

2 Flute Drills • Metric: DIN 338

101

FRACTIONAL & METRIC SERIES

CONTINUED

| CUTTING DIAMETER D ₁ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|---------------------------------------|-------------------|------------------|-------------------------------------|-----------------------------------|-------------------------------------|----------|------------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AlTiN) |
| 5,7 mm | 0.2244 | | 93,0 | 57,0 | 45,0 | 61089 | 68331 |
| #1 | 0.2280 | 5.79 | 3 | 1-3/4 | 1-13/32 | 51001 | 57169 |
| 5,8 mm | 0.2283 | | 93,0 | 57,0 | 45,0 | 61090 | 68332 |
| 5,9 mm | 0.2323 | | 93,0 | 57,0 | 45,0 | 61091 | 68333 |
| A | 0.2340 | 5.94 | 3-1/4 | 2 | 1-39/64 | 51201 | 57170 |
| 15/64 | 0.2344 | 5.95 | 3-1/4 | 2 | 1-39/64 | 51115 | 57171 |
| 6,0 mm | 0.2362 | | 93,0 | 57,0 | 45,0 | 61027 | 68281 |
| B | 0.2380 | 6.05 | 3-1/4 | 2 | 1-39/64 | 51202 | 57172 |
| 6,1 mm | 0.2402 | | 101,0 | 63,0 | 50,0 | 61092 | 68334 |
| C | 0.2420 | 6.15 | 3-1/4 | 2 | 1-39/64 | 51203 | 57173 |
| 6,2 mm | 0.2441 | | 101,0 | 63,0 | 50,0 | 61093 | 68335 |
| D | 0.2460 | 6.25 | 3-1/4 | 2 | 1-39/64 | 51204 | 57174 |
| 6,3 mm | 0.2480 | | 101,0 | 63,0 | 50,0 | 61094 | 68336 |
| *1/4 | 0.2500 | 6.35 | 3-1/4 | 2 | 1-39/64 | 51116 | 57176 |
| 6,4 mm | 0.2520 | | 101,0 | 63,0 | 50,0 | 61095 | 68337 |
| 6,5 mm | 0.2559 | | 101,0 | 63,0 | 50,0 | 61029 | 68282 |
| F | 0.2570 | 6.53 | 3-1/4 | 2 | 1-39/64 | 51206 | 57177 |
| 6,6 mm | 0.2598 | | 101,0 | 63,0 | 50,0 | 61096 | 68338 |
| G | 0.2610 | 6.63 | 3-1/2 | 2-1/8 | 1-45/64 | 51207 | 57178 |
| 6,7 mm | 0.2638 | | 101,0 | 63,0 | 50,0 | 61097 | 68339 |
| 17/64 | 0.2656 | 6.75 | 3-1/2 | 2-1/8 | 1-45/64 | 51117 | 57179 |
| H | 0.2660 | 6.76 | 3-1/2 | 2-1/8 | 1-45/64 | 51208 | 57180 |
| 6,8 mm | 0.2677 | | 109,0 | 69,0 | 55,0 | 61098 | 68340 |
| 6,9 mm | 0.2717 | | 109,0 | 69,0 | 55,0 | 61099 | 68341 |
| I | 0.2720 | 6.91 | 3-1/2 | 2-1/8 | 1-45/64 | 51209 | 57181 |
| 7,0 mm | 0.2756 | | 109,0 | 69,0 | 55,0 | 61031 | 68283 |
| J | 0.2770 | 7.04 | 3-1/2 | 2-1/8 | 1-45/64 | 51210 | 57182 |
| 7,1 mm | 0.2795 | | 109,0 | 69,0 | 55,0 | 61100 | 68342 |
| K | 0.2810 | 7.14 | 3-1/2 | 2-1/8 | 1-45/64 | 51211 | 57183 |
| 9/32 | 0.2812 | 7.14 | 3-1/2 | 2-1/8 | 1-45/64 | 51118 | 57184 |
| 7,2 mm | 0.2835 | | 109,0 | 69,0 | 55,0 | 61101 | 68343 |
| 7,3 mm | 0.2874 | | 109,0 | 69,0 | 55,0 | 61102 | 68344 |
| L | 0.2900 | 7.37 | 3-1/2 | 2-1/8 | 1-45/64 | 51212 | 57185 |
| 7,4 mm | 0.2913 | | 109,0 | 69,0 | 55,0 | 61103 | 68345 |
| M | 0.2950 | 7.49 | 3-3/4 | 2-3/8 | 1-29/32 | 51213 | 57186 |
| 7,5 mm | 0.2953 | | 109,0 | 69,0 | 55,0 | 61033 | 68284 |
| 19/64 | 0.2969 | 7.54 | 3-3/4 | 2-3/8 | 1-29/32 | 51119 | 57187 |
| 7,6 mm | 0.2992 | | 117,0 | 75,0 | 60,0 | 61104 | 68346 |
| N | 0.3020 | 7.67 | 3-3/4 | 2-3/8 | 1-29/32 | 51214 | 57188 |
| 7,7 mm | 0.3031 | | 117,0 | 75,0 | 60,0 | 61105 | 68347 |
| 7,8 mm | 0.3071 | | 117,0 | 75,0 | 60,0 | 61106 | 68348 |
| 7,9 mm | 0.3110 | | 117,0 | 75,0 | 60,0 | 61107 | 68349 |
| *5/16 | 0.3125 | 7.94 | 3-3/4 | 2-3/8 | 1-29/32 | 51120 | 57189 |
| 8,0 mm | 0.3150 | | 117,0 | 75,0 | 60,0 | 61035 | 68285 |
| O | 0.3160 | 8.03 | 3-3/4 | 2-3/8 | 1-29/32 | 51215 | 57190 |
| 8,1 mm | 0.3189 | | 117,0 | 75,0 | 60,0 | 61108 | 68350 |
| 8,2 mm | 0.3228 | | 117,0 | 75,0 | 60,0 | 61109 | 68351 |
| P | 0.3230 | 8.20 | 3-3/4 | 2-3/8 | 1-29/32 | 51216 | 57191 |
| 8,3 mm | 0.3268 | | 117,0 | 75,0 | 60,0 | 61110 | 68352 |
| 21/64 | 0.3281 | 8.33 | 4 | 2-1/2 | 2 | 51121 | 57192 |
| 8,4 mm | 0.3307 | | 117,0 | 75,0 | 60,0 | 61111 | 68353 |
| Q | 0.3320 | 8.43 | 4 | 2-1/2 | 2 | 51217 | 57193 |
| 8,5 mm | 0.3346 | | 117,0 | 75,0 | 60,0 | 61037 | 68286 |
| 8,6 mm | 0.3386 | | 125,0 | 81,0 | 64,0 | 61112 | 68354 |

continued on next page

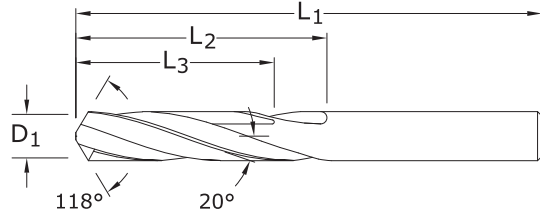
2 Flute Drills • Metric: DIN 338



5xD



Pictured:
Series 101 Drill Set



101 FRACTIONAL & METRIC SERIES

| CUTTING DIAMETER D ₁ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|------------------------------------|----------------|---------------|----------------------------------|--------------------------------|----------------------------------|----------|---------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AlTiN) |
| R | 0.3390 | 8.61 | 4 | 2-1/2 | 2 | 51218 | 57194 |
| 8,7 mm | 0.3425 | | 125,0 | 81,0 | 64,0 | 61113 | 68355 |
| 11/32 | 0.3438 | 8.73 | 4 | 2-1/2 | 2 | 51122 | 57195 |
| 8,8 mm | 0.3465 | | 125,0 | 81,0 | 64,0 | 61114 | 68356 |
| S | 0.3480 | 8.84 | 4 | 2-1/2 | 2 | 51219 | 57196 |
| 8,9 mm | 0.3504 | | 125,0 | 81,0 | 64,0 | 61115 | 68357 |
| 9,0 mm | 0.3543 | | 125,0 | 81,0 | 64,0 | 61039 | 68287 |
| T | 0.3580 | 9.09 | 4-1/4 | 2-3/4 | 2-13/64 | 51220 | 57197 |
| 9,1 mm | 0.3583 | | 125,0 | 81,0 | 64,0 | 61116 | 68358 |
| 23/64 | 0.3594 | 9.13 | 4-1/4 | 2-3/4 | 2-13/64 | 51123 | 57198 |
| 9,2 mm | 0.3622 | | 125,0 | 81,0 | 64,0 | 61117 | 68359 |
| 9,3 mm | 0.3661 | | 125,0 | 81,0 | 64,0 | 61118 | 68360 |
| U | 0.3680 | 9.35 | 4-1/4 | 2-3/4 | 2-13/64 | 51221 | 57199 |
| 9,4 mm | 0.3701 | | 125,0 | 81,0 | 64,0 | 61119 | 68361 |
| 9,5 mm | 0.3740 | | 125,0 | 81,0 | 64,0 | 61041 | 68288 |
| *3/8 | 0.3750 | 9.53 | 4-1/4 | 2-3/4 | 2-13/64 | 51124 | 57200 |
| V | 0.3770 | 9.58 | 4-1/4 | 2-3/4 | 2-13/64 | 51222 | 57201 |
| 9,6 mm | 0.3780 | | 133,0 | 87,0 | 69,0 | 61120 | 68362 |
| 9,7 mm | 0.3819 | | 133,0 | 87,0 | 69,0 | 61121 | 68363 |
| 9,8 mm | 0.3858 | | 133,0 | 87,0 | 69,0 | 61122 | 68364 |
| W | 0.3860 | 9.80 | 4-1/2 | 2-7/8 | 2-19/64 | 51223 | 57202 |
| 9,9 mm | 0.3898 | | 133,0 | 87,0 | 69,0 | 61123 | 68365 |
| 25/64 | 0.3906 | 9.92 | 4-1/2 | 2-7/8 | 2-19/64 | 51125 | 57203 |
| 10,0 mm | 0.3937 | | 133,0 | 87,0 | 69,0 | 61043 | 68289 |
| X | 0.3970 | 10.08 | 4-1/2 | 2-7/8 | 2-19/64 | 51224 | 57204 |
| 10,2 mm | 0.4016 | | 133,0 | 87,0 | 69,0 | 61124 | 68366 |
| Y | 0.4040 | 10.26 | 4-1/2 | 2-7/8 | 2-19/64 | 51225 | 57205 |
| 13/32 | 0.4062 | 10.32 | 4-1/2 | 2-7/8 | 2-19/64 | 51126 | 57206 |
| Z | 0.4130 | 10.49 | 4-1/2 | 2-7/8 | 2-19/64 | 51226 | 57207 |
| 10,5 mm | 0.4134 | | 133,0 | 87,0 | 69,0 | 61045 | 68290 |
| 27/64 | 0.4219 | 10.72 | 4-1/2 | 2-7/8 | 2-19/64 | 51127 | 57208 |
| 11,0 mm | 0.4331 | | 142,0 | 94,0 | 75,0 | 61047 | 68291 |
| 7/16 | 0.4375 | 11.11 | 4-1/2 | 2-7/8 | 2-19/64 | 51128 | 57209 |
| 11,5 mm | 0.4528 | | 142,0 | 94,0 | 75,0 | 61049 | 68292 |
| 29/64 | 0.4531 | 11.51 | 4-3/4 | 3 | 2-13/32 | 51129 | 57210 |
| 15/32 | 0.4688 | 11.91 | 4-3/4 | 3 | 2-13/32 | 51130 | 57211 |
| 12,0 mm | 0.4724 | | 151,0 | 101,0 | 80,0 | 61051 | 68293 |
| 31/64 | 0.4844 | 12.30 | 4-3/4 | 3 | 2-13/32 | 51131 | 57212 |
| 1/2 | 0.5000 | 12.70 | 4-3/4 | 3 | 2-13/32 | 51132 | 57213 |
| *Series 101 Set | | | | | | 61175 | 57351 |

TOLERANCES (inch)

D₁ = +.0000/- .0005

TOLERANCES (mm)

D₁ = +0,0000/-0,0127

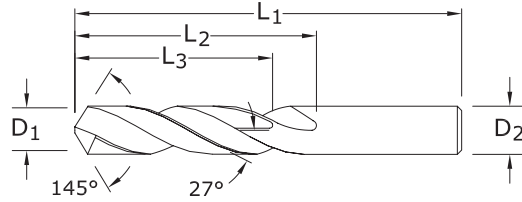
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Short Length Self Centering Drills • DIN 6539



3xD



108M Plus
METRIC SERIES

TOLERANCES (mm)

≤3 DIAMETER

D₁ = +0,000/-0,010

D₂ = h₆

>3-6 DIAMETER

D₁ = +0,000/-0,012

D₂ = h₆

>6-10 DIAMETER

D₁ = +0,000/-0,015

D₂ = h₆

>10-18 DIAMETER

D₁ = +0,000/-0,018

D₂ = h₆

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

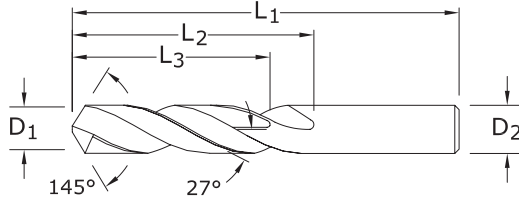
| mm | | | | EDP NO. | |
|--|----------------------------------|--------------------------------|----------------------------------|----------|------------------------|
| CUTTING DIAMETER D ₁ /D ₂ | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | UNCOATED | TI-NAMITE-A (AlTiN) |
| 0,5 | 20,0 | 3,0 | — | 62001 | 68643 |
| 0,55 | 21,0 | 3,5 | — | 62003 | 68644 |
| 0,6 | 21,0 | 3,5 | — | 62005 | 68645 |
| 0,65 | 22,0 | 4,0 | — | 62007 | 68646 |
| 0,7 | 23,0 | 4,5 | — | 62009 | 68647 |
| 0,75 | 23,0 | 4,5 | — | 62011 | 68648 |
| 0,8 | 24,0 | 5,0 | — | 62013 | 68649 |
| 0,85 | 24,0 | 5,0 | — | 62015 | 68650 |
| 0,9 | 25,0 | 5,5 | 4,0 | 62017 | 68651 |
| 0,95 | 25,0 | 5,5 | 4,0 | 62019 | 68652 |
| 1,0 | 26,0 | 6,0 | 4,7 | 62021 | 68653 |
| 1,05 | 26,0 | 6,0 | 4,7 | 62023 | 68654 |
| 1,1 | 28,0 | 7,0 | 5,4 | 62025 | 68655 |
| 1,15 | 28,0 | 7,0 | 5,4 | 62027 | 68656 |
| 1,2 | 30,0 | 8,0 | 6,0 | 62029 | 68657 |
| 1,25 | 30,0 | 8,0 | 6,0 | 62031 | 68658 |
| 1,3 | 30,0 | 8,0 | 6,0 | 62033 | 68659 |
| 1,35 | 32,0 | 9,0 | 7,0 | 62035 | 68660 |
| 1,4 | 32,0 | 9,0 | 7,0 | 62037 | 68661 |
| 1,45 | 32,0 | 9,0 | 7,0 | 62039 | 68662 |
| 1,5 | 32,0 | 9,0 | 7,0 | 62041 | 68663 |
| 1,6 | 34,0 | 10,0 | 7,0 | 62043 | 68664 |
| 1,7 | 34,0 | 10,0 | 7,0 | 62045 | 68665 |
| 1,8 | 36,0 | 11,0 | 8,0 | 62047 | 68666 |
| 1,9 | 36,0 | 11,0 | 8,0 | 62049 | 68667 |
| 2,0 | 38,0 | 12,0 | 9,0 | 62051 | 68668 |
| 2,1 | 38,0 | 12,0 | 9,0 | 62053 | 68669 |
| 2,2 | 40,0 | 13,0 | 10,0 | 62055 | 68670 |
| 2,3 | 40,0 | 13,0 | 10,0 | 62057 | 68671 |
| 2,4 | 43,0 | 14,0 | 11,0 | 62059 | 68672 |
| 2,5 | 43,0 | 14,0 | 11,0 | 62061 | 68673 |
| 2,6 | 43,0 | 14,0 | 11,0 | 62063 | 68674 |
| 2,7 | 46,0 | 16,0 | 12,0 | 62065 | 68675 |
| 2,8 | 46,0 | 16,0 | 12,0 | 62067 | 68676 |

continued on next page

Short Length Self Centering Drills • DIN 6539



3xD



108M Plus

METRIC SERIES

| CUTTING DIAMETER D ₁ /D ₂ | mm | | | EDP NO. | |
|--|----------------------------------|--------------------------------|----------------------------------|----------|---------------------|
| | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | UNCOATED | Ti-NAMITE-A (AlTiN) |
| 2,9 | 46,0 | 16,0 | 12,0 | 62069 | 68677 |
| 3,0 | 46,0 | 16,0 | 12,0 | 62071 | 68678 |
| 3,1 | 49,0 | 18,0 | 14,0 | 62073 | 68679 |
| 3,2 | 49,0 | 18,0 | 14,0 | 62075 | 68680 |
| 3,3 | 49,0 | 18,0 | 14,0 | 62077 | 68681 |
| 3,4 | 52,0 | 20,0 | 15,0 | 62079 | 68682 |
| 3,5 | 52,0 | 20,0 | 15,0 | 62081 | 68683 |
| 3,6 | 52,0 | 20,0 | 15,0 | 62083 | 68684 |
| 3,7 | 52,0 | 20,0 | 15,0 | 62085 | 68685 |
| 3,8 | 55,0 | 22,0 | 17,0 | 62087 | 68686 |
| 3,9 | 55,0 | 22,0 | 17,0 | 62089 | 68687 |
| 4,0 | 55,0 | 22,0 | 17,0 | 62091 | 68688 |
| 4,1 | 55,0 | 22,0 | 17,0 | 62093 | 68689 |
| 4,2 | 55,0 | 22,0 | 17,0 | 62095 | 68690 |
| 4,3 | 58,0 | 24,0 | 18,0 | 62097 | 68691 |
| 4,4 | 58,0 | 24,0 | 18,0 | 62099 | 68692 |
| 4,5 | 58,0 | 24,0 | 18,0 | 62101 | 68693 |
| 4,6 | 58,0 | 24,0 | 18,0 | 62103 | 68694 |
| 4,7 | 58,0 | 24,0 | 18,0 | 62105 | 68695 |
| 4,8 | 62,0 | 26,0 | 20,0 | 62107 | 68696 |
| 4,9 | 62,0 | 26,0 | 20,0 | 62109 | 68697 |
| 5,0 | 62,0 | 26,0 | 20,0 | 62111 | 68698 |
| 5,1 | 62,0 | 26,0 | 20,0 | 62113 | 68699 |
| 5,2 | 62,0 | 26,0 | 20,0 | 62115 | 68700 |
| 5,3 | 62,0 | 26,0 | 20,0 | 62117 | 68701 |
| 5,4 | 66,0 | 28,0 | 21,0 | 62119 | 68702 |
| 5,5 | 66,0 | 28,0 | 21,0 | 62121 | 68703 |
| 5,6 | 66,0 | 28,0 | 21,0 | 62123 | 68704 |
| 5,7 | 66,0 | 28,0 | 21,0 | 62125 | 68705 |
| 5,8 | 66,0 | 28,0 | 21,0 | 62127 | 68706 |
| 5,9 | 66,0 | 28,0 | 21,0 | 62129 | 68707 |
| 6,0 | 66,0 | 28,0 | 21,0 | 62131 | 68708 |

TOLERANCES (mm)

≤3 DIAMETER

D₁ = +0,000/-0,010

D₂ = h₆

>3-6 DIAMETER

D₁ = +0,000/-0,012

D₂ = h₆

>6-10 DIAMETER

D₁ = +0,000/-0,015

D₂ = h₆

>10-16 DIAMETER

D₁ = +0,000/-0,018

D₂ = h₆

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

continued on next page

Short Length Self Centering Drills • DIN 6539

108M Plus

METRIC SERIES

| CUTTING DIAMETER D ₁ /D ₂ | mm | | | EDP NO. | |
|---|-------------------------------------|-----------------------------------|-------------------------------------|----------|------------------------|
| | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | UNCOATED | Ti-NAMITE-A (AITiN) |
| 6,1 | 70,0 | 31,0 | 23,0 | 62133 | 68709 |
| 6,2 | 70,0 | 31,0 | 23,0 | 62135 | 68710 |
| 6,3 | 70,0 | 31,0 | 23,0 | 62137 | 68711 |
| 6,4 | 70,0 | 31,0 | 23,0 | 62139 | 68712 |
| 6,5 | 70,0 | 31,0 | 23,0 | 62141 | 68713 |
| 6,8 | 70,0 | 31,0 | 23,0 | 62142 | 68603 |
| 7,0 | 74,0 | 34,0 | 25,0 | 62143 | 68718 |
| 7,5 | 74,0 | 34,0 | 25,0 | 62145 | 68723 |
| 7,8 | 79,0 | 37,0 | 27,0 | 62146 | 68604 |
| 8,0 | 79,0 | 37,0 | 27,0 | 62147 | 68728 |
| 8,5 | 79,0 | 37,0 | 27,0 | 62149 | 68733 |
| 9,0 | 84,0 | 40,0 | 29,0 | 62151 | 68738 |
| 9,5 | 84,0 | 40,0 | 29,0 | 62153 | 68743 |
| 9,8 | 89,0 | 43,0 | 31,0 | 62154 | 68606 |
| 10,0 | 89,0 | 43,0 | 31,0 | 62155 | 68748 |
| 10,2 | 89,0 | 43,0 | 31,0 | 62156 | 68607 |
| 10,5 | 89,0 | 43,0 | 31,0 | 62066 | 68753 |
| 11,0 | 95,0 | 47,0 | 33,0 | 62157 | 68758 |
| 11,5 | 95,0 | 47,0 | 33,0 | 62084 | 68763 |
| 11,8 | 102,0 | 51,0 | 35,0 | 62158 | 68608 |
| 12,0 | 102,0 | 51,0 | 35,0 | 62159 | 68768 |
| 12,5 | 102,0 | 51,0 | 35,0 | 62102 | 68773 |
| 13,0 | 102,0 | 51,0 | 35,0 | 62112 | 68778 |
| 13,8 | 107,0 | 54,0 | 37,0 | 62164 | 68609 |
| 14,0 | 107,0 | 54,0 | 37,0 | 62116 | 68780 |
| 14,5 | 111,0 | 56,0 | 38,0 | 62166 | 68611 |
| 14,8 | 111,0 | 56,0 | 38,0 | 62167 | 68612 |
| 15,0 | 111,0 | 56,0 | 38,0 | 62168 | 68613 |
| 15,8 | 115,0 | 58,0 | 38,0 | 62170 | 68614 |
| 16,0 | 115,0 | 58,0 | 38,0 | 62171 | 68616 |

CONTINUED

2 Flute Drills

| Series 101 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|--|-----------------------------|--------------------------------------|---------|---------|--------|--------|--------|--------|--------|--------|
| | | | 1/64 | 1/32 | 1/16 | 1/8 | 1/4 | 3/8 | 1/2 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 265 | RPM | 64787 | 32394 | 16197 | 8098 | 4049 | 2699 | 2025 |
| | | | (212-318) | Fr | 0.00021 | 0.0004 | 0.0008 | 0.0017 | 0.0033 | 0.0050 | 0.0067 |
| | | | Feed (ipm) | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | | |
| | | ≤ 300 Bhn or ≤ 32 HRc | 125 | RPM | 30560 | 15280 | 7640 | 3820 | 1910 | 1273 | 955 |
| | | | (100-150) | Fr | 0.00020 | 0.0004 | 0.0008 | 0.0016 | 0.0031 | 0.0047 | 0.0063 |
| | | | Feed (ipm) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 85 | RPM | 20781 | 10390 | 5195 | 2598 | 1299 | 866 | 649 | |
| | | (68-102) | Fr | 0.00011 | 0.0002 | 0.0004 | 0.0008 | 0.0017 | 0.0025 | 0.0034 | |
| | | Feed (ipm) | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 230 | RPM | 56230 | 28115 | 14058 | 7029 | 3514 | 2343 | 1757 |
| | | | (184-276) | Fr | 0.00019 | 0.0004 | 0.0007 | 0.0015 | 0.0030 | 0.0045 | 0.0060 |
| | | | Feed (ipm) | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | |
| ≤ 375 Bhn or ≤ 40 HRc | | 145 | RPM | 35450 | 17725 | 8862 | 4431 | 2216 | 1477 | 1108 | |
| | | (116-174) | Fr | 0.00019 | 0.0004 | 0.0007 | 0.0015 | 0.0030 | 0.0045 | 0.0060 | |
| | | Feed (ipm) | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | 6.6 | | |
| ≤ 450 Bhn or ≤ 48 HRc | 60 | RPM | 14669 | 7334 | 3667 | 1834 | 917 | 611 | 458 | | |
| | (48-72) | Fr | 0.00008 | 0.0002 | 0.0003 | 0.0007 | 0.0013 | 0.0020 | 0.0026 | | |
| | Feed (ipm) | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | | | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 250 Bhn or ≤ 24 HRc | 85 | RPM | 20781 | 10390 | 5195 | 2598 | 1299 | 866 | 649 |
| | | | (68-102) | Fr | 0.00011 | 0.0002 | 0.0004 | 0.0009 | 0.0018 | 0.0027 | 0.0035 |
| | | | Feed (ipm) | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | 2.3 | |
| | | ≤ 375 Bhn or ≤ 40 HRc | 55 | RPM | 13446 | 6723 | 3362 | 1681 | 840 | 560 | 420 |
| | | | (44-66) | Fr | 0.00005 | 0.0001 | 0.0002 | 0.0004 | 0.0008 | 0.0012 | 0.0017 |
| | | | Feed (ipm) | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | |
| ≤ 475 Bhn or ≤ 50 HRc | 40 | RPM | 9779 | 4890 | 2445 | 1222 | 611 | 407 | 306 | | |
| | (32-48) | Fr | 0.00005 | 0.0001 | 0.0002 | 0.0004 | 0.0008 | 0.0012 | 0.0016 | | |
| | Feed (ipm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | | | |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 280 | RPM | 68454 | 34227 | 17114 | 8557 | 4278 | 2852 | 2139 |
| | | | (224-336) | Fr | 0.00026 | 0.0005 | 0.0010 | 0.0020 | 0.0041 | 0.0061 | 0.0082 |
| | | | Feed (ipm) | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | 17.5 | |
| | | ≤ 330 Bhn or ≤ 36 HRc | 250 | RPM | 61120 | 30560 | 15280 | 7640 | 3820 | 2547 | 1910 |
| | | | (200-300) | Fr | 0.00025 | 0.0005 | 0.0010 | 0.0020 | 0.0041 | 0.0061 | 0.0081 |
| | | | Feed (ipm) | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | ≤ 250 Bhn or ≤ 24 HRc | 210 | RPM | 51341 | 25670 | 12835 | 6418 | 3209 | 2139 | 1604 |
| | | | (168-252) | Fr | 0.00015 | 0.0003 | 0.0006 | 0.0012 | 0.0024 | 0.0036 | 0.0048 |
| | | | Feed (ipm) | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | 7.7 | |
| | | ≤ 330 Bhn or ≤ 36 HRc | 110 | RPM | 26893 | 13446 | 6723 | 3362 | 1681 | 1121 | 840 |
| | | | (88-132) | Fr | 0.00009 | 0.0002 | 0.0004 | 0.0007 | 0.0015 | 0.0022 | 0.0030 |
| | | | Feed (ipm) | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | |
| STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 65 | RPM | 15891 | 7946 | 3973 | 1986 | 993 | 662 | 497 | |
| | | (52-78) | Fr | 0.00010 | 0.0002 | 0.0005 | 0.0009 | 0.0018 | 0.0025 | 0.0035 | |
| | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | | |
| | ≤ 375 Bhn or ≤ 40 HRc | 55 | RPM | 13446 | 6723 | 3362 | 1681 | 840 | 560 | 420 | |
| | | (44-66) | Fr | 0.00010 | 0.0002 | 0.0004 | 0.0008 | 0.0015 | 0.0023 | 0.0031 | |
| | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | | |

continued on next page

FRACTIONAL 2 Flute Drills

| Series | 101 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | |
|-----------------------------|---|-----------------------------|---|-----------------------------------|-----------|------------|---------|--------|--------|--------|--------|--------|--------|
| | | | | 1/64 | 1/32 | 1/16 | 1/8 | 1/4 | 3/8 | 1/2 | | | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy | ≤ 220 Bhn or ≤ 19 HRc | 40 | RPM | 9779 | 4890 | 2445 | 1222 | 611 | 407 | 306 | | |
| | | | (32-48) | Fr | 0.00010 | 0.0002 | 0.0004 | 0.0008 | 0.0016 | 0.0025 | 0.0033 | | |
| | | | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | | |
| | | ≤ 320 Bhn or ≤ 34 HRc | 25 | RPM | 6112 | 3056 | 1528 | 764 | 382 | 255 | 191 | | |
| | | | (20-30) | Fr | 0.00010 | 0.0002 | 0.0004 | 0.0008 | 0.0016 | 0.0024 | 0.0031 | | |
| | | | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | | |
| | | ≤ 425 Bhn or ≤ 45 HRc | 20 | RPM | 4890 | 2445 | 1222 | 611 | 306 | 204 | 153 | | |
| | | | (16-24) | Fr | 0.00004 | 0.0001 | 0.0002 | 0.0003 | 0.0007 | 0.0010 | 0.0013 | | |
| | | | | Feed (ipm) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | | |
| | | S | TITANIUM ALLOYS (DIFFICULT) Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 85 | RPM | 20781 | 10390 | 5195 | 2598 | 1299 | 866 | 649 |
| | | | | | (68-102) | Fr | 0.00020 | 0.0004 | 0.0008 | 0.0016 | 0.0032 | 0.0049 | 0.0065 |
| | | | | | | Feed (ipm) | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 | 4.2 |
| ≤ 350 Bhn or ≤ 38 HRc | 65 | | | RPM | 15891 | 7946 | 3973 | 1986 | 993 | 662 | 497 | | |
| | (52-78) | | | Fr | 0.00011 | 0.0002 | 0.0004 | 0.0009 | 0.0017 | 0.0026 | 0.0034 | | |
| | | | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | | |
| ≤ 440 Bhn or ≤ 47 HRc | 55 | | | RPM | 13446 | 6723 | 3362 | 1681 | 840 | 560 | 420 | | |
| | (44-66) | | | Fr | 0.00010 | 0.0002 | 0.0004 | 0.0008 | 0.0015 | 0.0023 | 0.0031 | | |
| | | | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | | |
| N | ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | | ≤ 80 Bhn or ≤ 47 HRb | 540 | RPM | 132019 | 66010 | 33005 | 16502 | 8251 | 5501 | 4126 |
| | | | | | (432-648) | Fr | 0.00030 | 0.0006 | 0.0012 | 0.0024 | 0.0048 | 0.0073 | 0.0097 |
| | | | | | | Feed (ipm) | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 455 | RPM | 111238 | 55619 | 27810 | 13905 | 6952 | 4635 | 3476 | | |
| | | | (364-546) | Fr | 0.00031 | 0.0006 | 0.0013 | 0.0025 | 0.0050 | 0.0076 | 0.0101 | | |
| | | | | Feed (ipm) | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | 35.0 | | |
| | | ≤ 140 Bhn or ≤ 3 HRc | 190 | RPM | 46451 | 23226 | 11613 | 5806 | 2903 | 1935 | 1452 | | |
| | | | (152-228) | Fr | 0.00015 | 0.0003 | 0.0006 | 0.0012 | 0.0024 | 0.0036 | 0.0048 | | |
| | | | | Feed (ipm) | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | 7.0 | | |
| | | ≤ 200 Bhn or ≤ 23 HRc | 175 | RPM | 42784 | 21392 | 10696 | 5348 | 2674 | 1783 | 1337 | | |
| | | | (140-210) | Fr | 0.00015 | 0.0003 | 0.0006 | 0.0012 | 0.0024 | 0.0036 | 0.0048 | | |
| | | | | Feed (ipm) | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | | |
| N | PLASTICS Polycarbonate, PVC | 500 (400-600) | 500 | RPM | 122240 | 61120 | 30560 | 15280 | 7640 | 5093 | 3820 | | |
| | | | Fr | 0.00031 | 0.0006 | 0.0012 | 0.0025 | 0.0050 | 0.0075 | 0.0099 | | | |
| | | | Feed (ipm) | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | 38.0 | | | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

$rpm = Vc \times 3.82 / D_1$

$ipm = Fr \times rpm$

reduce speed and feed 30 percent when using uncoated drills

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

2 Flute Drills

Short Length Self Centering Drills • DIN 6539

| Series 101M, 108M Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|--|---|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|
| | | | 1 | 3 | 6 | 8 | 10 | 12 | 16 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 81 (65-97) | RPM | 25690 | 8563 | 4282 | 3211 | 2569 | 2141 | 1606 | |
| | | | Fr | 0.014 | 0.041 | 0.082 | 0.109 | 0.136 | 0.163 | 0.218 | |
| | | | Feed (mm/min) | 350 | 350 | 350 | 350 | 350 | 350 | 350 | |
| | ≤ 300 Bhn or ≤ 32 HRc | 38 (30-46) | RPM | 12118 | 4039 | 2020 | 1515 | 1212 | 1010 | 757 | |
| | | | Fr | 0.012 | 0.036 | 0.072 | 0.096 | 0.120 | 0.144 | 0.191 | |
| | | | Feed (mm/min) | 145 | 145 | 145 | 145 | 145 | 145 | 145 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 26 (21-31) | RPM | 8240 | 2747 | 1373 | 1030 | 824 | 687 | 515 | |
| | | | Fr | 0.007 | 0.020 | 0.040 | 0.053 | 0.067 | 0.080 | 0.107 | |
| | | | Feed (mm/min) | 55 | 55 | 55 | 55 | 55 | 55 | 55 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 70 (56-84) | RPM | 22297 | 7432 | 3716 | 2787 | 2230 | 1858 | 1394 |
| | | | | Fr | 0.012 | 0.036 | 0.073 | 0.097 | 0.121 | 0.145 | 0.194 |
| | | | | Feed (mm/min) | 270 | 270 | 270 | 270 | 270 | 270 | 270 |
| ≤ 375 Bhn or ≤ 40 HRc | | 44 (35-53) | RPM | 14057 | 4686 | 2343 | 1757 | 1406 | 1171 | 879 | |
| | | | Fr | 0.012 | 0.036 | 0.073 | 0.097 | 0.121 | 0.145 | 0.194 | |
| | | | Feed (mm/min) | 170 | 170 | 170 | 170 | 170 | 170 | 170 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 18 (15-22) | RPM | 5816 | 1939 | 969 | 727 | 582 | 485 | 364 | |
| | | | Fr | 0.005 | 0.015 | 0.030 | 0.040 | 0.050 | 0.060 | 0.080 | |
| | | | Feed (mm/min) | 29 | 29 | 29 | 29 | 29 | 29 | 29 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 250 Bhn or ≤ 24 HRc | 26 (21-31) | RPM | 8240 | 2747 | 1373 | 1030 | 824 | 687 | 515 |
| | | | | Fr | 0.007 | 0.020 | 0.040 | 0.053 | 0.067 | 0.080 | 0.107 |
| | | | | Feed (mm/min) | 55 | 55 | 55 | 55 | 55 | 55 | 55 |
| | ≤ 375 Bhn or ≤ 40 HRc | 17 (13-20) | RPM | 5332 | 1777 | 889 | 666 | 533 | 444 | 333 | |
| | | | Fr | 0.003 | 0.010 | 0.020 | 0.027 | 0.034 | 0.041 | 0.054 | |
| | | | Feed (mm/min) | 18 | 18 | 18 | 18 | 18 | 18 | 18 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 12 (10-15) | RPM | 3878 | 1293 | 646 | 485 | 388 | 323 | 242 | |
| | | | Fr | 0.003 | 0.009 | 0.019 | 0.025 | 0.031 | 0.037 | 0.050 | |
| | | | Feed (mm/min) | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| | M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 85 (68-102) | RPM | 27144 | 9048 | 4524 | 3393 | 2714 | 2262 | 1696 |
| | | | | Fr | 0.016 | 0.049 | 0.097 | 0.130 | 0.162 | 0.195 | 0.259 |
| | | | | Feed (mm/min) | 440 | 440 | 440 | 440 | 440 | 440 | 440 |
| ≤ 330 Bhn or ≤ 36 HRc | | 76 (61-91) | RPM | 24235 | 8078 | 4039 | 3029 | 2424 | 2020 | 1515 | |
| | | | Fr | 0.017 | 0.050 | 0.099 | 0.132 | 0.165 | 0.198 | 0.264 | |
| | | | Feed (mm/min) | 400 | 400 | 400 | 400 | 400 | 400 | 400 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | ≤ 250 Bhn or ≤ 24 HRc | 64 (51-77) | RPM | 20358 | 6786 | 3393 | 2545 | 2036 | 1696 | 1272 | |
| | | | Fr | 0.010 | 0.029 | 0.059 | 0.079 | 0.098 | 0.118 | 0.157 | |
| | | | Feed (mm/min) | 200 | 200 | 200 | 200 | 200 | 200 | 200 | |
| | ≤ 330 Bhn or ≤ 36 HRc | 34 (27-40) | RPM | 10664 | 3555 | 1777 | 1333 | 1066 | 889 | 666 | |
| | | | Fr | 0.006 | 0.017 | 0.034 | 0.045 | 0.056 | 0.068 | 0.090 | |
| | | | Feed (mm/min) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 20 (16-24) | RPM | 6301 | 2100 | 1050 | 788 | 630 | 525 | 394 |
| | | | | Fr | 0.007 | 0.021 | 0.043 | 0.057 | 0.071 | 0.086 | 0.114 |
| | | | | Feed (mm/min) | 45 | 45 | 45 | 45 | 45 | 45 | 45 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 17 (13-20) | RPM | 5332 | 1777 | 889 | 666 | 533 | 444 | 333 |
| | | | | Fr | 0.007 | 0.020 | 0.039 | 0.053 | 0.066 | 0.079 | 0.105 |
| | | | | Feed (mm/min) | 35 | 35 | 35 | 35 | 35 | 35 | 35 |

continued on next page

2 Flute Drills

Short Length Self Centering Drills • DIN 6539

| Series 101M, 108M Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|---|---|----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|
| | | | 1 | 3 | 6 | 8 | 10 | 12 | 16 | | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy | ≤ 220 Bhn or ≤ 19 HRc | 12 (10-15) | RPM | 3878 | 1293 | 646 | 485 | 388 | 323 | 242 | |
| | | | Fr | 0.006 | 0.019 | 0.039 | 0.052 | 0.064 | 0.077 | 0.103 | |
| | | | Feed (mm/min) | 25 | 25 | 25 | 25 | 25 | 25 | 25 | |
| | ≤ 320 Bhn or ≤ 34 HRc | 8 (6-9) | RPM | 2424 | 808 | 404 | 303 | 242 | 202 | 151 | |
| | | | Fr | 0.006 | 0.019 | 0.037 | 0.050 | 0.062 | 0.074 | 0.099 | |
| | | | Feed (mm/min) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 6 (5-7) | RPM | 1939 | 646 | 323 | 242 | 194 | 162 | 121 | |
| | | | Fr | 0.005 | 0.015 | 0.031 | 0.041 | 0.052 | 0.062 | 0.083 | |
| | | | Feed (mm/min) | 10 | 10 | 10 | 10 | 10 | 10 | 10 | |
| S TITANIUM ALLOYS (DIFFICULT) Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 26 (21-31) | RPM | 8240 | 2747 | 1373 | 1030 | 824 | 687 | 515 | |
| | | | Fr | 0.013 | 0.040 | 0.080 | 0.107 | 0.133 | 0.160 | 0.214 | |
| | | | Feed (mm/min) | 110 | 110 | 110 | 110 | 110 | 110 | 110 | |
| | ≤ 350 Bhn or ≤ 38 HRc | 20 (16-24) | RPM | 6301 | 2100 | 1050 | 788 | 630 | 525 | 394 | |
| | | | Fr | 0.007 | 0.021 | 0.043 | 0.057 | 0.071 | 0.086 | 0.114 | |
| | | | Feed (mm/min) | 45 | 45 | 45 | 45 | 45 | 45 | 45 | |
| | ≤ 440 Bhn or ≤ 47 HRc | 17 (13-20) | RPM | 5332 | 1777 | 889 | 666 | 533 | 444 | 333 | |
| | | | Fr | 0.007 | 0.020 | 0.039 | 0.053 | 0.066 | 0.079 | 0.105 | |
| | | | Feed (mm/min) | 35 | 35 | 35 | 35 | 35 | 35 | 35 | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | ≤ 80 Bhn or ≤ 47 HRb | 165 (132-198) | RPM | 52348 | 17449 | 8725 | 6544 | 5235 | 4362 | 3272 | |
| | | | Fr | 0.020 | 0.060 | 0.120 | 0.160 | 0.200 | 0.240 | 0.319 | |
| | | | Feed (mm/min) | 1045 | 1045 | 1045 | 1045 | 1045 | 1045 | 1045 | |
| | ≤ 150 Bhn or ≤ 7 HRc | 139 (111-166) | RPM | 44108 | 14703 | 7351 | 5514 | 4411 | 3676 | 2757 | |
| | | | Fr | 0.020 | 0.060 | 0.120 | 0.160 | 0.200 | 0.239 | 0.319 | |
| | | | Feed (mm/min) | 880 | 880 | 880 | 880 | 880 | 880 | 880 | |
| | N COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 58 (46-69) | RPM | 18419 | 6140 | 3070 | 2302 | 1842 | 1535 | 1151 |
| | | | | Fr | 0.010 | 0.030 | 0.060 | 0.080 | 0.100 | 0.121 | 0.161 |
| | | | | Feed (mm/min) | 185 | 185 | 185 | 185 | 185 | 185 | 185 |
| ≤ 200 Bhn or ≤ 23 HRc | | 53 (43-64) | RPM | 16965 | 5655 | 2827 | 2121 | 1696 | 1414 | 1060 | |
| | | | Fr | 0.010 | 0.030 | 0.060 | 0.080 | 0.100 | 0.120 | 0.160 | |
| | | | Feed (mm/min) | 170 | 170 | 170 | 170 | 170 | 170 | 170 | |
| N PLASTICS Polycarbonate, PVC | 152 (122-183) | RPM | 48471 | 16157 | 8078 | 6059 | 4847 | 4039 | 3029 | | |
| | | Fr | 0.020 | 0.060 | 0.120 | 0.160 | 0.200 | 0.240 | 0.320 | | |
| | | Feed (mm/min) | 970 | 970 | 970 | 970 | 970 | 970 | 970 | | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fr \times rpm$
 reduce speed and feed 30 percent when using uncoated drills
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Straight Flute Drills • Metric: DIN 6539

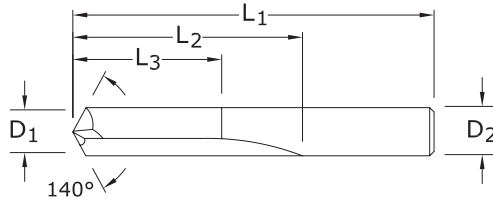


3xD



106

FRACTIONAL & METRIC SERIES



| CUTTING DIAMETER D ₁ /D ₂ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|--|----------------|---------------|----------------------------------|--------------------------------|----------------------------------|----------|---------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AITiN) |
| 1,0 mm | 0.0394 | | 26,0 | 6,0 | 4,5 | 66001 | 66002 |
| #60 | 0.0400 | 1.02 | 1-1/2 | 1/2 | 13/32 | 56060 | 56269 |
| #59 | 0.0410 | 1.04 | 1-1/2 | 1/2 | 13/32 | 56059 | 56268 |
| #58 | 0.0420 | 1.07 | 1-1/2 | 1/2 | 13/32 | 56058 | 56267 |
| #57 | 0.0430 | 1.09 | 1-1/2 | 1/2 | 13/32 | 56057 | 56266 |
| #56 | 0.0465 | 1.18 | 1-1/2 | 1/2 | 13/32 | 56056 | 56265 |
| 3/64 | 0.0469 | 1.19 | 1-1/2 | 1/2 | 13/32 | 56103 | 56135 |
| #55 | 0.0520 | 1.32 | 1-1/2 | 1/2 | 13/32 | 56055 | 56264 |
| #54 | 0.0550 | 1.40 | 1-1/2 | 1/2 | 13/32 | 56054 | 56263 |
| 1,5 mm | 0.0591 | | 32,0 | 9,0 | 7,0 | 66003 | 66004 |
| #53 | 0.0595 | 1.51 | 1-1/2 | 1/2 | 13/32 | 56053 | 56262 |
| 1/16 | 0.0625 | 1.59 | 1-1/2 | 5/8 | 1/2 | 56104 | 56136 |
| #52 | 0.0635 | 1.61 | 1-11/16 | 11/16 | 35/64 | 56052 | 56261 |
| #51 | 0.0670 | 1.70 | 1-11/16 | 11/16 | 35/64 | 56051 | 56260 |
| #50 | 0.0700 | 1.78 | 1-11/16 | 11/16 | 35/64 | 56050 | 56259 |
| #49 | 0.0730 | 1.85 | 1-11/16 | 11/16 | 35/64 | 56049 | 56258 |
| #48 | 0.0760 | 1.93 | 1-11/16 | 11/16 | 35/64 | 56048 | 56257 |
| 5/64 | 0.0781 | 1.98 | 1-11/16 | 11/16 | 35/64 | 56105 | 56137 |
| #47 | 0.0785 | 1.99 | 1-3/4 | 3/4 | 39/64 | 56047 | 56256 |
| 2,0 mm | 0.0787 | | 38,0 | 12,0 | 9,0 | 66005 | 66006 |
| #46 | 0.0810 | 2.06 | 1-3/4 | 3/4 | 39/64 | 56046 | 56255 |
| #45 | 0.0820 | 2.08 | 1-3/4 | 3/4 | 39/64 | 56045 | 56254 |
| #44 | 0.0860 | 2.18 | 1-3/4 | 3/4 | 39/64 | 56044 | 56253 |
| #43 | 0.0890 | 2.26 | 1-3/4 | 3/4 | 39/64 | 56043 | 56252 |
| #42 | 0.0935 | 2.37 | 1-3/4 | 3/4 | 39/64 | 56042 | 56251 |
| 3/32 | 0.0938 | 2.38 | 1-3/4 | 3/4 | 39/64 | 56106 | 56138 |
| #41 | 0.0960 | 2.44 | 1-13/16 | 13/16 | 21/32 | 56041 | 56250 |
| #40 | 0.0980 | 2.49 | 1-13/16 | 13/16 | 21/32 | 56040 | 56249 |
| 2,5 mm | 0.0984 | | 43,0 | 14,0 | 11,0 | 66007 | 66008 |
| #39 | 0.0995 | 2.53 | 1-13/16 | 13/16 | 21/32 | 56039 | 56248 |
| #38 | 0.1015 | 2.58 | 1-13/16 | 13/16 | 21/32 | 56038 | 56247 |
| #37 | 0.1040 | 2.64 | 1-13/16 | 13/16 | 21/32 | 56037 | 56246 |
| #36 | 0.1065 | 2.71 | 1-13/16 | 13/16 | 21/32 | 56036 | 56245 |
| 7/64 | 0.1094 | 2.78 | 1-13/16 | 13/16 | 21/32 | 56107 | 56139 |
| #35 | 0.1100 | 2.79 | 1-7/8 | 7/8 | 45/64 | 56035 | 56244 |
| #34 | 0.1110 | 2.82 | 1-7/8 | 7/8 | 45/64 | 56034 | 56243 |

TOLERANCES (inch)

D₁ = +.0000/- .0005
D₂ = h6

TOLERANCES (mm)

D₁ = +0,0000/-0,0127
D₂ = h6

- STEELS
- CAST IRON
- HARDENED STEELS

For patent information visit www.ksptpatents.com

continued on next page

Straight Flute Drills • Metric: DIN 6539

106

FRACTIONAL & METRIC SERIES

| CUTTING DIAMETER D ₁ /D ₂ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|---|-------------------|------------------|-------------------------------------|-----------------------------------|-------------------------------------|----------|------------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AITiN) |
| #33 | 0.1130 | 2.87 | 1-7/8 | 7/8 | 45/64 | 56033 | 56242 |
| #32 | 0.1160 | 2.95 | 1-7/8 | 7/8 | 45/64 | 56032 | 56241 |
| 3,0 mm | 0.1181 | | 46,0 | 16,0 | 12,0 | 66009 | 66010 |
| #31 | 0.1200 | 3.05 | 1-7/8 | 7/8 | 45/64 | 56031 | 56240 |
| 1/8 | 0.1250 | 3.18 | 1-7/8 | 7/8 | 45/64 | 56108 | 56140 |
| #30 | 0.1285 | 3.26 | 1-15/16 | 15/16 | 3/4 | 56030 | 56239 |
| #29 | 0.1360 | 3.45 | 1-15/16 | 15/16 | 3/4 | 56029 | 56238 |
| 3,5 mm | 0.1378 | | 52,0 | 20,0 | 15,0 | 66011 | 66012 |
| #28 | 0.1405 | 3.57 | 1-15/16 | 15/16 | 3/4 | 56028 | 56237 |
| 9/64 | 0.1406 | 3.57 | 1-15/16 | 15/16 | 3/4 | 56109 | 56141 |
| #27 | 0.1440 | 3.66 | 2-1/16 | 1 | 51/64 | 56027 | 56236 |
| #26 | 0.1470 | 3.73 | 2-1/16 | 1 | 51/64 | 56026 | 56235 |
| #25 | 0.1495 | 3.80 | 2-1/16 | 1 | 51/64 | 56025 | 56234 |
| #24 | 0.1520 | 3.86 | 2-1/16 | 1 | 51/64 | 56024 | 56233 |
| #23 | 0.1540 | 3.91 | 2-1/16 | 1 | 51/64 | 56023 | 56232 |
| 5/32 | 0.1562 | 3.97 | 2-1/16 | 1 | 51/64 | 56110 | 56142 |
| #22 | 0.1570 | 3.99 | 2-1/8 | 1-1/16 | 55/64 | 56022 | 56231 |
| 4,0 mm | 0.1575 | | 55,0 | 22,0 | 17,0 | 66013 | 66014 |
| #21 | 0.1590 | 4.04 | 2-1/8 | 1-1/16 | 55/64 | 56021 | 56230 |
| #20 | 0.1610 | 4.09 | 2-1/8 | 1-1/16 | 55/64 | 56020 | 56229 |
| #19 | 0.1660 | 4.22 | 2-1/8 | 1-1/16 | 55/64 | 56019 | 56228 |
| #18 | 0.1695 | 4.31 | 2-1/8 | 1-1/16 | 55/64 | 56018 | 56227 |
| 11/64 | 0.1719 | 4.37 | 2-1/8 | 1-1/16 | 55/64 | 56111 | 56143 |
| #17 | 0.1730 | 4.39 | 2-3/16 | 1-1/8 | 29/32 | 56017 | 56226 |
| #16 | 0.1770 | 4.50 | 2-3/16 | 1-1/8 | 29/32 | 56016 | 56225 |
| 4,5 mm | 0.1772 | | 58,0 | 24,0 | 18,0 | 66015 | 66016 |
| #15 | 0.1800 | 4.57 | 2-3/16 | 1-1/8 | 29/32 | 56015 | 56224 |
| #14 | 0.1820 | 4.62 | 2-3/16 | 1-1/8 | 29/32 | 56014 | 56223 |
| #13 | 0.1850 | 4.70 | 2-3/16 | 1-1/8 | 29/32 | 56013 | 56222 |
| 3/16 | 0.1875 | 4.76 | 2-3/16 | 1-1/8 | 29/32 | 56112 | 56144 |
| #12 | 0.1890 | 4.80 | 2-3/16 | 1-1/8 | 29/32 | 56012 | 56221 |
| #11 | 0.1910 | 4.85 | 2-3/16 | 1-1/8 | 29/32 | 56011 | 56220 |
| #10 | 0.1935 | 4.91 | 2-3/16 | 1-1/8 | 29/32 | 56010 | 56219 |
| #9 | 0.1960 | 4.98 | 2-1/4 | 1-3/16 | 61/64 | 56009 | 56218 |
| 5,0 mm | 0.1969 | | 62,0 | 26,0 | 20,0 | 66017 | 66018 |
| #8 | 0.1990 | 5.05 | 2-1/4 | 1-3/16 | 61/64 | 56008 | 56217 |
| #7 | 0.2010 | 5.11 | 2-1/4 | 1-3/16 | 61/64 | 56007 | 56216 |
| 13/64 | 0.2031 | 5.16 | 2-1/4 | 1-3/16 | 61/64 | 56113 | 56145 |
| #6 | 0.2040 | 5.18 | 2-3/8 | 1-1/4 | 1 | 56006 | 56215 |
| #5 | 0.2055 | 5.22 | 2-3/8 | 1-1/4 | 1 | 56005 | 56214 |
| #4 | 0.2090 | 5.31 | 2-3/8 | 1-1/4 | 1 | 56004 | 56213 |
| #3 | 0.2130 | 5.41 | 2-3/8 | 1-1/4 | 1 | 56003 | 56212 |
| 5,5 mm | 0.2165 | | 66,0 | 28,0 | 21,0 | 66019 | 66020 |
| 7/32 | 0.2188 | 5.56 | 2-3/8 | 1-1/4 | 1 | 56114 | 56146 |
| #2 | 0.2210 | 5.61 | 2-7/16 | 1-5/16 | 1-3/64 | 56002 | 56211 |
| #1 | 0.2280 | 5.79 | 2-7/16 | 1-5/16 | 1-3/64 | 56001 | 56210 |

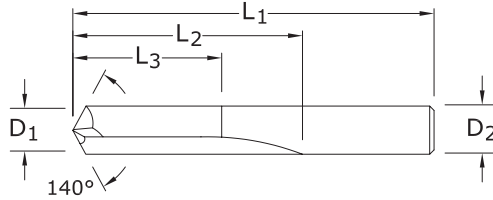
continued on next page

CONTINUED

Straight Flute Drills • Metric: DIN 6539



3xD



106

FRACTIONAL & METRIC SERIES

| CUTTING DIAMETER D ₁ /D ₂ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|--|----------------|---------------|----------------------------------|--------------------------------|----------------------------------|----------|---------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AlTiN) |
| 15/64 | 0.2344 | 5.95 | 2-7/16 | 1-5/16 | 1-3/64 | 56115 | 56147 |
| 6,0 mm | 0.2362 | | 66,0 | 28,0 | 21,0 | 66021 | 66045 |
| 1/4 | 0.2500 | 6.35 | 2-1/2 | 1-3/8 | 1-7/64 | 56116 | 56148 |
| 6,5 mm | 0.2559 | | 70,0 | 31,0 | 23,0 | 66022 | 66046 |
| 17/64 | 0.2656 | 6.75 | 2-5/8 | 1-7/16 | 1-7/64 | 56117 | 56149 |
| 7,0 mm | 0.2756 | | 74,0 | 34,0 | 25,0 | 66023 | 66024 |
| 9/32 | 0.2812 | 7.14 | 2-11/16 | 1-1/2 | 1-13/64 | 56118 | 56150 |
| 7,5 mm | 0.2953 | | 74,0 | 34,0 | 25,0 | 66025 | 66026 |
| 19/64 | 0.2969 | 7.54 | 2-3/4 | 1-9/16 | 1-1/4 | 56119 | 56151 |
| 5/16 | 0.3125 | 7.94 | 2-13/16 | 1-5/8 | 1-19/64 | 56120 | 56152 |
| 8,0 mm | 0.3150 | | 79,0 | 37,0 | 27,0 | 66027 | 66028 |
| 21/64 | 0.3281 | 8.33 | 2-15/16 | 1-11/16 | 1-23/64 | 56121 | 56153 |
| 8,5 mm | 0.3346 | | 79,0 | 37,0 | 27,0 | 66029 | 66030 |
| 11/32 | 0.3438 | 8.73 | 3 | 1-11/16 | 1-23/64 | 56122 | 56154 |
| 9,0 mm | 0.3543 | | 84,0 | 40,0 | 29,0 | 66031 | 66032 |
| 23/64 | 0.3594 | 9.13 | 3-1/16 | 1-3/4 | 1-13/32 | 56123 | 56155 |
| 9,5 mm | 0.3740 | | 84,0 | 40,0 | 29,0 | 66033 | 66034 |
| 3/8 | 0.3750 | 9.53 | 3-1/8 | 1-13/16 | 1-29/64 | 56124 | 56156 |
| 25/64 | 0.3906 | 9.92 | 3-1/4 | 1-7/8 | 1-1/2 | 56125 | 56157 |
| 10,0 mm | 0.3937 | | 89,0 | 43,0 | 31,0 | 66035 | 66036 |
| 13/32 | 0.4062 | 10.32 | 3-5/16 | 1-15/16 | 1-35/64 | 56126 | 56158 |
| 10,5 mm | 0.4134 | | 89,0 | 43,0 | 31,0 | 66037 | 66038 |
| 27/64 | 0.4219 | 10.72 | 3-3/8 | 2 | 1-39/64 | 56127 | 56159 |
| 11,0 mm | 0.4331 | | 95,0 | 47,0 | 33,0 | 66039 | 66040 |
| 7/16 | 0.4375 | 11.11 | 3-7/16 | 2-1/16 | 1-21/32 | 56128 | 56160 |
| 11,5 mm | 0.4528 | | 95,0 | 47,0 | 33,0 | 66041 | 66042 |
| 29/64 | 0.4531 | 11.51 | 3-9/16 | 2-1/8 | 1-45/64 | 56129 | 56161 |
| 15/32 | 0.4688 | 11.91 | 3-5/8 | 2-1/8 | 1-45/64 | 56130 | 56162 |
| 12,0 mm | 0.4724 | | 102,0 | 51,0 | 35,0 | 66043 | 66044 |
| 31/64 | 0.4844 | 12.30 | 3-11/16 | 2-3/16 | 1-3/4 | 56131 | 56163 |
| 1/2 | 0.5000 | 12.70 | 3-3/4 | 2-1/4 | 1-51/64 | 56132 | 56164 |

TOLERANCES (inch)

D₁ = +.0000/-0.0005
D₂ = h6

TOLERANCES (mm)

D₁ = +0,0000/-0,0127
D₂ = h6

STEELS

CAST IRON

HARDENED STEELS

For patent information visit www.ksptpatents.com

FRACTIONAL & METRIC
Straight Flute Drills

| Series 106 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | |
|--|-----------------------------|------------------|--------------------------------------|--------|--------|--------|--------|--------|--------|
| | | | 1/16 | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | |
| P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 500 Bhn or ≤ 52 HRc | 60 (48-72) | RPM | 3667 | 1834 | 1222 | 917 | 611 | 458 |
| | | | Fr | 0.0004 | 0.0007 | 0.0011 | 0.0014 | 0.0021 | 0.0028 |
| | | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| | ≤ 615 Bhn or ≤ 58 HRc | 50 (40-60) | RPM | 3056 | 1528 | 1019 | 764 | 509 | 382 |
| | | | Fr | 0.0004 | 0.0008 | 0.0012 | 0.0016 | 0.0024 | 0.0031 |
| | | | Feed (ipm) | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 500 Bhn or ≤ 52 HRc | 60 (48-72) | RPM | 3667 | 1834 | 1222 | 917 | 611 | 458 |
| | | | Fr | 0.0004 | 0.0007 | 0.0011 | 0.0014 | 0.0021 | 0.0028 |
| | | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| | ≤ 615 Bhn or ≤ 58 HRc | 50 (40-60) | RPM | 3056 | 1528 | 1019 | 764 | 509 | 382 |
| | | | Fr | 0.0004 | 0.0008 | 0.0012 | 0.0016 | 0.0024 | 0.0031 |
| | | | Feed (ipm) | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 |
| K CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 250 (200-300) | RPM | 15280 | 7640 | 5093 | 3820 | 2547 | 1910 |
| | | | Fr | 0.0010 | 0.0020 | 0.0030 | 0.0041 | 0.0061 | 0.0081 |
| | | | Feed (ipm) | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 |
| | ≤ 330 Bhn or ≤ 36 HRc | 195 (156-234) | RPM | 11918 | 5959 | 3973 | 2980 | 1986 | 1490 |
| | | | Fr | 0.0010 | 0.0020 | 0.0030 | 0.0040 | 0.0060 | 0.0081 |
| | | | Feed (ipm) | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 | 12.0 |

Bhn (Brinell) HRc (Rockwell C)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fr \times rpm$
 reduce speed and feed 30 percent when using uncoated drills
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

| Series 106M Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | |
|--|-----------------------------|---------------|------------------------------------|-------|-------|-------|-------|-------|-------|
| | | | 1 | 3 | 6 | 8 | 10 | 12 | |
| P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 500 Bhn or ≤ 52 HRc | 18 (15-22) | RPM | 5816 | 1939 | 969 | 727 | 582 | 485 |
| | | | Fr | 0.006 | 0.018 | 0.035 | 0.047 | 0.058 | 0.070 |
| | | | Feed (mm/min) | 34 | 34 | 34 | 34 | 34 | 34 |
| | ≤ 615 Bhn or ≤ 58 HRc | 15 (12-18) | RPM | 4847 | 1616 | 808 | 606 | 485 | 404 |
| | | | Fr | 0.006 | 0.017 | 0.033 | 0.045 | 0.056 | 0.067 |
| | | | Feed (mm/min) | 27 | 27 | 27 | 27 | 27 | 27 |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 500 Bhn or ≤ 52 HRc | 18 (15-22) | RPM | 5816 | 1939 | 969 | 727 | 582 | 485 |
| | | | Fr | 0.006 | 0.018 | 0.035 | 0.047 | 0.058 | 0.070 |
| | | | Feed (mm/min) | 34 | 34 | 34 | 34 | 34 | 34 |
| | ≤ 615 Bhn or ≤ 58 HRc | 15 (12-18) | RPM | 4847 | 1616 | 808 | 606 | 485 | 404 |
| | | | Fr | 0.006 | 0.017 | 0.033 | 0.045 | 0.056 | 0.067 |
| | | | Feed (mm/min) | 27 | 27 | 27 | 27 | 27 | 27 |
| K CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 76 (61-91) | RPM | 24235 | 8078 | 4039 | 3029 | 2424 | 2020 |
| | | | Fr | 0.016 | 0.048 | 0.096 | 0.128 | 0.160 | 0.192 |
| | | | Feed (mm/min) | 395 | 395 | 395 | 395 | 395 | 395 |
| | ≤ 330 Bhn or ≤ 36 HRc | 59 (48-71) | RPM | 18904 | 6301 | 3151 | 2363 | 1890 | 1575 |
| | | | Fr | 0.016 | 0.048 | 0.096 | 0.128 | 0.160 | 0.192 |
| | | | Feed (mm/min) | 305 | 305 | 305 | 305 | 305 | 305 |

Bhn (Brinell) HRc (Rockwell C)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fr \times rpm$
 reduce speed and feed 30 percent when using uncoated drills
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

3 Flute Drills • Metric: DIN 6539

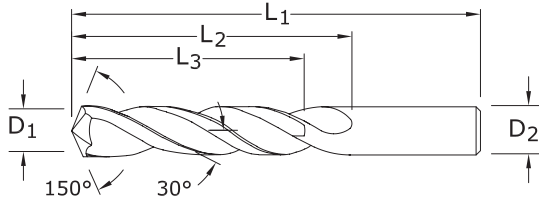


3xD
(mm)

5xD
(inch)



3



103

FRACTIONAL & METRIC SERIES

| CUTTING DIAMETER D ₁ /D ₂ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|--|----------------|---------------|----------------------------------|--------------------------------|----------------------------------|----------|---------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AITiN) |
| #36 | 0.1065 | 2.71 | 2-1/4 | 1-1/4 | 1 | 53036 | 58011 |
| 7/64 | 0.1094 | 2.78 | 2-1/4 | 1-1/4 | 1 | 53107 | 58012 |
| #35 | 0.1100 | 2.79 | 2-1/4 | 1-1/4 | 1 | 53035 | 58013 |
| #34 | 0.1110 | 2.82 | 2-1/4 | 1-1/4 | 1 | 53034 | 58014 |
| #33 | 0.1130 | 2.87 | 2-1/4 | 1-1/4 | 1 | 53033 | 58015 |
| #32 | 0.1160 | 2.95 | 2-1/4 | 1-1/4 | 1 | 53032 | 58016 |
| 3,0 mm | 0.1181 | | 46,0 | 16,0 | 12,0 | 63000 | 68965 |
| #31 | 0.1200 | 3.05 | 2-1/4 | 1-1/4 | 1 | 53031 | 58017 |
| 3,1 mm | 0.1220 | | 49,0 | 18,0 | 14,0 | 63044 | 68966 |
| 1/8 | 0.1250 | 3.18 | 2-1/4 | 1-1/4 | 1 | 53108 | 58018 |
| 3,2 mm | 0.1260 | | 49,0 | 18,0 | 14,0 | 63045 | 68967 |
| #30 | 0.1285 | 3.26 | 2-1/4 | 1-1/4 | 1 | 53030 | 58019 |
| 3,3 mm | 0.1299 | | 49,0 | 18,0 | 14,0 | 63001 | 68968 |
| 3,4 mm | 0.1339 | | 52,0 | 20,0 | 15,0 | 63046 | 68969 |
| #29 | 0.1360 | 3.45 | 2-1/2 | 1-3/8 | 1-7/64 | 53029 | 58020 |
| 3,5 mm | 0.1378 | | 52,0 | 20,0 | 15,0 | 63002 | 68970 |
| #28 | 0.1405 | 3.57 | 2-1/2 | 1-3/8 | 1-7/64 | 53028 | 58021 |
| 9/64 | 0.1406 | 3.57 | 2-1/2 | 1-3/8 | 1-7/64 | 53109 | 58022 |
| 3,6 mm | 0.1417 | | 52,0 | 20,0 | 15,0 | 63047 | 68971 |
| #27 | 0.1440 | 3.66 | 2-1/2 | 1-3/8 | 1-7/64 | 53027 | 58023 |
| 3,7 mm | 0.1457 | | 52,0 | 20,0 | 15,0 | 63003 | 68972 |
| #26 | 0.1470 | 3.73 | 2-1/2 | 1-3/8 | 1-7/64 | 53026 | 58024 |
| #25 | 0.1495 | 3.80 | 2-1/2 | 1-3/8 | 1-7/64 | 53025 | 58025 |
| 3,8 mm | 0.1496 | | 55,0 | 22,0 | 17,0 | 63048 | 68973 |
| #24 | 0.1520 | 3.86 | 2-1/2 | 1-3/8 | 1-7/64 | 53024 | 58026 |
| 3,9 mm | 0.1535 | | 55,0 | 22,0 | 17,0 | 63049 | 68974 |
| #23 | 0.1540 | 3.91 | 2-1/2 | 1-3/8 | 1-7/64 | 53023 | 58027 |
| 5/32 | 0.1562 | 3.97 | 2-1/2 | 1-3/8 | 1-7/64 | 53110 | 58028 |
| #22 | 0.1570 | 3.99 | 2-1/2 | 1-3/8 | 1-7/64 | 53022 | 58029 |
| 4,0 mm | 0.1575 | | 55,0 | 22,0 | 17,0 | 63004 | 68975 |
| #21 | 0.1590 | 4.04 | 2-1/2 | 1-3/8 | 1-7/64 | 53021 | 58030 |
| #20 | 0.1610 | 4.09 | 2-1/2 | 1-3/8 | 1-7/64 | 53020 | 58031 |
| 4,1 mm | 0.1614 | | 55,0 | 22,0 | 17,0 | 63050 | 68976 |
| 4,2 mm | 0.1654 | | 55,0 | 22,0 | 17,0 | 63005 | 68977 |
| #19 | 0.1660 | 4.22 | 2-3/4 | 1-5/8 | 1-19/64 | 53019 | 58032 |
| 4,3 mm | 0.1693 | | 58,0 | 24,0 | 18,0 | 63051 | 68978 |
| #18 | 0.1695 | 4.31 | 2-3/4 | 1-5/8 | 1-19/64 | 53018 | 58033 |
| 11/64 | 0.1719 | 4.37 | 2-3/4 | 1-5/8 | 1-19/64 | 53111 | 58034 |
| #17 | 0.1730 | 4.39 | 2-3/4 | 1-5/8 | 1-19/64 | 53017 | 58035 |
| 4,4 mm | 0.1732 | | 58,0 | 24,0 | 18,0 | 63052 | 68979 |

TOLERANCES (inch)

D₁ = +.0000/- .0005
D₂ = h6

TOLERANCES (mm)

D₁ = +0,0000/-0,0127
D₂ = h6

- STEELS
- CAST IRON
- HARDENED STEELS
- NON-FERROUS

For patent information visit www.ksptpatents.com

continued on next page

3 Flute Drills • Metric: DIN 6539

103

FRACTIONAL & METRIC SERIES

CONTINUED

| CUTTING DIAMETER D ₁ /D ₂ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|---|-------------------|------------------|-------------------------------------|-----------------------------------|-------------------------------------|----------|------------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AlTiN) |
| #16 | 0.1770 | 4.50 | 2-3/4 | 1-5/8 | 1-19/64 | 53016 | 58036 |
| 4,5 mm | 0.1772 | | 58,0 | 24,0 | 18,0 | 63006 | 68980 |
| #15 | 0.1800 | 4.57 | 2-3/4 | 1-5/18 | 1-19/64 | 53015 | 58037 |
| 4,6 mm | 0.1811 | | 58,0 | 24,0 | 18,0 | 63053 | 68981 |
| #14 | 0.1820 | 4.62 | 2-3/4 | 1-5/8 | 1-19/64 | 53014 | 58038 |
| #13 | 0.1850 | 4.70 | 2-3/4 | 1-5/8 | 1-19/64 | 53013 | 58039 |
| 4,7 mm | 0.1850 | | 58,0 | 24,0 | 18,0 | 63054 | 68982 |
| 3/16 | 0.1875 | 4.76 | 2-3/4 | 1-5/8 | 1-19/64 | 53112 | 58040 |
| #12 | 0.1890 | 4.80 | 2-3/4 | 1-5/8 | 1-19/64 | 53012 | 58041 |
| 4,8 mm | 0.1890 | | 62,0 | 26,0 | 20,0 | 63055 | 68983 |
| #11 | 0.1910 | 4.85 | 2-3/4 | 1-5/8 | 1-19/64 | 53011 | 58042 |
| 4,9 mm | 0.1929 | | 62,0 | 26,0 | 20,0 | 63056 | 68984 |
| #10 | 0.1935 | 4.91 | 2-3/4 | 1-5/8 | 1-19/64 | 53010 | 58043 |
| #9 | 0.1960 | 4.98 | 3 | 1-3/4 | 1-13/32 | 53009 | 58044 |
| 5,0 mm | 0.1969 | | 62,0 | 26,0 | 20,0 | 63007 | 68985 |
| #8 | 0.1990 | 5.05 | 3 | 1-3/4 | 1-13/32 | 53008 | 58045 |
| 5,1 mm | 0.2008 | | 62,0 | 26,0 | 20,0 | 63057 | 68986 |
| #7 | 0.2010 | 5.11 | 3 | 1-3/4 | 1-13/32 | 53007 | 58046 |
| 13/64 | 0.2031 | 5.16 | 3 | 1-3/4 | 1-13/32 | 53113 | 58047 |
| #6 | 0.2040 | 5.18 | 3 | 1-3/4 | 1-13/32 | 53006 | 58048 |
| 5,2 mm | 0.2047 | | 62,0 | 26,0 | 20,0 | 63008 | 68987 |
| #5 | 0.2055 | 5.22 | 3 | 1-3/4 | 1-13/32 | 53005 | 58049 |
| 5,3 mm | 0.2087 | | 62,0 | 26,0 | 20,0 | 63058 | 68988 |
| #4 | 0.2090 | 5.31 | 3 | 1-3/4 | 1-13/32 | 53004 | 58050 |
| 5,4 mm | 0.2126 | | 66,0 | 28,0 | 21,0 | 63059 | 68989 |
| #3 | 0.2130 | 5.41 | 3 | 1-3/4 | 1-13/32 | 53003 | 58051 |
| 5,5 mm | 0.2165 | | 66,0 | 28,0 | 21,0 | 63009 | 68990 |
| 7/32 | 0.2188 | 5.56 | 3 | 1-3/4 | 1-13/32 | 53114 | 58052 |
| 5,6 mm | 0.2205 | | 66,0 | 28,0 | 21,0 | 63060 | 68991 |
| #2 | 0.2210 | 5.61 | 3 | 1-3/4 | 1-13/32 | 53002 | 58053 |
| 5,7 mm | 0.2244 | | 66,0 | 28,0 | 21,0 | 63061 | 68992 |
| #1 | 0.2280 | 5.79 | 3 | 1-3/4 | 1-13/32 | 53001 | 58054 |
| 5,8 mm | 0.2283 | | 66,0 | 28,0 | 21,0 | 63062 | 68993 |
| 5,9 mm | 0.2323 | | 66,0 | 28,0 | 21,0 | 63063 | 68994 |
| A | 0.2340 | 5.94 | 3-1/4 | 2 | 1-39/64 | 53201 | 58055 |
| 15/64 | 0.2344 | 5.95 | 3-1/4 | 2 | 1-39/64 | 53115 | 58056 |
| 6,0 mm | 0.2362 | | 66,0 | 28,0 | 21,0 | 63010 | 68995 |
| B | 0.2380 | 6.05 | 3-1/4 | 2 | 1-39/64 | 53202 | 58057 |
| 6,1 mm | 0.2402 | | 70,0 | 31,0 | 23,0 | 63064 | 68996 |
| C | 0.2420 | 6.15 | 3-1/4 | 2 | 1-39/64 | 53203 | 58058 |
| 6,2 mm | 0.2441 | | 70,0 | 31,0 | 23,0 | 63011 | 68997 |
| D | 0.2460 | 6.25 | 3-1/4 | 2 | 1-39/64 | 53204 | 58059 |
| 6,3 mm | 0.2480 | | 70,0 | 31,0 | 23,0 | 63065 | 68998 |
| 1/4 | 0.2500 | 6.35 | 3-1/4 | 2 | 1-39/64 | 53116 | 58061 |
| 6,4 mm | 0.2520 | | 70,0 | 31,0 | 23,0 | 63066 | 68999 |
| 6,5 mm | 0.2559 | | 70,0 | 31,0 | 23,0 | 63012 | 69000 |
| F | 0.2570 | 6.53 | 3-1/4 | 2 | 1-39/64 | 53206 | 58062 |
| 6,6 mm | 0.2598 | | 70,0 | 31,0 | 23,0 | 63067 | 69001 |
| G | 0.2610 | 6.63 | 3-1/2 | 2-1/8 | 1-45/64 | 53207 | 58063 |
| 6,7 mm | 0.2638 | | 70,0 | 31,0 | 23,0 | 63068 | 69002 |

continued on next page

3 Flute Drills • Metric: DIN 6539

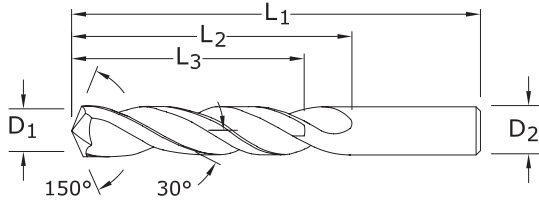


3xD
(mm)

5xD
(inch)



3



103

FRACTIONAL & METRIC SERIES

| CUTTING DIAMETER D ₁ /D ₂ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|--|----------------|---------------|----------------------------------|--------------------------------|----------------------------------|----------|---------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AITiN) |
| 17/64 | 0.2656 | 6.75 | 3-1/2 | 2-1/8 | 1-45/64 | 53117 | 58064 |
| H | 0.2660 | 6.76 | 3-1/2 | 2-1/8 | 1-45/64 | 53208 | 58065 |
| 6,8 mm | 0.2677 | | 74,0 | 34,0 | 25,0 | 63013 | 69003 |
| 6,9 mm | 0.2717 | | 74,0 | 34,0 | 25,0 | 63069 | 69004 |
| I | 0.2720 | 6.91 | 3-1/2 | 2-1/8 | 1-45/64 | 53209 | 58066 |
| 7,0 mm | 0.2756 | | 74,0 | 34,0 | 25,0 | 63014 | 69005 |
| J | 0.2770 | 7.04 | 3-1/2 | 2-1/8 | 1-45/64 | 53210 | 58067 |
| 7,1 mm | 0.2795 | | 74,0 | 34,0 | 25,0 | 63070 | 69006 |
| K | 0.2810 | 7.14 | 3-1/2 | 2-1/8 | 1-45/64 | 53211 | 58068 |
| 9/32 | 0.2812 | 7.14 | 3-1/2 | 2-1/8 | 1-45/64 | 53118 | 58069 |
| 7,2 mm | 0.2835 | | 74,0 | 34,0 | 25,0 | 63015 | 69007 |
| 7,3 mm | 0.2874 | | 74,0 | 34,0 | 25,0 | 63071 | 69008 |
| L | 0.2900 | 7.37 | 3-1/2 | 2-1/8 | 1-45/64 | 53212 | 58070 |
| 7,4 mm | 0.2913 | | 74,0 | 34,0 | 25,0 | 63072 | 69009 |
| M | 0.2950 | 7.49 | 3-3/4 | 2-3/8 | 1-29/32 | 53213 | 58071 |
| 7,5 mm | 0.2953 | | 74,0 | 34,0 | 25,0 | 63016 | 69010 |
| 19/64 | 0.2969 | 7.54 | 3-3/4 | 2-3/8 | 1-29/32 | 53119 | 58072 |
| 7,6 mm | 0.2992 | | 79,0 | 37,0 | 27,0 | 63073 | 69011 |
| N | 0.3020 | 7.67 | 2-3/8 | 2-3/8 | 1-29/32 | 53214 | 58073 |
| 7,7 mm | 0.3031 | | 79,0 | 37,0 | 27,0 | 63074 | 69012 |
| 7,8 mm | 0.3071 | | 79,0 | 37,0 | 27,0 | 63075 | 69013 |
| 7,9 mm | 0.3110 | | 79,0 | 37,0 | 27,0 | 63076 | 69014 |
| 5/16 | 0.3125 | 7.94 | 3-3/4 | 2-3/8 | 1-29/32 | 53120 | 58074 |
| 8,0 mm | 0.3150 | | 79,0 | 37,0 | 27,0 | 63017 | 69015 |
| O | 0.3160 | 8.03 | 3-3/4 | 2-3/8 | 1-29/32 | 53215 | 58075 |
| 8,1 mm | 0.3189 | | 79,0 | 37,0 | 27,0 | 63077 | 69016 |
| 8,2 mm | 0.3228 | | 79,0 | 37,0 | 27,0 | 63018 | 69017 |
| P | 0.3230 | 8.20 | 3-3/4 | 2-3/8 | 1-29/32 | 53216 | 58076 |
| 8,3 mm | 0.3268 | | 79,0 | 37,0 | 27,0 | 63078 | 69018 |
| 21/64 | 0.3281 | 8.33 | 4 | 2-1/2 | 2 | 53121 | 58077 |
| 8,4 mm | 0.3307 | | 79,0 | 37,0 | 27,0 | 63019 | 69019 |
| Q | 0.3320 | 8.43 | 4 | 2-1/2 | 2 | 53217 | 58078 |
| 8,5 mm | 0.3346 | | 79,0 | 37,0 | 27,0 | 63020 | 69020 |
| 8,6 mm | 0.3386 | | 84,0 | 40,0 | 29,0 | 63021 | 69021 |
| R | 0.3390 | 8.61 | 4 | 2-1/2 | 2 | 53218 | 58079 |
| 8,7 mm | 0.3425 | | 84,0 | 40,0 | 29,0 | 63079 | 69022 |
| 11/32 | 0.3438 | 8.73 | 4 | 2-1/2 | 2 | 53122 | 58080 |
| 8,8 mm | 0.3465 | | 84,0 | 40,0 | 29,0 | 63022 | 69023 |
| S | 0.3480 | 8.84 | 4 | 2-1/2 | 2 | 53219 | 58081 |
| 8,9 mm | 0.3504 | | 84,0 | 40,0 | 29,0 | 63080 | 69024 |
| 9,0 mm | 0.3543 | | 84,0 | 40,0 | 29,0 | 63023 | 69025 |
| T | 0.3580 | 9.09 | 4-1/4 | 2-3/4 | 2-13/64 | 53220 | 58082 |

continued on next page

TOLERANCES (inch)

D₁ = +.0000/-0.0005
D₂ = h6

TOLERANCES (mm)

D₁ = +0,0000/-0,0127
D₂ = h6

- STEELS
- CAST IRON
- HARDENED STEELS
- NON-FERROUS

For patent information visit www.ksptpatents.com

3 Flute Drills • Metric: DIN 6539

103

FRACTIONAL & METRIC SERIES

CONTINUED

| CUTTING DIAMETER D ₁ /D ₂ | DECIMAL EQUIV. | METRIC EQUIV. | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | CLEARED LENGTH L ₃ | EDP NO. | |
|---|-------------------|------------------|-------------------------------------|-----------------------------------|-------------------------------------|----------|------------------------|
| | | | | | | UNCOATED | Ti-NAMITE-A (AITiN) |
| 9,1 mm | 0.3583 | | 84,0 | 40,0 | 29,0 | 63081 | 69026 |
| 23/64 | 0.3594 | 9.13 | 4-1/4 | 2-3/4 | 2-13/64 | 53123 | 58083 |
| 9,2 mm | 0.3622 | | 84,0 | 40,0 | 29,0 | 63024 | 69027 |
| 9,3 mm | 0.3661 | | 84,0 | 40,0 | 29,0 | 63082 | 69028 |
| U | 0.3680 | 9.35 | 4-1/4 | 2-3/4 | 2-13/64 | 53221 | 58084 |
| 9,4 mm | 0.3701 | | 84,0 | 40,0 | 29,0 | 63083 | 69029 |
| 9,5 mm | 0.3740 | | 84,0 | 40,0 | 29,0 | 63025 | 69030 |
| 3/8 | 0.3750 | 9.53 | 4-1/4 | 2-3/4 | 2-13/64 | 53124 | 58085 |
| V | 0.3770 | 9.58 | 4-1/4 | 2-3/4 | 2-13/64 | 53222 | 58086 |
| 9,6 mm | 0.3780 | | 89,0 | 43,0 | 31,0 | 63084 | 69031 |
| 9,7 mm | 0.3819 | | 89,0 | 43,0 | 31,0 | 63085 | 69032 |
| 9,8 mm | 0.3858 | | 89,0 | 43,0 | 31,0 | 63086 | 69033 |
| W | 0.3860 | 9.80 | 4-1/2 | 2-7/8 | 2-19/64 | 53223 | 58087 |
| 9,9 mm | 0.3898 | | 89,0 | 43,0 | 31,0 | 63087 | 69034 |
| 25/64 | 0.3906 | 9.92 | 4-1/2 | 2-7/8 | 2-19/64 | 53125 | 58088 |
| 10,0 mm | 0.3937 | | 89,0 | 43,0 | 31,0 | 63026 | 69035 |
| X | 0.3970 | 10.08 | 4-1/2 | 2-7/8 | 2-19/64 | 53224 | 58089 |
| 10,1 mm | 0.3976 | | 89,0 | 43,0 | 31,0 | 63088 | 69036 |
| 10,2 mm | 0.4016 | | 89,0 | 43,0 | 31,0 | 63027 | 69037 |
| Y | 0.4040 | 10.26 | 4-1/2 | 2-7/8 | 2-19/64 | 53225 | 58090 |
| 13/32 | 0.4062 | 10.32 | 4-1/2 | 2-7/8 | 2-19/64 | 53126 | 58091 |
| 10,4 mm | 0.4094 | | 89,0 | 43,0 | 31,0 | 63028 | 69038 |
| Z | 0.4130 | 10.49 | 4-1/2 | 2-7/8 | 2-19/64 | 53226 | 58092 |
| 10,5 mm | 0.4134 | | 89,0 | 43,0 | 31,0 | 63029 | 69039 |
| 10,7 mm | 0.4213 | | 95,0 | 47,0 | 33,0 | 63030 | 69040 |
| 27/64 | 0.4219 | 10.72 | 4-1/2 | 2-7/8 | 2-19/64 | 53127 | 58093 |
| 10,8 mm | 0.4252 | | 95,0 | 47,0 | 33,0 | 63031 | 69041 |
| 11,0 mm | 0.4331 | | 95,0 | 47,0 | 33,0 | 63032 | 69042 |
| 7/16 | 0.4375 | 11.11 | 4-1/2 | 2-7/8 | 2-19/64 | 53128 | 58094 |
| 11,5 mm | 0.4528 | | 95,0 | 47,0 | 33,0 | 63033 | 69043 |
| 29/64 | 0.4531 | 11.51 | 4-3/4 | 3 | 2-13/32 | 53129 | 58095 |
| 15/32 | 0.4688 | 11.91 | 4-3/4 | 3 | 2-13/32 | 53130 | 58096 |
| 12,0 mm | 0.4724 | | 102,0 | 51,0 | 35,0 | 63034 | 69044 |
| 31/64 | 0.4844 | 12.30 | 4-3/4 | 3 | 2-13/32 | 53131 | 58097 |
| 12,5 mm | 0.4921 | | 102,0 | 51,0 | 35,0 | 63035 | 69045 |
| 1/2 | 0.5000 | 12.70 | 4-3/4 | 3 | 2-13/32 | 53132 | 58098 |
| 12,8 mm | 0.5039 | | 102,0 | 51,0 | 35,0 | 63036 | 69046 |
| 13,0 mm | 0.5118 | | 102,0 | 51,0 | 35,0 | 63089 | 69047 |
| 33/64 | 0.5156 | 13.10 | 4-3/4 | 3 | 2-13/32 | 53135 | 58099 |
| 13,1 mm | 0.5157 | | 102,0 | 51,0 | 35,0 | 63037 | 69048 |
| 13,5 mm | 0.5315 | | 107,0 | 54,0 | 37,0 | 63090 | 69049 |
| 14,0 mm | 0.5512 | | 107,0 | 54,0 | 37,0 | 63038 | 69050 |
| 9/16 | 0.5625 | 14.29 | 4-3/4 | 3 | 2-13/32 | 53136 | 58100 |
| 14,3 mm | 0.5630 | | 111,0 | 56,0 | 38,0 | 63039 | 69051 |
| 14,5 mm | 0.5709 | | 111,0 | 56,0 | 38,0 | 63040 | 69052 |
| 15,0 mm | 0.5906 | | 111,0 | 56,0 | 38,0 | 63091 | 69053 |
| 5/8 | 0.6250 | 15.88 | 5-3/4 | 3-1/2 | 2-51/64 | 53133 | 58101 |
| 11/16 | 0.6875 | 17.46 | 5-3/4 | 3-1/2 | 2-51/64 | 53137 | 58102 |
| 17,5 mm | 0.6890 | | 123,0 | 62,0 | 40,0 | 63041 | 69054 |
| 3/4 | 0.7500 | 19.05 | 5-3/4 | 4-1/4 | 3 13/32 | 53134 | 58103 |
| 19,5 mm | 0.7677 | | 131,0 | 66,0 | 42,0 | 63042 | 69055 |
| 20,0 mm | 0.7874 | | 131,0 | 66,0 | 42,0 | 63043 | 69056 |

3 Flute Drills

| Series 103 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | |
|--|--|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 1/4 | 3/8 | 1/2 | 5/8 | 3/4 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 295 (236-354) | RPM | 9015 | 4508 | 3005 | 2254 | 1803 | 1503 | |
| | | | Fr | 0.0026 | 0.0051 | 0.0077 | 0.0102 | 0.0128 | 0.0153 | |
| | | | Feed (ipm) | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | 23.0 | |
| | ≤ 300 Bhn or ≤ 32 HRc | 260 (208-312) | RPM | 7946 | 3973 | 2649 | 1986 | 1589 | 1324 | |
| | | | Fr | 0.0023 | 0.0045 | 0.0068 | 0.0091 | 0.0113 | 0.0136 | |
| | | | Feed (ipm) | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 150 (120-180) | RPM | 4584 | 2292 | 1528 | 1146 | 917 | 764 | |
| | | | Fr | 0.0013 | 0.0026 | 0.0039 | 0.0052 | 0.0065 | 0.0079 | |
| | | | Feed (ipm) | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | 6.0 | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 230 (184-276) | RPM | 7029 | 3514 | 2343 | 1757 | 1406 | 1171 |
| | | | | Fr | 0.0019 | 0.0038 | 0.0058 | 0.0077 | 0.0096 | 0.0115 |
| | | | | Feed (ipm) | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 | 13.5 |
| ≤ 375 Bhn or ≤ 40 HRc | | 145 (116-174) | RPM | 4431 | 2216 | 1477 | 1108 | 886 | 739 | |
| | | | Fr | 0.0019 | 0.0038 | 0.0058 | 0.0077 | 0.0096 | 0.0115 | |
| | | | Feed (ipm) | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | 8.5 | |
| ≤ 450 Bhn or ≤ 48 HRc | 115 (92-138) | RPM | 3514 | 1757 | 1171 | 879 | 703 | 586 | | |
| | | Fr | 0.0005 | 0.0010 | 0.0015 | 0.0020 | 0.0026 | 0.0031 | | |
| | | Feed (ipm) | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | | |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 250 Bhn or ≤ 24 HRc | 85 (68-102) | RPM | 2598 | 1299 | 866 | 649 | 520 | 433 | |
| | | | Fr | 0.0013 | 0.0026 | 0.0039 | 0.0052 | 0.0065 | 0.0079 | |
| | | | Feed (ipm) | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | 3.4 | |
| | ≤ 375 Bhn or ≤ 40 HRc | 65 (52-78) | RPM | 1986 | 993 | 662 | 497 | 397 | 331 | |
| | | | Fr | 0.0007 | 0.0013 | 0.0020 | 0.0026 | 0.0033 | 0.0039 | |
| | | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | |
| ≤ 475 Bhn or ≤ 50 HRc | 50 (40-60) | RPM | 1528 | 764 | 509 | 382 | 306 | 255 | | |
| | | Fr | 0.0007 | 0.0013 | 0.0020 | 0.0026 | 0.0033 | 0.0039 | | |
| | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | | |
| K CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 250 (200-300) | RPM | 7640 | 3820 | 2547 | 1910 | 1528 | 1273 | |
| | | | Fr | 0.0026 | 0.0052 | 0.0079 | 0.0105 | 0.0131 | 0.0157 | |
| | | | Feed (ipm) | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | 20.0 | |
| | ≤ 330 Bhn or ≤ 36 HRc | 195 (156-234) | RPM | 5959 | 2980 | 1986 | 1490 | 1192 | 993 | |
| | | | Fr | 0.0026 | 0.0052 | 0.0078 | 0.0104 | 0.0130 | 0.0156 | |
| | | | Feed (ipm) | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | 15.5 | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | ≤ 80 Bhn or ≤ 47 HRb | 540 (432-648) | RPM | 16502 | 8251 | 5501 | 4126 | 3300 | 2750 | |
| | | | Fr | 0.0032 | 0.0064 | 0.0096 | 0.0128 | 0.0161 | 0.0193 | |
| | | | Feed (ipm) | 53.0 | 53.0 | 53.0 | 53.0 | 53.0 | 53.0 | |
| | ≤ 150 Bhn or ≤ 7 HRc | 455 (364-546) | RPM | 13905 | 6952 | 4635 | 3476 | 2781 | 2317 | |
| | | | Fr | 0.0032 | 0.0065 | 0.0097 | 0.0129 | 0.0162 | 0.0194 | |
| | | | Feed (ipm) | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | 45.0 | |
| COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 305 (244-366) | RPM | 9321 | 4660 | 3107 | 2330 | 1864 | 1553 | |
| | | | Fr | 0.0019 | 0.0039 | 0.0058 | 0.0077 | 0.0097 | 0.0116 | |
| | | | Feed (ipm) | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | 18.0 | |
| ≤ 200 Bhn or ≤ 23 HRc | 160 (128-192) | RPM | 4890 | 2445 | 1630 | 1222 | 978 | 815 | | |
| | | Fr | 0.0016 | 0.0033 | 0.0049 | 0.0065 | 0.0082 | 0.0098 | | |
| | | Feed (ipm) | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

rpm = Vc x 3.82 / D₁

ipm = Fr x rpm

reduce speed and feed 30 percent when using uncoated drills

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

3 Flute Drills

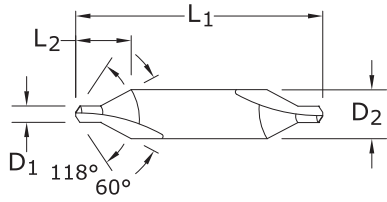
| Series 103M Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | |
|---|---|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|
| | | | 3 | 6 | 10 | 12 | 16 | 20 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 90 (72-108) | RPM | 9533 | 4766 | 2860 | 2383 | 1787 | 1430 | |
| | | | Fr | 0.062 | 0.124 | 0.206 | 0.248 | 0.330 | 0.413 | |
| | | | Feed (mm/min) | 590 | 590 | 590 | 590 | 590 | 590 | |
| | ≤ 300 Bhn or ≤ 32 HRc | 79 (63-95) | RPM | 8402 | 4201 | 2520 | 2100 | 1575 | 1260 | |
| | | | Fr | 0.055 | 0.110 | 0.183 | 0.219 | 0.292 | 0.365 | |
| | | | Feed (mm/min) | 460 | 460 | 460 | 460 | 460 | 460 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 46 (37-55) | RPM | 4847 | 2424 | 1454 | 1212 | 909 | 727 | |
| | | | Fr | 0.032 | 0.064 | 0.107 | 0.128 | 0.171 | 0.213 | |
| | | | Feed (mm/min) | 155 | 155 | 155 | 155 | 155 | 155 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 70 (56-84) | RPM | 7432 | 3716 | 2230 | 1858 | 1394 | 1115 |
| | | | | Fr | 0.046 | 0.093 | 0.155 | 0.186 | 0.248 | 0.309 |
| | | | | Feed (mm/min) | 345 | 345 | 345 | 345 | 345 | 345 |
| ≤ 375 Bhn or ≤ 40 HRc | | 44 (35-53) | RPM | 4686 | 2343 | 1406 | 1171 | 879 | 703 | |
| | | | Fr | 0.046 | 0.092 | 0.153 | 0.184 | 0.245 | 0.306 | |
| | | | Feed (mm/min) | 215 | 215 | 215 | 215 | 215 | 215 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 35 (28-42) | RPM | 3716 | 1858 | 1115 | 929 | 697 | 557 | |
| | | | Fr | 0.012 | 0.024 | 0.040 | 0.048 | 0.065 | 0.081 | |
| | | | Feed (mm/min) | 45 | 45 | 45 | 45 | 45 | 45 | |
| K CAST IRONS Gray, Malleable, Ductile | | ≤ 250 Bhn or ≤ 24 HRc | 26 (21-31) | RPM | 2747 | 1373 | 824 | 687 | 515 | 412 |
| | | | | Fr | 0.031 | 0.062 | 0.103 | 0.124 | 0.165 | 0.206 |
| | | | | Feed (mm/min) | 85 | 85 | 85 | 85 | 85 | 85 |
| | ≤ 375 Bhn or ≤ 40 HRc | 20 (16-24) | RPM | 2100 | 1050 | 630 | 525 | 394 | 315 | |
| | | | Fr | 0.017 | 0.033 | 0.056 | 0.067 | 0.089 | 0.111 | |
| | | | Feed (mm/min) | 35 | 35 | 35 | 35 | 35 | 35 | |
| ≤ 475 Bhn or ≤ 50 HRc | 15 (12-18) | RPM | 1616 | 808 | 485 | 404 | 303 | 242 | | |
| | | Fr | 0.015 | 0.031 | 0.052 | 0.062 | 0.083 | 0.103 | | |
| | | Feed (mm/min) | 25 | 25 | 25 | 25 | 25 | 25 | | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | ≤ 220 Bhn or ≤ 19 HRc | 76 (61-91) | RPM | 8078 | 4039 | 2424 | 2020 | 1515 | 1212 | |
| | | | Fr | 0.063 | 0.126 | 0.210 | 0.253 | 0.337 | 0.421 | |
| | | | Feed (mm/min) | 510 | 510 | 510 | 510 | 510 | 510 | |
| | ≤ 330 Bhn or ≤ 36 HRc | 59 (48-71) | RPM | 6301 | 3151 | 1890 | 1575 | 1181 | 945 | |
| | | | Fr | 0.052 | 0.105 | 0.175 | 0.209 | 0.279 | 0.349 | |
| | | | Feed (mm/min) | 330 | 330 | 330 | 330 | 330 | 330 | |
| | N COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 80 Bhn or ≤ 47 HRb | 165 (132-198) | RPM | 17449 | 8725 | 5235 | 4362 | 3272 | 2617 |
| | | | | Fr | 0.078 | 0.156 | 0.260 | 0.312 | 0.416 | 0.520 |
| | | | | Feed (mm/min) | 1360 | 1360 | 1360 | 1360 | 1360 | 1360 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 139 (111-166) | RPM | 14703 | 7351 | 4411 | 3676 | 2757 | 2205 |
| | | | | Fr | 0.078 | 0.156 | 0.261 | 0.313 | 0.417 | 0.521 |
| | | | | Feed (mm/min) | 1150 | 1150 | 1150 | 1150 | 1150 | 1150 |
| ≤ 140 Bhn or ≤ 3 HRc | 93 (74-112) | RPM | 9856 | 4928 | 2957 | 2464 | 1848 | 1478 | | |
| | | Fr | 0.047 | 0.094 | 0.157 | 0.189 | 0.252 | 0.315 | | |
| | | Feed (mm/min) | 465 | 465 | 465 | 465 | 465 | 465 | | |
| ≤ 200 Bhn or ≤ 23 HRc | 49 (39-59) | RPM | 5170 | 2585 | 1551 | 1293 | 969 | 776 | | |
| | | Fr | 0.039 | 0.077 | 0.129 | 0.155 | 0.206 | 0.258 | | |
| | | Feed (mm/min) | 200 | 200 | 200 | 200 | 200 | 200 | | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
 rpm = (Vc x 1000) / (D₁ x 3.14)
 mm/min = Fr x rpm
 reduce speed and feed 30 percent when using uncoated drills
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Combined Drill & Countersink



301 FRACTIONAL SERIES



*Pictured:
Series 301 Set*

| SIZE | inch | | | | EDP NO. | |
|-----------------|----------------------------------|---------------------------------|----------------------------------|--------------------------------|----------|---------------------|
| | DRILL DIAMETER D ₁ | BODY DIAMETER D ₂ | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | UNCOATED | Ti-NAMITE-A (AlTiN) |
| 00* | .025 | 1/8 | 1-1/2 | .125 | 57005 | 57015 |
| 0* | 1/32 | 1/8 | 1-1/2 | .130 | 57006 | 57016 |
| 1* | 3/64 | 1/8 | 1-1/2 | .135 | 57007 | 57017 |
| 2* | 5/64 | 3/16 | 1-7/8 | .200 | 57008 | 57018 |
| 3* | 7/64 | 1/4 | 2 | .280 | 57009 | 57019 |
| 4* | 1/8 | 5/16 | 2-1/8 | .340 | 57010 | 57020 |
| 5* | 3/16 | 7/16 | 2-3/4 | .475 | 57011 | 57021 |
| 6* | 7/32 | 1/2 | 3 | .540 | 57012 | 57022 |
| *Series 301 Set | — | — | — | — | 57075 | — |

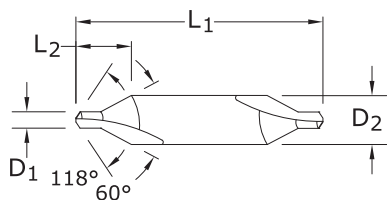
TOLERANCES (inch)

D₁ = +.003/-.000
D₂ = -.0001/-.0005

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Combined Drill & Countersink



TOLERANCES (mm)

$D_1 = +0,076/-0,000$
 $D_2 = -0,0025/-0,0127$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

301M
METRIC SERIES

| mm | | | | EDP NO. | |
|-------------------------|------------------------|-------------------------|-----------------------|----------|---------------------|
| DRILL DIAMETER D_1 | BODY DIAMETER D_2 | OVERALL LENGTH L_1 | FLUTE LENGTH L_2 | UNCOATED | Ti-NAMITE-A (AITiN) |
| 0,5 | 3,15 | 20,0 | 3,0 | 67005 | 67035 |
| 0,8 | 3,15 | 20,0 | 3,5 | 67007 | 67037 |
| 1 | 3,15 | 31,5 | 3,5 | 67009 | 67039 |
| 1,25 | 3,15 | 31,5 | 4,0 | 67011 | 67041 |
| 1,6 | 4,0 | 35,5 | 5,0 | 67013 | 67043 |
| 2 | 5,0 | 40,0 | 6,0 | 67015 | 67045 |
| 2,5 | 6,3 | 45,0 | 7,0 | 67017 | 67047 |
| 3,15 | 8,0 | 50,0 | 9,0 | 67019 | 67049 |
| 4 | 10,0 | 56,0 | 11,0 | 67021 | 67051 |
| 5 | 12,5 | 63,0 | 14,0 | 67023 | 67053 |

Combined Drill & Countersink

| Series 301 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | |
|--|---|-----------------------------|--------------------------------------|------------|---------|--------|--------|--------|--------|
| | | | 1/32 | 5/64 | 1/8 | 3/16 | 7/32 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 265 | RPM | 8098 | 5399 | 3239 | 2314 | 2025 | |
| | | (212-318) | Fr | 0.00068 | 0.0010 | 0.0017 | 0.0024 | 0.0027 | |
| | | | Feed (ipm) | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | |
| | ≤ 300 Bhn or ≤ 32 HRc | 125 | RPM | 3820 | 2547 | 1528 | 1091 | 955 | |
| | | (100-150) | Fr | 0.00065 | 0.0010 | 0.0016 | 0.0023 | 0.0026 | |
| | | | Feed (ipm) | 2.5 | 2.5 | 2.5 | 2.5 | 2.5 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 85 | RPM | 2598 | 1732 | 1039 | 742 | 649 | |
| | | (68-102) | Fr | 0.00038 | 0.0006 | 0.0010 | 0.0013 | 0.0015 | |
| | | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| | P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 230 | RPM | 7029 | 4686 | 2812 | 2008 | 1757 |
| | | | (184-276) | Fr | 0.00064 | 0.0010 | 0.0016 | 0.0022 | 0.0026 |
| | | | | Feed (ipm) | 4.5 | 4.5 | 4.5 | 4.5 | 4.5 |
| ≤ 375 Bhn or ≤ 40 HRc | | 145 | RPM | 4431 | 2954 | 1772 | 1266 | 1108 | |
| | | (116-174) | Fr | 0.00059 | 0.0009 | 0.0015 | 0.0021 | 0.0023 | |
| | | | Feed (ipm) | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 60 | RPM | 1834 | 1222 | 733 | 524 | 458 | |
| | | (48-72) | Fr | 0.00027 | 0.0004 | 0.0007 | 0.0010 | 0.0011 | |
| | | | Feed (ipm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 250 Bhn or ≤ 24 HRc | 85 | RPM | 2598 | 1732 | 1039 | 742 | 649 |
| | | | (68-102) | Fr | 0.00035 | 0.0005 | 0.0009 | 0.0012 | 0.0014 |
| | | | | Feed (ipm) | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 |
| | ≤ 375 Bhn or ≤ 40 HRc | 55 | RPM | 1681 | 1121 | 672 | 480 | 420 | |
| | | (44-66) | Fr | 0.00016 | 0.0002 | 0.0004 | 0.0006 | 0.0006 | |
| | | | Feed (ipm) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 40 | RPM | 1222 | 815 | 489 | 349 | 306 | |
| | | (32-48) | Fr | 0.00016 | 0.0002 | 0.0004 | 0.0006 | 0.0007 | |
| | | | Feed (ipm) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | |
| | K CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 280 | RPM | 8557 | 5705 | 3423 | 2445 | 2139 |
| | | | (224-336) | Fr | 0.00084 | 0.0013 | 0.0021 | 0.0029 | 0.0034 |
| | | | | Feed (ipm) | 7.2 | 7.2 | 7.2 | 7.2 | 7.2 |
| ≤ 330 Bhn or ≤ 36 HRc | | 250 | RPM | 7640 | 5093 | 3056 | 2183 | 1910 | |
| | | (200-300) | Fr | 0.00084 | 0.0013 | 0.0021 | 0.0029 | 0.0034 | |
| | | | Feed (ipm) | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | ≤ 250 Bhn or ≤ 24 HRc0 | 210 | RPM | 6418 | 4278 | 2567 | 1834 | 1604 | |
| | | (168-252) | Fr | 0.00048 | 0.0007 | 0.0012 | 0.0017 | 0.0019 | |
| | | | Feed (ipm) | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | |
| | ≤ 330 Bhn or ≤ 36 HRc | 110 | RPM | 3362 | 2241 | 1345 | 960 | 840 | |
| | | (88-132) | Fr | 0.00028 | 0.0004 | 0.0007 | 0.0010 | 0.0011 | |
| | | | Feed (ipm) | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 65 | RPM | 1986 | 1324 | 795 | 568 | 497 |
| | | | (52-78) | Fr | 0.00036 | 0.0005 | 0.0009 | 0.0013 | 0.0014 |
| | | | | Feed (ipm) | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 55 | RPM | 1681 | 1121 | 672 | 480 | 420 |
| | | | (44-66) | Fr | 0.00032 | 0.0005 | 0.0008 | 0.0011 | 0.0013 |
| | | | | Feed (ipm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |

continued on next page

Combined Drill & Countersink

| Series 301 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | |
|--|---|-----------------------------|--------------------------------------|------------|---------|--------|--------|--------|--------|
| | | | 1/32 | 5/64 | 1/8 | 3/16 | 7/32 | | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy | ≤ 220 Bhn or ≤ 19 HRc | 40 (32-48) | RPM | 1222 | 815 | 489 | 349 | 306 | |
| | | | Fr | 0.00036 | 0.0005 | 0.0009 | 0.0013 | 0.0014 | |
| | | | Feed (ipm) | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | |
| | ≤ 320 Bhn or ≤ 34 HRc | 25 (20-30) | RPM | 764 | 509 | 306 | 218 | 191 | |
| | | | Fr | 0.00033 | 0.0005 | 0.0008 | 0.0011 | 0.0013 | |
| | | | Feed (ipm) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 20 (16-24) | RPM | 611 | 407 | 244 | 175 | 153 | |
| | | | Fr | 0.00016 | 0.0002 | 0.0004 | 0.0006 | 0.0007 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 85 (68-102) | RPM | 2598 | 1732 | 1039 | 742 | 649 |
| | | | | Fr | 0.00064 | 0.0010 | 0.0016 | 0.0022 | 0.0026 |
| | | | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 |
| ≤ 350 Bhn or ≤ 38 HRc | | 65 (52-78) | RPM | 1986 | 1324 | 795 | 568 | 497 | |
| | | | Fr | 0.00036 | 0.0005 | 0.0009 | 0.0013 | 0.0014 | |
| | | | Feed (ipm) | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | |
| ≤ 440 Bhn or ≤ 47 HRc | | 55 (44-66) | RPM | 1681 | 1121 | 672 | 480 | 420 | |
| | | | Fr | 0.00032 | 0.0005 | 0.0008 | 0.0011 | 0.0013 | |
| | | | Feed (ipm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 540 (432-648) | RPM | 16502 | 11002 | 6601 | 4715 | 4126 |
| | | | | Fr | 0.00100 | 0.0015 | 0.0025 | 0.0035 | 0.0040 |
| | | | | Feed (ipm) | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 |
| | ≤ 150 Bhn or ≤ 7 HRc | 455 (364-546) | RPM | 13905 | 9270 | 5562 | 3973 | 3476 | |
| | | | Fr | 0.00100 | 0.0015 | 0.0025 | 0.0035 | 0.0040 | |
| | | | Feed (ipm) | 13.9 | 13.9 | 13.9 | 13.9 | 13.9 | |
| | ≤ 140 Bhn or ≤ 3 HRc | 190 (152-228) | RPM | 5806 | 3871 | 2323 | 1659 | 1452 | |
| | | | Fr | 0.00048 | 0.0007 | 0.0012 | 0.0017 | 0.0019 | |
| | | | Feed (ipm) | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | |
| | ≤ 200 Bhn or ≤ 23 HRc | 175 (140-210) | RPM | 5348 | 3565 | 2139 | 1528 | 1337 | |
| | | | Fr | 0.00048 | 0.0007 | 0.0012 | 0.0017 | 0.0019 | |
| | | | Feed (ipm) | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | |
| PLASTICS Polycarbonate, PVC | 500 (400-600) | RPM | 15280 | 10187 | 6112 | 4366 | 3820 | | |
| | | Fr | 0.00100 | 0.0015 | 0.0025 | 0.0035 | 0.0040 | | |
| | | Feed (ipm) | 15.3 | 15.3 | 15.3 | 15.3 | 15.3 | | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

$rpm = Vc \times 3.82 / D_2$

$ipm = Fr \times rpm$

reduce speed and feed 30 percent when using uncoated drills

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Combined Drill & Countersink

| Series 301M Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | |
|--|---|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|
| | | | 1 | 1.6 | 2.5 | 4 | 5 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 81 | RPM | 8155 | 6422 | 4078 | 2569 | 2055 | |
| | | (65-97) | Fr | 0.017 | 0.022 | 0.034 | 0.054 | 0.068 | |
| | | | Feed (mm/min) | 139 | 139 | 139 | 139 | 139 | |
| | ≤ 300 Bhn or ≤ 32 HRc | 38 | RPM | 3847 | 3029 | 1923 | 1212 | 969 | |
| | | (30-46) | Fr | 0.016 | 0.020 | 0.032 | 0.051 | 0.064 | |
| | | | Feed (mm/min) | 62 | 62 | 62 | 62 | 62 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 26 | RPM | 2616 | 2060 | 1308 | 824 | 659 | |
| | | (21-31) | Fr | 0.010 | 0.013 | 0.020 | 0.032 | 0.039 | |
| | | | Feed (mm/min) | 26 | 26 | 26 | 26 | 26 | |
| | P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 70 | RPM | 7078 | 5574 | 3539 | 2230 | 1784 |
| | | | (56-84) | Fr | 0.016 | 0.020 | 0.032 | 0.051 | 0.063 |
| | | | | Feed (mm/min) | 113 | 113 | 113 | 113 | 113 |
| ≤ 375 Bhn or ≤ 40 HRc | | 44 | RPM | 4462 | 3514 | 2231 | 1406 | 1125 | |
| | | (35-53) | Fr | 0.015 | 0.019 | 0.030 | 0.048 | 0.060 | |
| | | | Feed (mm/min) | 67 | 67 | 67 | 67 | 67 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 18 | RPM | 1847 | 1454 | 923 | 582 | 465 | |
| | | (15-22) | Fr | 0.007 | 0.009 | 0.014 | 0.022 | 0.028 | |
| | | | Feed (mm/min) | 13 | 13 | 13 | 13 | 13 | |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 250 Bhn or ≤ 24 HRc | 26 | RPM | 2616 | 2060 | 1308 | 824 | 659 |
| | | | (21-31) | Fr | 0.009 | 0.012 | 0.018 | 0.029 | 0.036 |
| | | | | Feed (mm/min) | 24 | 24 | 24 | 24 | 24 |
| | ≤ 375 Bhn or ≤ 40 HRc | 17 | RPM | 1693 | 1333 | 846 | 533 | 427 | |
| | | (13-20) | Fr | 0.004 | 0.005 | 0.008 | 0.013 | 0.016 | |
| | | | Feed (mm/min) | 7 | 7 | 7 | 7 | 7 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 12 | RPM | 1231 | 969 | 616 | 388 | 310 | |
| | | (10-15) | Fr | 0.004 | 0.005 | 0.008 | 0.013 | 0.016 | |
| | | | Feed (mm/min) | 5 | 5 | 5 | 5 | 5 | |
| | K CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 85 | RPM | 8617 | 6786 | 4309 | 2714 | 2171 |
| | | | (68-102) | Fr | 0.021 | 0.027 | 0.042 | 0.067 | 0.083 |
| | | | | Feed (mm/min) | 181 | 181 | 181 | 181 | 181 |
| ≤ 330 Bhn or ≤ 36 HRc | | 76 | RPM | 7694 | 6059 | 3847 | 2424 | 1939 | |
| | | (61-91) | Fr | 0.021 | 0.027 | 0.042 | 0.067 | 0.084 | |
| | | | Feed (mm/min) | 162 | 162 | 162 | 162 | 162 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | ≤ 250 Bhn or ≤ 24 HRc | 64 | RPM | 6463 | 5089 | 3231 | 2036 | 1629 | |
| | | (51-77) | Fr | 0.012 | 0.015 | 0.024 | 0.038 | 0.048 | |
| | | | Feed (mm/min) | 78 | 78 | 78 | 78 | 78 | |
| | ≤ 330 Bhn or ≤ 36 HRc | 34 | RPM | 3385 | 2666 | 1693 | 1066 | 853 | |
| | | (27-40) | Fr | 0.007 | 0.009 | 0.014 | 0.023 | 0.028 | |
| | | | Feed (mm/min) | 24 | 24 | 24 | 24 | 24 | |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 20 | RPM | 2000 | 1575 | 1000 | 630 | 504 |
| | | | (16-24) | Fr | 0.009 | 0.011 | 0.018 | 0.029 | 0.036 |
| | | | | Feed (mm/min) | 18 | 18 | 18 | 18 | 18 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 17 | RPM | 1693 | 1333 | 846 | 533 | 427 |
| | | | (13-20) | Fr | 0.008 | 0.011 | 0.017 | 0.026 | 0.033 |
| | | | | Feed (mm/min) | 14 | 14 | 14 | 14 | 14 |

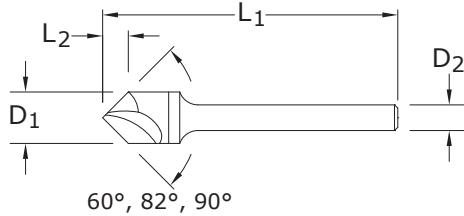
continued on next page

Combined Drill & Countersink

| Series 301M Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | |
|--|---|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|
| | | | 1 | 1.6 | 2.5 | 4 | 5 | | |
| SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy | ≤ 220 Bhn or ≤ 19 HRc | 12 (10-15) | RPM | 1231 | 969 | 616 | 388 | 310 | |
| | | | Fr | 0.009 | 0.011 | 0.018 | 0.028 | 0.035 | |
| | | | Feed (mm/min) | 11 | 11 | 11 | 11 | 11 | |
| | ≤ 320 Bhn or ≤ 34 HRc | 8 (6-9) | RPM | 769 | 606 | 385 | 242 | 194 | |
| | | | Fr | 0.008 | 0.010 | 0.016 | 0.025 | 0.031 | |
| | | | Feed (mm/min) | 6 | 6 | 6 | 6 | 6 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 6 (5-7) | RPM | 616 | 485 | 308 | 194 | 155 | |
| | | | Fr | 0.003 | 0.004 | 0.006 | 0.010 | 0.013 | |
| | | | Feed (mm/min) | 2 | 2 | 2 | 2 | 2 | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 26 (21-31) | RPM | 2616 | 2060 | 1308 | 824 | 659 |
| | | | | Fr | 0.016 | 0.020 | 0.032 | 0.051 | 0.064 |
| | | | | Feed (mm/min) | 42 | 42 | 42 | 42 | 42 |
| ≤ 350 Bhn or ≤ 38 HRc | | 20 (16-24) | RPM | 2000 | 1575 | 1000 | 630 | 504 | |
| | | | Fr | 0.009 | 0.011 | 0.018 | 0.029 | 0.036 | |
| | | | Feed (mm/min) | 18 | 18 | 18 | 18 | 18 | |
| ≤ 440 Bhn or ≤ 47 HRc | | 17 (13-20) | RPM | 1693 | 1333 | 846 | 533 | 427 | |
| | | | Fr | 0.008 | 0.011 | 0.017 | 0.026 | 0.033 | |
| | | | Feed (mm/min) | 14 | 14 | 14 | 14 | 14 | |
| ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 165 (132-198) | RPM | 16619 | 13087 | 8309 | 5235 | 4188 |
| | | | | Fr | 0.025 | 0.032 | 0.050 | 0.079 | 0.099 |
| | | | | Feed (mm/min) | 415 | 415 | 415 | 415 | 415 |
| | ≤ 150 Bhn or ≤ 7 HRc | 139 (111-166) | RPM | 14003 | 11027 | 7001 | 4411 | 3529 | |
| | | | Fr | 0.025 | 0.032 | 0.050 | 0.079 | 0.099 | |
| | | | Feed (mm/min) | 350 | 350 | 350 | 350 | 350 | |
| COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 58 (46-69) | RPM | 5847 | 4605 | 2924 | 1842 | 1474 | |
| | | | Fr | 0.012 | 0.015 | 0.024 | 0.038 | 0.048 | |
| | | | Feed (mm/min) | 70 | 70 | 70 | 70 | 70 | |
| | ≤ 200 Bhn or ≤ 23 HRc | 53 (43-64) | RPM | 5386 | 4241 | 2693 | 1696 | 1357 | |
| | | | Fr | 0.012 | 0.015 | 0.024 | 0.038 | 0.048 | |
| | | | Feed (mm/min) | 65 | 65 | 65 | 65 | 65 | |
| PLASTICS Polycarbonate, PVC | 152 (122-183) | RPM | 15388 | 12118 | 7694 | 4847 | 3878 | | |
| | | Fr | 0.025 | 0.032 | 0.050 | 0.079 | 0.099 | | |
| | | | Feed (mm/min) | 385 | 385 | 385 | 385 | 385 | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
 $rpm = (Vc \times 1000) / (D_2 \times 3.14)$
 $mm/min = Fr \times rpm$
 reduce speed and feed 30 percent when using uncoated drills
 reduce speed and feed for materials harder than listed
 refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Single Flute Countersink



601

FRACTIONAL SERIES

| CUTTING DIAMETER D ₁ | SHANK DIAMETER D ₂ | inch | | EDP NO. | | |
|------------------------------------|----------------------------------|----------------------------------|--------------------------------|-----------------|-----------------|-----------------|
| | | OVERALL LENGTH L ₁ | FLUTE LENGTH L ₂ | UNCOATED 60° | UNCOATED 82° | UNCOATED 90° |
| 1/8 | 1/8 | 1-1/2 | .062 | — | — | 74201 |
| 1/8 | 1/8 | 1-1/2 | .072 | — | 74101 | — |
| 1/8 | 1/8 | 1-1/2 | .108 | 74001 | — | — |
| 3/16 | 3/16 | 2 | .094 | — | — | 74204 |
| 3/16 | 3/16 | 2 | .108 | — | 74104 | — |
| 3/16 | 3/16 | 2 | .163 | 74004 | — | — |
| 1/4 | 1/4 | 2 | .125 | — | — | 74207 |
| 1/4 | 1/4 | 2 | .144 | — | 74107 | — |
| 1/4 | 1/4 | 2 | .217 | 74007 | — | — |
| 3/8* | 1/4 | 2-13/16 | .188 | — | — | 74210 |
| 3/8* | 1/4 | 2-13/16 | .216 | — | 74110 | — |
| 3/8* | 1/4 | 2-13/16 | .325 | 74010 | — | — |
| 1/2* | 1/4 | 2-7/8 | .250 | — | — | 74213 |
| 1/2* | 1/4 | 2-7/8 | .288 | — | 74113 | — |
| 1/2* | 1/4 | 2-7/8 | .433 | 74013 | — | — |
| 5/8* | 3/8 | 3 | .313 | — | — | 74216 |
| 5/8* | 3/8 | 3 | .360 | — | 74116 | — |
| 5/8* | 3/8 | 3 | .541 | 74016 | — | — |
| 3/4* | 1/2 | 3 | .375 | — | — | 74219 |
| 3/4* | 1/2 | 3 | .431 | — | 74119 | — |
| 3/4* | 1/2 | 3 | .650 | 74019 | — | — |
| 1* | 1/2 | 3-1/4 | .500 | — | — | 74222 |
| 1* | 1/2 | 3-1/4 | .575 | — | 74122 | — |
| 1* | 1/2 | 3-1/4 | .866 | 74022 | — | — |

*Steel Shank / Con mango de acero / Avec queue en acier / Mit Stahlschaft

TOLERANCES (inch)

1/8–1/4 DIAMETER

D₁ = +.0000/–.0005

3/8–1 DIAMETER

D₁ = +.003/–.000

Included Angle

+1°/–1°

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS

For patent information visit www.ksptpatents.com

Single Flute Countersink

| Series 601 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|--|---|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 125 | RPM | 3820 | 2547 | 1910 | 1273 | 955 | 637 | 478 | |
| | | (100-150) | Fr | 0.0005 | 0.0008 | 0.0010 | 0.0016 | 0.0021 | 0.0031 | 0.0042 | |
| | | | Feed (ipm) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | |
| | ≤ 300 Bhn or ≤ 32 HRc | 60 | RPM | 1834 | 1222 | 917 | 611 | 458 | 306 | 229 | |
| | | (48-72) | Fr | 0.0005 | 0.0007 | 0.0010 | 0.0015 | 0.0020 | 0.0029 | 0.0039 | |
| | | | Feed (ipm) | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 45 | RPM | 1375 | 917 | 688 | 458 | 344 | 229 | 172 | |
| | | (36-54) | Fr | 0.0003 | 0.0004 | 0.0006 | 0.0009 | 0.0012 | 0.0017 | 0.0023 | |
| | | | Feed (ipm) | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 95 | RPM | 2903 | 1935 | 1452 | 968 | 726 | 484 | 363 |
| | | | (76-114) | Fr | 0.0004 | 0.0007 | 0.0009 | 0.0013 | 0.0018 | 0.0027 | 0.0036 |
| | | | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 |
| ≤ 375 Bhn or ≤ 40 HRc | | 60 | RPM | 1834 | 1222 | 917 | 611 | 458 | 306 | 229 | |
| | | (48-72) | Fr | 0.0004 | 0.0007 | 0.0009 | 0.0013 | 0.0017 | 0.0026 | 0.0035 | |
| | | | Feed (ipm) | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 35 | RPM | 1070 | 713 | 535 | 357 | 267 | 178 | 134 | |
| | | (28-42) | Fr | 0.0003 | 0.0004 | 0.0006 | 0.0008 | 0.0011 | 0.0017 | 0.0022 | |
| | | | Feed (ipm) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 250 Bhn or ≤ 24 HRc | 35 | RPM | 1070 | 713 | 535 | 357 | 267 | 178 | 134 |
| | | | (28-42) | Fr | 0.0003 | 0.0004 | 0.0006 | 0.0008 | 0.0011 | 0.0017 | 0.0022 |
| | | | | Feed (ipm) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| | ≤ 375 Bhn or ≤ 40 HRc | 25 | RPM | 764 | 509 | 382 | 255 | 191 | 127 | 96 | |
| | | (20-30) | Fr | 0.0001 | 0.0002 | 0.0003 | 0.0004 | 0.0005 | 0.0008 | 0.0010 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 20 | RPM | 611 | 407 | 306 | 204 | 153 | 102 | 76 | |
| | | (16-24) | Fr | 0.0002 | 0.0002 | 0.0003 | 0.0005 | 0.0007 | 0.0010 | 0.0013 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| | M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 105 | RPM | 3209 | 2139 | 1604 | 1070 | 802 | 535 | 401 |
| | | | (84-126) | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0018 | 0.0024 | 0.0036 | 0.0047 |
| | | | | Feed (ipm) | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |
| ≤ 330 Bhn or ≤ 36 HRc | | 75 | RPM | 2292 | 1528 | 1146 | 764 | 573 | 382 | 287 | |
| | | (60-90) | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0018 | 0.0024 | 0.0037 | 0.0049 | |
| | | | Feed (ipm) | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | | ≤ 250 Bhn or ≤ 24 HRc | 53 | RPM | 1620 | 1080 | 810 | 540 | 405 | 270 | 202 |
| | | | (42-64) | Fr | 0.0003 | 0.0005 | 0.0006 | 0.0009 | 0.0012 | 0.0019 | 0.0025 |
| | | | | Feed (ipm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| | | ≤ 330 Bhn or ≤ 36 HRc | 46 | RPM | 1406 | 937 | 703 | 469 | 351 | 234 | 176 |
| | | | (37-55) | Fr | 0.0002 | 0.0003 | 0.0004 | 0.0006 | 0.0009 | 0.0013 | 0.0017 |
| | | | | Feed (ipm) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 28 | RPM | 856 | 570 | 428 | 285 | 214 | 143 | 107 |
| | | | (22-34) | Fr | 0.0004 | 0.0005 | 0.0007 | 0.0011 | 0.0014 | 0.0021 | 0.0028 |
| | | | | Feed (ipm) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 21 | RPM | 642 | 428 | 321 | 214 | 160 | 107 | 80 |
| | | | (17-25) | Fr | 0.0002 | 0.0002 | 0.0003 | 0.0005 | 0.0006 | 0.0009 | 0.0012 |
| | | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

continued on next page

Single Flute Countersink

| Series 601 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|---|---|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy | ≤ 220 Bhn or ≤ 19 HRc | 18 (14-22) | RPM | 550 | 367 | 275 | 183 | 138 | 92 | 69 | |
| | | | Fr | 0.0002 | 0.0003 | 0.0004 | 0.0005 | 0.0007 | 0.0011 | 0.0015 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| | ≤ 320 Bhn or ≤ 34 HRc | 14 (11-17) | RPM | 428 | 285 | 214 | 143 | 107 | 71 | 53 | |
| | | | Fr | 0.0002 | 0.0004 | 0.0005 | 0.0007 | 0.0009 | 0.0014 | 0.0019 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 12 (10-14) | RPM | 367 | 244 | 183 | 122 | 92 | 61 | 46 | |
| | | | Fr | 0.0003 | 0.0004 | 0.0005 | 0.0008 | 0.0011 | 0.0016 | 0.0022 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 36 (29-43) | RPM | 1100 | 733 | 550 | 367 | 275 | 183 | 138 |
| | | | | Fr | 0.0005 | 0.0007 | 0.0009 | 0.0014 | 0.0018 | 0.0027 | 0.0036 |
| | | | | Feed (ipm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 |
| ≤ 350 Bhn or ≤ 38 HRc | | 28 (22-34) | RPM | 856 | 570 | 428 | 285 | 214 | 143 | 107 | |
| | | | Fr | 0.0004 | 0.0005 | 0.0007 | 0.0011 | 0.0014 | 0.0021 | 0.0028 | |
| | | | Feed (ipm) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | |
| ≤ 440 Bhn or ≤ 47 HRc | | 21 (17-25) | RPM | 642 | 428 | 321 | 214 | 160 | 107 | 80 | |
| | | | Fr | 0.0002 | 0.0002 | 0.0003 | 0.0005 | 0.0006 | 0.0009 | 0.0012 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 225 (180-270) | RPM | 6876 | 4584 | 3438 | 2292 | 1719 | 1146 | 860 |
| | | | | Fr | 0.0008 | 0.0011 | 0.0015 | 0.0023 | 0.0030 | 0.0045 | 0.0061 |
| | | | | Feed (ipm) | 5.2 | 5.2 | 5.2 | 5.2 | 5.2 | 5.2 | 5.2 |
| | ≤ 150 Bhn or ≤ 7 HRc | 190 (152-228) | RPM | 5806 | 3871 | 2903 | 1935 | 1452 | 968 | 726 | |
| | | | Fr | 0.0008 | 0.0011 | 0.0015 | 0.0023 | 0.0030 | 0.0045 | 0.0061 | |
| | | | Feed (ipm) | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | 4.4 | |
| | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 95 (76-114) | RPM | 2903 | 1935 | 1452 | 968 | 726 | 484 | 363 |
| | | | | Fr | 0.0004 | 0.0006 | 0.0008 | 0.0011 | 0.0015 | 0.0023 | 0.0030 |
| | | | | Feed (ipm) | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 | 1.1 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 80 (64-96) | RPM | 2445 | 1630 | 1222 | 815 | 611 | 407 | 306 |
| | | | | Fr | 0.0004 | 0.0006 | 0.0008 | 0.0012 | 0.0016 | 0.0025 | 0.0033 |
| | | | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

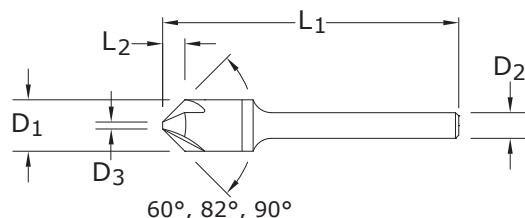
rpm = Vc x 3.82 / D₁

ipm = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

3 Flute Countersink



603
FRACTIONAL SERIES

TOLERANCES (inch)

1/8–1/4 DIAMETER

$D_1 = +.0000/-0.0005$

3/8–1 DIAMETER

$D_1 = +.003/-0.000$

Included Angle

$+1^\circ/-1^\circ$

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS

For patent information visit www.ksptpatents.com

| inch | | | | EDP NO. | | |
|---------------------------|-------------------------|-------------------------|-----------------------|-----------------|-----------------|-----------------|
| CUTTING DIAMETER D_1 | SHANK DIAMETER D_2 | OVERALL LENGTH L_1 | TIP DIAMETER D_3 | UNCOATED 60° | UNCOATED 82° | UNCOATED 90° |
| 1/8 | 1/8 | 1-1/2 | .040 | — | — | 74225 |
| 1/8 | 1/8 | 1-1/2 | .040 | — | 74125 | — |
| 1/8 | 1/8 | 1-1/2 | .035 | 74025 | — | — |
| 3/16 | 3/16 | 2 | .060 | — | — | 74228 |
| 3/16 | 3/16 | 2 | .060 | — | 74128 | — |
| 3/16 | 3/16 | 2 | .045 | 74028 | — | — |
| 1/4 | 1/4 | 2 | .100 | — | — | 74231 |
| 1/4 | 1/4 | 2 | .100 | — | 74131 | — |
| 1/4 | 1/4 | 2 | .070 | 74031 | — | — |
| 3/8* | 1/4 | 2-13/16 | .108 | — | — | 74234 |
| 3/8* | 1/4 | 2-13/16 | .108 | — | 74134 | — |
| 3/8* | 1/4 | 2-13/16 | .100 | 74034 | — | — |
| 1/2* | 1/4 | 2-7/8 | .122 | — | — | 74237 |
| 1/2* | 1/4 | 2-7/8 | .122 | — | 74137 | — |
| 1/2* | 1/4 | 2-7/8 | .113 | 74037 | — | — |
| 5/8* | 3/8 | 3 | .138 | — | — | 74240 |
| 5/8* | 3/8 | 3 | .138 | — | 74140 | — |
| 5/8* | 3/8 | 3 | .128 | 74040 | — | — |
| 3/4* | 1/2 | 3 | .153 | — | — | 74243 |
| 3/4* | 1/2 | 3 | .153 | — | 74143 | — |
| 3/4* | 1/2 | 3 | .143 | 74043 | — | — |
| 1* | 1/2 | 3-1/4 | .168 | — | — | 74246 |
| 1* | 1/2 | 3-1/4 | .168 | — | 74146 | — |
| 1* | 1/2 | 3-1/4 | .158 | 74046 | — | — |

*Steel Shank / Con mango de acero / Avec queue en acier / Mit Stahlschaft
NOTE: D3 dimension varies based on angle. Contact your KSPT representative or consult KYOCERA SGS Tool Wizard® for dimension information.

3 Flute Countersink

| Series 603 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|--|---|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 125 | RPM | 3820 | 2547 | 1910 | 1273 | 955 | 637 | 478 | |
| | | (100-150) | Fr | 0.0008 | 0.0012 | 0.0016 | 0.0024 | 0.0031 | 0.0047 | 0.0063 | |
| | | | Feed (ipm) | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | |
| | ≤ 300 Bhn or ≤ 32 HRc | 60 | RPM | 1834 | 1222 | 917 | 611 | 458 | 306 | 229 | |
| | | (48-72) | Fr | 0.0007 | 0.0011 | 0.0014 | 0.0021 | 0.0028 | 0.0043 | 0.0057 | |
| | | | Feed (ipm) | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | 1.3 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 45 | RPM | 1375 | 917 | 688 | 458 | 344 | 229 | 172 | |
| | | (36-54) | Fr | 0.0004 | 0.0007 | 0.0009 | 0.0013 | 0.0017 | 0.0026 | 0.0035 | |
| | | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | |
| | P ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 95 | RPM | 2903 | 1935 | 1452 | 968 | 726 | 484 | 363 |
| | | | (76-114) | Fr | 0.0007 | 0.0010 | 0.0014 | 0.0021 | 0.0028 | 0.0041 | 0.0055 |
| | | | | Feed (ipm) | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| ≤ 375 Bhn or ≤ 40 HRc | | 60 | RPM | 1834 | 1222 | 917 | 611 | 458 | 306 | 229 | |
| | | (48-72) | Fr | 0.0007 | 0.0010 | 0.0013 | 0.0020 | 0.0026 | 0.0039 | 0.0052 | |
| | | | Feed (ipm) | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | 1.2 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 35 | RPM | 1070 | 713 | 535 | 357 | 267 | 178 | 134 | |
| | | (28-42) | Fr | 0.0004 | 0.0006 | 0.0007 | 0.0011 | 0.0015 | 0.0022 | 0.0030 | |
| | | | Feed (ipm) | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | |
| H TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 250 Bhn or ≤ 24 HRc | 35 | RPM | 1070 | 713 | 535 | 357 | 267 | 178 | 134 |
| | | | (28-42) | Fr | 0.0004 | 0.0006 | 0.0007 | 0.0011 | 0.0015 | 0.0022 | 0.0030 |
| | | | | Feed (ipm) | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | ≤ 375 Bhn or ≤ 40 HRc | 25 | RPM | 764 | 509 | 382 | 255 | 191 | 127 | 96 | |
| | | (20-30) | Fr | 0.0003 | 0.0004 | 0.0005 | 0.0008 | 0.0010 | 0.0016 | 0.0021 | |
| | | | Feed (ipm) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 20 | RPM | 611 | 407 | 306 | 204 | 153 | 102 | 76 | |
| | | (16-24) | Fr | 0.0002 | 0.0002 | 0.0003 | 0.0005 | 0.0007 | 0.0010 | 0.0013 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| | K CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 105 | RPM | 3209 | 2139 | 1604 | 1070 | 802 | 535 | 401 |
| | | | (84-126) | Fr | 0.0009 | 0.0014 | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0072 |
| | | | | Feed (ipm) | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 | 2.9 |
| ≤ 330 Bhn or ≤ 36 HRc | | 75 | RPM | 2292 | 1528 | 1146 | 764 | 573 | 382 | 287 | |
| | | (60-90) | Fr | 0.0009 | 0.0014 | 0.0018 | 0.0027 | 0.0037 | 0.0055 | 0.0073 | |
| | | | Feed (ipm) | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | ≤ 250 Bhn or ≤ 24 HRc | 53 | RPM | 1620 | 1080 | 810 | 540 | 405 | 270 | 202 | |
| | | (42-64) | Fr | 0.0004 | 0.0006 | 0.0009 | 0.0013 | 0.0017 | 0.0026 | 0.0035 | |
| | | | Feed (ipm) | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | |
| | ≤ 330 Bhn or ≤ 36 HRc | 46 | RPM | 1406 | 937 | 703 | 469 | 351 | 234 | 176 | |
| | | (37-55) | Fr | 0.0004 | 0.0005 | 0.0007 | 0.0011 | 0.0014 | 0.0021 | 0.0028 | |
| | | | Feed (ipm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 28 | RPM | 856 | 570 | 428 | 285 | 214 | 143 | 107 |
| | | | (22-34) | Fr | 0.0005 | 0.0007 | 0.0009 | 0.0014 | 0.0019 | 0.0028 | 0.0037 |
| | | | | Feed (ipm) | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 21 | RPM | 642 | 428 | 321 | 214 | 160 | 107 | 80 |
| | | | (17-25) | Fr | 0.0002 | 0.0002 | 0.0003 | 0.0005 | 0.0006 | 0.0009 | 0.0012 |
| | | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

continued on next page

3 Flute Countersink

| Series 603 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|--|---|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| S SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy | ≤ 220 Bhn or ≤ 19 HRc | 18 | RPM | 550 | 367 | 275 | 183 | 138 | 92 | 69 | |
| | | (14-22) | Fr | 0.0004 | 0.0005 | 0.0007 | 0.0011 | 0.0015 | 0.0022 | 0.0029 | |
| | | | Feed (ipm) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | |
| | ≤ 320 Bhn or ≤ 34 HRc | 14 | RPM | 428 | 285 | 214 | 143 | 107 | 71 | 53 | |
| | | (11-17) | Fr | 0.0002 | 0.0004 | 0.0005 | 0.0007 | 0.0009 | 0.0014 | 0.0019 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 12 | RPM | 367 | 244 | 183 | 122 | 92 | 61 | 46 | |
| | | (10-14) | Fr | 0.0003 | 0.0004 | 0.0005 | 0.0008 | 0.0011 | 0.0016 | 0.0022 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| | N TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 36 | RPM | 1100 | 733 | 550 | 367 | 275 | 183 | 138 |
| | | | (29-43) | Fr | 0.0007 | 0.0011 | 0.0015 | 0.0022 | 0.0029 | 0.0044 | 0.0058 |
| | | | | Feed (ipm) | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 |
| ≤ 350 Bhn or ≤ 38 HRc | | 28 | RPM | 856 | 570 | 428 | 285 | 214 | 143 | 107 | |
| | | (22-34) | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0018 | 0.0023 | 0.0035 | 0.0047 | |
| | | | Feed (ipm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | |
| ≤ 440 Bhn or ≤ 47 HRc | | 21 | RPM | 642 | 428 | 321 | 214 | 160 | 107 | 80 | |
| | | (17-25) | Fr | 0.0002 | 0.0002 | 0.0003 | 0.0005 | 0.0006 | 0.0009 | 0.0012 | |
| | | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | |
| ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | ≤ 80 Bhn or ≤ 47 HRb | 225 | RPM | 6876 | 4584 | 3438 | 2292 | 1719 | 1146 | 860 |
| | | | (180-270) | Fr | 0.0011 | 0.0017 | 0.0023 | 0.0034 | 0.0045 | 0.0068 | 0.0091 |
| | | | | Feed (ipm) | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 | 7.8 |
| | ≤ 150 Bhn or ≤ 7 HRc | 190 | RPM | 5806 | 3871 | 2903 | 1935 | 1452 | 968 | 726 | |
| | | (152-228) | Fr | 0.0011 | 0.0017 | 0.0022 | 0.0034 | 0.0045 | 0.0067 | 0.0090 | |
| | | | Feed (ipm) | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | 6.5 | |
| COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 95 | RPM | 2903 | 1935 | 1452 | 968 | 726 | 484 | 363 | |
| | | (76-114) | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0018 | 0.0023 | 0.0035 | 0.0047 | |
| | | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | |
| | ≤ 200 Bhn or ≤ 23 HRc | 80 | RPM | 2445 | 1630 | 1222 | 815 | 611 | 407 | 306 | |
| | | (64-96) | Fr | 0.0006 | 0.0009 | 0.0011 | 0.0017 | 0.0023 | 0.0034 | 0.0046 | |
| | | | Feed (ipm) | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | 1.4 | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

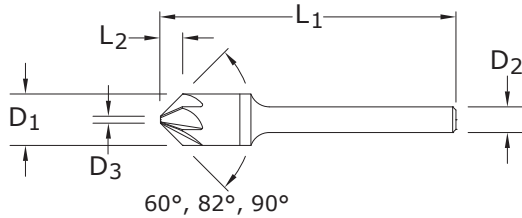
rpm = Vc x 3.82 / D₁

ipm = Fr x rpm

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

6 Flute Countersink



606

FRACTIONAL SERIES

| CUTTING DIAMETER D ₁ | SHANK DIAMETER D ₂ | OVERALL LENGTH L ₁ | TIP DIAMETER D ₃ | EDP NO. | | |
|------------------------------------|----------------------------------|----------------------------------|--------------------------------|--------------|--------------|--------------|
| | | | | UNCOATED 60° | UNCOATED 82° | UNCOATED 90° |
| 1/8 | 1/8 | 1-1/2 | .035 | — | — | 74249 |
| 1/8 | 1/8 | 1-1/2 | .035 | — | 74149 | — |
| 1/8 | 1/8 | 1-1/2 | .035 | 74049 | — | — |
| 3/16 | 3/16 | 2 | .045 | — | — | 74252 |
| 3/16 | 3/16 | 2 | .045 | — | 74152 | — |
| 3/16 | 3/16 | 2 | .045 | 74052 | — | — |
| 1/4 | 1/4 | 2 | .070 | — | — | 74255 |
| 1/4 | 1/4 | 2 | .070 | — | 74155 | — |
| 1/4 | 1/4 | 2 | .070 | 74055 | — | — |
| 3/8* | 1/4 | 2-13/16 | .100 | — | — | 74258 |
| 3/8* | 1/4 | 2-13/16 | .100 | — | 74158 | — |
| 3/8* | 1/4 | 2-13/16 | .100 | 74058 | — | — |
| 1/2* | 1/4 | 2-7/8 | .160 | — | — | 74261 |
| 1/2* | 1/4 | 2-7/8 | .160 | — | 74161 | — |
| 1/2* | 1/4 | 2-7/8 | .160 | 74061 | — | — |
| 5/8* | 3/8 | 3 | .190 | — | — | 74264 |
| 5/8* | 3/8 | 3 | .190 | — | 74164 | — |
| 5/8* | 3/8 | 3 | .190 | 74064 | — | — |
| 3/4* | 1/2 | 3 | .220 | — | — | 74267 |
| 3/4* | 1/2 | 3 | .220 | — | 74167 | — |
| 3/4* | 1/2 | 3 | .220 | 74067 | — | — |
| 1* | 1/2 | 3-1/4 | .260 | — | — | 74270 |
| 1* | 1/2 | 3-1/4 | .260 | — | 74170 | — |
| 1* | 1/2 | 3-1/4 | .260 | 74070 | — | — |

*Steel Shank / Con mango de acero / Avec queue en acier / Mit Stahlschaft

NOTE: D₃ dimension varies based on angle. Contact your KSPT representative or consult KYOCERA SGS Tool Wizard® for dimension information.

TOLERANCES (inch)

1/8–1/4 DIAMETER

D₁ = +.0000/–.0005

3/8–1 DIAMETER

D₁ = +.003/–.000

Included Angle

+1°/–1°

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com

6 Flute Countersink

| Series 606 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|--|--|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 125 | RPM | 3820 | 2547 | 1910 | 1273 | 955 | 637 | 478 | |
| | | (100-150) | Fr | 0.0010 | 0.0016 | 0.0021 | 0.0031 | 0.0042 | 0.0063 | 0.0084 | |
| | | | Feed (ipm) | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | |
| | ≤ 300 Bhn or ≤ 32 HRc | 60 | RPM | 1834 | 1222 | 917 | 611 | 458 | 306 | 229 | |
| | | (48-72) | Fr | 0.0010 | 0.0015 | 0.0020 | 0.0029 | 0.0039 | 0.0059 | 0.0079 | |
| | | | Feed (ipm) | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | 1.8 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 45 | RPM | 1375 | 917 | 688 | 458 | 344 | 229 | 172 | |
| | | (36-54) | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0017 | 0.0023 | 0.0035 | 0.0047 | |
| | | | Feed (ipm) | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | 0.8 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 95 | RPM | 2903 | 1935 | 1452 | 968 | 726 | 484 | 363 |
| | | | (76-114) | Fr | 0.0009 | 0.0013 | 0.0018 | 0.0027 | 0.0036 | 0.0054 | 0.0072 |
| | | | | Feed (ipm) | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 | 2.6 |
| ≤ 375 Bhn or ≤ 40 HRc | | 60 | RPM | 1834 | 1222 | 917 | 611 | 458 | 306 | 229 | |
| | | (48-72) | Fr | 0.0009 | 0.0014 | 0.0019 | 0.0028 | 0.0037 | 0.0056 | 0.0074 | |
| | | | Feed (ipm) | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 35 | RPM | 1070 | 713 | 535 | 357 | 267 | 178 | 134 | |
| | | (28-42) | Fr | 0.0006 | 0.0008 | 0.0011 | 0.0017 | 0.0022 | 0.0034 | 0.0045 | |
| | | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 250 Bhn or ≤ 24 HRc | 35 | RPM | 1070 | 713 | 535 | 357 | 267 | 178 | 134 |
| | | | (28-42) | Fr | 0.0006 | 0.0008 | 0.0011 | 0.0017 | 0.0022 | 0.0034 | 0.0045 |
| | | | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| | ≤ 375 Bhn or ≤ 40 HRc | 25 | RPM | 764 | 509 | 382 | 255 | 191 | 127 | 96 | |
| | | (20-30) | Fr | 0.0003 | 0.0004 | 0.0005 | 0.0008 | 0.0010 | 0.0016 | 0.0021 | |
| | | | Feed (ipm) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 20 | RPM | 611 | 407 | 306 | 204 | 153 | 102 | 76 | |
| | | (16-24) | Fr | 0.0003 | 0.0005 | 0.0007 | 0.0010 | 0.0013 | 0.0020 | 0.0026 | |
| | | | Feed (ipm) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | |
| | K CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 105 | RPM | 3209 | 2139 | 1604 | 1070 | 802 | 535 | 401 |
| | | | (84-126) | Fr | 0.0012 | 0.0018 | 0.0024 | 0.0036 | 0.0049 | 0.0073 | 0.0097 |
| | | | | Feed (ipm) | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 | 3.9 |
| ≤ 330 Bhn or ≤ 36 HRc | | 75 | RPM | 2292 | 1528 | 1146 | 764 | 573 | 382 | 287 | |
| | | (60-90) | Fr | 0.0012 | 0.0018 | 0.0024 | 0.0037 | 0.0049 | 0.0073 | 0.0098 | |
| | | | Feed (ipm) | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | 2.8 | |

continued on next page

6 Flute Countersink

| Series 606 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|-----------------------------|--|-----------------------------|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|-----|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | ≤ 250 Bhn or ≤ 24 HRc | 53 | RPM | 1620 | 1080 | 810 | 540 | 405 | 270 | 202 |
| | | (42-64) | Fr | 0.0006 | 0.0009 | 0.0012 | 0.0019 | 0.0025 | 0.0037 | 0.0049 | |
| | | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| | | ≤ 330 Bhn or ≤ 36 HRc | 46 | RPM | 1406 | 937 | 703 | 469 | 351 | 234 | 176 |
| | | (37-55) | Fr | 0.0005 | 0.0007 | 0.0010 | 0.0015 | 0.0020 | 0.0030 | 0.0040 | |
| | | | Feed (ipm) | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | 0.7 | |
| | STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 28 | RPM | 856 | 570 | 428 | 285 | 214 | 143 | 107 |
| | | (22-34) | Fr | 0.0007 | 0.0011 | 0.0014 | 0.0021 | 0.0028 | 0.0042 | 0.0056 | |
| | | | Feed (IPM) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | |
| | | ≤ 375 Bhn or ≤ 40 HRc | 21 | RPM | 642 | 428 | 321 | 214 | 160 | 107 | 80 |
| | | (17-25) | Fr | 0.0003 | 0.0005 | 0.0006 | 0.0009 | 0.0012 | 0.0019 | 0.0025 | |
| | | | Feed (IPM) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy | ≤ 220 Bhn or ≤ 19 HRc | 18 | RPM | 550 | 367 | 275 | 183 | 138 | 92 | 69 |
| | | (14-22) | Fr | 0.0005 | 0.0008 | 0.0011 | 0.0016 | 0.0022 | 0.0033 | 0.0044 | |
| | | | Feed (ipm) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | |
| | | ≤ 320 Bhn or ≤ 34 HRc | 14 | RPM | 428 | 285 | 214 | 143 | 107 | 71 | 53 |
| | | (11-17) | Fr | 0.0005 | 0.0007 | 0.0009 | 0.0014 | 0.0019 | 0.0028 | 0.0037 | |
| | | | Feed (ipm) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 12 | RPM | 367 | 244 | 183 | 122 | 92 | 61 | 46 | |
| | (10-14) | Fr | 0.0003 | 0.0004 | 0.0005 | 0.0008 | 0.0011 | 0.0016 | 0.0022 | | |
| | | Feed (ipm) | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 36 | RPM | 1100 | 733 | 550 | 367 | 275 | 183 | 138 |
| | | (29-43) | Fr | 0.0009 | 0.0014 | 0.0018 | 0.0027 | 0.0036 | 0.0055 | 0.0073 | |
| | | | Feed (ipm) | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | 1.0 | |
| ≤ 350 Bhn or ≤ 38 HRc | | 28 | RPM | 856 | 570 | 428 | 285 | 214 | 143 | 107 | |
| (22-34) | | Fr | 0.0007 | 0.0011 | 0.0014 | 0.0021 | 0.0028 | 0.0042 | 0.0056 | | |
| | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | | |
| ≤ 440 Bhn or ≤ 47 HRc | 21 | RPM | 642 | 428 | 321 | 214 | 160 | 107 | 80 | | |
| (17-25) | Fr | 0.0003 | 0.0005 | 0.0006 | 0.0009 | 0.0012 | 0.0019 | 0.0025 | | | |
| | Feed (ipm) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | | | |

continued on next page

6 Flute Countersink

| Series 606 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|--|--|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/8 | 3/16 | 1/4 | 3/8 | 1/2 | 3/4 | 1 | | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | ≤ 80 Bhn or ≤ 47 HRb | 225 (180-270) | RPM | 6876 | 4584 | 3438 | 2292 | 1719 | 1146 | 860 | |
| | | | Fr | 0.0015 | 0.0022 | 0.0030 | 0.0045 | 0.0060 | 0.0090 | 0.0120 | |
| | | | Feed (ipm) | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | 10.3 | |
| | ≤ 150 Bhn or ≤ 7 HRc | 190 (152-228) | RPM | 5806 | 3871 | 2903 | 1935 | 1452 | 968 | 726 | |
| | | | Fr | 0.0015 | 0.0022 | 0.0030 | 0.0045 | 0.0060 | 0.0090 | 0.0120 | |
| | | | Feed (ipm) | 8.7 | 8.7 | 8.7 | 8.7 | 8.7 | 8.7 | 8.7 | |
| | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 95 (76-114) | RPM | 2903 | 1935 | 1452 | 968 | 726 | 484 | 363 |
| | | | | Fr | 0.0008 | 0.0011 | 0.0015 | 0.0023 | 0.0030 | 0.0045 | 0.0061 |
| | | | | Feed (ipm) | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 | 2.2 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 80 (64-96) | RPM | 2445 | 1630 | 1222 | 815 | 611 | 407 | 306 |
| | | | | Fr | 0.0008 | 0.0012 | 0.0016 | 0.0023 | 0.0031 | 0.0047 | 0.0062 |
| | | | | Feed (ipm) | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 | 1.9 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

$rpm = Vc \times 3.82 / D_1$

$ipm = Fr \times rpm$

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Straight Flute Accu-Reamer

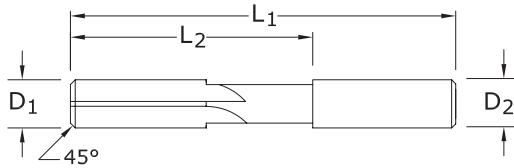


5xD



200

FRACTIONAL SERIES



| inch | | | | | EDP NO. |
|------------------------------------|----------------------------------|---------------------------------------|----------------------------------|---------------|----------|
| CUTTING DIAMETER D ₁ | SHANK DIAMETER D ₂ | MAXIMUM REAM LENGTH L ₂ | OVERALL LENGTH L ₁ | NO. OF FLUTES | UNCOATED |
| 3/64 | 3/64 | 3/4 | 1-1/2 | 4 | 70003 |
| 1/16 | 1/16 | 3/4 | 1-1/2 | 4 | 70004 |
| 5/64 | 5/64 | 1 | 2 | 4 | 70005 |
| 3/32 | 3/32 | 1-1/4 | 2-1/4 | 4 | 70006 |
| 7/64 | 7/64 | 1-1/4 | 2-1/4 | 4 | 70007 |
| 1/8 | 1/8 | 1-1/4 | 2-1/4 | 4 | 70008 |
| 9/64 | 9/64 | 1-1/2 | 2-1/2 | 4 | 70009 |
| 5/32 | 5/32 | 1-1/2 | 2-1/2 | 4 | 70010 |
| 11/64 | 11/64 | 1-3/4 | 2-3/4 | 4 | 70011 |
| 3/16 | 3/16 | 1-3/4 | 2-3/4 | 4 | 70012 |
| 13/64 | 13/64 | 2 | 3 | 4 | 70013 |
| 7/32 | 7/32 | 2 | 3 | 4 | 70014 |
| 15/64 | 15/64 | 2 | 3 | 4 | 70015 |
| 1/4 | 1/4 | 2 | 3 | 4 | 70016 |
| 17/64 | 17/64 | 2-1/4 | 3-1/4 | 6 | 70017 |
| 9/32 | 9/32 | 2-1/4 | 3-1/4 | 6 | 70018 |
| 19/64 | 19/64 | 2-1/4 | 3-1/4 | 6 | 70019 |
| 5/16 | 5/16 | 2-1/4 | 3-1/4 | 6 | 70020 |
| 21/64 | 21/64 | 2-3/8 | 3-1/2 | 6 | 70021 |
| 11/32 | 11/32 | 2-3/8 | 3-1/2 | 6 | 70022 |
| 23/64 | 23/64 | 2-3/8 | 3-1/2 | 6 | 70023 |
| 3/8 | 3/8 | 2-3/8 | 3-1/2 | 6 | 70024 |
| 25/64 | 25/64 | 2-7/8 | 4 | 6 | 70025 |
| 13/32 | 13/32 | 2-7/8 | 4 | 6 | 70026 |
| 27/64 | 27/64 | 2-7/8 | 4 | 6 | 70027 |
| 7/16 | 7/16 | 2-7/8 | 4 | 6 | 70028 |
| 29/64 | 29/64 | 2-7/8 | 4 | 6 | 70029 |
| 15/32 | 15/32 | 2-7/8 | 4 | 6 | 70030 |
| 31/64 | 31/64 | 2-7/8 | 4 | 6 | 70031 |
| 1/2 | 1/2 | 2-7/8 | 4 | 6 | 70032 |

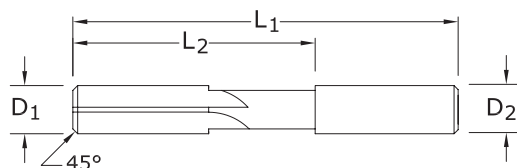
TOLERANCES (inch)

D₁ = +.0002/-0.0000
D₂ = +.0002/-0.0000

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com

Straight Flute Accu-Reamer


TOLERANCES (inch)
 $D_1 = +.0002/-0.0000$
 $D_2 = +.0002/-0.0000$

200
 FRACTIONAL SERIES

| inch | | | | NO. OF FLUTES |
|---------------------------|-------------------------|------------------------------|-------------------------|---------------|
| CUTTING DIAMETER D_1 | SHANK DIAMETER D_2 | MAXIMUM REAM LENGTH L_2 | OVERALL LENGTH L_1 | |
| .0470 – .0625 | 1/16 | 3/4 | 1-1/2 | 4 |
| .0626 – .0781 | 5/64 | 1 | 2 | 4 |
| .0782 – .0938 | 3/32 | 1-1/4 | 2-1/4 | 4 |
| .0939 – .1094 | 7/64 | 1-1/4 | 2-1/4 | 4 |
| .1095 – .1250 | 1/8 | 1-1/4 | 2-1/4 | 4 |
| .1251 – .1406 | 9/64 | 1-1/2 | 2-1/2 | 4 |
| .1407 – .1562 | 5/32 | 1-1/2 | 2-1/2 | 4 |
| .1563 – .1719 | 11/64 | 1-3/4 | 2-3/4 | 4 |
| .1720 – .1875 | 3/16 | 1-3/4 | 2-3/4 | 4 |
| .1876 – .2031 | 13/64 | 2 | 3 | 4 |
| .2032 – .2188 | 7/32 | 2 | 3 | 4 |
| .2189 – .2344 | 15/64 | 2 | 3 | 4 |
| .2345 – .2500 | 1/4 | 2 | 3 | 4 |
| .2501 – .2656 | 17/64 | 2-1/4 | 3-1/4 | 6 |
| .2657 – .2812 | 9/32 | 2-1/4 | 3-1/4 | 6 |
| .2813 – .2969 | 19/64 | 2-1/4 | 3-1/4 | 6 |
| .2970 – .3125 | 5/16 | 2-1/4 | 3-1/4 | 6 |
| .3126 – .3281 | 21/64 | 2-3/8 | 3-1/2 | 6 |
| .3282 – .3438 | 11/32 | 2-3/8 | 3-1/2 | 6 |
| .3439 – .3594 | 23/64 | 2-3/8 | 3-1/2 | 6 |
| .3595 – .3750 | 3/8 | 2-3/8 | 3-1/2 | 6 |
| .3751 – .3906 | 25/64 | 2-7/8 | 4 | 6 |
| .3907 – .4062 | 13/32 | 2-7/8 | 4 | 6 |
| .4063 – .4219 | 27/64 | 2-7/8 | 4 | 6 |
| .4220 – .4375 | 7/16 | 2-7/8 | 4 | 6 |
| .4376 – .4531 | 29/64 | 2-7/8 | 4 | 6 |
| .4532 – .4688 | 15/32 | 2-7/8 | 4 | 6 |
| .4689 – .4844 | 31/64 | 2-7/8 | 4 | 6 |
| .4845 – .5000 | 1/2 | 2-7/8 | 4 | 6 |

SER 200 Fractional reamers can be ordered to specific diameters according to the size range of Cutting Diameter D_1 . Please order as:

- 200. Then the size of the cut diameter in fractional format.
 - i.e. 200.0492
 - Description: Series 200 size 0.0492
 - For Metric sizes convert to fractional inches (i.e. $\div 25.4$)
 - The above sample would be a 1.25mm size ($1.25 \div 25.4 = 0.0492$)
- All other dimensions are fractional as per table including the Shank

Straight Flute Accu-Reamer

| Series 200 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | |
|--|---|-----------------------------|--------------------------------------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | 1/16 | 1/8 | 3/16 | 1/4 | 5/16 | 3/8 | 1/2 | | |
| P CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 150 | RPM | 9168 | 4584 | 3056 | 2292 | 1834 | 1528 | 1146 | |
| | | (120-180) | Fr | 0.0018 | 0.0035 | 0.0053 | 0.0071 | 0.0088 | 0.0106 | 0.0141 | |
| | | | Feed (ipm) | 16.5 | 16.0 | 16.2 | 16.3 | 16.1 | 16.2 | 16.2 | |
| | ≤ 300 Bhn or ≤ 32 HRc | 75 | RPM | 4584 | 2292 | 1528 | 1146 | 917 | 764 | 573 | |
| | | (60-90) | Fr | 0.0016 | 0.0031 | 0.0047 | 0.0062 | 0.0078 | 0.0093 | 0.0124 | |
| | | | Feed (ipm) | 7.3 | 7.1 | 7.2 | 7.1 | 7.2 | 7.1 | 7.1 | |
| | ≤ 425 Bhn or ≤ 45 HRc | 55 | RPM | 3362 | 1681 | 1121 | 840 | 672 | 560 | 420 | |
| | | (44-66) | Fr | 0.0009 | 0.0019 | 0.0028 | 0.0037 | 0.0046 | 0.0056 | 0.0074 | |
| | | | Feed (ipm) | 3.0 | 3.2 | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 | |
| | H ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 115 | RPM | 7029 | 3514 | 2343 | 1757 | 1406 | 1171 | 879 |
| | | | (92-138) | Fr | 0.0015 | 0.0030 | 0.0045 | 0.0060 | 0.0075 | 0.0090 | 0.0120 |
| | | | | Feed (ipm) | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 | 10.5 |
| ≤ 375 Bhn or ≤ 40 HRc | | 70 | RPM | 4278 | 2139 | 1426 | 1070 | 856 | 713 | 535 | |
| | | (56-84) | Fr | 0.0015 | 0.0030 | 0.0045 | 0.0060 | 0.0075 | 0.0090 | 0.0120 | |
| | | | Feed (ipm) | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | 6.4 | |
| ≤ 450 Bhn or ≤ 48 HRc | | 45 | RPM | 2750 | 1375 | 917 | 688 | 550 | 458 | 344 | |
| | | (36-54) | Fr | 0.0009 | 0.0019 | 0.0028 | 0.0037 | 0.0046 | 0.0056 | 0.0074 | |
| | | | Feed (ipm) | 2.5 | 2.6 | 2.6 | 2.5 | 2.5 | 2.6 | 2.5 | |
| K TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | | ≤ 250 Bhn or ≤ 24 HRc | 40 | RPM | 2445 | 1222 | 815 | 611 | 489 | 407 | 306 |
| | | | (32-48) | Fr | 0.0010 | 0.0020 | 0.0029 | 0.0039 | 0.0049 | 0.0059 | 0.0078 |
| | | | | Feed (ipm) | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 | 2.4 |
| | ≤ 375 Bhn or ≤ 40 HRc | 25 | RPM | 1528 | 764 | 509 | 382 | 306 | 255 | 191 | |
| | | (20-30) | Fr | 0.0006 | 0.0013 | 0.0019 | 0.0025 | 0.0031 | 0.0038 | 0.0050 | |
| | | | Feed (ipm) | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | |
| | ≤ 475 Bhn or ≤ 50 HRc | 20 | RPM | 1222 | 611 | 407 | 306 | 244 | 204 | 153 | |
| | | (16-24) | Fr | 0.0004 | 0.0008 | 0.0012 | 0.0016 | 0.0019 | 0.0023 | 0.0031 | |
| | | | Feed (ipm) | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | 0.5 | |
| | ≤ 655 Bhn or ≤ 60 HRc | 14 | RPM | 856 | 428 | 285 | 214 | 171 | 143 | 107 | |
| | | (11-17) | Fr | 0.0003 | 0.0007 | 0.0011 | 0.0014 | 0.0018 | 0.0021 | 0.0028 | |
| | | | Feed (ipm) | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | |
| M CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 125 | RPM | 7640 | 3820 | 2547 | 1910 | 1528 | 1273 | 955 | |
| | | (100-150) | Fr | 0.0020 | 0.0040 | 0.0060 | 0.0081 | 0.0101 | 0.0121 | 0.0161 | |
| | | | Feed (ipm) | 15.3 | 15.3 | 15.3 | 15.5 | 15.4 | 15.4 | 15.4 | |
| | ≤ 330 Bhn or ≤ 36 HRc | 95 | RPM | 5806 | 2903 | 1935 | 1452 | 1161 | 968 | 726 | |
| | | (76-114) | Fr | 0.0020 | 0.0040 | 0.0060 | 0.0081 | 0.0101 | 0.0121 | 0.0161 | |
| | | | Feed (ipm) | 11.6 | 11.6 | 11.6 | 11.8 | 11.7 | 11.7 | 11.7 | |
| M STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | ≤ 250 Bhn or ≤ 24 HRc | 75 | RPM | 4584 | 2292 | 1528 | 1146 | 917 | 764 | 573 | |
| | | (60-90) | Fr | 0.0010 | 0.0020 | 0.0029 | 0.0039 | 0.0049 | 0.0059 | 0.0078 | |
| | | | Feed (ipm) | 4.6 | 4.6 | 4.4 | 4.5 | 4.5 | 4.5 | 4.5 | |
| | ≤ 330 Bhn or ≤ 36 HRc | 55 | RPM | 3362 | 1681 | 1121 | 840 | 672 | 560 | 420 | |
| | | (44-66) | Fr | 0.0008 | 0.0015 | 0.0023 | 0.0030 | 0.0038 | 0.0045 | 0.0060 | |
| | | | Feed (ipm) | 2.7 | 2.5 | 2.6 | 2.5 | 2.6 | 2.5 | 2.5 | |
| | M STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | 35 | RPM | 2139 | 1070 | 713 | 535 | 428 | 357 | 267 |
| | | | (28-42) | Fr | 0.0010 | 0.0020 | 0.0029 | 0.0039 | 0.0049 | 0.0059 | 0.0078 |
| | | | | Feed (ipm) | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 |
| | | ≤ 375 Bhn or ≤ 40 HRc | 25 | RPM | 1528 | 764 | 509 | 382 | 306 | 255 | 191 |
| | | | (20-30) | Fr | 0.0006 | 0.0013 | 0.0019 | 0.0025 | 0.0031 | 0.0038 | 0.0050 |
| | | | | Feed (ipm) | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 |

continued on next page

Straight Flute Accu-Reamer

| Series | 200 Fractional | Hardness | Vc (sfm) | Diameter (D ₁) (inch) | | | | | | | | | |
|-----------------------------|--|-----------------------------|--|-----------------------------------|-----------|------------|--------|--------|--------|--------|--------|--------|--------|
| | | | | 1/16 | 1/8 | 3/16 | 1/4 | 5/16 | 3/8 | 1/2 | | | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy | ≤ 220 Bhn or ≤ 19 HRc | 20 | RPM | 1222 | 611 | 407 | 306 | 244 | 204 | 153 | | |
| | | | (16-24) | Fr | 0.0008 | 0.0015 | 0.0023 | 0.0030 | 0.0038 | 0.0045 | 0.0060 | | |
| | | | | Feed (ipm) | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | 0.9 | | |
| | | ≤ 320 Bhn or ≤ 34 HRc | 15 | RPM | 917 | 458 | 306 | 229 | 183 | 153 | 115 | | |
| | | | (12-18) | Fr | 0.0006 | 0.0013 | 0.0019 | 0.0025 | 0.0031 | 0.0038 | 0.0050 | | |
| | | | | Feed (ipm) | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | | |
| | | ≤ 425 Bhn or ≤ 45 HRc | 10 | RPM | 611 | 306 | 204 | 153 | 122 | 102 | 76 | | |
| | | | (8-12) | Fr | 0.0004 | 0.0007 | 0.0011 | 0.0015 | 0.0018 | 0.0022 | 0.0029 | | |
| | | | | Feed (ipm) | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | 0.2 | | |
| | | S | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | 45 | RPM | 2750 | 1375 | 917 | 688 | 550 | 458 | 344 |
| | | | | | (36-54) | Fr | 0.0015 | 0.0030 | 0.0045 | 0.0060 | 0.0075 | 0.0090 | 0.0120 |
| | | | | | | Feed (ipm) | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| ≤ 350 Bhn or ≤ 38 HRc | 35 | | | RPM | 2139 | 1070 | 713 | 535 | 428 | 357 | 267 | | |
| | (28-42) | | | Fr | 0.0010 | 0.0020 | 0.0029 | 0.0039 | 0.0049 | 0.0059 | 0.0078 | | |
| | | | | Feed (ipm) | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | 2.1 | | |
| ≤ 440 Bhn or ≤ 47 HRc | 25 | | | RPM | 1528 | 764 | 509 | 382 | 306 | 255 | 191 | | |
| | (20-30) | | | Fr | 0.0006 | 0.0013 | 0.0019 | 0.0025 | 0.0031 | 0.0038 | 0.0050 | | |
| | | | | Feed (ipm) | 0.9 | 1.0 | 1.0 | 1.0 | 0.9 | 1.0 | 1.0 | | |
| N | ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | | | ≤ 80 Bhn or ≤ 47 HRb | 270 | RPM | 16502 | 8251 | 5501 | 4126 | 3300 | 2750 | 2063 |
| | | | | | (216-324) | Fr | 0.0025 | 0.0050 | 0.0075 | 0.0100 | 0.0125 | 0.0150 | 0.0200 |
| | | | | | | Feed (ipm) | 41.3 | 41.3 | 41.3 | 41.3 | 41.3 | 41.3 | 41.3 |
| | | ≤ 150 Bhn or ≤ 7 HRc | 230 | RPM | 14058 | 7029 | 4686 | 3514 | 2812 | 2343 | 1757 | | |
| | | | (184-276) | Fr | 0.0025 | 0.0050 | 0.0075 | 0.0100 | 0.0125 | 0.0150 | 0.0200 | | |
| | | | | Feed (ipm) | 35.1 | 35.1 | 35.1 | 35.1 | 35.1 | 35.1 | 35.1 | | |
| | | ≤ 140 Bhn or ≤ 3 HRc | 115 | RPM | 7029 | 3514 | 2343 | 1757 | 1406 | 1171 | 879 | | |
| | | | (92-138) | Fr | 0.0013 | 0.0026 | 0.0038 | 0.0051 | 0.0064 | 0.0077 | 0.0102 | | |
| | | | | Feed (ipm) | 9.1 | 9.1 | 8.9 | 9.0 | 9.0 | 9.0 | 9.0 | | |
| | | ≤ 200 Bhn or ≤ 23 HRc | 95 | RPM | 5806 | 2903 | 1935 | 1452 | 1161 | 968 | 726 | | |
| | | | (76-114) | Fr | 0.0013 | 0.0026 | 0.0038 | 0.0051 | 0.0064 | 0.0077 | 0.0102 | | |
| | | | | Feed (ipm) | 7.5 | 7.5 | 7.4 | 7.4 | 7.4 | 7.5 | 7.4 | | |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

$rpm = Vc \times 3.82 / D_1$

$ipm = Fr \times rpm$

increase speed and feed 30 percent when using coated reamers

reduce speed and feed for materials harder than listed

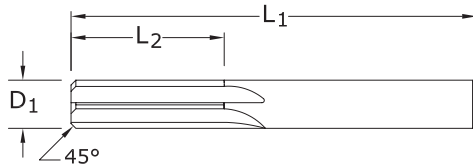
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

METRIC

Straight Flute Reamer



201M
METRIC SERIES



| CUTTING DIAMETER D ₁ | mm | | | NO. OF FLUTES | EDP NO. UNCOATED |
|------------------------------------|---------------------------------------|----------------------------------|--|---------------|---------------------|
| | MAXIMUM REAM LENGTH L ₂ | OVERALL LENGTH L ₁ | | | |
| 1,0 | 6,0 | 32,0 | | 4 | 81001 |
| 1,5 | 9,5 | 38,0 | | 4 | 81003 |
| 2,0 | 12,7 | 44,0 | | 4 | 81005 |
| 2,5 | 12,7 | 50,0 | | 4 | 81007 |
| 3,0 | 16,0 | 57,0 | | 4 | 81009 |
| 3,5 | 19,0 | 63,0 | | 4 | 81011 |
| 4,0 | 19,0 | 63,0 | | 4 | 81013 |
| 4,5 | 22,0 | 70,0 | | 4 | 81015 |
| 5,0 | 25,0 | 75,0 | | 4 | 81017 |
| 5,5 | 25,0 | 75,0 | | 4 | 81019 |
| 6,0 | 25,0 | 75,0 | | 4 | 81021 |
| 7,0 | 28,0 | 82,0 | | 6 | 81023 |
| 8,0 | 28,0 | 82,0 | | 6 | 81025 |
| 9,0 | 31,0 | 89,0 | | 6 | 81027 |
| 10,0 | 31,0 | 89,0 | | 6 | 81029 |

TOLERANCES (mm)

1-6 DIAMETER

D₁ = +0,008/-0,000

>6-10 DIAMETER

D₁ = +0,011/-0,000

- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- HARDENED STEELS

For patent information visit www.ksptpatents.com

Straight Flute Reamer

| Series 201M Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|-----------------------------|--|-----------------------------|------------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|
| | | | 1 | 2 | 3 | 4 | 6 | 8 | 10 | | |
| P | CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536 | ≤ 175 Bhn or ≤ 7 HRc | 46 | RPM | 14541 | 7271 | 4847 | 3635 | 2424 | 1818 | 1454 |
| | | | (37-55) | Fr | 0.028 | 0.056 | 0.085 | 0.113 | 0.169 | 0.226 | 0.282 |
| | | | Feed (mm/min) | 410 | 410 | 410 | 410 | 410 | 410 | 410 | |
| | | ≤ 300 Bhn or ≤ 32 HRc | 23 | RPM | 7271 | 3635 | 2424 | 1818 | 1212 | 909 | 727 |
| | | | (18-27) | Fr | 0.025 | 0.050 | 0.074 | 0.099 | 0.149 | 0.198 | 0.248 |
| | | | Feed (mm/min) | 180 | 180 | 180 | 180 | 180 | 180 | 180 | |
| | | ≤ 425 Bhn or ≤ 45 HRc | 17 | RPM | 5332 | 2666 | 1777 | 1333 | 889 | 666 | 533 |
| | | | (13-20) | Fr | 0.015 | 0.030 | 0.044 | 0.059 | 0.089 | 0.119 | 0.148 |
| | | | Feed (mm/min) | 79 | 79 | 79 | 79 | 79 | 79 | 79 | |
| | ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100 | ≤ 275 Bhn or ≤ 28 HRc | 35 | RPM | 11148 | 5574 | 3716 | 2787 | 1858 | 1394 | 1115 |
| | | | (28-42) | Fr | 0.024 | 0.048 | 0.072 | 0.096 | 0.144 | 0.192 | 0.240 |
| | | | Feed (mm/min) | 268 | 268 | 268 | 268 | 268 | 268 | 268 | |
| ≤ 375 Bhn or ≤ 40 HRc | | 21 | RPM | 6786 | 3393 | 2262 | 1696 | 1131 | 848 | 679 | |
| | | (17-26) | Fr | 0.024 | 0.048 | 0.072 | 0.096 | 0.144 | 0.192 | 0.240 | |
| | | Feed (mm/min) | 163 | 163 | 163 | 163 | 163 | 163 | 163 | | |
| ≤ 450 Bhn or ≤ 48 HRc | | 14 | RPM | 4362 | 2181 | 1454 | 1091 | 727 | 545 | 436 | |
| | | (11-16) | Fr | 0.015 | 0.030 | 0.045 | 0.060 | 0.089 | 0.119 | 0.149 | |
| | | Feed (mm/min) | 65 | 65 | 65 | 65 | 65 | 65 | 65 | | |
| H | TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2 | ≤ 250 Bhn or ≤ 24 HRc | 12 | RPM | 3878 | 1939 | 1293 | 969 | 646 | 485 | 388 |
| | | | (10-15) | Fr | 0.015 | 0.031 | 0.046 | 0.062 | 0.093 | 0.124 | 0.155 |
| | | | Feed (mm/min) | 60 | 60 | 60 | 60 | 60 | 60 | 60 | |
| | | ≤ 375 Bhn or ≤ 40 HRc | 8 | RPM | 2424 | 1212 | 808 | 606 | 404 | 303 | 242 |
| | | | (6-9) | Fr | 0.010 | 0.020 | 0.030 | 0.040 | 0.059 | 0.079 | 0.099 |
| | | | Feed (mm/min) | 24 | 24 | 24 | 24 | 24 | 24 | 24 | |
| | | ≤ 475 Bhn or ≤ 50 HRc | 6 | RPM | 1939 | 969 | 646 | 485 | 323 | 242 | 194 |
| | | | (5-7) | Fr | 0.006 | 0.012 | 0.019 | 0.025 | 0.037 | 0.050 | 0.062 |
| | | | Feed (mm/min) | 12 | 12 | 12 | 12 | 12 | 12 | 12 | |
| | ≤ 655 Bhn or ≤ 60 HRc | 4 | RPM | 1272 | 636 | 424 | 318 | 212 | 159 | 127 | |
| | | (3-5) | Fr | 0.006 | 0.013 | 0.019 | 0.025 | 0.038 | 0.050 | 0.063 | |
| | | Feed (mm/min) | 8 | 8 | 8 | 8 | 8 | 8 | 8 | | |
| K | CAST IRONS Gray, Malleable, Ductile | ≤ 220 Bhn or ≤ 19 HRc | 38 | RPM | 12118 | 6059 | 4039 | 3029 | 2020 | 1515 | 1212 |
| | | | (30-46) | Fr | 0.032 | 0.064 | 0.097 | 0.129 | 0.193 | 0.257 | 0.322 |
| | | | Feed (mm/min) | 390 | 390 | 390 | 390 | 390 | 390 | 390 | |
| | | ≤ 330 Bhn or ≤ 36 HRc | 29 | RPM | 9209 | 4605 | 3070 | 2302 | 1535 | 1151 | 921 |
| | | | (23-35) | Fr | 0.032 | 0.064 | 0.096 | 0.128 | 0.192 | 0.256 | 0.320 |
| | | | Feed (mm/min) | 295 | 295 | 295 | 295 | 295 | 295 | 295 | |

continued on next page

Straight Flute Reamer

| Series 201M Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | | |
|-----------------------------|--|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|-----|
| | | | 1 | 2 | 3 | 4 | 6 | 8 | 10 | | | |
| M | STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F | ≤ 250 Bhn or ≤ 24 HRc | 23 | RPM | 7271 | 3635 | 2424 | 1818 | 1212 | 909 | 727 | |
| | | | (18-27) | Fr | 0.015 | 0.030 | 0.045 | 0.059 | 0.089 | 0.119 | 0.149 | |
| | | | | Feed (mm/min) | 108 | 108 | 108 | 108 | 108 | 108 | 108 | |
| | | ≤ 330 Bhn or ≤ 36 HRc | (13-20) | 17 | RPM | 5332 | 2666 | 1777 | 1333 | 889 | 666 | 533 |
| | | | | Fr | 0.012 | 0.024 | 0.036 | 0.048 | 0.072 | 0.096 | 0.120 | |
| | | | | Feed (mm/min) | 64 | 64 | 64 | 64 | 64 | 64 | 64 | |
| | STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450 | ≤ 275 Bhn or ≤ 28 HRc | (9-13) | 11 | RPM | 3393 | 1696 | 1131 | 848 | 565 | 424 | 339 |
| | | | | Fr | 0.015 | 0.029 | 0.044 | 0.059 | 0.088 | 0.118 | 0.147 | |
| | | | | Feed (mm/min) | 50 | 50 | 50 | 50 | 50 | 50 | 50 | |
| | | ≤ 375 Bhn or ≤ 40 HRc | (6-9) | 8 | RPM | 2424 | 1212 | 808 | 606 | 404 | 303 | 242 |
| | | | | Fr | 0.010 | 0.020 | 0.030 | 0.040 | 0.059 | 0.079 | 0.099 | |
| | | | | Feed (mm/min) | 24 | 24 | 24 | 24 | 24 | 24 | 24 | |
| S | SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy | ≤ 220 Bhn or ≤ 19 HRc | (5-7) | 6 | RPM | 1939 | 969 | 646 | 485 | 323 | 242 | 194 |
| | | | | Fr | 0.012 | 0.024 | 0.036 | 0.047 | 0.071 | 0.095 | 0.119 | |
| | | | | Feed (mm/min) | 23 | 23 | 23 | 23 | 23 | 23 | 23 | |
| | | ≤ 320 Bhn or ≤ 34 HRc | (4-5) | 5 | RPM | 1454 | 727 | 485 | 364 | 242 | 182 | 145 |
| | | | | Fr | 0.010 | 0.021 | 0.031 | 0.041 | 0.062 | 0.083 | 0.103 | |
| | | | | Feed (mm/min) | 15 | 15 | 15 | 15 | 15 | 15 | 15 | |
| | ≤ 425 Bhn or ≤ 45 HRc | (2-4) | 3 | RPM | 969 | 485 | 323 | 242 | 162 | 121 | 97 | |
| | | | Fr | 0.006 | 0.012 | 0.019 | 0.025 | 0.037 | 0.050 | 0.062 | | |
| | | | Feed (mm/min) | 6 | 6 | 6 | 6 | 6 | 6 | 6 | | |
| | TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V | ≤ 275 Bhn or ≤ 28 HRc | (11-16) | 14 | RPM | 4362 | 2181 | 1454 | 1091 | 727 | 545 | 436 |
| | | | | Fr | 0.024 | 0.048 | 0.072 | 0.096 | 0.144 | 0.193 | 0.241 | |
| | | | | Feed (mm/min) | 105 | 105 | 105 | 105 | 105 | 105 | 105 | |
| ≤ 350 Bhn or ≤ 38 HRc | | (9-13) | 11 | RPM | 3393 | 1696 | 1131 | 848 | 565 | 424 | 339 | |
| | | | Fr | 0.015 | 0.029 | 0.044 | 0.059 | 0.088 | 0.118 | 0.147 | | |
| | | | Feed (mm/min) | 50 | 50 | 50 | 50 | 50 | 50 | 50 | | |
| ≤ 440 Bhn or ≤ 47 HRc | (6-9) | 8 | RPM | 2424 | 1212 | 808 | 606 | 404 | 303 | 242 | | |
| | | Fr | 0.010 | 0.020 | 0.030 | 0.040 | 0.059 | 0.079 | 0.099 | | | |
| | | Feed (mm/min) | 24 | 24 | 24 | 24 | 24 | 24 | 24 | | | |

continued on next page

Straight Flute Reamer

| Series 201M Metric | Hardness | Vc (m/min) | Diameter (D ₁) (mm) | | | | | | | | |
|---|---|-----------------------------|------------------------------------|---------------|-------|-------|-------|-------|-------|-------|-------|
| | | | 1 | 2 | 3 | 4 | 6 | 8 | 10 | | |
| N ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075 | ≤ 80 Bhn or ≤ 47 HRb | 82 | RPM | 26174 | 13087 | 8725 | 6544 | 4362 | 3272 | 2617 | |
| | | (66-99) | Fr | 0.040 | 0.080 | 0.120 | 0.160 | 0.240 | 0.320 | 0.400 | |
| | | | Feed (mm/min) | 1047 | 1047 | 1047 | 1047 | 1047 | 1047 | 1047 | |
| | ≤ 150 Bhn or ≤ 7 HRc | 70 | RPM | 22297 | 11148 | 7432 | 5574 | 3716 | 2787 | 2230 | |
| | | (56-84) | Fr | 0.040 | 0.080 | 0.120 | 0.160 | 0.240 | 0.320 | 0.400 | |
| | | | Feed (mm/min) | 892 | 892 | 892 | 892 | 892 | 892 | 892 | |
| | COPPER ALLOYS Alum Bronze, C110, Muntz Brass | ≤ 140 Bhn or ≤ 3 HRc | 35 | RPM | 11148 | 5574 | 3716 | 2787 | 1858 | 1394 | 1115 |
| | | | (28-42) | Fr | 0.020 | 0.041 | 0.061 | 0.081 | 0.122 | 0.163 | 0.204 |
| | | | | Feed (mm/min) | 227 | 227 | 227 | 227 | 227 | 227 | 227 |
| | | ≤ 200 Bhn or ≤ 23 HRc | 29 | RPM | 9209 | 4605 | 3070 | 2302 | 1535 | 1151 | 921 |
| | | | (23-35) | Fr | 0.020 | 0.041 | 0.061 | 0.082 | 0.122 | 0.163 | 0.204 |
| | | | | Feed (mm/min) | 188 | 188 | 188 | 188 | 188 | 188 | 188 |

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)

$$rpm = (Vc \times 1000) / (D_1 \times 3.14)$$

$$mm/min = Fr \times rpm$$

increase speed and feed 30 percent when using coated reamers

reduce speed and feed for materials harder than listed

refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Routers



Routing

| HIGH PERFORMANCE ROUTERS | SERIES | DESCRIPTION | PAGE |
|-----------------------------|---------|--|------|
| Plastic Composite | 29 | Multi-Flute Plastic Composite Fractional | 352 |
| | 29M | Multi-Flute Plastic Composite Metric | 354 |
| Carbon Composite | 20-CCR | Multi-Flute Carbon Composite Fractional | 356 |
| | 20M-CCR | Multi-Flute Carbon Composite Metric | 359 |
| Coarse Cut Carbon Composite | 31-CCR | Multi-Flute Coarse Composite Fractional | 362 |
| | 31M-CCR | Multi-Flute Coarse Composite Metric | 364 |
| Compression | 25 | Multi-Flute Compression Fractional | 366 |
| | 25M | Multi-Flute Compression Metric | 368 |
| GENERAL PURPOSE ROUTERS | SERIES | DESCRIPTION | PAGE |
| Up Cut | 21 | 2 Flute Up Cut Fractional | 370 |
| | 21M | 2 Flute Up Cut Metric | 373 |
| Down Cut | 22 | 2 Flute Down Cut Fractional | 371 |
| | 22M | 2 Flute Down Cut Metric | 374 |

Speed & Feed Recommendations listed after each series

Ranurado

| RANURADORES DE ALTO RENDIMIENTO | SERIE | DESCRIPCIÓN | PÁGINA |
|--------------------------------------|---------|---|--------|
| Compuesto de plástico | 29 | Filo múltiple, compuesto plástico, fraccional | 352 |
| | 29M | Filo múltiple, compuesto plástico, métrico | 354 |
| Compuesto de carbono | 20-CCR | Filo múltiple, compuesto de carbono, fraccional | 356 |
| | 20M-CCR | Filo múltiple, compuesto de carbono, métrico | 359 |
| Compuesto de carbono de corte grueso | 31-CCR | Filo múltiple, compuesto grueso, fraccional | 362 |
| | 31M-CCR | Filo múltiple, compuesto grueso, métrico | 364 |
| Compresión | 25 | Filo múltiple, compresión, fraccional | 366 |
| | 25M | Filo múltiple, compresión, métrico | 368 |

| RANURADORES DE USO GENERAL | SERIE | DESCRIPCIÓN | PÁGINA |
|----------------------------|-------|--|--------|
| Corte ascendente | 21 | 2 filos, corte ascendente, fraccional | 370 |
| | 21M | 2 filos, corte ascendente, métrico | 373 |
| Corte descendente | 22 | 2 filos, corte descendente, fraccional | 371 |
| | 22M | 2 filos, corte descendente, métrico | 374 |

Recomendaciones de velocidades y avances mostradas tras cada serie

Détourage

| FRAISES A DETOURER HAUTE PERFORMANCE | SERIES | DESCRIPTION | PAGE |
|---|---------|---|------|
| Composites plastique | 29 | Multi-dents pour composites plastique (fractionnel) | 352 |
| | 29M | Multi-dents pour composites plastique (métrique) | 354 |
| Composites carbone | 20-CCR | Multi-dents pour composites carbone (fractionnel) | 356 |
| | 20M-CCR | Multi-dents pour composites carbone (métrique) | 359 |
| Pour composites carbone coupe grossière | 31-CCR | Multi-dents pour composites grossiers (fractionnel) | 362 |
| | 31M-CCR | Multi-dents pour composites grossiers (métrique) | 364 |
| Compression | 25 | Multi-dents de compression (fractionnel) | 366 |
| | 25M | Multi-dents de compression (métrique) | 368 |

| FRAISES À DÉTOURER UNIVERSELLES | SERIES | DESCRIPTION | PAGE |
|---------------------------------|--------|---|------|
| Coupe ascendante | 21 | 2 dents coupe ascendante (fractionnel) | 370 |
| | 21M | 2 dents coupe ascendante (métrique) | 373 |
| Coupe descendante | 22 | 2 dents coupe descendante (fractionnel) | 371 |
| | 22M | 2 dents coupe descendante (métrique) | 374 |

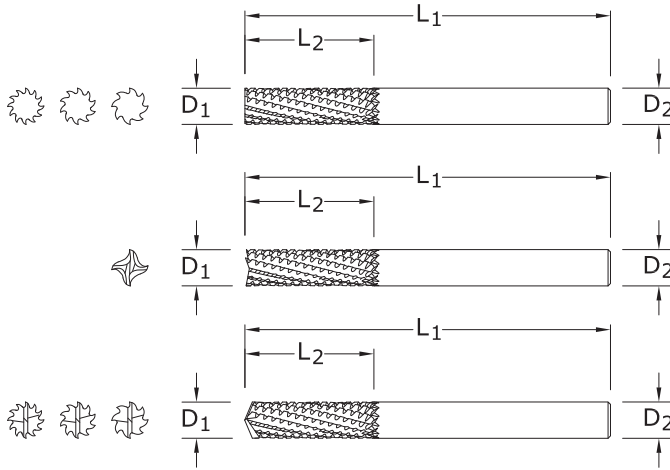
Recommandations de vitesse et avance indiquées après chaque série

| HOCHLEISTUNGS-KONTURENFRÄSER | SERIE | BESCHREIBUNG | SEITE |
|--|---------|--|-------|
| Verbundkunststoff | 29 | Zölliger Konturenfräser für Verbundkunststoff | 352 |
| | 29M | Konturenfräser für Verbundkunststoff | 354 |
| Kohlefaserverbundwerkstoff | 20-CCR | Zölliger Konturenfräser für Kohlefaserverbundwerkstoff | 356 |
| | 20M-CCR | Konturenfräser für Kohlefaserverbundwerkstoff | 359 |
| Grobschnitt Kohlefaserverbundwerkstoff | 31-CCR | Zölliger Konturenfräser für Verbundkunststoff | 362 |
| | 31M-CCR | Konturenfräser für Verbundkunststoff | 364 |
| Gegenläufiger Drall | 25 | Zölliger Gegenläufiger Konturenfräser | 366 |
| | 25M | Gegenläufiger Konturenfräser | 368 |

| STANDARD-KONTURENFRÄSER | SERIE | BESCHREIBUNG | SEITE |
|-------------------------|-------|--|-------|
| Rechtsspirale | 21 | Zölliger VHM-Fräser mit 2 Schneiden (ziehend) | 370 |
| | 21M | VHM-Fräser mit 2 Schneiden (ziehend) | 373 |
| Linksspirale | 22 | Zölliger VHM-Fräser mit 2 Schneiden (drückend) | 371 |
| | 22M | VHM-Fräser mit 2 Schneiden (drückend) | 374 |

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

Plastic Composite



29

FRACTIONAL SERIES

- Radial chisel edge design provides smoother cuts and enhanced tool life
- Eccentric relief and neutral rake for strength
- Excels at trimming and profiling non-filled plastics as well as glass-filled plastics

| inch | | | | | | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|---------------|------------|----------|-------------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | NO. OF FLUTES | END STYLE | UNCOATED | Di-NAMITE® (Diamond) |
| 1/8 | 1/2 | 1-1/2 | 1/8 | 8 | No End Cut | 74280 | 75080 |
| 1/8 | 1/2 | 1-1/2 | 1/8 | 8 | End Mill | 74281 | 75081 |
| 1/8 | 1/2 | 1-1/2 | 1/8 | 8 | Drill | 74282 | 75082 |
| 1/4 | 1 | 2-1/2 | 1/4 | 10 | No End Cut | 74283 | 75083 |
| 1/4 | 1 | 2-1/2 | 1/4 | 10 | End Mill | 74284 | 75084 |
| 1/4 | 1 | 2-1/2 | 1/4 | 10 | Drill | 74285 | 75085 |
| 5/16 | 1 | 2-1/2 | 5/16 | 12 | No End Cut | 74286 | 75086 |
| 5/16 | 1 | 2-1/2 | 5/16 | 12 | End Mill | 74287 | 75087 |
| 5/16 | 1 | 2-1/2 | 5/16 | 12 | Drill | 74288 | 75088 |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 12 | No End Cut | 74289 | 75089 |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 12 | End Mill | 74290 | 75090 |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 12 | Drill | 74291 | 75091 |

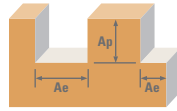
TOLERANCES (inch)

D₁ = +.000/- .005

D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

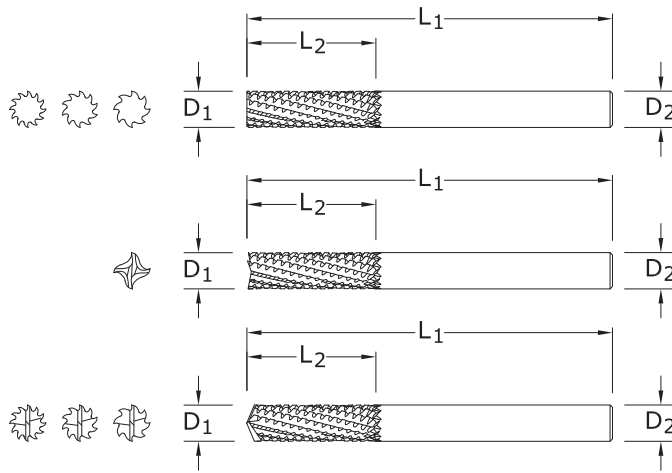


| Series 29 Fractional | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | |
|---|---------------------|---------------------|-------------|--------------------------------------|------------|--------|--------|--------|--------|
| | | | | 1/8 | 1/4 | 5/16 | 3/8 | | |
| CFRP, AFRP (CARBON FIBER, ARAMID FIBER) | Slot | 1 | ≤ 1 | 400 | RPM | 12224 | 6112 | 4890 | 4075 |
| | | | | (320-480) | Fr | 0.0024 | 0.0048 | 0.0060 | 0.0072 |
| | | | | | Feed (ipm) | 29 | 29 | 29 | 29 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 500 | RPM | 15280 | 7640 | 6112 | 5093 |
| | | | | (400-600) | Fr | 0.0024 | 0.0048 | 0.0060 | 0.0072 |
| | | | | | Feed (ipm) | 37 | 37 | 37 | 37 |
| | HSM | ≤ 0.05 | ≤ 2 | 825 | RPM | 25212 | 12606 | 10085 | 8404 |
| | | | | (660-990) | Fr | 0.0055 | 0.0110 | 0.0138 | 0.0165 |
| | | | | | Feed (ipm) | 139 | 139 | 139 | 139 |
| GFRP (FIBERGLASS) | Slot | 1 | ≤ 1 | 320 | RPM | 9779 | 4890 | 3912 | 3260 |
| | | | | (256-384) | Fr | 0.0024 | 0.0048 | 0.0060 | 0.0072 |
| | | | | | Feed (ipm) | 23 | 23 | 23 | 23 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 400 | RPM | 12224 | 6112 | 4890 | 4075 |
| | | | | (320-480) | Fr | 0.0024 | 0.0048 | 0.0060 | 0.0072 |
| | | | | | Feed (ipm) | 29 | 29 | 29 | 29 |
| | HSM | ≤ 0.05 | ≤ 2 | 660 | RPM | 20170 | 10085 | 8068 | 6723 |
| | | | | (528-792) | Fr | 0.0055 | 0.0110 | 0.0138 | 0.0165 |
| | | | | | Feed (ipm) | 111 | 111 | 111 | 111 |
| CARBON, GRAPHITE | Slot | 1 | ≤ 1 | 480 | RPM | 14669 | 7334 | 5868 | 4890 |
| | | | | (384-576) | Fr | 0.0037 | 0.0075 | 0.0094 | 0.0112 |
| | | | | | Feed (ipm) | 55 | 55 | 55 | 55 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 600 | RPM | 18336 | 9168 | 7334 | 6112 |
| | | | | (480-720) | Fr | 0.0037 | 0.0075 | 0.0094 | 0.0112 |
| | | | | | Feed (ipm) | 69 | 69 | 69 | 69 |
| | HSM | ≤ 0.05 | ≤ 2 | 990 | RPM | 30254 | 15127 | 12102 | 10085 |
| | | | | (792-1188) | Fr | 0.0086 | 0.0172 | 0.0215 | 0.0258 |
| | | | | | Feed (ipm) | 260 | 260 | 260 | 260 |
| PLASTICS | Slot | 1 | ≤ 1 | 800 | RPM | 24448 | 12224 | 9779 | 8149 |
| | | | | (640-690) | Fr | 0.0038 | 0.0075 | 0.0094 | 0.0113 |
| | | | | | Feed (ipm) | 92 | 92 | 92 | 92 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 1000 | RPM | 30560 | 15280 | 12224 | 10187 |
| | | | | (800-1200) | Fr | 0.0038 | 0.0075 | 0.0094 | 0.0113 |
| | | | | | Feed (ipm) | 115 | 115 | 115 | 115 |
| | HSM | ≤ 0.05 | ≤ 2 | 1650 | RPM | 50424 | 25212 | 20170 | 16808 |
| | | | | (1320-1980) | Fr | 0.0035 | 0.0069 | 0.0086 | 0.0104 |
| | | | | | Feed (ipm) | 174 | 174 | 174 | 174 |

HSM (high speed machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fr \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)

Plastic Composite



29M METRIC SERIES

- Radial chisel edge design provides smoother cuts and enhanced tool life
- Eccentric relief and neutral rake for strength
- Excels at trimming and profiling non-filled plastics as well as glass-filled plastics

| mm | | | | | | | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|---------------|------------|----------|-------------------------|--|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | NO. OF FLUTES | END STYLE | UNCOATED | Di-NAMITE® (Diamond) | |
| 3,0 | 12,0 | 38,0 | 3,0 | 8 | No End Cut | 84280 | 85080 | |
| 3,0 | 12,0 | 38,0 | 3,0 | 8 | End Mill | 84281 | 85081 | |
| 3,0 | 12,0 | 38,0 | 3,0 | 8 | Drill | 84282 | 85082 | |
| 6,0 | 25,0 | 63,0 | 6,0 | 10 | No End Cut | 84283 | 85083 | |
| 6,0 | 25,0 | 63,0 | 6,0 | 10 | End Mill | 84284 | 85084 | |
| 6,0 | 25,0 | 63,0 | 6,0 | 10 | Drill | 84285 | 85085 | |
| 8,0 | 25,0 | 63,0 | 8,0 | 12 | No End Cut | 84286 | 85086 | |
| 8,0 | 25,0 | 63,0 | 8,0 | 12 | End Mill | 84287 | 85087 | |
| 8,0 | 25,0 | 63,0 | 8,0 | 12 | Drill | 84288 | 85088 | |
| 10,0 | 25,0 | 63,0 | 10,0 | 12 | No End Cut | 84289 | 85089 | |
| 10,0 | 25,0 | 63,0 | 10,0 | 12 | End Mill | 84290 | 85090 | |
| 10,0 | 25,0 | 63,0 | 10,0 | 12 | Drill | 84291 | 85091 | |

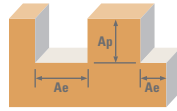
TOLERANCES (mm)

D₁ = +0,00/-0,13
D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Plastic Composite



| Series 29M Metric | Ae x D ₁ | Ap x D ₁ | Vc (m/min) | Diameter (D ₁) (mm) | | | | | |
|---|---------------------|---------------------|---------------|------------------------------------|---------------|-------|-------|-------|-------|
| | | | | 3 | 6 | 8 | 10 | | |
| CFRP, AFRP (CARBON FIBER, ARAMID FIBER) | Slot | 1 | ≤ 1 | 120 | RPM | 12722 | 6361 | 4771 | 3817 |
| | | | | (96-164) | Fr | 0.061 | 0.122 | 0.163 | 0.203 |
| | | | | | Feed (mm/min) | 776 | 776 | 776 | 776 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 150 | RPM | 15903 | 7951 | 5963 | 4771 |
| | | | | (120-180) | Fr | 0.061 | 0.122 | 0.163 | 0.203 |
| | | | | | Feed (mm/min) | 970 | 970 | 970 | 970 |
| | HSM | ≤ 0.05 | ≤ 2 | 250 | RPM | 26504 | 13252 | 9939 | 7951 |
| | | | | (200-300) | Fr | 0.140 | 0.280 | 0.373 | 0.467 |
| | | | | | Feed (mm/min) | 3710 | 3710 | 3710 | 3710 |
| GFRP (FIBERGLASS) | Slot | 1 | ≤ 1 | 100 | RPM | 10602 | 5301 | 3976 | 3181 |
| | | | | (80-120) | Fr | 0.061 | 0.122 | 0.162 | 0.203 |
| | | | | | Feed (mm/min) | 646 | 646 | 646 | 646 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 120 | RPM | 12722 | 6361 | 4771 | 3817 |
| | | | | (96-164) | Fr | 0.061 | 0.122 | 0.163 | 0.203 |
| | | | | | Feed (mm/min) | 776 | 776 | 776 | 776 |
| | HSM | ≤ 0.05 | ≤ 2 | 200 | RPM | 21203 | 10602 | 7951 | 6361 |
| | | | | (160-240) | Fr | 0.140 | 0.280 | 0.374 | 0.467 |
| | | | | | Feed (mm/min) | 2970 | 2970 | 2970 | 2970 |
| CARBON, GRAPHITE | Slot | 1 | ≤ 1 | 145 | RPM | 15372 | 7686 | 5765 | 4612 |
| | | | | (116-174) | Fr | 0.095 | 0.190 | 0.253 | 0.317 |
| | | | | | Feed (mm/min) | 1460 | 1460 | 1460 | 1460 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 185 | RPM | 19613 | 9807 | 7355 | 5884 |
| | | | | (148-222) | Fr | 0.095 | 0.190 | 0.253 | 0.317 |
| | | | | | Feed (mm/min) | 1863 | 1863 | 1863 | 1863 |
| | HSM | ≤ 0.05 | ≤ 2 | 300 | RPM | 31805 | 15903 | 11927 | 9542 |
| | | | | (240-360) | Fr | 0.219 | 0.437 | 0.583 | 0.729 |
| | | | | | Feed (mm/min) | 6957 | 6957 | 6957 | 6957 |
| PLASTICS | Slot | 1 | ≤ 1 | 245 | RPM | 25974 | 12987 | 9740 | 7792 |
| | | | | (196-294) | Fr | 0.037 | 0.075 | 0.100 | 0.125 |
| | | | | | Feed (mm/min) | 974 | 974 | 974 | 974 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 305 | RPM | 32335 | 16168 | 12126 | 9701 |
| | | | | (244-366) | Fr | 0.038 | 0.075 | 0.100 | 0.125 |
| | | | | | Feed (mm/min) | 1213 | 1213 | 1213 | 1213 |
| | HSM | ≤ 0.05 | ≤ 2 | 505 | RPM | 53538 | 26769 | 20077 | 16062 |
| | | | | (404-606) | Fr | 0.088 | 0.175 | 0.233 | 0.292 |
| | | | | | Feed (mm/min) | 4685 | 4685 | 4685 | 4685 |

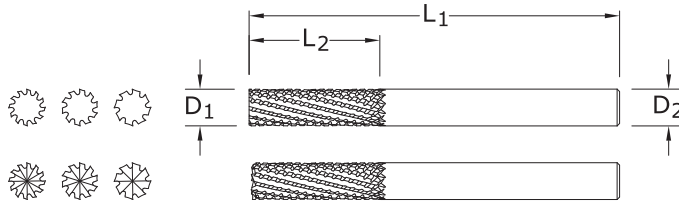
HSM (high speed machining)
 $rpm = (Vc \times 1000) / (D_1 \times 3.14)$
 $mm/min = Fr \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)

Carbon Composite



20-CCR FRACTIONAL SERIES



- Multi-flute design and positive geometry to shear with minimal pressure and delamination
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | inch | | | NO. OF FLUTES | END STYLE | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|----------------|-----------|-------------------------|--|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | | | Di-NAMITE® (Diamond) | |
| 1/4 | 1 | 2-1/2 | 1/4 | 8 | No End Cutting | 72930 | 73013 | |
| 1/4 | 1 | 2-1/2 | 1/4 | 8 | End Cutting | 72947 | 73012 | |
| 5/16 | 1 | 2-1/2 | 5/16 | 10 | No End Cutting | 72948 | 73026 | |
| 5/16 | 1 | 2-1/2 | 5/16 | 10 | End Cutting | 72949 | 73014 | |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 12 | No End Cutting | 72950 | 73028 | |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 12 | End Cutting | 72951 | 73027 | |
| 1/2 | 1-1/2 | 3-1/2 | 1/2 | 12 | No End Cutting | 72952 | 73041 | |
| 1/2 | 1-1/2 | 3-1/2 | 1/2 | 12 | End Cutting | 72953 | 73029 | |

TOLERANCES (inch)

D₁ = +.000/- .005

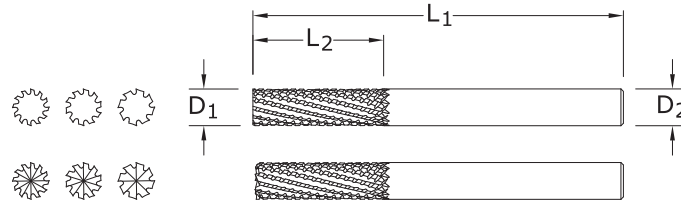
D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



FRACTIONAL Carbon Composite



20-CCR-LHC FRACTIONAL SERIES

TOLERANCES (inch)

$D_1 = +.000/-0.005$

$D_2 = h_6$

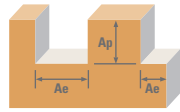
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | NO. OF FLUTES | END STYLE | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|---------------|----------------|----------|----------------------|
| | | | | | | UNCOATED | Di-NAMITE® (Diamond) |
| 1/4 | 1 | 2-1/2 | 1/4 | 8 | No End Cutting | 73070 | 73078 |
| 1/4 | 1 | 2-1/2 | 1/4 | 8 | End Cutting | 73071 | 73079 |
| 5/16 | 1 | 2-1/2 | 5/16 | 10 | No End Cutting | 73072 | 73080 |
| 5/16 | 1 | 2-1/2 | 5/16 | 10 | End Cutting | 73073 | 73081 |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 12 | No End Cutting | 73074 | 73082 |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 12 | End Cutting | 73075 | 73083 |

- Multi-flute design and positive geometry to shear with minimal pressure and delamination
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

Carbon Composite



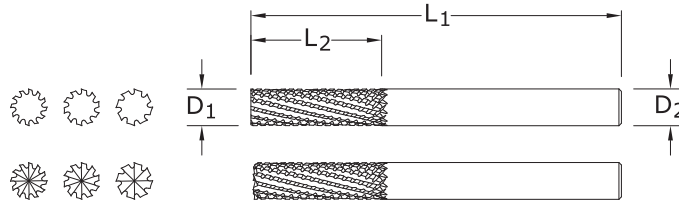
| Series 20 Fractional | | | Vc (sfm) | Diameter (D ₁) (inch) | | | | | |
|---|---------------------|---------------------|-------------|--------------------------------------|------------|--------|--------|--------|--------|
| | Ae x D ₁ | Ap x D ₁ | | 1/4 | 5/16 | 3/8 | 1/2 | | |
| CFRP, AFRP (CARBON FIBER, ARAMID FIBER) | Slot | 1 | ≤ 1 | 400 | RPM | 6112 | 4890 | 4075 | 3056 |
| | | | | (320-480) | Fr | 0.0049 | 0.0094 | 0.0135 | 0.0180 |
| | | | | | Feed (ipm) | 30 | 46 | 55 | 55 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 500 | RPM | 7640 | 6112 | 5093 | 3820 |
| | | | | (400-600) | Fr | 0.0049 | 0.0094 | 0.0135 | 0.0180 |
| | | | | | Feed (ipm) | 38 | 58 | 69 | 69 |
| | HSM | ≤ 0.05 | ≤ 2 | 825 | RPM | 12606 | 10085 | 8404 | 6303 |
| | | | | (660-990) | Fr | 0.0111 | 0.0215 | 0.0309 | 0.0413 |
| | | | | | Feed (ipm) | 140 | 217 | 260 | 260 |
| GFRP (FIBERGLASS) | Slot | 1 | ≤ 1 | 320 | RPM | 4890 | 3912 | 3260 | 2445 |
| | | | | (256-384) | Fr | 0.0049 | 0.0095 | 0.0135 | 0.0180 |
| | | | | | Feed (ipm) | 24 | 37 | 44 | 44 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 400 | RPM | 6112 | 4890 | 4075 | 3056 |
| | | | | (320-480) | Fr | 0.0049 | 0.0095 | 0.0135 | 0.0180 |
| | | | | | Feed (ipm) | 30 | 46 | 55 | 55 |
| | HSM | ≤ 0.05 | ≤ 2 | 660 | RPM | 10085 | 8068 | 6723 | 5042 |
| | | | | (528-792) | Fr | 0.0110 | 0.0214 | 0.0311 | 0.0414 |
| | | | | | Feed (ipm) | 111 | 173 | 209 | 209 |
| CARBON, GRAPHITE | Slot | 1 | ≤ 1 | 480 | RPM | 7334 | 5868 | 4890 | 3667 |
| | | | | (384-576) | Fr | 0.0064 | 0.0124 | 0.0180 | 0.0240 |
| | | | | | Feed (ipm) | 47 | 73 | 88 | 88 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 600 | RPM | 9168 | 7334 | 6112 | 4584 |
| | | | | (480-720) | Fr | 0.0064 | 0.0124 | 0.0180 | 0.0240 |
| | | | | | Feed (ipm) | 59 | 91 | 110 | 110 |
| | HSM | ≤ 0.05 | ≤ 2 | 990 | RPM | 15127 | 12102 | 10085 | 7564 |
| | | | | (792-1188) | Fr | 0.0147 | 0.0287 | 0.0412 | 0.0549 |
| | | | | | Feed (ipm) | 223 | 347 | 415 | 415 |
| PLASTICS | Slot | 1 | ≤ 1 | 800 | RPM | 12224 | 9779 | 8149 | 6112 |
| | | | | (640-690) | Fr | 0.0064 | 0.0125 | 0.0180 | 0.0241 |
| | | | | | Feed (ipm) | 78 | 122 | 147 | 147 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 1000 | RPM | 15280 | 12224 | 10187 | 7640 |
| | | | | (800-1200) | Fr | 0.0064 | 0.0125 | 0.0180 | 0.0241 |
| | | | | | Feed (ipm) | 98 | 153 | 184 | 184 |
| | HSM | ≤ 0.05 | ≤ 2 | 1650 | RPM | 25212 | 20170 | 16808 | 12606 |
| | | | | (1320-1980) | Fr | 0.0147 | 0.0287 | 0.0413 | 0.0551 |
| | | | | | Feed (ipm) | 370 | 579 | 694 | 694 |

HSM (high speed machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fr \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)



Carbon Composite



TOLERANCES (mm)

$D_1 = +0,00/-0,13$

$D_2 = h_6$

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

20M-CCR METRIC SERIES

| mm | | | | | | EDP NO. | | |
|---------------------------|------------------------|-------------------------|-------------------------|---------------|----------------|----------|------------------------------------|-------------------------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | NO. OF FLUTES | END STYLE | UNCOATED | Ti-NAMITE-B (TiB ₂) | Di-NAMITE® (Diamond) |
| 2,0 | 6,0 | 38,0 | 3,0 | 5 | End Cutting | 82930 | 83100 | 83070 |
| 3,0 | 10,0 | 38,0 | 3,0 | 5 | End Cutting | 82931 | 83101 | 83071 |
| 4,0 | 12,0 | 50,0 | 4,0 | 5 | End Cutting | 82932 | 83102 | 83072 |
| 5,0 | 15,0 | 50,0 | 6,0 | 5 | End Cutting | 82933 | 83103 | 83073 |
| 6,0 | 25,0 | 63,0 | 6,0 | 8 | No End Cutting | 82966 | 83104 | 83027 |
| 6,0 | 25,0 | 63,0 | 6,0 | 8 | End Cutting | 82967 | 83105 | 83026 |
| 8,0 | 25,0 | 63,0 | 8,0 | 10 | No End Cutting | 82968 | 83106 | 83029 |
| 8,0 | 25,0 | 63,0 | 8,0 | 10 | End Cutting | 82969 | 83107 | 83028 |
| 10,0 | 28,0 | 63,0 | 10,0 | 12 | No End Cutting | 82970 | 83108 | 83042 |
| 10,0 | 28,0 | 63,0 | 10,0 | 12 | End Cutting | 82971 | 83109 | 83041 |
| 12,0 | 38,0 | 89,0 | 12,0 | 12 | No End Cutting | 82972 | 83110 | 83044 |
| 12,0 | 38,0 | 89,0 | 12,0 | 12 | End Cutting | 82973 | 83111 | 83043 |

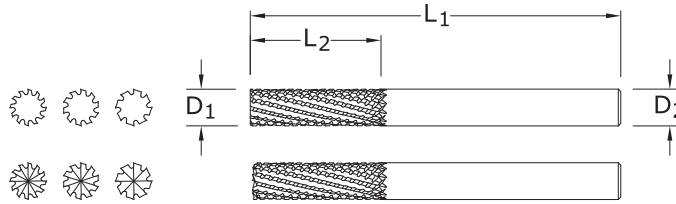
- Multi-flute design and positive geometry to shear with minimal pressure and delamination
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

Carbon Composite



20M-CCR-LHC

METRIC SERIES



- Multi-flute design and positive geometry to shear with minimal pressure and delamination
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | mm | | | NO. OF FLUTES | END STYLE | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|----------------|-----------|-------------------------|--|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | UNCOATED | | | DI-NAMITE® (Diamond) | |
| 6,0 | 25,0 | 63,0 | 6,0 | 8 | No End Cutting | 83220 | 83230 | |
| 6,0 | 25,0 | 63,0 | 6,0 | 8 | End Cutting | 83221 | 83231 | |
| 8,0 | 25,0 | 63,0 | 8,0 | 10 | No End Cutting | 83222 | 83232 | |
| 8,0 | 25,0 | 63,0 | 8,0 | 10 | End Cutting | 83223 | 83233 | |
| 10,0 | 28,0 | 63,0 | 10,0 | 12 | No End Cutting | 83224 | 83234 | |
| 10,0 | 28,0 | 63,0 | 10,0 | 12 | End Cutting | 83225 | 83235 | |

TOLERANCES (mm)

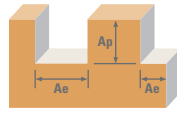
D₁ = +0,00/-0,13

D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Carbon Composite



| Series 20M Metric | Ae x D1 | Ap x D1 | Vc (m/min) | Diameter (D1) (mm) | | | | | | |
|---|-------------|---------|---------------|-----------------------|---------------|-------|-------|-------|-------|-------|
| | | | | 3 | 6 | 8 | 10 | 12 | | |
| CFRP, AFRP (CARBON FIBER, ARAMID FIBER) | Slot | 1 | ≤ 1 | 120 | RPM | 12722 | 6361 | 4771 | 3817 | 3181 |
| | | | | (96-164) | Fr | 0.055 | 0.113 | 0.243 | 0.366 | 0.439 |
| | | | | | Feed (mm/min) | 700 | 720 | 1160 | 1395 | 1395 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 150 | RPM | 15903 | 7951 | 5963 | 4771 | 3976 |
| | | | | (120-180) | Fr | 0.055 | 0.113 | 0.243 | 0.366 | 0.439 |
| | | | | | Feed (mm/min) | 875 | 900 | 1450 | 1744 | 1744 |
| | HSM | ≤ 0.05 | ≤ 2 | 250 | RPM | 26504 | 13252 | 9939 | 7951 | 6626 |
| | | | | (200-300) | Fr | 0.126 | 0.260 | 0.556 | 0.833 | 1.000 |
| | | | | | Feed (mm/min) | 3350 | 3450 | 5527 | 6625 | 6625 |
| GFRP (FIBERGLASS) | Slot | 1 | ≤ 1 | 100 | RPM | 10602 | 5301 | 3976 | 3181 | 2650 |
| | | | | (80-120) | Fr | 0.054 | 0.111 | 0.236 | 0.357 | 0.428 |
| | | | | | Feed (mm/min) | 570 | 587 | 940 | 1135 | 1135 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 120 | RPM | 12722 | 6361 | 4771 | 3817 | 3181 |
| | | | | (96-164) | Fr | 0.054 | 0.111 | 0.236 | 0.357 | 0.428 |
| | | | | | Feed (mm/min) | 684 | 704 | 1128 | 1362 | 1362 |
| | HSM | ≤ 0.05 | ≤ 2 | 200 | RPM | 21203 | 10602 | 7951 | 6361 | 5301 |
| | | | | (160-240) | Fr | 0.124 | 0.261 | 0.557 | 1.011 | 1.213 |
| | | | | | Feed (mm/min) | 2629 | 2765 | 4430 | 6430 | 6430 |
| CARBON, GRAPHITE | Slot | 1 | ≤ 1 | 145 | RPM | 15372 | 7686 | 5765 | 4612 | 3843 |
| | | | | (116-174) | Fr | 0.069 | 0.152 | 0.323 | 0.482 | 0.579 |
| | | | | | Feed (mm/min) | 1061 | 1165 | 1860 | 2224 | 2224 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 185 | RPM | 19613 | 9807 | 7355 | 5884 | 4903 |
| | | | | (148-222) | Fr | 0.069 | 0.152 | 0.323 | 0.482 | 0.579 |
| | | | | | Feed (mm/min) | 1353 | 1486 | 2373 | 2838 | 2838 |
| | HSM | ≤ 0.05 | ≤ 2 | 300 | RPM | 31805 | 15903 | 11927 | 9542 | 7951 |
| | | | | (240-360) | Fr | 0.159 | 0.348 | 0.740 | 1.109 | 1.331 |
| | | | | | Feed (mm/min) | 5057 | 5535 | 8820 | 10580 | 10580 |
| PLASTICS | Slot | 1 | ≤ 1 | 245 | RPM | 25974 | 12987 | 9740 | 7792 | 6494 |
| | | | | (196-294) | Fr | 0.069 | 0.150 | 0.319 | 0.477 | 0.572 |
| | | | | | Feed (mm/min) | 1792 | 1945 | 3107 | 3717 | 3717 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 305 | RPM | 32335 | 16168 | 12126 | 9701 | 8084 |
| | | | | (244-366) | Fr | 0.069 | 0.150 | 0.319 | 0.477 | 0.572 |
| | | | | | Feed (mm/min) | 2231 | 2421 | 3868 | 4627 | 4627 |
| | HSM | ≤ 0.05 | ≤ 2 | 505 | RPM | 53538 | 26769 | 20077 | 16062 | 13385 |
| | | | | (404-606) | Fr | 0.159 | 0.344 | 0.732 | 1.097 | 1.316 |
| | | | | | Feed (mm/min) | 8513 | 9220 | 14690 | 17617 | 17617 |

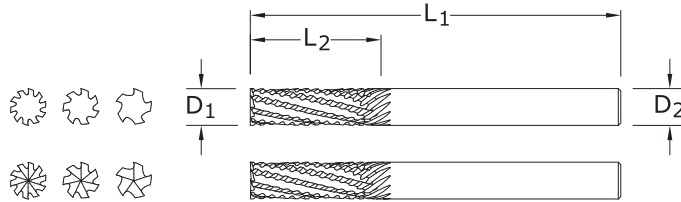
HSM (high speed machining)
 $rpm = (Vc \times 1000) / (D1 \times 3.14)$
 $mm/min = Fr \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)

Coarse Cut Carbon Composite



31-CCR FRACTIONAL SERIES



- Fewer, deeper flutes to prevent clogging in heavy routing
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

| CUTTING DIAMETER D ₁ | inch | | | | | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|---------------|----------------|----------|----------------------|
| | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | NO. OF FLUTES | END STYLE | UNCOATED | Di-NAMITE® (Diamond) |
| 1/4 | 1 | 2-1/2 | 1/4 | 5 | End Cutting | 72954 | 72955 |
| 1/4 | 1 | 2-1/2 | 1/4 | 5 | No End Cutting | 72956 | 72957 |
| 5/16 | 1 | 2-1/2 | 5/16 | 7 | End Cutting | 72958 | 72959 |
| 5/16 | 1 | 2-1/2 | 5/16 | 7 | No End Cutting | 72960 | 72961 |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 8 | End Cutting | 72962 | 72963 |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 8 | No End Cutting | 72964 | 72965 |
| 1/2 | 1-1/2 | 3-1/2 | 1/2 | 10 | End Cutting | 72966 | 72967 |
| 1/2 | 1-1/2 | 3-1/2 | 1/2 | 10 | No End Cutting | 72968 | 72969 |

TOLERANCES (inch)

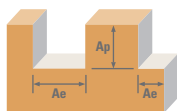
D₁ = +.000/- .005

D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Coarse Cut Carbon Composite



| Series 31 Fractional | Material | Ae x D1 | Ap x D1 | Vc (sfm) | Diameter (D1) (inch) | | | | |
|---|-------------|---------|---------|-------------|-------------------------|--------|--------|--------|--------|
| | | | | | 1/4 | 5/16 | 3/8 | 1/2 | |
| CFRP, AFRP (CARBON FIBER, ARAMID FIBER) | Slot | 1 | ≤ 1 | 400 | RPM | 6112 | 4890 | 4075 | 3056 |
| | | | | (320-480) | Fr | 0.0029 | 0.0065 | 0.0088 | 0.0147 |
| | | | | | Feed (ipm) | 18 | 32 | 36 | 45 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 500 | RPM | 7640 | 6112 | 5093 | 3820 |
| | | | | (400-600) | Fr | 0.0029 | 0.0065 | 0.0088 | 0.0147 |
| | | | | | Feed (ipm) | 23 | 40 | 45 | 56 |
| | HSM | ≤ 0.05 | ≤ 2 | 825 | RPM | 12606 | 10085 | 8404 | 6303 |
| | | | | (660-990) | Fr | 0.0069 | 0.0151 | 0.0206 | 0.0344 |
| | | | | | Feed (ipm) | 87 | 152 | 173 | 217 |
| GFRP (FIBERGLASS) | Slot | 1 | ≤ 1 | 320 | RPM | 4890 | 3912 | 3260 | 2445 |
| | | | | (256-384) | Fr | 0.0031 | 0.0066 | 0.0089 | 0.0147 |
| | | | | | Feed (ipm) | 15 | 26 | 29 | 36 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 400 | RPM | 6112 | 4890 | 4075 | 3056 |
| | | | | (320-480) | Fr | 0.0031 | 0.0066 | 0.0089 | 0.0147 |
| | | | | | Feed (ipm) | 19 | 33 | 36 | 45 |
| | HSM | ≤ 0.05 | ≤ 2 | 660 | RPM | 10085 | 8068 | 6723 | 5042 |
| | | | | (528-792) | Fr | 0.0069 | 0.0150 | 0.0205 | 0.0343 |
| | | | | | Feed (ipm) | 70 | 121 | 138 | 173 |
| CARBON, GRAPHITE | Slot | 1 | ≤ 1 | 480 | RPM | 7334 | 5868 | 4890 | 3667 |
| | | | | (384-576) | Fr | 0.0040 | 0.0087 | 0.0119 | 0.0199 |
| | | | | | Feed (ipm) | 29 | 51 | 58 | 73 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 600 | RPM | 9168 | 7334 | 6112 | 4584 |
| | | | | (480-720) | Fr | 0.0040 | 0.0087 | 0.0119 | 0.0199 |
| | | | | | Feed (ipm) | 36 | 64 | 73 | 91 |
| | HSM | ≤ 0.05 | ≤ 2 | 990 | RPM | 15127 | 12102 | 10085 | 7564 |
| | | | | (792-1188) | Fr | 0.0092 | 0.0201 | 0.0275 | 0.0459 |
| | | | | | Feed (ipm) | 139 | 243 | 277 | 347 |
| PLASTICS | Slot | 1 | ≤ 1 | 800 | RPM | 12224 | 9779 | 8149 | 6112 |
| | | | | (640-690) | Fr | 0.0040 | 0.0087 | 0.0119 | 0.0200 |
| | | | | | Feed (ipm) | 49 | 85 | 97 | 122 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 1000 | RPM | 15280 | 12224 | 10187 | 7640 |
| | | | | (800-1200) | Fr | 0.0040 | 0.0087 | 0.0119 | 0.0200 |
| | | | | | Feed (ipm) | 61 | 106 | 121 | 153 |
| | HSM | ≤ 0.05 | ≤ 2 | 1650 | RPM | 25212 | 20170 | 16808 | 12606 |
| | | | | (1320-1980) | Fr | 0.0092 | 0.0201 | 0.0275 | 0.0459 |
| | | | | | Feed (ipm) | 232 | 405 | 462 | 578 |

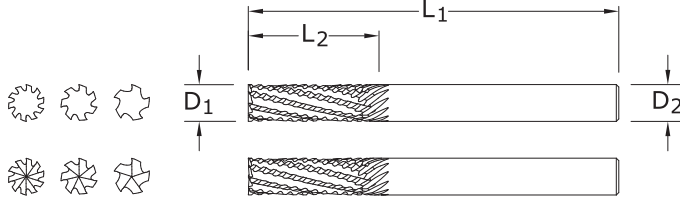
HSM (high speed machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fr \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)

Coarse Cut Carbon Composite



31M-CCR METRIC SERIES



- Fewer, deeper flutes to prevent clogging in heavy routing
- Unique clearance grind minimizes contact between tool diameter and workpiece eliminating friction
- Left hand flutes engineered to control the fibers within CFRP, preventing excessive fiber breakout
- Excels at trimming and profiling difficult and abrasive fiber filled plastics

| mm | | | | | | EDP NO. | | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|---------------|----------------|----------|---------------------------------|----------------------|
| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | NO. OF FLUTES | END STYLE | UNCOATED | Ti-NAMITE-B (TiB ₂) | Di-NAMITE* (Diamond) |
| 6,0 | 25,0 | 63,0 | 6,0 | 5 | End Cutting | 82974 | 83200 | 82982 |
| 6,0 | 25,0 | 63,0 | 6,0 | 5 | No End Cutting | 82975 | 83201 | 82983 |
| 8,0 | 25,0 | 63,0 | 8,0 | 7 | End Cutting | 82976 | 83202 | 82984 |
| 8,0 | 25,0 | 63,0 | 8,0 | 7 | No End Cutting | 82977 | 83203 | 82985 |
| 10,0 | 28,0 | 63,0 | 10,0 | 8 | End Cutting | 82978 | 83204 | 82986 |
| 10,0 | 28,0 | 63,0 | 10,0 | 8 | No End Cutting | 82979 | 83205 | 82987 |
| 12,0 | 38,0 | 89,0 | 12,0 | 10 | End Cutting | 82980 | 83206 | 82988 |
| 12,0 | 38,0 | 89,0 | 12,0 | 10 | No End Cutting | 82981 | 83207 | 82989 |

TOLERANCES (mm)

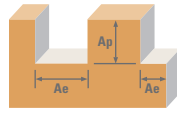
D₁ = +0,00/-0,13

D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Coarse Cut Carbon Composite



| Series 31M Metric | Ae x D1 | Ap x D1 | Vc (m/min) | Diameter (D1) (mm) | | | | | |
|---|-------------|---------|---------------|-----------------------|---------------|-------|-------|-------|-------|
| | | | | 6 | 8 | 10 | 12 | | |
| CFRP, AFRP (CARBON FIBER, ARAMID FIBER) | Slot | 1 | ≤ 1 | 120 | RPM | 6361 | 4771 | 3817 | 3181 |
| | | | | (96-164) | Fr | 0.071 | 0.170 | 0.244 | 0.366 |
| | | | | | Feed (mm/min) | 450 | 810 | 930 | 1165 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 150 | RPM | 7951 | 5963 | 4771 | 3976 |
| | | | | (120-180) | Fr | 0.071 | 0.170 | 0.244 | 0.366 |
| | | | | | Feed (mm/min) | 563 | 1013 | 1163 | 1456 |
| | HSM | ≤ 0.05 | ≤ 2 | 250 | RPM | 13252 | 9939 | 7951 | 6626 |
| | | | | (200-300) | Fr | 0.162 | 0.388 | 0.555 | 0.832 |
| | | | | | Feed (mm/min) | 2150 | 3860 | 4415 | 5515 |
| GFRP (FIBERGLASS) | Slot | 1 | ≤ 1 | 100 | RPM | 5301 | 3976 | 3181 | 2650 |
| | | | | (80-120) | Fr | 0.069 | 0.165 | 0.237 | 0.357 |
| | | | | | Feed (mm/min) | 365 | 655 | 755 | 945 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 120 | RPM | 6361 | 4771 | 3817 | 3181 |
| | | | | (96-164) | Fr | 0.069 | 0.165 | 0.237 | 0.357 |
| | | | | | Feed (mm/min) | 438 | 786 | 906 | 1134 |
| | HSM | ≤ 0.05 | ≤ 2 | 200 | RPM | 10602 | 7951 | 6361 | 5301 |
| | | | | (160-240) | Fr | 0.163 | 0.390 | 0.557 | 0.834 |
| | | | | | Feed (mm/min) | 1725 | 3100 | 3540 | 4420 |
| CARBON, GRAPHITE | Slot | 1 | ≤ 1 | 145 | RPM | 7686 | 5765 | 4612 | 3843 |
| | | | | (116-174) | Fr | 0.095 | 0.226 | 0.321 | 0.483 |
| | | | | | Feed (mm/min) | 728 | 1300 | 1480 | 1855 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 185 | RPM | 9807 | 7355 | 5884 | 4903 |
| | | | | (148-222) | Fr | 0.095 | 0.226 | 0.321 | 0.483 |
| | | | | | Feed (mm/min) | 929 | 1659 | 1888 | 2367 |
| | HSM | ≤ 0.05 | ≤ 2 | 300 | RPM | 15903 | 11927 | 9542 | 7951 |
| | | | | (240-360) | Fr | 0.217 | 0.517 | 0.739 | 1.111 |
| | | | | | Feed (mm/min) | 3450 | 6170 | 7050 | 8830 |
| PLASTICS | Slot | 1 | ≤ 1 | 245 | RPM | 12987 | 9740 | 7792 | 6494 |
| | | | | (196-294) | Fr | 0.094 | 0.223 | 0.318 | 0.477 |
| | | | | | Feed (mm/min) | 1215 | 2175 | 2475 | 3100 |
| | Profile | ≤ 0.5 | ≤ 1.5 | 305 | RPM | 16168 | 12126 | 9701 | 8084 |
| | | | | (244-366) | Fr | 0.094 | 0.223 | 0.318 | 0.477 |
| | | | | | Feed (mm/min) | 1513 | 2708 | 3081 | 3859 |
| | HSM | ≤ 0.05 | ≤ 2 | 505 | RPM | 26769 | 20077 | 16062 | 13385 |
| | | | | (404-606) | Fr | 0.215 | 0.512 | 0.731 | 1.098 |
| | | | | | Feed (mm/min) | 5760 | 10280 | 11745 | 14700 |

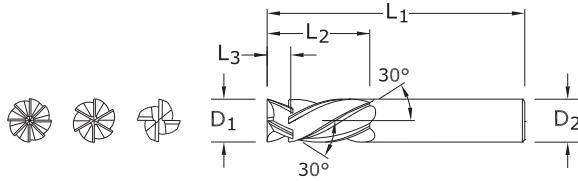
HSM (high speed machining)
 $rpm = (Vc \times 1000) / (D1 \times 3.14)$
 $mm/min = Fr \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)

FRACTIONAL Compression



25 FRACTIONAL SERIES



- Compression-style helixes direct cutting forces inward, eliminating fiber breakout and delamination
- Primary/secondary relief grind for reduced friction and pressure
- Rigid, heavy core

| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | inch | | | | NO. OF FLUTES | EDP NO. | |
|---------------------------|------------------------|-------------------------|-------------------------|---------------------------|----------|---------------|-------------------------|--|
| | | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | INTERSECT LENGTH L_3 | UNCOATED | | Di-NAMITE® (Diamond) | |
| 1/4 | 1 | 2-1/2 | 1/4 | 11/64 | 4 | 72970 | 72971 | |
| 5/16 | 1 | 2-1/2 | 5/16 | 7/32 | 4 | 72972 | 72973 | |
| 3/8 | 1-1/8 | 2-1/2 | 3/8 | 17/64 | 6 | 72974 | 72975 | |
| 1/2 | 1-1/2 | 3-1/2 | 1/2 | 23/64 | 8 | 72976 | 72977 | |

TOLERANCES (inch)

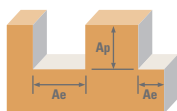
$D_1 = +.000/-0.003$

$D_2 = h_6$

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Compression



| Series | 25 | Fractional | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | |
|---|---------|------------|---------------------|---------------------|------------|-----------------------------------|--------|--------|--------|
| | | | | | | 1/4 | 5/16 | 3/8 | 1/2 |
| CFRP, AFRP (CARBON FIBER, ARAMID FIBER) | Profile | ≤ 0.5 | ≤ 1.5 | 500 | RPM | 7640 | 6112 | 5093 | 3820 |
| | | | | (400-600) | Fz | 0.0016 | 0.0030 | 0.0040 | 0.0048 |
| | | | | | Feed (ipm) | 49 | 73 | 122 | 147 |
| | HSM | ≤ 0.05 | ≤ 2 | 825 | RPM | 12606 | 10085 | 8404 | 6303 |
| | | | | (660-990) | Fz | 0.0037 | 0.0069 | 0.0092 | 0.0110 |
| | | | | | Feed (ipm) | 187 | 278 | 464 | 555 |
| GFRP (FIBERGLASS) | Profile | ≤ 0.5 | ≤ 1.5 | 400 | RPM | 6112 | 4890 | 4075 | 3056 |
| | | | | (320-480) | Fz | 0.0016 | 0.0030 | 0.0040 | 0.0048 |
| | | | | | Feed (ipm) | 39 | 59 | 98 | 117 |
| | HSM | ≤ 0.05 | ≤ 2 | 660 | RPM | 10085 | 8068 | 6723 | 5042 |
| | | | | (528-792) | Fz | 0.0037 | 0.0069 | 0.0092 | 0.0110 |
| | | | | | Feed (ipm) | 149 | 223 | 371 | 444 |
| N CARBON, GRAPHITE | Profile | ≤ 0.5 | ≤ 1.5 | 600 | RPM | 9168 | 7334 | 6112 | 4584 |
| | | | | (480-720) | Fz | 0.0020 | 0.0038 | 0.0050 | 0.0060 |
| | | | | | Feed (ipm) | 73 | 111 | 183 | 220 |
| | HSM | ≤ 0.05 | ≤ 2 | 990 | RPM | 15127 | 12102 | 10085 | 7564 |
| | | | | (792-1188) | Fz | 0.0046 | 0.0086 | 0.0115 | 0.0138 |
| | | | | | Feed (ipm) | 278 | 416 | 696 | 835 |
| PLASTICS | Profile | ≤ 0.5 | ≤ 1.5 | 1000 | RPM | 15280 | 12224 | 10187 | 7640 |
| | | | | (800-1200) | Fz | 0.0020 | 0.0038 | 0.0050 | 0.0060 |
| | | | | | Feed (ipm) | 122 | 186 | 306 | 367 |
| | HSM | ≤ 0.05 | ≤ 2 | 1650 | RPM | 25212 | 20170 | 16808 | 12606 |
| | | | | (1320-1980) | Fz | 0.0046 | 0.0086 | 0.0115 | 0.0138 |
| | | | | | Feed (ipm) | 464 | 694 | 1160 | 1392 |
| MACHINABLE CERAMICS MACHINABLE GLASS | Profile | ≤ 0.5 | ≤ 1.5 | 50 | RPM | 764 | 611 | 509 | 382 |
| | | | | (40-60) | Fz | 0.0008 | 0.0015 | 0.0020 | 0.0024 |
| | | | | | Feed (ipm) | 2.4 | 3.7 | 6.1 | 7.3 |
| | HSM | ≤ 0.05 | ≤ 2 | 85 | RPM | 1299 | 1039 | 866 | 649 |
| | | | | (68-102) | Fz | 0.0018 | 0.0034 | 0.0046 | 0.0055 |
| | | | | | Feed (ipm) | 9.4 | 14.1 | 23.9 | 28.6 |

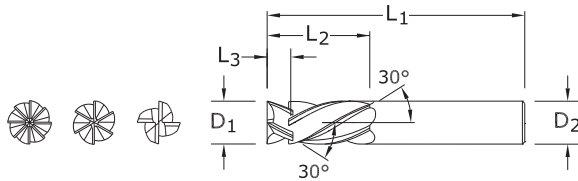
HSM (high speed machining)
 $rpm = Vc \times 3.82 / D_1$
 $ipm = Fz \times \text{number of flutes} \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)

Compression



25M METRIC SERIES



- Compression-style helixes direct cutting forces inward, eliminating fiber breakout and delamination
- Primary/secondary relief grind for reduced friction and pressure
- Rigid, heavy core

| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | mm | | | | NO. OF FLUTES | EDP NO. | |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|------------------------------------|----------|---------------|----------------------|--|
| | | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | INTERSECT LENGTH L ₃ | UNCOATED | | Di-NAMITE® (Diamond) | |
| 6,0 | 25,0 | 63,0 | 6,0 | 4,10 | 4 | 82990 | 82991 | |
| 8,0 | 25,0 | 63,0 | 8,0 | 5,58 | 4 | 82992 | 82993 | |
| 10,0 | 28,0 | 63,0 | 10,0 | 7,05 | 6 | 82994 | 82995 | |
| 12,0 | 38,0 | 89,0 | 12,0 | 8,60 | 8 | 82996 | 82997 | |

TOLERANCES (mm)

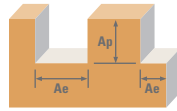
D₁ = +0,00/-0,08

D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Compression



| Series 25M Metric | Ae x D1 | Ap x D1 | Vc (m/min) | Diameter (D1) (mm) | | | | | |
|---|-------------|---------|---------------|-----------------------|-------|-------|-------|-------|-------|
| | | | | 6 | 8 | 10 | 12 | | |
| CFRP, AFRP (CARBON FIBER, ARAMID FIBER) | Profile | ≤ 0.5 | ≤ 1.5 | 150 | RPM | 7951 | 5963 | 4771 | 3976 |
| | | | | (96-164) | Fz | 0.040 | 0.065 | 0.075 | 0.100 |
| | | | | Feed (mm/min) | 1272 | 1550 | 2147 | 3181 | |
| | HSM | ≤ 0.05 | ≤ 2 | 250 | RPM | 13252 | 9939 | 7951 | 6626 |
| | | | | (200-300) | Fz | 0.095 | 0.145 | 0.175 | 0.235 |
| | | | | Feed (mm/min) | 5036 | 5765 | 8349 | 12457 | |
| GFRP (FIBERGLASS) | Profile | ≤ 0.5 | ≤ 1.5 | 120 | RPM | 6361 | 4771 | 3817 | 3181 |
| | | | | (96-164) | Fz | 0.040 | 0.065 | 0.075 | 0.100 |
| | | | | Feed (mm/min) | 1018 | 1240 | 1717 | 2544 | |
| | HSM | ≤ 0.05 | ≤ 2 | 200 | RPM | 10602 | 7951 | 6361 | 5301 |
| | | | | (160-240) | Fz | 0.095 | 0.145 | 0.175 | 0.235 |
| | | | | Feed (mm/min) | 4029 | 4612 | 6679 | 9966 | |
| N CARBON, GRAPHITE | Profile | ≤ 0.5 | ≤ 1.5 | 185 | RPM | 9807 | 7355 | 5884 | 4903 |
| | | | | (148-222) | Fz | 0.050 | 0.080 | 0.095 | 0.125 |
| | | | | Feed (mm/min) | 1961 | 2354 | 3354 | 4903 | |
| | HSM | ≤ 0.05 | ≤ 2 | 300 | RPM | 15903 | 11927 | 9542 | 7951 |
| | | | | (240-360) | Fz | 0.115 | 0.185 | 0.220 | 0.290 |
| | | | | Feed (mm/min) | 7315 | 8826 | 12595 | 18447 | |
| PLASTICS | Profile | ≤ 0.5 | ≤ 1.5 | 305 | RPM | 16168 | 12126 | 9701 | 8084 |
| | | | | (244-366) | Fz | 0.050 | 0.080 | 0.095 | 0.125 |
| | | | | Feed (mm/min) | 3234 | 3880 | 5529 | 8084 | |
| | HSM | ≤ 0.05 | ≤ 2 | 505 | RPM | 26769 | 20077 | 16062 | 13385 |
| | | | | (404-606) | Fz | 0.115 | 0.185 | 0.220 | 0.290 |
| | | | | Feed (mm/min) | 12314 | 14857 | 21201 | 31052 | |
| MACHINABLE CERAMICS MACHINABLE GLASS | Profile | ≤ 0.5 | ≤ 1.5 | 15 | RPM | 795 | 596 | 477 | 398 |
| | | | | (12-18) | Fz | 0.020 | 0.035 | 0.045 | 0.050 |
| | | | | Feed (mm/min) | 64 | 83 | 129 | 159 | |
| | HSM | ≤ 0.05 | ≤ 2 | 25 | RPM | 1325 | 994 | 795 | 663 |
| | | | | (20-30) | Fz | 0.045 | 0.075 | 0.085 | 0.115 |
| | | | | Feed (mm/min) | 239 | 298 | 406 | 610 | |

HSM (high speed machining)
 $rpm = (Vc \times 1000) / (D1 \times 3.14)$
 $mm/min = Fz \times \text{number of flutes} \times rpm$
 adjust parameters based on resin type and fiber structure
 reduce speed when overheating causes melting or damage to resin
 reduce feed if delamination or fraying occur

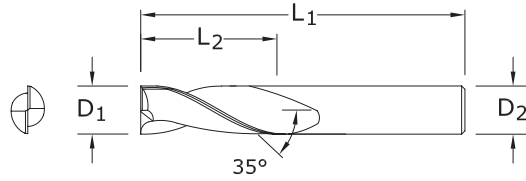
finish cuts typically required reduced feed and cutting depths
 rates shown are for use without coolant; rates may be increased with coolant
 dust collection is vital when machining dry
 diamond coating will increase tool life in graphite and composite materials
 refer to the KYOCERA SGS Tool Wizard® for complete technical information
 (www.kyocera-sgstool.com)

FRACTIONAL Up Cut



21

FRACTIONAL SERIES



| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|
| | | | | UNCOATED |
| 1/8 | 1/2 | 2 | 1/4 | 90001 |
| 5/32 | 5/8 | 2-1/2 | 1/4 | 90005 |
| 3/16 | 3/4 | 2-1/2 | 1/4 | 90009 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 90013 |
| 1/4 | 1 | 2-1/2 | 1/4 | 90017 |
| 5/16 | 1 | 2-1/2 | 5/16 | 90021 |
| 5/16 | 1 | 3 | 1/2 | 90025 |
| 3/8 | 1 | 2-1/2 | 3/8 | 90029 |
| 3/8 | 1-1/4 | 3 | 1/2 | 90033 |
| 1/2 | 1-1/4 | 3 | 1/2 | 90037 |
| 1/2 | 1-1/2 | 3-1/2 | 1/2 | 90041 |
| 1/2 | 2 | 4 | 1/2 | 90045 |
| 5/8 | 2 | 4-1/2 | 5/8 | 90049 |
| 3/4 | 2 | 4-1/2 | 3/4 | 90053 |

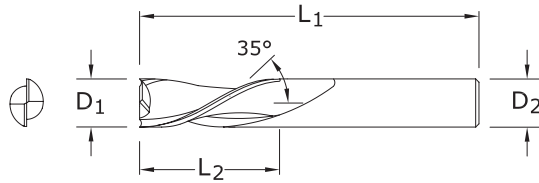
TOLERANCES (inch)

D₁ = +.000/- .003

D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



TOLERANCES (inch)

$D_1 = +.000/-0.003$

$D_2 = h_6$

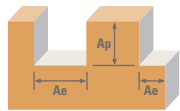
PLASTICS/COMPOSITES









For patent
information visit
www.ksptpatents.com

22
FRACTIONAL SERIES

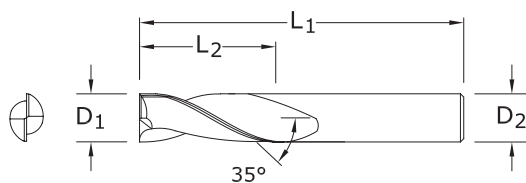
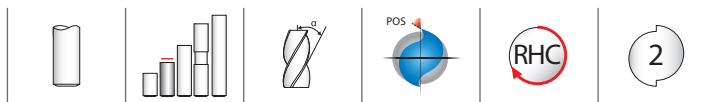
| inch | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED |
| 1/8 | 1/2 | 2 | 1/4 | 91001 |
| 5/32 | 5/8 | 2-1/2 | 1/4 | 91005 |
| 3/16 | 3/4 | 2-1/2 | 1/4 | 91009 |
| 1/4 | 3/4 | 2-1/2 | 1/4 | 91013 |
| 1/4 | 1 | 2-1/2 | 1/4 | 91017 |
| 5/16 | 1 | 2-1/2 | 5/16 | 91021 |
| 5/16 | 1 | 3 | 1/2 | 91025 |
| 3/8 | 1 | 2-1/2 | 3/8 | 91029 |
| 3/8 | 1-1/4 | 3 | 1/2 | 91033 |
| 1/2 | 1-1/4 | 3 | 1/2 | 91037 |
| 1/2 | 1-1/2 | 3-1/2 | 1/2 | 91041 |
| 1/2 | 2 | 4 | 1/2 | 91045 |
| 5/8 | 2 | 4-1/2 | 5/8 | 91049 |
| 3/4 | 2 | 4-1/2 | 3/4 | 91053 |

Up Cut Down Cut



| Series 21, 22 Fractional | Ae x D ₁ | Ap x D ₁ | Vc (sfm) | Diameter (D ₁) (inch) | | | | | |
|--------------------------------|--|---------------------|-------------|--------------------------------------|--------|--------|--------|--------|--------|
| | | | | 1/8 | 1/4 | 3/8 | 1/2 | 3/4 | |
| HARDWOODS | Slot  | 1 ≤ 1 | 1550 | RPM | 47368 | 23684 | 15789 | 11842 | 7895 |
| | | | (1240-1860) | Fz | 0.0008 | 0.0015 | 0.0025 | 0.0030 | 0.0045 |
| | | | Feed (ipm) | 76 | 71 | 79 | 71 | 71 | |
| | Profile  | ≤ 0.5 ≤ 1.5 | 1550 | RPM | 47368 | 23684 | 15789 | 11842 | 7895 |
| | | | (1240-1860) | Fz | 0.0008 | 0.0015 | 0.0025 | 0.0030 | 0.0045 |
| | | | Feed (ipm) | 76 | 71 | 79 | 71 | 71 | |
| SOFTWOODS | Slot  | 1 ≤ 1 | 1950 | RPM | 59592 | 29796 | 19864 | 14898 | 9932 |
| | | | (1560-2340) | Fz | 0.0010 | 0.0020 | 0.0030 | 0.0035 | 0.0055 |
| | | | Feed (ipm) | 119 | 119 | 119 | 104 | 109 | |
| | Profile  | ≤ 0.5 ≤ 1.5 | 1950 | RPM | 59592 | 29796 | 19864 | 14898 | 9932 |
| | | | (1560-2340) | Fz | 0.0010 | 0.0020 | 0.0030 | 0.0035 | 0.0055 |
| | | | Feed (ipm) | 119 | 119 | 119 | 104 | 109 | |
| PLYWOODS | Slot  | 1 ≤ 1 | 1950 | RPM | 59592 | 29796 | 19864 | 14898 | 9932 |
| | | | (1560-2340) | Fz | 0.0013 | 0.0025 | 0.0040 | 0.0050 | 0.0075 |
| | | | Feed (ipm) | 155 | 149 | 159 | 149 | 149 | |
| | Profile  | ≤ 0.5 ≤ 1.5 | 1950 | RPM | 59592 | 29796 | 19864 | 14898 | 9932 |
| | | | (1560-2340) | Fz | 0.0013 | 0.0025 | 0.0040 | 0.0050 | 0.0075 |
| | | | Feed (ipm) | 155 | 149 | 159 | 149 | 149 | |
| N PLASTICS | Slot  | 1 ≤ 1 | 1950 | RPM | 59592 | 29796 | 19864 | 14898 | 9932 |
| | | | (1560-2340) | Fz | 0.0008 | 0.0017 | 0.0025 | 0.0035 | 0.0050 |
| | | | Feed (ipm) | 95 | 101 | 99 | 104 | 99 | |
| | Profile  | ≤ 0.5 ≤ 1.5 | 1950 | RPM | 59592 | 29796 | 19864 | 14898 | 9932 |
| | | | (1560-2340) | Fz | 0.0008 | 0.0017 | 0.0025 | 0.0035 | 0.0050 |
| | | | Feed (ipm) | 95 | 101 | 99 | 104 | 99 | |

rpm = Vc x 3.82 / D₁
ipm = Fz x 2 x rpm



TOLERANCES (mm)

$D_1 = +0,00/-0,08$

$D_2 = h_6$

PLASTICS/COMPOSITES

For patent
information visit
www.ksptpatents.com

21M
METRIC SERIES

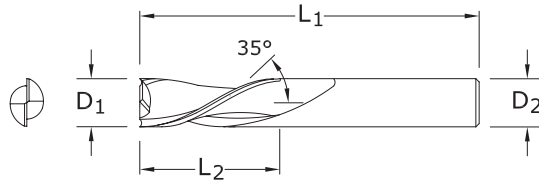
| mm | | | | EDP NO. |
|---------------------------|------------------------|-------------------------|-------------------------|----------|
| CUTTING DIAMETER D_1 | LENGTH OF CUT L_2 | OVERALL LENGTH L_1 | SHANK DIAMETER D_2 | UNCOATED |
| 3,0 | 13,0 | 50,0 | 6,0 | 90101 |
| 4,0 | 16,0 | 63,0 | 6,0 | 90107 |
| 5,0 | 19,0 | 63,0 | 6,0 | 90109 |
| 6,0 | 25,0 | 63,0 | 6,0 | 90113 |
| 8,0 | 25,0 | 63,0 | 8,0 | 90121 |
| 10,0 | 31,0 | 75,0 | 10,0 | 90129 |
| 12,0 | 31,0 | 75,0 | 12,0 | 90137 |

METRIC

Down Cut



22M
METRIC SERIES



| CUTTING DIAMETER D ₁ | LENGTH OF CUT L ₂ | OVERALL LENGTH L ₁ | SHANK DIAMETER D ₂ | EDP NO. |
|------------------------------------|---------------------------------|----------------------------------|----------------------------------|----------|
| | | | | UNCOATED |
| 3,0 | 13,0 | 50,0 | 6,0 | 91101 |
| 4,0 | 16,0 | 63,0 | 6,0 | 91107 |
| 5,0 | 19,0 | 63,0 | 6,0 | 91109 |
| 6,0 | 25,0 | 63,0 | 6,0 | 91113 |
| 8,0 | 25,0 | 63,0 | 8,0 | 91121 |
| 10,0 | 31,0 | 75,0 | 10,0 | 91129 |
| 12,0 | 31,0 | 75,0 | 12,0 | 91137 |

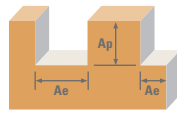
TOLERANCES (mm)








D₁ = +0,00/-0,08

D₂ = h₆

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



| Series 21M, 22M Metric | Ae x D ₁ | Ap x D ₁ | V _c (m/min) | Diameter (D ₁) (mm) | | | | | | |
|------------------------------|--|---------------------|---------------------------|------------------------------------|------|-------|-------|-------|--------|--------|
| | | | | 3 | 6 | 10 | 12 | 20 | | |
| HARDWOODS | Slot  | 1 | ≤ 1 | 470 | RPM | 49828 | 24914 | 14948 | 12457 | 7474 |
| | | | | (376-564) | Fz | 0.020 | 0.040 | 0.065 | 0.075 | 0.115 |
| | | | | Feed (mm/min) | 1993 | 1993 | 1943 | 1869 | 1719 | |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 470 | RPM | 49828 | 24914 | 8155 | 4241 | 1509 |
| | | | | (376-564) | Fz | 0.020 | 0.040 | 0.065 | 0.075 | 0.115 |
| | | | | Feed (mm/min) | 1993 | 1993 | 1060 | 636 | 347 | |
| SOFTWOODS | Slot  | 1 | ≤ 1 | 600 | RPM | 63610 | 31805 | 19083 | 15903 | 9542 |
| | | | | (480-720) | Fz | 0.025 | 0.050 | 0.075 | 0.090 | 0.140 |
| | | | | Feed (mm/min) | 3181 | 3181 | 2862 | 2862 | 2672 | |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 600 | RPM | 63610 | 31805 | 19083 | 15903 | 303467 |
| | | | | (480-720) | Fz | 0.025 | 0.050 | 0.075 | 0.090 | 0.140 |
| | | | | Feed (mm/min) | 3181 | 3181 | 2862 | 2862 | 84971 | |
| PLYWOODS | Slot  | 1 | ≤ 1 | 600 | RPM | 63610 | 31805 | 19083 | 15903 | 9542 |
| | | | | (480-720) | Fz | 0.030 | 0.065 | 0.100 | 0.125 | 0.190 |
| | | | | Feed (mm/min) | 3817 | 4135 | 3817 | 3976 | 3626 | |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 600 | RPM | 63610 | 31805 | 19083 | 15903 | 303467 |
| | | | | (480-720) | Fz | 0.030 | 0.065 | 0.100 | 0.125 | 0.190 |
| | | | | Feed (mm/min) | 3817 | 4135 | 3817 | 3976 | 115318 | |
| N PLASTICS | Slot  | 1 | ≤ 1 | 600 | RPM | 63610 | 31805 | 19083 | 15903 | 9542 |
| | | | | (480-720) | Fz | 0.020 | 0.040 | 0.065 | 0.090 | 0.125 |
| | | | | Feed (mm/min) | 2544 | 2544 | 2481 | 2862 | 2385 | |
| | Profile  | ≤ 0.5 | ≤ 1.5 | 600 | RPM | 63610 | 31805 | 19083 | 15903 | 9542 |
| | | | | (480-720) | Fz | 0.020 | 0.040 | 0.065 | 0.090 | 0.125 |
| | | | | Feed (mm/min) | 2544 | 2544 | 2481 | 2862 | 2385 | |

rpm = (V_c x 1000) / (D₁ x 3.14)
mm/min = Fz x 2 x rpm

EDP Number Index

| EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE |
|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|
| 30000 | 193 | 30111 | 193 | 30192 | 193 | 30375 | 180 | 30495 | 185 | 30578 | 189 | 30833 | 188 |
| 30001 | 193 | 30112 | 198 | 30193 | 193 | 30376 | 185 | 30496 | 185 | 30589 | 211 | 30834 | 188 |
| 30002 | 193 | 30113 | 193 | 30194 | 193 | 30377 | 179 | 30497 | 185 | 30590 | 189 | 30835 | 188 |
| 30003 | 193 | 30114 | 198 | 30195 | 193 | 30378 | 184 | 30498 | 185 | 30590 | 212 | 30836 | 188 |
| 30004 | 193 | 30115 | 193 | 30196 | 193 | 30379 | 194 | 30499 | 185 | 30591 | 185 | 30837 | 188 |
| 30005 | 193 | 30116 | 198 | 30197 | 193 | 30380 | 194 | 30500 | 185 | 30592 | 185 | 30838 | 188 |
| 30006 | 193 | 30117 | 193 | 30198 | 193 | 30381 | 194 | 30501 | 188 | 30593 | 185 | 30839 | 188 |
| 30007 | 193 | 30118 | 198 | 30199 | 193 | 30382 | 194 | 30502 | 189 | 30594 | 185 | 30840 | 188 |
| 30008 | 193 | 30119 | 193 | 30300 | 193 | 30383 | 194 | 30503 | 188 | 30595 | 185 | 30841 | 188 |
| 30009 | 193 | 30120 | 198 | 30301 | 179 | 30384 | 199 | 30504 | 189 | 30596 | 185 | 30842 | 188 |
| 30010 | 193 | 30121 | 193 | 30302 | 184 | 30385 | 199 | 30505 | 188 | 30597 | 185 | 30843 | 188 |
| 30011 | 193 | 30122 | 198 | 30303 | 179 | 30386 | 199 | 30506 | 189 | 30598 | 185 | 30844 | 188 |
| 30012 | 194 | 30123 | 193 | 30304 | 184 | 30387 | 199 | 30507 | 188 | 30599 | 184 | 30845 | 188 |
| 30013 | 194 | 30124 | 198 | 30305 | 179 | 30388 | 199 | 30508 | 189 | 30600 | 185 | 30846 | 188 |
| 30014 | 194 | 30125 | 193 | 30306 | 184 | 30389 | 180 | 30509 | 188 | 30600 | 212 | 30847 | 188 |
| 30015 | 194 | 30126 | 198 | 30307 | 179 | 30389 | 211 | 30510 | 189 | 30602 | 189 | 30848 | 188 |
| 30016 | 194 | 30127 | 193 | 30308 | 184 | 30390 | 185 | 30511 | 188 | 30604 | 189 | 30849 | 188 |
| 30017 | 194 | 30128 | 198 | 30309 | 179 | 30390 | 212 | 30512 | 189 | 30606 | 189 | 30850 | 211 |
| 30018 | 194 | 30129 | 193 | 30310 | 184 | 30397 | 179 | 30513 | 188 | 30608 | 189 | 30851 | 189 |
| 30019 | 194 | 30130 | 198 | 30311 | 179 | 30398 | 179 | 30514 | 189 | 30610 | 189 | 30852 | 189 |
| 30020 | 194 | 30131 | 193 | 30312 | 184 | 30399 | 179 | 30515 | 188 | 30612 | 189 | 30853 | 189 |
| 30021 | 194 | 30132 | 198 | 30313 | 179 | 30400 | 179 | 30516 | 189 | 30771 | 188 | 30854 | 189 |
| 30022 | 194 | 30133 | 193 | 30314 | 184 | 30435 | 179 | 30517 | 188 | 30772 | 188 | 30855 | 189 |
| 30023 | 194 | 30134 | 198 | 30315 | 179 | 30436 | 179 | 30518 | 189 | 30773 | 188 | 30856 | 189 |
| 30024 | 194 | 30135 | 193 | 30316 | 184 | 30437 | 179 | 30519 | 188 | 30774 | 188 | 30857 | 189 |
| 30025 | 194 | 30136 | 198 | 30317 | 179 | 30438 | 179 | 30520 | 189 | 30775 | 188 | 30858 | 189 |
| 30026 | 194 | 30137 | 193 | 30318 | 184 | 30439 | 179 | 30521 | 188 | 30776 | 188 | 30859 | 189 |
| 30027 | 194 | 30138 | 198 | 30319 | 179 | 30440 | 179 | 30522 | 189 | 30777 | 188 | 30860 | 189 |
| 30028 | 194 | 30139 | 193 | 30320 | 184 | 30441 | 179 | 30523 | 188 | 30778 | 188 | 30861 | 189 |
| 30029 | 193 | 30140 | 198 | 30321 | 179 | 30442 | 179 | 30524 | 189 | 30779 | 188 | 30862 | 189 |
| 30030 | 194 | 30141 | 193 | 30322 | 184 | 30443 | 179 | 30525 | 188 | 30780 | 188 | 30863 | 189 |
| 30030 | 211 | 30142 | 198 | 30323 | 179 | 30444 | 179 | 30526 | 189 | 30781 | 188 | 30864 | 189 |
| 30031 | 198 | 30143 | 194 | 30324 | 184 | 30445 | 179 | 30527 | 188 | 30782 | 188 | 30865 | 189 |
| 30032 | 198 | 30144 | 199 | 30325 | 179 | 30446 | 179 | 30528 | 189 | 30783 | 188 | 30866 | 189 |
| 30033 | 198 | 30145 | 194 | 30326 | 184 | 30447 | 179 | 30529 | 188 | 30784 | 188 | 30867 | 189 |
| 30034 | 198 | 30146 | 199 | 30327 | 179 | 30448 | 179 | 30530 | 189 | 30785 | 188 | 30868 | 189 |
| 30035 | 198 | 30147 | 194 | 30328 | 184 | 30449 | 179 | 30531 | 188 | 30786 | 188 | 30869 | 189 |
| 30036 | 198 | 30148 | 199 | 30329 | 179 | 30450 | 179 | 30532 | 189 | 30787 | 188 | 30870 | 189 |
| 30037 | 198 | 30149 | 194 | 30330 | 184 | 30451 | 179 | 30533 | 188 | 30788 | 188 | 30871 | 189 |
| 30038 | 198 | 30150 | 199 | 30331 | 179 | 30452 | 179 | 30534 | 188 | 30789 | 188 | 30872 | 189 |
| 30039 | 198 | 30151 | 194 | 30332 | 184 | 30453 | 179 | 30535 | 189 | 30790 | 188 | 30873 | 189 |
| 30040 | 198 | 30152 | 199 | 30333 | 179 | 30454 | 179 | 30536 | 189 | 30791 | 188 | 30874 | 189 |
| 30041 | 198 | 30153 | 194 | 30334 | 184 | 30455 | 180 | 30537 | 188 | 30792 | 188 | 30875 | 189 |
| 30042 | 198 | 30154 | 199 | 30335 | 179 | 30456 | 180 | 30538 | 189 | 30793 | 188 | 30876 | 189 |
| 30043 | 198 | 30155 | 194 | 30336 | 184 | 30457 | 180 | 30539 | 188 | 30794 | 188 | 30877 | 189 |
| 30044 | 198 | 30156 | 199 | 30337 | 179 | 30458 | 180 | 30540 | 189 | 30795 | 188 | 30878 | 189 |
| 30045 | 198 | 30157 | 194 | 30338 | 184 | 30459 | 180 | 30541 | 188 | 30796 | 188 | 30879 | 189 |
| 30046 | 198 | 30158 | 199 | 30339 | 179 | 30460 | 180 | 30542 | 189 | 30797 | 188 | 30880 | 189 |
| 30047 | 198 | 30159 | 194 | 30340 | 184 | 30461 | 180 | 30543 | 188 | 30798 | 188 | 30881 | 189 |
| 30048 | 198 | 30160 | 199 | 30341 | 179 | 30462 | 180 | 30544 | 189 | 30799 | 188 | 30882 | 189 |
| 30049 | 198 | 30161 | 194 | 30342 | 184 | 30463 | 180 | 30545 | 188 | 30800 | 188 | 30883 | 189 |
| 30050 | 198 | 30162 | 199 | 30343 | 179 | 30464 | 180 | 30546 | 189 | 30801 | 188 | 30884 | 189 |
| 30051 | 198 | 30163 | 194 | 30344 | 185 | 30465 | 180 | 30547 | 188 | 30802 | 188 | 30885 | 189 |
| 30052 | 199 | 30164 | 199 | 30345 | 179 | 30466 | 180 | 30548 | 189 | 30803 | 188 | 30886 | 189 |
| 30053 | 199 | 30165 | 194 | 30346 | 185 | 30467 | 180 | 30549 | 188 | 30804 | 188 | 30887 | 189 |
| 30054 | 199 | 30166 | 199 | 30347 | 179 | 30468 | 180 | 30550 | 189 | 30805 | 188 | 30888 | 189 |
| 30055 | 199 | 30167 | 194 | 30348 | 185 | 30469 | 179 | 30551 | 188 | 30806 | 188 | 30889 | 189 |
| 30056 | 199 | 30168 | 199 | 30349 | 180 | 30470 | 180 | 30552 | 189 | 30807 | 188 | 30900 | 189 |
| 30057 | 199 | 30169 | 194 | 30350 | 185 | 30470 | 211 | 30553 | 188 | 30808 | 188 | 30900 | 212 |
| 30058 | 199 | 30170 | 199 | 30351 | 180 | 30471 | 184 | 30554 | 189 | 30809 | 188 | 30902 | 189 |
| 30059 | 199 | 30171 | 194 | 30352 | 185 | 30472 | 184 | 30555 | 188 | 30810 | 211 | 30904 | 189 |
| 30060 | 199 | 30172 | 199 | 30353 | 180 | 30473 | 184 | 30556 | 188 | 30811 | 188 | 30906 | 189 |
| 30061 | 199 | 30173 | 194 | 30354 | 185 | 30474 | 184 | 30557 | 189 | 30812 | 188 | 30908 | 189 |
| 30062 | 199 | 30174 | 199 | 30355 | 180 | 30475 | 184 | 30558 | 189 | 30813 | 188 | 30910 | 189 |
| 30063 | 199 | 30175 | 194 | 30356 | 185 | 30476 | 184 | 30559 | 188 | 30814 | 188 | 30912 | 189 |
| 30064 | 199 | 30176 | 199 | 30357 | 180 | 30477 | 184 | 30560 | 189 | 30815 | 188 | 30914 | 189 |
| 30065 | 199 | 30177 | 193 | 30358 | 185 | 30478 | 184 | 30561 | 188 | 30816 | 188 | 30916 | 189 |
| 30066 | 199 | 30178 | 198 | 30359 | 180 | 30479 | 184 | 30562 | 189 | 30817 | 188 | 30918 | 189 |
| 30067 | 199 | 30179 | 194 | 30360 | 185 | 30480 | 184 | 30563 | 188 | 30818 | 188 | 30920 | 189 |
| 30068 | 199 | 30180 | 194 | 30361 | 180 | 30481 | 184 | 30564 | 189 | 30819 | 188 | 30921 | 189 |
| 30069 | 198 | 30181 | 194 | 30362 | 185 | 30482 | 184 | 30565 | 188 | 30820 | 188 | 30922 | 189 |
| 30070 | 199 | 30182 | 194 | 30363 | 180 | 30483 | 184 | 30566 | 189 | 30821 | 188 | 30923 | 189 |
| 30070 | 212 | 30183 | 194 | 30364 | 185 | 30484 | 184 | 30567 | 188 | 30822 | 188 | 30924 | 189 |
| 30101 | 193 | 30184 | 199 | 30365 | 180 | 30485 | 184 | 30568 | 189 | 30823 | 188 | 30925 | 189 |
| 30102 | 198 | 30185 | 199 | 30366 | 185 | 30486 | 184 | 30569 | 188 | 30824 | 188 | 30926 | 189 |
| 30103 | 193 | 30186 | 199 | 30367 | 180 | 30487 | 184 | 30570 | 189 | 30825 | 188 | 30927 | 189 |
| 30104 | 198 | 30187 | 199 | 30368 | 185 | 30488 | 184 | 30571 | 188 | 30826 | 188 | 30928 | 189 |
| 30105 | 193 | 30188 | 199 | 30369 | 180 | 30489 | 184 | 30572 | 189 | 30827 | 188 | 30929 | 189 |
| 30106 | 198 | 30189 | 194 | 30370 | 185 | 30490 | 184 | 30573 | 188 | 30828 | 188 | 30930 | 189 |
| 30107 | 193 | 30189 | 211 | 30371 | 180 | 30491 | 184 | 30574 | 189 | 30829 | 188 | 30931 | 189 |
| 30108 | 198 | 30190 | 199 | 30372 | 185 | 30492 | 185 | 30575 | 188 | 30830 | 188 | 30932 | 189 |
| 30109 | 193 | 30190 | 212 | 30373 | 180 | 30493 | 185 | 30576 | 189 | 30831 | 188 | 30933 | 189 |
| 30110 | 198 | 30191 | 193 | 30374 | 185 | 30494 | 185 | 30577 | 188 | 30832 | 188 | 30934 | 189 |

EDP Number Index

| EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE |
|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|
| 30935 | 189 | 31225 | 200 | 31346 | 187 | 31458 | 200 | 31553 | 183 | 31735 | 194 | 31826 | 179 |
| 30936 | 189 | 31226 | 200 | 31347 | 187 | 31459 | 197 | 31554 | 187 | 31736 | 194 | 31827 | 180 |
| 30937 | 189 | 31227 | 200 | 31348 | 187 | 31460 | 200 | 31555 | 183 | 31737 | 193 | 31830 | 184 |
| 30938 | 189 | 31228 | 200 | 31349 | 187 | 31461 | 197 | 31556 | 187 | 31738 | 193 | 31831 | 184 |
| 30939 | 189 | 31229 | 200 | 31350 | 187 | 31462 | 200 | 31557 | 183 | 31739 | 193 | 31832 | 184 |
| 30940 | 189 | 31230 | 200 | 31351 | 187 | 31463 | 197 | 31558 | 187 | 31740 | 193 | 31833 | 184 |
| 30941 | 189 | 31231 | 200 | 31352 | 187 | 31464 | 200 | 31559 | 183 | 31741 | 194 | 31834 | 185 |
| 30942 | 189 | 31232 | 200 | 31353 | 187 | 31465 | 197 | 31560 | 187 | 31742 | 194 | 31835 | 185 |
| 30943 | 189 | 31233 | 200 | 31354 | 187 | 31466 | 200 | 31561 | 183 | 31743 | 194 | 31836 | 185 |
| 30944 | 189 | 31234 | 200 | 31355 | 187 | 31467 | 197 | 31562 | 187 | 31744 | 194 | 31837 | 185 |
| 30944 | 212 | 31235 | 200 | 31356 | 187 | 31468 | 200 | 31563 | 183 | 31745 | 194 | 31838 | 185 |
| 31130 | 189 | 31236 | 200 | 31357 | 187 | 31469 | 197 | 31564 | 187 | 31746 | 194 | 31839 | 185 |
| 31131 | 189 | 31237 | 200 | 31357 | 212 | 31470 | 200 | 31565 | 183 | 31747 | 193 | 31840 | 184 |
| 31132 | 189 | 31238 | 192 | 31358 | 178 | 31471 | 197 | 31566 | 187 | 31748 | 193 | 31841 | 184 |
| 31133 | 189 | 31239 | 192 | 31359 | 178 | 31472 | 200 | 31567 | 183 | 31749 | 193 | 31842 | 184 |
| 31134 | 189 | 31240 | 192 | 31360 | 178 | 31473 | 197 | 31568 | 187 | 31750 | 178 | 31843 | 184 |
| 31135 | 189 | 31241 | 192 | 31361 | 178 | 31474 | 200 | 31569 | 183 | 31751 | 178 | 31844 | 185 |
| 31136 | 189 | 31242 | 192 | 31362 | 178 | 31475 | 197 | 31570 | 187 | 31752 | 178 | 31845 | 185 |
| 31137 | 189 | 31243 | 192 | 31363 | 178 | 31476 | 200 | 31571 | 183 | 31753 | 178 | 31846 | 185 |
| 31138 | 189 | 31244 | 192 | 31364 | 178 | 31477 | 197 | 31572 | 187 | 31754 | 178 | 31847 | 185 |
| 31139 | 189 | 31245 | 192 | 31365 | 178 | 31478 | 200 | 31573 | 183 | 31755 | 178 | 31848 | 185 |
| 31140 | 189 | 31246 | 192 | 31366 | 178 | 31479 | 197 | 31574 | 187 | 31756 | 178 | 31849 | 185 |
| 31141 | 189 | 31247 | 192 | 31367 | 178 | 31480 | 200 | 31575 | 183 | 31757 | 178 | 31850 | 179 |
| 31142 | 189 | 31248 | 192 | 31368 | 178 | 31481 | 197 | 31576 | 187 | 31758 | 178 | 31851 | 179 |
| 31143 | 189 | 31249 | 192 | 31369 | 178 | 31481 | 211 | 31577 | 183 | 31759 | 178 | 31852 | 179 |
| 31144 | 189 | 31250 | 192 | 31370 | 178 | 31482 | 200 | 31578 | 187 | 31760 | 178 | 31853 | 179 |
| 31145 | 189 | 31251 | 192 | 31401 | 197 | 31482 | 212 | 31579 | 183 | 31761 | 178 | 31854 | 179 |
| 31146 | 189 | 31252 | 192 | 31402 | 200 | 31489 | 197 | 31580 | 187 | 31762 | 178 | 31855 | 180 |
| 31147 | 189 | 31253 | 192 | 31403 | 197 | 31489 | 211 | 31581 | 183 | 31763 | 193 | 31856 | 180 |
| 31148 | 189 | 31254 | 192 | 31404 | 200 | 31490 | 200 | 31581 | 211 | 31764 | 194 | 31857 | 180 |
| 31149 | 189 | 31255 | 192 | 31405 | 197 | 31490 | 212 | 31582 | 187 | 31765 | 194 | 31858 | 180 |
| 31150 | 189 | 31256 | 192 | 31406 | 200 | 31501 | 183 | 31582 | 212 | 31766 | 194 | 31859 | 180 |
| 31151 | 189 | 31257 | 192 | 31407 | 197 | 31502 | 187 | 31589 | 183 | 31767 | 194 | 31860 | 193 |
| 31152 | 189 | 31258 | 192 | 31408 | 200 | 31503 | 183 | 31589 | 211 | 31768 | 194 | 31861 | 193 |
| 31153 | 189 | 31259 | 192 | 31409 | 197 | 31504 | 187 | 31590 | 187 | 31769 | 194 | 31862 | 193 |
| 31154 | 189 | 31260 | 192 | 31410 | 200 | 31505 | 183 | 31590 | 212 | 31770 | 198 | 31863 | 193 |
| 31155 | 189 | 31261 | 192 | 31411 | 197 | 31506 | 187 | 31601 | 192 | 31771 | 198 | 31864 | 194 |
| 31156 | 189 | 31262 | 192 | 31412 | 200 | 31507 | 183 | 31603 | 192 | 31772 | 198 | 31865 | 194 |
| 31157 | 189 | 31263 | 192 | 31413 | 197 | 31508 | 187 | 31605 | 192 | 31773 | 198 | 31866 | 194 |
| 31158 | 189 | 31303 | 178 | 31414 | 200 | 31509 | 183 | 31607 | 192 | 31774 | 199 | 31867 | 194 |
| 31159 | 189 | 31304 | 178 | 31415 | 197 | 31510 | 187 | 31609 | 192 | 31775 | 199 | 31868 | 194 |
| 31160 | 189 | 31305 | 178 | 31416 | 200 | 31511 | 183 | 31611 | 192 | 31776 | 199 | 31869 | 194 |
| 31161 | 189 | 31306 | 178 | 31417 | 197 | 31512 | 187 | 31613 | 192 | 31777 | 199 | 31870 | 193 |
| 31162 | 189 | 31307 | 178 | 31418 | 200 | 31513 | 183 | 31615 | 192 | 31778 | 199 | 31871 | 193 |
| 31163 | 189 | 31308 | 178 | 31419 | 197 | 31514 | 187 | 31617 | 192 | 31779 | 199 | 31872 | 193 |
| 31164 | 189 | 31309 | 178 | 31420 | 200 | 31515 | 183 | 31619 | 192 | 31780 | 198 | 31873 | 193 |
| 31165 | 189 | 31310 | 178 | 31421 | 197 | 31516 | 187 | 31621 | 192 | 31781 | 198 | 31874 | 194 |
| 31166 | 189 | 31311 | 178 | 31422 | 200 | 31517 | 183 | 31623 | 192 | 31782 | 198 | 31875 | 194 |
| 31167 | 189 | 31312 | 178 | 31423 | 197 | 31518 | 187 | 31625 | 192 | 31783 | 198 | 31876 | 194 |
| 31168 | 189 | 31313 | 178 | 31424 | 200 | 31519 | 183 | 31650 | 192 | 31784 | 199 | 31877 | 194 |
| 31169 | 189 | 31314 | 178 | 31425 | 197 | 31520 | 187 | 31651 | 192 | 31785 | 199 | 31878 | 194 |
| 31169 | 212 | 31315 | 178 | 31426 | 200 | 31521 | 183 | 31652 | 192 | 31786 | 199 | 31879 | 194 |
| 31170 | 197 | 31316 | 183 | 31427 | 197 | 31522 | 187 | 31653 | 192 | 31787 | 199 | 31880 | 193 |
| 31171 | 197 | 31317 | 183 | 31428 | 200 | 31523 | 183 | 31654 | 192 | 31788 | 199 | 31881 | 193 |
| 31172 | 197 | 31318 | 183 | 31429 | 197 | 31524 | 187 | 31655 | 192 | 31789 | 199 | 31882 | 193 |
| 31173 | 197 | 31319 | 183 | 31430 | 200 | 31525 | 183 | 31656 | 192 | 31790 | 198 | 31883 | 193 |
| 31174 | 197 | 31320 | 183 | 31431 | 197 | 31526 | 187 | 31657 | 192 | 31791 | 198 | 31884 | 194 |
| 31175 | 197 | 31321 | 183 | 31432 | 200 | 31527 | 183 | 31658 | 192 | 31792 | 198 | 31885 | 194 |
| 31176 | 197 | 31322 | 183 | 31433 | 197 | 31528 | 187 | 31659 | 192 | 31793 | 198 | 31886 | 194 |
| 31177 | 197 | 31323 | 183 | 31434 | 200 | 31529 | 183 | 31660 | 192 | 31794 | 199 | 31887 | 194 |
| 31178 | 197 | 31324 | 183 | 31435 | 197 | 31530 | 187 | 31661 | 192 | 31795 | 199 | 31888 | 194 |
| 31179 | 197 | 31325 | 183 | 31436 | 200 | 31531 | 183 | 31662 | 192 | 31796 | 199 | 31889 | 194 |
| 31180 | 197 | 31326 | 183 | 31437 | 197 | 31532 | 187 | 31701 | 178 | 31797 | 199 | 31890 | 184 |
| 31181 | 197 | 31327 | 183 | 31438 | 200 | 31533 | 183 | 31703 | 178 | 31798 | 199 | 31891 | 184 |
| 31182 | 197 | 31328 | 183 | 31439 | 197 | 31534 | 187 | 31705 | 178 | 31799 | 199 | 31892 | 184 |
| 31183 | 197 | 31329 | 183 | 31440 | 200 | 31535 | 183 | 31707 | 178 | 31800 | 179 | 31893 | 184 |
| 31184 | 197 | 31330 | 183 | 31441 | 197 | 31536 | 187 | 31709 | 178 | 31802 | 179 | 31894 | 185 |
| 31185 | 197 | 31331 | 183 | 31442 | 200 | 31537 | 183 | 31711 | 178 | 31804 | 179 | 31895 | 185 |
| 31186 | 197 | 31332 | 183 | 31443 | 197 | 31538 | 187 | 31713 | 178 | 31806 | 180 | 31896 | 185 |
| 31187 | 197 | 31333 | 183 | 31444 | 200 | 31539 | 183 | 31715 | 178 | 31808 | 180 | 31897 | 185 |
| 31188 | 197 | 31334 | 183 | 31445 | 197 | 31540 | 187 | 31717 | 178 | 31810 | 179 | 31898 | 185 |
| 31189 | 197 | 31335 | 183 | 31446 | 200 | 31541 | 183 | 31719 | 178 | 31812 | 179 | 31899 | 185 |
| 31190 | 197 | 31336 | 183 | 31447 | 197 | 31542 | 187 | 31721 | 178 | 31814 | 179 | 31900 | 198 |
| 31190 | 211 | 31336 | 211 | 31448 | 200 | 31543 | 183 | 31723 | 178 | 31816 | 180 | 31902 | 198 |
| 31217 | 200 | 31337 | 187 | 31449 | 197 | 31544 | 187 | 31725 | 178 | 31817 | 180 | 31904 | 198 |
| 31217 | 212 | 31338 | 187 | 31450 | 200 | 31545 | 183 | 31727 | 193 | 31818 | 180 | 31906 | 198 |
| 31218 | 200 | 31339 | 187 | 31451 | 197 | 31546 | 187 | 31728 | 193 | 31819 | 180 | 31908 | 199 |
| 31219 | 200 | 31340 | 187 | 31452 | 200 | 31547 | 183 | 31729 | 193 | 31820 | 179 | 31910 | 199 |
| 31220 | 200 | 31341 | 187 | 31453 | 197 | 31548 | 187 | 31730 | 193 | 31821 | 179 | 31912 | 199 |
| 31221 | 200 | 31342 | 187 | 31454 | 200 | 31549 | 183 | 31731 | 194 | 31822 | 180 | 31914 | 199 |
| 31222 | 200 | 31343 | 187 | 31455 | 197 | 31550 | 187 | 31732 | 194 | 31823 | 180 | 31916 | 199 |
| 31223 | 200 | 31344 | 187 | 31456 | 200 | 31551 | 183 | 31733 | 194 | 31824 | 180 | 31917 | 199 |
| 31224 | 200 | 31345 | 187 | 31457 | 197 | 31552 | 187 | 31734 | 194 | 31825 | 179 | 31918 | 198 |

EDP Number Index

| EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE |
|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|
| 31919 | 198 | 32037 | 164 | 32306 | 190 | 32410 | 191 | 32573 | 64 | 32686 | 64 | 32783 | 139 |
| 31920 | 198 | 32038 | 164 | 32307 | 190 | 32411 | 191 | 32574 | 64 | 32687 | 64 | 32784 | 139 |
| 31921 | 198 | 32039 | 164 | 32308 | 190 | 32412 | 191 | 32575 | 64 | 32688 | 64 | 32785 | 140 |
| 31922 | 199 | 32040 | 164 | 32309 | 190 | 32413 | 191 | 32576 | 64 | 32689 | 64 | 32786 | 140 |
| 31923 | 199 | 32041 | 164 | 32310 | 190 | 32414 | 191 | 32577 | 64 | 32691 | 138 | 32787 | 140 |
| 31924 | 199 | 32042 | 164 | 32311 | 190 | 32415 | 191 | 32578 | 64 | 32692 | 138 | 32788 | 140 |
| 31925 | 199 | 32043 | 164 | 32312 | 190 | 32416 | 191 | 32579 | 64 | 32697 | 138 | 32789 | 140 |
| 31926 | 199 | 32044 | 164 | 32313 | 190 | 32417 | 191 | 32580 | 64 | 32698 | 138 | 32790 | 140 |
| 31927 | 199 | 32045 | 164 | 32314 | 190 | 32418 | 191 | 32581 | 64 | 32699 | 138 | 32791 | 140 |
| 31928 | 198 | 32046 | 164 | 32315 | 190 | 32419 | 191 | 32582 | 64 | 32700 | 138 | 32792 | 140 |
| 31929 | 198 | 32047 | 164 | 32316 | 190 | 32420 | 191 | 32583 | 64 | 32701 | 138 | 32793 | 140 |
| 31930 | 198 | 32048 | 164 | 32317 | 190 | 32421 | 191 | 32584 | 64 | 32702 | 138 | 32794 | 140 |
| 31931 | 198 | 32049 | 164 | 32318 | 190 | 32422 | 191 | 32585 | 64 | 32703 | 138 | 32795 | 140 |
| 31932 | 199 | 32053 | 164 | 32319 | 190 | 32423 | 191 | 32586 | 64 | 32704 | 138 | 32796 | 140 |
| 31933 | 199 | 32054 | 164 | 32320 | 190 | 32424 | 191 | 32587 | 64 | 32705 | 138 | 32797 | 140 |
| 31934 | 199 | 32055 | 164 | 32321 | 190 | 32425 | 191 | 32588 | 64 | 32706 | 138 | 32798 | 140 |
| 31935 | 199 | 32056 | 164 | 32322 | 190 | 32426 | 191 | 32589 | 64 | 32707 | 138 | 32799 | 140 |
| 31936 | 199 | 32057 | 164 | 32323 | 190 | 32427 | 191 | 32590 | 64 | 32708 | 138 | 32800 | 140 |
| 31937 | 199 | 32058 | 164 | 32324 | 190 | 32428 | 191 | 32591 | 64 | 32709 | 138 | 32801 | 140 |
| 31938 | 179 | 32059 | 164 | 32325 | 190 | 32429 | 191 | 32592 | 64 | 32710 | 138 | 32802 | 140 |
| 31939 | 179 | 32060 | 164 | 32326 | 190 | 32430 | 191 | 32593 | 64 | 32711 | 138 | 32803 | 140 |
| 31940 | 179 | 32061 | 164 | 32327 | 190 | 32431 | 191 | 32594 | 64 | 32712 | 138 | 32804 | 140 |
| 31941 | 179 | 32062 | 164 | 32328 | 190 | 32434 | 191 | 32595 | 64 | 32713 | 138 | 32805 | 140 |
| 31942 | 180 | 32063 | 164 | 32329 | 190 | 32435 | 191 | 32596 | 64 | 32714 | 138 | 32806 | 140 |
| 31943 | 180 | 32064 | 164 | 32330 | 190 | 32436 | 191 | 32597 | 64 | 32715 | 138 | 32807 | 140 |
| 31944 | 180 | 32065 | 164 | 32333 | 190 | 32437 | 191 | 32598 | 64 | 32716 | 138 | 32808 | 140 |
| 31945 | 180 | 32066 | 164 | 32334 | 190 | 32438 | 191 | 32599 | 64 | 32717 | 138 | 32809 | 140 |
| 31946 | 180 | 32067 | 164 | 32335 | 190 | 32439 | 191 | 32600 | 64 | 32718 | 138 | 32810 | 140 |
| 31947 | 180 | 32068 | 164 | 32336 | 190 | 32440 | 191 | 32601 | 64 | 32719 | 138 | 32815 | 139 |
| 31948 | 179 | 32069 | 164 | 32337 | 190 | 32441 | 191 | 32602 | 64 | 32720 | 138 | 32816 | 139 |
| 31949 | 179 | 32200 | 186 | 32338 | 190 | 32442 | 191 | 32603 | 64 | 32725 | 138 | 32817 | 139 |
| 31950 | 179 | 32201 | 186 | 32339 | 190 | 32443 | 191 | 32604 | 64 | 32726 | 138 | 32818 | 139 |
| 31951 | 179 | 32202 | 186 | 32340 | 190 | 32445 | 191 | 32605 | 64 | 32727 | 138 | 32819 | 139 |
| 31952 | 180 | 32203 | 186 | 32341 | 190 | 32446 | 191 | 32606 | 64 | 32728 | 138 | 32820 | 139 |
| 31953 | 180 | 32204 | 186 | 32342 | 190 | 32447 | 191 | 32607 | 64 | 32729 | 138 | 32821 | 139 |
| 31954 | 180 | 32205 | 186 | 32345 | 190 | 32448 | 191 | 32608 | 64 | 32730 | 138 | 32822 | 139 |
| 31955 | 180 | 32206 | 186 | 32346 | 190 | 32449 | 191 | 32609 | 64 | 32731 | 138 | 32823 | 139 |
| 31956 | 180 | 32207 | 186 | 32347 | 190 | 32450 | 191 | 32610 | 64 | 32732 | 138 | 32824 | 139 |
| 31957 | 180 | 32210 | 186 | 32348 | 190 | 32451 | 191 | 32611 | 64 | 32733 | 138 | 32825 | 135 |
| 31958 | 179 | 32211 | 186 | 32349 | 190 | 32452 | 191 | 32612 | 64 | 32734 | 138 | 32826 | 139 |
| 31959 | 179 | 32212 | 186 | 32350 | 190 | 32453 | 191 | 32613 | 64 | 32735 | 138 | 32827 | 139 |
| 31960 | 179 | 32213 | 186 | 32351 | 190 | 32454 | 191 | 32614 | 64 | 32736 | 138 | 32828 | 139 |
| 31961 | 179 | 32214 | 186 | 32352 | 190 | 32455 | 191 | 32615 | 64 | 32737 | 138 | 32829 | 139 |
| 31962 | 180 | 32215 | 186 | 32353 | 190 | 32456 | 191 | 32616 | 64 | 32738 | 138 | 32830 | 136 |
| 31963 | 180 | 32216 | 186 | 32354 | 190 | 32457 | 191 | 32619 | 64 | 32739 | 138 | 32831 | 139 |
| 31964 | 180 | 32217 | 186 | 32355 | 190 | 32458 | 191 | 32620 | 64 | 32740 | 138 | 32832 | 139 |
| 31965 | 180 | 32260 | 181 | 32356 | 190 | 32459 | 191 | 32621 | 64 | 32741 | 138 | 32833 | 139 |
| 31966 | 180 | 32261 | 181 | 32357 | 190 | 32460 | 191 | 32625 | 64 | 32742 | 138 | 32834 | 139 |
| 31967 | 180 | 32262 | 181 | 32358 | 190 | 32461 | 191 | 32626 | 64 | 32743 | 138 | 32835 | 139 |
| 31968 | 184 | 32263 | 181 | 32359 | 190 | 32462 | 191 | 32627 | 64 | 32744 | 138 | 32836 | 139 |
| 31969 | 184 | 32264 | 181 | 32360 | 190 | 32463 | 191 | 32628 | 64 | 32745 | 138 | 32837 | 139 |
| 31970 | 184 | 32265 | 181 | 32361 | 190 | 32464 | 191 | 32632 | 64 | 32751 | 139 | 32838 | 139 |
| 31971 | 184 | 32266 | 181 | 32362 | 190 | 32470 | 191 | 32633 | 64 | 32752 | 139 | 32839 | 139 |
| 31972 | 185 | 32267 | 181 | 32363 | 190 | 32471 | 191 | 32655 | 63 | 32753 | 139 | 32840 | 139 |
| 31973 | 185 | 32270 | 181 | 32364 | 190 | 32472 | 191 | 32656 | 63 | 32754 | 139 | 32841 | 139 |
| 31974 | 185 | 32271 | 181 | 32370 | 190 | 32473 | 191 | 32657 | 63 | 32755 | 139 | 32842 | 139 |
| 31975 | 185 | 32272 | 181 | 32371 | 190 | 32474 | 191 | 32658 | 63 | 32756 | 139 | 32843 | 139 |
| 31976 | 185 | 32273 | 181 | 32372 | 190 | 32475 | 191 | 32659 | 63 | 32757 | 139 | 32844 | 139 |
| 31977 | 185 | 32274 | 181 | 32373 | 190 | 32476 | 191 | 32660 | 63 | 32758 | 139 | 32845 | 139 |
| 31978 | 184 | 32275 | 181 | 32374 | 190 | 32477 | 191 | 32661 | 63 | 32759 | 139 | 32846 | 139 |
| 31979 | 184 | 32276 | 181 | 32375 | 190 | 32478 | 191 | 32662 | 63 | 32760 | 139 | 32847 | 139 |
| 31980 | 184 | 32277 | 181 | 32376 | 190 | 32479 | 191 | 32663 | 63 | 32761 | 135 | 32848 | 139 |
| 31981 | 184 | 32280 | 181 | 32377 | 190 | 32480 | 191 | 32664 | 63 | 32762 | 139 | 32849 | 140 |
| 31982 | 185 | 32281 | 181 | 32378 | 190 | 32481 | 191 | 32665 | 63 | 32763 | 139 | 32850 | 140 |
| 31983 | 185 | 32282 | 181 | 32379 | 190 | 32482 | 191 | 32666 | 63 | 32764 | 139 | 32851 | 140 |
| 31984 | 185 | 32283 | 181 | 32380 | 190 | 32483 | 191 | 32667 | 63 | 32765 | 139 | 32852 | 140 |
| 31985 | 185 | 32284 | 181 | 32381 | 190 | 32484 | 191 | 32668 | 63 | 32766 | 136 | 32853 | 140 |
| 31986 | 185 | 32285 | 181 | 32382 | 190 | 32485 | 191 | 32669 | 63 | 32767 | 139 | 32854 | 140 |
| 31987 | 185 | 32286 | 181 | 32383 | 190 | 32486 | 191 | 32670 | 63 | 32768 | 139 | 32855 | 140 |
| 31988 | 184 | 32287 | 181 | 32384 | 190 | 32487 | 191 | 32671 | 63 | 32769 | 139 | 32856 | 140 |
| 31989 | 184 | 32290 | 186 | 32385 | 190 | 32488 | 191 | 32672 | 63 | 32770 | 139 | 32857 | 140 |
| 31990 | 184 | 32291 | 186 | 32386 | 190 | 32489 | 191 | 32673 | 63 | 32771 | 139 | 32858 | 140 |
| 31991 | 184 | 32292 | 186 | 32387 | 190 | 32500 | 65 | 32674 | 63 | 32772 | 139 | 32859 | 140 |
| 31992 | 185 | 32293 | 186 | 32388 | 190 | 32501 | 65 | 32675 | 63 | 32773 | 139 | 32860 | 140 |
| 31993 | 185 | 32294 | 186 | 32389 | 190 | 32502 | 65 | 32676 | 63 | 32774 | 139 | 32861 | 140 |
| 31994 | 185 | 32295 | 186 | 32402 | 191 | 32503 | 65 | 32677 | 63 | 32775 | 139 | 32862 | 140 |
| 31995 | 185 | 32296 | 186 | 32403 | 191 | 32504 | 65 | 32678 | 63 | 32776 | 139 | 32863 | 140 |
| 31996 | 185 | 32297 | 186 | 32404 | 191 | 32505 | 65 | 32679 | 63 | 32777 | 139 | 32864 | 140 |
| 31997 | 185 | 32301 | 190 | 32405 | 191 | 32506 | 65 | 32680 | 63 | 32778 | 139 | 32865 | 140 |
| 32033 | 164 | 32302 | 190 | 32406 | 191 | 32569 | 64 | 32681 | 63 | 32779 | 139 | 32866 | 140 |
| 32034 | 164 | 32303 | 190 | 32407 | 191 | 32570 | 64 | 32682 | 63 | 32780 | 139 | 32867 | 140 |
| 32035 | 164 | 32304 | 190 | 32408 | 191 | 32571 | 64 | 32683 | 63 | 32781 | 139 | 32868 | 140 |
| 32036 | 164 | 32305 | 190 | 32409 | 191 | 32572 | 64 | 32685 | 64 | 32782 | 139 | 32869 | 140 |

EDP Number Index

| EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE |
|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|
| 35137 | 77 | 35506 | 209 | 35648 | 137 | 35741 | 137 | 36238 | 141 | 36448 | 38 | 36605 | 37 |
| 35138 | 77 | 35507 | 209 | 35649 | 137 | 35742 | 137 | 36239 | 139 | 36449 | 38 | 36610 | 37 |
| 35139 | 77 | 35508 | 209 | 35650 | 137 | 35743 | 137 | 36240 | 139 | 36450 | 38 | 36611 | 37 |
| 35140 | 77 | 35509 | 209 | 35651 | 137 | 35744 | 137 | 36241 | 141 | 36452 | 38 | 36612 | 37 |
| 35141 | 77 | 35510 | 209 | 35652 | 137 | 35787 | 139 | 36242 | 141 | 36453 | 38 | 36613 | 37 |
| 35150 | 75 | 35511 | 209 | 35653 | 137 | 35788 | 139 | 36243 | 139 | 36454 | 38 | 36614 | 37 |
| 35151 | 75 | 35512 | 209 | 35654 | 137 | 35789 | 141 | 36244 | 139 | 36456 | 38 | 36615 | 37 |
| 35152 | 75 | 35513 | 209 | 35665 | 135 | 35790 | 141 | 36245 | 141 | 36457 | 38 | 36616 | 56 |
| 35153 | 75 | 35514 | 209 | 35666 | 135 | 35791 | 139 | 36246 | 141 | 36458 | 38 | 36617 | 56 |
| 35154 | 75 | 35515 | 209 | 35667 | 135 | 35792 | 139 | 36247 | 141 | 36460 | 38 | 36618 | 56 |
| 35155 | 75 | 35575 | 135 | 35668 | 135 | 35793 | 141 | 36248 | 141 | 36462 | 38 | 36620 | 86 |
| 35156 | 75 | 35576 | 135 | 35669 | 135 | 35794 | 141 | 36249 | 141 | 36463 | 38 | 36621 | 86 |
| 35157 | 75 | 35577 | 135 | 35670 | 135 | 35795 | 139 | 36250 | 141 | 36464 | 38 | 36622 | 86 |
| 35158 | 75 | 35578 | 135 | 35671 | 135 | 35796 | 139 | 36251 | 140 | 36466 | 38 | 36623 | 86 |
| 35159 | 75 | 35579 | 135 | 35672 | 135 | 35797 | 141 | 36252 | 140 | 36468 | 38 | 36624 | 86 |
| 35160 | 75 | 35580 | 135 | 35673 | 135 | 35798 | 141 | 36253 | 141 | 36469 | 38 | 36625 | 86 |
| 35161 | 75 | 35581 | 135 | 35674 | 135 | 35799 | 141 | 36254 | 141 | 36470 | 38 | 36626 | 86 |
| 35180 | 77 | 35582 | 135 | 35675 | 135 | 35800 | 141 | 36257 | 140 | 36472 | 38 | 36627 | 86 |
| 35181 | 77 | 35583 | 135 | 35676 | 135 | 35801 | 141 | 36258 | 140 | 36474 | 38 | 36628 | 86 |
| 35182 | 77 | 35584 | 135 | 35677 | 135 | 35802 | 141 | 36259 | 140 | 36475 | 38 | 36629 | 86 |
| 35183 | 77 | 35585 | 135 | 35678 | 135 | 35803 | 140 | 36260 | 140 | 36480 | 39 | 36630 | 86 |
| 35184 | 77 | 35586 | 135 | 35679 | 135 | 35804 | 140 | 36261 | 141 | 36482 | 39 | 36631 | 86 |
| 35185 | 77 | 35587 | 135 | 35680 | 135 | 35805 | 141 | 36262 | 141 | 36486 | 39 | 36632 | 86 |
| 35186 | 77 | 35588 | 135 | 35681 | 135 | 35806 | 141 | 36263 | 141 | 36500 | 39 | 36633 | 86 |
| 35187 | 77 | 35589 | 135 | 35682 | 135 | 35809 | 140 | 36264 | 141 | 36502 | 39 | 36634 | 86 |
| 35188 | 77 | 35590 | 135 | 35683 | 135 | 35810 | 140 | 36265 | 141 | 36504 | 39 | 36635 | 86 |
| 35189 | 77 | 35591 | 135 | 35684 | 135 | 35811 | 140 | 36266 | 141 | 36505 | 48 | 36636 | 86 |
| 35190 | 77 | 35592 | 135 | 35685 | 135 | 35812 | 140 | 36344 | 49 | 36506 | 48 | 36637 | 86 |
| 35191 | 77 | 35593 | 135 | 35686 | 135 | 35813 | 141 | 36345 | 49 | 36507 | 48 | 36638 | 86 |
| 35273 | 208 | 35594 | 135 | 35687 | 135 | 35814 | 141 | 36346 | 49 | 36508 | 48 | 36639 | 86 |
| 35275 | 208 | 35595 | 135 | 35688 | 135 | 35815 | 141 | 36347 | 49 | 36509 | 48 | 36640 | 86 |
| 35277 | 208 | 35596 | 135 | 35689 | 135 | 35816 | 141 | 36348 | 49 | 36511 | 48 | 36641 | 86 |
| 35278 | 208 | 35597 | 135 | 35690 | 135 | 35817 | 141 | 36349 | 49 | 36513 | 48 | 36701 | 36 |
| 35279 | 208 | 35598 | 135 | 35691 | 135 | 35818 | 141 | 36350 | 49 | 36515 | 48 | 36702 | 36 |
| 35280 | 208 | 35599 | 135 | 35692 | 135 | 36106 | 206 | 36351 | 49 | 36517 | 48 | 36704 | 37 |
| 35281 | 208 | 35600 | 135 | 35693 | 136 | 36107 | 206 | 36352 | 49 | 36519 | 48 | 36706 | 37 |
| 35282 | 208 | 35601 | 135 | 35694 | 136 | 36108 | 206 | 36353 | 49 | 36520 | 48 | 36707 | 37 |
| 35283 | 208 | 35602 | 135 | 35695 | 136 | 36109 | 206 | 36354 | 49 | 36530 | 47 | 36709 | 37 |
| 35285 | 208 | 35603 | 136 | 35696 | 136 | 36110 | 206 | 36355 | 49 | 36531 | 47 | 36710 | 37 |
| 35287 | 208 | 35604 | 136 | 35697 | 136 | 36111 | 206 | 36356 | 49 | 36532 | 47 | 36711 | 37 |
| 35289 | 208 | 35605 | 136 | 35698 | 136 | 36112 | 206 | 36357 | 49 | 36533 | 47 | 36712 | 37 |
| 35291 | 208 | 35606 | 136 | 35699 | 136 | 36113 | 206 | 36358 | 49 | 36534 | 47 | 36713 | 37 |
| 35293 | 208 | 35607 | 136 | 35700 | 136 | 36114 | 206 | 36359 | 49 | 36535 | 47 | 36714 | 37 |
| 35295 | 208 | 35608 | 136 | 35701 | 136 | 36116 | 206 | 36361 | 49 | 36536 | 47 | 36715 | 37 |
| 35297 | 208 | 35609 | 136 | 35702 | 136 | 36117 | 206 | 36370 | 36 | 36537 | 47 | 36716 | 37 |
| 35300 | 208 | 35610 | 136 | 35703 | 136 | 36118 | 206 | 36371 | 36 | 36538 | 47 | 36717 | 37 |
| 35301 | 208 | 35611 | 136 | 35704 | 136 | 36120 | 206 | 36372 | 36 | 36539 | 49 | 36718 | 37 |
| 35302 | 208 | 35612 | 136 | 35705 | 136 | 36121 | 206 | 36373 | 36 | 36540 | 49 | 36719 | 37 |
| 35303 | 208 | 35613 | 136 | 35706 | 136 | 36122 | 206 | 36374 | 36 | 36541 | 49 | 36722 | 36 |
| 35304 | 208 | 35614 | 136 | 35707 | 136 | 36124 | 206 | 36375 | 36 | 36542 | 49 | 36723 | 36 |
| 35305 | 208 | 35615 | 136 | 35708 | 136 | 36125 | 206 | 36376 | 36 | 36543 | 49 | 36724 | 36 |
| 35306 | 208 | 35616 | 136 | 35709 | 136 | 36126 | 206 | 36378 | 37 | 36544 | 49 | 36725 | 36 |
| 35307 | 208 | 35617 | 136 | 35710 | 136 | 36128 | 206 | 36380 | 37 | 36545 | 49 | 36727 | 36 |
| 35308 | 208 | 35618 | 136 | 35711 | 136 | 36129 | 206 | 36381 | 37 | 36546 | 49 | 36729 | 37 |
| 35309 | 208 | 35619 | 136 | 35712 | 136 | 36130 | 206 | 36383 | 37 | 36547 | 49 | 36731 | 37 |
| 35310 | 208 | 35620 | 136 | 35713 | 136 | 36140 | 110 | 36384 | 37 | 36555 | 56 | 36733 | 37 |
| 35311 | 208 | 35621 | 136 | 35714 | 136 | 36141 | 110 | 36385 | 37 | 36556 | 56 | 36736 | 36 |
| 35312 | 208 | 35622 | 136 | 35715 | 136 | 36142 | 110 | 36386 | 37 | 36557 | 56 | 36738 | 36 |
| 35313 | 208 | 35623 | 136 | 35716 | 136 | 36143 | 110 | 36387 | 37 | 36558 | 56 | 36740 | 37 |
| 35314 | 208 | 35624 | 136 | 35717 | 136 | 36206 | 204 | 36388 | 37 | 36559 | 56 | 36742 | 37 |
| 35315 | 208 | 35625 | 136 | 35718 | 136 | 36207 | 204 | 36389 | 37 | 36560 | 56 | 36744 | 37 |
| 35473 | 209 | 35626 | 136 | 35719 | 136 | 36208 | 204 | 36390 | 37 | 36561 | 56 | 36780 | 60 |
| 35475 | 209 | 35627 | 136 | 35720 | 136 | 36209 | 204 | 36391 | 37 | 36570 | 56 | 36781 | 60 |
| 35477 | 209 | 35628 | 136 | 35721 | 137 | 36210 | 204 | 36392 | 37 | 36571 | 56 | 36782 | 60 |
| 35478 | 209 | 35629 | 136 | 35722 | 137 | 36211 | 204 | 36393 | 37 | 36572 | 56 | 36783 | 60 |
| 35479 | 209 | 35630 | 136 | 35723 | 137 | 36212 | 204 | 36404 | 47 | 36573 | 56 | 36784 | 60 |
| 35480 | 209 | 35631 | 137 | 35724 | 137 | 36213 | 204 | 36406 | 47 | 36574 | 56 | 36785 | 60 |
| 35481 | 209 | 35632 | 137 | 35725 | 137 | 36214 | 204 | 36408 | 47 | 36575 | 56 | 36786 | 60 |
| 35482 | 209 | 35633 | 137 | 35726 | 137 | 36216 | 204 | 36410 | 47 | 36576 | 56 | 36787 | 60 |
| 35483 | 209 | 35634 | 137 | 35727 | 137 | 36217 | 204 | 36416 | 47 | 36577 | 56 | 36788 | 60 |
| 35485 | 209 | 35635 | 137 | 35728 | 137 | 36218 | 204 | 36418 | 47 | 36578 | 56 | 36789 | 60 |
| 35487 | 209 | 35636 | 137 | 35729 | 137 | 36220 | 204 | 36420 | 47 | 36590 | 49 | 36790 | 60 |
| 35489 | 209 | 35637 | 137 | 35730 | 137 | 36221 | 204 | 36422 | 47 | 36591 | 49 | 36791 | 60 |
| 35491 | 209 | 35638 | 137 | 35731 | 137 | 36222 | 204 | 36424 | 47 | 36592 | 49 | 36792 | 60 |
| 35493 | 209 | 35639 | 137 | 35732 | 137 | 36224 | 204 | 36426 | 47 | 36596 | 47 | 36793 | 60 |
| 35495 | 209 | 35640 | 137 | 35733 | 137 | 36225 | 204 | 36428 | 47 | 36597 | 47 | 36804 | 37 |
| 35497 | 209 | 35641 | 137 | 35734 | 137 | 36226 | 204 | 36430 | 47 | 36598 | 47 | 36805 | 37 |
| 35500 | 209 | 35642 | 137 | 35735 | 137 | 36228 | 204 | 36432 | 47 | 36599 | 36 | 36806 | 37 |
| 35501 | 209 | 35643 | 137 | 35736 | 137 | 36229 | 204 | 36436 | 47 | 36600 | 36 | 36807 | 37 |
| 35502 | 209 | 35644 | 137 | 35737 | 137 | 36230 | 204 | 36440 | 47 | 36601 | 36 | 36808 | 37 |
| 35503 | 209 | 35645 | 137 | 35738 | 137 | 36235 | 139 | 36442 | 47 | 36602 | 37 | 36809 | 37 |
| 35504 | 209 | 35646 | 137 | 35739 | 137 | 36236 | 139 | 36444 | 47 | 36603 | 37 | 36810 | 37 |
| 35505 | 209 | 35647 | 137 | 35740 | 137 | 36237 | 141 | 36447 | 38 | 36604 | 37 | 36811 | 37 |

EDP Number Index

| EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE |
|------------|------|------------|------|------------|------|------------|------|------------|------|------------|------|------------|------|
| 36812..... | 37 | 37031..... | 29 | 37114..... | 30 | 37206..... | 28 | 37343..... | 29 | 38096..... | 196 | 38179..... | 195 |
| 36813..... | 37 | 37032..... | 29 | 37115..... | 30 | 37207..... | 30 | 37344..... | 29 | 38097..... | 196 | 38180..... | 195 |
| 36814..... | 37 | 37033..... | 29 | 37116..... | 28 | 37208..... | 30 | 37345..... | 29 | 38098..... | 196 | 38181..... | 195 |
| 36815..... | 37 | 37034..... | 29 | 37117..... | 30 | 37209..... | 30 | 37346..... | 29 | 38099..... | 196 | 38182..... | 195 |
| 36816..... | 37 | 37035..... | 29 | 37118..... | 30 | 37210..... | 28 | 37348..... | 29 | 38100..... | 196 | 38183..... | 195 |
| 36817..... | 37 | 37036..... | 28 | 37119..... | 30 | 37211..... | 30 | 37349..... | 29 | 38101..... | 196 | 38184..... | 195 |
| 36818..... | 37 | 37037..... | 29 | 37120..... | 30 | 37212..... | 30 | 37350..... | 29 | 38102..... | 196 | 38185..... | 195 |
| 36819..... | 37 | 37038..... | 29 | 37121..... | 30 | 37213..... | 30 | 37351..... | 29 | 38103..... | 196 | 38186..... | 195 |
| 36820..... | 37 | 37039..... | 29 | 37122..... | 30 | 37214..... | 28 | 37352..... | 29 | 38104..... | 196 | 38187..... | 196 |
| 36821..... | 37 | 37040..... | 29 | 37123..... | 28 | 37215..... | 30 | 37353..... | 29 | 38105..... | 196 | 38188..... | 196 |
| 36822..... | 37 | 37041..... | 29 | 37124..... | 30 | 37216..... | 30 | 37354..... | 29 | 38106..... | 196 | 38189..... | 196 |
| 36823..... | 37 | 37042..... | 28 | 37125..... | 30 | 37217..... | 30 | 37355..... | 29 | 38107..... | 196 | 38190..... | 196 |
| 36824..... | 37 | 37043..... | 29 | 37126..... | 30 | 37218..... | 28 | 37356..... | 29 | 38108..... | 196 | 38191..... | 196 |
| 36825..... | 37 | 37044..... | 29 | 37127..... | 30 | 37219..... | 30 | 37357..... | 29 | 38109..... | 196 | 38192..... | 196 |
| 36826..... | 47 | 37045..... | 29 | 37128..... | 30 | 37220..... | 30 | 37359..... | 29 | 38110..... | 196 | 38193..... | 196 |
| 36827..... | 47 | 37046..... | 29 | 37129..... | 30 | 37221..... | 30 | 37360..... | 29 | 38111..... | 196 | 38194..... | 196 |
| 36828..... | 47 | 37047..... | 29 | 37130..... | 28 | 37260..... | 28 | 37361..... | 29 | 38112..... | 196 | 38195..... | 196 |
| 36829..... | 47 | 37048..... | 28 | 37131..... | 30 | 37261..... | 29 | 37362..... | 29 | 38113..... | 196 | 38196..... | 196 |
| 36830..... | 47 | 37049..... | 29 | 37132..... | 30 | 37262..... | 29 | 38001..... | 195 | 38114..... | 196 | 38197..... | 196 |
| 36846..... | 49 | 37050..... | 29 | 37133..... | 30 | 37263..... | 29 | 38002..... | 195 | 38115..... | 195 | 38198..... | 196 |
| 36847..... | 49 | 37051..... | 29 | 37134..... | 30 | 37264..... | 29 | 38003..... | 195 | 38116..... | 195 | 38201..... | 182 |
| 36848..... | 49 | 37052..... | 29 | 37135..... | 30 | 37265..... | 29 | 38004..... | 195 | 38117..... | 195 | 38202..... | 182 |
| 36849..... | 49 | 37053..... | 29 | 37136..... | 30 | 37266..... | 30 | 38009..... | 195 | 38118..... | 195 | 38203..... | 182 |
| 36850..... | 49 | 37054..... | 28 | 37137..... | 28 | 37267..... | 28 | 38010..... | 195 | 38119..... | 195 | 38204..... | 182 |
| 36851..... | 36 | 37055..... | 29 | 37138..... | 30 | 37268..... | 30 | 38011..... | 195 | 38120..... | 195 | 38209..... | 182 |
| 36852..... | 36 | 37056..... | 29 | 37139..... | 30 | 37269..... | 30 | 38012..... | 195 | 38121..... | 195 | 38210..... | 182 |
| 36853..... | 36 | 37057..... | 29 | 37140..... | 30 | 37270..... | 30 | 38013..... | 195 | 38122..... | 195 | 38211..... | 182 |
| 36854..... | 36 | 37058..... | 29 | 37141..... | 30 | 37271..... | 30 | 38014..... | 195 | 38123..... | 195 | 38212..... | 182 |
| 36855..... | 36 | 37059..... | 29 | 37142..... | 30 | 37272..... | 30 | 38019..... | 195 | 38124..... | 195 | 38213..... | 182 |
| 36856..... | 36 | 37060..... | 28 | 37143..... | 30 | 37273..... | 30 | 38020..... | 195 | 38125..... | 195 | 38214..... | 182 |
| 36857..... | 37 | 37061..... | 29 | 37144..... | 28 | 37274..... | 28 | 38021..... | 195 | 38126..... | 195 | 38219..... | 182 |
| 36858..... | 37 | 37062..... | 29 | 37145..... | 30 | 37275..... | 30 | 38022..... | 195 | 38127..... | 195 | 38220..... | 182 |
| 36859..... | 37 | 37063..... | 29 | 37146..... | 30 | 37276..... | 30 | 38023..... | 195 | 38128..... | 195 | 38221..... | 182 |
| 36860..... | 37 | 37064..... | 29 | 37147..... | 30 | 37277..... | 30 | 38024..... | 195 | 38129..... | 195 | 38222..... | 182 |
| 36861..... | 37 | 37065..... | 29 | 37148..... | 30 | 37278..... | 30 | 38025..... | 195 | 38130..... | 195 | 38223..... | 182 |
| 36862..... | 37 | 37066..... | 30 | 37149..... | 30 | 37279..... | 30 | 38026..... | 195 | 38131..... | 195 | 38224..... | 182 |
| 36863..... | 37 | 37067..... | 28 | 37150..... | 30 | 37280..... | 30 | 38031..... | 195 | 38132..... | 195 | 38225..... | 182 |
| 36864..... | 36 | 37068..... | 29 | 37151..... | 28 | 37281..... | 28 | 38032..... | 195 | 38133..... | 195 | 38226..... | 182 |
| 36865..... | 37 | 37069..... | 29 | 37152..... | 30 | 37282..... | 30 | 38033..... | 195 | 38134..... | 195 | 38231..... | 182 |
| 36866..... | 37 | 37070..... | 29 | 37153..... | 30 | 37283..... | 30 | 38034..... | 195 | 38135..... | 195 | 38232..... | 182 |
| 36867..... | 37 | 37071..... | 29 | 37154..... | 30 | 37284..... | 30 | 38035..... | 195 | 38136..... | 195 | 38233..... | 182 |
| 36868..... | 37 | 37072..... | 29 | 37155..... | 30 | 37285..... | 30 | 38036..... | 195 | 38137..... | 195 | 38234..... | 182 |
| 36869..... | 37 | 37073..... | 30 | 37156..... | 30 | 37286..... | 30 | 38037..... | 195 | 38138..... | 195 | 38235..... | 182 |
| 36870..... | 37 | 37074..... | 28 | 37157..... | 30 | 37287..... | 30 | 38038..... | 195 | 38139..... | 195 | 38236..... | 182 |
| 36871..... | 37 | 37075..... | 30 | 37159..... | 28 | 37288..... | 28 | 38045..... | 195 | 38140..... | 195 | 38237..... | 182 |
| 36872..... | 36 | 37076..... | 30 | 37160..... | 29 | 37289..... | 30 | 38046..... | 195 | 38141..... | 195 | 38238..... | 182 |
| 36873..... | 36 | 37077..... | 30 | 37161..... | 29 | 37290..... | 30 | 38047..... | 195 | 38142..... | 195 | 38245..... | 182 |
| 36874..... | 36 | 37078..... | 30 | 37162..... | 29 | 37291..... | 30 | 38048..... | 195 | 38143..... | 195 | 38246..... | 182 |
| 36875..... | 36 | 37079..... | 30 | 37163..... | 29 | 37292..... | 30 | 38049..... | 195 | 38144..... | 195 | 38247..... | 182 |
| 36876..... | 36 | 37080..... | 30 | 37164..... | 29 | 37293..... | 30 | 38050..... | 195 | 38145..... | 196 | 38248..... | 182 |
| 36877..... | 36 | 37081..... | 28 | 37165..... | 29 | 37294..... | 30 | 38051..... | 195 | 38146..... | 196 | 38249..... | 182 |
| 36878..... | 36 | 37082..... | 30 | 37166..... | 29 | 37295..... | 28 | 38052..... | 195 | 38147..... | 196 | 38250..... | 182 |
| 37000..... | 28 | 37083..... | 30 | 37167..... | 29 | 37296..... | 30 | 38059..... | 195 | 38148..... | 196 | 38251..... | 182 |
| 37001..... | 29 | 37084..... | 30 | 37168..... | 28 | 37297..... | 30 | 38060..... | 195 | 38149..... | 196 | 38252..... | 182 |
| 37002..... | 28 | 37085..... | 30 | 37169..... | 28 | 37298..... | 30 | 38061..... | 195 | 38150..... | 196 | 38259..... | 182 |
| 37003..... | 29 | 37086..... | 30 | 37170..... | 28 | 37299..... | 30 | 38062..... | 195 | 38151..... | 196 | 38260..... | 182 |
| 37004..... | 28 | 37087..... | 30 | 37175..... | 29 | 37300..... | 30 | 38063..... | 195 | 38152..... | 196 | 38261..... | 182 |
| 37005..... | 29 | 37088..... | 28 | 37180..... | 28 | 37301..... | 28 | 38064..... | 195 | 38153..... | 196 | 38262..... | 182 |
| 37006..... | 28 | 37089..... | 30 | 37181..... | 29 | 37302..... | 28 | 38065..... | 195 | 38154..... | 196 | 38263..... | 182 |
| 37007..... | 29 | 37090..... | 30 | 37182..... | 28 | 37303..... | 30 | 38066..... | 195 | 38155..... | 196 | 38264..... | 182 |
| 37008..... | 28 | 37091..... | 30 | 37183..... | 29 | 37304..... | 30 | 38067..... | 195 | 38156..... | 196 | 38265..... | 182 |
| 37009..... | 29 | 37092..... | 30 | 37184..... | 28 | 37305..... | 30 | 38068..... | 195 | 38157..... | 195 | 38266..... | 182 |
| 37010..... | 29 | 37093..... | 30 | 37185..... | 29 | 37306..... | 30 | 38073..... | 195 | 38158..... | 195 | 38267..... | 182 |
| 37011..... | 28 | 37094..... | 30 | 37186..... | 29 | 37307..... | 30 | 38074..... | 195 | 38159..... | 195 | 38268..... | 182 |
| 37012..... | 29 | 37095..... | 28 | 37187..... | 28 | 37308..... | 30 | 38075..... | 195 | 38160..... | 195 | 38273..... | 182 |
| 37013..... | 29 | 37096..... | 30 | 37188..... | 29 | 37320..... | 28 | 38076..... | 195 | 38161..... | 195 | 38274..... | 182 |
| 37014..... | 28 | 37097..... | 30 | 37189..... | 29 | 37321..... | 28 | 38077..... | 195 | 38162..... | 195 | 38275..... | 182 |
| 37015..... | 29 | 37098..... | 30 | 37190..... | 28 | 37322..... | 28 | 38078..... | 195 | 38163..... | 195 | 38276..... | 182 |
| 37016..... | 28 | 37099..... | 30 | 37191..... | 29 | 37323..... | 28 | 38079..... | 195 | 38164..... | 195 | 38277..... | 182 |
| 37017..... | 29 | 37100..... | 30 | 37192..... | 29 | 37324..... | 28 | 38080..... | 195 | 38165..... | 195 | 38278..... | 182 |
| 37018..... | 28 | 37101..... | 30 | 37193..... | 29 | 37325..... | 28 | 38081..... | 195 | 38166..... | 195 | 38279..... | 182 |
| 37019..... | 29 | 37102..... | 28 | 37194..... | 28 | 37330..... | 29 | 38082..... | 195 | 38167..... | 195 | 38280..... | 182 |
| 37020..... | 29 | 37103..... | 30 | 37195..... | 29 | 37331..... | 29 | 38083..... | 195 | 38168..... | 195 | 38281..... | 182 |
| 37021..... | 28 | 37104..... | 30 | 37196..... | 29 | 37332..... | 29 | 38084..... | 195 | 38169..... | 195 | 38282..... | 182 |
| 37022..... | 29 | 37105..... | 30 | 37197..... | 29 | 37333..... | 29 | 38087..... | 195 | 38170..... | 195 | 38283..... | 182 |
| 37023..... | 29 | 37106..... | 30 | 37198..... | 28 | 37334..... | 29 | 38088..... | 195 | 38171..... | 195 | 38284..... | 182 |
| 37024..... | 28 | 37107..... | 30 | 37199..... | 30 | 37335..... | 29 | 38089..... | 195 | 38172..... | 195 | 38287..... | 182 |
| 37025..... | 29 | 37108..... | 30 | 37200..... | 30 | 37337..... | 29 | 38090..... | 195 | 38173..... | 195 | 38288..... | 182 |
| 37026..... | 29 | 37109..... | 28 | 37201..... | 30 | 37338..... | 29 | 38091..... | 196 | 38174..... | 195 | 38289..... | 182 |
| 37027..... | 29 | 37110..... | 30 | 37202..... | 30 | 37339..... | 29 | 38092..... | 196 | 38175..... | 195 | 38290..... | 182 |
| 37028..... | 29 | 37111..... | 30 | 37203..... | 30 | 37340..... | 29 | 38093..... | 196 | 38176..... | 195 | 38291..... | 182 |
| 37029..... | 29 | 37112..... | 30 | 37204..... | 30 | 37341..... | 29 | 38094..... | 196 | 38177..... | 195 | 38292..... | 182 |
| 37030..... | 28 | 37113..... | 30 | 37205..... | 30 | 37342..... | 29 | 38095..... | 196 | 38178..... | 195 | 38293..... | 182 |

EDP Number Index

| EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE |
|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|
| 38294 | 182 | 38377 | 182 | 39031 | 193 | 39131 | 193 | 39333 | 179 | 39534 | 184 | 39635 | 197 |
| 38295 | 182 | 38378 | 182 | 39032 | 198 | 39132 | 198 | 39334 | 184 | 39535 | 179 | 39636 | 200 |
| 38296 | 182 | 38379 | 182 | 39033 | 193 | 39133 | 193 | 39335 | 179 | 39536 | 184 | 39637 | 197 |
| 38297 | 182 | 38380 | 182 | 39034 | 198 | 39134 | 198 | 39336 | 184 | 39537 | 179 | 39638 | 200 |
| 38298 | 182 | 38381 | 182 | 39035 | 193 | 39135 | 193 | 39337 | 179 | 39538 | 184 | 39639 | 197 |
| 38299 | 182 | 38382 | 182 | 39036 | 198 | 39136 | 198 | 39338 | 184 | 39539 | 179 | 39640 | 200 |
| 38300 | 182 | 38383 | 182 | 39037 | 193 | 39137 | 193 | 39339 | 179 | 39540 | 184 | 39641 | 197 |
| 38301 | 182 | 38384 | 182 | 39038 | 198 | 39138 | 198 | 39340 | 184 | 39541 | 179 | 39642 | 200 |
| 38302 | 182 | 38385 | 182 | 39039 | 193 | 39139 | 193 | 39341 | 179 | 39542 | 184 | 39642 | 200 |
| 38303 | 182 | 38386 | 182 | 39040 | 198 | 39140 | 198 | 39342 | 184 | 39543 | 179 | 39642 | 212 |
| 38304 | 182 | 38387 | 182 | 39041 | 193 | 39141 | 193 | 39343 | 179 | 39544 | 185 | 39651 | 183 |
| 38305 | 182 | 38388 | 182 | 39042 | 198 | 39142 | 198 | 39344 | 185 | 39545 | 179 | 39652 | 187 |
| 38306 | 182 | 38389 | 182 | 39043 | 194 | 39143 | 194 | 39345 | 179 | 39546 | 185 | 39653 | 183 |
| 38307 | 182 | 38390 | 182 | 39044 | 199 | 39144 | 199 | 39346 | 185 | 39547 | 179 | 39654 | 187 |
| 38308 | 182 | 38391 | 182 | 39045 | 194 | 39145 | 194 | 39347 | 179 | 39548 | 185 | 39655 | 183 |
| 38309 | 182 | 38392 | 182 | 39046 | 199 | 39146 | 199 | 39348 | 185 | 39549 | 180 | 39656 | 187 |
| 38310 | 182 | 38393 | 182 | 39047 | 194 | 39147 | 194 | 39349 | 180 | 39550 | 185 | 39657 | 183 |
| 38311 | 182 | 38394 | 182 | 39048 | 199 | 39148 | 199 | 39350 | 185 | 39551 | 180 | 39658 | 187 |
| 38312 | 182 | 38395 | 182 | 39049 | 194 | 39149 | 194 | 39351 | 180 | 39552 | 185 | 39659 | 183 |
| 38313 | 182 | 38396 | 182 | 39050 | 199 | 39150 | 199 | 39352 | 185 | 39553 | 180 | 39660 | 187 |
| 38314 | 182 | 38397 | 182 | 39051 | 194 | 39151 | 194 | 39353 | 180 | 39554 | 185 | 39661 | 183 |
| 38315 | 182 | 38398 | 182 | 39052 | 199 | 39152 | 199 | 39354 | 185 | 39555 | 180 | 39662 | 187 |
| 38316 | 182 | 38490 | 39 | 39053 | 194 | 39153 | 194 | 39355 | 180 | 39556 | 185 | 39663 | 183 |
| 38317 | 182 | 38492 | 39 | 39054 | 199 | 39154 | 199 | 39356 | 185 | 39557 | 180 | 39664 | 187 |
| 38318 | 182 | 38496 | 39 | 39055 | 194 | 39155 | 194 | 39357 | 180 | 39558 | 185 | 39665 | 183 |
| 38319 | 182 | 38502 | 28 | 39056 | 199 | 39156 | 199 | 39358 | 185 | 39559 | 180 | 39666 | 187 |
| 38320 | 182 | 38504 | 28 | 39057 | 194 | 39157 | 194 | 39359 | 180 | 39560 | 185 | 39667 | 183 |
| 38321 | 182 | 38506 | 28 | 39058 | 199 | 39158 | 199 | 39360 | 185 | 39561 | 180 | 39668 | 187 |
| 38322 | 182 | 38507 | 28 | 39059 | 194 | 39159 | 194 | 39361 | 180 | 39562 | 185 | 39669 | 183 |
| 38323 | 182 | 38508 | 28 | 39060 | 199 | 39160 | 199 | 39362 | 185 | 39563 | 180 | 39670 | 187 |
| 38324 | 182 | 38512 | 28 | 39061 | 194 | 39161 | 194 | 39363 | 180 | 39564 | 185 | 39671 | 183 |
| 38325 | 182 | 38513 | 28 | 39062 | 199 | 39162 | 199 | 39364 | 185 | 39565 | 180 | 39672 | 187 |
| 38326 | 182 | 38514 | 28 | 39063 | 194 | 39163 | 194 | 39365 | 180 | 39566 | 185 | 39673 | 183 |
| 38327 | 182 | 38515 | 28 | 39064 | 199 | 39164 | 199 | 39366 | 185 | 39567 | 180 | 39674 | 187 |
| 38328 | 182 | 38517 | 28 | 39065 | 194 | 39165 | 194 | 39367 | 180 | 39568 | 185 | 39675 | 183 |
| 38329 | 182 | 38525 | 29 | 39066 | 199 | 39166 | 199 | 39368 | 185 | 39569 | 180 | 39676 | 187 |
| 38330 | 182 | 38528 | 29 | 39067 | 194 | 39167 | 194 | 39369 | 180 | 39570 | 185 | 39677 | 183 |
| 38331 | 182 | 38529 | 29 | 39068 | 199 | 39168 | 199 | 39370 | 185 | 39571 | 180 | 39678 | 187 |
| 38332 | 182 | 38530 | 29 | 39069 | 194 | 39169 | 194 | 39371 | 180 | 39572 | 185 | 39679 | 183 |
| 38333 | 182 | 38532 | 29 | 39070 | 199 | 39170 | 199 | 39372 | 185 | 39573 | 180 | 39680 | 187 |
| 38334 | 182 | 38539 | 29 | 39071 | 194 | 39171 | 194 | 39373 | 180 | 39574 | 185 | 39681 | 183 |
| 38335 | 182 | 38549 | 29 | 39072 | 199 | 39172 | 199 | 39374 | 185 | 39575 | 180 | 39682 | 187 |
| 38336 | 182 | 38578 | 29 | 39073 | 194 | 39173 | 194 | 39375 | 180 | 39576 | 185 | 39683 | 183 |
| 38337 | 182 | 38579 | 29 | 39074 | 199 | 39174 | 199 | 39376 | 185 | 39577 | 179 | 39684 | 187 |
| 38338 | 182 | 38580 | 29 | 39075 | 194 | 39175 | 194 | 39377 | 179 | 39578 | 184 | 39685 | 183 |
| 38339 | 182 | 38581 | 29 | 39076 | 199 | 39176 | 199 | 39378 | 184 | 39589 | 180 | 39686 | 187 |
| 38340 | 182 | 38583 | 29 | 39077 | 193 | 39177 | 193 | 39389 | 180 | 39589 | 211 | 39687 | 183 |
| 38341 | 182 | 38584 | 29 | 39078 | 198 | 39178 | 198 | 39389 | 211 | 39590 | 185 | 39688 | 187 |
| 38342 | 182 | 38585 | 29 | 39089 | 194 | 39189 | 194 | 39390 | 185 | 39590 | 212 | 39689 | 183 |
| 38343 | 182 | 38591 | 29 | 39089 | 211 | 39189 | 211 | 39390 | 212 | 39601 | 197 | 39690 | 187 |
| 38344 | 182 | 38599 | 30 | 39090 | 199 | 39190 | 199 | 39501 | 179 | 39602 | 200 | 39691 | 183 |
| 38345 | 182 | 38608 | 30 | 39090 | 212 | 39301 | 179 | 39502 | 184 | 39603 | 197 | 39691 | 211 |
| 38346 | 182 | 38617 | 30 | 39101 | 193 | 39302 | 184 | 39503 | 179 | 39604 | 200 | 39692 | 187 |
| 38347 | 182 | 39001 | 193 | 39102 | 198 | 39303 | 179 | 39504 | 184 | 39605 | 197 | 39692 | 212 |
| 38348 | 182 | 39002 | 198 | 39103 | 193 | 39304 | 184 | 39505 | 179 | 39606 | 200 | 39701 | 188 |
| 38349 | 182 | 39003 | 193 | 39104 | 198 | 39305 | 179 | 39506 | 184 | 39607 | 197 | 39703 | 188 |
| 38350 | 182 | 39004 | 198 | 39105 | 193 | 39306 | 184 | 39507 | 179 | 39608 | 200 | 39705 | 188 |
| 38351 | 182 | 39005 | 193 | 39106 | 198 | 39307 | 179 | 39508 | 184 | 39609 | 197 | 39707 | 188 |
| 38352 | 182 | 39006 | 198 | 39107 | 193 | 39308 | 184 | 39509 | 179 | 39610 | 200 | 39709 | 188 |
| 38353 | 182 | 39007 | 193 | 39108 | 198 | 39309 | 179 | 39510 | 184 | 39611 | 197 | 39711 | 188 |
| 38354 | 182 | 39008 | 198 | 39109 | 193 | 39310 | 184 | 39511 | 179 | 39612 | 200 | 39713 | 188 |
| 38355 | 182 | 39009 | 193 | 39109 | 212 | 39311 | 179 | 39512 | 184 | 39613 | 197 | 39715 | 188 |
| 38356 | 182 | 39010 | 198 | 39110 | 198 | 39312 | 184 | 39513 | 179 | 39614 | 200 | 39717 | 188 |
| 38357 | 182 | 39011 | 193 | 39111 | 193 | 39313 | 179 | 39514 | 184 | 39615 | 197 | 39719 | 188 |
| 38358 | 182 | 39012 | 198 | 39112 | 198 | 39314 | 184 | 39515 | 179 | 39616 | 200 | 39721 | 188 |
| 38359 | 182 | 39013 | 193 | 39113 | 193 | 39315 | 179 | 39516 | 184 | 39617 | 197 | 39723 | 188 |
| 38360 | 182 | 39014 | 198 | 39114 | 198 | 39316 | 184 | 39517 | 179 | 39618 | 200 | 39725 | 188 |
| 38361 | 182 | 39015 | 193 | 39115 | 193 | 39317 | 179 | 39518 | 184 | 39619 | 197 | 39727 | 188 |
| 38362 | 182 | 39016 | 198 | 39116 | 198 | 39318 | 184 | 39519 | 179 | 39620 | 200 | 39729 | 188 |
| 38363 | 182 | 39017 | 193 | 39117 | 193 | 39319 | 179 | 39520 | 184 | 39621 | 197 | 39731 | 188 |
| 38364 | 182 | 39018 | 198 | 39118 | 198 | 39320 | 184 | 39521 | 179 | 39622 | 200 | 39733 | 188 |
| 38365 | 182 | 39019 | 193 | 39119 | 198 | 39321 | 179 | 39522 | 184 | 39623 | 197 | 39735 | 188 |
| 38366 | 182 | 39020 | 198 | 39120 | 198 | 39322 | 184 | 39523 | 179 | 39624 | 200 | 39737 | 188 |
| 38367 | 182 | 39021 | 193 | 39121 | 193 | 39323 | 179 | 39524 | 184 | 39625 | 197 | 39739 | 188 |
| 38368 | 182 | 39022 | 198 | 39122 | 198 | 39324 | 184 | 39525 | 179 | 39626 | 200 | 39741 | 188 |
| 38369 | 182 | 39023 | 193 | 39123 | 193 | 39325 | 179 | 39526 | 184 | 39627 | 197 | 39743 | 188 |
| 38370 | 182 | 39024 | 198 | 39124 | 198 | 39326 | 184 | 39527 | 179 | 39628 | 200 | 39745 | 188 |
| 38371 | 182 | 39025 | 193 | 39125 | 193 | 39327 | 179 | 39528 | 184 | 39629 | 197 | 39747 | 188 |
| 38372 | 182 | 39026 | 198 | 39126 | 198 | 39328 | 184 | 39529 | 179 | 39630 | 200 | 39749 | 188 |
| 38373 | 182 | 39027 | 193 | 39127 | 193 | 39329 | 179 | 39530 | 184 | 39631 | 197 | 39751 | 188 |
| 38374 | 182 | 39028 | 198 | 39128 | 198 | 39330 | 184 | 39531 | 179 | 39632 | 200 | 39753 | 188 |
| 38375 | 182 | 39029 | 193 | 39129 | 193 | 39331 | 179 | 39532 | 184 | 39633 | 197 | 39755 | 188 |
| 38376 | 182 | 39030 | 198 | 39130 | 198 | 39332 | 184 | 39533 | 179 | 39634 | 200 | 39757 | 188 |

EDP Number Index

| EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE |
|------------|------|------------|------|------------|------|------------|------|------------|------|------------|------|------------|------|
| 39759..... | 188 | 40310..... | 217 | 41409..... | 225 | 41725..... | 213 | 42693..... | 70 | 43335..... | 214 | 43906..... | 218 |
| 39761..... | 188 | 40313..... | 214 | 41410..... | 227 | 41729..... | 213 | 42694..... | 70 | 43336..... | 217 | 43907..... | 218 |
| 39763..... | 188 | 40314..... | 217 | 41413..... | 225 | 41733..... | 213 | 42695..... | 70 | 43345..... | 214 | 43908..... | 218 |
| 39765..... | 188 | 40317..... | 214 | 41414..... | 227 | 41737..... | 213 | 42696..... | 70 | 43346..... | 217 | 43909..... | 218 |
| 39767..... | 188 | 40318..... | 217 | 41417..... | 225 | 41741..... | 213 | 42697..... | 70 | 43355..... | 214 | 43910..... | 215 |
| 39769..... | 188 | 40321..... | 214 | 41418..... | 227 | 41745..... | 213 | 42698..... | 70 | 43356..... | 217 | 43911..... | 215 |
| 39771..... | 188 | 40322..... | 217 | 41421..... | 225 | 41749..... | 213 | 42699..... | 70 | 43365..... | 214 | 43912..... | 215 |
| 39773..... | 188 | 40325..... | 214 | 41422..... | 227 | 41753..... | 213 | 42700..... | 70 | 43366..... | 217 | 43913..... | 215 |
| 39775..... | 188 | 40326..... | 217 | 41425..... | 225 | 41757..... | 213 | 42701..... | 70 | 43375..... | 214 | 43914..... | 215 |
| 39777..... | 188 | 40329..... | 214 | 41426..... | 227 | 41761..... | 213 | 42702..... | 70 | 43376..... | 217 | 43915..... | 215 |
| 39789..... | 211 | 40330..... | 217 | 41429..... | 225 | 41765..... | 213 | 42703..... | 70 | 43385..... | 214 | 43916..... | 215 |
| 40000..... | 224 | 40333..... | 214 | 41430..... | 227 | 42606..... | 68 | 42704..... | 70 | 43386..... | 217 | 43917..... | 215 |
| 40001..... | 224 | 40334..... | 217 | 41433..... | 225 | 42607..... | 68 | 42705..... | 70 | 43395..... | 214 | 43918..... | 215 |
| 40003..... | 224 | 40337..... | 214 | 41434..... | 227 | 42608..... | 68 | 42706..... | 151 | 43396..... | 217 | 43919..... | 215 |
| 40004..... | 224 | 40338..... | 217 | 41437..... | 225 | 42609..... | 68 | 42707..... | 151 | 43445..... | 97 | 43920..... | 215 |
| 40005..... | 224 | 40341..... | 214 | 41438..... | 227 | 42610..... | 68 | 42708..... | 151 | 43446..... | 97 | 43921..... | 215 |
| 40007..... | 224 | 40342..... | 217 | 41441..... | 225 | 42611..... | 68 | 42709..... | 151 | 43447..... | 97 | 43922..... | 215 |
| 40009..... | 224 | 40345..... | 214 | 41442..... | 227 | 42612..... | 68 | 42710..... | 151 | 43448..... | 97 | 43923..... | 215 |
| 40010..... | 224 | 40346..... | 217 | 41445..... | 225 | 42613..... | 68 | 42711..... | 151 | 43449..... | 97 | 43924..... | 215 |
| 40011..... | 224 | 40349..... | 214 | 41446..... | 227 | 42614..... | 68 | 42712..... | 58 | 43450..... | 97 | 43925..... | 215 |
| 40012..... | 224 | 40350..... | 217 | 41449..... | 225 | 42615..... | 68 | 42713..... | 58 | 43451..... | 97 | 43926..... | 215 |
| 40015..... | 224 | 40353..... | 214 | 41450..... | 227 | 42616..... | 68 | 42714..... | 58 | 43452..... | 97 | 43927..... | 215 |
| 40016..... | 224 | 40354..... | 217 | 41453..... | 225 | 42617..... | 68 | 42715..... | 58 | 43453..... | 97 | 43928..... | 215 |
| 40017..... | 224 | 40357..... | 214 | 41454..... | 227 | 42618..... | 68 | 42716..... | 58 | 43470..... | 97 | 43929..... | 215 |
| 40019..... | 224 | 40358..... | 217 | 41457..... | 225 | 42619..... | 68 | 42717..... | 58 | 43471..... | 97 | 43930..... | 215 |
| 40020..... | 224 | 40361..... | 214 | 41458..... | 227 | 42620..... | 68 | 42718..... | 42 | 43472..... | 97 | 43931..... | 215 |
| 40021..... | 224 | 40362..... | 217 | 41461..... | 225 | 42621..... | 68 | 42719..... | 42 | 43473..... | 97 | 43932..... | 215 |
| 40023..... | 224 | 40365..... | 214 | 41462..... | 227 | 42622..... | 68 | 42721..... | 42 | 43474..... | 97 | 43933..... | 215 |
| 40024..... | 224 | 40366..... | 217 | 41465..... | 225 | 42623..... | 68 | 42722..... | 42 | 43475..... | 97 | 43934..... | 215 |
| 40025..... | 224 | 40369..... | 214 | 41466..... | 227 | 42624..... | 68 | 42723..... | 42 | 43476..... | 97 | 43935..... | 215 |
| 40028..... | 224 | 40370..... | 217 | 41505..... | 216 | 42625..... | 68 | 42731..... | 43 | 43477..... | 97 | 43936..... | 215 |
| 40030..... | 224 | 40373..... | 214 | 41506..... | 219 | 42626..... | 68 | 42732..... | 43 | 43478..... | 97 | 43937..... | 215 |
| 40031..... | 224 | 40374..... | 217 | 41509..... | 216 | 42627..... | 68 | 42733..... | 43 | 43479..... | 97 | 43938..... | 215 |
| 40032..... | 224 | 40377..... | 214 | 41510..... | 219 | 42628..... | 70 | 42734..... | 43 | 43480..... | 97 | 43939..... | 215 |
| 40035..... | 224 | 40378..... | 217 | 41513..... | 216 | 42630..... | 69 | 42735..... | 43 | 43481..... | 97 | 43950..... | 215 |
| 40037..... | 224 | 40381..... | 214 | 41514..... | 219 | 42631..... | 69 | 42736..... | 43 | 43482..... | 97 | 43951..... | 215 |
| 40038..... | 224 | 40382..... | 217 | 41517..... | 216 | 42632..... | 70 | 42737..... | 43 | 43483..... | 97 | 43952..... | 215 |
| 40039..... | 224 | 40385..... | 214 | 41518..... | 219 | 42633..... | 70 | 42738..... | 43 | 43484..... | 97 | 43953..... | 215 |
| 40105..... | 223 | 40386..... | 217 | 41521..... | 216 | 42648..... | 70 | 42739..... | 43 | 43485..... | 97 | 43954..... | 215 |
| 40106..... | 226 | 40505..... | 220 | 41522..... | 219 | 42649..... | 70 | 42750..... | 71 | 43486..... | 97 | 43955..... | 215 |
| 40109..... | 223 | 40506..... | 221 | 41525..... | 216 | 42650..... | 70 | 42751..... | 71 | 43487..... | 97 | 43956..... | 215 |
| 40110..... | 226 | 40509..... | 220 | 41526..... | 219 | 42651..... | 70 | 42752..... | 71 | 43488..... | 97 | 43957..... | 215 |
| 40113..... | 223 | 40510..... | 221 | 41529..... | 216 | 42652..... | 70 | 42753..... | 71 | 43489..... | 97 | 43958..... | 215 |
| 40114..... | 226 | 40513..... | 220 | 41530..... | 219 | 42653..... | 70 | 42754..... | 71 | 43490..... | 97 | 43959..... | 215 |
| 40117..... | 223 | 40514..... | 221 | 41533..... | 216 | 42654..... | 70 | 42755..... | 71 | 43491..... | 97 | 44299..... | 155 |
| 40118..... | 226 | 40517..... | 220 | 41534..... | 219 | 42655..... | 70 | 43101..... | 223 | 43492..... | 97 | 44300..... | 155 |
| 40121..... | 223 | 40518..... | 221 | 41537..... | 216 | 42656..... | 70 | 43102..... | 226 | 43493..... | 97 | 44301..... | 155 |
| 40122..... | 226 | 40521..... | 220 | 41538..... | 219 | 42657..... | 70 | 43103..... | 223 | 43494..... | 97 | 44302..... | 155 |
| 40125..... | 223 | 40522..... | 221 | 41541..... | 216 | 42658..... | 70 | 43104..... | 226 | 43495..... | 97 | 44303..... | 155 |
| 40126..... | 226 | 40525..... | 220 | 41542..... | 219 | 42659..... | 70 | 43105..... | 223 | 43496..... | 97 | 44304..... | 155 |
| 40129..... | 223 | 40526..... | 221 | 41545..... | 216 | 42660..... | 69 | 43106..... | 226 | 43497..... | 97 | 44305..... | 155 |
| 40130..... | 226 | 40529..... | 220 | 41546..... | 219 | 42661..... | 69 | 43107..... | 223 | 43501..... | 220 | 44306..... | 155 |
| 40133..... | 223 | 40530..... | 221 | 41549..... | 216 | 42662..... | 69 | 43108..... | 226 | 43502..... | 221 | 44307..... | 155 |
| 40134..... | 226 | 40533..... | 220 | 41550..... | 219 | 42663..... | 69 | 43115..... | 223 | 43503..... | 220 | 44308..... | 155 |
| 40137..... | 223 | 40534..... | 221 | 41553..... | 216 | 42664..... | 69 | 43116..... | 226 | 43504..... | 221 | 44309..... | 155 |
| 40138..... | 226 | 40537..... | 220 | 41554..... | 219 | 42665..... | 69 | 43125..... | 223 | 43505..... | 220 | 44505..... | 166 |
| 40141..... | 223 | 40538..... | 221 | 41557..... | 216 | 42666..... | 69 | 43126..... | 226 | 43506..... | 221 | 44506..... | 166 |
| 40142..... | 226 | 40541..... | 220 | 41558..... | 219 | 42667..... | 69 | 43135..... | 223 | 43507..... | 220 | 44509..... | 166 |
| 40145..... | 223 | 40542..... | 221 | 41561..... | 216 | 42668..... | 69 | 43136..... | 226 | 43508..... | 221 | 44510..... | 166 |
| 40146..... | 226 | 40545..... | 220 | 41562..... | 219 | 42669..... | 69 | 43145..... | 223 | 43515..... | 220 | 44513..... | 166 |
| 40149..... | 223 | 40546..... | 221 | 41565..... | 216 | 42670..... | 69 | 43146..... | 226 | 43516..... | 221 | 44514..... | 166 |
| 40150..... | 226 | 40549..... | 220 | 41566..... | 219 | 42671..... | 69 | 43155..... | 223 | 43525..... | 220 | 44517..... | 166 |
| 40153..... | 223 | 40550..... | 221 | 41605..... | 222 | 42672..... | 69 | 43156..... | 226 | 43526..... | 221 | 44518..... | 166 |
| 40154..... | 226 | 40553..... | 220 | 41609..... | 222 | 42673..... | 69 | 43165..... | 223 | 43535..... | 220 | 44521..... | 166 |
| 40157..... | 223 | 40554..... | 221 | 41613..... | 222 | 42674..... | 69 | 43166..... | 226 | 43536..... | 221 | 44522..... | 166 |
| 40158..... | 226 | 40557..... | 220 | 41617..... | 222 | 42675..... | 69 | 43175..... | 223 | 43545..... | 220 | 44525..... | 166 |
| 40161..... | 223 | 40558..... | 221 | 41621..... | 222 | 42676..... | 69 | 43176..... | 226 | 43546..... | 221 | 44526..... | 166 |
| 40162..... | 226 | 40561..... | 220 | 41625..... | 222 | 42677..... | 69 | 43185..... | 223 | 43555..... | 220 | 44529..... | 166 |
| 40165..... | 222 | 40562..... | 221 | 41629..... | 222 | 42678..... | 69 | 43186..... | 226 | 43556..... | 221 | 44530..... | 166 |
| 40166..... | 226 | 40565..... | 220 | 41633..... | 222 | 42679..... | 69 | 43195..... | 223 | 43565..... | 220 | 44533..... | 166 |
| 40169..... | 223 | 40566..... | 221 | 41637..... | 222 | 42680..... | 69 | 43196..... | 226 | 43566..... | 221 | 44534..... | 166 |
| 40170..... | 226 | 40569..... | 220 | 41641..... | 222 | 42681..... | 69 | 43301..... | 214 | 43575..... | 220 | 44537..... | 166 |
| 40173..... | 223 | 40570..... | 221 | 41645..... | 222 | 42682..... | 69 | 43302..... | 217 | 43576..... | 221 | 44538..... | 166 |
| 40174..... | 226 | 40573..... | 220 | 41649..... | 222 | 42683..... | 69 | 43303..... | 214 | 43585..... | 220 | 44541..... | 166 |
| 40177..... | 223 | 40574..... | 221 | 41653..... | 222 | 42684..... | 69 | 43304..... | 217 | 43586..... | 221 | 44542..... | 166 |
| 40178..... | 226 | 40577..... | 220 | 41657..... | 222 | 42685..... | 69 | 43305..... | 214 | 43595..... | 220 | 44545..... | 166 |
| 40181..... | 223 | 40578..... | 221 | 41661..... | 222 | 42686..... | 69 | 43306..... | 217 | 43596..... | 221 | 44546..... | 166 |
| 40182..... | 226 | 40581..... | 220 | 41665..... | 223 | 42687..... | 69 | 43307..... | 214 | 43900..... | 218 | 44550..... | 160 |
| 40185..... | 223 | 40582..... | 221 | 41705..... | 213 | 42688..... | 69 | 43308..... | 217 | 43901..... | 218 | 44551..... | 160 |
| 40186..... | 226 | 40585..... | 220 | 41709..... | 213 | 42689..... | 69 | 43315..... | 214 | 43902..... | 218 | 44552..... | 160 |
| 40305..... | 214 | 40586..... | 221 | 41713..... | 213 | 42690..... | 70 | 43316..... | 217 | 43903..... | 218 | 44553..... | 160 |
| 40306..... | 217 | 41405..... | 225 | 41717..... | 213 | 42691..... | 70 | 43325..... | 214 | 43904..... | 218 | 44554..... | 160 |
| 40309..... | 214 | 41406..... | 227 | 41721..... | 213 | 42692..... | 70 | 43326..... | 217 | 43905..... | 218 | 44555..... | 160 |

EDP Number Index

| EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE |
|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|
| 44556 | 160 | 44653 | 127 | 44789 | 152 | 44875 | 150 | 44993 | 129 | 45183 | 81 | 46147 | 112 |
| 44557 | 160 | 44654 | 127 | 44790 | 152 | 44876 | 150 | 44994 | 129 | 45184 | 81 | 46206 | 230 |
| 44558 | 160 | 44685 | 127 | 44791 | 152 | 44877 | 150 | 44995 | 129 | 45185 | 81 | 46207 | 230 |
| 44559 | 160 | 44686 | 127 | 44792 | 152 | 44878 | 150 | 44996 | 129 | 45186 | 81 | 46208 | 230 |
| 44560 | 160 | 44687 | 127 | 44793 | 152 | 44879 | 149 | 44997 | 129 | 45187 | 83 | 46209 | 230 |
| 44561 | 161 | 44688 | 127 | 44794 | 152 | 44880 | 150 | 44998 | 129 | 45188 | 83 | 46210 | 230 |
| 44562 | 161 | 44689 | 127 | 44795 | 152 | 44881 | 150 | 44999 | 129 | 45189 | 83 | 46211 | 230 |
| 44563 | 161 | 44690 | 127 | 44796 | 152 | 44882 | 150 | 45000 | 129 | 45190 | 83 | 46212 | 230 |
| 44564 | 161 | 44691 | 127 | 44797 | 152 | 44883 | 150 | 45001 | 129 | 45191 | 83 | 46213 | 230 |
| 44565 | 161 | 44692 | 127 | 44798 | 152 | 44884 | 150 | 45002 | 129 | 45192 | 83 | 46214 | 230 |
| 44566 | 161 | 44693 | 127 | 44799 | 152 | 44885 | 150 | 45003 | 129 | 45193 | 83 | 46216 | 230 |
| 44570 | 162 | 44694 | 127 | 44800 | 152 | 44886 | 150 | 45004 | 129 | 45194 | 83 | 46217 | 230 |
| 44571 | 162 | 44695 | 127 | 44801 | 152 | 44889 | 147 | 45005 | 130 | 45195 | 83 | 46218 | 230 |
| 44572 | 162 | 44696 | 127 | 44802 | 152 | 44891 | 147 | 45006 | 130 | 45196 | 83 | 46220 | 230 |
| 44573 | 162 | 44701 | 147 | 44803 | 152 | 44892 | 147 | 45007 | 130 | 45197 | 83 | 46221 | 230 |
| 44574 | 162 | 44702 | 147 | 44804 | 152 | 44893 | 147 | 45008 | 130 | 45198 | 83 | 46222 | 230 |
| 44575 | 162 | 44703 | 147 | 44805 | 152 | 44894 | 149 | 45009 | 130 | 45199 | 83 | 46228 | 230 |
| 44576 | 162 | 44705 | 147 | 44806 | 152 | 44895 | 147 | 45010 | 130 | 45200 | 83 | 46229 | 230 |
| 44577 | 162 | 44708 | 147 | 44807 | 152 | 44896 | 147 | 45011 | 130 | 45201 | 83 | 46230 | 230 |
| 44578 | 162 | 44711 | 147 | 44808 | 152 | 44897 | 147 | 45012 | 130 | 45202 | 83 | 46231 | 230 |
| 44579 | 162 | 44714 | 147 | 44809 | 127 | 44898 | 147 | 45013 | 130 | 45203 | 83 | 46232 | 230 |
| 44580 | 162 | 44715 | 147 | 44810 | 127 | 44899 | 147 | 45014 | 130 | 45277 | 234 | 46233 | 230 |
| 44581 | 162 | 44716 | 147 | 44811 | 127 | 44900 | 147 | 45015 | 130 | 45279 | 234 | 46343 | 53 |
| 44582 | 162 | 44717 | 147 | 44814 | 148 | 44901 | 147 | 45016 | 130 | 45281 | 234 | 46344 | 53 |
| 44583 | 162 | 44719 | 147 | 44815 | 148 | 44902 | 149 | 45017 | 130 | 45283 | 234 | 46345 | 53 |
| 44584 | 162 | 44722 | 147 | 44816 | 148 | 44916 | 154 | 45018 | 130 | 45285 | 234 | 46346 | 53 |
| 44585 | 162 | 44725 | 147 | 44817 | 148 | 44917 | 154 | 45019 | 130 | 45287 | 234 | 46347 | 53 |
| 44586 | 162 | 44728 | 147 | 44818 | 148 | 44918 | 154 | 45100 | 80 | 45289 | 234 | 46348 | 53 |
| 44587 | 160 | 44731 | 147 | 44819 | 148 | 44919 | 154 | 45101 | 80 | 45291 | 234 | 46349 | 53 |
| 44588 | 160 | 44732 | 148 | 44820 | 148 | 44920 | 154 | 45102 | 80 | 45293 | 234 | 46350 | 53 |
| 44589 | 160 | 44733 | 148 | 44821 | 148 | 44921 | 154 | 45103 | 80 | 45295 | 234 | 46351 | 53 |
| 44590 | 160 | 44734 | 148 | 44822 | 148 | 44922 | 154 | 45104 | 80 | 45297 | 234 | 46354 | 53 |
| 44591 | 160 | 44735 | 148 | 44823 | 148 | 44923 | 154 | 45105 | 80 | 45299 | 234 | 46355 | 53 |
| 44592 | 160 | 44736 | 148 | 44824 | 148 | 44924 | 154 | 45106 | 82 | 45477 | 235 | 46356 | 53 |
| 44593 | 160 | 44737 | 148 | 44826 | 148 | 44925 | 154 | 45107 | 82 | 45478 | 235 | 46357 | 52 |
| 44594 | 160 | 44738 | 152 | 44827 | 148 | 44926 | 154 | 45108 | 82 | 45479 | 235 | 46358 | 52 |
| 44595 | 160 | 44739 | 152 | 44828 | 148 | 44927 | 154 | 45109 | 82 | 45480 | 235 | 46359 | 52 |
| 44596 | 160 | 44740 | 152 | 44829 | 148 | 44928 | 154 | 45110 | 82 | 45481 | 235 | 46360 | 52 |
| 44597 | 160 | 44741 | 152 | 44830 | 148 | 44929 | 154 | 45111 | 82 | 45482 | 235 | 46362 | 52 |
| 44598 | 162 | 44745 | 132 | 44831 | 148 | 44930 | 154 | 45112 | 81 | 45483 | 235 | 46364 | 52 |
| 44599 | 162 | 44746 | 132 | 44832 | 152 | 44931 | 154 | 45113 | 81 | 45484 | 235 | 46366 | 52 |
| 44600 | 162 | 44747 | 132 | 44833 | 152 | 44932 | 154 | 45114 | 81 | 45485 | 235 | 46368 | 52 |
| 44601 | 162 | 44748 | 132 | 44834 | 152 | 44933 | 154 | 45115 | 81 | 45486 | 235 | 46370 | 52 |
| 44602 | 162 | 44749 | 132 | 44835 | 152 | 44934 | 154 | 45116 | 81 | 45487 | 235 | 46372 | 52 |
| 44603 | 162 | 44750 | 132 | 44836 | 152 | 44935 | 154 | 45117 | 81 | 45488 | 235 | 46374 | 52 |
| 44604 | 162 | 44751 | 132 | 44837 | 152 | 44936 | 154 | 45118 | 81 | 45489 | 235 | 46376 | 52 |
| 44605 | 162 | 44752 | 132 | 44838 | 152 | 44937 | 154 | 45119 | 81 | 45490 | 235 | 46450 | 58 |
| 44606 | 162 | 44753 | 132 | 44839 | 152 | 44938 | 154 | 45120 | 81 | 45491 | 235 | 46451 | 58 |
| 44607 | 162 | 44754 | 132 | 44840 | 152 | 44939 | 154 | 45121 | 81 | 45492 | 235 | 46452 | 58 |
| 44608 | 162 | 44755 | 132 | 44841 | 152 | 44940 | 154 | 45122 | 81 | 45493 | 235 | 46453 | 58 |
| 44609 | 161 | 44756 | 132 | 44842 | 149 | 44941 | 154 | 45123 | 81 | 45494 | 235 | 46454 | 58 |
| 44610 | 161 | 44757 | 132 | 44843 | 149 | 44942 | 154 | 45124 | 81 | 45495 | 235 | 46455 | 58 |
| 44611 | 161 | 44758 | 132 | 44844 | 150 | 44943 | 154 | 45125 | 81 | 45496 | 235 | 46456 | 58 |
| 44612 | 161 | 44759 | 132 | 44845 | 150 | 44944 | 154 | 45126 | 81 | 45497 | 235 | 46457 | 58 |
| 44613 | 161 | 44760 | 132 | 44846 | 149 | 44945 | 154 | 45127 | 83 | 45498 | 235 | 46458 | 58 |
| 44614 | 161 | 44761 | 132 | 44847 | 149 | 44950 | 153 | 45128 | 83 | 45499 | 235 | 46459 | 58 |
| 44615 | 162 | 44762 | 132 | 44848 | 149 | 44951 | 153 | 45129 | 83 | 45500 | 235 | 46460 | 58 |
| 44616 | 162 | 44763 | 132 | 44849 | 149 | 44952 | 153 | 45130 | 83 | 46106 | 232 | 46461 | 58 |
| 44617 | 162 | 44764 | 132 | 44850 | 150 | 44953 | 153 | 45131 | 83 | 46107 | 232 | 46462 | 58 |
| 44618 | 162 | 44765 | 132 | 44851 | 150 | 44954 | 153 | 45132 | 83 | 46108 | 232 | 46463 | 58 |
| 44619 | 162 | 44766 | 132 | 44852 | 150 | 44955 | 153 | 45133 | 83 | 46109 | 232 | 46464 | 58 |
| 44620 | 162 | 44767 | 132 | 44853 | 150 | 44956 | 153 | 45134 | 83 | 46110 | 232 | 46465 | 58 |
| 44627 | 132 | 44768 | 132 | 44854 | 149 | 44957 | 153 | 45135 | 83 | 46111 | 232 | 46466 | 58 |
| 44628 | 132 | 44769 | 152 | 44855 | 149 | 44958 | 153 | 45136 | 83 | 46112 | 232 | 46467 | 58 |
| 44629 | 132 | 44770 | 152 | 44856 | 149 | 44959 | 153 | 45137 | 83 | 46113 | 232 | 46468 | 58 |
| 44630 | 132 | 44771 | 152 | 44857 | 149 | 44960 | 153 | 45138 | 83 | 46114 | 232 | 46469 | 58 |
| 44631 | 132 | 44772 | 152 | 44858 | 150 | 44961 | 153 | 45139 | 83 | 46116 | 232 | 46470 | 58 |
| 44634 | 132 | 44773 | 152 | 44859 | 150 | 44962 | 153 | 45140 | 83 | 46117 | 232 | 46471 | 58 |
| 44635 | 132 | 44774 | 152 | 44860 | 150 | 44963 | 153 | 45141 | 83 | 46118 | 232 | 46472 | 58 |
| 44636 | 132 | 44775 | 152 | 44861 | 150 | 44964 | 153 | 45150 | 81 | 46120 | 232 | 46473 | 58 |
| 44637 | 132 | 44776 | 152 | 44862 | 150 | 44965 | 153 | 45170 | 81 | 46121 | 232 | 46474 | 58 |
| 44638 | 132 | 44777 | 152 | 44863 | 150 | 44966 | 153 | 45171 | 81 | 46122 | 232 | 46475 | 58 |
| 44639 | 132 | 44778 | 152 | 44864 | 150 | 44967 | 153 | 45172 | 81 | 46128 | 232 | 46476 | 58 |
| 44641 | 132 | 44779 | 152 | 44865 | 150 | 44968 | 153 | 45173 | 81 | 46129 | 232 | 46477 | 58 |
| 44642 | 132 | 44780 | 152 | 44866 | 150 | 44969 | 153 | 45174 | 81 | 46130 | 232 | 46478 | 58 |
| 44643 | 132 | 44781 | 152 | 44867 | 150 | 44970 | 153 | 45175 | 81 | 46131 | 232 | 46479 | 58 |
| 44645 | 127 | 44782 | 152 | 44868 | 149 | 44971 | 153 | 45176 | 81 | 46132 | 232 | 46480 | 58 |
| 44646 | 127 | 44783 | 152 | 44869 | 149 | 44972 | 153 | 45177 | 81 | 46133 | 232 | 46481 | 58 |
| 44647 | 127 | 44784 | 152 | 44870 | 149 | 44973 | 153 | 45178 | 81 | 46140 | 112 | 46482 | 58 |
| 44648 | 127 | 44785 | 152 | 44871 | 149 | 44974 | 153 | 45179 | 81 | 46141 | 112 | 46483 | 58 |
| 44649 | 127 | 44786 | 152 | 44872 | 150 | 44990 | 129 | 45180 | 81 | 46142 | 112 | 46493 | 42 |
| 44650 | 127 | 44787 | 152 | 44873 | 150 | 44991 | 129 | 45181 | 81 | 46143 | 112 | 46494 | 42 |
| 44652 | 127 | 44788 | 152 | 44874 | 150 | 44992 | 129 | 45182 | 81 | 46145 | 112 | 46495 | 42 |

EDP Number Index

| EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE | EDP NO. | PAGE |
|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|
| 69054 | 321 | 70489 | 100 | 73028 | 356 | 74228 | 333 | 82980 | 364 | 84280 | 354 | 91241 | 168 |
| 69055 | 321 | 70527 | 104 | 73029 | 356 | 74231 | 333 | 82981 | 364 | 84281 | 354 | 91242 | 168 |
| 69056 | 321 | 70529 | 104 | 73041 | 356 | 74234 | 333 | 82982 | 364 | 84282 | 354 | 91243 | 168 |
| 70003 | 340 | 70531 | 104 | 73070 | 357 | 74237 | 333 | 82983 | 364 | 84283 | 354 | 91244 | 168 |
| 70004 | 340 | 70533 | 104 | 73071 | 357 | 74240 | 333 | 82984 | 364 | 84284 | 354 | 91245 | 168 |
| 70005 | 340 | 70535 | 104 | 73072 | 357 | 74243 | 333 | 82985 | 364 | 84285 | 354 | 91246 | 168 |
| 70006 | 340 | 70537 | 104 | 73073 | 357 | 74246 | 333 | 82986 | 364 | 84286 | 354 | 91247 | 168 |
| 70007 | 340 | 70539 | 104 | 73074 | 357 | 74249 | 336 | 82987 | 364 | 84287 | 354 | 91248 | 168 |
| 70008 | 340 | 70540 | 104 | 73075 | 357 | 74252 | 336 | 82988 | 364 | 84288 | 354 | 91250 | 168 |
| 70009 | 340 | 70542 | 104 | 73078 | 357 | 74255 | 336 | 82989 | 364 | 84289 | 354 | 91251 | 168 |
| 70010 | 340 | 70544 | 104 | 73079 | 357 | 74258 | 336 | 82990 | 368 | 84290 | 354 | 91252 | 168 |
| 70011 | 340 | 70546 | 104 | 73080 | 357 | 74261 | 336 | 82991 | 368 | 84291 | 354 | 91253 | 168 |
| 70012 | 340 | 70548 | 104 | 73081 | 357 | 74264 | 336 | 82992 | 368 | 85080 | 354 | 91254 | 168 |
| 70013 | 340 | 70550 | 104 | 73082 | 357 | 74267 | 336 | 82993 | 368 | 85081 | 354 | 91255 | 168 |
| 70014 | 340 | 70551 | 103 | 73083 | 357 | 74270 | 336 | 82994 | 368 | 85082 | 354 | 91256 | 168 |
| 70015 | 340 | 70552 | 103 | 74001 | 330 | 74280 | 352 | 82995 | 368 | 85083 | 354 | 91257 | 168 |
| 70016 | 340 | 70553 | 103 | 74004 | 330 | 74281 | 352 | 82996 | 368 | 85084 | 354 | 91258 | 168 |
| 70017 | 340 | 70554 | 103 | 74007 | 330 | 74282 | 352 | 82997 | 368 | 85085 | 354 | 91259 | 168 |
| 70018 | 340 | 70555 | 103 | 74010 | 330 | 74283 | 352 | 82998 | 368 | 85086 | 354 | 91260 | 168 |
| 70019 | 340 | 70556 | 103 | 74013 | 330 | 74284 | 352 | 83027 | 359 | 85087 | 354 | 91261 | 168 |
| 70020 | 340 | 70557 | 103 | 74016 | 330 | 74285 | 352 | 83028 | 359 | 85088 | 354 | 91262 | 168 |
| 70021 | 340 | 70558 | 103 | 74019 | 330 | 74286 | 352 | 83029 | 359 | 85089 | 354 | 91263 | 168 |
| 70022 | 340 | 70559 | 103 | 74022 | 330 | 74287 | 352 | 83041 | 359 | 85090 | 354 | 91266 | 179 |
| 70023 | 340 | 70560 | 103 | 74025 | 333 | 74288 | 352 | 83042 | 359 | 85091 | 354 | 91268 | 193 |
| 70024 | 340 | 70561 | 103 | 74028 | 333 | 74289 | 352 | 83043 | 359 | 90001 | 370 | 91269 | 198 |
| 70025 | 340 | 70562 | 103 | 74031 | 333 | 74290 | 352 | 83044 | 359 | 90005 | 370 | 91270 | 179 |
| 70026 | 340 | 70563 | 103 | 74034 | 333 | 74291 | 352 | 83056 | 116 | 90009 | 370 | 91272 | 193 |
| 70027 | 340 | 72930 | 356 | 74037 | 333 | 75080 | 352 | 83057 | 116 | 90013 | 370 | 91273 | 198 |
| 70028 | 340 | 72947 | 356 | 74040 | 333 | 75081 | 352 | 83058 | 116 | 90017 | 370 | 91274 | 179 |
| 70029 | 340 | 72948 | 356 | 74043 | 333 | 75082 | 352 | 83059 | 116 | 90021 | 370 | 91276 | 193 |
| 70030 | 340 | 72949 | 356 | 74046 | 333 | 75083 | 352 | 83060 | 116 | 90025 | 370 | 91277 | 198 |
| 70031 | 340 | 72950 | 356 | 74049 | 336 | 75084 | 352 | 83061 | 116 | 90029 | 370 | 91278 | 179 |
| 70032 | 340 | 72951 | 356 | 74052 | 336 | 75085 | 352 | 83062 | 116 | 90033 | 370 | 91280 | 193 |
| 70441 | 101 | 72952 | 356 | 74055 | 336 | 75086 | 352 | 83063 | 116 | 90037 | 370 | 91281 | 198 |
| 70442 | 101 | 72953 | 356 | 74058 | 336 | 75087 | 352 | 83064 | 116 | 90041 | 370 | 91282 | 179 |
| 70444 | 101 | 72954 | 362 | 74061 | 336 | 75088 | 352 | 83065 | 116 | 90045 | 370 | 91284 | 193 |
| 70445 | 101 | 72955 | 362 | 74064 | 336 | 75089 | 352 | 83070 | 359 | 90049 | 370 | 91285 | 198 |
| 70447 | 101 | 72956 | 362 | 74067 | 336 | 75090 | 352 | 83071 | 359 | 90053 | 370 | 91286 | 179 |
| 70448 | 101 | 72957 | 362 | 74070 | 336 | 75091 | 352 | 83072 | 359 | 90101 | 373 | 91288 | 194 |
| 70450 | 101 | 72958 | 362 | 74101 | 330 | 81001 | 344 | 83073 | 359 | 90107 | 373 | 91289 | 199 |
| 70451 | 101 | 72959 | 362 | 74104 | 330 | 81003 | 344 | 83100 | 359 | 90109 | 373 | 91290 | 180 |
| 70453 | 101 | 72960 | 362 | 74107 | 330 | 81005 | 344 | 83101 | 359 | 90113 | 373 | 91292 | 194 |
| 70454 | 101 | 72961 | 362 | 74110 | 330 | 81007 | 344 | 83102 | 359 | 90121 | 373 | 91293 | 199 |
| 70456 | 101 | 72962 | 362 | 74113 | 330 | 81009 | 344 | 83103 | 359 | 90129 | 373 | 91349 | 108 |
| 70457 | 101 | 72963 | 362 | 74116 | 330 | 81011 | 344 | 83104 | 359 | 90137 | 373 | 91350 | 108 |
| 70459 | 101 | 72964 | 362 | 74119 | 330 | 81013 | 344 | 83105 | 359 | 91001 | 371 | 91351 | 108 |
| 70460 | 101 | 72965 | 362 | 74122 | 330 | 81015 | 344 | 83106 | 359 | 91005 | 371 | 91352 | 108 |
| 70462 | 101 | 72966 | 362 | 74125 | 333 | 81017 | 344 | 83107 | 359 | 91009 | 371 | 91353 | 108 |
| 70463 | 101 | 72967 | 362 | 74128 | 333 | 81019 | 344 | 83108 | 359 | 91013 | 371 | 91354 | 108 |
| 70465 | 101 | 72968 | 362 | 74131 | 333 | 81021 | 344 | 83109 | 359 | 91017 | 371 | 91355 | 108 |
| 70466 | 101 | 72969 | 362 | 74134 | 333 | 81023 | 344 | 83110 | 359 | 91021 | 371 | 91356 | 108 |
| 70468 | 101 | 72970 | 366 | 74137 | 333 | 81025 | 344 | 83111 | 359 | 91025 | 371 | 91357 | 108 |
| 70469 | 101 | 72971 | 366 | 74140 | 333 | 81027 | 344 | 83200 | 364 | 91029 | 371 | 91358 | 108 |
| 70470 | 100 | 72972 | 366 | 74143 | 333 | 81029 | 344 | 83201 | 364 | 91033 | 371 | 91359 | 108 |
| 70471 | 100 | 72973 | 366 | 74146 | 333 | 82930 | 359 | 83202 | 364 | 91037 | 371 | 91360 | 108 |
| 70472 | 100 | 72974 | 366 | 74149 | 336 | 82931 | 359 | 83203 | 364 | 91041 | 371 | 91361 | 108 |
| 70473 | 100 | 72975 | 366 | 74152 | 336 | 82932 | 359 | 83204 | 364 | 91045 | 371 | 93272 | 106 |
| 70474 | 100 | 72976 | 366 | 74155 | 336 | 82933 | 359 | 83205 | 364 | 91049 | 371 | 93273 | 106 |
| 70475 | 100 | 72977 | 366 | 74158 | 336 | 82966 | 359 | 83206 | 364 | 91053 | 371 | 93274 | 106 |
| 70476 | 100 | 72978 | 114 | 74161 | 336 | 82967 | 359 | 83207 | 364 | 91101 | 374 | 93275 | 106 |
| 70477 | 100 | 72979 | 114 | 74164 | 336 | 82968 | 359 | 83220 | 360 | 91107 | 374 | 93276 | 106 |
| 70478 | 100 | 72980 | 114 | 74167 | 336 | 82969 | 359 | 83221 | 360 | 91109 | 374 | 93277 | 106 |
| 70479 | 100 | 72981 | 114 | 74170 | 336 | 82970 | 359 | 83222 | 360 | 91113 | 374 | 93278 | 106 |
| 70480 | 100 | 72982 | 114 | 74201 | 330 | 82971 | 359 | 83223 | 360 | 91121 | 374 | 93279 | 106 |
| 70481 | 100 | 72983 | 114 | 74204 | 330 | 82972 | 359 | 83224 | 360 | 91129 | 374 | 93280 | 106 |
| 70482 | 100 | 72984 | 114 | 74207 | 330 | 82973 | 359 | 83225 | 360 | 91137 | 374 | 93281 | 106 |
| 70483 | 100 | 72985 | 114 | 74210 | 330 | 82974 | 364 | 83230 | 360 | 91235 | 168 | 93282 | 106 |
| 70484 | 100 | 73012 | 356 | 74213 | 330 | 82975 | 364 | 83231 | 360 | 91236 | 168 | | |
| 70485 | 100 | 73013 | 356 | 74216 | 330 | 82976 | 364 | 83232 | 360 | 91237 | 168 | | |
| 70486 | 100 | 73014 | 356 | 74219 | 330 | 82977 | 364 | 83233 | 360 | 91238 | 168 | | |
| 70487 | 100 | 73026 | 356 | 74222 | 330 | 82978 | 364 | 83234 | 360 | 91239 | 168 | | |
| 70488 | 100 | 73027 | 356 | 74225 | 333 | 82979 | 364 | 83235 | 360 | 91240 | 168 | | |

KSPT Reference Information

| ISO H6 SPECIFICATIONS | | | | | |
|-----------------------|---------|----------|-----------|-------|-------|
| DIAMETER | + | - | DIAMETER | + | - |
| ≥ 1/8 - 3/16 | 0.00000 | -0.00032 | ≤ 3 | 0,000 | 0,006 |
| > 3/16 - 7/16 | 0.00000 | -0.00035 | > 3 - 6 | 0,000 | 0,008 |
| > 7/16 - 5/8 | 0.00000 | -0.00043 | > 6 - 10 | 0,000 | 0,009 |
| > 5/8 - 1 | 0.00000 | -0.00051 | > 10 - 18 | 0,000 | 0,011 |
| > 1 - 1-1/4 | 0.00000 | -0.00063 | > 18 - 25 | 0,000 | 0,013 |

| MACHINING FORMULAS | |
|--|--|
| INCH FORMULAS | METRIC FORMULAS |
| sfm = rpm x .262 x cutting diameter | m/min = (3.14 x cutting diameter x rpm) / 1000 |
| rpm = sfm x 3.82 / cutting diameter | rpm = (1000 x m / min) / (3.14 x cutting diameter) |
| feed (inches per tooth) = ipm / (number of teeth x rpm) | feed (mm per tooth) = millimeters per minute / (number of teeth x rpm) |
| feed (inches / minute) = inches per tooth x number of teeth x rpm | feed (mm/minute) = feed per tooth x number of teeth x rpm |
| feed (inches / minute) = ipr x rpm | feed (mm/minute) = mmr x rpm |
| feed (inches / revolution) = ipm / rpm | feed (mm per revolution) = mmr / rpm |
| cuspl height* = (tool diameter / 2) - $\sqrt{(\text{tool diameter}^2 - \text{pitch}^2) / 4}$ | cuspl height* = (tool diameter / 2) - $\sqrt{(\text{tool diameter}^2 - \text{pitch}^2) / 4}$ |
| pitch = $\sqrt{4 \times (\text{cuspl height} \times \text{tool diameter}) - 4 \times (\text{cuspl height}^2)}$ | pitch = $\sqrt{4 \times (\text{cuspl height} \times \text{tool diameter}) - 4 \times (\text{cuspl height}^2)}$ |
| mrr – milling – (in ³ /min) = width of cut x depth of cut x ipm | mrr – milling – (cm ³ /min) = (width of cut x depth of cut x mm/min) / 1000 |
| cutting time – drilling – (minutes) = length / ipm | cutting time – drilling – (minutes) = length / mm/min |

| | |
|--------|-------------------------------------|
| sfm | surface feet per minute |
| rpm | revolutions per minute |
| ipm | feed rate in inches per minutes |
| ipr | inches per revolution |
| mmr | millimeters per revolution |
| mm/min | feed rate in millimeters per minute |
| mrr | material removal rate |
| * | on flat surface |

| GENERAL FORMULAS |
|---|
| coolant pressure: 1 Bar = 14.5 Pounds per Square Inch (PSI) |
| calculation of coolant pressure: Pounds Per Square Inch (PSI) = (Horsepower of Pump x 1.460) / Gallons per Minute (GPM) |
| 1 Liter = 0.254 Gallons |
| inch = millimeters / 25.4 millimeters = inch x 25.4 |
| inch tap drill sizes = major diameter - ((1.299 x % of thread) / threads per inch) |
| metric tap drill sizes = major diameter - (1.082 x pitch x % of thread) |
| inch thread forming drill size: maximum diameter = basic major diameter - (3/8 x number of threads per inch) |
| inch thread forming drill size: minimum diameter = basic major diameter - (1/2 x number of threads per inch) |
| metric thread forming drill size: maximum diameter = basic major diameter - (.375 x pitch) |
| metric thread forming drill size: minimum diameter = basic major diameter - (.500 x pitch) |

Decimal Equivalents

Fraction • Number • Letter • Metric Sizes

| INCH | METRIC | DECIMAL EQUIVALENT | INCH | METRIC | DECIMAL EQUIVALENT | INCH | METRIC | DECIMAL EQUIVALENT | INCH | METRIC | DECIMAL EQUIVALENT | INCH | METRIC | DECIMAL EQUIVALENT | INCH | METRIC | DECIMAL EQUIVALENT |
|------|--------|--------------------|------|--------|--------------------|-------|--------|--------------------|-------|--------|--------------------|-------|--------|--------------------|-------|--------|--------------------|
| - | 0,10 | 0.0039 | - | 1,60 | 0.0630 | 9/64 | 3,57 | 0.1406 | #1 | 5,79 | 0.2280 | R | 8,61 | 0.3390 | - | 13,00 | 0.5118 |
| - | 0,20 | 0.0079 | #52 | 1,61 | 0.0635 | - | 3,60 | 0.1417 | - | 5,80 | 0.2283 | - | 8,70 | 0.3425 | 33/64 | 13,10 | 0.5156 |
| - | 0,25 | 0.0098 | - | 1,65 | 0.0650 | #27 | 3,66 | 0.1440 | - | 5,90 | 0.2323 | 11/32 | 8,73 | 0.3438 | 17/32 | 13,49 | 0.5312 |
| - | 0,30 | 0.0118 | #51 | 1,70 | 0.0669 | - | 3,70 | 0.1457 | A | 5,94 | 0.2340 | - | 8,75 | 0.3445 | - | 13,50 | 0.5315 |
| #80 | 0,34 | 0.0135 | - | 1,75 | 0.0689 | #26 | 3,73 | 0.1470 | 15/64 | 5,95 | 0.2344 | - | 8,80 | 0.3465 | 35/64 | 13,89 | 0.5469 |
| - | 0,35 | 0.0138 | #50 | 1,78 | 0.0700 | - | 3,75 | 0.1476 | - | 6,00 | 0.2362 | S | 8,84 | 0.3480 | - | 14,00 | 0.5512 |
| #79 | 0,37 | 0.0145 | - | 1,80 | 0.0709 | #25 | 3,80 | 0.1495 | B | 6,05 | 0.2380 | - | 8,90 | 0.3504 | 9/16 | 14,29 | 0.5625 |
| 1/64 | 0,40 | 0.0156 | #49 | 1,85 | 0.0728 | - | 3,80 | 0.1496 | - | 6,10 | 0.2402 | - | 9,00 | 0.3543 | - | 14,50 | 0.5709 |
| #78 | 0,41 | 0.0160 | - | 1,90 | 0.0748 | #24 | 3,86 | 0.1520 | C | 6,15 | 0.2420 | T | 9,09 | 0.3580 | 37/64 | 14,68 | 0.5781 |
| - | 0,45 | 0.0177 | #48 | 1,93 | 0.0760 | - | 3,90 | 0.1535 | - | 6,20 | 0.2441 | - | 9,10 | 0.3583 | - | 15,00 | 0.5906 |
| #77 | 0,46 | 0.0180 | - | 1,95 | 0.0768 | #23 | 3,91 | 0.1540 | D | 6,25 | 0.2461 | 23/64 | 9,13 | 0.3594 | 19/32 | 15,08 | 0.5938 |
| - | 0,50 | 0.0197 | 5/64 | 1,98 | 0.0781 | 5/32 | 3,97 | 0.1562 | - | 6,30 | 0.2480 | - | 9,20 | 0.3622 | 39/64 | 15,48 | 0.6094 |
| #76 | 0,51 | 0.0200 | #47 | 1,99 | 0.0785 | #22 | 3,99 | 0.1570 | E | 6,35 | 0.2500 | - | 9,25 | 0.3642 | - | 15,50 | 0.6102 |
| #75 | 0,53 | 0.0210 | - | 2,00 | 0.0787 | - | 4,00 | 0.1575 | 1/4 | 6,35 | 0.2500 | - | 9,30 | 0.3661 | 5/8 | 15,88 | 0.6250 |
| - | 0,55 | 0.0217 | - | 2,05 | 0.0807 | #21 | 4,04 | 0.1590 | - | 6,40 | 0.2520 | U | 9,35 | 0.3680 | - | 16,00 | 0.6299 |
| #74 | 0,57 | 0.0225 | #46 | 2,06 | 0.0810 | #20 | 4,09 | 0.1610 | - | 6,50 | 0.2559 | - | 9,40 | 0.3701 | 41/64 | 16,27 | 0.6406 |
| - | 0,60 | 0.0236 | #45 | 2,08 | 0.0820 | - | 4,10 | 0.1614 | F | 6,53 | 0.2570 | - | 9,50 | 0.3740 | - | 16,50 | 0.6496 |
| #73 | 0,61 | 0.0240 | - | 2,10 | 0.0827 | - | 4,20 | 0.1654 | - | 6,60 | 0.2598 | 3/8 | 9,53 | 0.3750 | 21/32 | 16,67 | 0.6562 |
| #72 | 0,64 | 0.0250 | - | 2,15 | 0.0846 | #19 | 4,22 | 0.1660 | G | 6,63 | 0.2610 | V | 9,56 | 0.3770 | - | 17,00 | 0.6693 |
| - | 0,65 | 0.0256 | #44 | 2,18 | 0.0860 | - | 4,25 | 0.1673 | - | 6,70 | 0.2638 | - | 9,60 | 0.3780 | 43/64 | 17,07 | 0.6719 |
| #71 | 0,66 | 0.0260 | - | 2,20 | 0.0866 | - | 4,30 | 0.1693 | 17/64 | 6,75 | 0.2656 | - | 9,70 | 0.3819 | 11/16 | 17,46 | 0.6875 |
| - | 0,70 | 0.0276 | - | 2,25 | 0.0886 | #18 | 4,31 | 0.1695 | H | 6,76 | 0.2667 | - | 9,75 | 0.3839 | - | 17,50 | 0.6890 |
| #70 | 0,71 | 0.0280 | #43 | 2,26 | 0.0890 | 11/64 | 4,37 | 0.1719 | - | 6,80 | 0.2677 | W | 9,80 | 0.3858 | 45/64 | 17,86 | 0.7031 |
| #69 | 0,74 | 0.0292 | - | 2,30 | 0.0906 | #17 | 4,39 | 0.1730 | - | 6,90 | 0.2717 | - | 9,90 | 0.3898 | - | 18,00 | 0.7087 |
| - | 0,75 | 0.0295 | - | 2,35 | 0.0925 | - | 4,40 | 0.1732 | I | 6,91 | 0.2720 | 25/64 | 9,92 | 0.3906 | 23/32 | 18,26 | 0.7188 |
| #68 | 0,79 | 0.0310 | #42 | 2,37 | 0.0935 | #16 | 4,50 | 0.1770 | - | 7,00 | 0.2756 | - | 10,00 | 0.3937 | - | 18,50 | 0.7283 |
| 1/32 | 0,79 | 0.0313 | 3/32 | 2,38 | 0.0938 | - | 4,50 | 0.1772 | J | 7,04 | 0.2770 | X | 10,08 | 0.3970 | 47/64 | 18,65 | 0.7344 |
| - | 0,80 | 0.0315 | - | 2,40 | 0.0945 | #15 | 4,57 | 0.1800 | - | 7,10 | 0.2795 | - | 10,10 | 0.3976 | - | 19,00 | 0.7480 |
| #67 | 0,81 | 0.0320 | #41 | 2,44 | 0.0960 | - | 4,60 | 0.1811 | K | 7,14 | 0.2810 | - | 10,20 | 0.4016 | 3/4 | 19,05 | 0.7500 |
| #66 | 0,84 | 0.0330 | - | 2,45 | 0.0965 | #14 | 4,62 | 0.1820 | 9/32 | 7,14 | 0.2812 | Y | 10,26 | 0.4040 | 49/64 | 19,45 | 0.7656 |
| - | 0,85 | 0.0335 | #40 | 2,50 | 0.0984 | #13 | 4,70 | 0.1850 | - | 7,20 | 0.2835 | - | 10,30 | 0.4055 | - | 19,50 | 0.7677 |
| #65 | 0,89 | 0.0350 | #39 | 2,53 | 0.0995 | - | 4,75 | 0.1870 | - | 7,25 | 0.2854 | 13/32 | 10,32 | 0.4062 | 25/32 | 19,84 | 0.7812 |
| - | 0,90 | 0.0354 | #38 | 2,58 | 0.1015 | 3/16 | 4,76 | 0.1875 | - | 7,30 | 0.2874 | - | 10,40 | 0.4094 | - | 20,00 | 0.7874 |
| #64 | 0,91 | 0.0360 | - | 2,60 | 0.1024 | #12 | 4,80 | 0.1890 | L | 7,37 | 0.2900 | Z | 10,49 | 0.4130 | 51/64 | 20,24 | 0.7969 |
| #63 | 0,94 | 0.0370 | #37 | 2,64 | 0.1040 | #11 | 4,85 | 0.1910 | - | 7,40 | 0.2913 | - | 10,50 | 0.4134 | - | 20,50 | 0.8071 |
| - | 0,95 | 0.0374 | - | 2,70 | 0.1063 | - | 4,90 | 0.1929 | M | 7,49 | 0.2950 | - | 10,60 | 0.4173 | 13/16 | 20,64 | 0.8125 |
| #62 | 0,97 | 0.0380 | #36 | 2,71 | 0.1065 | #10 | 4,91 | 0.1935 | - | 7,50 | 0.2953 | - | 10,70 | 0.4213 | - | 21,00 | 0.8268 |
| #61 | 0,99 | 0.0390 | - | 2,75 | 0.1083 | #9 | 4,98 | 0.1960 | 19/64 | 7,54 | 0.2969 | 27/64 | 10,72 | 0.4219 | 53/64 | 21,03 | 0.8281 |
| - | 1,00 | 0.0394 | 7/64 | 2,78 | 0.1094 | - | 5,00 | 0.1969 | - | 7,60 | 0.2992 | - | 10,80 | 0.4252 | 27/32 | 21,43 | 0.8438 |
| #60 | 1,02 | 0.0400 | #35 | 2,79 | 0.1100 | #8 | 5,05 | 0.1990 | N | 7,67 | 0.3020 | - | 10,90 | 0.4291 | - | 21,50 | 0.8465 |
| #59 | 1,04 | 0.0410 | - | 2,80 | 0.1102 | - | 5,10 | 0.2008 | - | 7,70 | 0.3031 | - | 11,00 | 0.4331 | 55/64 | 21,84 | 0.8594 |
| - | 1,05 | 0.0413 | #34 | 2,82 | 0.1110 | #7 | 5,11 | 0.2010 | - | 7,75 | 0.3051 | - | 11,10 | 0.4370 | - | 22,00 | 0.8661 |
| #58 | 1,07 | 0.0420 | #33 | 2,87 | 0.1130 | 13/64 | 5,16 | 0.2031 | - | 7,80 | 0.3071 | 7/16 | 11,11 | 0.4375 | 7/8 | 22,23 | 0.8750 |
| #57 | 1,09 | 0.0430 | - | 2,90 | 0.1142 | #6 | 5,18 | 0.2040 | - | 7,90 | 0.3110 | - | 11,20 | 0.4409 | - | 22,50 | 0.8858 |
| - | 1,10 | 0.0433 | #32 | 2,95 | 0.1160 | - | 5,20 | 0.2047 | 5/16 | 7,94 | 0.3125 | - | 11,30 | 0.4449 | 57/64 | 22,62 | 0.8906 |
| - | 1,15 | 0.0453 | - | 3,00 | 0.1181 | #5 | 5,22 | 0.2055 | - | 8,00 | 0.3150 | - | 11,40 | 0.4488 | - | 23,00 | 0.9055 |
| #56 | 1,18 | 0.0465 | #31 | 3,05 | 0.1200 | - | 5,25 | 0.2067 | O | 8,03 | 0.3160 | - | 11,50 | 0.4528 | 29/32 | 23,02 | 0.9062 |
| 3/64 | 1,19 | 0.0469 | - | 3,10 | 0.1220 | - | 5,3 | 0.2087 | - | 8,10 | 0.3189 | 29/64 | 11,51 | 0.4531 | 59/64 | 23,42 | 0.9219 |
| - | 1,20 | 0.0472 | 1/8 | 3,18 | 0.1250 | #4 | 5,31 | 0.2090 | - | 8,20 | 0.3228 | - | 11,60 | 0.4567 | - | 23,50 | 0.9252 |
| - | 1,25 | 0.0492 | - | 3,20 | 0.1260 | - | 5,40 | 0.2126 | P | 8,20 | 0.3230 | - | 11,70 | 0.4606 | 15/16 | 23,81 | 0.9375 |
| - | 1,30 | 0.0512 | - | 3,25 | 0.1280 | #3 | 5,41 | 0.2130 | - | 8,25 | 0.3248 | - | 11,80 | 0.4646 | - | 24,00 | 0.9449 |
| #55 | 1,32 | 0.0520 | #30 | 3,26 | 0.1285 | - | 5,50 | 0.2165 | - | 8,30 | 0.3268 | - | 11,90 | 0.4685 | 61/64 | 24,21 | 0.9531 |
| - | 1,35 | 0.0531 | - | 3,30 | 0.1299 | 7/32 | 5,56 | 0.2188 | 21/64 | 8,33 | 0.3281 | 15/32 | 11,91 | 0.4688 | - | 24,50 | 0.9646 |
| #54 | 1,40 | 0.0550 | - | 3,40 | 0.1339 | - | 5,60 | 0.2205 | - | 8,40 | 0.3307 | - | 12,00 | 0.4724 | 31/32 | 24,61 | 0.9688 |
| #53 | 1,51 | 0.0595 | #29 | 3,45 | 0.1360 | #2 | 5,61 | 0.2210 | Q | 8,43 | 0.3320 | 31/64 | 12,30 | 0.4844 | - | 25,00 | 0.9843 |
| - | 1,55 | 0.0610 | - | 3,50 | 0.1378 | - | 5,70 | 0.2244 | - | 8,50 | 0.3346 | - | 12,50 | 0.4921 | 63/64 | 25,00 | 0.9844 |
| 1/16 | 1,59 | 0.0625 | #28 | 3,57 | 0.1405 | - | 5,75 | 0.2264 | - | 8,60 | 0.3386 | 1/2 | 12,70 | 0.5000 | 1 | 25,40 | 1.0000 |

Hardness Conversion Chart

| ROCKWELL HARDNESS (HRb) | ROCKWELL HARDNESS (HRc) | BRINELL HARDNESS (HB) | VICKERS HARDNESS (HV) | TENSILE STRENGTH (N/mm ²) | PSI (1000lb/in ²) |
|-------------------------------|-------------------------------|-----------------------------|-----------------------------|---|----------------------------------|
| 67 | – | 121 | 122 | 401 | 58 |
| 70 | – | 126 | 127 | 432 | 63 |
| 73 | – | 132 | 132 | 448 | 65 |
| 75 | – | 136 | 137 | 455 | 66 |
| 77 | – | 140 | 143 | 463 | 67 |
| 80 | – | 147 | 150 | 479 | 69 |
| 82 | – | 153 | 156 | 494 | 72 |
| 84 | – | 159 | 163 | 525 | 76 |
| 86 | – | 165 | 171 | 540 | 78 |
| 89 | – | 177 | 178 | 556 | 81 |
| 91 | – | 186 | 188 | 602 | 88 |
| 93 | – | 197 | 196 | 632 | 92 |
| 96 | – | 216 | 212 | 664 | 97 |
| 97 | – | 223 | 218 | 695 | 101 |
| 98 | 21 | 230 | 234 | 756 | 110 |
| – | 22 | 236 | 241 | 772 | 112 |
| – | 23 | 242 | 247 | 787 | 114 |
| – | 24 | 248 | 255 | 818 | 118 |
| – | 25 | 254 | 261 | 849 | 123 |
| – | 27 | 266 | 269 | 865 | 125 |
| – | 28 | 272 | 275 | 895 | 130 |
| – | 29 | 278 | 284 | 911 | 132 |
| – | 30 | 284 | 292 | 942 | 136 |
| – | 31 | 293 | 300 | 973 | 141 |
| – | 32 | 302 | 308 | 988 | 143 |
| – | 33 | 310 | 318 | 1019 | 147 |
| – | 34 | 319 | 327 | 1050 | 152 |
| – | 35 | 328 | 337 | 1096 | 159 |
| – | 37 | 345 | 349 | 1127 | 163 |
| – | 38 | 353 | 359 | 1158 | 168 |
| – | 39 | 362 | 370 | 1189 | 172 |
| – | 40 | 370 | 381 | 1235 | 179 |
| – | 41 | 381 | 395 | 1266 | 183 |
| – | 42 | 391 | 408 | 1312 | 190 |
| – | 44 | 411 | 422 | 1359 | 197 |
| – | 45 | 422 | 437 | 1420 | 206 |
| – | 46 | 433 | 452 | 1467 | 212 |
| – | 48 | 455 | 470 | 1513 | 219 |
| – | 50 | 479 | 497 | 1559 | 226 |
| – | 51 | 485 | 517 | 1621 | 235 |
| – | 52 | 497 | 532 | 1668 | 241 |
| – | 54 | – | 573 | 1729 | 250 |
| – | 56 | – | 609 | 1807 | 262 |
| – | 57 | – | 630 | 1884 | 273 |
| – | 59 | – | 670 | 1961 | 284 |
| – | 60 | – | 698 | 2039 | 295 |
| – | 61 | – | 725 | – | – |
| – | 62 | – | 740 | – | – |
| – | 63 | – | 780 | – | – |
| – | 64 | – | 812 | – | – |
| – | 65 | – | 847 | – | – |
| – | 66 | – | 885 | – | – |
| – | 67 | – | 926 | – | – |
| – | 68 | – | 971 | – | – |

Conversions from each scale are approximate

SOLUTIONS AROUND THE GLOBE

KYOCERA SGS Precision Tools is an ISO-certified leader of round solid carbide cutting tool technology for the aerospace, metalworking, and automotive industries with manufacturing sites in the United States and United Kingdom. Our global network of Sales Representatives, Industrial Distributors, and Agents blanket the world selling into more than 60 countries.

LEADERS IN SOLID CARBIDE TOOL TECHNOLOGY

Brand names such as Z-Carb, S-Carb®, V-Carb, Hi-PerCarb, Multi-Carb have become synonymous with high performance tooling in the machining and metalworking industry.

We're proud to have pioneered some of the world's most advanced cutting technology right here on our Northeast Ohio manufacturing campus. KSPT high performance end mills, drills and routers are increasing productivity and reducing cost around the world.

EXCEEDING CUSTOMER EXPECTATIONS

As the world's manufacturing needs change, so does KSPT. It's all about the science, starting with our lab inspected substrate materials to our tool designs and coatings. Our exceptional team of researchers, engineers, and machinists are dedicated to developing the absolute best and delivering the ultimate Value at the spindle®.

- Incredible batch-to-batch consistency
- Metallurgical lab dedicated to testing and rigorous quality control
- ISO-certified quality procedures
- Patented geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality—even at extreme parameters
- Specialists in extreme and demanding product applications
- Comprehensive tooling services
- Experienced Field Sales Engineers who work to optimize a tool for your particular application
- Dedicated multi-lingual customer service representatives

KSPT PRODUCTS ARE DISTRIBUTED BY:



www.kyocera-sgstool.com



UNITED STATES OF AMERICA

KYOCERA SGS Precision Tools
P.O. Box 187
55 South Main Street
Munroe Falls, Ohio 44262 U.S.A.
customer service -
US and Canada: (330) 686-5700
fax - US & Canada: (800) 447-4017
international fax: (330) 686-2146
orders: sales@kyocera-sgstool.com
web: www.kyocera-sgstool.com

UNITED KINGDOM

KYOCERA SGS Precision Tools Europe Ltd.
10 Ashville Way
Wokingham, Berkshire
RG41 2PL England
phone: (44) 1189-795-200
fax: (44) 1189-795-295
e-mail: SalesEU@kyocera-sgstool.com
web: www.kyocera-sgstool.eu

JAPAN

KYOCERA Corporation
International Sales Dept.
6 Takeda Tobadono-cho,
Fushimi-ku, Kyoto 612-8501, Japan
phone: +81-75-604-3473
fax: +81-75-604-3472
web: global.kyocera.com/prdct/tool/index.html

COMMERCIAL OFFICES

EASTERN EUROPE

SINTCOM
Sintcom Tools
95 Arsenalski Blvd.
1421 Sofia, Bulgaria
phone: (359) 283-64421
fax: (359) 286-52493
e-mail: sintcom@sintcomtools.com

FRANCE

DOGA-KSPTE FRANCE
8, Avenue Gutenberg
78310 Maurepas, France
phone: +33 (0) 1 30 66 41 64
fax: +33 (0) 1 30 66 41 49
e-mail: KSPTF@kyocera-sgstool.com
web: www.doga.fr

INDIA

KYOCERA Asia Pacific India Pvt. Ltd
Plot No.51, Phase-I,
Udyog Vihar Gurgaon 122016,
Haryana, India
phone: +91-124-4025022
fax: +91-124-4025001

KOREA

KYOCERA Precision Tools Korea Co., Ltd.
2LT 69BL, Namdong Industrial Estate,
638-1, Kozan-Dong, Namdong Incheon,
Korea
phone: +82-32-821-8365
fax: +82-32-821-8369
web: www.kptk.co.kr/

POLAND

KYOCERA SGS Precision Tools
phone: +48 530 432 002
e-mail: SalesEU@kyocera-sgstool.com

RUSSIA

HALTEC
phone: (7) 495-252-05-00
e-mail: info@haltec.ru
web: www.haltec.ru

SPAIN

KYOCERA SGS Precision Tools IBERICA
e-mail: SalesEU@kyocera-sgstool.com

THAILAND

KYOCERA Asia Pacific (Thailand) Co., Ltd.
1 Capital Work Place Building
7th Floor, Soi Chamchan, Sukhumvit
55 Road, Klongton Nua, Wattana,
Bangkok 10110, Thailand
phone: +66-2-030-6688
fax: +66-2-030-6600

SINGAPORE

KYOCERA Asia Pacific Pte. Ltd.
298 Tiong Bahru Road, #13-03/05 Central Plaza,
Singapore 168730
phone: +65-6373-6700
fax: +65-6271-0600
web: asia.kyocera.com/products/cuttingtools/
index.html

CHINA

KYOCERA (China) Sales & Trading Corporation
Room 140, Building A3, Daning Central Square,
No. 700 Wanrong Road,
Zhabei District, Shanghai, 200072,
P.R. China
phone: +86-21-3660-7711
fax: +86-21-568-6200
web: www.kyocera.com.cn/prdct/cuttingtool