KYOCERA
SGS Precision Tools

SGS
Solid Carbide Tools

2018 Global Product Catalog

www.kyocera-sgstool.com

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®.

KYOCERA SGS Precision Tools 2
KYOCERA SGS Precision Tools Europe Ltd. . . 4
Global Innovation Center 5
Tooling Services. 6
Tool Wizard® 7

OVERVIEW
Common Legend. 8
End Mill Legend. 10
Drill Legend. 11
Router Legend 12

COATINGS 13

MILLING
High Performance End Mills. 14
End Mill Matrix. 20
High Performance Aluminum End Mills 116
General Purpose End Mills. 166

HOLE MAKING
High Performance Drills 234
General Purpose Drills 284
General Purpose Countersinks 310
General Purpose Reamers 326

ROUTING
High Performance Routers 338
General Purpose Routers 356

TECHNICAL INFORMATION
EDP Index 362
KSPT Reference Information 377
Decimal Equivalent Chart 378
Hardness Conversion Chart 379

KYOCERA

SGS Precision Tools

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 SGS Tool 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.

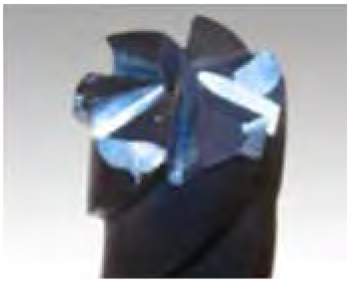
KSPT TOOLING SERVICES FACILITIES

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

BEFORE



AFTER

KYOCERA
SGS Precision Tools

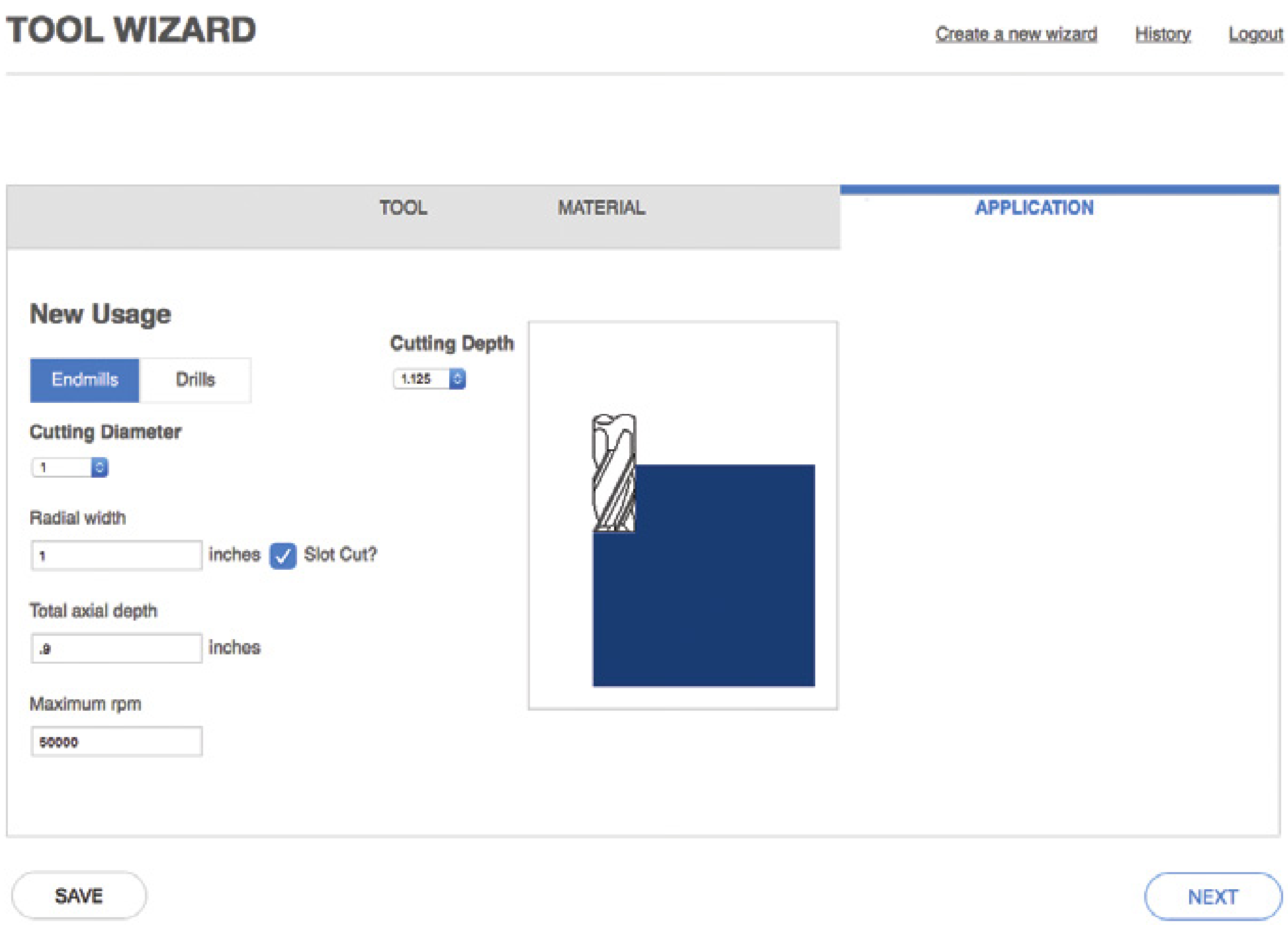
TOOLWIZARD2.1

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.sgstoolwizard.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 Servicio.

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 Kunden Kundendienstmitarbeiter für RMA-Nummer.

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

DEBEN USARSE GAFAS PROTECTORAS CUANDO SE UTILIZA UN EQUIPO DE ALTA VELOCIDAD

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

BEI SCHNELLLAUFENDEN SPANABHEBENDEN MASCHINEN MÜSSEN IMMER DIE VORGESCHRIEBENEN SICHERHEITSBRILLEN GETRAGEN WERDEN

INTELLECTUAL PROPERTY
PROPRIEDAD INTELECTUAL
PROPRIÈTÈ INTELLECTUELLE
GEISTIGES EIGENTUM

KYOCERA SGS Precision Tools holds more than 10 patents globally. Please visit our website at www.kyocera-sgstool.com to learn more.

KYOCERA SGS Precision Tools posee más de 10 patentes a nivel mundial. Para más información, visita nuestra página web www.kyocera-sgstool.com.

KYOCERA SGS Precision Tools possède plus de 10 brevets mondialement reconnus. Pour plus d'information, veuillez consulter notre site web www.kyocera-sgstool.com.

KYOCERA SGS Precision Tools besitzt mehr als 10 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 Inox Nichtrostende Stähle	Cast Iron Hierro Fundido Fonte Grauguss	High Temp Alloys Aleaciones a Altas Temperaturas Alliages Haute Temp Warmfeste Legierungen
Titanium Titanio Titane Titan	Non-Ferrous No Férrico Non Ferreux Nichteisenmetalle	Plastics/Composites Plásticos/Resinas Plastiques/Composites Kunststoffe/Verbundkunststoffe	Hardened Steels Aceros Endurecidos Aciers Trempés Gehärteter Stahl

TOOL LENGTH
LONGITUD FRESA
LONGUEUR DE L'OUTIL
WERKZEUGLÄNGE

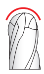
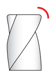
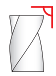
Stub Corta Court Kurze Bauform	Regular Media Moyen Standard	Long Larga Long Lang	Long Reach Neck Larga con cuello Gorge de dégagement longue portée Weiter Ansatz	Extra Long Extra-larga Extra-long Extra-Lang

FLUTES
FILOS
GOUJURES
SCHNEIDEKANTEN

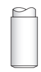
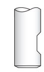
2 2 Flutes 2 Filos 2 Goujures 2 Schneidekanten	3 3 Flutes 3 Filos 3 Goujures 3 Schneidekanten	4 4 Flutes 4 Filos 4 Goujures 4 Schneidekanten	5 5 Flutes 5 Filos 5 Goujures 5 Schneidekanten	6 6 Flutes 6 Filos 6 Goujures 6 Schneidekanten	7 7 Flutes 7 Filos 7 Goujures 7 Schneidekanten
8 8 Flutes 8 Filos 8 Goujures 8 Schneidekanten	9 9 Flutes 9 Filos 9 Goujures 9 Schneidekanten	10 10 Flutes 10 Filos 10 Goujures 10 Schneidekanten	11 11 Flutes 11 Filos 11 Goujures 11 Schneidekanten	12 12 Flutes 12 Filos 12 Goujures 12 Schneidekanten	

End Mill Legend
Leyenda fresas
Légende fraise
Fräser-Legende

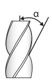
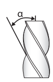
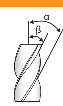
END CONFIGURATIONS
CONFIGURACIONES DE LA PUNTA
CONFIGURATIONS TERMINALES
ENDENAUSFÜHRUNG

 Ball Esférica Boule Kugelkopf	 Corner Plana con borde romo Coin Ecke	 Square Plana Carrée Ohne Eckenradius

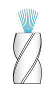
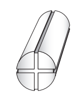
SHANK TYPE
TIPO DE VÁSTAGO
TYPE DE TIGE
SCHAFTART

 Common Normal Commune Standard	 Straight Recto Droite Gerade	 Weldon Flat Weldon plano Méplat Weldon Spannfläche

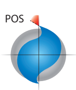
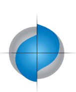
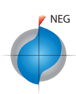
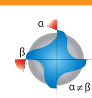
HELIX ANGLES
ÁNGULOS HELICOIDALES
SPANWINKEL
ANGLES DE L'HÉLICE

 Right Spiral Espiral sentido derecho Spirale droite Rechtsläufig	 Left Spiral Espiral sentido izquierdo Spirale gauche Linksläufig	 Variable Right Spiral Espiral sentido derecha con ángulo variable Spirale droite variable Rechtsläufig, variabel

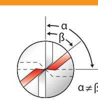
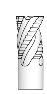
COOLANT OPTIONS
OPCIONES DE REFRIGERACIÓN
OPTIONS DE REFROIDISSEMENT
KÜHLSCHMIERMITTEL-OPTIONEN

 Internal Coolant Refrigerante interno Refroidissement interne Innenkühlung	 JetStream Coolant Slots Ranuras del refrigerante JetStream Fentes de refroidissement JetStream JetStream- Kühlmittelschlitze

RAKE ANGLE
ÁNGULO DE ATAQUE
ANGLE DE PENTE
SPANWINKEL

 Positive Positivo Positif Positiv	 Neutral Neutro Neutre Neutral	 Negative Negativo Négatif Negativ	 Variable Variable Variable Variabel

ADDITIONAL GEOMETRY
CARACTERÍSTICAS GEOMÉTRICAS ADICIONALES
GÉOMÉTRIE SUPPLÉMENTAIRE
WEITERE BAUFORMEN

 Flute Spacing Unequal Espaciado filos desigual Espacement inégal entre les goujoures 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 schneiden rechtsdrehend, soweit nicht anders angegeben

Drill Legend
Leyenda taladros
Légende perçage
Bohrer-Legende

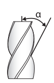
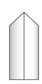
SHANK TYPE
TIPO DE VÁSTAGO
TYPE DE TIGE
SCHAFTART

	
Common Normal Commune Standard	Straight Recto Droite Gerade

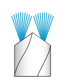
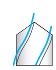
REACH
ALCANCE
LONGUEUR
NUTENLÄNGE

3xD	5xD	8xD
>3xD Reach Alcance >3xD >Longueur 3xD >3xD Nutenlänge	5xD Reach Alcance 5xD Longueur 5xD 5xD Nutenlänge	8xD Reach Alcance 8xD Longueur 8xD 8xD Nutenlänge

HELIX ANGLES
ÁNGULOS HELICOIDALES
ANGLES DE L'HÉLICE
SPANWINKEL

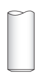
	
Right Spiral Espiral sentido derecho Spirale droite Rechtsläufig	None Ninguno Aucun Ohne

COOLANT OPTIONS
OPCIONES DE REFRIGERACIÓN
OPTIONS DE REFROIDISSEMENT
KÜHLSCHMIERMITTEL-OPTIONEN

	
Internal Coolant Refrigerante externo Refroidissement interne Innenkühlung	External Coolant Refrigerante interno Refroidissement externe Außenkühlung

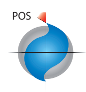
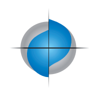
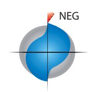
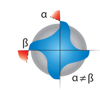
Router Legend
Leyenda ranuradores
Légende détourage
Oberfräsen-Legende

SHANK TYPE
TIPO DE VÁSTAGO
TYPE DE TIGE
SCHAFTART

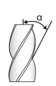
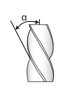


Straight
Recto
Droite
Gerade

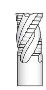
RAKE ANGLE
ÁNGULO DE ATAQUE
ANGLE DE PENTE
SPANWINKEL

			
Positive Positivo Positif Positiv	Neutral Neutro Neutre Neutral	Negative Negativo Négatif Negativ	Variable Variable Variable Variabel

HELIX ANGLES
ÁNGULOS HELICOIDALES
ANGLES DE L'HÉLICE
SPANWINKEL

	
Right Spiral Espiral sentido derecho Spirale droite Rechtsläufig	Left Spiral Espiral sentido izquierdo Spirale gauche Linksläufig

ADDITIONAL GEOMETRY
CARACTERÍSTICAS GEOMÉTRICAS 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 Spanteiler

KYOCERA

SGS Precision Tools

Coatings

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
Ti-NAMITE	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.
Ti-NAMITE-A	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.
Ti-NAMITE-B	Titanium DiBoride (TiB2)	light grey-silver	Monolayer	1–2 microns	4000	0.45	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.
Ti-NAMITE-C	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.
Ti-NAMITE-X ADVANCED TOOL COATING	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.
Di-NAMITE CRYSTALLINE DIAMOND COATING	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.
Ti-NAMITE-M	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.

KYOCERA
SGS Precision Tools

SGS
Solid Carbide Tools

High Performance End Mills

Milling

HIGH PERFORMANCE END MILLS	SERIES	DESCRIPTION	PAGE
Z-Carb-HPR	Z5	5 Flute Rougher Square End Fractional	26
	Z5CR	5 Flute Rougher Corner Radius Fractional	27
	Z5MCR	5 Flute Rougher Corner Radius Metric	31
Z-Carb-AP	Z1PCR	4 Flute Variable Rake Corner Radius Fractional	34
	Z1MPCR	4 Flute Variable Rake Corner Radius Metric	40
	Z1PLC	4 Flute Variable Rake Long Reach Corner Radius Fractional	36
	Z1MPIC	4 Flute Variable Rake Intermediate Reach Corner Radius Metric	41
	Z1MPLC	4 Flute Variable Rake Long Reach Corner Radius Metric	42
	Z1PLB	4 Flute Variable Rake Ball End Long Reach Fractional	37
Z-Carb	Z1	4 Flute Variable Geometry Square End Fractional	45
	Z1M	4 Flute Variable Geometry Square End Metric	50
	Z1B	4 Flute Variable Geometry Ball End Fractional	47
	Z1MB	4 Flute Variable Geometry Ball End Metric	51
	Z16CR	4 Flute Variable Geometry Corner Radius Fractional	46
Z-Carb-HTA	ZH1CR	4 Flute Variable Geometry High Temp Alloys Corner Radius Fractional	54
	ZH1MCR	4 Flute Variable Geometry High Temp Alloys Corner Radius Metric	56
	ZH1MCRS	4 Flute Variable Geometry High Temp Alloys Stub Corner Radius Metric	56
Z-Carb-MD	ZD1CR	4 Flute Variable Geometry Hard Materials Long Reach Corner Radius Fractional	58
	ZD1MCR	4 Flute Variable Geometry Hard Materials Long Reach Corner Radius Metric	59
Series 7	7	4 Flute Variable Geometry Long Length Square End Fractional	98
	7M	4 Flute Variable Geometry Long Length Square End Metric	101
	7B	4 Flute Variable Geometry Long Length Ball End Fractional	99
	7MB	4 Flute Variable Geometry Long Length Ball End Metric	102
V-Carb	55	5 Flute Finisher & Semi-Finisher Square End Fractional	61
	55CR	5 Flute Finisher & Semi-Finisher Corner Radius Fractional	62
	55M	5 Flute Finisher & Semi-Finisher Square End Metric	66
	55MCR	5 Flute Finisher & Semi-Finisher Corner Radius Metric	67
	55MB	5 Flute Finisher & Semi-Finisher Ball End Metric	69

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	73
	51M	6 Flute High Speed Machining Square End Metric	78
	51L	6 Flute High Speed Machining Square End Long Reach Fractional	74
	51ML	6 Flute High Speed Machining Square End Long Reach Metric	80
	51CR	6 Flute High Speed Machining Corner Radius Fractional	73
	51MCR	6 Flute High Speed Machining Corner Radius Metric	79
	51LC	6 Flute High Speed Machining Long Reach Corner Radius Fractional	75
	51MLC	6 Flute High Speed Machining Long Reach Corner Radius Metric	81
Multi-Carb	66	Multi-Flute Finisher Square End Fractional	84
	66M	Multi-Flute Finisher Square End Metric	87
	66CR	Multi-Flute Finisher Corner Radius Fractional	84
	66MCR	Multi-Flute Finisher Corner Radius Metric	88
Turbo-Carb	56B	2 Flute Contouring Long Reach Ball End Fractional	104
	56MB	2 Flute Contouring Long Reach Ball End Metric	106
Power-Carb	57	6 Flute Finisher Square End Fractional	108
	57M	6 Flute Finisher Square End Metric	110
Series 33	33CR	3 Flute Difficult to Machine Materials Corner Radius Fractional	92
	33MCR	3 Flute Difficult to Machine Materials Corner Radius Metric	95
CFRP Slow Helix	27	4 Flute Slow Helix Square End Fractional	112
	27M	4 Flute Slow Helix Square End Metric	114

Speed & Feed Recommendations listed after each series

FRESAS DE ALTO RENDIMIENTO	SERIE	DESCRIPCIÓN	PÁGINA
Z-Carb-HPR	Z5	5 filos, desbastador, punta cuadrada, fraccional	26
	Z5CR	5 filos, desbastador, radio angulado, fraccional	27
	Z5MCR	5 filos, desbastador, radio angulado, métrico	31
Z-Carb-AP	Z1PCR	4 filos, inclinación variable, radio angulado, fraccional	34
	Z1MPCR	4 filos, inclinación variable, radio angulado, métrico	40
	Z1PLC	4 filos, inclinación variable, largo alcance, radio angulado, fraccional	36
	Z1MPIC	4 filos, inclinación variable, medio alcance, radio angulado, métrico	41
	Z1MPLC	4 filos, inclinación variable, largo alcance, radio angulado, métrico	42
	Z1PLB	4 filos, inclinación variable, punta esférica, largo alcance, fraccional	37
Z-Carb	Z1	4 filos, geometría variable, punta cuadrada, fraccional	45
	Z1M	4 filos, geometría variable, punta cuadrada, métrico	50
	Z1B	4 filos, geometría variable, punta esférica, fraccional	47
	Z1MB	4 filos, geometría variable, punta esférica, métrico	51
	Z16CR	4 filos, geometría variable, radio angulado, fraccional	46
Z-Carb-HTA	ZH1CR	4 filos, geometría variable, aleaciones a altas temperaturas, radio angulado, fraccional	54
	ZH1MCR	4 filos, geometría variable, aleaciones a altas temperaturas, radio angulado, métrico	56
	ZH1MCRS	4 filos, geometría variable, aleaciones a altas temperaturas, versión corta, radio angulado, métrico	56
Z-Carb-MD	ZD1CR	4 filos, geometría variable, materiales duros, largo alcance, radio angulado, fraccional	58
	ZD1MCR	4 filos, geometría variable, materiales duros, largo alcance, radio angulado, métrico	59
Serie 7	7	4 filos, geometría variable, longitud larga, punta cuadrada, fraccional	98
	7M	4 filos, geometría variable, longitud larga, punta cuadrada, métrico	101
	7B	4 filos, geometría variable, longitud larga, punta esférica, fraccional	99
	7MB	4 filos, geometría variable, longitud larga, punta esférica, métrico	102
V-Carb	55	5 filos, acabador y semiacabador, punta cuadrada, fraccional	61
	55CR	5 filos, acabador y semiacabador, radio angulado, fraccional	62
	55M	5 filos, acabador y semiacabador, punta cuadrada, métrico	66
	55MCR	5 filos, acabador y semiacabador, radio angulado, métrico	67
	55MB	5 filos, acabador y semiacabador, punta esférica, métrico	69
T-Carb®	51	6 filos, mecanizado de alta velocidad, punta cuadrada, fraccional	73
	51M	6 filos, mecanizado de alta velocidad, punta cuadrada, métrico	78
	51L	6 filos, mecanizado de alta velocidad, punta cuadrada, largo alcance, fraccional	74
	51ML	6 filos, mecanizado de alta velocidad, punta cuadrada, largo alcance, métrico	80
	51CR	6 filos mecanizado de alta velocidad, radio angulado, fraccional	73
	51MCR	6 filos mecanizado de alta velocidad, radio angulado, métrico	79
	51LC	6 filos mecanizado de alta velocidad, largo alcance, radio angulado, fraccional	75
	51MLC	6 filos mecanizado de alta velocidad, largo alcance, radio angulado, métrico	81
Multi-Carb	66	Filo múltiple, acabador, punta cuadrada, fraccional	84
	66M	Filo múltiple, acabador, punta cuadrada, métrico	87
	66CR	Filo múltiple, acabador, radio angulado, fraccional	84
	66MCR	Filo múltiple, acabador, radio angulado, métrico	88
Turbo-Carb	56B	2 filos, contorneado, largo alcance, punta esférica, fraccional	104
	56MB	2 filos, contorneado, largo alcance, punta esférica, métrico	106
Power-Carb	57	6 filos, acabador, punta cuadrada, fraccional	108
	57M	6 filos, acabador, punta cuadrada, métrico	110
Serie 33	33CR	3 filos, materiales difíciles de mecanizar, radio angulado, fraccional	92
	33MCR	3 filos, materiales difíciles de mecanizar, radio angulado, métrico	95
Helicoidal de avance lento CFRP	27	4 filos, helicoidal de avance lento, punta cuadrada, fraccional	112
	27M	4 filos, helicoidal de avance lento, punta cuadrada, métrico	114

Recomendaciones de velocidades y avances mostradas tras cada serie

Fraisage

FRAISES A DETOURER UNIVERSELLES	SÉRIES	DESCRIPTION	PAGE
Z-Carb-HPR	Z5	5 dents à bout plat d'ébauche (fractionnel)	26
	Z5CR	5 dents rayon en coin d'ébauche (fractionnel)	27
	Z5MCR	5 dents rayon en coin d'ébauche (métrique)	31
Z-Carb-AP	Z1PCR	4 dents à vague de coupe variable rayon en coin (fractionnel)	34
	Z1MPCR	4 dents à vague de coupe variable rayon en coin (métrique)	40
	Z1PLC	4 dents à vague de coupe variable longue portée rayon en coin (fractionnel)	36
	Z1MPIC	4 dents à vague de coupe variable portée intermédiaire rayon en coin (métrique)	41
	Z1MPLC	4 dents à vague de coupe variable longue portée rayon en coin (métrique)	42
	Z1PLB	4 dents à vague de coupe variable longue portée à bout hémisphérique (fractionnel)	37
Z-Carb	Z1	4 dents géométrie variable à bout plat (fractionnel)	45
	Z1M	4 dents géométrie variable à bout plat (métrique)	50
	Z1B	4 dents géométrie variable à bout hémisphérique (fractionnel)	47
	Z1MB	4 dents géométrie variable à bout hémisphérique (métrique)	51
	Z16CR	4 dents géométrie variable rayon en coin (fractionnel)	46
Z-Carb-HTA	ZH1CR	4 dents géométrie variable alliages haute température rayon en coin (fractionnel)	54
	ZH1MCR	4 dents géométrie variable alliages haute température rayon en coin (métrique)	56
	ZH1MCRS	4 dents géométrie variable, alliages haute température, longueur de l'outil court, rayon en coin (métrique)	56
Z-Carb-MD	ZD1CR	4 dents géométrie variable matériaux durs longue portée rayon en coin (fractionnel)	58
	ZD1MCR	4 dents géométrie variable matériaux durs longue portée rayon en coin (métrique)	59
Série 7	7	4 dents géométrie variable à queue longue à bout plat (fractionnel)	98
	7M	4 dents géométrie variable à queue longue à bout plat (métrique)	101
	7B	4 dents géométrie variable à queue longue à bout hémisphérique (fractionnel)	99
	7MB	4 dents géométrie variable à queue longue à bout hémisphérique (métrique)	102
V-Carb	55	5 dents en bout de finition et semi-finition plat (fractionnel)	61
	55CR	5 dents en bout finition et semi-finition rayon en coin (fractionnel)	62
	55M	5 dents en bout de finition et semi-finition plat (métrique)	66
	55MCR	5 dents en bout finition et semi-finition rayon en coin (métrique)	67
	55MB	5 dents en bout de finition et semi-finition hémisphérique (métrique)	69
T-Carb®	51	6 dents pour usinage grande vitesse à bout plat (fractionnel)	73
	51M	6 dents pour usinage grande vitesse à bout plat (métrique)	78
	51L	6 dents pour usinage grande vitesse à bout plat longue portée (fractionnel)	74
	51ML	6 dents pour usinage grande vitesse à bout plat longue portée (métrique)	80
	51CR	6 dents pour usinage grande vitesse rayon en coin (fractionnel)	73
	51MCR	6 dents pour usinage grande vitesse rayon en coin (métrique)	79
	51LC	6 dents pour usinage grande vitesse longue portée rayon en coin (fractionnel)	75
	51MLC	6 dents pour usinage grande vitesse longue portée rayon en coin (métrique)	81
Multi-Carb	66	Multi-dents en bout de finition plat (fractionnel)	84
	66M	Multi-dents en bout de finition plat (métrique)	87
	66CR	Multi-dents en bout de finition rayon en coin (fractionnel)	84
	66MCR	Multi-dents en bout de finition rayon en coin (métrique)	88
Turbo-Carb	56B	2 dents contournage longue portée à bout hémisphérique (fractionnel)	104
	56MB	2 dents contournage longue portée à bout hémisphérique (métrique)	106
Power-Carb	57	6 dents en bout de finition plat (fractionnel)	108
	57M	6 dents en bout de finition plat (métrique)	110
Série 33	33CR	3 dents usinage des matériaux difficiles rayon en coin (fractionnel)	92
	33MCR	3 dents usinage des matériaux difficiles rayon en coin (métrique)	95
CFRP hélice lente	27	4 dents hélice lente à bout plat (fractionnel)	112
	27M	4 dents hélice lente à bout plat (métrique)	114

Recommandativons de vitesse et avance indiquées après chaque série

HOCHLEISTUNGS-SCHAFTFRÄSER	SERIE	BESCHREIBUNG	SEITE
Z-Carb-HPR	Z5	Zölliger Schruppfräser mit 5 Schneidekanten ohne Eckenradien	26
	Z5CR	Zölliger Schruppfräser mit 5 Schneidekanten und Eckenradien	27
	Z5MCR	Metrischer Schruppfräser mit 5 Schneidekanten und Eckenradien	31
Z-Carb-AP	Z1PCR	Zölliger Fräser mit 4 variablen Schneidekanten und Eckenradien	34
	Z1MPCR	Metrischer Fräser mit 4 Schneidekanten und variablen Spanwinkel	40
	Z1PLC	Zölliger Tiefbohr-fräser mit 4 variablen Schneidekanten und Eckenradien	36
	Z1MPIC	Metrischer Fräser mittlerer Länge mit 4 variablen Schneidekanten und Eckenradien	41
	Z1MPLC	Metrischer Tiefbohr-fräser mit 4 variablen Schneidekanten und Eckenradien	42
	Z1PLB	Zölliger Radiusschaftfräser mit 4 Schneidekanten und variablem Spanwinkel	37
Z-Carb	Z1	Zölliger Schaftfräser mit 4 Schneidekanten ohne Eckenradien und variabler Form	45
	Z1M	Metrischer Schaftfräser mit 4 Schneidekanten ohne Eckenradien und variabler Form	50
	Z1B	Zölliger Radiusschaftfräser mit 4 Schneidekanten und variabler Form	47
	Z1MB	Metrischer Radiusschaftfräser mit 4 Schneidekanten und variabler Form	51
	Z16CR	Zölliger Fräser mit 4 variablen Schneidekanten und Eckenradien	46
Z-Carb-HTA	ZH1CR	Hochwarmfester zölliger Fräser mit 4 variablen Schneidekanten und Eckenradien	54
	ZH1MCR	Hochwarmfester metrischer Fräser mit 4 variablen Schneidekanten und Eckenradien	56
	ZH1MCRS	Hochwarmfester metrischer Fräser mit 4 variablen Schneidekanten und Eckenradien	56
Z-Carb-MD	ZD1CR	Zölliger Tiefbohr-fräser mit 4 variablen Schneidekanten, Eckenradien und Form aus Hartmetall	58
	ZD1MCR	Metrischer Tiefbohr-fräser mit 4 variablen Schneidekanten, Eckenradien und Form aus Hartmetall	59
Serie 7	7	Zölliger Langloch-Schaftfräser mit 4 Schneidekanten ohne Eckenradien und variabler Form	98
	7M	Metrischer Langloch-Schaftfräser mit 4 Schneidekanten ohne Eckenradien und variabler Form	101
	7B	Zölliger Langloch-Radiusschaftfräser mit 4 Schneidekanten und variabler Form	99
	7MB	Metrischer Langloch-Radiusschaftfräser mit 4 Schneidekanten und variabler Form	102
V-Carb	55	Zölliger Schlicht- und Halbschlichtfräser mit 5 Schneidekanten ohne Eckenradien und variabler Form	61
	55CR	Zölliger Schlicht- und Halbschlichtfräser mit 5 Schneidekanten ohne Eckenradien	62
	55M	Metrischer Schlicht- und Halbschlichtfräser mit 5 Schneidekanten ohne Eckenradien und variabler Form	66
	55MCR	Metrischer Schlicht- und Halbschlichtfräser mit 5 Schneidekanten und Eckenradien	67
	55MB	Metrischer Schlicht- und Halbschlicht-Radiusschaftfräser mit 5 Schneidekanten und variabler Form	69
T-Carb®	51	Zölliger Schaftfräser aus Schnellstahl mit 6 Schneidekanten ohne Eckenradien	73
	51M	Metrischer Schaftfräser aus Schnellstahl mit 6 Schneidekanten ohne Eckenradien	78
	51L	Zölliger Langloch-Schaftfräser aus Schnellstahl mit 6 Schneidekanten ohne Eckenradien	74
	51ML	Metrischer Langloch-Schaftfräser aus Schnellstahl mit 6 Schneidekanten ohne Eckenradien	80
	51CR	Zölliger Fräser aus Schnellstahl mit 6 Schneidekanten und Eckenradien	73
	51MCR	Metrischer Fräser aus Schnellstahl mit 6 Schneidekanten und Eckenradien aus Schnellstahl	79
	51LC	Zölliger Tiefbohr-fräser aus Schnellstahl mit 6 Schneidekanten und Eckenradien	75
	51MLC	Metrischer Tiefbohr-fräser aus Schnellstahl mit 6 Schneidekanten und Eckenradien	81
Multi-Carb	66	Zölliger mehrschneidiger Schlichtfräser ohne Eckenradien	84
	66M	Metrischer mehrschneidiger Schlichtfräser ohne Eckenradien	87
	66CR	Zölliger mehrschneidiger Schlichtfräser mit Eckenradien	84
	66MCR	Metrischer mehrschneidiger Schlichtfräser mit Eckenradien	88
Turbo-Carb	56B	Zölliger Langloch-Profil-Radiusschaftfräser mit 2 Schneidekanten	104
	56MB	Metrischer Langloch-Profil-Radiusschaftfräser mit 2 Schneidekanten	106
Power-Carb	57	Zölliger Schlichtfräser mit 6 Schneidekanten ohne Eckenradien	108
	57M	Metrischer Schlichtfräser mit 6 Schneidekanten ohne Eckenradien	110
Serie 33	33CR	Zölliger Fräser aus Schnellstahl mit 3 Schneidekanten und Eckenradien für schwerspanbare Werkstoffe	92
	33MCR	Metrischer Fräser aus Schnellstahl mit 3 Schneidekanten und Eckenradien für schwerspanbare Werkstoffe	95
CFRP Slow Helix	27	Zölliger Schaftfräser mit 4 steilen Schneidekanten ohne Eckenradien	112
	27M	Metrischer Schaftfräser mit 4 steilen Schneidekanten ohne Eckenradien	114

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

End Mill Matrix

Name	Series	Page No.	Material: Steel	Stainless Steels	Cast Iron	High Temp Alloys	Titanium Alloys	Non Ferrous	Plastics, Composites	Hardened Steels	No. Flutes	Helix °	Flute Index	Rake	Relief	Center Cutting
Z-Carb HPR	Z5	26	★	★	★	★	★			☆	5	37	≠	+	E	N
Z-Carb	Z1 / Z16 / Z1B	45	★	★	★	☆	★			☆	4	35 / 38	≠	+	E	Y
Z-Carb-AP	Z1P	34	★	★	★	☆	★			☆	4	35 / 38	≠	+	E	Y
Z-Carb-HTA	ZH1	54	☆	☆	☆	★	☆			☆	4	38 / 41	≠	+	E	Y
Z-Carb-MD	ZD1	58	★							★	4	42 / 45	≠	–	E	Y
Series 33	33	92	★	★	★	☆	★			☆	3	32 / 48	≠	+	E	Y
T-Carb®	51	73	★	★	☆	★	★			☆	6	41	≠	+	E	Y
Series 7	7	98	★	★	★	★	★			☆	4	38	≠	+	P-S	Y
V-Carb	55	61	★	★	★	★	★			☆	5	45	≠	+	P-S	Y
Multi-Carb	66	84	★	★	☆	☆	★			☆	7, 9, 11	35	=	+	E	N
Turbo-Carb	56B	104	★							★	2	30	=	+	E	Y
Power-Carb	57	108								★	6	45	=	–	E	Y
Ski-Carb	44, 45	160						★	☆		2	45	=	+	P-S	Y
S-Carb® 3 Flute	43	130						★	☆		3	38	=	+	E	Y
S-Carb® Chipbreaker	43CB	140						★	☆		3	38	=	+	E	Y
S-Carb® 2 Flute	47	153						★	☆		2	35	=	+	E	Y
S-Carb APR®	43APR	122						★			3	38	=	+	E	Y
S-Carb APF®	43APF	124						★			4	38 / 41	≠	+	E	Y
Slow Helix	27	112							★		4	10 / 12	≠	+	P-S	Y
CCR *	20-CCR	342							★		8, 10, 12	15	=	+	C	EM or DR
CCR *	31-CCR	348							★		5, 7, 10	15	=	+	C	EM or DR
PCR *	29-PCR	338							★		8, 9, 12	15	=	0	E	EM or DR
Compression Router	25	352							★		4, 6, 8	30	=	+	P-S	Y
Up Cut Router	21	356						☆	★		2	35	=	+	P-S	Y
Down Cut Router	22	357						☆	★		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

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

Center Cutting Key
Y = Yes
N = No
EM = End Mill End
DR = Drill End

End Mill Matrix

		Finishing					HSM				Profiling						Slotting						Ramping			Plunging	
	Ae %	2	2	5	5	5	5	5	10	10	25	50	25	50	25	50	100	100	100	100	100	100				Ap	Ap
Coating	Ap %	100	200	100	200	300	100	200	100	200	100	100	150	150	200	200	25	50	75	100	150	200	1°	3°	6°	50%	100%
TM / TA		☆	☆	☆	☆		★	★	★	★	★	★	★	★	★	☆	★	★	★	★	★	☆	★	★	★		
TA / TX		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	★	☆	★	★	★	★	☆		★	★	☆		
TX		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	★	☆	★	★	★	★	★	☆	★	★	★	☆	
TA		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	★	☆	★	★	★	★	☆		★	★	☆		
TX		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	★	☆	★	★	★	★			★	★	☆		
TA		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	★	☆	★	★	★	★	★	★	★	★	★	★	☆
TX		☆	☆	☆	☆		★	★	★	★	☆		☆										★	☆			
TX		★	★	★	★	★																	★				
TA		★	★	★	★		☆	☆			☆		☆				☆	☆					★	☆			
TX		★	★	★	★																		★				
TX		★	★	★	★		★	★	☆		☆	☆					☆						★	☆			
TX		★	★	★	★		★	★	★		★	☆	☆				★	☆					★				
TB		★	★	★	★		★	★	★	☆	★	★	★	★	☆		★	★	★	★	☆	☆	★	★	★	★	☆
TB		★	★	★	★		★	★	★	☆	★	★	★	★	☆		★	★	★	★	☆	☆	★	★	★	★	★
TB							★	★	★	★	★	★	★	★	☆	☆	★	★	★	★	★	☆	★	★	★	★	★
TB		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	☆		★	★	★	★	☆	☆	★	★	★	★	★
TB							★	★	★	★	★	★	★	★	☆	☆	★	★	★	★	★	☆	★	★	★	★	★
TB		★	★	★	★	★	★	★	★	☆													★	★	☆		
Di-Namite® (opt.)		☆	☆	☆	☆	☆					★	★	★	★	★	☆	★	★	★	★	☆	☆	★	★	☆	☆	
Di-Namite® (opt.)		☆	☆	☆	☆	☆					★	★	★	★	★	☆	★	★	★	★	☆	☆	★	★	☆		
Di-Namite® (opt.)		☆	☆	☆	☆	☆					★	★	★	★	★	★	★	★	★	★	★	★	★	★	☆		
Di-Namite® (opt.)		☆	☆	☆	☆	☆					★	★	★	★	★	☆	★	★	★	★	☆	☆	★	★	★	★	★
Di-Namite® (opt.)		★	★	★	★	★					☆	☆	☆	☆	☆	☆							★				
various (opt.)		☆	☆	☆	☆	☆					★	★	★	★	★	★	★	★	★	★	★	☆	★	★	★	★	★
various (opt.)		☆	☆	☆	☆	☆					★	★	★	★	★	★	★	★	★	★	★	☆	★	★	★	★	★

Ramping Basics
Use 100% of slotting feed rates for 1° ramp
Use 50% of slotting feed rates for 3° ramp
Use 25% of slotting feed rates for 6° ramp

Plunging Basics
Use 50% of slotting feed rates in Non-Ferrous materials
Use 20% of slotting feed rates for all other plungable materials

Notes
Reduce speed, feed, and cut depths as material hardness increases—see KYOCERA SGS Tool Wizard® for recommendations
Long flute or long reach tools also require reduced rates and cut depths
Machine, tool holding, work holding, and coolant also affect rates and cut depths

***For Ramping and Plunging:**
Non-end cut version not intended for ramping or plunging
End cut version intended for ramping only
Drill end intended for plunging only

Application Tips

Tool

- 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

- 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

- Secure clamping of the workpiece will reduce chatter and deflection

Machine

- 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

- Avoid re-milling chips through use of air blast or liquid coolant as necessary
- Maintain clean coolant with appropriate concentration
- General recommendations:
  —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

- 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 (Ae) and Axial Depth (Ap)

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

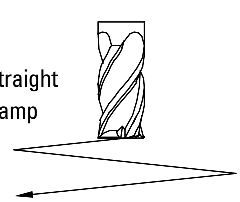
ENTRY METHODS

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.

Puntas para aplicaciones

Herramientas

- Siempre que sea posible, seleccione el cortador con el mayor diámetro, largo de filo y largo total mas corto posible para obtener una mejor 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

- Los Portaherramientas deberán tener buena presión de agarre para la sujeción de la herramienta y una concentricidad máxima indicada (TIR)
- Se recomienda usar portaherramientas de agarre directo cortos, o de boquilla con longitud cero para lograr un máximo arranque de viruta
- Cuando se utilicen portaherramientas de agarre directo, no se recomienda hacer manualmente el plano para la sujeción del tornillo en el zanco de la herramienta

Pieza a maquinar

- La buena sujeción de la pieza a maquinar reducirá la vibración y la desviación de la herramienta

Máquina

- El usillo de la maquina debe estar en condiciones optimas, para asegurar la concentricidad 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

Refrigerante

- Evite el re-maquinado de virutas usando aire a presión o líquido refrigerante según sea necesario
- Mantener limpio el refrigerante con su concentración adecuada
- Recomendaciones generales:
  –Para el maquinado de Aceros Grado 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 de Alta Temperatura, Titanio y Aleaciones No Ferrosas, utilice solamente Aceite Soluble en Agua

Métodos

- Se recomienda el maquinado en sentido ascendente o trepado
- El cuidado en los detalles de la programación, la concentricidad 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 (→|Ae|←), y profundidad axial (Ap)

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

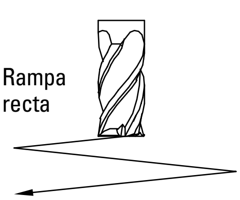
MÉTODOS DE ENTRADA

Barreno previo

Preferentemente usar un barreno previo como método de entrada para la mayor parte de las aplicaciones.

Rampa helicoidal

Rampa recta



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.

Agujero o Barrenado

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.

Conseils relatifs à l'application

Outil

- 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

- 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

- Le système de fixation et de bridage de la pièce devra permettre de réduire les vibrations et la déformation

Machine

- 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

- 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 –
  –Huile soluble ou Air comprimé: aciers à outils, aciers pour moules, aciersau carbone ou alliés
  –Huile soluble: aciers inoxydables, titane, alliages à haute température, alliages non ferreux

Méthodes

- 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 (Ae), et axial (Ap)

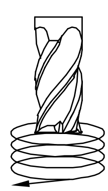
La réduction de la vitesse et de l'avance doit être nécessaire quand:
- Les engagements Ae et Ap sont importants
- Des dentures longues ou des séries longues sont utilisées
- Des attachement longs sont utilisés
- Lors d'usinage de matériaux durs

TYPES D'ENTREE MATIERE

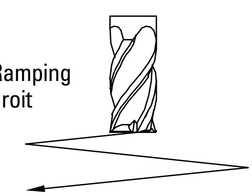
Preperçage

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

- Wählen Sie möglichst immer den Schaftfräser mit dem größten Durchmesser, der kürzesten Schneidekante und Gesamtlänge, um eine hohe Steifigkeit zu erhalten
- Langlochschaftfräser sind nicht zum Taschen-, Schlitz- oder Profilfräsen bestimmt – die Dehnung auf Ae 0,2 der Streckgrenze begrenzen
- Hochleistungswerkzeuge minimieren die Zykluszeit und verlängern die Werkzeugstandzeit

Werkzeughalter

- Es werden Spannzangen mit ausreichendem Kraftschluss und TIR benötigt
- Steilkegel oder bündige Spannfutter werden bei hohem Materialabtrag empfohlen
- Von der Verwendung fester handverschraubter Halterungen wird abgeraten

Werkstück

- Sicheres Werkzeugspannen verringert Vibrationen und das Auswandern aus der Ziellinie

Werkzeugmaschine

- Die Spindel muss für in optimalem Zustand sein, um genaue TIR 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

- Das Überfräsen der Späne durch Luftstrahl oder flüssige Kühlmittel möglichst verhindern
- Kühlmittel in geeigneter Konzentration vorhalten
- Allgemeine Empfehlungen:
  - Wasser-Öl-Emulsionen oder Luftstrahl: Werkzeugstähle, Form- und Schneidstähle, unlegierte oder legierte Stähle
  - Wasser-Öl-Emulsion: Nichtrostender Stahl, Titan, Warmfeste Legierungen, Nichteisenlegierungen

Verfahren

- Vorzugsweise Gleichlauffräsen anwenden
- Das Beachten der Fräsparameter, Werkzeughalter, TIR, 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 (→|Ae|←) und Frästiefe (Ap) ab

Drehzahl und Vorschub müssen ggfs. verringert werden wenn:

- die empfohlenen Werte für Ae und Ap überschritten werden
- lange Schneidekantenn oder Langschaftfräser verwendet werden
- lange Werkzeughalter verwendet werden
- die Werkstoffe härter als vorgesehen sind

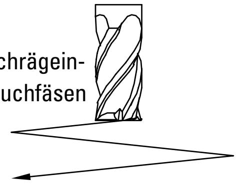
VORBEREITUNGEN

Vorbohrung

Vorbohren ist in den meisten Fällen ratsam.

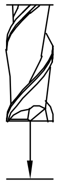
Zirkularein-
tauchfräsen

Schrägein-
tauchfäsen



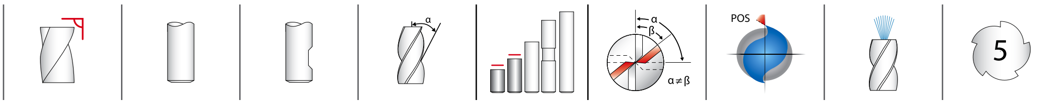
Alternative Verfahren sind Zirkulareintauchen und Schrägeintauchen. Starke Tauchwinkel erfordern verringerte Vorschubgeschwindigkeiten. Geringe Tauchwinkel ermöglichen höhere Vorschubgeschwindigkeiten und verlängern die Standzeit. Verwenden Sie die Drehzahlen und Vorschübe zum Schlitzfräsen für Tauchwinkel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

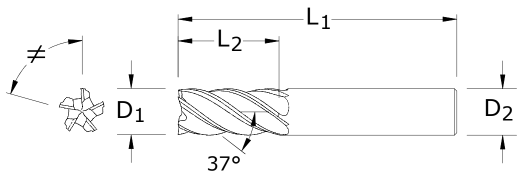
Stechen



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

Z-Carb-HPR





Z5

FRACTIONAL SERIES

- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter supression 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	–	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)

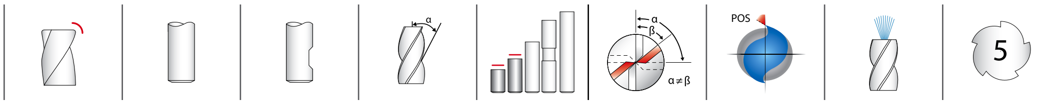
1/8–1/4 DIAMETER
D_1 = +0.0000/–0.0012
D_2 = h_6

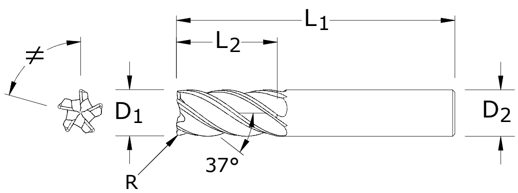
>1/4–3/8 DIAMETER
D_1 = +0.0000/–0.0016
D_2 = h_6

>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





Z5CR
FRACTIONAL SERIES

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

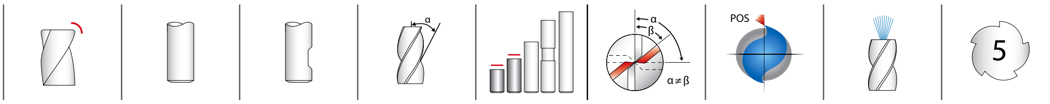
For patent information visit www.ksptpatents.com

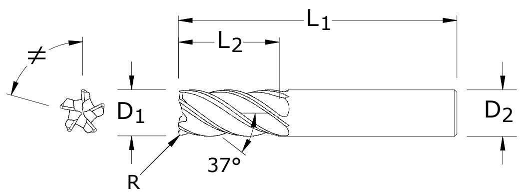
inch					EDP NO.					
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	CORNER RADIUS R	TI-NAMITE-A (TA)	TI-NAMITE-A (TA) W/FLAT	TI-NAMITE-A (TA) W/INTERNAL COOLANT	TI-NAMITE-M (TM)	TI-NAMITE-M (TM) W/FLAT	TI-NAMITE-M (TM) W/INTERNAL COOLANT
1/8	1/4	1-1/2	1/8	.015	–	–	–	37001	–	–
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	–	–	–	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

- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter supression 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





Z5CR

FRACTIONAL SERIES

CONTINUED

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
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)

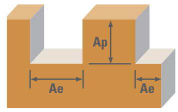
1/8–1/4 DIAMETER
D_1 = +0.0000/–0.0012
D_2 = h_6
R = +0.0000/–0.0020

>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.ksptpatents.com



	Series Z5, Z5CR 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	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
							Feed (ipm)	39.0	50.9	65.0	65.7	57.7	52.3	45.6
			Slot	1	≤ 1	440	RPM	13446	6723	4482	3362	2689	2241	1681
						(352-528)	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
							Feed (ipm)	16.4	21.7	27.3	27.7	25.0	22.5	19.3
			Slot	1	≤ 1	250	RPM	7640	3820	2547	1910	1528	1273	955
						(200-300)	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
							Feed (ipm)	7.9	9.9	13.2	12.7	11.3	10.4	9.2
			Slot	1	≤ 1	145	RPM	4431	2216	1477	1108	886	739	554
						(116-174)	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
							Feed (ipm)	28.6	37.4	47.6	47.6	42.2	38.5	33.1
			Slot	1	≤ 1	355	RPM	10849	5424	3616	2712	2170	1808	1356
						(284-426)	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
	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
							Feed (ipm)	16.1	21.8	27.7	27.3	23.9	21.6	18.8
			Slot	1	≤ 1	270	RPM	8251	4126	2750	2063	1650	1375	1031
						(216-324)	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
							Feed (ipm)	25.5	33.7	42.4	43.1	38.9	34.9	29.9
			Slot	1	≤ 1	390	RPM	11918	5959	3973	2980	2384	1986	1490
						(312-468)	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
	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
							Feed (ipm)	14.0	18.2	24.2	23.4	20.8	19.0	16.2
			Slot	1	≤ 1	270	RPM	8251	4126	2750	2063	1650	1375	1031
						(216-324)	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

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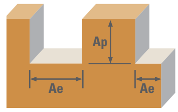
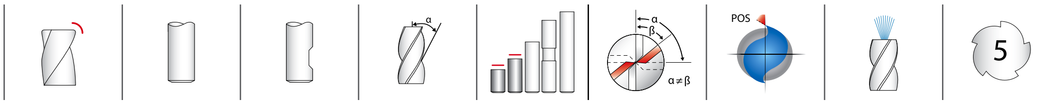
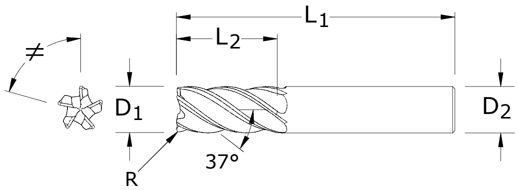
Z-Carb-HPR



	Series Z5, Z5CR 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 (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
	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
	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
	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)
rpm = Vc x 3.82 / D_1
ipm = Fz x 5 x 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)





Z5MCR
METRIC SERIES

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

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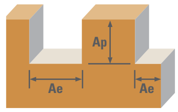
mm					EDP NO.					
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	CORNER RADIUS R	TI-NAMITE-A (TA)	TI-NAMITE-A (TA) W/FLAT	TI-NAMITE-A (TA) EDP NO. W/INTERNAL COOLANT	TI-NAMITE-M (TM) EDP NO.	TI-NAMITE-M (TM) EDP NO. W/FLAT	TI-NAMITE-M (TM) EDP NO. W/INTERNAL COOLANT
6,0	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	–	–	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

- An ideal balance of helix, indexing, flute depth, rake and relief
- Variable indexing for chatter supression 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
			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
			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
			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
			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
	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
			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
			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
	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
			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

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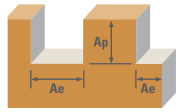
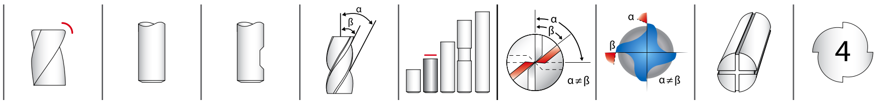
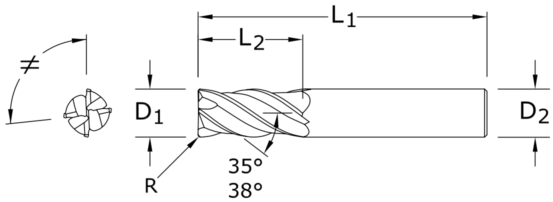


Series Z5MCR Metric		Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20	25
M	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Profile	≤ 0.5	≤ 1.5	94	RPM	5009	3756	3005	2504	1878	1503	1202
						(76-113)	Fz	0.017	0.030	0.037	0.043	0.051	0.059	0.063
							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, Waspaloy, 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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 5 x 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

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)

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	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	–

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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

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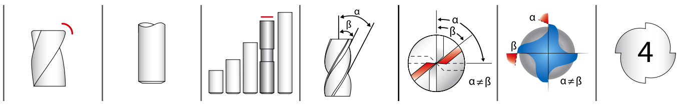
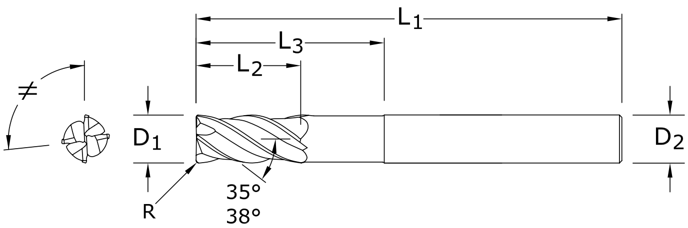
Z1PCR

FRACTIONAL SERIES

CONTINUED

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	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





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

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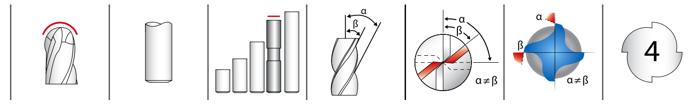
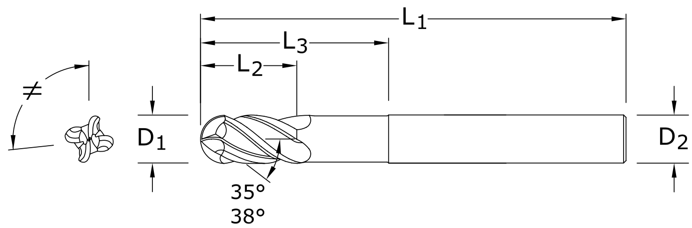




Z1PLB
FRACTIONAL SERIES

TOLERANCES (inch)

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

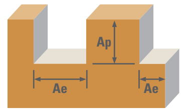
For patent information visit www.ksptpatents.com

inch					EDP NO.
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	REACH L_3	Ti-NAMITE-X
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

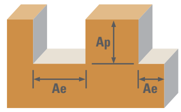
Z-Carb-AP



Diameter (D_1) (inch)

	Series Z1PCR, Z1PLC, Z1PLB Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		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
P	**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
K	**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

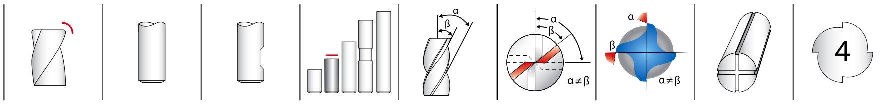
continued on next page

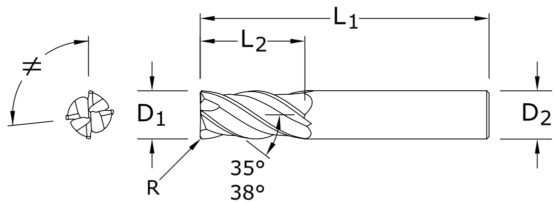


Diameter (D_1) (inch)

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





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)

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-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

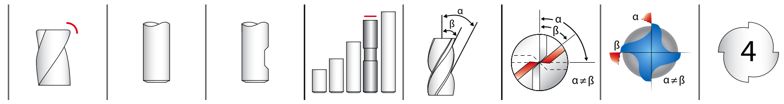
>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6
R = +0,000/–0,050

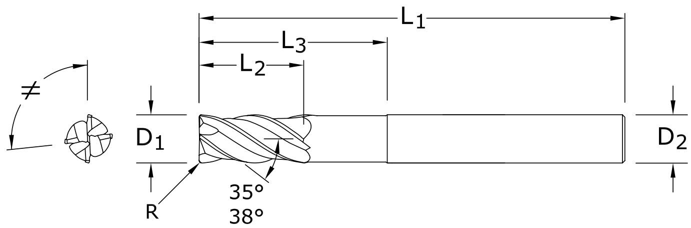
>10–25 DIAMETER
D_1 = +0,000/–0,050
D_2 = h_6
R = +0,000/–0,050

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

For patent information visit www.ksptpatents.com

Patented Variable Rake End Mills





Z1MPIC

METRIC SERIES

TOLERANCES (mm)

>12–20 DIAMETER

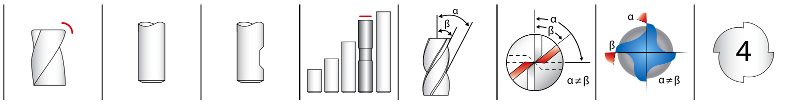
D_1 = +0,000/–0,050
D_2 = h_6
R = +0,000/–0,050

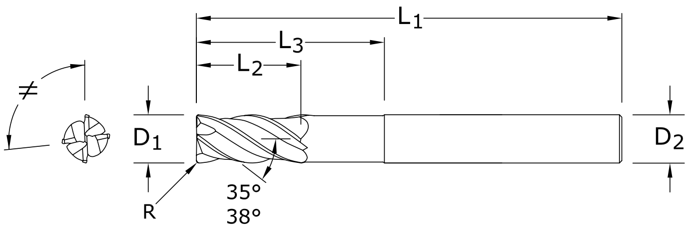
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM

For patent information visit www.ksptpatents.com

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 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)





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)

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	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)

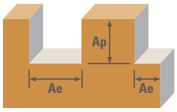
6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6
R = +0,000/–0,050

>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

STEELS
STAINLESS STEELS
CAST IRON
HIGH TEMP ALLOYS
TITANIUM

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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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

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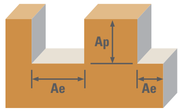
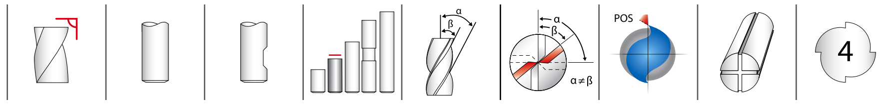
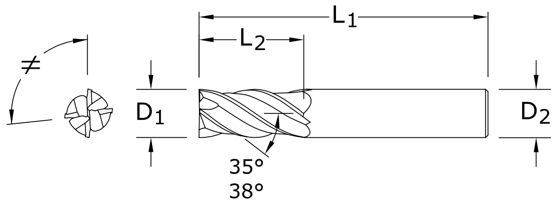
Z-Carb-AP



	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) / (D_1 x 3.14)
ipm = Fz x 4 x rpm
maximum Slotting Ap for Z1PCR <3mm diameter and all Z1MPLC / Z1MPLB is .25 x D_1
maximum Profile Ae for Z1PCR <3mm diameter and all Z1MPLC / Z1MPLB is .20 x D_1
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)





Z1

FRACTIONAL SERIES

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

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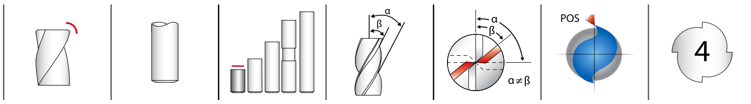
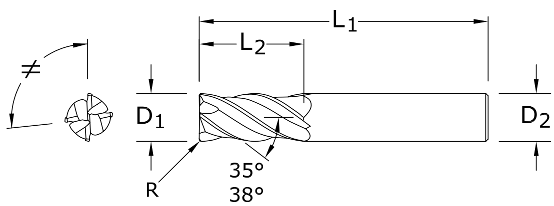
inch				EDP NO.		
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	Ti-NAMITE-A (AlTiN)	Ti-NAMITE-A (AlTiN) W/FLAT	JetStream
1/8	3/8	1-1/2	1/8	36404	–	–
5/32	7/16	2	3/16	36406	–	–
3/16	7/16	2	3/16	36408	–	–
7/32	7/16	2-1/2	1/4	36410	–	–
1/4	1/2	2-1/2	1/4	36416	–	–
1/4	3/4	2-1/2	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 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
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)





Z16CR

FRACTIONAL SERIES

- 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
- 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	TI-NAMITE-X
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

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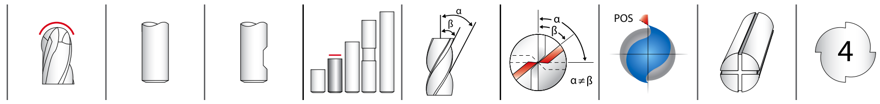
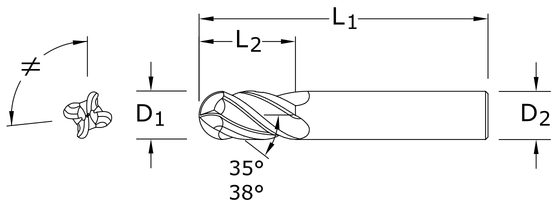




Z1B

FRACTIONAL SERIES

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

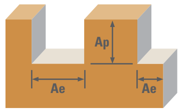
For patent information visit www.ksptpatents.com

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 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
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

FRACTIONAL

Z-Carb



Diameter (D_1) (inch)

	Series Z1, Z1B, Z16CR Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		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

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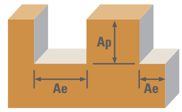
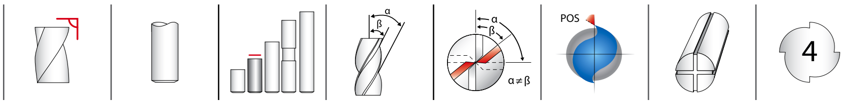
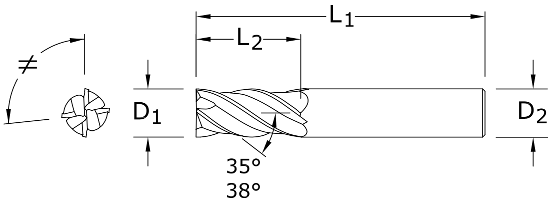


	Series Z1, Z1B, Z16CR Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/8	1/4	3/8	1/2	5/8	3/4	1
M	**STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L**	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	340	RPM	10390	5195	3463	2598	2078	1732	1299
						(272-408)	Fz	0.0002	0.0006	0.0011	0.0014	0.0018	0.0019	0.0020
							Feed (ipm)	8.3	12.5	15.2	14.5	15.0	13.2	10.4
			Slot	1	≤ 1	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
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	0.0002	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
S	**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
			Slot	1	≤ 1	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
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	0.0002	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
			Slot	1	≤ 1	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
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	0.0002	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
			Slot	1	≤ 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 x 3.82 / D_1
ipm = Fz x 4 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)





Z1M
METRIC SERIES

- 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
- 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-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)

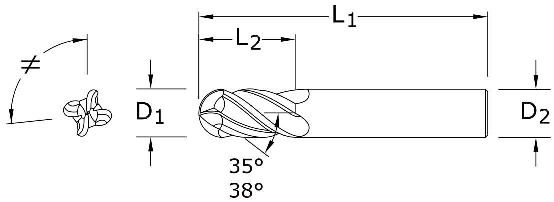
3–6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6

>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

STEELS
STAINLESS STEELS
CAST IRON
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS

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

>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

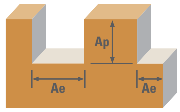
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

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 (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 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
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

Z-Carb



ISO	Series Z1M, Z1MB Metric	Hardness	Operation	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
P	**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	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
K	**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	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

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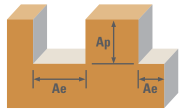
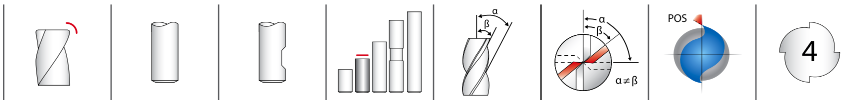
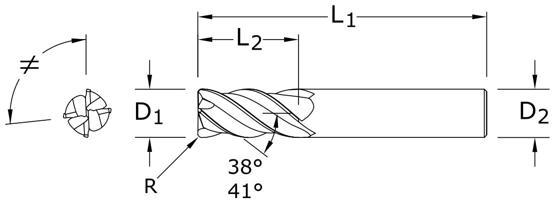


	Series Z1M, Z1MB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)	Diameter (D_1) (mm)	3	6	8	10	12	16	20	25
M	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	104	RPM	10987	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050
							Feed (mm/min)	211	316	387	387	369	380	334	264
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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) / (D_1 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

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 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)

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 (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

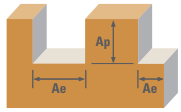
>3/8–1 DIAMETER

D_1 = +0.0000/–0.0020
D_2 = h_6
R = +0.0000/–0.0020

HIGH TEMP ALLOYS

TITANIUM

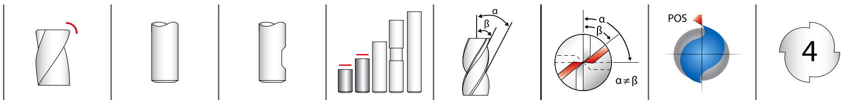
For patent information visit www.ksptpatents.com

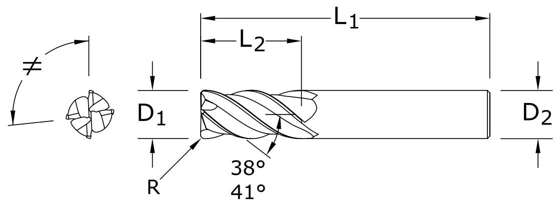


	Series ZH1CR Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/4	3/8	1/2	3/4	1
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400**	≤ 300 Bhn or ≤ 32 HRc	Profile	≤ 0.5	≤ 1.5	85	RPM	1299	866	649	433	325
						(68-102)	Fz	0.0007	0.0012	0.0017	0.0020	0.0023
							Feed (ipm)	3.6	4.2	4.4	3.5	3.0
			Slot	1	≤ 1	70	RPM	1070	713	535	357	267
						(56-84)	Fz	0.0007	0.0012	0.0017	0.0020	0.0023
							Feed (ipm)	3.0	3.4	3.6	2.9	2.5
	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
							Feed (ipm)	2.1	2.6	2.6	2.0	1.7
			Slot	1	≤ 1	55	RPM	840	560	420	280	210
						(44-66)	Fz	0.0005	0.0009	0.0012	0.0014	0.0016
							Feed (ipm)	1.7	2.0	2.0	1.6	1.3
	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
							Feed (ipm)	10.5	13.1	13.1	10.5	9.2
			Slot	1	≤ 1	170	RPM	2598	1732	1299	866	649
						(136-204)	Fz	0.0008	0.0015	0.0020	0.0024	0.0028
							Feed (ipm)	8.3	10.4	10.4	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	1146	764	573	382	287
						(60-90)	Fz	0.0008	0.0015	0.0020	0.0024	0.0028
							Feed (ipm)	3.7	4.6	4.6	3.7	3.2
			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 / D_1
ipm = Fz x 4 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 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)

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 (AlTiN)
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
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

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)

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 (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
D_1 = +0,000/–0,030
D_2 = h_6
R = +0,000/–0,050

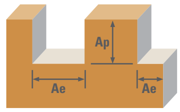
>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6
R = +0,000/–0,050

>10–20 DIAMETER
D_1 = +0,000/–0,050
D_2 = h_6
R = +0,000/–0,050

HIGH TEMP ALLOYS

TITANIUM

For patent information visit www.ksptpatents.com



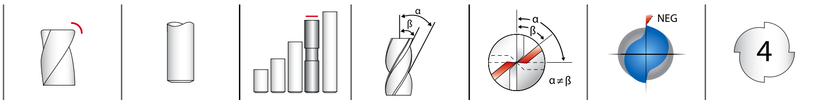
Series ZH1MCRS, ZH1MCR Metric

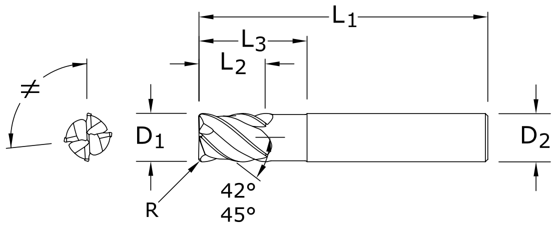
Diameter (D_1) (mm)

	Series ZH1MCRS, ZH1MCR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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
			Slot	1	≤ 1	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) / (D_1 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

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 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
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials 35-60HRc (327 to 654 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
1/8	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)

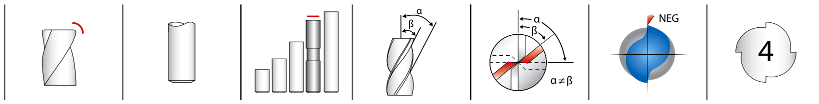
1/8–1/4 DIAMETER
D_1 = +0.0000/–0.0012
D_2 = h_6
R = +0.0000/–0.0020

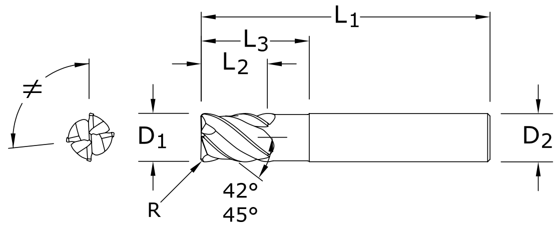
>1/4–3/8 DIAMETER
D_1 = +0.0000/–0.0016
D_2 = h_6
R = +0.0000/–0.0020

>3/8–3/4 DIAMETER
D_1 = +0.0000/–0.0020
D_2 = h_6
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
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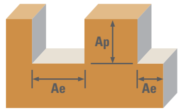
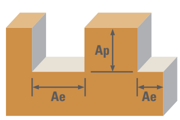
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials 35-60HRc (327 to 654 Bhn)

FRACTIONAL & METRIC
Z-Carb-MD



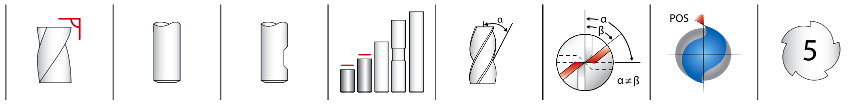
Series ZD1CR Fractional		Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/8	1/4	3/8	1/2	5/8	3/4
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.4	≤ 1	405	RPM	12377	6188	4126	3094	2475	2063
						(324-486)	Fz	0.0005	0.0012	0.0023	0.0030	0.0039	0.0042
							Feed (ipm)	24.8	29.7	38.0	37.1	38.6	34.7
			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
	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
			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
			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

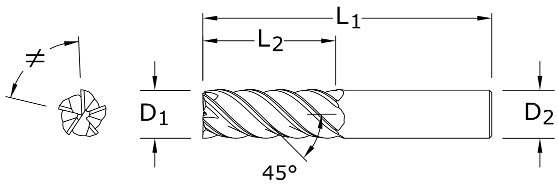
Bhn (Brinell)   HRc (Rockwell C)
rpm = Vc x 3.82 / D_1
ipm = Fz x 4 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)



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
H	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
			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
	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
			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
			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)
rpm = (Vc x 1000) / (D_1 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)





55
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

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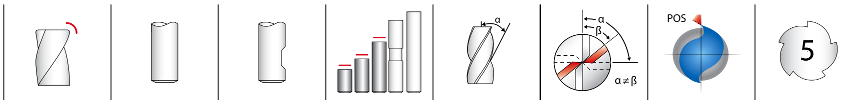
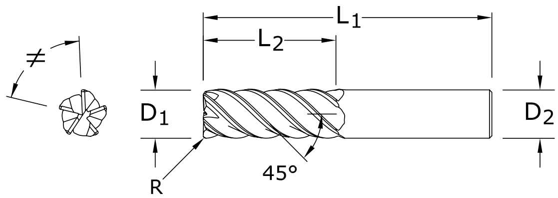
inch				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	Ti-NAMITE-A (AlTiN)	Ti-NAMITE-A (AlTiN) W/FLAT
1/8	1/4	1-1/2	1/8	32672	–
1/8	1/2	1-1/2	1/8	32655	–
5/32	9/16	2	3/16	32656	–
3/16	5/16	2	3/16	32673	–
3/16	5/8	2	3/16	32657	–
7/32	3/4	2-1/2	1/4	32658	–
1/4	3/8	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

- 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)

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 (AlTiN)	Ti-NAMITE-A (AlTiN) 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	–

continued on next page

TOLERANCES (inch)

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

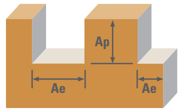
For patent information visit www.ksptpatents.com

55CR
FRACTIONAL SERIES

CONTINUED

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 (AlTiN)	Ti-NAMITE-A (AlTiN) W/FLAT
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	–

V-Carb



	Series 55, 55CR 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	≤ 0.25	≤ 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
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 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
	CAST IRONS (HIGH ALLOY) Gray, Malleable, Ductile	≤ 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

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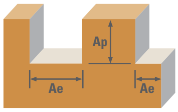
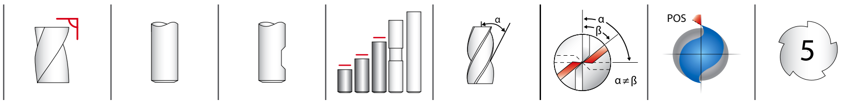
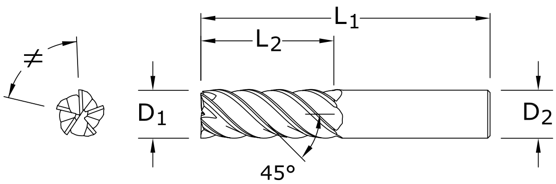


Group	Series 55, 55CR Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/8	1/4	3/8	1/2	5/8	3/4	1
M	**STAINLESS STEELS (DIFFICULT)** 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.25	≤ 1.5	255	RPM	7793	3896	2598	1948	1559	1299	974
						(204-306)	Fz	0.0002	0.0006	0.0012	0.0016	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
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	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	≤ 300 Bhn or ≤ 32 HRc	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
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	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
S	**TITANIUM ALLOYS** Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	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
S	**TITANIUM ALLOYS (DIFFICULT)** Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	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 x 3.82 / D_1
ipm = Fz x 5 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
reduce Ap to 1 x D_1 (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)

mm				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
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

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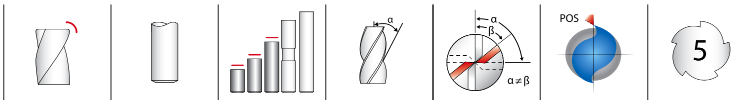
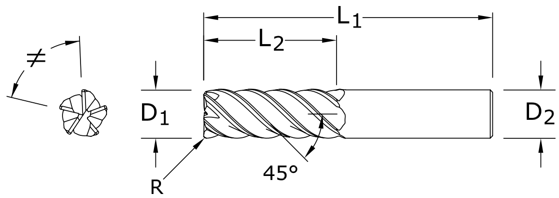
Five Flute End Mills





55MCR
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	CORNER RADIUS R	Ti-NAMITE-A (AlTiN)
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

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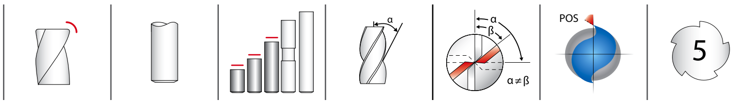
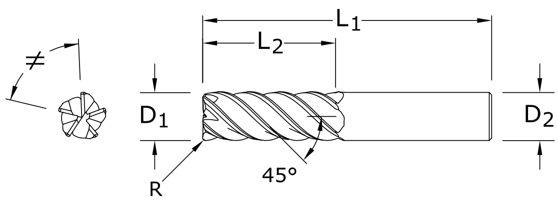
- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)





55MCR
METRIC SERIES

CONTINUED

CUTTING DIAMETER D_1 (mm)	LENGTH OF CUT L_2 (mm)	OVERALL LENGTH L_1 (mm)	SHANK DIAMETER D_2 (mm)	CORNER RADIUS R (mm)	EDP NO. Ti-NAMITE-A (AlTiN)
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

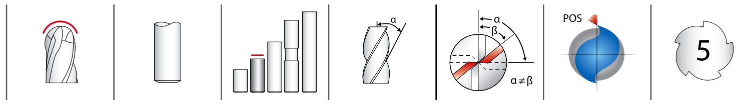
TOLERANCES (mm)

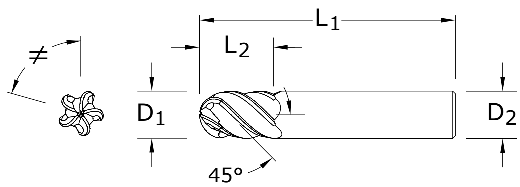
D_1 = +0,000/–0,050

D_2 = h_6

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

For patent information visit www.ksptpatents.com





55MB
METRIC SERIES

TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6

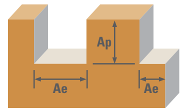
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

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	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)

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
P	**CARBON STEELS** 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	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	≤ 375 Bhn or ≤ 40 HRc	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	≤ 375 Bhn or ≤ 40 HRc	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	≤ 220 Bhn or ≤ 19 HRc	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	≤ 260 Bhn or ≤ 26 HRc	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

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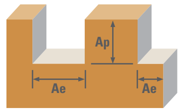

	Series 55M, 55MCR, 55MB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20
M	**STAINLESS STEELS (FREE MACHINING)** 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.25	≤ 1.5	113	RPM	5978	4484	3587	2989	2242	1793
						(90-135)	Fz	0.017	0.028	0.045	0.053	0.059	0.064
							Feed (mm/min)	502	622	813	789	660	574
			HSM	≤ 0.05	≤ 2	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
			HSM	≤ 0.05	≤ 2	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
	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
			HSM	≤ 0.05	≤ 2	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
			HSM	≤ 0.05	≤ 2	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
	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
			HSM	≤ 0.05	≤ 2	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

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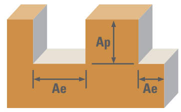
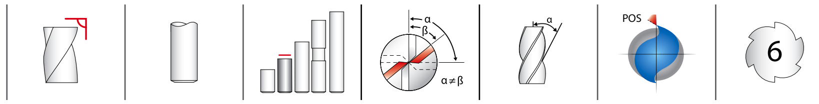
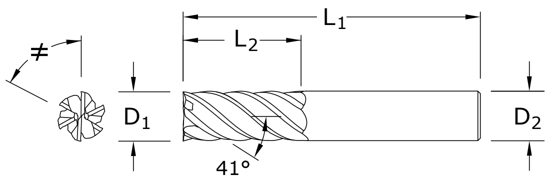
V-Carb



Series 55M, 55MCR, 55MB Metric	Hardness		$Ae \times D_1$	$Ap \times D_1$	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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 5 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
reduce Ap to 1 x D_1 (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)





51
FRACTIONAL SERIES

TOLERANCES (inch)

D_1 = +0.0000/–0.0020
D_2 = h6

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

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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)

51CR
FRACTIONAL SERIES

TOLERANCES (inch)

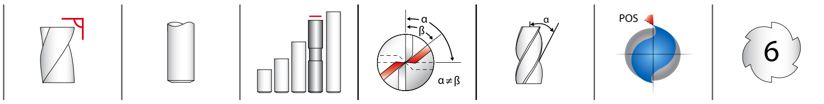
D_1 = +0.0000/–0.0020
D_2 = h6
R = +0.000/–0.0020

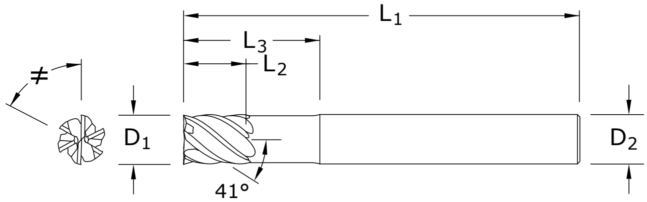
- STEELS
- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

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	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)

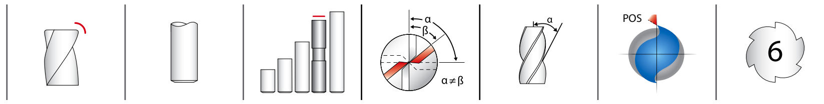
inch					EDP NO.
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	REACH L_3	TI-NAMITE-X (TX)
1/4	3/8	4	1/4	1-1/8	35106
3/8	1/2	4	3/8	2-1/8	35107
1/2	5/8	4	1/2	2-1/4	35108
5/8	3/4	5	5/8	2-1/2	35109
3/4	1	6	3/4	3-3/8	35110
1	1-1/4	6	1	3-3/8	35111

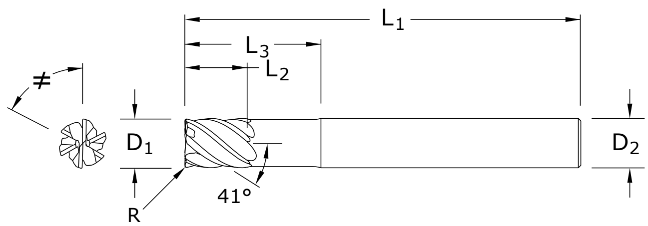
TOLERANCES (inch)

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 = +0.000/–0.0020

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

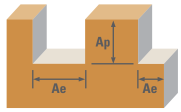
For patent information visit www.ksptpatents.com

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)

FRACTIONAL

T-Carb®



ISO	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	≤ 275 Bhn or ≤ 28 HRc	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	≤ 375 Bhn or ≤ 40 HRc	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	≤ 375 Bhn or ≤ 40 HRc	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	≤ 275 Bhn or ≤ 28 HRc	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	≤ 275 Bhn or ≤ 28 HRc	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	≤ 325 Bhn or ≤ 35 HRc	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

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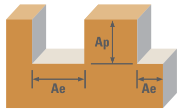
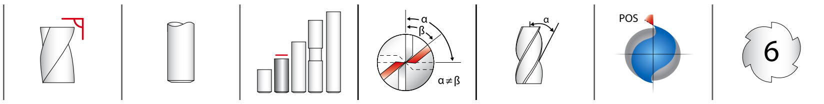
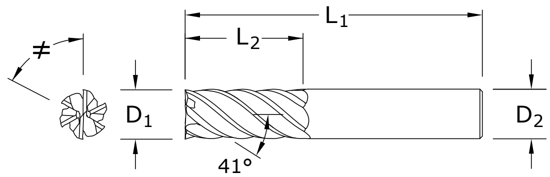


Diameter (D_1) (inch)

Series 51, 51CR, 51L, 51LC Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		1/4	3/8	1/2	5/8	3/4	1
S — **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 / D_1
ipm = Fz x 6 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 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)

D_1 = +0,000/–0,050
D_2 = h6

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

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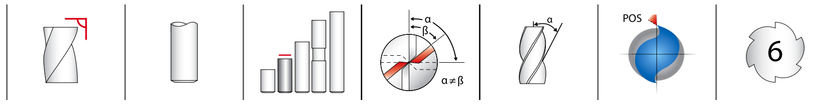
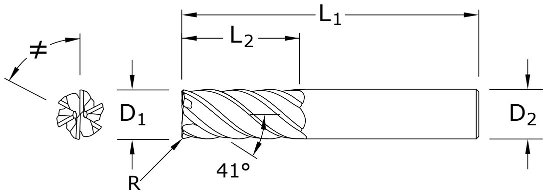




51MCR
METRIC SERIES

TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h6
R = +0,000/–0,050

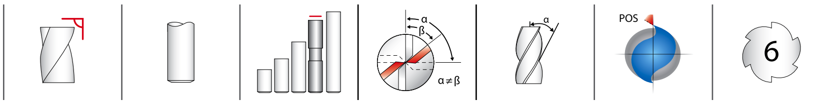
- STEELS
- STAINLESS STEELS
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS

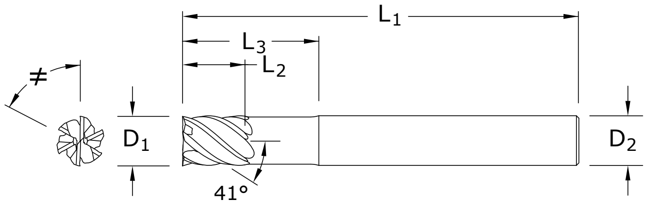
For patent information visit www.ksptpatents.com

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-X (TX)
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)

T-Carb®





51ML

METRIC SERIES

- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
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- 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	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)

D_1 = +0,000/–0,050

D_2 = h6

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

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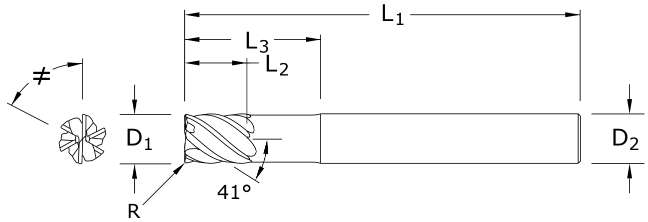

51MLC

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

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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
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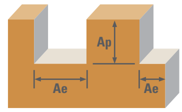
T-Carb®



	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
P	**CARBON STEELS** 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	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
P	**ALLOY STEELS** 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 375 Bhn or ≤ 40 HRc	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	≤ 375 Bhn or ≤ 40 HRc	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	≤ 275 Bhn or ≤ 28 HRc	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
M	**STAINLESS STEELS (DIFFICULT)** 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	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
M	**STAINLESS STEELS (PH)** 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	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

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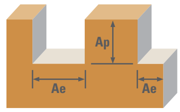
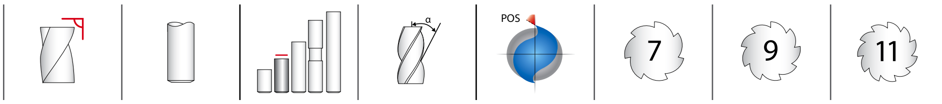


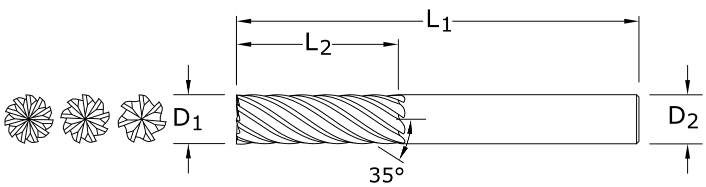
Series 51M, 51MCR, 51ML, 51MLC Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20
S												
SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc	Profile	≤ 0.1	≤ 1	32	RPM	1696	1272	1018	848	636	509
					(26-38)	Fz	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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 6 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Multi-Carb

MULTICarb
HIGH PERFORMANCE FINISHING END MILLS





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

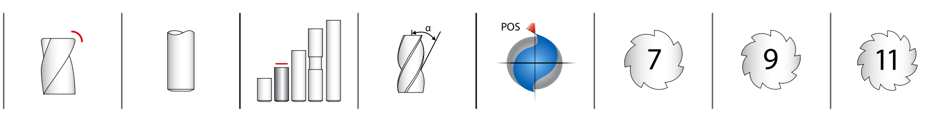
Neck Option Available

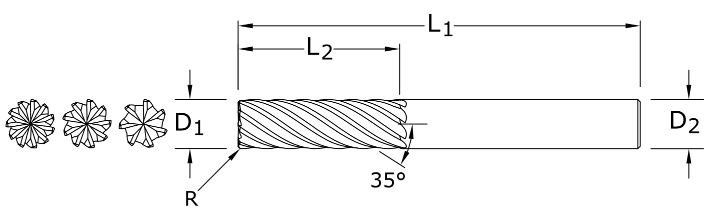
TOLERANCES (inch)

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





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

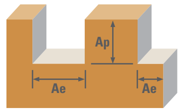
Neck Option Available

TOLERANCES (inch)

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



ISO	Series 66, 66CR Fractional	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	≤ 275 Bhn or ≤ 28 HRc	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	≤ 375 Bhn or ≤ 40 HRc	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	**TOOL STEELS** A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	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**	≤ 220 Bhn or ≤ 19 HRc	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	≤ 260 Bhn or ≤ 26 HRc	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	**STAINLESS STEELS (FREE MACHINING)** 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	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

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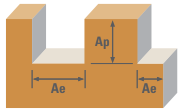
FRACTIONAL

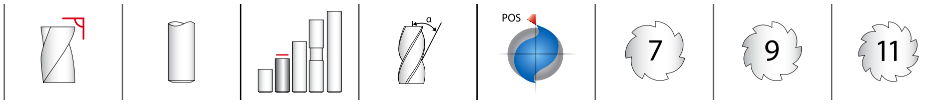
Multi-Carb

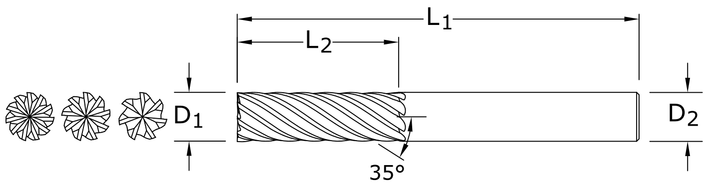


	Series 66, 66CR Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 3/16	1/4	3/8	1/2	5/8	3/4	1
M	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.05	≤ 1	385	RPM	7844	5883	3922	2941	2353	1961	1471
						(308-462)	Fz	0.0005	0.0007	0.0014	0.0018	0.0023	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
	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 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
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 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 / D_1
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)

MULTI Carb
HIGH PERFORMANCE FINISHING END MILLS





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

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)

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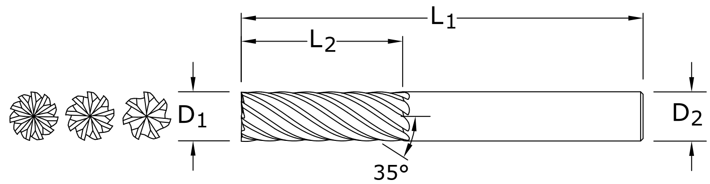
MULTI Carb
HIGH PERFORMANCE FINISHING END MILLS

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)

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-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)

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

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SGS®
Solid Carbide Tools

66MCR

METRIC SERIES

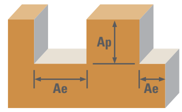
CONTINUED

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-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

Neck Option Available

METRIC

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
			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
	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
			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
H	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
			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
K	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
			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
	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
			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
			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

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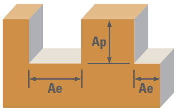
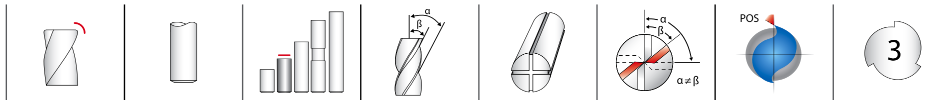
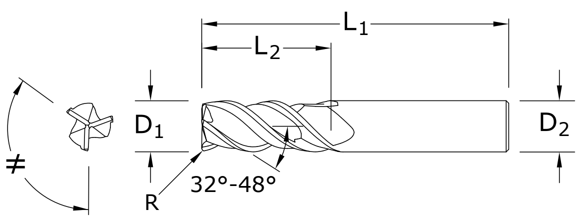


	Series 66M, 66MCR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20	25
M	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.05	≤ 1	117	RPM	6220	4665	3732	3110	2333	1866	1493
						(94-141)	Fz	0.017	0.030	0.037	0.043	0.059	0.064	0.065
							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 x 1000) / (D_1 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)

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)

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 (AlTiN)
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

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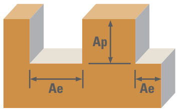

	Series 33CR Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)	Diameter (D_1) (inch)	1/8	1/4	3/8	1/2	5/8	3/4	1
P	**CARBON STEELS** 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	550	RPM	16808	8404	5603	4202	3362	2801	2101
						(440-660)	Fz	0.0005	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
P	**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
K	**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

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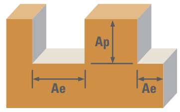
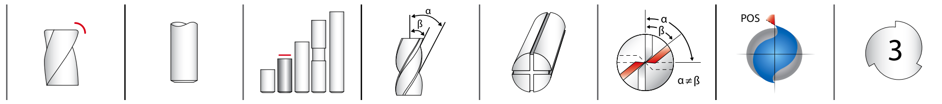
FRACTIONAL

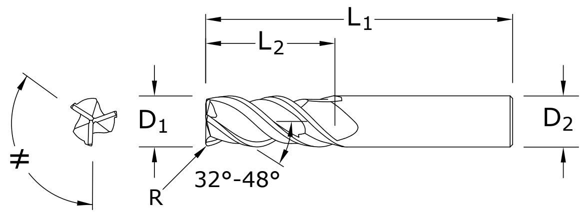
Series 33



	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 / D_1
ipm = Fz x 3 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)





33MCR
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

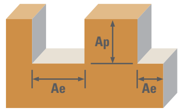
STEELS
STAINLESS STEELS
CAST IRON
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS

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 (AlTiN)
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 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
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

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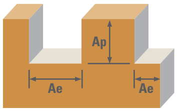
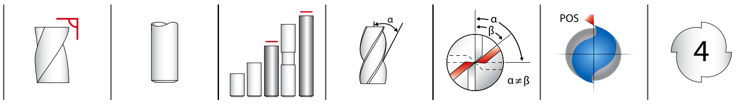
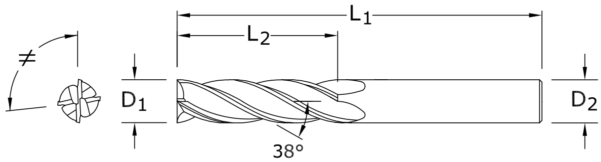


Group	Series 33MCR Metric	Hardness	Operation	Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	16	20
M	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	104	RPM	10987	5493	4120	3296	2747	2060	1648
						(83-124)	Fz	0.007	0.019	0.032	0.040	0.048	0.064	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
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	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	≤ 300 Bhn or ≤ 32 HRc	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
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	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
S	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
						(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
S	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
						(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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 3 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 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)

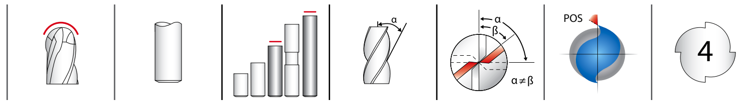
inch				EDP NO.
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	Ti-NAMITE-X
1/8	3/4	2-1/4	1/8	70470
1/8	1	3	1/8	70471
3/16	3/4	2-1/2	3/16	70472
3/16	1-1/8	3	3/16	70473
1/4	1-1/8	3	1/4	70474
1/4	1-1/2	4	1/4	70475
5/16	1-1/8	3	5/16	70476
5/16	1-5/8	4	5/16	70477
3/8	1-1/8	3	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

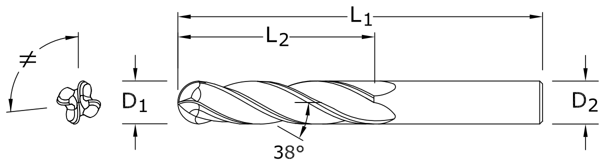
TOLERANCES (inch)

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





7B
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

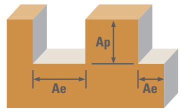
For patent information visit www.ksptpatents.com

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

- 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)

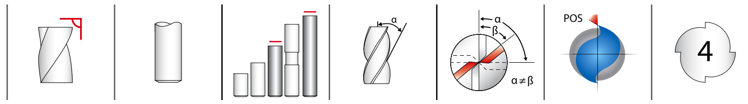
FRACTIONAL

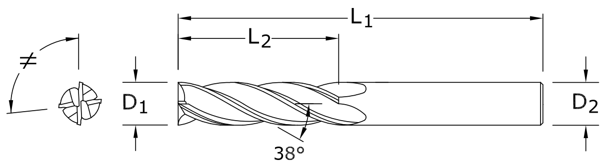
Series 7



	Series 7, 7B Fractional	Hardness		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 / D_1
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)





7M
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

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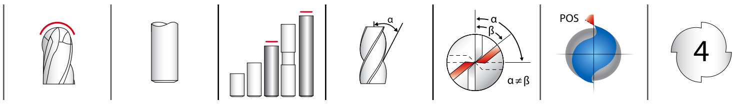
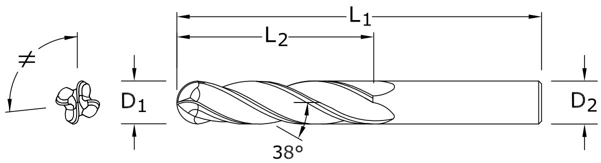
mm				EDP NO.
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	Ti-NAMITE-X
3,0	25,0	75,0	3,0	70551
4,0	25,0	75,0	4,0	70552
5,0	25,0	75,0	5,0	70553
6,0	25,0	75,0	6,0	70554
8,0	25,0	75,0	8,0	70555
10,0	38,0	100,0	10,0	70556
12,0	50,0	100,0	12,0	70557
12,0	75,0	150,0	12,0	70558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

- 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)

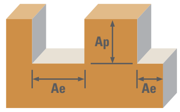
mm				EDP NO.
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	Ti-NAMITE-X
3,0	25,0	75,0	3,0	70527
4,0	25,0	75,0	4,0	70529
5,0	25,0	75,0	5,0	70531
6,0	25,0	75,0	6,0	70533
8,0	25,0	75,0	8,0	70535
10,0	38,0	100,0	10,0	70537
12,0	50,0	100,0	12,0	70539
12,0	75,0	150,0	12,0	70540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

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

For patent information visit www.ksptpatents.com

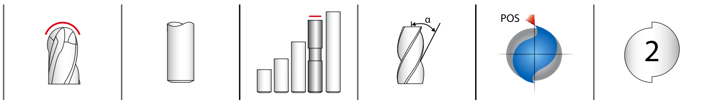


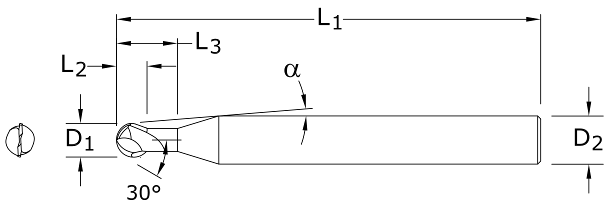
Diameter (D_1) (mm)

	Series 7M, 7MB Metric	Hardness		$Ae \times D_1$	$Ap \times D_1$	Vc (m/min)		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) / (D_1 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)

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)

inch						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
1/32	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
D_1 = +0.0000/–0.0010
D_2 = h_6

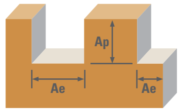
>3/32–1/4 DIAMETER
D_1 = +0.0000/–0.0012
D_2 = h_6

>1/4–3/8 DIAMETER
D_1 = +0.0000/–0.0016
D_2 = h_6

>3/8–3/4 DIAMETER
D_1 = +0.0000/–0.0020
D_2 = h_6

HARDENED STEELS

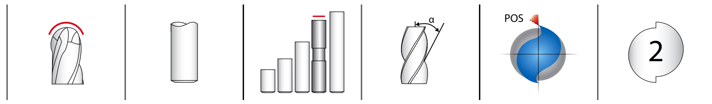
For patent information visit www.ksptpatents.com



	Series 56B Fractional	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
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	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

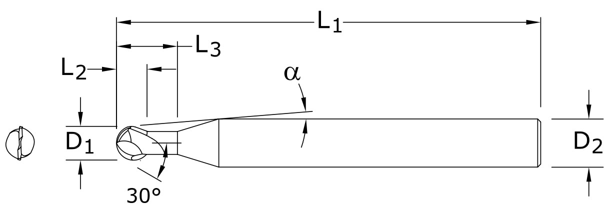
Bhn (Brinell) HRc (Rockwell C) HSM (High Speed Machining)
rpm = Vc x 3.82 / D_1
ipm = Fz x 2 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Turbo-Carb HIGH PERFORMANCE CARBIDE END MILLS



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
D_1 = +0,000/–0,025
D_2 = h_6

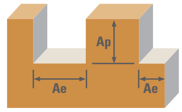
>2,5–6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6

>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6

>10–20 DIAMETER
D_1 = +0,000/–0,050
D_2 = h_6

HARDENED STEELS

For patent information visit www.ksptpatents.com

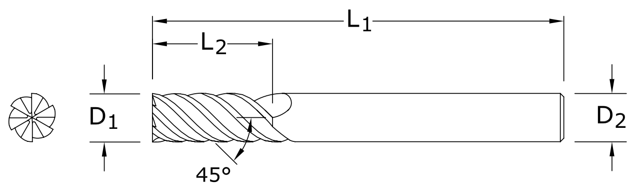


Diameter (D_1) (mm)

	Series 56MB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		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
	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	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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 2 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Power-Carb



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
D_1 = +0.0000/–0.0012
D_2 = h_6

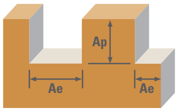
5/16 DIAMETER
D_1 = +0.0000/–0.0016
D_2 = h_6

3/8 DIAMETER
D_1 = +0.0000/–0.0016
D_2 = h_6

1/2 DIAMETER
D_1 = +0.0000/–0.0020
D_2 = h_6

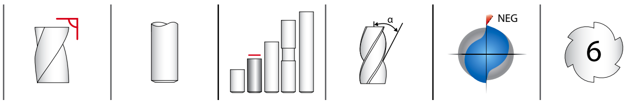
HARDENED STEELS

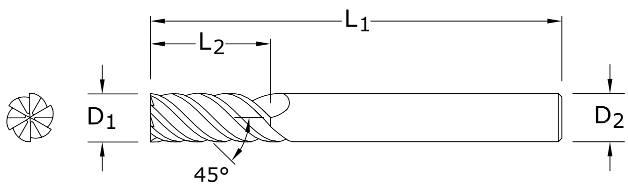
For patent information visit www.ksptpatents.com



	Series 57 Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/4	5/16	3/8	1/2
H	**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
							Fz	0.0013	0.0019	0.0025	0.0031
						(172-258)	Feed (ipm)	26	30	33	31
			Profile	≤ 0.1	≤ 1.5	265	RPM	4049	3239	2699	2025
							Fz	0.0018	0.0026	0.0035	0.0044
						(212-318)	Feed (ipm)	44	51	57	53
			HSM	≤ 0.04	≤ 1.5	560	RPM	8557	6845	5705	4278
							Fz	0.0022	0.0033	0.0044	0.0055
						(448-672)	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
							Fz	0.0010	0.0015	0.0020	0.0025
						(96-144)	Feed (ipm)	11	13	15	14
			Profile	≤ 0.1	≤ 1.5	150	RPM	2292	1834	1528	1146
							Fz	0.0014	0.0021	0.0028	0.0035
						(120-180)	Feed (ipm)	19	23	26	24
			HSM	≤ 0.04	≤ 1.5	490	RPM	7487	5990	4991	3744
							Fz	0.0018	0.0026	0.0035	0.0044
						(392-588)	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
							Fz	0.0008	0.0011	0.0015	0.0019
						(52-78)	Feed (ipm)	5	5	6	6
			Profile	≤ 0.1	≤ 1.5	80	RPM	1222	978	815	611
							Fz	0.0011	0.0016	0.0021	0.0026
						(64-96)	Feed (ipm)	8	9	10	10
			HSM	≤ 0.04	≤ 1.5	250	RPM	3820	3056	2547	1910
							Fz	0.0013	0.0019	0.0025	0.0031
						(200-300)	Feed (ipm)	30	35	38	36

Bhn (Brinell)   HRc (Rockwell C)   HSM (High Speed Machining)
rpm = Vc x 3.82 / D_1
ipm = Fz x 6 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 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
D_1 = +0,000/–0,030
D_2 = h_6

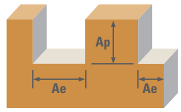
8 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6

10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6

12–20 DIAMETER
D_1 = +0,000/–0,050
D_2 = h_6

HARDENED STEELS

For patent information visit www.ksptpatents.com

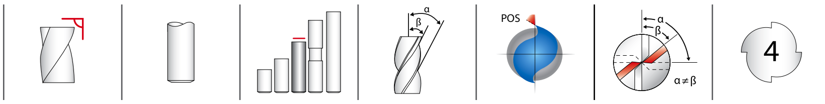


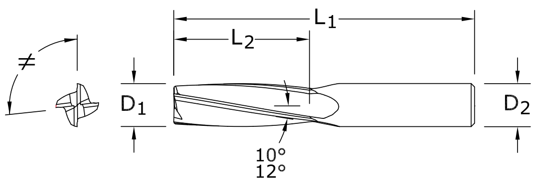
Group	Series 57M Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		6	8	10	12	16	20
								Diameter (D_1) (mm)					
H	**TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2**	≤ 420 Bhn or ≤ 45 HRc	Slot	1	≤ 0.3	66	RPM	3499	2624	2099	1749	1312	1050
						(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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 6 x rpm
reduce speed and feed for materials harder than listed
reduce feed and Ae when finish milling (.02 x D_1 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

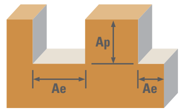
inch				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Di-NAMITE® (Diamond)
1/4	1	2-1/2	1/4	72978	72979
3/8	1-1/8	2-1/2	3/8	72980	72981
1/2	1-1/2	3-1/2	1/2	72982	72983
3/4	1-3/8	4	3/4	72984	72985

TOLERANCES (inch)

D_1 = +0.0000/–0.0030
D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

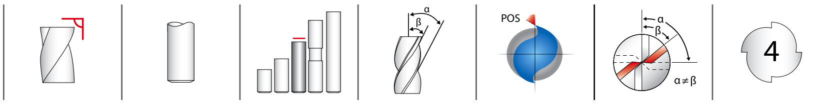


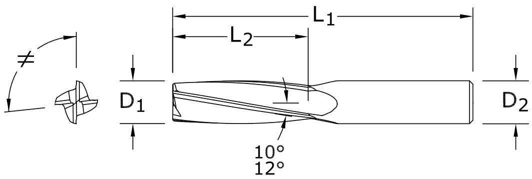
Series 27 Fractional		Operation	Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/4	3/8	1/2	3/4
N	CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot	1	≤ 1	400	RPM	6112	4075	3056	2037
					(320-480)	Fz	0.0016	0.0030	0.0040	0.0048
						Feed (ipm)	39	49	49	39
		Profile	≤ 0.5	≤ 1.5	500	RPM	7640	5093	3820	2547
					(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
	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 x 3.82 / D_1
ipm = Fz x 4 x 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)

Series 27





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

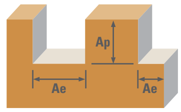
mm				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Di-NAMITE® (Diamond)
6,0	25,0	63,0	6,0	83056	83057
8,0	25,0	63,0	8,0	83058	83059
10,0	28,0	63,0	10,0	83060	83061
12,0	38,0	89,0	12,0	83062	83063
16,0	48,0	115,0	16,0	83064	83065

TOLERANCES (mm)

D_1 = +0,000/–0,080
D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



	Series 27M Metric		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16
N	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
	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 x 3.82 / D_1
ipm = Fz x 4 x 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)

KYOCERA
SGS Precision Tools

SGS
Solid Carbide Tools

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	122
	43MAPR	3 Flute Advanced Productivity Rougher Metric	126
	43APF	4 Flute Advanced Productivity Finisher Fractional	124
	43MAPF	4 Flute Advanced Productivity Finisher Metric	128
S-Carb® (3 Flute)	43	3 Flute Non-Ferrous Square End Fractional	130
	43M	3 Flute Non-Ferrous Square End Metric (Unpolished Flutes)	143
	43M	3 Flute Non-Ferrous Square End Metric (Polished Flutes)	143
	43CR	3 Flute Non-Ferrous Corner Radius Fractional	131
	43MCR	3 Flute Non-Ferrous Corner Radius Metric (Unpolished Flutes)	144
	43MCR	3 Flute Non-Ferrous Corner Radius Metric (Polished Flutes)	145
	43MCR	3 Flute Non-Ferrous Corner Radius 4xD Metric (Polished Flutes)	146
	43LC	3 Flute Non-Ferrous Long Reach Corner Radius Fractional	135
	43MLC	3 Flute Non-Ferrous Long Reach Corner Radius Metric (Unpolished Flutes)	148
	43MLC	3 Flute Non-Ferrous Long Reach Corner Radius Metric (Polished Flutes)	149
	43L	3 Flute Non-Ferrous Square End Long Reach Fractional	134
	43ML	3 Flute Non-Ferrous Square End Long Reach Metric	147
	43EC	3 Flute Non-Ferrous Square End Extra Long Reach Fractional	137
	43B	3 Flute Non-Ferrous Ball End Fractional	138
	43MB	3 Flute Non-Ferrous Ball End Metric (Polished Flutes)	150
	43LB	3 Flute Non-Ferrous Ball End Long Reach Fractional	139
	43EB	3 Flute Non-Ferrous Ball End Extra Long Reach Fractional	139
S-Carb® Rougher (3 Flute)	43CB	3 Flute Rougher Non-Ferrous Chip Breaker Fractional	140
	43MCB	3 Flute Rougher Non-Ferrous Chip Breaker Metric	151
	43LCB	3 Flute Rougher Non-Ferrous Chip Breaker Long Reach Fractional	141
S-Carb® (2 Flute)	47	2 Flute Non-Ferrous Square End Fractional	153
	47M	2 Flute Non-Ferrous Square End Metric	156
	47B	2 Flute Non-Ferrous Ball End Fractional	154
	47MB	2 Flute Non-Ferrous Ball End Metric	158
	47L	2 Flute Non-Ferrous Square End Long Reach Fractional	153
	47ML	2 Flute Non-Ferrous Square End Long Reach Metric	157
	47LB	2 Flute Non-Ferrous Ball End Long Reach Fractional	154
	47MLB	2 Flute Non-Ferrous Ball End Long Reach Metric	158
Ski-Carb	44	2 Flute Non-Ferrous Materials Square End Fractional	160
	44M	2 Flute Non-Ferrous Materials Square End Metric	162
	45	2 Flute Non-Ferrous Materials Long Reach Corner Radius Fractional	164

Speed & Feed Recommendations listed after each series

Fresado

FRESAS DE ALTO RENDIMIENTO PARA ALUMINIO	SERIE	DESCRIPCIÓN	PÁGINA
S-Carb APR® y APF®	43APR	3 filos, productividad avanzada, desbastador, fraccional	122
	43MAPR	3 filos, productividad avanzada, desbastador, métrico	126
	43APF	4 filos, productividad avanzada, acabador, fraccional	124
	43MAPF	4 filos, productividad avanzada, acabador, métrico	128
S-Carb® (3 filos)	43	3 filos, no férrico, punta cuadrada, fraccional	130
	43M	3 filos, no férrico, punta cuadrada, métrico (filos no pulidos)	143
	43M	3 filos, no férrico, punta cuadrada, métrico (filos pulidos)	143
	43CR	3 filos, no férrico, radio angulado, fraccional	131
	43MCR	3 filos, no férrico, radio angulado, métrico (filos no pulidos)	144
	43MCR	3 filos, no férrico, radio angulado, métrico (filos pulidos)	145
	43MCR	3 filos, no férrico, radio angulado 4xD, métrico (filos pulidos)	146
	43LC	3 filos, no férricos, largo alcance, radio angulado, fraccional	135
	43MLC	3 filos, no férrico, largo alcance, radio angulado, métrico (filos no pulidos)	148
	43MLC	3 filos, no férrico, largo alcance, radio angulado, métrico (filos pulidos)	149
	43L	3 filos, no férrico, punta cuadrada, largo alcance, fraccional	134
	43ML	3 filos, no férrico, punta cuadrada, largo alcance, métrico	147
	43EC	3 filos, no férrico, punta cuadrada, alcance extralargo, fraccional	137
	43B	3 filos, no férrico, punta esférica, fraccional	138
	43MB	3 filos, no férrico, punta esférica, métrico (filos pulidos)	150
	43LB	3 filos, no férrico, punta esférica, largo alcance, fraccional	139
	43EB	3 filos, no férrico, punta esférica, alcance extralargo, fraccional	139
Desbastador S-Carb® (3 filos)	43CB	3 filos, desbastador, no férrico, rompevirutas, fraccional	140
	43MCB	3 filos, desbastador, no férrico, rompevirutas, métrico	151
	43LCB	3 filos, desbastador, no férrico, rompevirutas, largo alcance, fraccional	141
S-Carb® (2 filos)	47	2 filos, no férrico, punta cuadrada, fraccional	153
	47M	2 filos, no férrico, punta cuadrada, métrico	156
	47B	2 filos, no férrico, punta esférica, fraccional	154
	47MB	2 filos, no férrico, punta esférica, métrico	158
	47L	2 filos, no férrico, punta cuadrada, largo alcance, fraccional	153
	47ML	2 filos, no férrico, punta cuadrada, largo alcance, métrico	157
	47LB	2 filos, no férrico, punta esférica, largo alcance, fraccional	154
	47MLB	2 filos, no férrico, punta esférica, largo alcance, métrico	158
Ski-Carb	44	2 filos, materiales no férricos, punta cuadrada, fraccional	160
	44M	2 filos, materiales no férricos, punta cuadrada, métrico	162
	45	2 filos, materiales no férricos, largo alcance, radio angulado, fraccional	164

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)	122
	43MAPR	3 dents productivité avancée d'ébauche (métrique)	126
	43APF	4 dents productivité avancée de finition (fractionnel)	124
	43MAPF	4 dents productivité avancée de finition (métrique)	128
S-Carb® (3 dents)	43	3 dents non-ferreux à bout plat (fractionnel)	130
	43M	3 dents non-ferreux à bout plat (métrique) (goujures non polies)	143
	43M	3 dents non-ferreux à bout plat (métrique) (goujures polies)	143
	43CR	3 dents non-ferreux rayon en coin (fractionnel)	131
	43MCR	3 dents matériaux non-ferreux rayon en coin (métrique) (goujures non polies)	144
	43MCR	3 dents matériaux non-ferreux rayon en coin (métrique) (goujures polies)	145
	43MCR	3 dents matériaux non-ferreux rayon en coin 4xD (métrique) (goujures polies)	146
	43LC	3 dents non-ferreux longue portée rayon en coin (fractionnel)	135
	43MLC	3 dents non-ferreux longue portée rayon en coin (métrique) (goujures non polies)	148
	43MLC	3 dents non-ferreux longue portée rayon en coin (métrique) (goujures polies)	149
	43L	3 dents non-ferreux à bout plat longue portée (fractionnel)	134
	43ML	3 dents non-ferreux à bout plat longue portée (métrique)	147
	43EC	3 dents non-ferreux à bout plat portée extra-longue (fractionnel)	137
	43B	3 dents non-ferreux à bout hémisphérique (fractionnel)	138
	43MB	3 dents non-ferreux à bout hémisphérique (métrique) (goujures polies)	150
	43LB	3 dents non-ferreux à bout hémisphérique longue portée (fractionnel)	139
	43EB	3 dents non-ferreux à bout hémisphérique portée extra-longue (fractionnel)	139
S-Carb® d'ébauche (3 dents)	43CB	3 dents d'ébauche non-ferreux brise-copeaux (fractionnel)	140
	43MCB	3 dents d'ébauche non-ferreux brise-copeaux (métrique)	151
	43LCB	3 dents d'ébauche non-ferreux brise-copeaux longue portée (fractionnel)	141
S-Carb® (2 dents)	47	2 dents non-ferreux à bout plat (fractionnel)	153
	47M	2 dents non-ferreux à bout plat (métrique)	156
	47B	2 dents non-ferreux à bout hémisphérique (fractionnel)	154
	47MB	2 dents non-ferreux à bout hémisphérique (métrique)	158
	47L	2 dents non-ferreux à bout plat longue portée (fractionnel)	153
	47ML	2 dents non-ferreux à bout plat longue portée (métrique)	157
	47LB	2 dents non-ferreux à bout hémisphérique longue portée (fractionnel)	154
	47MLB	2 dents non-ferreux à bout hémisphérique longue portée (métrique)	158
Ski-Carb	44	2 dents matériaux non-ferreux à bout plat (fractionnel)	160
	44M	2 dents matériaux non-ferreux à bout plat (métrique)	162
	45	2 dents matériaux non-ferreux longue portée rayon en coin (fractionnel)	164

Recommandations de vitesse et avance indiquées après chaque série

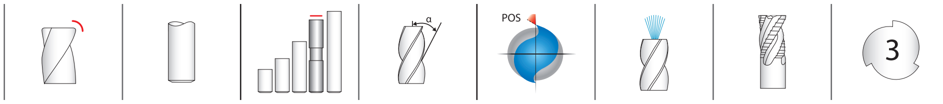
Fräsen

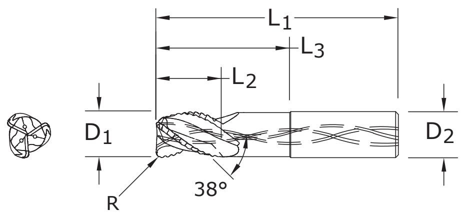
HOCHLEISTUNGS-SCHAFTFRÄSER	SERIE	BESCHREIBUNG	SEITE
S-Carb APR® & APF®	43APR	Zölliger Hochleistungs-Stirnschruppfräser mit 3 Schneidekanten	122
	43MAPR	Metrischer Hochleistungs-Stirnschruppfräser mit 3 Schneidekanten	126
	43APF	Zölliger Hochleistungs-Schlichtfräser mit 4 Schneidekanten	124
	43MAPF	Metrischer Hochleistungs-Schlichtfräser mit 4 Schneidekanten	128
S-Carb® (3 Schneidekanten)	43	Zölliger Nichteisenmetall-Schaftfräser mit 3 Schneidekanten ohne Eckenradien	130
	43M	Metrischer Nichteisenmetall-Schaftfräser mit 3 unpolierten Schneidekanten ohne Eckenradien	143
	43M	Metrischer Nichteisenmetall-Schaftfräser mit 3 polierten Schneidekanten ohne Eckenradien	143
	43CR	Zölliger Nichteisenmetall-Fräser mit 3 Schneidekanten und Eckenradien	131
	43MCR	Metrischer Nichteisenmetall-Fräser mit 3 unpolierten Schneidekanten und Eckenradien	144
	43MCR	Metrischer Nichteisenmetall-Fräser mit 3 polierten Schneidekanten und Eckenradien	145
	43MCR	Metrischer Nichteisenmetall-Fräser mit 3 polierten Schneidekanten und 4xD-Eckenradien	146
	43LC	Zölliger Tiefbohr-fräser mit 3 Schneidekanten und Eckenradien	135
	43MLC	Metrischer Nichteisenmetall-Tiefbohr-fräser mit 3 unpolierten Schneidekanten und Eckenradien	148
	43MLC	Metrischer Nichteisenmetall-Tiefbohr-fräser mit 3 polierten Schneidekanten und Eckenradien	149
	43L	Zölliger Nichteisenmetall-Langloch-Schaftfräser mit 3 Schneidekanten ohne Eckenradien	134
	43ML	Metrischer Nichteisenmetall-Langloch-Schaftfräser mit 3 Schneidekanten ohne Eckenradien	147
	43EC	Zölliger Nichteisenmetall-Superlangloch-Schaftfräser mit 3 Schneidekanten ohne Eckenradien	137
	43B	Zölliger Nichteisenmetall-Radiusschaftfräser mit 3 Schneidekanten	138
	43MB	Metrischer Nichteisenmetall-Radiusschaftfräser mit 3 polierten Schneidekanten	150
	43LB	Zölliger Nichteisenmetall-Langloch-Radiusschaftfräser mit 3 Schneidekanten	139
	43EB	Zölliger Nichteisenmetall-Superlangloch-Radiusschaftfräser mit 3 Schneidekanten	139

HOCHLEISTUNGS-SCHAFTFRÄSER	SERIE	BESCHREIBUNG	SEITE
S-Carb® Schruppfräser (3 Schneidekanten)	43CB	Zölliger Nichteisenmetall-Schruppfräser mit 3 Spanteilernuten	140
	43MCB	Metrischer Nichteisenmetall-Schruppfräser mit 3 Spanteilernuten	151
	43LCB	Zölliger Nichteisenmetall-Langloch-Schruppfräser mit 3 Spanteilernuten	141
S-Carb® (2 Schneidekanten)	47	Zölliger Nichteisenmetall-Schaftfräser mit 2 Schneidekanten ohne Eckenradien	153
	47M	Metrischer Nichteisenmetall-Schaftfräser mit 2 Schneidekanten ohne Eckenradien	156
	47B	Zölliger Nichteisenmetall-Radiusschaftfräser mit 2 Schneidekanten	154
	47MB	Metrischer Nichteisenmetall-Radiusschaftfräser mit 2 Schneidekanten	158
	47L	Zölliger Nichteisenmetall-Langloch-Schaftfräser mit 2 Schneidekanten ohne Eckenradien	153
	47ML	Metrischer Nichteisenmetall-Langloch-Schaftfräser mit 2 Schneidekanten ohne Eckenradien	157
	47LB	Zölliger Nichteisenmetall-Langloch-Radiusschaftfräser mit 2 Schneidekanten	154
	47MLB	Metrischer Nichteisenmetall-Langloch-Radiusschaftfräser mit 2 Schneidekanten	158
Ski-Carb	44	Zölliger Schaftfräser mit 2 Schneidekanten ohne Eckenradien für Nichteisenmetalle	160
	44M	Metrischer Schaftfräser mit 2 Schneidekanten ohne Eckenradien für Nichteisenmetalle	162
	45	Zölliger Tiefbohr-fräser mit 2 Schneidekantenn und Eckenradien für Nichteisenmetalle	164

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

S-Carb APR®





43APR

FRACTIONAL SERIES

- 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)

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

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

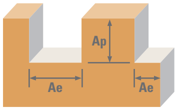
TOLERANCES (inch)

3/4–1 DIAMETER

D_1 = +0.00040/–0.0020
D_2 = h_6
R = +0.0000/–0.0018

NON-FERROUS

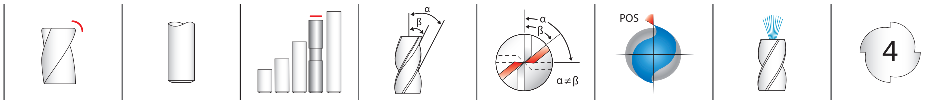
For patent information visit www.ksptpatents.com



	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	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	4920	RPM	25059	18794
						(3936-5904)	Fz	0.0060	0.0070
							Feed (in/min)	451	395
			Profile	≤ 0.5	≤ 1.5	6560	RPM	33412	25059
						(5248-7872)	Fz	0.0060	0.0070
							Feed (in/min)	601	526
	ALUMINUM ALLOyS (LITHIUM)* 2090, 2091, 2099, 2195, 2199, 2297, 8090	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	3940	RPM	20068	15051
						(3152-4728)	Fz	0.0045	0.0053
							Feed (in/min)	271	239
			Profile	≤ 0.5	≤ 1.5	4920	RPM	25059	18794
						(3936-5904)	Fz	0.0045	0.0053
							Feed (in/min)	338	299

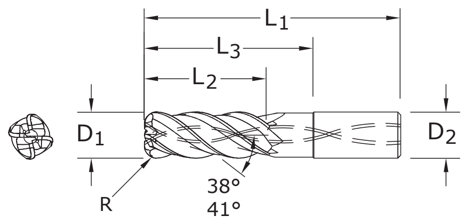
Bhn (Brinell) HRc (Rockwell C)
surface speed is dependent on machine spindle and fixturing
balancing is recommended at ultra high surface speeds
tool life may be reduced when machining Lithium Alloys
rpm = Vc x 3.82 / D_1
ipm = Fz x 3 x rpm
maximum recommended depths shown
reduce speed and feed for materials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

S-Carb APF®



43APF

FRACTIONAL 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)

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

Available on request: • JetStream Technology

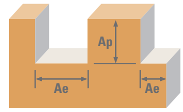
TOLERANCES (inch)

1/2–3/4 DIAMETER

D_1 = +0.00040/–0.0020
D_2 = h_6
R = +/–0.0018

NON-FERROUS

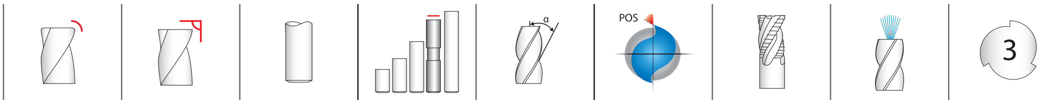
For patent information visit www.ksptpatents.com

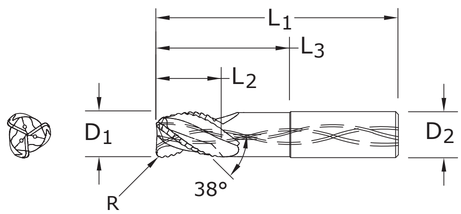


	Series 43APF Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/2	3/4
N	**ALUMINUM ALLOyS** 2024, 5052, 5086, 6061, 6063, 7075	≤ 150 Bhn or ≤ 7 HRc	Profile	≤ 0.1	≤ 2.5	2625	RPM	20055	13370
						(2100-3150)	Fz	0.0030	0.0050
							Feed (in/min)	241	267
			Profile	≤ 0.1	≤ 4	2625	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 x 3.82 / D_1
ipm = Fz x 4 x 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 D_1 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)

S-Carb APR®





43MAPR

METRIC SERIES

- 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)

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

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

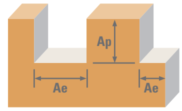
TOLERANCES (mm)

12–25 DIAMETER

D_1 = +0,010/–0,050
D_2 = h_6
R = +0,000/–0,030

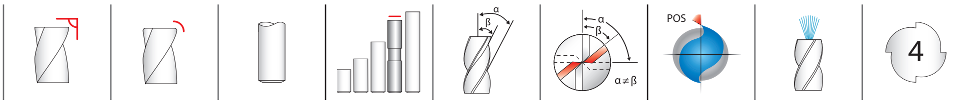
NON-FERROUS

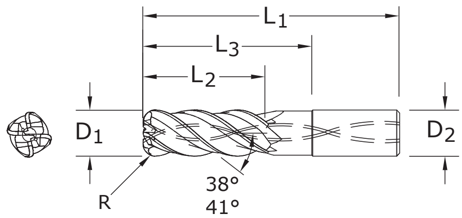
For patent information visit www.ksptpatents.com



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	RPM	39788	29841	23873	19098
						(1200-1800)	Fz	0.080	0.110	0.150	0.180
							Feed (mm/min)	9549	9848	10743	10313
			Profile	≤ 0.5	≤ 1.5	2000	RPM	53050	39788	31830	25464
						(1600-2400)	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	RPM	31830	23873	19098	15278
						(960-1440)	Fz	0.060	0.083	0.110	0.140
							Feed (mm/min)	11459	5944	6302	6417
			Profile	≤ 0.5	≤ 1.5	1500	RPM	39788	29841	23873	19098
						(1200-1800)	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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 3 x rpm
maximum recommended depths shown
reduce speed and feed for materials harder than listed
ramp angle = 15° (feed rate = 50%)
plunge depth = 1 x D_1 (feed rate = 30%)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)





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	Ov ERALL 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

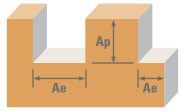
TOLERANCES (mm)

6–25 DIAMETER

D_1 = +0,010/–0,050
D_2 = h_6
R = +0,000/–0,030

NON-FERROUS

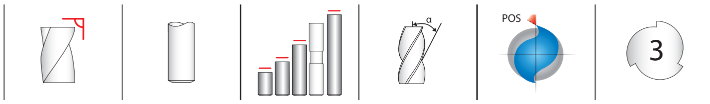
For patent information visit www.ksptpatents.com

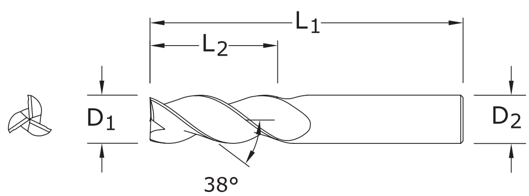


Series 43MAPF Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20	25
ALUMINUM ALLOyS **2024, 5052, 5086, 6061, 6063, 7075**	≤ 150 Bhn or ≤ 7 HRc	Profile 	≤ 0.1	≤ 2.5	800	RPM	42440	31830	25464	21220	15915	12732	10186
					(640-960)	Fz	0.050	0.055	0.060	0.070	0.100	0.140	0.170
						Feed (mm/min)	8488	7003	6111	5942	6366	7130	6926
		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
N						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
		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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 4 x 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 D_1 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)

S-Carb®





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)

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	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
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

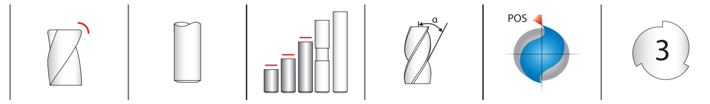
1/2–5/8 DIAMETER
D_1 = +0.0000/–0.00043
D_2 = h_6

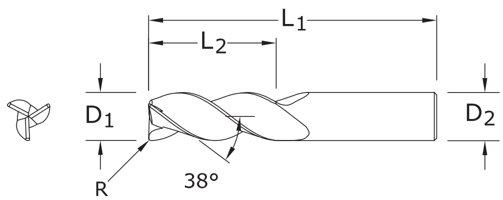
3/4–1 DIAMETER
D_1 = +0.0000/–0.00051
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com





43CR
FRACTIONAL SERIES

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

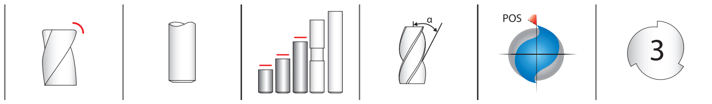
NON-FERROUS
PLASTICS/COMPOSITES

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-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

continued on next page

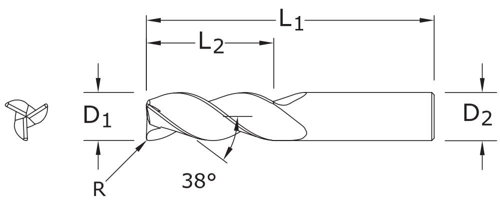
- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Enhanced corner geometry with tight tolerance corner radii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



43CR

FRACTIONAL SERIES

CONTINUED



		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-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

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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

NON-FERROUS

PLASTICS/COMPOSITES

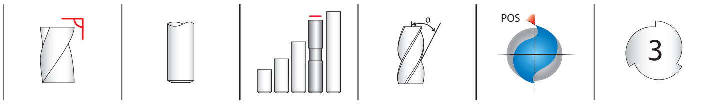
For patent information visit www.ksptpatents.com

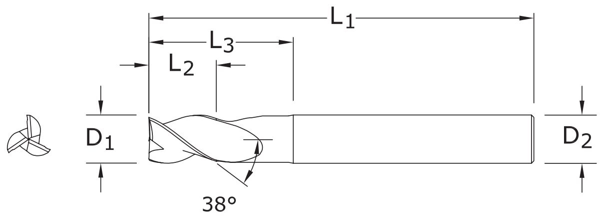
43CR
FRACTIONAL SERIES

CONTINUED

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-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

S-Carb®





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)

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)
1/8	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

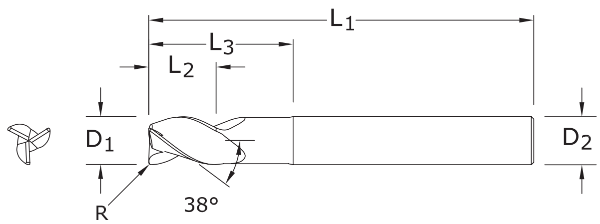
1/2–5/8 DIAMETER
D_1 = +0.0000/–0.00043
D_2 = h_6

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



43LC
FRACTIONAL SERIES

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

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	REACH L_3	CORNER RADIUS R	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

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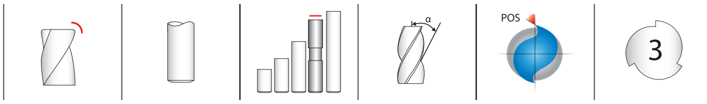
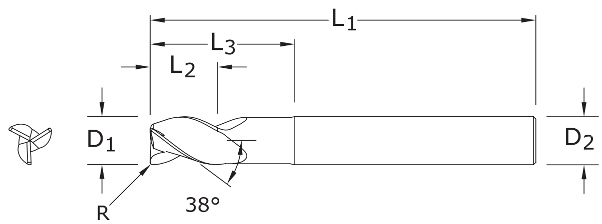
- Circular land allows for increased control at various speed and feed rates and reduces chatter
- Symmetrical end gashing for excellent balance at high speeds and aggressive plunging capability
- Open fluting for deep slotting and profiling
- Necked design with blended diameter transitions provide clearance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





43LC
FRACTIONAL SERIES

CONTINUED

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	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
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

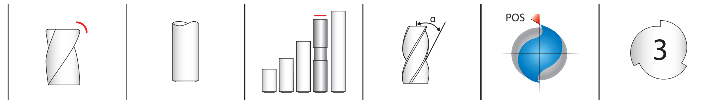
1/2–5/8 DIAMETER
D_1 = +0.0000/–0.00043
D_2 = h_6
R = +0.0000/–0.0020

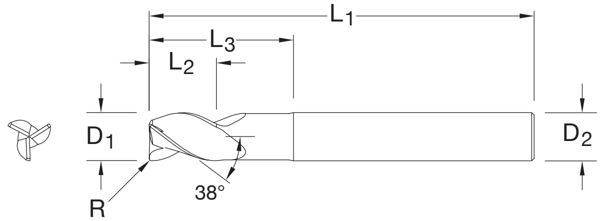
3/4–1 DIAMETER
D_1 = +0.0000/–0.00051
D_2 = h_6
R = +0.0000/–0.0020

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

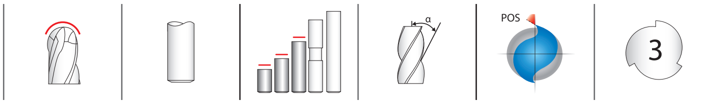
For patent information visit www.ksptpatents.com

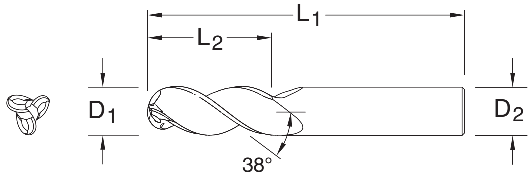
inch						EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OvERALL LENGTH L_1	SHANk DIAMETER D_2	REACH L_3	CORNER RADIUS R	UNCOATED	Ti-NAMITE-B (TiB_2)
1/4	3/8	3	1/4	1-1/8	.015	35789	36237
1/4	3/8	3	1/4	1-1/8	.060	35790	36238
3/8	1/2	4	3/8	2-1/8	.015	35793	36241
3/8	1/2	4	3/8	2-1/8	.090	35794	36242
1/2	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)

FRACTIONAL

S-Carb®





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)

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)
1/4	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

1/2–5/8 DIAMETER

D_1 = +0.0000/–0.00043

D_2 = h_6

3/4–1 DIAMETER

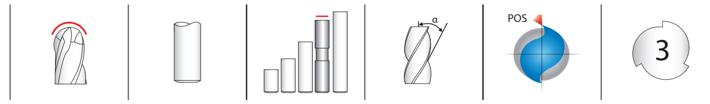
D_1 = +0.0000/–0.00051

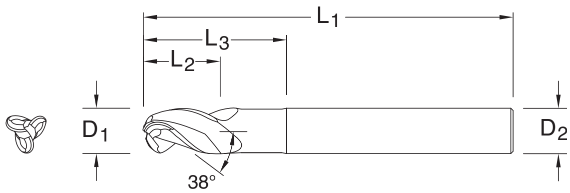
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com





43LB

FRACTIONAL SERIES

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

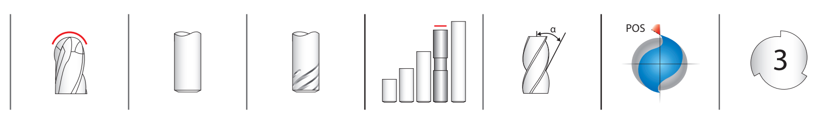
NON-FERROUS

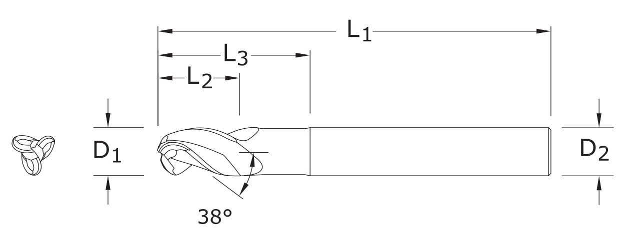
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

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	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)





43EB

FRACTIONAL SERIES

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
R = +0.0000/–0.0020

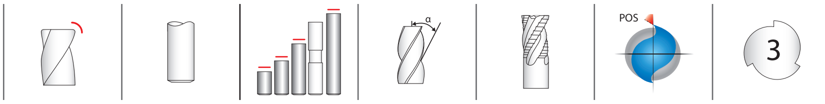
NON-FERROUS

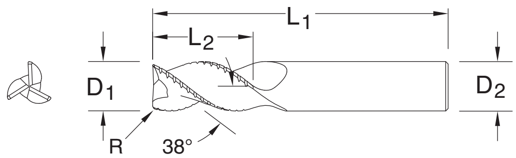
PLASTICS/COMPOSITES

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	REACH L_3	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)





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)

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-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	34300	34305
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	34301	34306
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	34302	34307
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	34303	34308
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	34304	34309
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)

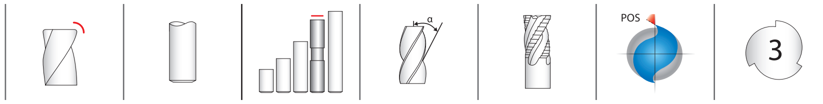
1/4–3/8 DIAMETER
D_1 = +0.0000/–0.00035
D_2 = h_6
R = +0.0000/–0.0020

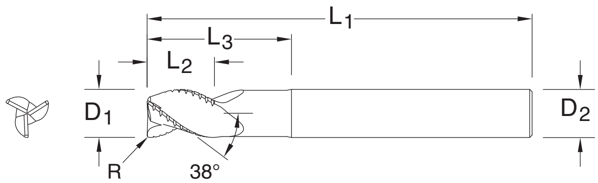
1/2–5/8 DIAMETER
D_1 = +0.0000/–0.00043
D_2 = h_6
R = +0.0000/–0.0020

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





43LCB
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

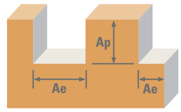
PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

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	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)

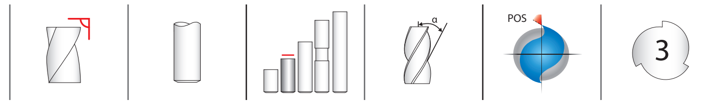
S-Carb®

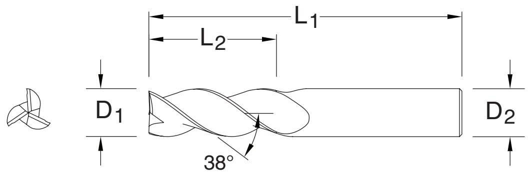


	Series 43CR, 43CB, 43LC, 43, 43L, 43LCB, 43B, 43LB, 43ELB, 43EC Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/8	1/4	3/8	1/2	5/8	3/4	1
N	**ALUMINUM ALLOyS** 2024, 5052, 5086, 6061, 6073, 7075	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	1600	RPM	48896	24448	16299	12224	9779	8149	6112
						(1280-1920)	Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	0.0085
							Feed (ipm)	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	≤ 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)	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	≤ 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)	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
N	**COPPER ALLOyS** Beryllium Copper C110, Malleable 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)	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, Pv C, 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 x 3.82 / D_1
ipm = Fz x 3 x 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 D_1 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

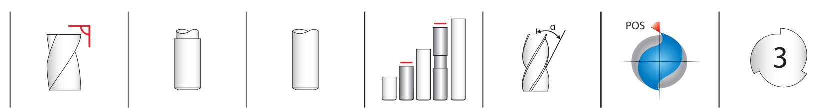
NON-FERROUS

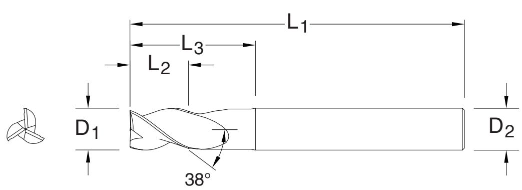
PLASTICS/COMPOSITES

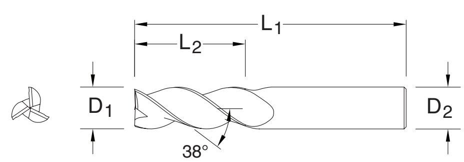
For patent information visit www.ksptpatents.com

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)







43M
METRIC SERIES

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

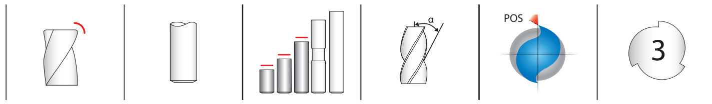
PLASTICS/COMPOSITES

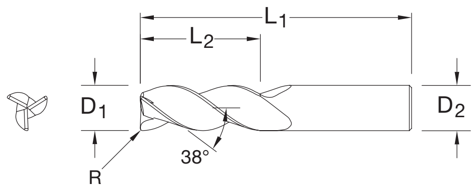
For patent information visit www.ksptpatents.com

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)

S-Carb®





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)

mm					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-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

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

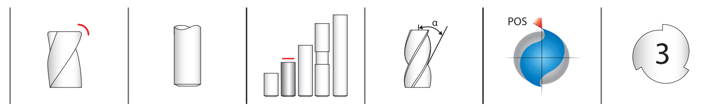
D_1 = +0,000/–0,013

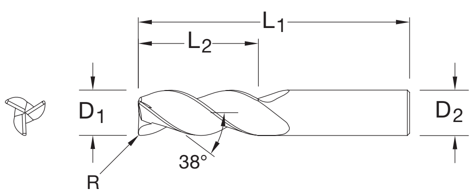
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com





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

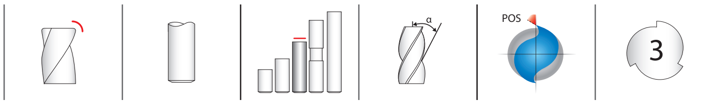
>18–20 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6
R = +0,00/–0,05

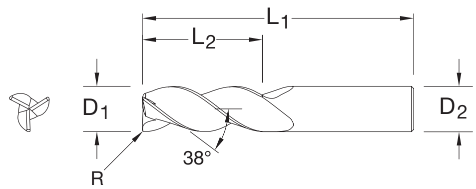
NON-FERROUS
PLASTICS/COMPOSITES

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)

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	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
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

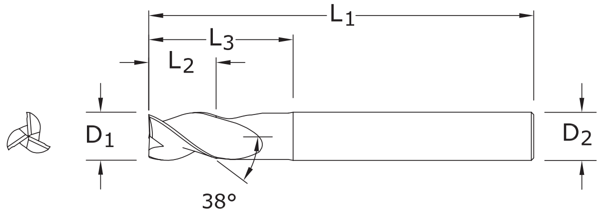
>10–18 DIAMETER
D_1 = +0,000/–0,011
D_2 = h_6
R = +0,00/–0,05

>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



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

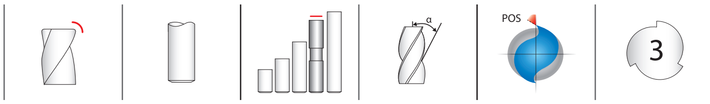
PLASTICS/COMPOSITES

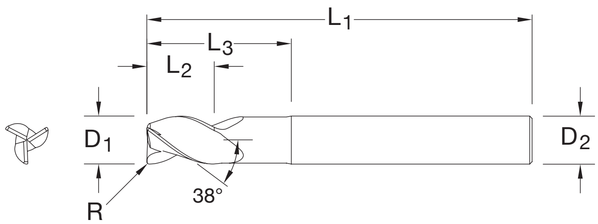
For patent information visit www.ksptpatents.com

mm					EDP NO.
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	Ov ERALL 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)

S-Carb®





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)

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	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

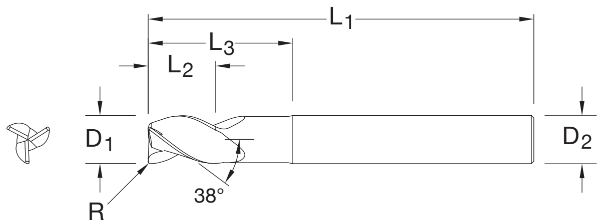
>18–20 DIAMETER

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



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

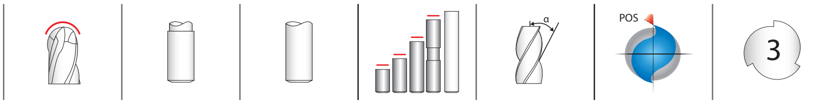
43MLC Aero Radius Range

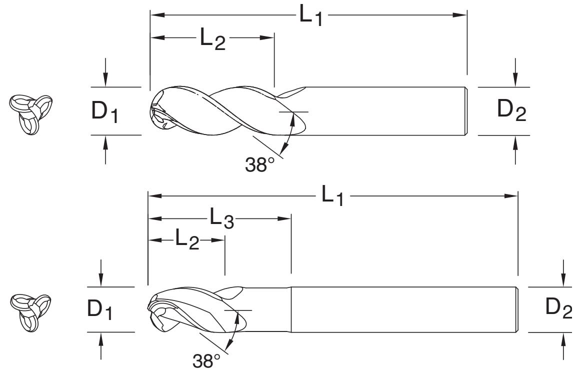
METRIC SERIES

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	POLISHED FLUTE	Ti-NAMITE-B (TiB_2)
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)

S-Carb®





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

>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

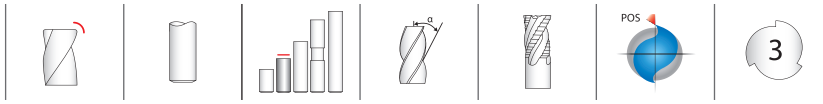
>10–18 DIAMETER
D_1 = +0,000/–0,011
D_2 = h_6

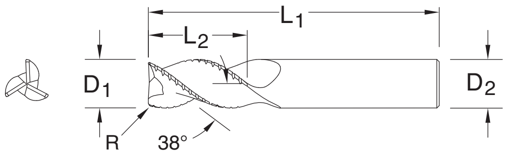
>18–25 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com





43MCB

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

NON-FERROUS

PLASTICS/COMPOSITES

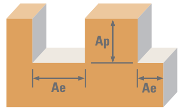
For patent information visit www.ksptpatents.com

mm					EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OvERALL LENGTH L_1	SHANk DIAMETER D_2	CORNER RADIUS R	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)

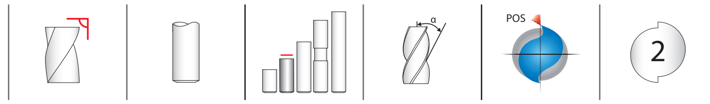
METRIC

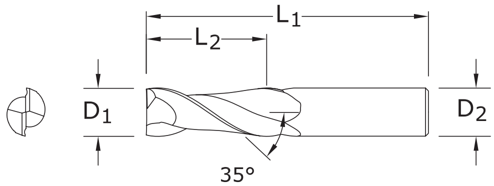
S-Carb®



	Series 43M, 43MB, 43MCR, 43ML, 43MLC, 43MCB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)	Diameter (D_1) (mm)	3	6	10	12	16	20	25
N	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, Pv C, 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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 3 x 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)





47
FRACTIONAL SERIES

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

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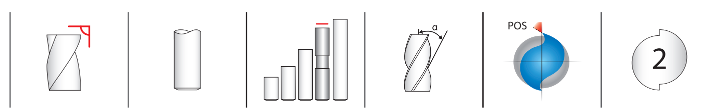
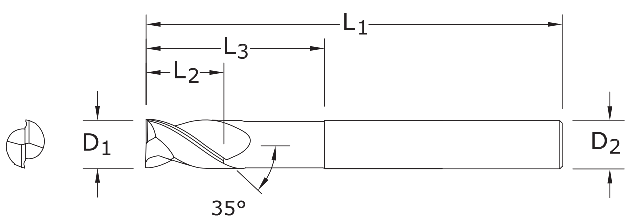
inch				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE-B (TiB_2)
1/8	3/8	1-1/2	1/8	34620	34660
3/16	9/16	2	3/16	34621	34661
1/4	3/4	2-1/2	1/4	34622	34662
5/16	13/16	2-1/2	5/16	34623	34663
3/8	1	2-1/2	3/8	34624	34664
1/2	1-1/4	3-1/4	1/2	34625	34665
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)





47L
FRACTIONAL SERIES

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

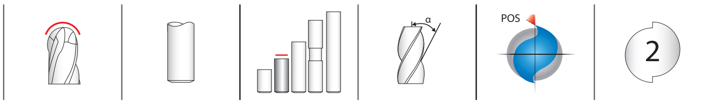
NON-FERROUS
PLASTICS/COMPOSITES

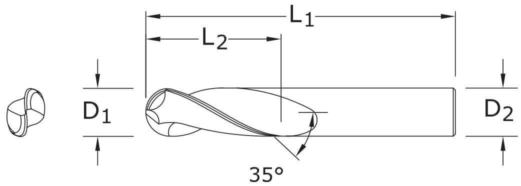
For patent information visit www.ksptpatents.com

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)

S-Carb®





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)

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	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

1/4–3/8 DIAMETER
D_1 = +0.0000/–0.00035
D_2 = h_6

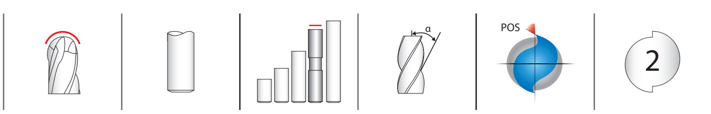
1/2–5/8 DIAMETER
D_1 = +0.0000/–0.00043
D_2 = h_6

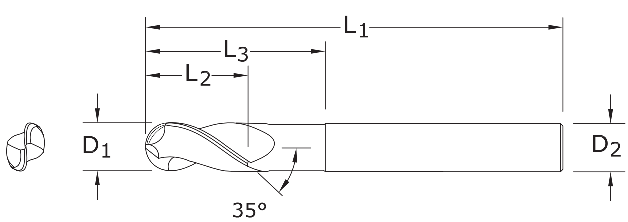
3/4–1 DIAMETER
D_1 = +0.0000/–0.00051
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com





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)

mm					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	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	3-3/8	34654	34691
5/8	3/4	6	5/8	2-3/8	34655	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

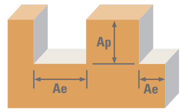
1/2–5/8 DIAMETER
D_1 = +0.0000/–0.00043
D_2 = h_6

3/4–1 DIAMETER
D_1 = +0.0000/–0.00051
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

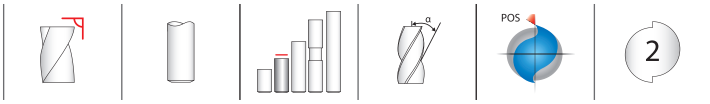
For patent information visit www.ksptpatents.com

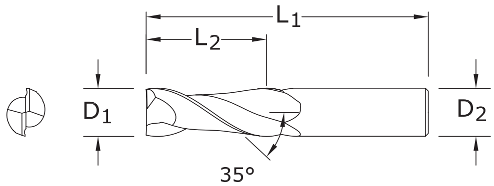


	Series 47, 47B, 47L, 47LB Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)	Diameter (D_1) (inch)	1/8	1/4	3/8	1/2	5/8	3/4	1
N	**ALUMINUM ALLOyS 2024, 5052, 5086, 6061, 6073, 7075**	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	1600	RPM	48896	24448	16299	12224	9779	8149	6112
						(1280-1920)	Fz	0.0009	0.0025	0.0045	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
N	**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, Pv C, 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 x 3.82 / D_1
ipm = Fz x 2 x 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

S-Carb®





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)

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)
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

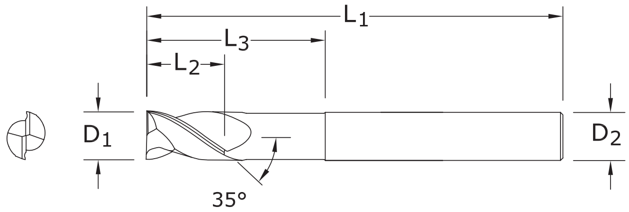
>10–18 DIAMETER
D_1 = +0,000/–0,012
D_2 = h_6

>18–25 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



47ML
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

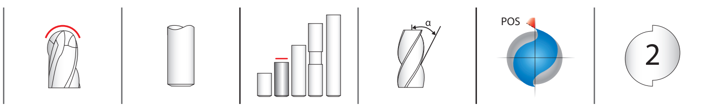
For patent information visit www.ksptpatents.com

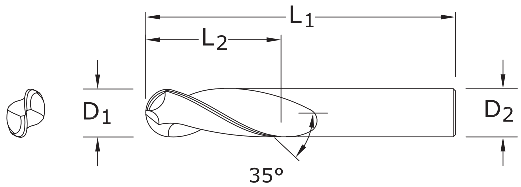
mm					EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OvERALL LENGTH L_1	SHANk DIAMETER D_2	REACH L_3	UNCOATED	Ti-NAMITE-B (TiB_2)
6,0	10,0	100,0	6,0	54,0	44561	44609
8,0	12,0	100,0	8,0	54,0	44562	44610
10,0	12,0	100,0	10,0	54,0	44563	44611
12,0	16,0	150,0	12,0	80,0	44564	44612
16,0	20,0	150,0	16,0	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)

METRIC

S-Carb®





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)

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)
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

>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

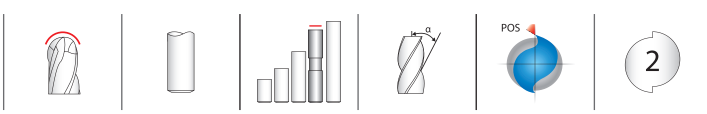
>10–18 DIAMETER
D_1 = +0,000/–0,012
D_2 = h_6

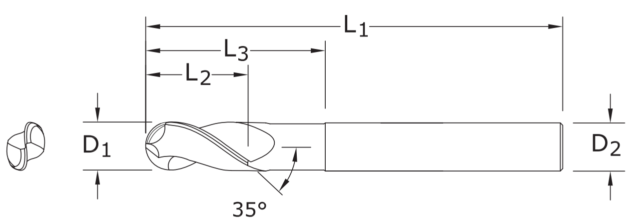
>18–25 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com





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)

mm					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)
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

>6–10 DIAMETER
D_1 = +0,000/–0,009
D_2 = h_6

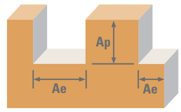
>10–18 DIAMETER
D_1 = +0,000/–0,011
D_2 = h_6

>18–20 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com



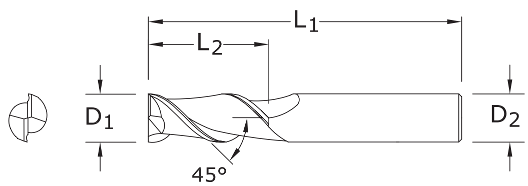
Series 47M, 47MB, 47ML, 47MLB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	10	12	16	20	25
ALUMINUM ALLOyS 2024, 5052, 5086, 6061, 6073, 7075	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	490	RPM	52022	26011	15607	13005	9754	7803	6243
					(392-588)	Fz	0.022	0.060	0.120	0.144	0.166	0.187	0.213
						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
N **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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 2 x 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

FRACTIONAL

Ski-Carb

2



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
R = +0.0000/–0.0020

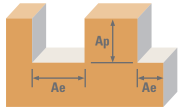
1/2–5/8 DIAMETER
D_1 = +0.0000/–0.00043
D_2 = h_6
R = +0.0000/–0.0020

3/4–1 DIAMETER
D_1 = +0.0000/–0.00051
D_2 = h_6
R = +0.0000/–0.0020

NON-FERROUS

PLASTICS/COMPOSITES

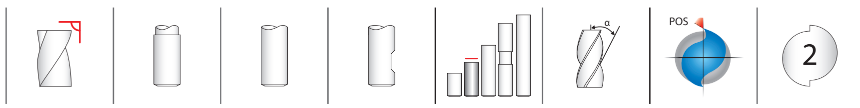
For patent information visit www.ksptpatents.com

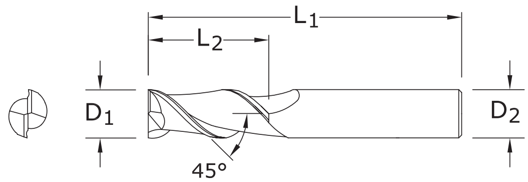


	Series 44 Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/8	1/4	3/8	1/2	5/8	3/4	1
N	**ALUMINUM ALLOyS 2024, 5052, 5086, 6061, 6073, 7075**	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	1600	RPM	48896	24448	16299	12224	9779	8149	6112
						(1280-1920)	Fz	0.0009	0.0025	0.0045	0.0060	0.0065	0.0070	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 x 3.82 / D_1
ipm = Fz x 2 x 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

SGS SKI-CARB





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)

mm				EDP NO.			
CUTTING DIAMETER D_1	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
R = +0,000/–0,050

>3–6 DIAMETER
D_1 = +0,000/–0,008
D_2 = h_6
R = +0,000/–0,050

>6–10 DIAMETER
D_1 = +0,000/–0,009
D_2 = h_6
R = +0,000/–0,050

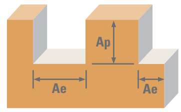
>10–18 DIAMETER
D_1 = +0,000/–0,011
D_2 = h_6
R = +0,000/–0,050

>18–20 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6
R = +0,000/–0,050

NON-FERROUS

PLASTICS/COMPOSITES

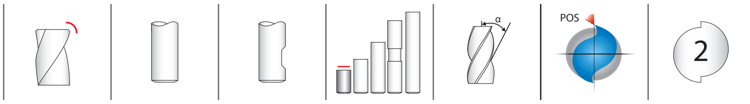
For patent information visit www.ksptpatents.com

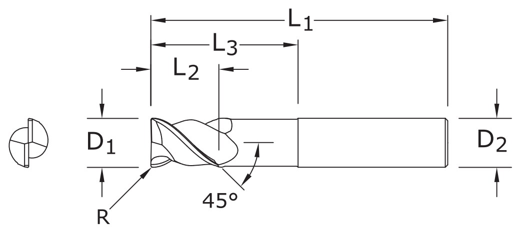


	Series 44M Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)	Diameter (D_1) (mm)	3	6	10	12	16	20	25
N	**ALUMINUM ALLOyS 2024, 5052, 5086, 6061, 6073, 7075**	≤ 150 Bhn ≤ 7 HRc	Slot	1	≤ 1	490	RPM	52022	26011	15607	13005	9754	7803	6243
						(392-588)	Fz	0.022	0.060	0.120	0.144	0.166	0.187	0.213
							Feed (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 x 1000) / (D_1 x 3.14)
mm/min = Fz x 2 x 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Ski-Carb





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

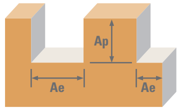
1/2–5/8 DIAMETER
- D_1 = +0.0000/–0.00043
- D_2 = h_6
- R = +0.0000/–0.0020

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
N	**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
N	**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
N	**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
N	**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
N	**PLASTICS** ABS, Polycarbonate, Pv C, 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 x 3.82 / D_1
ipm = Fz x 2 x 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

KYOCERA SGS Precision Tools

SGS® Solid Carbide Tools

General Purpose End Mills

Milling

SERIES	GENERAL PURPOSE END MILLS DESCRIPTION	PAGE
16	4 Flute Square End Stub Fractional	188
16M	4 Flute Square End Stub Metric	218
1	4 Flute Square End Standard Length Fractional	189
1L	4 Flute Square End Long Reach Fractional	189
1EL	4 Flute Square End Extended Length Fractional	189
1M	4 Flute Square End Standard Length Metric	219
1XLM	4 Flute Square End Extra Long Reach Metric	219
14	4 Flute Double End Square Stub Fractional	193
14M	4 Flute Double End Square Stub Metric	221
1B	4 Flute Ball End Standard Length Fractional	194
1LB	4 Flute Ball End Long Reach Fractional	194
1ELB	4 Flute Ball End Extended Length Fractional	194
1MB	4 Flute Ball End Standard Length Metric	222
1XLMB	4 Flute Ball End Extra Long Reach Metric	222
14B	4 Flute Double End Ball Stub Fractional	196
14MB	4 Flute Double End Ball Stub Metric	223
1CR	4 Flute Corner Radius Standard Length Fractional	191
1MCR	4 Flute Corner Radius Standard Length Metric	220
54	4 Flute High Shear Square End Standard Length Fractional	205
54M	4 Flute High Shear Square End Standard Length Metric	231
17	2 Flute Square End Stub Fractional	174
17M	2 Flute Square End Stub Metric	209
3	2 Flute Square End Standard Length Fractional	175
3L	2 Flute Square End Long Reach Fractional	175
3EL	2 Flute Square End Extended Length Fractional	175
3M	2 Flute Square End Standard Length Metric	210
3XLM	2 Flute Square End Extra Long Reach Metric	210
59	2 Flute Square End Long Reach Fractional	177
59M	2 Flute Square End Long Reach Metric	211
15	2 Flute Double End Square Stub Fractional	179
15M	2 Flute Double End Square Stub Metric	212
3B	2 Flute Ball End Standard Length Fractional	180
3LB	2 Flute Ball End Long Reach Fractional	180
3ELB	2 Flute Ball End Extended Length Fractional	180
3MB	2 Flute Ball End Standard Length Metric	213
3XLMB	2 Flute Ball End Extra Long Reach Metric	213
59B	2 Flute Ball End Long Reach Fractional	182
59MB	2 Flute Ball End Long Reach Metric	214

Speed & Feed Recommendations listed after each series

SERIES	GENERAL PURPOSE END MILLS DESCRIPTION	PAGE
15B	2 Flute Double End Ball Stub Fractional	183
15MB	2 Flute Double End Ball Stub Metric	215
3CR	2 Flute Corner Radius Standard Length Fractional	178
52	2 Flute High Shear Square End Standard Length Fractional	204
52M	2 Flute High Shear Square End Standard Length Metric	230
5	3 Flute Square End Standard Length Fractional	184
5M	3 Flute Square End Standard Length Metric	216
5XLM	3 Flute Square End Extra Long Reach Metric	216
5B	3 Flute Ball End Standard Length Fractional	185
5MB	3 Flute Ball End Standard Length Metric	217
5XLMB	3 Flute Ball End Extra Long Reach Metric	217
61	Multi-Flute Coarse Pitch Rougher Fractional	202
61M	Multi-Flute Coarse Pitch Rougher Metric	228
62	Multi-Flute Fine Pitch Rougher Fractional	200
62M	Multi-Flute Fine Pitch Rougher Metric	226
23	3 Flute Tapered Square End Standard Length Fractional	186
24	3 Flute Tapered Corner Radius Standard Length Fractional	187
End Mill Sets	2, 3, & 4 Flute Square End Series 1, 3, 5, 14, 15	207
	2, 3, & 4 Flute Ball End Series 1B, 3B, 5B, 14B ,15B	208

Speed & Feed Recommendations listed after each series

Fresado

SERIE	DESCRIPCIÓN DE FRESAS DE USO GENERAL	PÁGINA
16	4 filos, pieza de punta cuadrada, fraccional	188
16M	4 filos, pieza de punta cuadrada, métrico	218
1	4 filos, punta cuadrada, longitud estándar, fraccional	189
1L	4 filos, punta cuadrada, largo alcance, fraccional	189
1EL	4 filos, punta cuadrada, longitud extendida, fraccional	189
1M	4 filos, punta cuadrada, longitud estándar, métrico	219
1XLM	4 filos, punta cuadrada, alcance extralargo, métrico	219
14	4 filos, pieza doble de punta cuadrada, fraccional	193
14M	4 filos, pieza doble de punta cuadrada, métrico	221
1B	4 filos, punta esférica, longitud estándar, fraccional	194
1LB	4 filos, punta esférica, largo alcance, fraccional	194
1ELB	4 filos, punta esférica, longitud extendida, fraccional	194
1MB	4 filos, punta esférica, longitud estándar, métrico	222
1XLMB	4 filos, punta esférica, alcance extralargo, métrico	222
14B	4 filos, pieza doble de punta esférica, fraccional	196
14MB	4 filos, pieza doble de punta esférica, métrico	223

SERIE	DESCRIPCIÓN DE FRESAS DE USO GENERAL	PÁGINA
1CR	4 filos, radio angulado, longitud estándar, fraccional	191
1MCR	4 filos, radio angulado, longitud estándar, métrico	220
54	4 filos, alto rendimiento, punta cuadrada, longitud estándar, fraccional	205
54M	4 filos, alto rendimiento, punta cuadrada, longitud estándar, métrico	231
17	2 filos, pieza de punta cuadrada, fraccional	174
17M	2 filos, pieza de punta cuadrada, métrico	209
3	2 filos, punta cuadrada, longitud estándar, fraccional	175
3L	2 filos, punta cuadrada, largo alcance, fraccional	175
3EL	2 filos, punta cuadrada, longitud extendida, fraccional	175
3M	2 filos, punta cuadrada, longitud estándar, métrico	210
3XLM	2 filos, punta cuadrada, alcance extralargo, métrico	210
59	2 filos, punta cuadrada, largo alcance, fraccional	177
59M	2 filos, punta cuadrada, largo alcance, métrico	211
15	2 filos, pieza doble de punta cuadrada, fraccional	179
15M	2 filos, pieza doble de punta cuadrada, métrico	212
3B	2 filos, punta esférica, longitud estándar, fraccional	180
3LB	2 filos, punta esférica, largo alcance, fraccional	180
3ELB	2 filos, punta esférica, longitud extendida, fraccional	180
3MB	2 filos, punta esférica, longitud estándar, métrico	213
3XLMB	2 filos, punta esférica, alcance extralargo, métrico	213
59B	2 filos, punta esférica, largo alcance, fraccional	182
59MB	2 filos, punta esférica, largo alcance, métrico	214
15B	2 filos, pieza doble de punta esférica, fraccional	183
15MB	2 filos, pieza doble de punta esférica, métrico	215
3CR	2 filos, radio angulado, longitud estándar, fraccional	178
52	2 filos, alto rendimiento, punta cuadrada, longitud estándar, fraccional	204
52M	2 filos, alto rendimiento, punta cuadrada, longitud estándar, métrico	230
5	3 filos, punta cuadrada, longitud estándar, fraccional	184
5M	3 filos, punta cuadrada, longitud estándar, métrico	216
5XLM	3 filos, punta cuadrada, alcance extralargo, métrico	216
5B	3 filos, punta esférica, longitud estándar, fraccional	185
5MB	3 filos, punta esférica, longitud estándar, métrico	217
5XLMB	3 filos, punta esférica, alcance extralargo, métrico	217
61	Filo múltiple, paso grueso, desbastador, fraccional	202
61M	Filo múltiple, paso grueso, desbastador, métrico	228
62	Filo múltiple, paso fino, desbastador, fraccional	200
62M	Filo múltiple, paso fino, desbastador, métrico	226
23	3 filos, cónico, punta cuadrada, longitud estándar, fraccional	186
24	3 filos, cónico, radio angulado, longitud estándar, fraccional	187
Juegos de fresas	2, 3 y 4 filos, punta cuadrada, series 1, 3, 5, 14, 15	207
	2, 3 y 4 filos, punta esférica, series 1B, 3B, 5B, 14B ,15B	208

Recomendaciones de velocidades y avances mostradas tras cada serie

Fraisage

SERIES	DESCRIPTION DE FRAISES À USAGE GÉNÉRAL	PAGE
16	4 dents à bout plat court (fractionnel)	188
16M	4 dents à bout plat court (métrique)	218
1	4 dents à bout plat longueur standard (fractionnel)	189
1L	4 dents à bout plat longue portée (fractionnel)	189
1EL	4 dents à bout plat extra-long (fractionnel)	189
1M	4 dents à bout plat longueur standard (métrique)	219
1XLM	4 dents à bout plat portée extra-longue (métrique)	219
14	4 dents à double bouts plats court (fractionnel)	193
14M	4 dents à double bouts plats court (métrique)	221
1B	4 dents à bout hémisphérique longueur standard (fractionnel)	194
1LB	4 dents à bout hémisphérique longue portée (fractionnel)	194
1ELB	4 dents à bout hémisphérique extra-long (fractionnel)	194
1MB	4 dents à bout hémisphérique longueur standard (métrique)	222
1XLMB	4 dents à bout hémisphérique portée extra-longue (métrique)	222
14B	4 dents à double bouts hémisphériques court (fractionnel)	196
14MB	4 dents à double bouts hémisphériques court (métrique)	223
1CR	4 dents rayon en coin longueur standard (fractionnel)	191
1MCR	4 dents rayon en coin longueur standard (métrique)	220
54	4 dents cisaillement élevé à bout plat longueur standard (fractionnel)	205
54M	4 dents cisaillement élevé à bout plat longueur standard (métrique)	231
17	2 dents à bout plat court (fractionnel)	174
17M	2 dents à bout plat court (métrique)	209
3	2 dents à bout plat longueur standard (fractionnel)	175
3L	2 dents à bout plat longue portée (fractionnel)	175
3EL	2 dents à bout plat extra-long (fractionnel)	175
3M	2 dents à bout plat longueur standard (métrique)	210
3XLM	2 dents à bout plat portée extra-longue (métrique)	210
59	2 dents à bout plat longue portée (fractionnel)	177
59M	2 dents à bout plat longue portée (métrique)	211
15	2 dents à double bouts plats court (fractionnel)	179
15M	2 dents à double bouts plats court (métrique)	212
3B	2 dents à bout hémisphérique longueur standard (fractionnel)	180
3LB	2 dents à bout hémisphérique longue portée (fractionnel)	180
3ELB	2 dents à bout hémisphérique extra-long (fractionnel)	180
3MB	2 dents à bout hémisphérique longueur standard (métrique)	213
3XLMB	2 dents à bout hémisphérique portée extra-longue (métrique)	213
59B	2 dents à bout hémisphérique longue portée (fractionnel)	182
59MB	2 dents à bout hémisphérique longue portée (métrique)	214
15B	2 dents à double bouts hémisphériques court (fractionnel)	183
15MB	2 dents à double bouts hémisphériques court (métrique)	215

SERIES	DESCRIPTION DE FRAISES À USAGE GÉNÉRAL	PAGE
3CR	2 dents rayon en coin longueur standard (fractionnel)	178
52	2 dents cisaillement élevé à bout plat longueur standard (fractionnel)	204
52M	2 dents cisaillement élevé à bout plat longueur standard (métrique)	230
5	3 dents à bout plat longueur standard (fractionnel)	184
5M	3 dents à bout plat longueur standard (métrique)	216
5XLM	3 dents à bout plat portée extra-longue (métrique)	216
5B	3 dents à bout hémisphérique longueur standard (fractionnel)	185
5MB	3 dents à bout hémisphérique longueur standard (métrique)	217
5XLMB	3 dents à bout hémisphérique portée extra-longue (métrique)	217
61	Multi-dents à pas gros d'ébauche (fractionnel)	202
61M	Multi-dents à pas gros d'ébauche (métrique)	228
62	Multi-dents à pas fin d'ébauche (fractionnel)	200
62M	Multi-dents à pas fin d'ébauche (métrique)	226
23	3 dents conique à bout plat longueur standard (fractionnel)	186
24	3 dents conique rayon en coin longueur standard (fractionnel)	187
Jeux de fraises	2, 3, & 4 Série goujure à bout plat 1,3,5,14,15	207
	2, 3, & 4 Série goujure à bout hémisphérique 15B, 15MB, 15B, 15MB ,15B, 15MB	208

Recommandations de vitesse et avance indiquées après chaque série

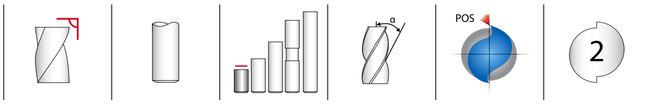
Fräsen

SERIE	BESCHREIBUNG DER ALLZWECK-SCHAFTFRÄSER	SEITE
16	Zölliger Schaftfräser mit 4 Schneidekanten ohne Eckenradien, kurze Ausführung	188
16M	Metrischer Schaftfräser mit 4 Schneidekanten ohne Eckenradien, kurze Ausführung	218
1	Zölliger Schaftfräser mit 4 Schneidekanten ohne Eckenradien, Standardlänge	189
1L	Zölliger Langloch-Schaftfräser mit 4 Schneidekanten ohne Eckenradien	189
1EL	Zölliger Schaftfräser mit 4 Schneidekanten ohne Eckenradien, extra lang	189
1M	Metrischer Schaftfräser mit 4 Schneidekanten ohne Eckenradien, Standardlänge	219
1XLM	Metrischer Superlangloch-Schaftfräser mit 4 Schneidekanten ohne Eckenradien	219
14	Zölliger Schaftfräser mit 4 Schneidekanten, kurze Ausführung	193
14M	Metrischer Schaftfräser mit 4 Schneidekanten, kurze Ausführung	221
1B	Zölliger Schaftfräser mit 4 Schneidekanten, Standardlänge	194
1LB	Zölliger Langloch-Radiusschaftfräser mit 4 Schneidekanten	194
1ELB	Zölliger Schaftfräser mit 4 Schneidekanten, Extra lang	194
1MB	Metrischer Schaftfräser mit 4 Schneidekanten, Standardlänge	222
1XLMB	Metrischer Superlangloch-Radiusschaftfräser mit 4 Schneidekanten	222
14B	Zölliger Doppelend-Radiusschaftfräser mit 4 Schneidekanten, kurze Ausführung	196
14MB	Metrischer Doppelend-Radiusschaftfräser mit 4 Schneidekanten, kurze Ausführung	223
1CR	Zölliger Schaftfräser mit 4 Schneidekanten mit Eckenradien, Standardlänge	191
1MCR	Metrischer Schaftfräser mit 4 Schneidekanten mit Eckenradien, Standardlänge	220
54	Zölliger Schaftfräser hoher Scherfestigkeit mit 4 Schneidekanten ohne Eckenradien, Standardlänge	205
54M	Metrischer Schaftfräser hoher Scherfestigkeit mit 4 Schneidekanten ohne Eckenradien, Standardlänge	231
17	Zölliger Schaftfräser mit 2 Schneidekanten ohne Eckenradien, kurze Ausführung	174
17M	Metrischer Schaftfräser mit 2 Schneidekanten ohne Eckenradien, kurze Ausführung	209
3	Zölliger Schaftfräser mit 2 Schneidekanten ohne Eckenradien, Standardlänge	175
3L	Zölliger Langloch-Schaftfräser mit 2 Schneidekanten ohne Eckenradien	175
3EL	Zölliger Schaftfräser mit 2 Schneidekanten ohne Eckenradien, extra lang	175
3M	Metrischer Schaftfräser mit 2 Schneidekanten ohne Eckenradien, Standardlänge	210
3XLM	Metrischer Superlangloch-Schaftfräser mit 2 Schneidekanten ohne Eckenradien	210
59	Zölliger Langloch-Schaftfräser mit 2 Schneidekanten ohne Eckenradien	177
59M	Metrischer Langloch-Schaftfräser mit 2 Schneidekanten ohne Eckenradien	211
15	Zölliger Schaftfräser mit 2 Schneidekanten, kurze Ausführung	179
15M	Metrischer Schaftfräser mit 2 Schneidekanten, kurze Ausführung	212
3B	Zölliger Radiusschaftfräser mit 2 Schneidekanten, Standdardlänge	180
3LB	Zölliger Langloch-Radiusschaftfräser mit 2 Schneidekanten	180
3ELB	Zölliger Schaftfräser mit 2 Schneidekanten, Extra lang	180
3MB	Metrischer Schaftfräser mit 2 Schneidekanten, Standardlänge	213
3XLMB	Metrischer Superlangloch-Schaftfräser mit 2 Schneidekanten	213
59B	Zölliger Langloch-Radiusschaftfräser mit 2 Schneidekanten	182
59MB	Metrischer Langloch-Radiusschaftfräser mit 2 Schneidekanten	214
15B	Zölliger Doppelend-Radiusschaftfräser mit 2 Schneidekanten, kurze Ausführung	183
15MB	Metrischer Doppelend-Radiusschaftfräser mit 2 Schneidekanten, kurze Ausführung	215

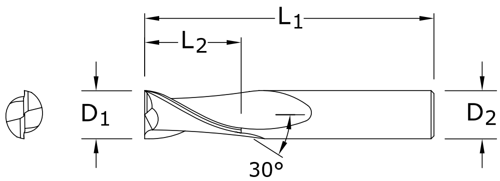
SERIE	BESCHREIBUNG DER ALLZWECK-SCHAFTFRÄSER	SEITE
3CR	Zölliger Schaftfräser mit 2 Schneidekanten mit Eckenradien, Standardlänge	178
52	Zölliger Schaftfräser hoher Scherfestigkeit mit 2 Schneidekanten ohne Eckenradien, Standardlänge	204
52M	Metrischer Schaftfräser hoher Scherfestigkeit mit 2 Schneidekanten ohne Eckenradien, Standardlänge	230
5	Zölliger Schaftfräser mit 3 Schneidekanten ohne Eckenradien, Standardlänge	184
5M	Metrischer Schaftfräser mit 3 Schneidekanten ohne Eckenradien, Standardlänge	216
5XLM	Metrischer Superlangloch-Schaftfräser mit 3 Schneidekanten ohne Eckenradien	216
5B	Zölliger Schaftfräser mit 3 Schneidekanten, Standardlänge	185
5MB	Metrischer Schaftfräser mit 3 Schneidekanten, Standardlänge	217
5XLMB	Metrischer Superlangloch-Schaftfräser mit 3 Schneidekanten	217
61	Zölliger mehrschneidiger fein verzahnter Schruppfräser	202
61M	Metrischer mehrschneidiger fein verzahnter Schruppfräser	228
62	Zölliger mehrschneidiger fein verzahnter Schruppfräser	200
62M	Metrischer mehrschneidiger fein verzahnter Schruppfräser	226
23	Zölliger Schaftfräser mit 3 Schneidekanten ohne Eckenradien, Standardlänge	186
24	Zölliger Schaftfräser mit 3 Schneidekanten mit Eckenradien, Standardlänge	187
Richtwerte zum Fräsen	Schaftfräser mit 2, 3 und 4 Schneidekanten ohne Eckenradien, Serien 1, 3, 5, 14, 15	207
	Radiusschaftfräser mit 2, 3 und 4 Schneidekanten, Serien 1B, 3B, 5B, 14B ,15B	208

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

2 Flute Square End Stub



17
FRACTIONAL SERIES



TOLERANCES (inch)

D_1 = +0.0000/–0.0020
D_2 = h_6

CUTTING DIAMETER D_1 (inch)	LENGTH OF CUT L_2 (inch)	OVERALL LENGTH L_1 (inch)	SHANK DIAMETER D_2 (inch)	EDP NO. UNCOATED	EDP NO. Ti-NAMITE (TiN)	EDP NO. Ti-NAMITE-C (TiCN)	EDP NO. 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

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

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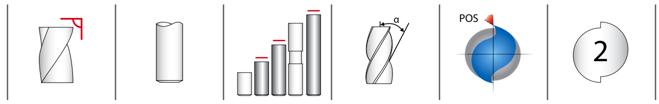
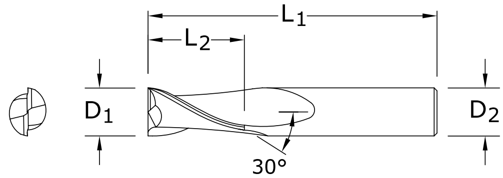
2 Flute Square End



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

continued on next page

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

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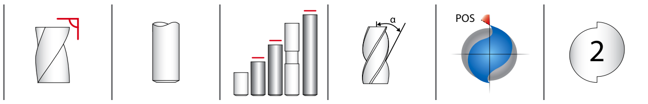
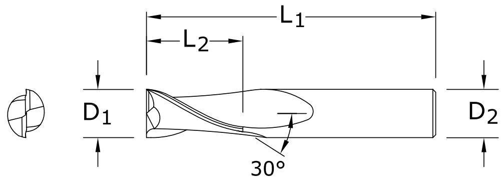
FRACTIONAL

2 Flute Square End



3•3L•3EL

FRACTIONAL SERIES



TOLERANCES (inch)

D_1 = +0.0000/–0.0020

D_2 = h_6

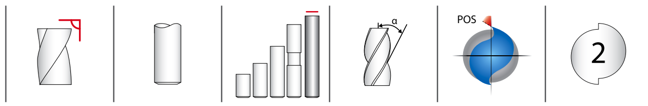
CONTINUED

CUTTING DIAMETER D_1 (inch)	LENGTH OF CUT L_2 (inch)	OVERALL LENGTH L_1 (inch)	SHANK DIAMETER D_2 (inch)	EDP NO. UNCOATED	EDP NO. Ti-NAMITE (TiN)	EDP NO. Ti-NAMITE-C (TiCN)	EDP NO. Ti-NAMITE-A (AlTiN)	EDP NO. Di-NAMITE® (Diamond)	SERIES
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

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

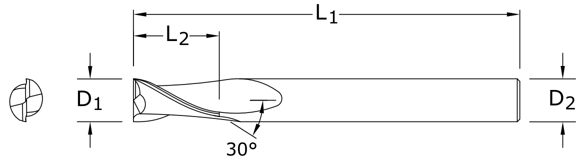
For patent information visit www.ksptpatents.com

2 Flute Square End 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

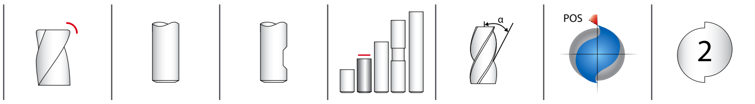
Neck Option Available

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

For patent information visit www.ksptpatents.com

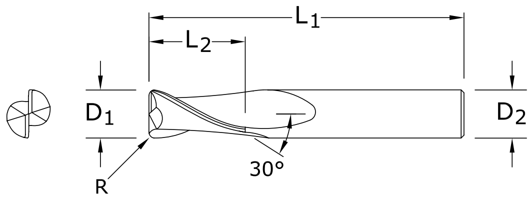
FRACTIONAL

2 Flute Corner Radius



3CR

FRACTIONAL SERIES



TOLERANCES (inch)

D_1 = –0.0010/–0.0020
D_2 = h_6
R = +0.0000/–0.0020

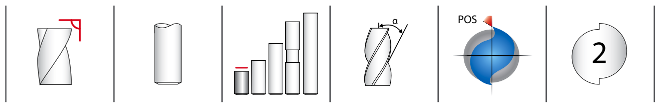
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

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

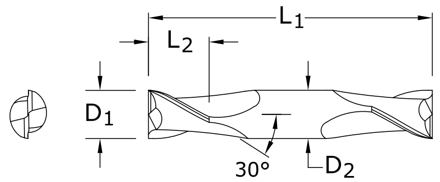
*Without Flat

2 Flute Double End Mills



TOLERANCES (inch)

D_1 = +0.0000/–0.0020
D_2 = h_6



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
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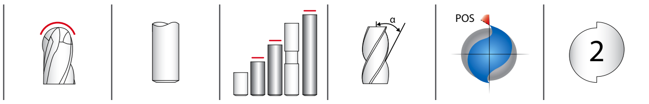
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

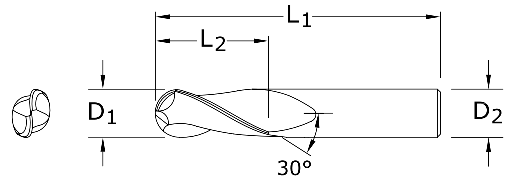
FRACTIONAL

2 Flute Ball End



3B•3LB•3ELB

FRACTIONAL SERIES



TOLERANCES (inch)

D_1 = +0.0000/–0.0020

D_2 = h_6

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

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

For patent information visit www.ksptpatents.com

3B•3LB•3ELB

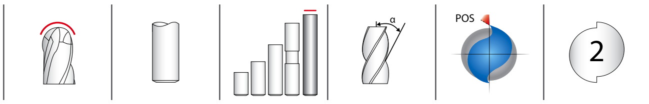
FRACTIONAL SERIES

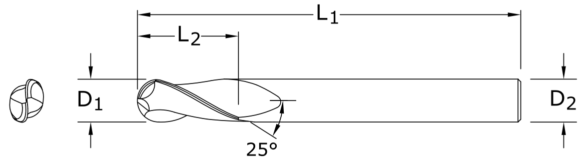
CONTINUED

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

FRACTIONAL

2 Flute Ball End Long Reach





59B

FRACTIONAL SERIES

TOLERANCES (inch)

D_1 = +0.0000/–0.0020

D_2 = h_6

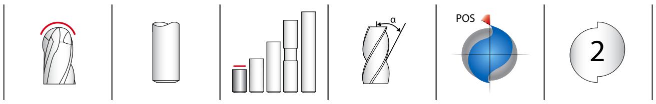
inch				EDP NO.		
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1/8	3/8	2-1/2	1/4	32210	32290	32200
3/16	9/16	3	1/4	32211	32291	32201
1/4	5/8	3-1/2	1/4	32212	32292	32202
5/16	11/16	4	5/16	32213	32293	32203
3/8	7/8	4	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

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

For patent information visit www.ksptpatents.com

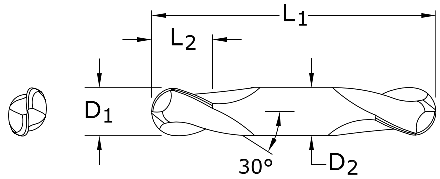
2 Flute Double End Ball End



TOLERANCES (inch)

D_1 = +0.0000/–0.0020

D_2 = h_6



15B
FRACTIONAL SERIES

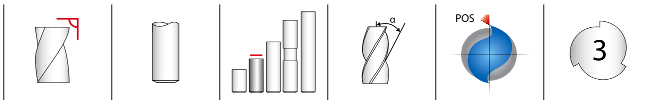
inch				EDP NO.			
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1/32	1/16	1-1/2	1/8	31502	31542	39652	31337
3/64	3/32	1-1/2	1/8	31504	31544	39654	31338
1/16	1/8	1-1/2	1/8	31506	31546	39656	31339
5/64	1/8	1-1/2	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

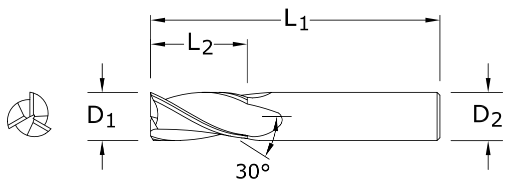
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

FRACTIONAL

3 Flute Square End





5
FRACTIONAL SERIES

TOLERANCES (inch)

D_1 = +0.0000/–0.0020
D_2 = h_6

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

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

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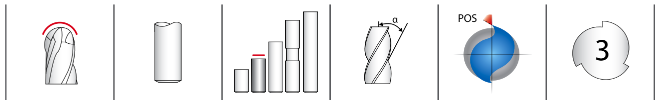
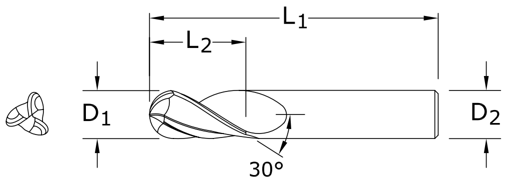
3 Flute Ball End



TOLERANCES (inch)

D_1 = +0.0000/–0.0020
D_2 = h_6



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
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- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

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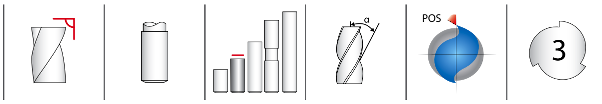
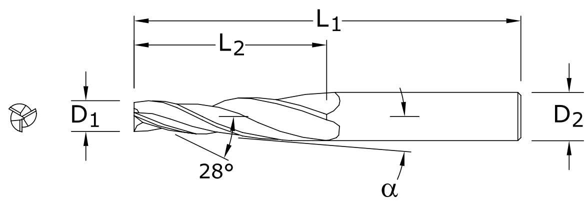
FRACTIONAL

Tapered Square End





23

FRACTIONAL SERIES

TOLERANCES (inch)

D_1 = +0.0000/–0.0020

D_2 = h_6

- STEELS
- STAINLESS STEELS
- CAST IRON
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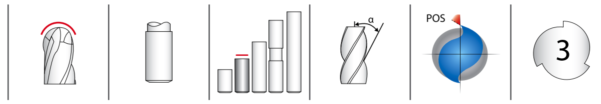
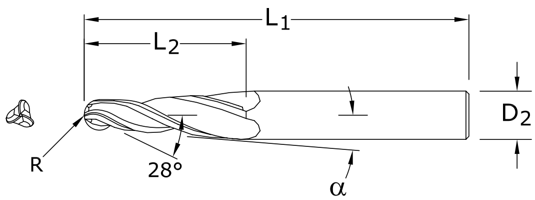
inch					EDP NO.			
SHANK DIAMETER D_2	CENTER LINE ANGLE α	SMALL DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1/4	1°	1/8	1-1/2	3	32301	32370	32302	32345
1/4	1°30'	1/8	1-1/2	3	32303	32371	32304	32346
1/4	2°	1/8	1-1/4	3	32305	32372	32306	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

Tapered Radius End



TOLERANCES (inch)

D_2 = h_6
R = +0.0005/–0.0010



24
FRACTIONAL SERIES

inch					EDP NO.			
SHANK DIAMETER D_2	CENTER LINE ANGLE α	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
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- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

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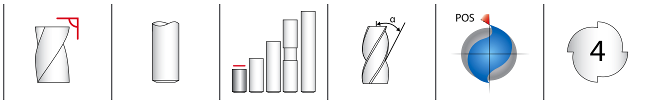
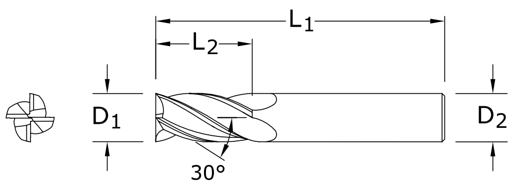
FRACTIONAL

4 Flute Square End Stub





16
FRACTIONAL SERIES

TOLERANCES (inch)

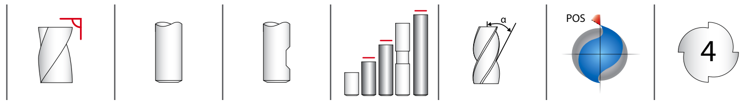
D_1 = +0.0000/–0.0020
D_2 = h_6

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	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

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

For patent information visit www.ksptpatents.com

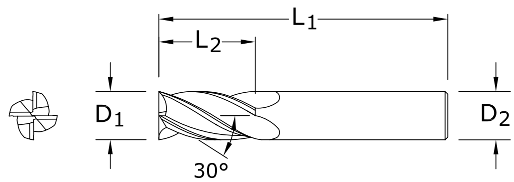
4 Flute End Mills



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

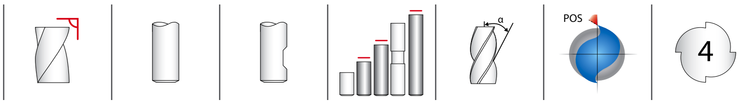
HARDENED STEELS

NON-FERROUS

PLASTICS/COMPOSITES

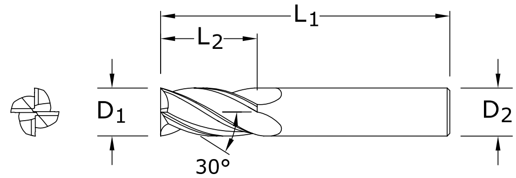
For patent information visit www.ksptpatents.com

4 Flute End Mills



1 • 1L • 1EL

FRACTIONAL SERIES



TOLERANCES (inch)

D_1 = +0.0000/–0.0020

D_2 = h_6

CONTINUED

CUTTING DIAMETER D_1 (inch)	LENGTH OF CUT L_2 (inch)	OVERALL LENGTH L_1 (inch)	SHANK DIAMETER D_2 (inch)	UNCOATED (EDP NO.)	UNCOATED W/ FLAT (EDP NO.)	Ti-NAMITE (TiN) (EDP NO.)	Ti-NAMITE-C (TiCN) (EDP NO.)	Ti-NAMITE-A (AlTiN) (EDP NO.)	Ti-NAMITE-A (AlTiN) W/FLAT (EDP NO.)	Di-NAMITE® (Diamond) (EDP NO.)	SERIES
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
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- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

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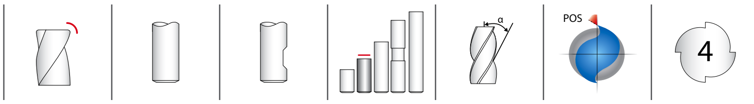
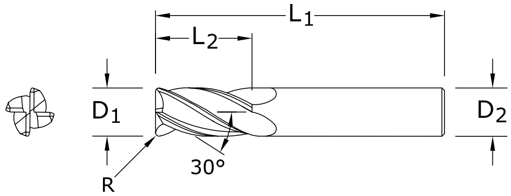
4 Flute Corner Radius



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
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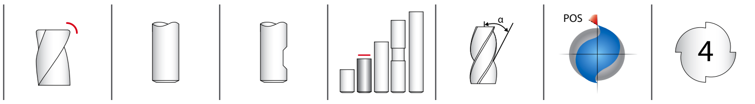
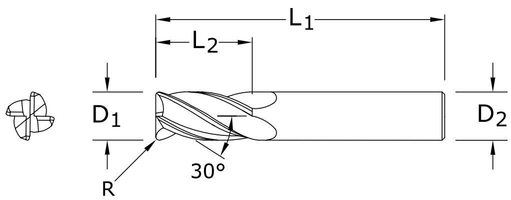
4 Flute Corner Radius





1CR
FRACTIONAL SERIES

TOLERANCES (inch)

D_1 = −0.0010/−0.0020
D_2 = h_6
R = +0.0000/−0.0020

CONTINUED

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)
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

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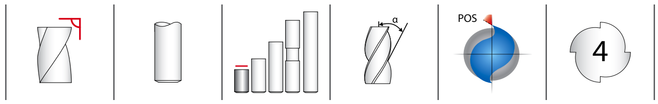
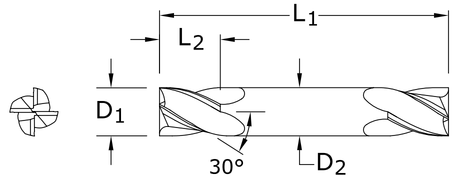
4 Flute Double End Mills



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
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- PLASTICS/COMPOSITES

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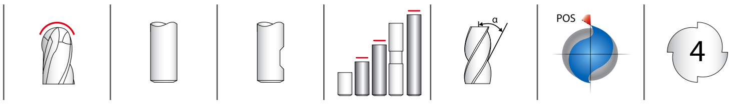
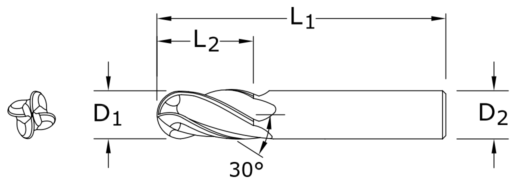
4 Flute Ball End



1B•1LB•1ELB

FRACTIONAL SERIES



TOLERANCES (inch)

D_1 = +0.0000/–0.0020

D_2 = h_6

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	–	–	1B
3/16	3/4	2-1/2	3/16	33102	–	31771	31781	31791	–	91277	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

- STEELS
- STAINLESS STEELS
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- HIGH TEMP ALLOYS
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For patent information visit www.ksptpatents.com

4 Flute Ball End

1B • 1LB • 1ELB

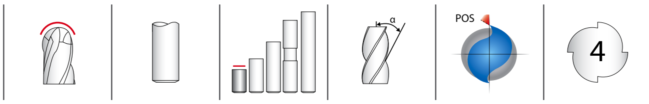
FRACTIONAL SERIES

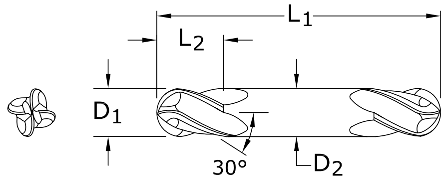
CONTINUED

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	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

FRACTIONAL

4 Flute Double End Ball End





14B

FRACTIONAL SERIES

TOLERANCES (inch)

D_1 = +0.0000/–0.0020

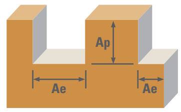
D_2 = h_6

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

- 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 & Ball End
4 Flute: Square & Ball End

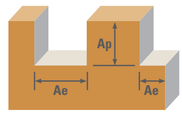


Diamond 1, 1B, 3, 3B Fractional		$Ae \times D_1$	$Ap \times D_1$	Vc (sfm)	Diameter (D_1) (inch)	1/8	1/4	5/16	3/8	1/2
GRAPHITE **Ultrafine, Superfine**	Profile	≤ 0.25	≤ 1.5	720	RPM	22003	11002	8801	7334	5501
				(576-864)	Fz	0.0009	0.0023	0.0036	0.0043	0.0058
					Feed 2 flutes (ipm)	38.3	50.6	63.4	63.1	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
COMPOSITES **FRP, CFRP, GRP**	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
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 = $(Vc \times 3.82) / D_1$
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

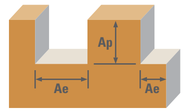
2 Flute: Square, Double, Stub, Long, Ball, Corner Radius
3 Flute: Square, Ball, Tapered
4 Flute: Square, Double, Stub, Ball, Corner Radius
Tapered: Square, Radius



Series 1, 3, 5, 14, 15, 16, 17, 23, 24, 59 Fractional	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				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
			2	≤ 0.50	≤ 1.5	(368-552)	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			10.1	10.1	11.0	12.7	16.9	21.1	21.1	16.9	14.8
			4	≤ 0.25	≤ 1.5			13.5	13.5	14.6	16.9	22.5	28.1	28.1	22.5	19.7
		Slot				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
			2	1	≤ 1	(268-402)	Feed (ipm)	4.9	4.9	5.3	6.1	8.2	10.2	10.2	8.2	7.2
			3	1	≤ 0.5			7.4	7.4	8.0	9.2	12.3	15.4	15.4	12.3	10.7
			4	1	≤ 0.4			9.8	9.8	10.6	12.3	16.4	20.5	20.5	16.4	14.3
ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	Profile				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
			2	≤ 0.50	≤ 1.5	(268-402)	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			4.9	6.1	5.5	6.1	9.2	11.3	11.5	9.2	8.1
			4	≤ 0.25	≤ 1.5			6.6	8.2	7.4	8.2	12.3	15.0	15.4	12.3	10.7
		Slot				245	RPM	59898	29949	14974	7487	3744	2496	1872	1248	936
							Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021
			2	1	≤ 1	(196-294)	Feed (ipm)	2.4	3.0	2.7	3.0	4.5	5.5	5.6	4.5	3.9
			3	1	≤ 0.5			3.6	4.5	4.0	4.5	6.7	8.2	8.4	6.7	5.9
			4	1	≤ 0.4			4.8	6.0	5.4	6.0	9.0	11.0	11.2	9.0	7.9
H **TOOL STEELS** A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc	Profile				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
			2	≤ 0.50	≤ 1.5	(252-378)	Feed (ipm)	3.1	3.9	3.5	3.9	5.8	7.1	7.2	5.8	5.1
			3	≤ 0.25	≤ 1.5			4.6	5.8	5.2	5.8	8.7	10.6	10.8	8.7	7.6
			4	≤ 0.25	≤ 1.5			6.2	7.7	6.9	7.7	11.6	14.1	14.4	11.6	10.1
		Slot				230	RPM	56230	28115	14058	7029	3514	2343	1757	1171	879
							Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021
			2	1	≤ 1	(184-276)	Feed (ipm)	2.2	2.8	2.5	2.8	4.2	5.2	5.3	4.2	3.7
			3	1	≤ 0.5			3.4	4.2	3.8	4.2	6.3	7.7	7.9	6.3	5.5
			4	1	≤ 0.4			4.5	5.6	5.1	5.6	8.4	10.3	10.5	8.4	7.4
K **CAST IRONS** Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile				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
			2	≤ 0.50	≤ 1.5	(268-402)	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			7.4	7.4	8.0	9.2	12.3	15.4	15.4	12.3	10.7
			4	≤ 0.25	≤ 1.5			9.8	9.8	10.6	12.3	16.4	20.5	20.5	16.4	14.3
		Slot				245	RPM	59898	29949	14974	7487	3744	2496	1872	1248	936
							Fz	0.00003	0.00006	0.00013	0.0003	0.0008	0.0015	0.0020	0.0024	0.0028
			2	1	≤ 1	(196-294)	Feed (ipm)	3.6	3.6	3.9	4.5	6.0	7.5	7.5	6.0	5.2
			3	1	≤ 0.5			5.4	5.4	5.8	6.7	9.0	11.2	11.2	9.0	7.9
			4	1	≤ 0.4			7.2	7.2	7.8	9.0	12.0	15.0	15.0	12.0	10.5
M **STAINLESS STEELS (FREE MACHINING)** 303, 416, 420F, 430F 440F	≤ 275 Bhn or ≤ 28 HRc	Profile				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
			2	≤ 0.50	≤ 1.5	(296-444)	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			5.4	6.8	6.1	6.8	10.2	12.4	12.7	10.2	8.9
			4	≤ 0.25	≤ 1.5			7.2	9.0	8.1	9.0	13.6	16.6	17.0	13.6	11.9
		Slot				270	RPM	66010	33005	16502	8251	4126	2750	2063	1375	1031
							Fz	0.00002	0.00005	0.00009	0.0002	0.0006	0.0011	0.0015	0.0018	0.0021
			2	1	≤ 1	(216-324)	Feed (ipm)	2.6	3.3	3.0	3.3	5.0	6.1	6.2	5.0	4.3
			3	1	≤ 0.5			4.0	5.0	4.5	5.0	7.4	9.1	9.3	7.4	6.5
			4	1	≤ 0.4			5.3	6.6	5.9	6.6	9.9	12.1	12.4	9.9	8.7
STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4 PH, 15-5, 13-4, Custom 450	≤ 275 Bhn or ≤ 28 HRc	Profile				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
			2	≤ 0.50	≤ 1.5	(204-306)	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			3.7	3.7	3.7	4.0	5.8	7.0	7.0	5.5	5.0
			4	≤ 0.25	≤ 1.5			5.0	5.0	5.0	5.3	7.8	9.4	9.4	7.3	6.6
		Slot				185	RPM	45229	22614	11307	5654	2827	1885	1413	942	707
							Fz	0.00002	0.00004	0.00008	0.0002	0.0005	0.0009	0.0012	0.0014	0.0017
			2	1	≤ 1	(148-222)	Feed (ipm)	1.8	1.8	1.8	1.9	2.8	3.4	3.4	2.6	2.4
			3	1	≤ 0.5			2.7	2.7	2.7	2.9	4.2	5.1	5.1	4.0	3.6
			4	1	≤ 0.4			3.6	3.6	3.6	3.8	5.7	6.8	6.8	5.3	4.8

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

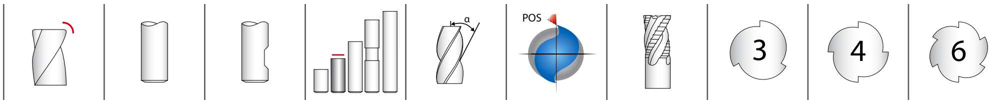
Diameter (D_1) (inch)

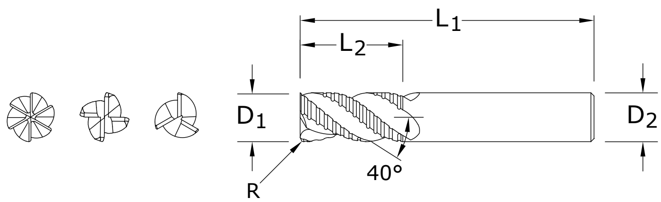
	Series 1, 3, 5, 14, 15, 16, 17, 23, 24, 59 Fractional	Hardness		Flutes	Ae x D_1	Ap x D_1	Vc (sfm)		1/64	1/32	1/16	1/8	1/4	3/8	1/2	3/4	1
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE)** Inconel 601, 617, 625, 718, Incoloy 800, Monel 400,Rene, Waspalloy	≤ 300 Bhn or ≤ 32 HRc	Profile				65	RPM	15891	7946	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
				2	≤ 0.50	≤ 1.5	(52-78)	Feed (ipm)	0.6	0.5	0.5	0.7	0.7	1.1	1.0	0.8	0.7
				3	≤ 0.25	≤ 1.5			1.0	0.7	0.7	1.1	1.0	1.6	1.5	1.2	1.0
				4	≤ 0.25	≤ 1.5			1.3	1.0	1.0	1.4	1.4	2.1	2.0	1.6	1.4
			Slot				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
				2	1	≤ 1	(36-54)	Feed (ipm)	0.4	0.3	0.3	0.5	0.5	0.7	0.7	0.6	0.5
				3	1	≤ 0.5			0.7	0.5	0.5	0.7	0.7	1.1	1.0	0.8	0.7
				4	1	≤ 0.4			0.9	0.7	0.7	1.0	1.0	1.5	1.4	1.1	1.0
	TITANIUM ALLOYS Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti10Al2Fe3Al, Ti5Al53Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al	≤ 350 Bhn or ≤ 38 HRc	Profile				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
				2	≤ 0.50	≤ 1.5	(144-216)	Feed (ipm)	1.8	1.8	1.8	2.2	2.8	3.3	3.3	2.6	2.3
				3	≤ 0.25	≤ 1.5			2.6	2.6	2.6	3.3	4.1	5.0	5.0	3.9	3.5
				4	≤ 0.25	≤ 1.5			3.5	3.5	3.5	4.4	5.5	6.6	6.6	5.1	4.7
			Slot				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
				2	1	≤ 1	(104-156)	Feed (ipm)	1.3	1.3	1.3	1.6	2.0	2.4	2.4	1.9	1.7
				3	1	≤ 0.5			1.9	1.9	1.9	2.4	3.0	3.6	3.6	2.8	2.5
				4	1	≤ 0.4			2.5	2.5	2.5	3.2	4.0	4.8	4.8	3.7	3.4
N	**ALUMINUM ALLOYS** 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	Profile				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
				2	≤ 0.50	≤ 1.5	(704-1056)	Feed (ipm)	25.8	28.0	26.9	32.3	43.0	53.8	53.8	43.0	37.6
				3	≤ 0.25	≤ 1.5			38.7	42.0	40.3	48.4	64.5	80.7	80.7	64.5	56.5
			Slot				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
				2	1	≤ 1	(512-768)	Feed (ipm)	18.8	20.3	19.6	23.5	31.3	39.1	39.1	31.3	27.4
				3	1	≤ 0.5			28.2	30.5	29.3	35.2	46.9	58.7	58.7	46.9	41.1
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	Profile				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
				2	≤ 0.50	≤ 1.5	(388-582)	Feed (ipm)	7.1	7.1	7.7	8.9	11.9	14.8	14.8	11.9	10.4
				3	≤ 0.25	≤ 1.5			10.7	10.7	11.6	13.3	17.8	22.2	22.2	17.8	15.6
				4	≤ 0.25	≤ 1.5			14.2	14.2	15.4	17.8	23.7	29.6	29.6	23.7	20.8
			Slot				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
				2	1	≤ 1	(280-420)	Feed (ipm)	5.1	5.1	5.6	6.4	8.6	10.7	10.7	8.6	7.5
				3	1	≤ 0.5			7.7	7.7	8.3	9.6	12.8	16.0	16.0	12.8	11.2
				4	1	≤ 0.4			10.3	10.3	11.1	12.8	17.1	21.4	21.4	17.1	15.0
	PLASTICS Polycarbonate, PVC, Polypropylene		Profile				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
				2	≤ 0.50	≤ 1.5	(704-1056)	Feed (ipm)	25.8	28.0	26.9	32.3	43.0	53.8	53.8	43.0	37.6
				3	≤ 0.25	≤ 1.5			38.7	42.0	40.3	48.4	64.5	80.7	80.7	64.5	56.5
				4	≤ 0.25	≤ 1.5			51.6	55.9	53.8	64.5	86.1	107.6	107.6	86.1	75.3
			Slot				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
				2	1	≤ 1	(512-768)	Feed (ipm)	18.8	20.3	19.6	23.5	31.3	39.1	39.1	31.3	27.4
				3	1	≤ 0.5			28.2	30.5	29.3	35.2	46.9	58.7	58.7	46.9	41.1
				4	1	≤ 0.4			37.6	40.7	39.1	46.9	62.6	78.2	78.2	62.6	54.8
	GRAPHITE		Profile				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
				2	≤ 0.50	≤ 1.5	(528-792)	Feed (ipm)	19.4	21.0	20.2	24.2	32.3	40.3	40.3	32.3	28.2
				3	≤ 0.25	≤ 1.5			29.0	31.5	30.3	36.3	48.4	60.5	60.5	48.4	42.4
				4	≤ 0.25	≤ 1.5			38.7	42.0	40.3	48.4	64.5	80.7	80.7	64.5	56.5
			Slot				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
				2	1	≤ 1	(384-576)	Feed (ipm)	14.1	15.3	14.7	17.6	23.5	29.3	29.3	23.5	20.5
				3	1	≤ 0.5			21.1	22.9	22.0	26.4	35.2	44.0	44.0	35.2	30.8
				4	1	≤ 0.4			28.2	30.5	29.3	35.2	46.9	58.7	58.7	46.9	41.1

Bhn (Brinell) HRc (Rockwell C)
rpm = (Vc x 3.82) / D_1
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 D_1 when slotting or profiling
reduce feed and Ae when finish milling (.02 x D_1 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

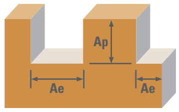
inch						EDP NO.		
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	CORNER RADIUS R	NO. OF FLUTES	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1/4*	3/4	2-1/2	1/4	.045	3	36207	36206	36210
5/16*	3/4	2-1/2	5/16	.045	3	36209	36208	36211
3/8	7/8	2-1/2	3/8	.060	3	36213	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

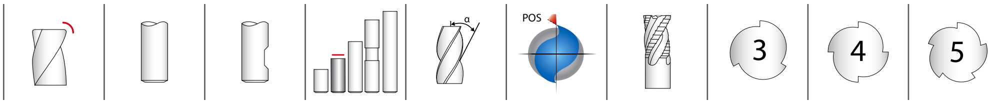
Single End Roughers (Fine Pitch)

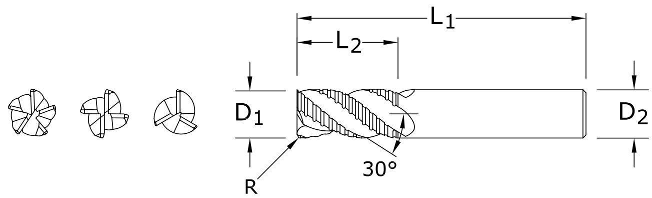


Group	Series 62 Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/4	3/8	1/2	3/4	1
M	**STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F**	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	405	RPM	6188	4126	3094	2063	1547
						(324-486)	Fz	0.0006	0.0011	0.0015	0.0019	0.0021
							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	≤ 275 Bhn or ≤ 28 HRc	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**	≤ 300 Bhn or ≤ 32 HRc	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, Ti5Al53Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al	≤ 350 Bhn or ≤ 38 HRc	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) / D_1
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

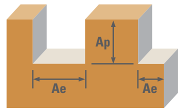
inch						EDP NO.		
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	CORNER RADIUS R	NO. OF FLUTES	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1/4*	3/4	2-1/2	1/4	.045	3	36107	36106	36110
5/16*	3/4	2-1/2	5/16	.045	3	36109	36108	36111
3/8	7/8	2-1/2	3/8	.060	3	36113	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)

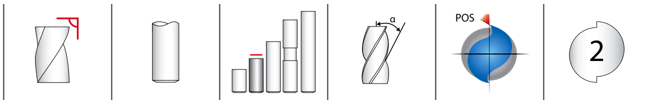


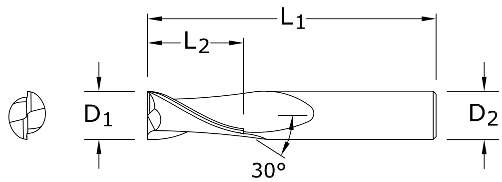
	Series 61 Fractional	Hardness		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/4	3/8	1/2	3/4	1
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	Profile	≤ 0.5	≤ 1.5	500	RPM	7640	5093	3820	2547	1910
						(400-600)	Fz	0.0006	0.0011	0.0014	0.0017	0.0020
							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 x 3.82) / D_1
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)

FRACTIONAL

2 Flute High Shear End Mills





52

FRACTIONAL SERIES

TOLERANCES (inch)

D_1 = +0.0000/–0.0020

D_2 = h_6

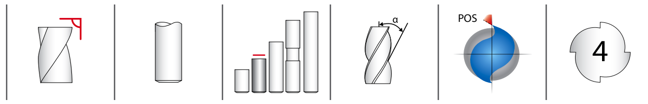
NON-FERROUS

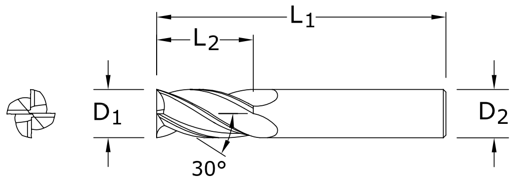
PLASTICS/COMPOSITES

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-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

4 Flute High Shear End Mills





TOLERANCES (inch)

D1 = $+0.0000/-0.0020$
D2 = h_6

54
FRACTIONAL SERIES

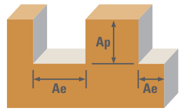
inch				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE-C (TiCN)
1/16	3/16	1-1/2	1/8	35473	35500
3/32	3/8	1-1/2	1/8	35475	35501
1/8	7/16	1-1/2	1/8	35477	35502
5/32	9/16	2	3/16	35478	35503
3/16	9/16	2	3/16	35479	35504
7/32	5/8	2-1/2	1/4	35480	35505
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

FRACTIONAL

2 Flute: High Shear End Mills
4 Flute: High Shear End Mills

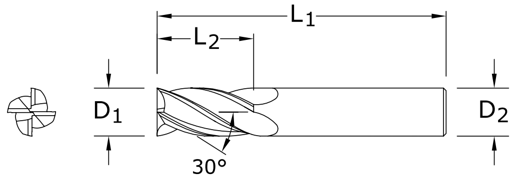


	Series 52, 54 Fractional	Hardness		Flutes	Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/8	1/4	3/8	1/2	3/4	1
N	**ALUMINUM ALLOYS** 2024, 5052, 5086, 6061, 6063, 7075	≤ 150 Bhn or ≤ 7 HRc	Profile				1360	RPM	41562	20781	13854	10390	6927	5195
								Fz	0.00069	0.0018	0.0034	0.0046	0.0055	0.0064
				2	≤ 0.3	≤ 1.5	(1088-1632)	Feed (ipm)	57.4	74.8	94.2	95.6	76.2	66.5
				4	≤ 0.3	≤ 1.5		Feed (ipm)	114.7	149.6	188.4	191.2	152.4	133.0
			Slot				1090	RPM	33310	16655	11103	8328	5552	4164
								Fz	0.00063	0.0017	0.0032	0.0042	0.0050	0.0059
				2	1	≤ 1	(872-1308)	Feed (ipm)	42.0	56.6	71.1	70.0	55.5	49.1
				4	1	≤ 0.25		Feed (ipm)	83.9	113.3	142.1	139.9	111.0	98.3
	ALUMINUM DIE CAST ALLOYS (HIGH SILICON) A-390, A-392, B-390	≤ 125 Bhn or ≤ 77 HRb	Profile				510	RPM	15586	7793	5195	3896	2598	1948
								Fz	0.00069	0.0018	0.0034	0.0046	0.0055	0.0064
				2	≤ 0.3	≤ 1.5	(408-612)	Feed (ipm)	21.5	28.1	35.3	35.8	28.6	24.9
				4	≤ 0.3	≤ 1.5		Feed (ipm)	43.0	56.1	70.7	71.7	57.1	49.9
			Slot				410	RPM	12530	6265	4177	3132	2088	1566
								Fz	0.00063	0.0017	0.0032	0.0042	0.0050	0.0059
				2	1	≤ 1	(328-492)	Feed (ipm)	15.8	21.3	26.7	26.3	20.9	18.5
				4	1	≤ 0.25		Feed (ipm)	31.6	42.6	53.5	52.6	41.8	37.0
	COPPER ALLOYS Aluminum Bronze, Muntz Brass, Naval, Brass, Red Brass	≤ 140 Bhn or ≤ 3 HRc	Profile				590	RPM	18030	9015	6010	4508	3005	2254
								Fz	0.00039	0.0010	0.0020	0.0026	0.0031	0.0037
				2	≤ 0.3	≤ 1.5	(472-708)	Feed (ipm)	14.1	18.0	24.0	23.4	18.6	16.7
				4	≤ 0.3	≤ 1.5		Feed (ipm)	28.1	36.1	48.1	46.9	37.3	33.4
			Slot				475	RPM	14516	7258	4839	3629	2419	1815
								Fz	0.00036	0.0010	0.0018	0.0024	0.0029	0.0034
				2	1	≤ 1	(380-570)	Feed (ipm)	10.5	14.5	17.4	17.4	14.0	12.3
				4	1	≤ 0.25		Feed (ipm)	20.9	29.0	34.8	34.8	28.1	24.7
	COPPER ALLOYS Beryllium Copper, C110, Manganese Bronze, Tin Bronze	≤ 200 Bhn or ≤ 23 HRc	Profile				235	RPM	7182	3591	2394	1795	1197	898
								Fz	0.00039	0.0010	0.0020	0.0026	0.0031	0.0037
				2	≤ 0.3	≤ 1.5	(188-282)	Feed (ipm)	5.6	7.2	9.6	9.3	7.4	6.6
				4	≤ 0.3	≤ 1.5		Feed (ipm)	11.2	14.4	19.2	18.7	14.8	13.3
			Slot				190	RPM	5806	2903	1935	1452	968	726
								Fz	0.00036	0.0010	0.0018	0.0024	0.0029	0.0034
				2	1	≤ 1	(152-228)	Feed (ipm)	4.2	5.8	7.0	7.0	5.6	4.9
				4	1	≤ 0.25		Feed (ipm)	8.4	11.6	13.9	13.9	11.2	9.9
	PLASTICS ABS, Polycarbonate, PVC, Polypropylene		Profile				1600	RPM	48896	24448	16299	12224	8149	6112
								Fz	0.00110	0.0030	0.0056	0.0074	0.0089	0.0100
				2	≤ 0.3	≤ 1.5	(1280-1920)	Feed (ipm)	107.6	146.7	182.5	180.9	145.1	122.2
				4	≤ 0.3	≤ 1.5		Feed (ipm)	215.1	293.4	365.1	361.8	290.1	244.5
			Slot				1280	RPM	39117	19558	13039	9779	6519	4890
								Fz	0.00100	0.0027	0.0051	0.0068	0.0082	0.0095
				2	1	≤ 1	(1024-1536)	Feed (ipm)	78.2	105.6	133.0	133.0	106.9	92.9
				4	1	≤ 0.25		Feed (ipm)	156.5	211.2	266.0	266.0	213.8	185.8
	PLASTICS Fiberglass, Glass Filled		Profile				720	RPM	22003	11002	7334	5501	3667	2750
								Fz	0.00082	0.0022	0.0041	0.0055	0.0065	0.0076
				2	≤ 0.3	≤ 1.5	(576-864)	Feed (ipm)	36.1	48.4	60.1	60.5	47.7	41.8
				4	≤ 0.3	≤ 1.5		Feed (ipm)	72.2	96.8	120.3	121.0	95.3	83.6
			Slot				575	RPM	17572	8786	5857	4393	2929	2197
								Fz	0.00075	0.0020	0.0037	0.0050	0.0060	0.0070
				2	1	≤ 1	(460-690)	Feed (ipm)	26.4	35.1	43.3	43.9	35.1	30.8
				4	1	≤ 0.25		Feed (ipm)	52.7	70.3	86.7	87.9	70.3	61.5

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
rpm = (Vc x 3.82) / D_1
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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

FRACTIONAL

End Mills Sets

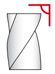


CUTTING DIAMETER D_1	SINGLE END LENGTH OF CUT L_2	DOUBLE END LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2
1/8	1/2	1/4	1-1/2	1/8
3/16	5/8	3/8	2	3/16
1/4	3/4	1/2	2-1/2	1/4
5/16	13/16	1/2	2-1/2	5/16
3/8	1	9/16	2-1/2	3/8
1/2	1	5/8	3	1/2

Square End

FRACTIONAL SERIES

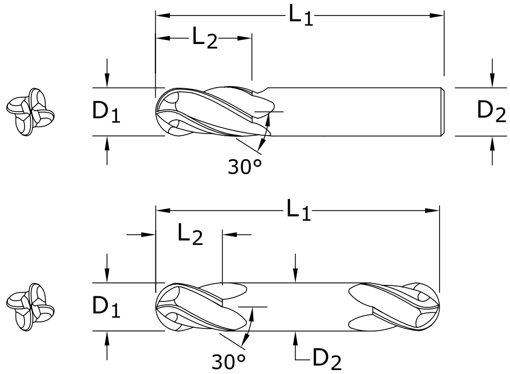
	EDP NO.			
DESCRIPTION	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
Series 1 – 4 Flute, Single End	30189	39189	39089	30030
Series 3 – 2 Flute, Single End	30389	39389	39589	30470
Series 5 – 3 Flute, Single End	30589	39789	30810	30850
Series 14 – 4 Flute, Double End	31489	31481	39641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



For patent information visit www.ksptpatents.com

FRACTIONAL

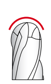
End Mills Sets



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

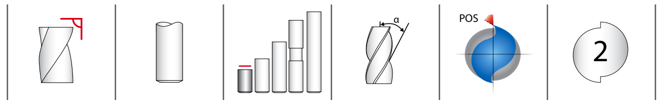
FRACTIONAL SERIES

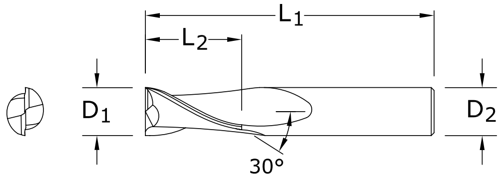


For patent information visit www.ksptpatents.com

DESCRIPTION	EDP NO.			
	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
Series 1B – 4 Flute, Single End	30190	39109	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)

D_1 = +0,000/–0,050
D_2 = h_6

17M
METRIC SERIES

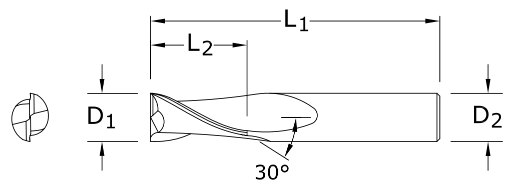
mm				EDP NO.			
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1,0	2,0	38,0	3,0	41705	49262	49283	49304
1,5	3,0	38,0	3,0	41709	49263	49284	49305
2,0	4,0	38,0	3,0	41713	49264	49285	49306
2,5	5,0	38,0	3,0	41717	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)
D_1 = +0,000/–0,050
D_2 = h_6

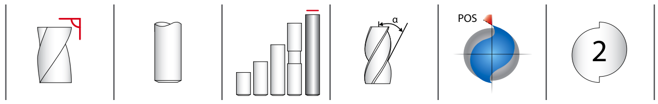
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

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

METRIC

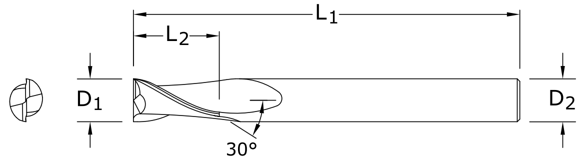
2 Flute Square End Long Reach



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



59M
METRIC SERIES

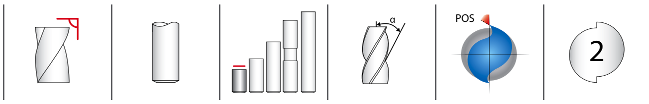
mm				EDP NO.			
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
3,0	9,0	60,0	6,0	43910	43920	43930	43950
4,0	12,0	70,0	6,0	43911	43921	43931	43951
6,0	15,0	80,0	6,0	43912	43922	43932	43952
8,0	20,0	89,0	8,0	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

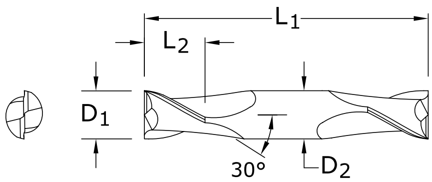
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

2 Flute Double End Mills



15M
METRIC SERIES



TOLERANCES (mm)
D_1 = +0,000/–0,050
D_2 = h_6

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

- STEELS
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- HARDENED STEELS
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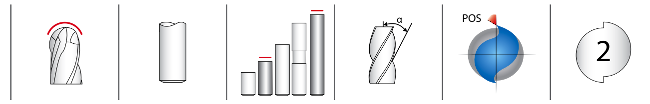
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

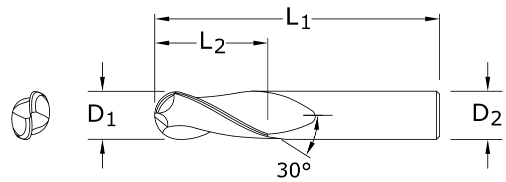
2 Flute Ball End



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



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
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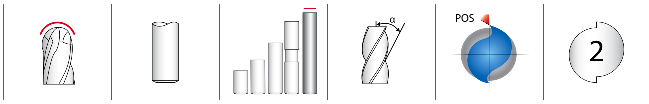
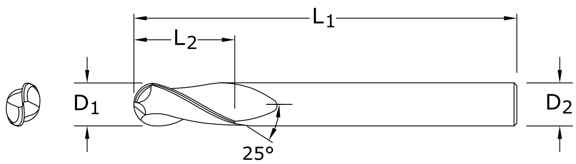
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

2 Flute Ball End Long Reach



59MB
METRIC SERIES



TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6

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

- STEELS
- STAINLESS STEELS
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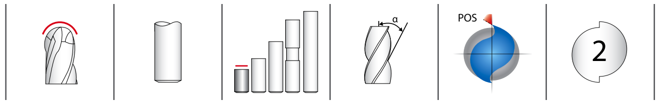
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

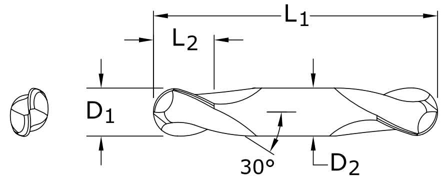
2 Flute Double End Ball End



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



15MB
METRIC SERIES

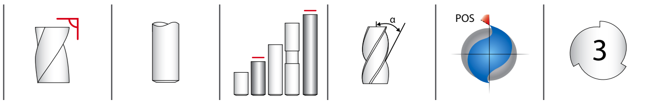
mm				EDP NO.			
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1,0	2,0	38,0	3,0	41506	49073	49094	49115
1,5	3,0	38,0	3,0	41510	49074	49095	49116
2,0	4,0	38,0	3,0	41514	49075	49096	49117
2,5	5,0	38,0	3,0	41518	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

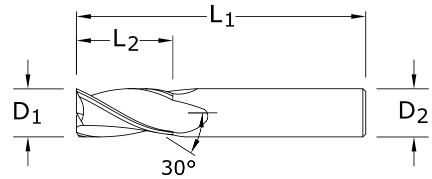
METRIC

3 Flute Square End



5M • 5XLM

METRIC SERIES



TOLERANCES (mm)

D_1 = +0,000/–0,050

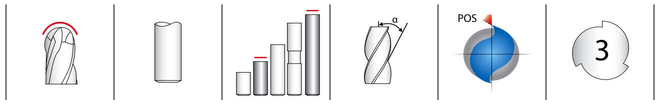
D_2 = h_6

CUTTING DIAMETER D_1 (mm)	LENGTH OF CUT L_2 (mm)	OVERALL LENGTH L_1 (mm)	SHANK DIAMETER D_2 (mm)	EDP NO. UNCOATED	EDP NO. Ti-NAMITE (TiN)	EDP NO. Ti-NAMITE-C (TiCN)	EDP NO. Ti-NAMITE-A (AlTiN)	SERIES
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

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

For patent information visit www.ksptpatents.com

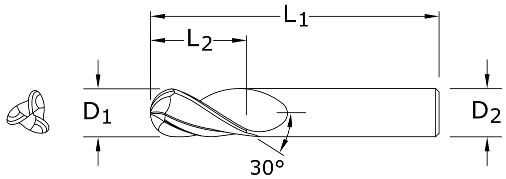
3 Flute Ball End



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



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
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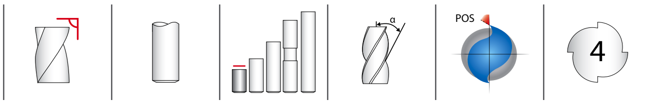
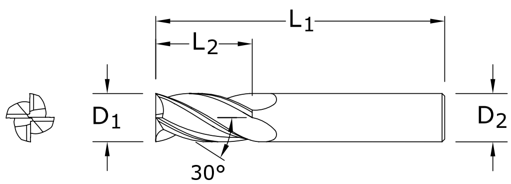
METRIC

4 Flute Square End Stub



16M

METRIC SERIES



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6

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	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

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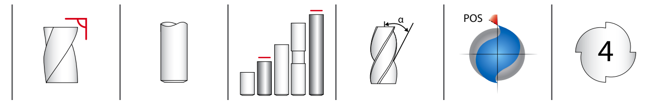
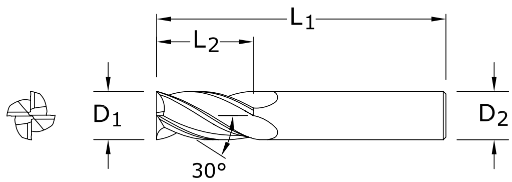
4 Flute End Mills



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
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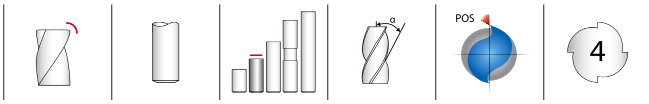
For patent information visit www.ksptpatents.com

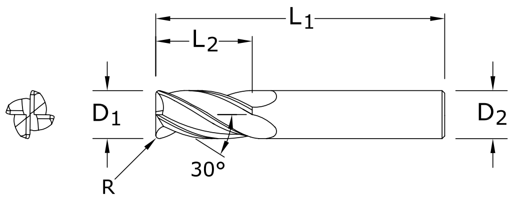
METRIC

4 Flute Corner Radius



1MCR

METRIC SERIES



TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6
R = +0,000/–0,050

mm					EDP NO.
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	CORNER RADIUS R	SHANK DIAMETER D_2	Ti-NAMITE-A (AlTiN)
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

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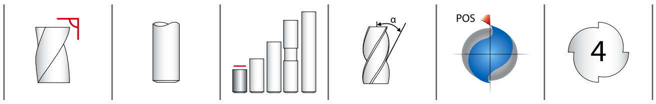
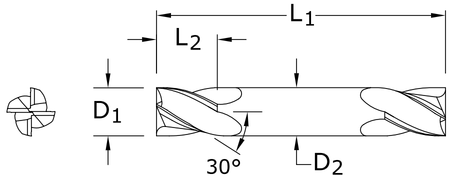
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

4 Flute Double End Mills





TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6

14M
METRIC SERIES

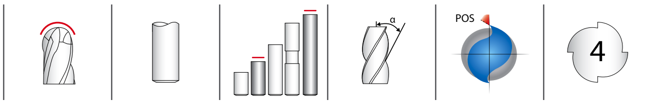
mm				EDP NO.			
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1,0	2,0	38,0	3,0	41405	48884	48905	48926
1,5	3,0	38,0	3,0	41409	48885	48906	48927
2,0	4,0	38,0	3,0	41413	48886	48907	48928
2,5	5,0	38,0	3,0	41417	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

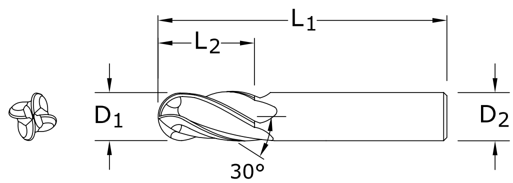
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

METRIC

4 Flute Ball End





1MB • 1XLMB

METRIC SERIES

TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6

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
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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

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

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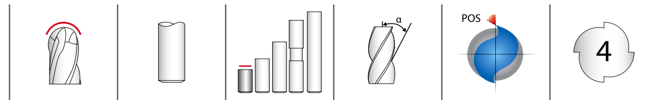
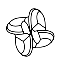
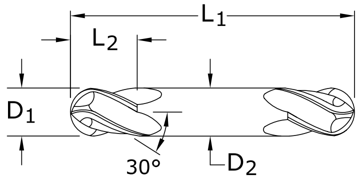
4 Flute Double End Ball End



TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6





14MB
METRIC SERIES

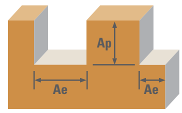
mm				EDP NO.			
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)
1,0	2,0	38,0	3,0	41406	48947	48968	48989
1,5	3,0	38,0	3,0	41410	48948	48969	48990
2,0	4,0	38,0	3,0	41414	48949	48970	48991
2,5	5,0	38,0	3,0	41418	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

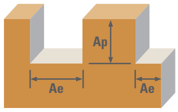


Diameter (D_1) (mm)

	Series 1M, 3M, 5M, 14M, 15M, 16M, 17M, 59M Metric	Hardness		Flutes	Ae x D_1	Ap x D_1	Vc (m/min)		0.4	0.75	1.5	3	6	10	12	20	25
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	Profile				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
				2	≤ 0.50	≤ 1.5	(112-168)	Feed (mm/min)	178	178	184	208	282	357	357	285	250
				3	≤ 0.25	≤ 1.5			268	268	276	312	424	535	535	428	375
				4	≤ 0.25	≤ 1.5			357	357	369	416	565	713	713	571	499
			Slot				102	RPM	81189	43301	21650	10825	5413	3248	2706	1624	1299
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	1	≤ 1	(82-123)	Feed (mm/min)	130	130	134	152	206	260	260	208	182
				3	1	≤ 0.5			195	195	201	227	309	390	390	312	273
				4	1	≤ 0.4			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				102	RPM	81189	43301	21650	10825	5413	3248	2706	1624	1299
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	≤ 0.50	≤ 1.5	(82-123)	Feed (mm/min)	81	104	95	130	152	188	195	156	135
				3	≤ 0.25	≤ 1.5			122	156	143	195	227	283	292	234	203
				4	≤ 0.25	≤ 1.5			162	208	191	260	303	377	390	312	270
			Slot				75	RPM	59377	31668	15834	7917	3958	2375	1979	1188	950
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	1	≤ 1	(60-90)	Feed (mm/min)	59	76	70	95	111	138	143	114	99
				3	1	≤ 0.5			119	152	139	190	222	276	285	228	198
				4	1	≤ 0.4			119	152	139	190	222	276	285	228	198
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc	Profile				96	RPM	76342	40715	20358	10179	5089	3054	2545	1527	1221
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	≤ 0.50	≤ 1.5	(77-115)	Feed (mm/min)	76	98	90	122	143	177	183	147	127
				3	≤ 0.25	≤ 1.5			115	147	134	183	214	266	275	220	191
				4	≤ 0.25	≤ 1.5			153	195	179	244	285	354	366	293	254
			Slot				70	RPM	55741	29729	14864	7432	3716	2230	1858	1115	892
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	1	≤ 1	(56-84)	Feed (mm/min)	56	71	65	89	104	129	134	107	93
				3	1	≤ 0.5			84	107	98	134	156	194	201	161	139
				4	1	≤ 0.4			111	143	131	178	208	259	268	214	186
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	Profile				102	RPM	81189	43301	21650	10825	5413	3248	2706	1624	1299
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	≤ 0.50	≤ 1.5	(82-123)	Feed (mm/min)	130	130	134	152	206	260	260	208	182
				3	≤ 0.25	≤ 1.5			195	195	201	227	309	390	390	312	273
				4	≤ 0.25	≤ 1.5			260	260	268	303	411	520	520	416	364
			Slot				75	RPM	59377	31668	15834	7917	3958	2375	1979	1188	950
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	1	≤ 1	(60-90)	Feed (mm/min)	95	95	98	111	150	190	190	152	133
				3	1	≤ 0.5			143	143	147	166	226	285	285	228	200
				4	1	≤ 0.4			190	190	196	222	301	380	380	304	266
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 275 Bhn or ≤ 28 HRc	Profile				113	RPM	89671	47825	23912	11956	5978	3587	2989	1793	1435
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	≤ 0.50	≤ 1.5	(90-135)	Feed (mm/min)	90	115	105	143	167	208	215	172	149
				3	≤ 0.25	≤ 1.5			135	172	158	215	251	312	323	258	224
				4	≤ 0.25	≤ 1.5			179	230	210	287	335	416	430	344	298
			Slot				82	RPM	65436	34899	17449	8725	4362	2617	2181	1309	1047
								Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	1	≤ 1	(66-99)	Feed (mm/min)	65	84	77	105	122	152	157	126	109
				3	1	≤ 0.5			98	126	115	157	183	228	236	188	163
				4	1	≤ 0.4			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				78	RPM	61800	32960	16480	8240	4120	2472	2060	1236	989
								Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042
				2	≤ 0.50	≤ 1.5	(62-93)	Feed (mm/min)	62	66	63	66	99	119	119	91	83
				3	≤ 0.25	≤ 1.5			93	99	94	99	148	178	179	137	125
				4	≤ 0.25	≤ 1.5			124	132	125	132	198	237	239	183	166
			Slot				56	RPM	44836	23912	11956	5978	2989	1793	1495	897	717
								Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042
				2	1	≤ 1	(45-68)	Feed (mm/min)	45	48	45	48	72	86	87	66	60
				3	1	≤ 0.5			67	72	68	72	108	129	130	100	90
				4	1	≤ 0.4			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

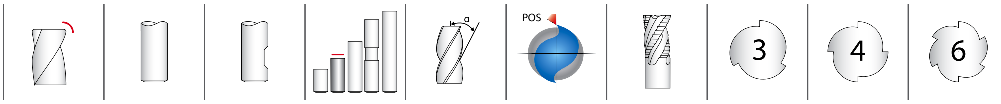


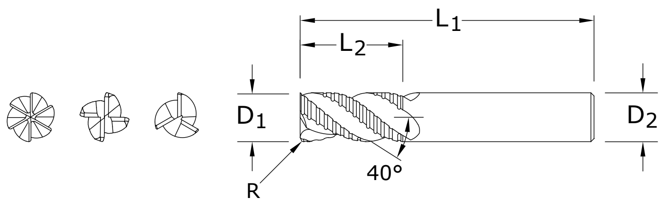
	Series 1M, 3M, 5M, 14M, 15M, 16M, 17M, 59M Metric	Hardness		Flutes	Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 0.4	0.75	1.5	3	6	10	12	20	25
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE)** Inconel 601, 617, 625, 718, Incoloy 800, Monel 400, Rene, Waspalloy	≤ 300 Bhn or ≤ 32 HRc	Profile				20	RPM	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
				2	≤ 0.50	≤ 1.5	(16-24)	Feed (mm/min)	16	12	12	17	21	26	25	20	18
				3	≤ 0.25	≤ 1.5			24	18	18	25	32	40	38	30	26
				4	≤ 0.25	≤ 1.5			32	24	24	34	42	53	50	40	35
			Slot				14	RPM	10906	5816	2908	1454	727	436	364	218	174
								Fz	0.0005	0.0007	0.0014	0.004	0.010	0.021	0.024	0.032	0.035
				2	1	≤ 1	(11-16)	Feed (mm/min)	11	8	8	12	15	18	17	14	12
				3	1	≤ 0.5			16	12	12	17	22	27	26	21	18
				4	1	≤ 0.4			22	16	16	23	29	37	35	28	24
S	**TITANIUM ALLOYS** Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti10Al2Fe3Al, Ti5Al53Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al	≤ 350 Bhn or ≤ 38 HRc	Profile				55	RPM	43624	23266	11633	5816	2908	1745	1454	872	698
								Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042
				2	≤ 0.50	≤ 1.5	(44-66)	Feed (mm/min)	44	47	44	47	70	84	84	65	59
				3	≤ 0.25	≤ 1.5			65	70	66	70	105	126	127	97	88
				4	≤ 0.25	≤ 1.5			87	93	88	93	140	168	169	129	117
			Slot				40	RPM	31506	16803	8402	4201	2100	1260	1050	630	504
								Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042
				2	1	≤ 1	(32-48)	Feed (mm/min)	32	34	32	34	50	60	61	47	42
				3	1	≤ 0.5			47	50	48	50	76	91	91	70	64
				4	1	≤ 0.4			63	67	64	67	101	121	122	93	85
N	**ALUMINUM ALLOYS** 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	Profile				268	RPM	213272	113745	56872	28436	14218	8531	7109	4265	3412
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	≤ 0.50	≤ 1.5	(215-322)	Feed (mm/min)	640	728	682	796	1081	1365	1365	1092	955
				3	≤ 0.25	≤ 1.5			960	1092	1024	1194	1621	2047	2047	1638	1433
			Slot				195	RPM	155107	82724	41362	20681	10340	6204	5170	3102	2482
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	1	≤ 1	(156-234)	Feed (mm/min)	465	529	496	579	786	993	993	794	695
				3	1	≤ 0.5			698	794	745	869	1179	1489	1489	1191	1042
N	**COPPER ALLOYS** Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	Profile				148	RPM	117542	62689	31344	15672	7836	4702	3918	2351	1881
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	≤ 0.50	≤ 1.5	(118-177)	Feed (mm/min)	188	188	194	219	298	376	376	301	263
				3	≤ 0.25	≤ 1.5			282	282	292	329	447	564	564	451	395
				4	≤ 0.25	≤ 1.5			376	376	389	439	596	752	752	602	527
			Slot					RPM	84824	45239	22620	11310	5655	3393	2827	1696	1357
								Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	1	≤ 1		Feed (mm/min)	136	136	140	158	215	271	271	217	190
				3	1	≤ 0.5			204	204	210	238	322	407	407	326	285
				4	1	≤ 0.4			271	271	280	317	430	543	543	434	380
N	**PLASTICS** Polycarbonate, PVC, Polypropylene		Profile				268	RPM	213272	113745	56872	28436	14218	8531	7109	4265	3412
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	≤ 0.50	≤ 1.5	(215-322)	Feed (mm/min)	640	728	682	796	1081	1365	1365	1092	955
				3	≤ 0.25	≤ 1.5			960	1092	1024	1194	1621	2047	2047	1638	1433
				4	≤ 0.25	≤ 1.5			1280	1456	1365	1592	2161	2730	2730	2184	1911
			Slot				195	RPM	155107	82724	41362	20681	10340	6204	5170	3102	2482
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	1	≤ 1	(156-234)	Feed (mm/min)	465	529	496	579	786	993	993	794	695
				3	1	≤ 0.5			698	794	745	869	1179	1489	1489	1191	1042
				4	1	≤ 0.4			931	1059	993	1158	1572	1985	1985	1588	1390
N	**GRAPHITE**		Profile				201	RPM	159954	85309	42654	21327	10664	6398	5332	3199	2559
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	≤ 0.50	≤ 1.5	(161-241)	Feed (mm/min)	480	546	512	597	810	1024	1024	819	717
				3	≤ 0.25	≤ 1.5			720	819	768	896	1216	1536	1536	1228	1075
				4	≤ 0.25	≤ 1.5			960	1092	1024	1194	1621	2047	2047	1638	1433
			Slot				146	RPM	116330	62043	31021	15511	7755	4653	3878	2327	1861
								Fz	0.0015	0.0032	0.0060	0.014	0.038	0.080	0.096	0.128	0.140
				2	1	≤ 1	(117-176)	Feed (mm/min)	349	397	372	434	589	745	745	596	521
				3	1	≤ 0.5			523	596	558	651	884	1117	1117	893	782
				4	1	≤ 0.4			698	794	745	869	1179	1489	1489	1191	1042

Bhn (Brinell) HRc (Rockwell C)
rpm = (Vc x 1000) / (D_1 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 D_1 when slotting or profiling
reduce feed and Ae when finish milling (.02 x D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Single End Roughers (Fine Pitch)





62M
METRIC SERIES

TOLERANCES h10 (mm)

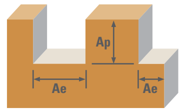
D_1 = +0,000 / –0,100
D_2 = h_6
R = +0,127/–0,127

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	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	6	46231	46230	46233

STAINLESS STEELS
HIGH TEMP ALLOYS
TITANIUM

For patent information visit www.ksptpatents.com

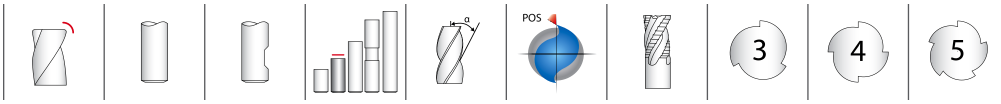
Single End Roughers (Fine Pitch)

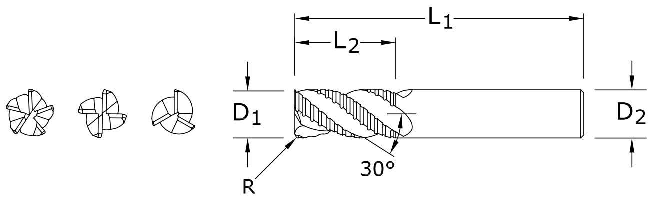


ISO	Series 62M Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)	Diameter (D_1) (mm)	6	10	12	20	25
M	**STAINLESS STEELS (FREE MACHINING)** 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	123	RPM	6544	3926	3272	1963	1570
						(99-148)	Fz	0.014	0.029	0.036	0.051	0.053
							Feed (mm/min)	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
M	**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
S	**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) / (D_1 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)

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

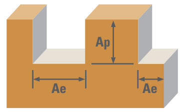
STEELS

CAST IRON

HARDENED STEELS

For patent information visit www.ksptpatents.com

Single End Roughers (Coarse Pitch)

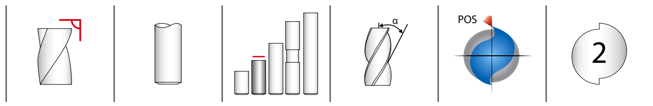


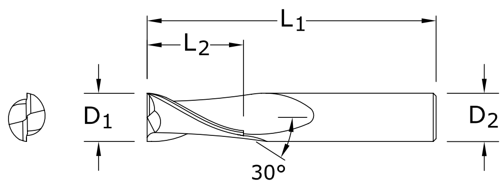
	Series 61M Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	10	12	20	25
P	**CARBON STEELS** 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	Profile	≤ 0.5	≤ 1.5	152	RPM	8078	4847	4039	2424	1939
						(122-183)	Fz	0.014	0.029	0.034	0.045	0.050
							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	≤ 275 Bhn or ≤ 28 HR	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	≤ 250 Bhn or ≤ 24 HRc	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	≤ 220 Bhn or ≤ 19 HRc	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) / (D_1 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

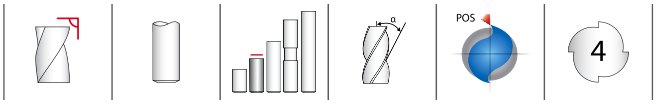
mm				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE-C (TiCN)
3,0	7,0	38,0	3,0	45277	49829
3,5	7,0	57,0	6,0	45279	49830
4,0	8,0	57,0	6,0	45281	49831
4,5	8,0	57,0	6,0	45283	49832
5,0	10,0	57,0	6,0	45285	49833
6,0	10,0	57,0	6,0	45287	49834
8,0	16,0	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

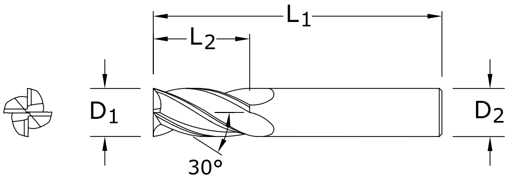
NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

4 Flute High Shear End Mills





TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6

54M
METRIC SERIES

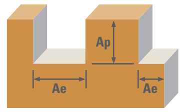
mm				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE-C (TiCN)
3,0	8,0	38,0	3,0	45477	45478
3,5	10,0	57,0	6,0	45479	45480
4,0	11,0	57,0	6,0	45481	45482
4,5	11,0	57,0	6,0	45483	45484
5,0	13,0	57,0	6,0	45485	45486
6,0	13,0	57,0	6,0	45487	45488
8,0	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

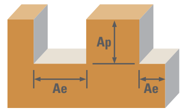
2 Flute: High Shear End Mills
4 Flute: High Shear End Mills



Series 52M, 54M Metric	Hardness		Flutes	Ae x D_1	Ap x D_1	Vc (m/min)	Diameter (D_1) (mm)	3	6	10	12	20	25
N													
ALUMINUM ALLOYS **2024, 5052, 5086, 6061, 6063, 7075**	≤ 150 Bhn or ≤ 7 HRc	Profile				415	RPM	43947	21973	13184	10987	6592	5274
							Fz	0.0166	0.043	0.091	0.110	0.147	0.160
			2	≤ 0.3	≤ 1.5	(332-497)	Feed (mm/min)	1459	1890	2399	2417	1938	1688
			4	≤ 0.3	≤ 1.5			2918	3779	4799	4834	3876	3375
		Slot				332	RPM	35222	17611	10567	8806	5283	4227
							Fz	0.0151	0.041	0.085	0.101	0.133	0.148
			2	1	≤ 1	(266-399)	Feed (mm/min)	1064	1444	1796	1779	1405	1251
			4	1	≤ 0.25			2127	2888	3593	3557	2811	2502
ALUMINUM DIE CAST ALLOYS (HIGH SILICON) A-390, A-392, B-390	≤ 125 Bhn or ≤ 77 HRb	Profile				155	RPM	16480	8240	4944	4120	2472	1978
							Fz	0.0166	0.043	0.091	0.110	0.147	0.160
			2	≤ 0.3	≤ 1.5	(124-187)	Feed (mm/min)	547	709	900	906	727	633
			4	≤ 0.3	≤ 1.5			1094	1417	1800	1813	1454	1266
		Slot				125	RPM	13249	6624	3975	3312	1987	1590
							Fz	0.0151	0.041	0.085	0.101	0.133	0.148
			2	1	≤ 1	(100-150)	Feed (mm/min)	400	543	676	669	529	471
			4	1	≤ 0.25			800	1086	1351	1338	1057	941
COPPER ALLOYS **Aluminum Bronze, Muntz Brass, Naval, Brass, Red Brass**	≤ 140 Bhn or ≤ 3 HRc	Profile				180	RPM	19065	9533	5720	4766	2860	2288
							Fz	0.0094	0.024	0.053	0.062	0.083	0.093
			2	≤ 0.3	≤ 1.5	(144-216)	Feed (mm/min)	358	458	606	591	475	426
			4	≤ 0.3	≤ 1.5			717	915	1213	1182	949	851
		Slot				145	RPM	15349	7675	4605	3837	2302	1842
							Fz	0.0086	0.024	0.048	0.058	0.077	0.085
			2	1	≤ 1	(116-174)	Feed (mm/min)	264	368	442	445	355	313
			4	1	≤ 0.25			528	737	884	890	709	626
COPPER ALLOYS **Beryllium Copper, C110, Manganese Bronze, Tin Bronze**	≤ 200 Bhn or ≤ 23 HRc	Profile				72	RPM	7594	3797	2278	1898	1139	911
							Fz	0.0094	0.024	0.053	0.062	0.083	0.093
			2	≤ 0.3	≤ 1.5	(57-86)	Feed (mm/min)	143	182	241	235	189	169
			4	≤ 0.3	≤ 1.5			286	365	483	471	378	339
		Slot				58	RPM	6140	3070	1842	1535	921	737
							Fz	0.0086	0.024	0.048	0.058	0.077	0.085
			2	1	≤ 1	(46-69)	Feed (mm/min)	106	147	177	178	142	125
			4	1	≤ 0.25			211	295	354	356	284	250

continued on next page

2 Flute: High Shear End Mills
4 Flute: High Shear End Mills



ISO	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				488	RPM	51702	25851	15511	12926	7755	6204
						(390-585)	Fz	0.0264	0.072	0.149	0.178	0.237	0.250
			2	≤ 0.3	≤ 1.5		Feed (mm/min)	2730	3723	4622	4601	3676	3102
			4	≤ 0.3	≤ 1.5			5460	7445	9244	9203	7352	6204
		Slot				390	RPM	41362	20681	12409	10340	6204	4963
						(312-468)	Fz	0.0240	0.065	0.136	0.163	0.210	0.238
			2	1	≤ 1		Feed (mm/min)	1985	2689	3375	3371	2606	2363
			4	1	≤ 0.25			3971	5377	6750	6742	5212	4725
	PLASTICS Fiberglass, Glass Filled	Profile				219	RPM	23266	11633	6980	5816	3490	2792
						(176-263)	Fz	0.0197	0.053	0.109	0.132	0.173	0.190
			2	≤ 0.3	≤ 1.5		Feed (mm/min)	917	1233	1522	1536	1208	1061
			4	≤ 0.3	≤ 1.5			1833	2466	3043	3071	2415	2122
		Slot				175	RPM	18580	9290	5574	4645	2787	2230
						(140-210)	Fz	0.0180	0.048	0.101	0.120	0.160	0.175
			2	1	≤ 1		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) / (D_1 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 D_1 maximum)
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

KYOCERA
SGS Precision Tools

SGS®
Solid Carbide Tools

High Performance Drills

Hole Making

HIGH PERFORMANCE DRILLS	SERIES	DESCRIPTION	PAGE
Hi-PerCarb	135 (3xD)	2 Flute External Coolant Double Margin 3xD	241
	135 (5xD)	2 Flute External Coolant Double Margin 5xD	250
	131N (5xD)	3 Flute External Coolant Triple Margin 5xD	260
Ice-Carb®	140 (5xD)	2 Flute Internal Coolant 5xD	266
	140 (8xD)	2 Flute Internal Coolant 8xD	274
CFRP 8 Facet	120	2 Flute External Coolant Double Margin CFRP	282

Speed & Feed Recommendations listed after each series

Taladrado

TALADROS DE ALTO RENDIMIENTO	SERIE	DESCRIPCIÓN	PÁGINA
Hi-PerCarb	135 (3xD)	2 filos, refrigerante externo, doble margen, 3xD	241
	135 (5xD)	2 filos, refrigerante externo, doble margen, 5xD	250
	131N (5xD)	3 filos, refrigerante externo, triple margen, 5xD	260
Ice-Carb®	140 (5xD)	2 filos, refrigerante interno, 5xD	266
	140 (8xD)	2 filos, refrigerante interno, 8xD	274
De 8 caras CFRP	120	2 filos, refrigerante externo, doble margen, CFRP	282

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	241
	135 (5xD)	2 dents refroidissement externe à double listel 5xD	250
	131N (5xD)	3 dents refroidissement externe à triple listel 5xD	260
Ice-Carb®	140 (5xD)	2 dents refroidissement interne 5xD	266
	140 (8xD)	2 dents refroidissement interne 8xD	274
CFRP à 8 facettes	120	2 dents refroidissement externe à double listel CFRP	282

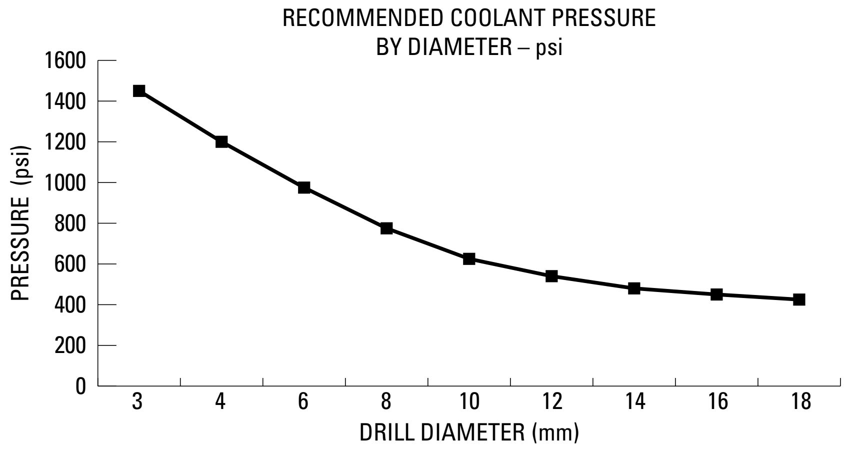
Recommandations de vitesse et avance indiquées après chaque série

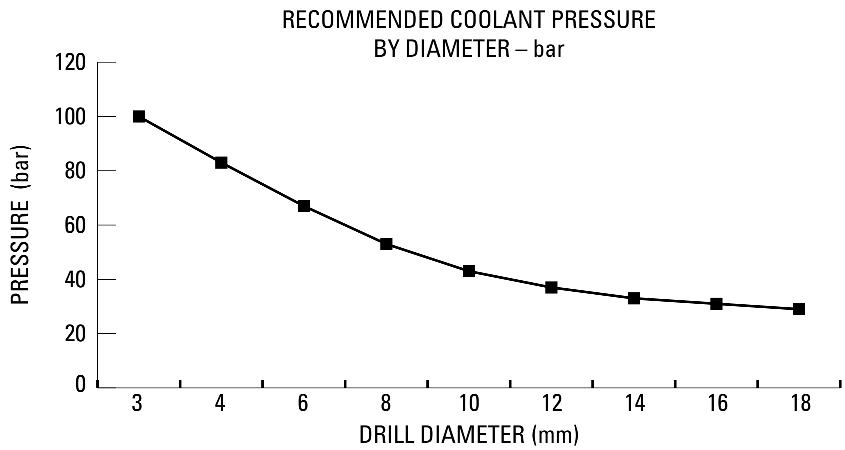
Bohren

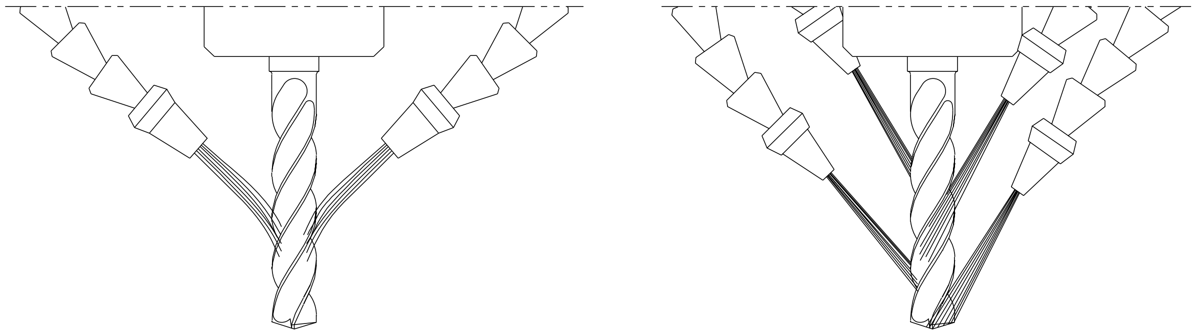
HOCHLEISTUNGS-BOHRER	SERIE	BESCHREIBUNG	SEITE
Hi-PerCarb	135 (3xD)	Doppelfasenbohrer 3xD mit 2 Schneidekanten und Außenkühlung	241
	135 (5xD)	Doppelfasenbohrer 5xD mit 2 Schneidekanten und Außenkühlung	250
	131N (5xD)	Dreifasenbohrer 5xD mit 3 Schneidekanten und Außenkühlung	260
Ice-Carb®	140 (5xD)	Bohrer 5xD mit 2 Schneidekanten und Innenkühlung	266
	140 (8xD)	Bohrer 8xD mit 2 Schneidekanten und Innenkühlung	274
CFRP 8 Facet	120	Doppelfasenbohrer CFRP mit 2 Schneidekanten und Außenkühlung	282

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

- 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.







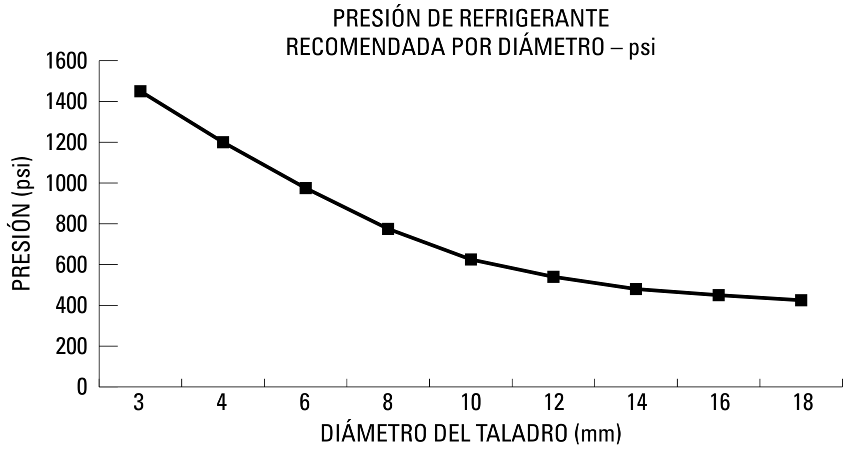
LARGE TIP – LOW VELOCITY
NO COVERAGE AT MAXIMUM DEPTH

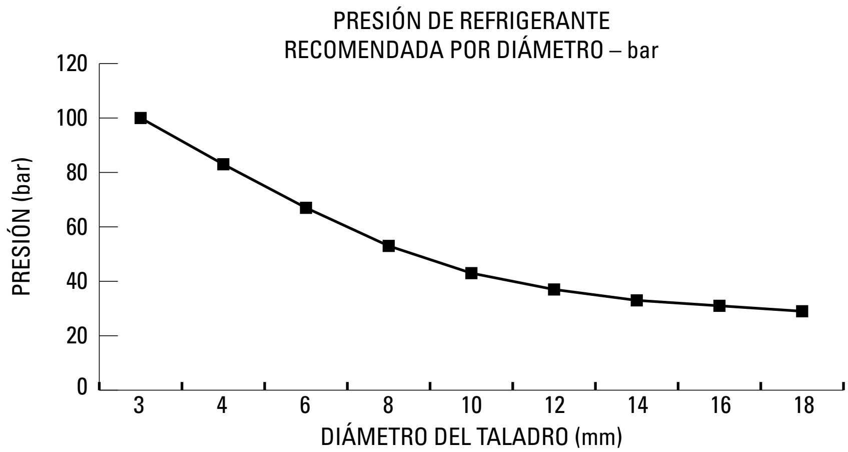
SMALL TIP – HIGH VELOCITY
COMPLETE COVERAGE

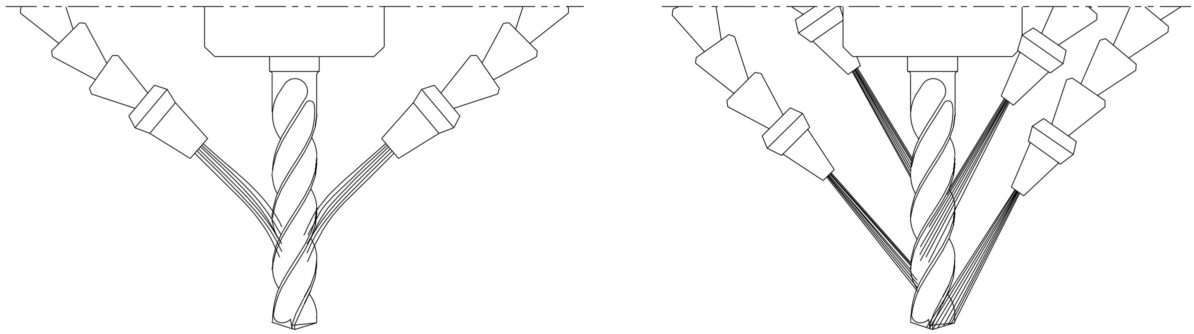
- Reducing the nozzle size helps maximize the cooling benefits of the unique double margin design on the Hi-PerCarb drill by increasing velocity. Aim the nozzles in line with the secondary flute located between the two margins as well as the flute for best results.

Operaciones de taladrado Refrigerantes recomendados

- El líquido refrigerante actúa movilizando las virutas fuera de la zona de corte, disminuyendo el calor generado durante el proceso de corte y minimizando la fricción.
- Es importante optimizar la presión del refrigerante y la posición para poder obtener todos los beneficios del refrigerante durante el proceso de corte.
- Una aplicación apropiada del refrigerante 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 es importante pero lo es más la estabilidad de la presión y la aplicación en la herramienta; la refrigeración intermitente del carburo conlleva un estrés térmico del material y la formación de "microfisuras".
- La limpieza adecuada y la filtración de refrigerantes es importante para que el mismo mantenga sus propiedades beneficiosas, y también para evitar una reducción en la presión o la posibilidad de obstruir los canales del refrigerante del taladro.







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 del taladro 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.

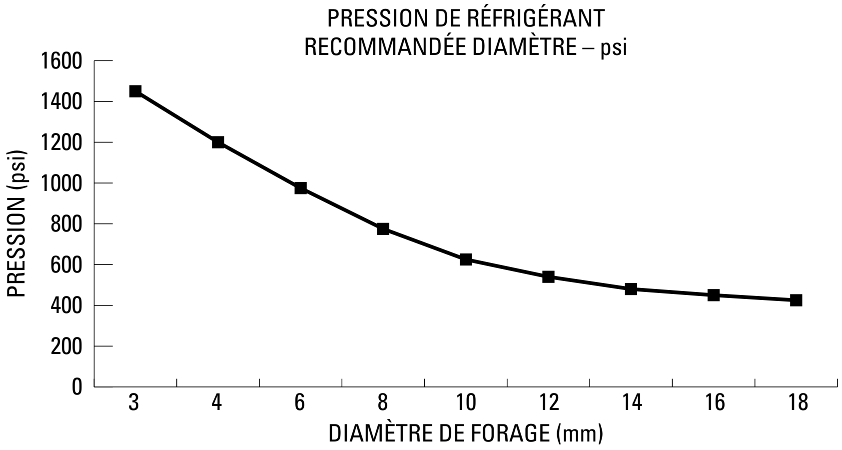
- Le réfrigérant sert à éloigner les copeaux de la zone de coupe, à réduire la chaleur dégagée durant la coupe et à minimiser la friction.

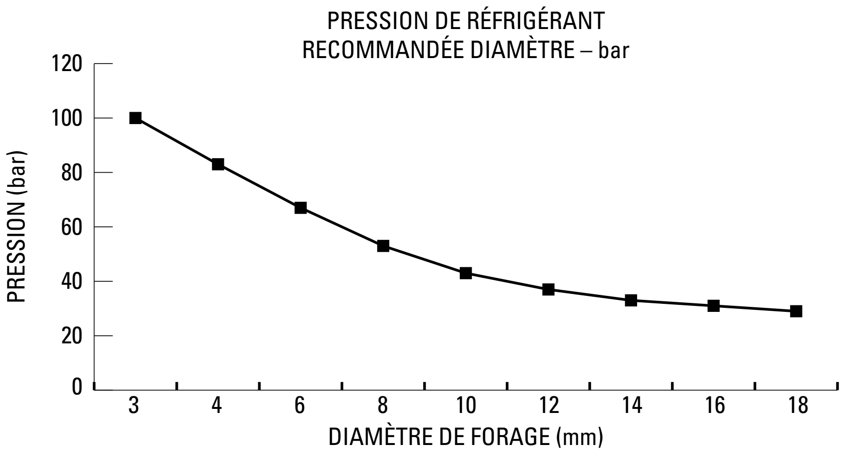
- Il est important d'optimiser la pression et la position du réfrigérant pour en retirer les bénéfices maximums durant la coupe.

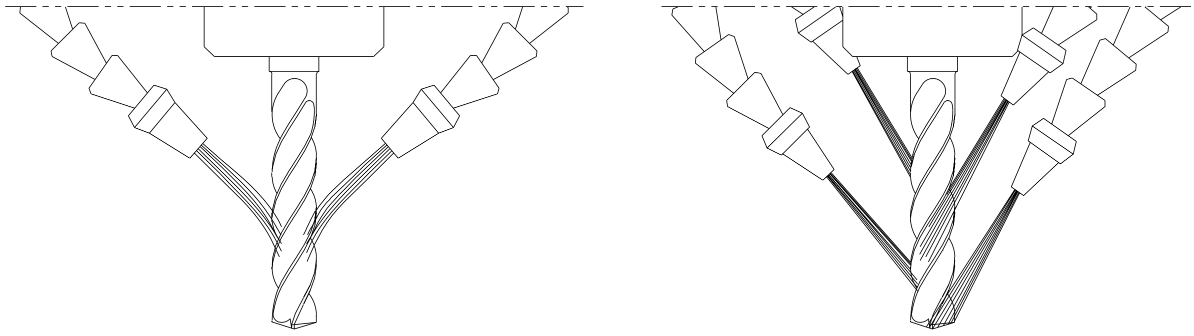
- L'application adéquate de réfrigérant se traduit par des paramètres opératoires supérieurs, des taux d'élimination supérieurs des matériaux, de plus belles finitions des surfaces, une durée de vie des outils prévisible, moins de consommation d'énergie et des temps de cycle réduits.

- 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

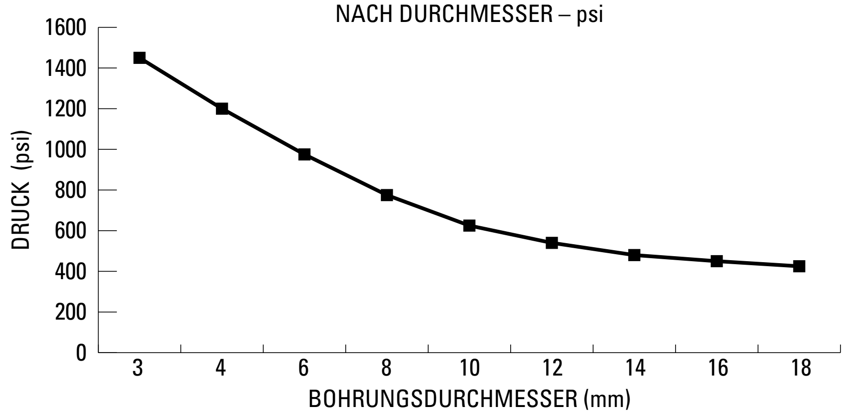
POINTE FINE – GRANDE VITESSE
COUVERTURE COMPLÈTE

- 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.

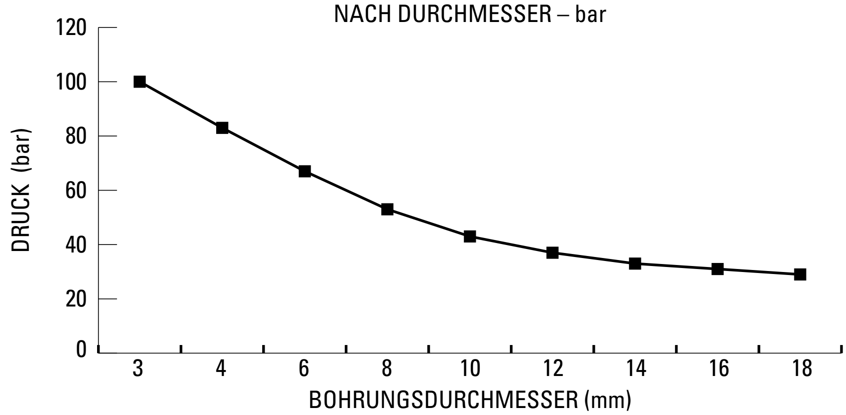
Bohrarbeiten Kühlmittelempfehlungen

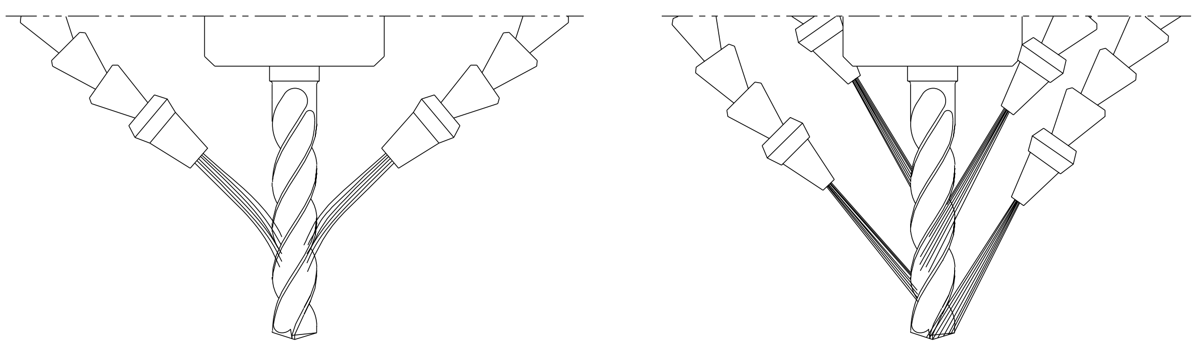
- Kühlmittel dienen dazu, die Späne aus dem Schneidenbereich zu entfernen, die beim Schneiden erzeugte Wärme abzutransportieren und die Reibung zu verringern.
- Es kommt darauf an, den Kühlschmiermitteldruck und die Zufuhr zu optimieren, um alle Vorteile beim Bohren nutzen zu können.
- Der richtige Kühlschmiermitteleinsatz ermöglicht höhere Schnittparameter, höheren Materialabtrag, geringere Oberflächenrauheit, vorhersehbare Standzeiten und geringere Leitungsaufnahme und Zykluszeiten.
- 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".
- Kühlmitteln 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

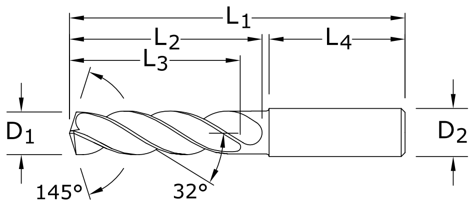
- Durch Verringern der Düsengröße können die vorteilhaften Eigenschaften der Doppelfase genutzt werden, um die Drehzahl des Hi-PerCarb-Bohrers zu steigern. Richten Sie die Düsen auf die Nebennut zwischen beiden Fasen sowie auf die Schneidekante aus, um beste Ergebnisse zu erzielen.

3xD

2

135 3xD

FRACTIONAL & METRIC SERIES



TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) 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

- 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)

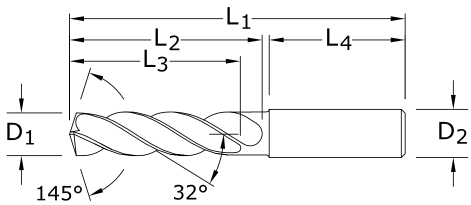
Hi-PerCarb

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

3xD 2

135 3xD

FRACTIONAL & METRIC SERIES



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CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) 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

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TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
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TOLERANCES (mm)

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>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 3xD
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D2	OVERALL LENGTH L1	FLUTE LENGTH L2	CLEARED LENGTH L3	SHANK LENGTH L4	Ti-NAMITE-A (AlTiN) EDP NO.
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

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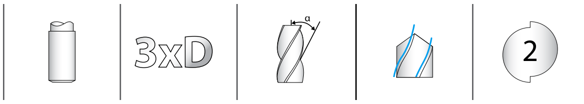
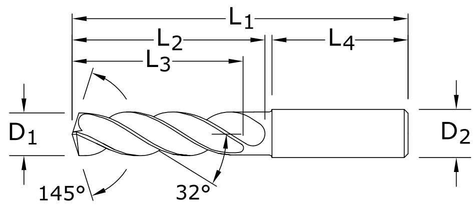
Hi-PerCarb

HIGH PERFORMANCE CARBIDE DRILLS



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 D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) 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

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TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

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HIGH PERFORMANCE CARBIDE DRILLS

135 3xD
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D2	OVERALL LENGTH L1	FLUTE LENGTH L2	CLEARED LENGTH L3	SHANK LENGTH L4	Ti-NAMITE-A (AlTiN) 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

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
	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
H	**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
K	**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
	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
S	**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
N	**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 x 3.82 / D_1
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)

METRIC

Hi-PerCarb

	Series 135 3D Metric	Hardness	Vc (m/min)		Diameter (D_1) (inch) 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
	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
H	**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
K	**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
	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

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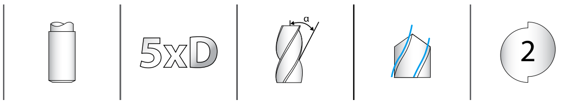
	Series 135 3D Metric	Hardness	Vc (m/min)	Diameter (D_1) (inch)	1.5	3	6	8	10	12	16	20
S	**SUPER ALLOYS (NICKEL , COBALT, IRON BASE)** Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy	≤ 300 Bhn or ≤ 32 HRc	17	RPM	3555	1777	889	666	533	444	333	267
			(13-20)	Fr	0.010	0.020	0.039	0.053	0.066	0.079	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) / (D_1 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)

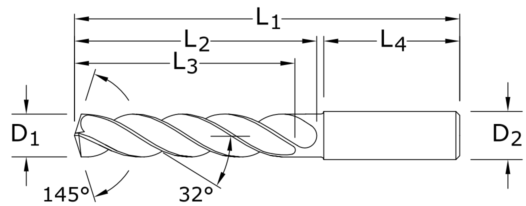
Hi-PerCarb

HIGH PERFORMANCE CARBIDE DRILLS



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 D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) 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)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

CONTINUED

CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) 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

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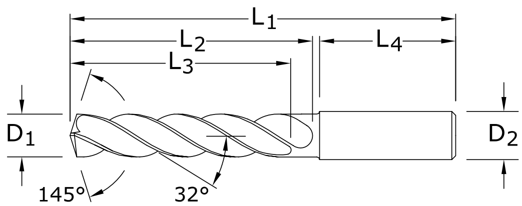
Hi-PerCarb

HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

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 D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) 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
5,9 mm	0.2323			6,0	82,0	44,0	35,0	36,0	64130
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

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TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

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135 5xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D2	OVERALL LENGTH L1	FLUTE LENGTH L2	CLEARED LENGTH L3	SHANK LENGTH L4	Ti-NAMITE-A (AlTiN) 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

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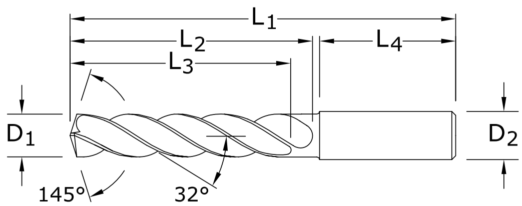
HIGH PERFORMANCE CARBIDE DRILLS



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 D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) 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

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TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

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HIGH PERFORMANCE CARBIDE DRILLS

135 5xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D2	OVERALL LENGTH L1	FLUTE LENGTH L2	CLEARED LENGTH L3	SHANK LENGTH L4	Ti-NAMITE-A (AlTiN) EDP NO.
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

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
	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
H	**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
K	**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
	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

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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 x 3.82 / D_1
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)

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	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
	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
H	**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
K	**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
	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

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	Series 135M 5D 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	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
N	**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 x 1000) / (D_1 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)

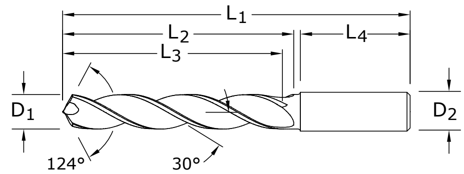
HI-PERCARB®
HIGH PERFORMANCE CARBIDE DRILLS

5xD

3

131N 5xD

FRACTIONAL & METRIC SERIES



- Triple margin design improves hole stability and size control while providing superior finish, roundness and hole 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 DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-B (TiB_2) EDP NO.
3,0 mm	0.1181			6,0	66,0	28,0	23,0	36,0	64800
3,1 mm	0.1220			6,0	66,0	28,0	23,0	36,0	64801
1/8	0.1250	3.18		6,0	66,0	28,0	23,0	36,0	54800
3,2 mm	0.1260		M3,5 X 0,35	6,0	66,0	28,0	23,0	36,0	64802
3,3 mm	0.1299		M4 X 0,7	6,0	66,0	28,0	23,0	36,0	64803
3,4 mm	0.1339			6,0	66,0	28,0	23,0	36,0	64804
#29	0.1360	3.45	8-32,8-36	6,0	66,0	28,0	23,0	36,0	54801
3,5 mm	0.1378		M4 X 0,5	6,0	66,0	28,0	23,0	36,0	64805
9/64	0.1406	3.57		6,0	66,0	28,0	23,0	36,0	54802
3,6 mm	0.1417		M4 X 0,35	6,0	66,0	28,0	23,0	36,0	64806
3,7 mm	0.1457		M4,5 X 0,75	6,0	66,0	28,0	23,0	36,0	64807
3,8 mm	0.1496		10-24	6,0	74,0	36,0	29,0	36,0	64808
3,9 mm	0.1535			6,0	74,0	36,0	29,0	36,0	64809
5/32	0.1562	3.97		6,0	74,0	36,0	29,0	36,0	54803
4,0 mm	0.1575		M4,5 X 0,5	6,0	74,0	36,0	29,0	36,0	64810
#21	0.1590	4.04	10-32	6,0	74,0	36,0	29,0	36,0	54804
4,1 mm	0.1614			6,0	74,0	36,0	29,0	36,0	64811
4,2 mm	0.1654		M5 / M5 x 0,75	6,0	74,0	36,0	29,0	36,0	64812
4,3 mm	0.1693			6,0	74,0	36,0	29,0	36,0	64813
11/64	0.1719	4.37		6,0	74,0	36,0	29,0	36,0	54805
4,4 mm	0.1732		12-24	6,0	74,0	36,0	29,0	36,0	64814
4,5 mm	0.1772		M5 X 0,5	6,0	74,0	36,0	29,0	36,0	64815
4,6 mm	0.1811		12-28	6,0	74,0	36,0	29,0	36,0	64816
4,7 mm	0.1850		12-32	6,0	74,0	36,0	29,0	36,0	64817
3/16	0.1875	4.76		6,0	82,0	44,0	35,0	36,0	54806
4,8 mm	0.1890		7/32-32	6,0	82,0	44,0	35,0	36,0	64818
4,9 mm	0.1929			6,0	82,0	44,0	35,0	36,0	64819
5,0 mm	0.1969		M6 X 1	6,0	82,0	44,0	35,0	36,0	64820
5,1 mm	0.2008		1/4-20	6,0	82,0	44,0	35,0	36,0	64821
13/64	0.2031	5.16		6,0	82,0	44,0	35,0	36,0	54807
5,2 mm	0.2047		M6 X 0,75	6,0	82,0	44,0	35,0	36,0	64822
5,3 mm	0.2087			6,0	82,0	44,0	35,0	36,0	64823
5,4 mm	0.2126			6,0	82,0	44,0	35,0	36,0	64824
5,5 mm	0.2165		M6 X 0,5	6,0	82,0	44,0	35,0	36,0	64825
7/32	0.2188	5.56	1/4-32	6,0	82,0	44,0	35,0	36,0	54808
5,6 mm	0.2205			6,0	82,0	44,0	35,0	36,0	64826

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TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

131N 5xD
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-B (TiB_2) EDP NO.
5,7 mm	0.2244			6,0	82,0	44,0	35,0	36,0	64827
5,8 mm	0.2283			6,0	82,0	44,0	35,0	36,0	64828
5,9 mm	0.2323			6,0	82,0	44,0	35,0	36,0	64829
15/64	0.2344	5.95		6,0	82,0	44,0	35,0	36,0	54809
6,0 mm	0.2362		M7 X 1	6,0	82,0	44,0	35,0	36,0	64830
6,1 mm	0.2402			8,0	91,0	53,0	43,0	36,0	64831
6,2 mm	0.2441		M7 X 0,75	8,0	91,0	53,0	43,0	36,0	64832
6,3 mm	0.2480			8,0	91,0	53,0	43,0	36,0	64833
1/4	0.2500	6.35		8,0	91,0	53,0	43,0	36,0	54810
6,4 mm	0.2520			8,0	91,0	53,0	43,0	36,0	64834
6,5 mm	0.2559			8,0	91,0	53,0	43,0	36,0	64835
F	0.2570	6.53	5/16-18	8,0	91,0	53,0	43,0	36,0	54811
6,6 mm	0.2598			8,0	91,0	53,0	43,0	36,0	64836
6,7 mm	0.2638			8,0	91,0	53,0	43,0	36,0	64837
17/64	0.2656	6.75	5/16-20	8,0	91,0	53,0	43,0	36,0	54812
6,8 mm	0.2677		M8 X 1,25	8,0	91,0	53,0	43,0	36,0	64838
6,9 mm	0.2717		5/16-24	8,0	91,0	53,0	43,0	36,0	64839
7,0 mm	0.2756		M8 X 1	8,0	91,0	53,0	43,0	36,0	64840
7,1 mm	0.2795			8,0	91,0	53,0	43,0	36,0	64841
9/32	0.2812	7.14	5/16-32	8,0	91,0	53,0	43,0	36,0	54813
7,2 mm	0.2835		M8 X 0,75	8,0	91,0	53,0	43,0	36,0	64842
7,3 mm	0.2874			8,0	91,0	53,0	43,0	36,0	64843
7,4 mm	0.2913			8,0	91,0	53,0	43,0	36,0	64844
7,5 mm	0.2953		M8 X 0,5	8,0	91,0	53,0	43,0	36,0	64845
19/64	0.2969	7.54		8,0	91,0	53,0	43,0	36,0	54814
7,6 mm	0.2992			8,0	91,0	53,0	43,0	36,0	64846
7,7 mm	0.3031			8,0	91,0	53,0	43,0	36,0	64847
7,8 mm	0.3071		M9 X 1,25	8,0	91,0	53,0	43,0	36,0	64848
7,9 mm	0.3110			8,0	91,0	53,0	43,0	36,0	64849
5/16	0.3125	7.94	3/8-16	8,0	91,0	53,0	43,0	36,0	54815
8,0 mm	0.3150		M9 X 1	8,0	91,0	53,0	43,0	36,0	64850
8,1 mm	0.3189			10,0	103,0	61,0	49,0	40,0	64851
8,2 mm	0.3228			10,0	103,0	61,0	49,0	40,0	64852
8,3 mm	0.3268			10,0	103,0	61,0	49,0	40,0	64853
21/64	0.3281	8.33	3/8-20	10,0	103,0	61,0	49,0	40,0	54816
8,4 mm	0.3307			10,0	103,0	61,0	49,0	40,0	64854
Q	0.3320	8.43	3/8-24	10,0	103,0	61,0	49,0	40,0	54817
8,5 mm	0.3346		M10 X 1,5	10,0	103,0	61,0	49,0	40,0	64855
8,6 mm	0.3386			10,0	103,0	61,0	49,0	40,0	64856
8,7 mm	0.3425			10,0	103,0	61,0	49,0	40,0	64857
11/32	0.3438	8.73	3/8-32	10,0	103,0	61,0	49,0	40,0	54818
8,8 mm	0.3465		M10 X 1,25	10,0	103,0	61,0	49,0	40,0	64858
8,9 mm	0.3504			10,0	103,0	61,0	49,0	40,0	64859
9,0 mm	0.3543		M10 X 1	10,0	103,0	61,0	49,0	40,0	64860
9,1 mm	0.3583			10,0	103,0	61,0	49,0	40,0	64861
23/64	0.3594	9.13		10,0	103,0	61,0	49,0	40,0	54819

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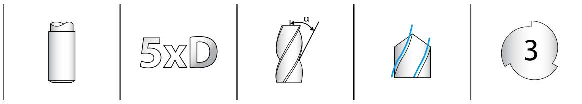
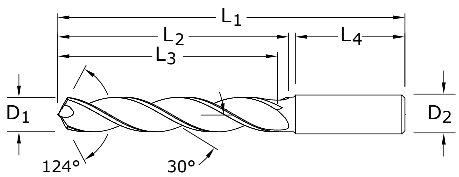
FRACTIONAL & METRIC

Hi-PerCarb





131N 5xD

FRACTIONAL & METRIC SERIES

- Triple margin design improves hole stability and size control while providing superior finish, roundness and hole 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 DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-B (TiB_2) EDP NO.
9,2 mm	0.3622		M10 X 0,75	10,0	103,0	61,0	49,0	40,0	64862
9,3 mm	0.3661			10,0	103,0	61,0	49,0	40,0	64863
U	0.3680	9.35	7/16-14	10,0	103,0	61,0	49,0	40,0	54820
9,4 mm	0.3701			10,0	103,0	61,0	49,0	40,0	64864
9,5 mm	0.3740		M11 / M10 X 0,5	10,0	103,0	61,0	49,0	40,0	64865
3/8	0.3750	9.53		10,0	103,0	61,0	49,0	40,0	54821
9,6 mm	0.3780			10,0	103,0	61,0	49,0	40,0	64866
9,7 mm	0.3819			10,0	103,0	61,0	49,0	40,0	64867
9,8 mm	0.3858			10,0	103,0	61,0	49,0	40,0	64868
9,9 mm	0.3898			10,0	103,0	61,0	49,0	40,0	64869
25/64	0.3906	9.92	7/16-20	10,0	103,0	61,0	49,0	40,0	54822
10,0 mm	0.3937			10,0	103,0	61,0	49,0	40,0	64870
10,1 mm	0.3976			12,0	118,0	71,0	56,0	45,0	64871
10,2 mm	0.4016		M12 X 1,75	12,0	118,0	71,0	56,0	45,0	64872
10,3 mm	0.4055			12,0	118,0	71,0	56,0	45,0	64873
13/32	0.4062	10.32		12,0	118,0	71,0	56,0	45,0	54823
10,4 mm	0.4094			12,0	118,0	71,0	56,0	45,0	64874
10,5 mm	0.4134		M12 X 1,5	12,0	118,0	71,0	56,0	45,0	64875
10,6 mm	0.4173			12,0	118,0	71,0	56,0	45,0	64876
10,7 mm	0.4213			12,0	118,0	71,0	56,0	45,0	64877
27/64	0.4219	10.72	1/2-13	12,0	118,0	71,0	56,0	45,0	54824
10,8 mm	0.4252		M12 X 1,25	12,0	118,0	71,0	56,0	45,0	64878
10,9 mm	0.4291			12,0	118,0	71,0	56,0	45,0	64879
11,0 mm	0.4331		M12 X 1	12,0	118,0	71,0	56,0	45,0	64880
11,1 mm	0.4370			12,0	118,0	71,0	56,0	45,0	64881
7/16	0.4375	11.11	1/4-18NPT	12,0	118,0	71,0	56,0	45,0	54825
11,2 mm	0.4409			12,0	118,0	71,0	56,0	45,0	64882
11,3 mm	0.4449			12,0	118,0	71,0	56,0	45,0	64883
11,4 mm	0.4488			12,0	118,0	71,0	56,0	45,0	64884
11,5 mm	0.4528		M12 X 0,5	12,0	118,0	71,0	56,0	45,0	64885
11,6 mm	0.4567			12,0	118,0	71,0	56,0	45,0	64886
11,7 mm	0.4606			12,0	118,0	71,0	56,0	45,0	64887
11,8 mm	0.4646			12,0	118,0	71,0	56,0	45,0	64888
11,9 mm	0.4685			12,0	118,0	71,0	56,0	45,0	64889

continued on next page

TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

NON-FERROUS

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

131N 5xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-B (TiB_2) EDP NO.
15/32	0.4688	11.91	1/2-28	12,0	118,0	71,0	56,0	45,0	54826
12,0 mm	0.4724		M14 X 2	12,0	118,0	71,0	56,0	45,0	64890
31/64	0.4844	12.30	9/16-12	14,0	124,0	77,0	60,0	45,0	54827
12,5 mm	0.4921		M14 X 1,5	14,0	124,0	77,0	60,0	45,0	64891
1/2	0.5000	12.70		14,0	124,0	77,0	60,0	45,0	54828
12,8 mm	0.5039		M14 X 1,25	14,0	124,0	77,0	60,0	45,0	64892
13,0 mm	0.5118		M14 X 1	14,0	124,0	77,0	60,0	45,0	64893
33/64	0.5156	13.10	9/16-18	14,0	124,0	77,0	60,0	45,0	54829
13,5 mm	0.5315		5/8-11	14,0	124,0	77,0	60,0	45,0	64894
13,8 mm	0.5433			14,0	124,0	77,0	60,0	45,0	64895
14,0 mm	0.5512		M16 X 2	14,0	124,0	77,0	60,0	45,0	64896
9/16	0.5625	14.29		16,0	133,0	83,0	63,0	48,0	54830
14,5 mm	0.5709		M16 X 1,5	16,0	133,0	83,0	63,0	48,0	64897
37/64	0.5781	14.68	5/8-18	16,0	133,0	83,0	63,0	48,0	54831
14,8 mm	0.5827			16,0	133,0	83,0	63,0	48,0	64898
15,0 mm	0.5906		M16 X 1	16,0	133,0	83,0	63,0	48,0	64899
15,5 mm	0.6102		M18 X 2,5	16,0	133,0	83,0	63,0	48,0	64900
15,8 mm	0.6220			16,0	133,0	83,0	63,0	48,0	64901
5/8	0.6250	15.88	11/16-16	16,0	133,0	83,0	63,0	48,0	54832
16,0 mm	0.6299			16,0	133,0	83,0	63,0	48,0	64902
21/32	0.6562	16.67	3/4-10	18,0	143,0	93,0	71,0	48,0	54833
11/16	0.6875	17.46	3/4-16	18,0	143,0	93,0	71,0	48,0	54834
3/4	0.7500	19.05	13/16-16	20,0	153,0	101,0	77,0	50,0	54835

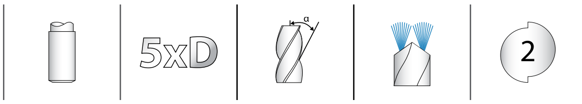
Hi-PerCarb

	Series 131N 5D Fractional	Hardness	Vc (sfm)		Diameter (D_1) (inch) 1/8	3/16	1/4	3/8	1/2	5/8	3/4
N	**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, Navel 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 x 3.82 / D_1
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)

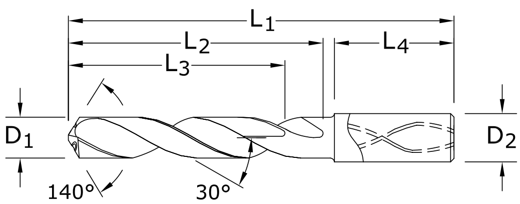
Series 131N 5D Metric		Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	14	16
N	**ALUMINUM ALLOYS < 12% SI 6061, 2024, 7075**	≤ 150 Bhn or ≤ 7 HRc	244	RPM	25851	12926	9694	7755	6463	5540	4847
			(195-293)	Fr	0.133	0.265	0.354	0.442	0.531	0.619	0.708
				Feed (mm/min)	3430	3430	3430	3430	3430	3430	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, Navel 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 x 1000) / (D_1 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)



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

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TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

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

For patent information visit www.ksptpatents.com

140 5xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm SHANK DIAMETER D2	OVERALL LENGTH L1	FLUTE LENGTH L2	CLEARED LENGTH L3	SHANK LENGTH L4	Ti-NAMITE-A (AlTiN) EDP NO.
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

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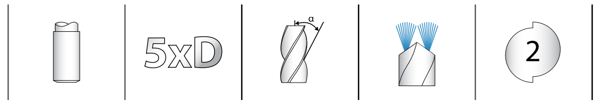
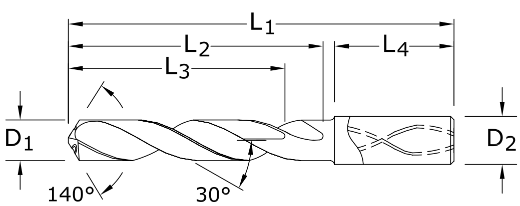


140 5xD

FRACTIONAL & METRIC SERIES



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- 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 SHANK DIAMETER	mm OVERALL LENGTH	mm FLUTE LENGTH	mm CLEARED LENGTH	mm SHANK LENGTH	Ti-NAMITE-A (AlTiN)
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

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TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

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

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140 5xD
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm SHANK DIAMETER D2	mm OVERALL LENGTH L1	mm FLUTE LENGTH L2	mm CLEARED LENGTH L3	mm SHANK LENGTH L4	Ti-NAMITE-A (AlTiN) EDP NO.
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

ICe-Carb®

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	RPM	12988	8659	6494	4329	3247	2598	2165
			(340-510)	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	RPM	11613	7742	5806	3871	2903	2323	1935
			(304-456)	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	RPM	6723	4482	3362	2241	1681	1345	1121
			(176-264)	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
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	330	RPM	10085	6723	5042	3362	2521	2017	1681
			(264-396)	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	RPM	6112	4075	3056	2037	1528	1222	1019
			(160-240)	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	RPM	4278	2852	2139	1426	1070	856	713
			(112-168)	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
H	**TOOL STEELS** A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 200 Bhn or ≤ 13 HRc	145	RPM	4431	2954	2216	1477	1108	886	739
			(116-174)	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	RPM	2903	1935	1452	968	726	581	484
			(76-114)	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	RPM	2598	1732	1299	866	649	520	433
			(68-102)	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
K	**CAST IRONS** Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	360	RPM	11002	7334	5501	3667	2750	2200	1834
			(288-432)	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	RPM	10238	6825	5119	3413	2559	2048	1706
			(268-402)	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	RPM	9321	6214	4660	3107	2330	1864	1553
			(244-366)	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	RPM	5959	3973	2980	1986	1490	1192	993
			(156-234)	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
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	150	RPM	4584	3056	2292	1528	1146	917	764
			(120-180)	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	RPM	3362	2241	1681	1121	840	672	560
			(88-132)	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

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Series 140 5D Fractional		Hardness	Vc (sfm)		Diameter (D1) (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
	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
	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 / D_1
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)

ICe-Carb®

Series 140M 5D 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	130	RPM	13733	6867	5150	4120	3433	2943	2575
			(104-155)	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	RPM	12279	6140	4605	3684	3070	2631	2302
			(93-139)	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	RPM	7109	3555	2666	2133	1777	1523	1333
			(54-80)	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
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	101	RPM	10664	5332	3999	3199	2666	2285	1999
			(80-121)	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	RPM	6463	3231	2424	1939	1616	1385	1212
			(49-73)	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	RPM	4524	2262	1696	1357	1131	969	848
			(34-51)	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
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 200 Bhn or ≤ 13 HRc	44	RPM	4686	2343	1757	1406	1171	1004	879
			(35-53)	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	RPM	3070	1535	1151	921	767	658	576
			(23-35)	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	RPM	2747	1373	1030	824	687	589	515
			(21-31)	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
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	110	RPM	11633	5816	4362	3490	2908	2493	2181
			(88-132)	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	RPM	10825	5413	4059	3248	2706	2320	2030
			(82-123)	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	RPM	9856	4928	3696	2957	2464	2112	1848
			(74-112)	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	RPM	6301	3151	2363	1890	1575	1350	1181
			(48-71)	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
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	46	RPM	4847	2424	1818	1454	1212	1039	909
			(37-55)	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	RPM	3555	1777	1333	1066	889	762	666
			(27-40)	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

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	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
	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
	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

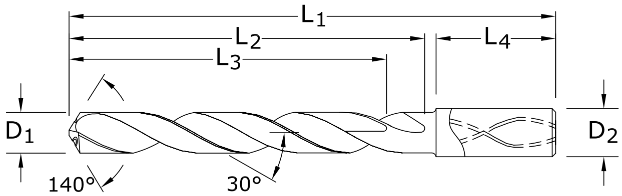
Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fr x rpm
reduce speed and feed for materials harder than listed
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

FRACTIONAL & METRIC

ICe-Carb®

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 D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm SHANK DIAMETER D_2	mm OVERALL LENGTH L_1	mm FLUTE LENGTH L_2	mm CLEARED LENGTH L_3	mm SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) 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

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TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

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

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140 8xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm SHANK DIAMETER D2	mm OVERALL LENGTH L1	mm FLUTE LENGTH L2	mm CLEARED LENGTH L3	mm SHANK LENGTH L4	Ti-NAMITE-A (AlTiN) EDP NO.
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

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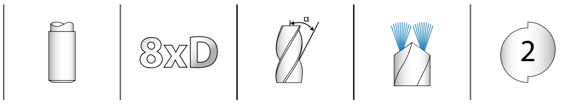

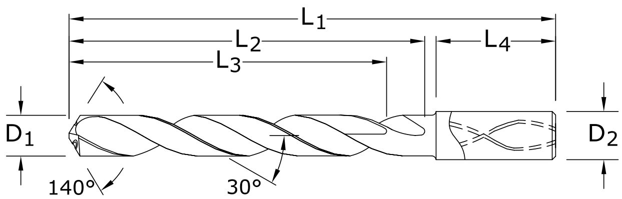

140 8xD

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 D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm SHANK DIAMETER D_2	mm OVERALL LENGTH L_1	mm FLUTE LENGTH L_2	mm CLEARED LENGTH L_3	mm SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) 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

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TOLERANCES (inch)

≤.1181 DIAMETER
D_1 = +.00008/+.00047
D_2 = h_6

>.1181–.2362 DIAMETER
D_1 = +.00016/+.00063
D_2 = h_6

>.2362–.3937 DIAMETER
D_1 = +.00024/+.00083
D_2 = h_6

>.3937–.7087 DIAMETER
D_1 = +.00028/+.00098
D_2 = h_6

>.7087–1.1811 DIAMETER
D_1 = +.00031/+.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

- STEELS
- STAINLESS STEELS
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- TITANIUM
- NON-FERROUS
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140 8xD
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIAMETER D1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIAMETER D2 (mm)	OVERALL LENGTH L1 (mm)	FLUTE LENGTH L2 (mm)	CLEARED LENGTH L3 (mm)	SHANK LENGTH L4 (mm)	Ti-NAMITE-A (AlTiN) EDP NO.
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

ICe-Carb®

Series 140 8D Fractional		Hardness	Vc (sfm)		1/8	3/16	1/4	3/8	1/2	5/8	3/4
					Diameter (D_1) (inch)						
P	**CARBON STEELS** 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	405	RPM	12377	8251	6188	4126	3094	2475	2063
			(324-486)	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	RPM	11307	7538	5654	3769	2827	2261	1885
			(296-444)	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	RPM	6418	4278	3209	2139	1604	1284	1070
			(168-252)	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
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	320	RPM	9779	6519	4890	3260	2445	1956	1630
			(256-384)	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	RPM	5806	3871	2903	1935	1452	1161	968
			(152-228)	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	RPM	4126	2750	2063	1375	1031	825	688
			(108-162)	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
H	**TOOL STEELS** A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 200 Bhn or ≤ 13 HRc	140	RPM	4278	2852	2139	1426	1070	856	713
			(112-168)	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	RPM	2750	1834	1375	917	688	550	458
			(72-108)	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	RPM	2445	1630	1222	815	611	489	407
			(64-96)	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
K	**CAST IRONS** Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	350	RPM	10696	7131	5348	3565	2674	2139	1783
			(280-420)	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	RPM	9474	6316	4737	3158	2368	1895	1579
			(248-372)	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	RPM	8862	5908	4431	2954	2216	1772	1477
			(232-348)	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	RPM	5501	3667	2750	1834	1375	1100	917
			(144-216)	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
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	130	RPM	3973	2649	1986	1324	993	795	662
			(104-156)	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	RPM	2903	1935	1452	968	726	581	484
			(76-114)	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

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	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 x 3.82 / D_1
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)

ICe-Carb®

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
	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
H	**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
K	**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
	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

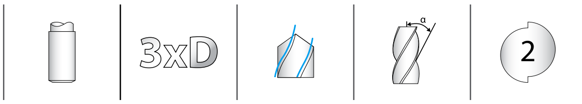
continued on next page

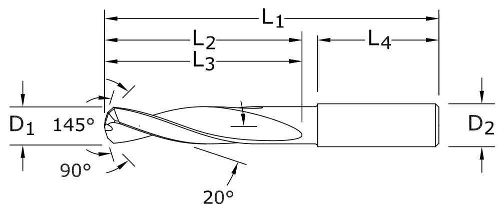
Series 140M 8D Metric		Hardness	Vc (m/min)	Diameter (D_1) (mm)	3	6	8	10	12	14	16
S	**SUPER ALLOYS (NICKEL , COBALT, IRON BASE)** **Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy**	≤ 300 Bhn or ≤ 32 HRc	20	RPM	2100	1050	788	630	525	450	394
			(16-24)	Fr	0.021	0.041	0.055	0.069	0.082	0.096	0.110
				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) / (D_1 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)

FRACTIONAL & METRIC

Series 120





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)

D_1 = +.0000/–.0005
D_2 = h_6

TOLERANCES (mm)

D_1 = +0,000/–0,013
D_2 = h_6

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
N CFRP, AFRP (Carbon Fiber, Aramid Fiber)	320	RPM	9779	6519	4890	3912	3260	2794	2445
	(256-384)	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
N GFRP (Fiberglass)	240	RPM	7334	4890	3667	2934	2445	2096	1834
	(192-288)	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
N CARBON, GRAPHITE	400	RPM	12224	8149	6112	4890	4075	3493	3056
	(320-480)	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 / D_1
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
N CFRP, AFRP (Carbon Fiber, Aramid Fiber)	100	RPM	12722	10602	7951	5301	3976	3181	2650
	(80-120)	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
N GFRP (Fiberglass)	75	RPM	9542	7951	5963	3976	2982	2385	1988
	(65-90)	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
N CARBON, GRAPHITE	120	RPM	15266	12722	9542	6361	4771	3817	3181
	(96-144)	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) / (D_1 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)

KYOCERA
SGS Precision Tools

SGS
Solid Carbide Tools

General Purpose Drills

Hole Making

GENERAL PURPOSE DRILLS	SERIES	DESCRIPTION	PAGE
2 Flute	101	2 Flute Slow Spiral	288
Short Length Self Centering (DIN6539)	108M Plus	2 Flute Short Length DIN 6539	293
Straight Flute	106	Straight Flute 140 Point Geometry	300
3 Flute with 150 Point Geometry	103	3 Flute 150 Point Geometry	304

GENERAL PURPOSE COUNTERSINKS	SERIES	DESCRIPTION	PAGE
Combined Drill & Countersink	301	2 Flute Straight Flute Combined Drill and Countersink Fractional	310
	301M	2 Flute Straight Flute Combined Drill and Countersink Metric	311
Single Flute Countersink	601	Single Flute Fractional	316
3 Flute Countersink	603	3 Flute Fractional	319
6 Flute Countersink	606	6 Flute Fractional	322

GENERAL PURPOSE REAMERS	SERIES	DESCRIPTION	PAGE
Straight Flute Accu-Reamer	200	Accu-Reamer	326
Straight Flute Reamer	201M	Metric Reamer	330

Speed & Feed Recommendations listed after each series

Taladrado

TALADROS DE USO GENERAL	SERIE	DESCRIPCIÓN	PÁGINA
2 filos	101	2 filos, espiral de avance lento	288
Autocentrante de longitud corta (DIN6539)	108M Plus	2 filos, longitud corta, DIN 6539	293
Filo recto	106	Filo recto, geometría de 140 puntos	300
3 filos con geometría de 150 puntos	103	3 filos, geometría de 150 puntos	304

TALADROS DE USO AVELLANADORES	SERIE	DESCRIPCIÓN	PÁGINA
Taladro y avellanador combinados	301	2 filos, filo recto, taladro y avellanador combinados, fraccional	310
	301M	2 filos, filo recto, taladro y avellanador combinados, métrico	311
Avellanador de filo único	601	Filo único, fraccional	316
Avellanador de 3 filos	603	3 filos, fraccional	319
Avellanador de 6 filos	606	6 filos, fraccional	322

TALADROS DE USO ESCARIADORES	SERIE	DESCRIPCIÓN	PÁGINA
Escariador Accu de filo recto	200	Escariador Accu	326
Escariador de filo recto	201M	Escariador métrico	330

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	288
Court autocentrant (DIN 6539)	108M Plus	2 dents court DIN 6539	293
Denture droite	106	Denture droite à angle de pointe 140º	300
3 dents à angle de pointe 150º	103	3 dents à angle de pointe 150º	304

FORETS À FRAISER	SERIES	DESCRIPTION	PAGE
Foret et foret à fraiser combinés	301	2 dents denture droite foret et foret à fraiser combinés (fractionnel)	310
	301M	2 dents denture droite foret et foret à fraiser combinés (métrique)	311
Foret à fraiser à dent simple	601	Foret à dent simple (fractionnel)	316
Foret à fraiser 3 dents	603	3 dents (fractionnel)	319
foret à fraiser 6 dents	606	6 dents (fractionnel)	322

FORETS À ALÉSOIRS	SERIES	DESCRIPTION	PAGE
Alésoir denture droite Accu-Reamer	200	Alésoir Accu-Reamer	326
Alésoir denture droite	201M	Alésoir (métrique)	330

Recommandations de vitesse et avance indiquées après chaque série

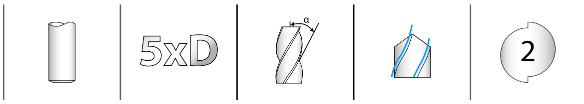
ALLZWECK-BOHRER	SERIE	BESCHREIBUNG	SEITE
2 Schneidekanten	101	2 Schneidekanten mit kleinem Spanwinkel	288
Kurze Bauform Selbstzentrierung (DIN 6539)	108M Plus	2 Schneidekanten Kurze Bauform DIN 6539	293
Gerade Schneidekante	106	Gerade Schneidekante Spitzengeometrie 140	300
3 Schneidekanten mit Spitzengeometrie 150	103	3 Schneidekanten Spitzengeometrie 150	304

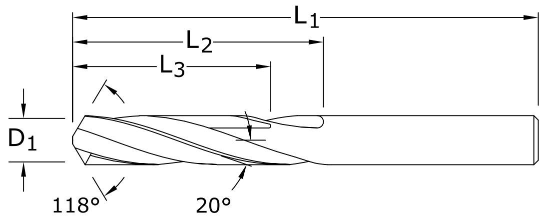
ALLZWECK-BOHRER	SERIE	BESCHREIBUNG	SEITE
Senkbohrer	301	Zölliger Senkbohrer mit 2 geraden Schneidekanten	310
	301M	Metrischer Senkbohrer mit 2 geraden Schneidekanten	311
Senker mit 1 Schneidekante	601	Zölliger Bohrer mit 1 Schneidekante	316
Senkbohrer mit 1 Schneidekante	603	Zölliger Bohrer mit 3 Schneidekanten	319
Senkbohrer mit 6 Schneidekanten	606	Zölliger Bohrer mit 6 Schneidekanten	322

ALLZWECK-BOHRER	SERIE	BESCHREIBUNG	SEITE
Reibahlen mit gerader Schneidekante	200	Accu-Reamer	326
Reibahle mit gerader Schneidekante	201M	Metrische Reibahle	330

Empfehlungen für Drehzahl & Vorschub im Anhang zu jeder Serie

2 Flute Drills • Metric: DIN 338





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	EDP NO. 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

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TOLERANCES (inch)

D_1 = +.0000/–.0005

TOLERANCES (mm)

D_1 = +0,0000/–0,0127

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

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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	EDP NO. Ti-NAMITE-A (AlTiN)
#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

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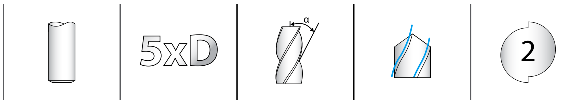
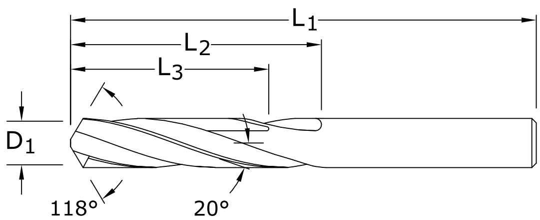
2 Flute Drills • Metric: DIN 338





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	EDP NO. 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	1-13/32	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

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TOLERANCES (inch)

D_1 = +.0000/–.0005

TOLERANCES (mm)

D_1 = +0,0000/–0,0127

- STEELS
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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	EDP NO. 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	57175
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

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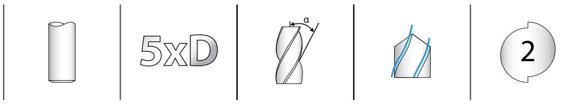
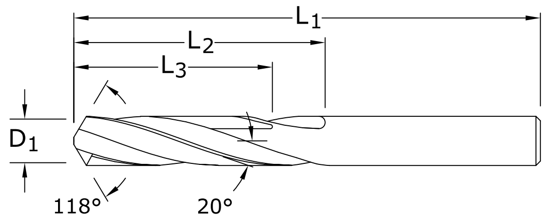
2 Flute Drills • Metric: DIN 338





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	EDP NO. 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)

D_1 = +.0000/–.0005

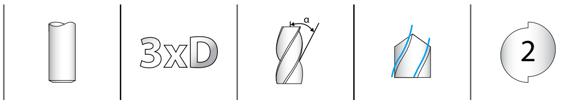
TOLERANCES (mm)

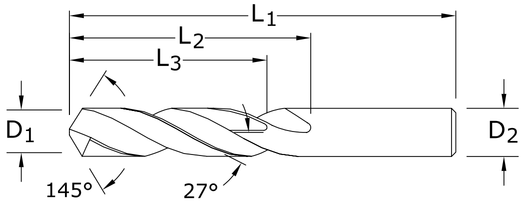
D_1 = +0,0000/–0,0127

- 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





TOLERANCES (mm)

≤3 DIAMETER
D_1 = +0,000/–0,010
D_2 = h_6

>3–6 DIAMETER
D_1 = +0,000/–0,012
D_2 = h_6

>6–10 DIAMETER
D_1 = +0,000/–0,015
D_2 = h_6

>10–18 DIAMETER
D_1 = +0,000/–0,018
D_2 = h_6

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108M Plus

METRIC SERIES

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

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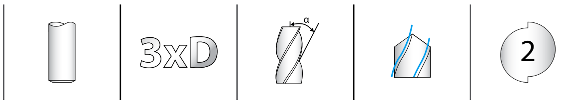
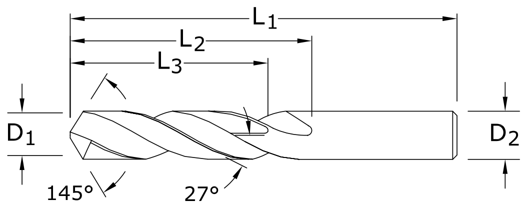
METRIC

Short Length Self Centering Drills • DIN 6539



108M Plus

METRIC SERIES



CUTTING DIAMETER D_1 / D_2 (mm)	OVERALL LENGTH L_1 (mm)	FLUTE LENGTH L_2 (mm)	CLEARED LENGTH L_3 (mm)	EDP NO. UNCOATED	EDP NO. 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

continued on next page

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

TOLERANCES (mm)

≤3 DIAMETER
D_1 = +0,000/–0,010
D_2 = h_6

>3–6 DIAMETER
D_1 = +0,000/–0,012
D_2 = h_6

>6–10 DIAMETER
D_1 = +0,000/–0,015
D_2 = h_6

>10–16 DIAMETER
D_1 = +0,000/–0,018
D_2 = h_6

- STEELS
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For patent information visit www.ksptpatents.com

Short Length Self Centering Drills • DIN 6539

108M Plus

METRIC SERIES

CONTINUED

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)
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

FRACTIONAL

2 Flute Drills

Diameter (D_1) (inch)

	Series 101 Fractional	Hardness	Vc (sfm)		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	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

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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
	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
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 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
	PLASTICS Polycarbonate, PVC		500	RPM	122240	61120	30560	15280	7640	5093	3820
			(400-600)	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 x 3.82 / D_1
ipm = Fz 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)

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
	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
H	**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
K	**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
	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

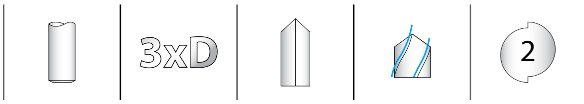
continued on next page

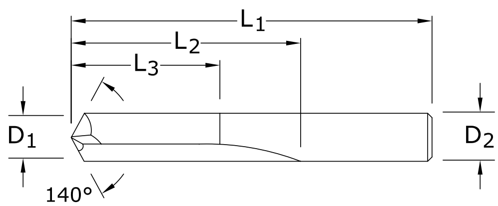
2 Flute Drills
Short Length Self Centering Drills • DIN 6539

	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	RPM	3878	1293	646	485	388	323	242
			(10-15)	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	RPM	2424	808	404	303	242	202	151
			(6-9)	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	RPM	1939	646	323	242	194	162	121
			(5-7)	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	RPM	8240	2747	1373	1030	824	687	515
			(21-31)	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	RPM	6301	2100	1050	788	630	525	394
			(16-24)	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	RPM	5332	1777	889	666	533	444	333
			(13-20)	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	RPM	52348	17449	8725	6544	5235	4362	3272
			(132-198)	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	RPM	44108	14703	7351	5514	4411	3676	2757
			(111-166)	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
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	58	RPM	18419	6140	3070	2302	1842	1535	1151
			(46-69)	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	RPM	16965	5655	2827	2121	1696	1414	1060
			(43-64)	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
	PLASTICS Polycarbonate, PVC		152	RPM	48471	16157	8078	6059	4847	4039	3029
			(122-183)	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 x 1000) / (D_1 x 3.14)
mm/min = Fz 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)

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	EDP NO. Ti-NAMITE-A (AlTiN)
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

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TOLERANCES (inch)

D_1 = +.0000/–.0005
D_2 = h6

TOLERANCES (mm)

D_1 = +0,0000/–0,0127
D_2 = h6

STEELS
CAST IRON
HARDENED STEELS

For patent information visit www.ksptpatents.com

Straight Flute Drills • Metric: DIN 6539

106
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	EDP NO. Ti-NAMITE-A (AlTiN)
#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

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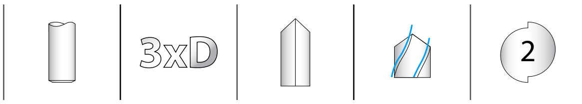
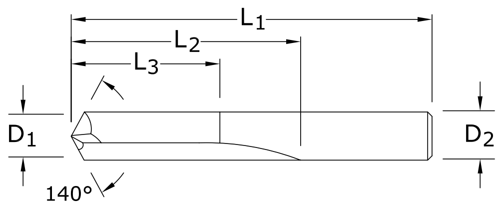
Straight Flute Drills • Metric: DIN 6539





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	EDP NO. 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		95,0	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	43,0	31,0	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	43,0	31,0	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)

D_1 = +.0000/–.0005
D_2 = h6

TOLERANCES (mm)

D_1 = +0,0000/–0,0127
D_2 = h6

STEELS
CAST IRON
HARDENED STEELS

For patent information visit www.ksptpatents.com

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	RPM	3667	1834	1222	917	611	458
		(48-72)	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	RPM	3056	1528	1019	764	509	382
		(40-60)	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	RPM	3667	1834	1222	917	611	458
		(48-72)	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	RPM	3056	1528	1019	764	509	382
		(40-60)	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	RPM	15280	7640	5093	3820	2547	1910
		(200-300)	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	RPM	11918	5959	3973	2980	1986	1490
		(156-234)	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

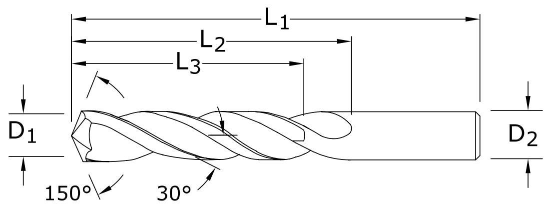
Bhn (Brinell)   HRc (Rockwell C)
rpm = Vc x 3.82 / D_1
ipm = Fr x rpm
reduce speed and feed 30 percent when using uncoated drills
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

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	RPM	5816	1939	969	727	582	485
		(15-22)	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	RPM	4847	1616	808	606	485	404
		(12-18)	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	RPM	5816	1939	969	727	582	485
		(15-22)	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	RPM	4847	1616	808	606	485	404
		(12-18)	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	RPM	24235	8078	4039	3029	2424	2020
		(61-91)	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	RPM	18904	6301	3151	2363	1890	1575
		(48-71)	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 x 1000) / (D_1 x 3.14)
mm/min = Fr x 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	EDP NO. Ti-NAMITE-A (AlTiN)
#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

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TOLERANCES (inch)

D_1 = +.0000/–.0005
D_2 = h6

TOLERANCES (mm)

D_1 = +0,0000/–0,0127
D_2 = 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	EDP NO. 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

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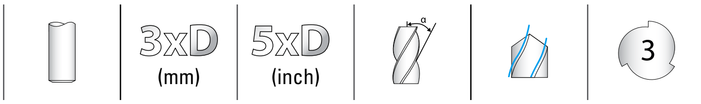
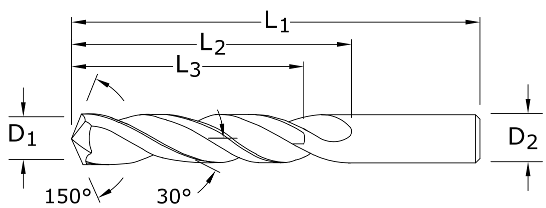
3 Flute Drills • Metric: DIN 6539





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	EDP NO. Ti-NAMITE-A (AlTiN)
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

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TOLERANCES (inch)

D_1 = +.0000/–.0005
D_2 = h6

TOLERANCES (mm)

D_1 = +0,0000/–0,0127
D_2 = h6

- STEELS
- CAST IRON
- HARDENED STEELS
- NON-FERROUS

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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	EDP NO. Ti-NAMITE-A (AlTiN)
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	0.5039		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

FRACTIONAL

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	RPM	9015	4508	3005	2254	1803	1503
			(236-354)	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	RPM	7946	3973	2649	1986	1589	1324
			(208-312)	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	RPM	4584	2292	1528	1146	917	764
			(120-180)	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	RPM	7029	3514	2343	1757	1406	1171
			(184-276)	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	RPM	4431	2216	1477	1108	886	739
			(116-174)	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	RPM	3514	1757	1171	879	703	586
			(92-138)	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	RPM	2598	1299	866	649	520	433
			(68-102)	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	RPM	1986	993	662	497	397	331
			(52-78)	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	RPM	1528	764	509	382	306	255
			(40-60)	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	RPM	7640	3820	2547	1910	1528	1273
			(200-300)	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	RPM	5959	2980	1986	1490	1192	993
			(156-234)	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	RPM	16502	8251	5501	4126	3300	2750
			(432-648)	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	RPM	13905	6952	4635	3476	2781	2317
			(364-546)	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	RPM	9321	4660	3107	2330	1864	1553
			(244-366)	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	RPM	4890	2445	1630	1222	978	815
			(128-192)	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

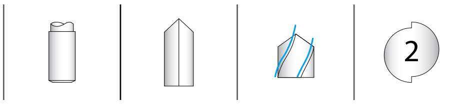
Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
rpm = Vc x 3.82 / D_1
ipm = Fr x rpm
reduce speed and feed 30 percent when using uncoated drills
reduce speed and feed for materials harder than listed
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

3 Flute Drills

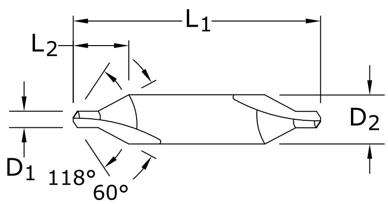
	Series 103M Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	10	12	16	20
P	**CARBON STEELS** 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	90	RPM	9533	4766	2860	2383	1787	1430
			(72-108)	Fr	0.062	0.124	0.206	0.248	0.330	0.413
				Feed (mm/min)	590	590	590	590	590	590
		≤ 300 Bhn or ≤ 32 HRc	79	RPM	8402	4201	2520	2100	1575	1260
			(63-95)	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	RPM	4847	2424	1454	1212	909	727
			(37-55)	Fr	0.032	0.064	0.107	0.128	0.171	0.213
				Feed (mm/min)	155	155	155	155	155	155
	ALLOY STEELS 4140, 4150, 4320, 5120, 5150, 8630, 86L20, 50100	≤ 275 Bhn or ≤ 28 HRc	70	RPM	7432	3716	2230	1858	1394	1115
			(56-84)	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	RPM	4686	2343	1406	1171	879	703
			(35-53)	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	RPM	3716	1858	1115	929	697	557
			(28-42)	Fr	0.012	0.024	0.040	0.048	0.065	0.081
				Feed (mm/min)	45	45	45	45	45	45
H	**TOOL STEELS** A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc	26	RPM	2747	1373	824	687	515	412
			(21-31)	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	RPM	2100	1050	630	525	394	315
			(16-24)	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	RPM	1616	808	485	404	303	242
			(12-18)	Fr	0.015	0.031	0.052	0.062	0.083	0.103
				Feed (mm/min)	25	25	25	25	25	25
K	**CAST IRONS** Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	76	RPM	8078	4039	2424	2020	1515	1212
			(61-91)	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	RPM	6301	3151	1890	1575	1181	945
			(48-71)	Fr	0.052	0.105	0.175	0.209	0.279	0.349
				Feed (mm/min)	330	330	330	330	330	330
N	**ALUMINUM ALLOYS** 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	165	RPM	17449	8725	5235	4362	3272	2617
			(132-198)	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	RPM	14703	7351	4411	3676	2757	2205
			(111-166)	Fr	0.078	0.156	0.261	0.313	0.417	0.521
				Feed (mm/min)	1150	1150	1150	1150	1150	1150
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	93	RPM	9856	4928	2957	2464	1848	1478
			(74-112)	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	RPM	5170	2585	1551	1293	969	776
			(39-59)	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) / (D_1 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



SIZE	DRILL DIAMETER D_1 (inch)	BODY DIAMETER D_2 (inch)	OVERALL LENGTH L_1 (inch)	FLUTE LENGTH L_2 (inch)	EDP NO. UNCOATED	EDP NO. 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)

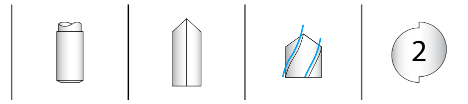
D_1 = +.003/–.000

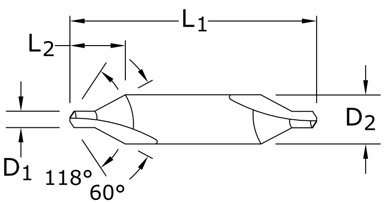
D_2 = –.0001/–.0005

- 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





301M
METRIC SERIES

TOLERANCES (mm)

D_1 = +0,076/–0,000

D_1 = −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

mm				EDP NO.	
DRILL DIAMETER D_1	BODY DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	UNCOATED	Ti-NAMITE-A (AlTiN)
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
	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
	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

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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	RPM	1222	815	489	349	306
		(32-48)	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	RPM	764	509	306	218	191
		(20-30)	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	RPM	611	407	244	175	153
		(16-24)	Fr	0.00016	0.0002	0.0004	0.0006	0.0007
			Feed (ipm)	0.1	0.1	0.1	0.1	0.1
S — TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	85	RPM	2598	1732	1039	742	649
		(68-102)	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	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
	≤ 440 Bhn or ≤ 47 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
N — ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	540	RPM	16502	11002	6601	4715	4126
		(432-648)	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	RPM	13905	9270	5562	3973	3476
		(364-546)	Fr	0.00100	0.0015	0.0025	0.0035	0.0040
			Feed (ipm)	13.9	13.9	13.9	13.9	13.9
N — COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	190	RPM	5806	3871	2323	1659	1452
		(152-228)	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	RPM	5348	3565	2139	1528	1337
		(140-210)	Fr	0.00048	0.0007	0.0012	0.0017	0.0019
			Feed (ipm)	2.6	2.6	2.6	2.6	2.6
N — PLASTICS Polycarbonate, PVC		500	RPM	15280	10187	6112	4366	3820
		(400-600)	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 x 3.82 / D_1
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)

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
	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
	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

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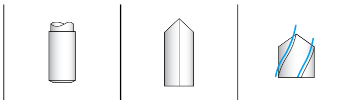
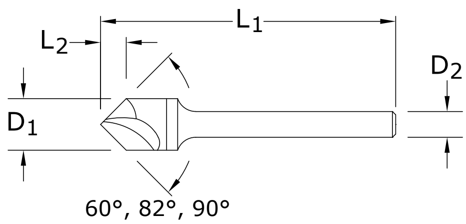
Combined Drill & Countersink

Group	Series 301M Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1	1.6	2.5	4	5
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	1231	969	616	388	310
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)	Fr	0.009	0.011	0.018	0.028	0.035
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)	Feed (mm/min)	11	11	11	11	11
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE)** Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 320 Bhn or ≤ 34 HRc	8 (6-9)	RPM	769	606	385	242	194
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE)** Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 320 Bhn or ≤ 34 HRc	8 (6-9)	Fr	0.008	0.010	0.016	0.025	0.031
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE)** Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 320 Bhn or ≤ 34 HRc	8 (6-9)	Feed (mm/min)	6	6	6	6	6
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE)** Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 425 Bhn or ≤ 45 HRc	6 (5-7)	RPM	616	485	308	194	155
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE)** Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 425 Bhn or ≤ 45 HRc	6 (5-7)	Fr	0.003	0.004	0.006	0.010	0.013
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE)** Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 425 Bhn or ≤ 45 HRc	6 (5-7)	Feed (mm/min)	2	2	2	2	2
S	**TITANIUM ALLOYS** Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	26 (21-31)	RPM	2616	2060	1308	824	659
S	**TITANIUM ALLOYS** Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	26 (21-31)	Fr	0.016	0.020	0.032	0.051	0.064
S	**TITANIUM ALLOYS** Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	26 (21-31)	Feed (mm/min)	42	42	42	42	42
S	**TITANIUM ALLOYS** Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 350 Bhn or ≤ 38 HRc	20 (16-24)	RPM	2000	1575	1000	630	504
S	**TITANIUM ALLOYS** Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 350 Bhn or ≤ 38 HRc	20 (16-24)	Fr	0.009	0.011	0.018	0.029	0.036
S	**TITANIUM ALLOYS** Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 350 Bhn or ≤ 38 HRc	20 (16-24)	Feed (mm/min)	18	18	18	18	18
S	**TITANIUM ALLOYS** Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 440 Bhn or ≤ 47 HRc	17 (13-20)	RPM	1693	1333	846	533	427
S	**TITANIUM ALLOYS** Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 440 Bhn or ≤ 47 HRc	17 (13-20)	Fr	0.008	0.011	0.017	0.026	0.033
S	**TITANIUM ALLOYS** Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 440 Bhn or ≤ 47 HRc	17 (13-20)	Feed (mm/min)	14	14	14	14	14
N	**ALUMINUM ALLOYS** 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	165 (132-198)	RPM	16619	13087	8309	5235	4188
N	**ALUMINUM ALLOYS** 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	165 (132-198)	Fr	0.025	0.032	0.050	0.079	0.099
N	**ALUMINUM ALLOYS** 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	165 (132-198)	Feed (mm/min)	415	415	415	415	415
N	**ALUMINUM ALLOYS** 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	139 (111-166)	RPM	14003	11027	7001	4411	3529
N	**ALUMINUM ALLOYS** 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	139 (111-166)	Fr	0.025	0.032	0.050	0.079	0.099
N	**ALUMINUM ALLOYS** 2017, 2024, 356, 6061, 7075	≤ 150 Bhn or ≤ 7 HRc	139 (111-166)	Feed (mm/min)	350	350	350	350	350
N	**COPPER ALLOYS** Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	58 (46-69)	RPM	5847	4605	2924	1842	1474
N	**COPPER ALLOYS** Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	58 (46-69)	Fr	0.012	0.015	0.024	0.038	0.048
N	**COPPER ALLOYS** Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	58 (46-69)	Feed (mm/min)	70	70	70	70	70
N	**COPPER ALLOYS** Alum Bronze, C110, Muntz Brass	≤ 200 Bhn or ≤ 23 HRc	53 (43-64)	RPM	5386	4241	2693	1696	1357
N	**COPPER ALLOYS** Alum Bronze, C110, Muntz Brass	≤ 200 Bhn or ≤ 23 HRc	53 (43-64)	Fr	0.012	0.015	0.024	0.038	0.048
N	**COPPER ALLOYS** Alum Bronze, C110, Muntz Brass	≤ 200 Bhn or ≤ 23 HRc	53 (43-64)	Feed (mm/min)	65	65	65	65	65
N	**PLASTICS** Polycarbonate, PVC		152 (122-183)	RPM	15388	12118	7694	4847	3878
N	**PLASTICS** Polycarbonate, PVC		152 (122-183)	Fr	0.025	0.032	0.050	0.079	0.099
N	**PLASTICS** Polycarbonate, PVC		152 (122-183)	Feed (mm/min)	385	385	385	385	385

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
rpm = (Vc x 1000) / (D_1 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)

Single Flute Countersink





601
FRACTIONAL SERIES

inch				EDP NO.		
CUTTING DIAMETER D_1	SHANK DIAMETER D_2	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
D_1 = +.0000/–.0005

3/8–1 DIAMETER
D_1 = +.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
	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
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	0.0003	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
K	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
	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

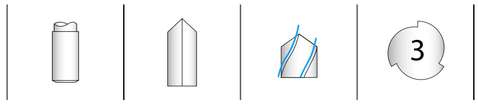
continued on next page

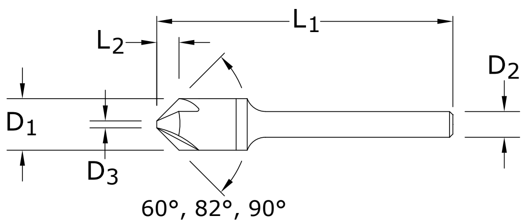
Single Flute Countersink

	Series 601 Fractional	Hardness	Vc (sfm)		Diameter (D_1) (inch) 1/8	3/16	1/4	3/8	1/2	3/4	1
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	0.0002	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	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
	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	0.0005	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	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
		≤ 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
N	**ALUMINUM ALLOYS** 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	225	RPM	6876	4584	3438	2292	1719	1146	860
			(180-270)	Fr	0.0008	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	RPM	5806	3871	2903	1935	1452	968	726
			(152-228)	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	RPM	2903	1935	1452	968	726	484	363
			(76-114)	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	RPM	2445	1630	1222	815	611	407	306
			(64-96)	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 / D_1
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/–.0005

3/8–1 DIAMETER
D_1 = +.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

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
	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
	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

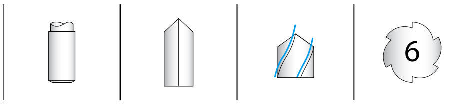
continued on next page

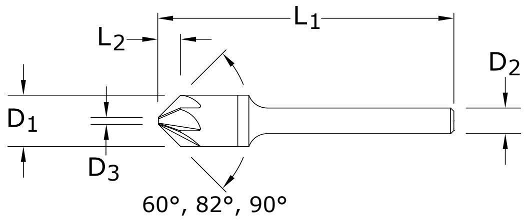
3 Flute Countersink

	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
	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
N	**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 / D_1
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

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	.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
D_1 = +.0000/–.0005

3/8–1 DIAMETER
D_1 = +.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
	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
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	0.0006	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

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FRACTIONAL
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

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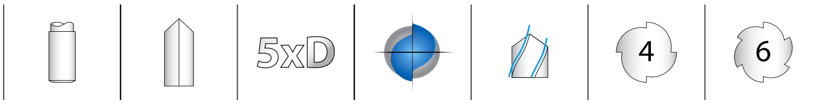
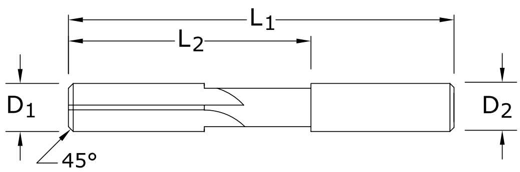
6 Flute Countersink

	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	RPM	6876	4584	3438	2292	1719	1146	860
			(180-270)	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	RPM	5806	3871	2903	1935	1452	968	726
			(152-228)	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	RPM	2903	1935	1452	968	726	484	363
			(76-114)	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	RPM	2445	1630	1222	815	611	407	306
			(64-96)	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 x 3.82 / D_1
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)

Straight Flute Accu-Reamer





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)

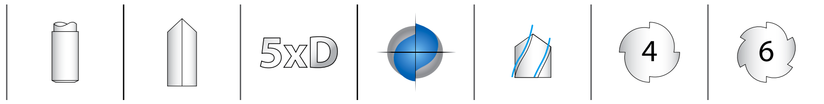
D_1 = +.0002/–.0000

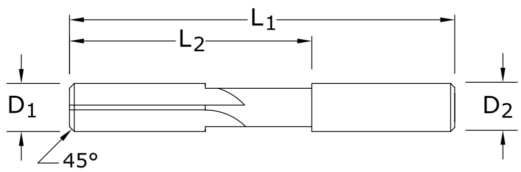
D_2 = +.0002/–.0000

- 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/–.0000
D_2 = +.0002/–.0000

200
FRACTIONAL SERIES

CUTTING DIAMETER D_1 (inch)	SHANK DIAMETER D_2 (inch)	MAXIMUM REAM LENGTH L_2 (inch)	OVERALL LENGTH L_1 (inch)	NO. OF FLUTES
.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 – .1563	5/32	1-1/2	2-1/2	4
.1564 – .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 – .2813	9/32	2-1/4	3-1/4	6
.2814 – .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 – .4063	13/32	2-7/8	4	6
.4064 – .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. ÷ 25.4)
- The above sample would be a 1.25mm size (1.25 ÷ 25.4 = 0.0492")

All other dimensions are fractional as per table including the Shank

FRACTIONAL

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
	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
H	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
K	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
	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

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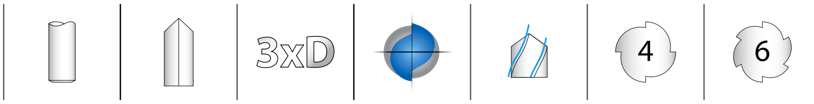
Straight Flute Accu-Reamer

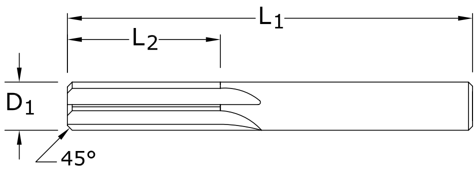
	Series 200 Fractional	Hardness	Vc (sfm)		Diameter (D_1) (inch) 1/16	1/8	3/16	1/4	5/16	3/8	1/2
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy**	≤ 220 Bhn or ≤ 19 HRc	20	RPM	1222	611	407	306	244	204	153
			(16-24)	Fr	0.0008	0.0015	0.0023	0.0030	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
	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
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 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 x 3.82 / D_1
ipm = Fr x 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

mm				EDP NO.
CUTTING DIAMETER D_1	MAXIMUM REAM LENGTH L_2	OVERALL LENGTH L_1	NO. OF FLUTES	UNCOATED
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

D_1 = +0,008/–0,000

>6–10 DIAMETER

D_1 = +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 (D1) (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

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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	17	RPM	5332	2666	1777	1333	889	666	533
			(13-20)	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	11	RPM	3393	1696	1131	848	565	424	339
			(9-13)	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	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
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 220 Bhn or ≤ 19 HRc	6	RPM	1939	969	646	485	323	242	194
			(5-7)	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	5	RPM	1454	727	485	364	242	182	145
			(4-5)	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	3	RPM	969	485	323	242	162	121	97
			(2-4)	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	14	RPM	4362	2181	1454	1091	727	545	436
			(11-16)	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	11	RPM	3393	1696	1131	848	565	424	339
			(9-13)	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	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

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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 x 1000) / (D_1 x 3.14)
mm/min = Fr x 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)

KYOCERA SGS Precision Tools

SGS Solid Carbide Tools

Routers

Routing

HIGH PERFORMANCE ROUTERS	SERIES	DESCRIPTION	PAGE
Plastic Composite	29	Multi-Flute Plastic Composite Fractional	338
	29M	Multi-Flute Plastic Composite Metric	340
Carbon Composite	20-CCR	Multi-Flute Carbon Composite Fractional	342
	20M-CCR	Multi-Flute Carbon Composite Metric	345
Coarse Cut Carbon Composite	31-CCR	Multi-Flute Coarse Composite Fractional	348
	31M-CCR	Multi-Flute Coarse Composite Metric	350
Compression	25	Multi-Flute Compression Fractional	352
	25M	Multi-Flute Compression Metric	354

GENERAL PURPOSE ROUTERS	SERIES	DESCRIPTION	PAGE
Up Cut	21	2 Flute Up Cut Fractional	356
	21M	2 Flute Up Cut Metric	359
Down Cut	22	2 Flute Down Cut Fractional	357
	22M	2 Flute Down Cut Metric	360

Speed & Feed Recommendations listed after each series

Ranurado

RANURADORES DE ALTO RENDIMIENTO	SERIE	DESCRIPCIÓN	PÁGINA
Compuesto de plástico	29	Filo múltiple, compuesto plástico, fraccional	338
	29M	Filo múltiple, compuesto plástico, métrico	340
Compuesto de carbono	20-CCR	Filo múltiple, compuesto de carbono, fraccional	342
	20M-CCR	Filo múltiple, compuesto de carbono, métrico	345
Compuesto de carbono de corte áspero	31-CCR	Filo múltiple, compuesto áspero, fraccional	348
	31M-CCR	Filo múltiple, compuesto áspero, métrico	350
Compresión	25	Filo múltiple, compresión, fraccional	352
	25M	Filo múltiple, compresión, métrico	354

RANURADORES DE USO GENERAL	SERIE	DESCRIPCIÓN	PÁGINA
Corte ascendente	21	2 filos, corte ascendente, fraccional	356
	21M	2 filos, corte ascendente, métrico	359
Corte descendente	22	2 filos, corte descendente, fraccional	357
	22M	2 filos, corte descendente, métrico	360

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)	338
	29M	Multi-dents pour composites plastique (métrique)	340
Composites carbone	20-CCR	Multi-dents pour composites carbone (fractionnel)	342
	20M-CCR	Multi-dents pour composites carbone (métrique)	345
Pour composites carbone coupe grossière	31-CCR	Multi-dents pour composites grossiers (fractionnel)	348
	31M-CCR	Multi-dents pour composites grossiers (métrique)	350
Compression	25	Multi-dents de compression (fractionnel)	352
	25M	Multi-dents de compression (métrique)	354

FRAISES À DÉTOURER UNIVERSELLES	SERIES	DESCRIPTION	PAGE
Coupe ascendante	21	2 dents coupe ascendante (fractionnel)	356
	21M	2 dents coupe ascendante (métrique)	359
Coupe descendante	22	2 dents coupe descendante (fractionnel)	357
	22M	2 dents coupe descendante (métrique)	360

Recommandations de vitesse et avance indiquées après chaque série

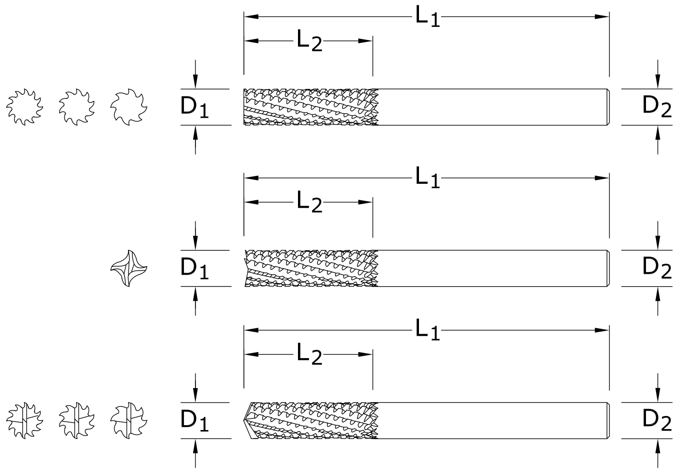
Ausfräsen

HOCHLEISTUNGS-OBERFRÄSE	SERIE	BESCHREIBUNG	SEITE
Verbundkunststoff	29	Zöllige Oberfräse mit mehrschneidigen Schneidekanten für Verbundkunststoff	338
	29M	Zöllige Oberfräse mit mehrschneidigen Schneidekanten für Verbundkunststoff	340
Kohlefaserverbundwerkstoff	20-CCR	Zöllige Oberfräse mit mehrschneidigen Schneidekanten für Kohlefaserverbundwerkstoff	342
	20M-CCR	Metrische Oberfräse mit mehrschneidigen Schneidekanten für Kohlefaserverbundwerkstoff	345
Grobschnitt Kohlefaserverbundwerkstoff	31-CCR	Zöllige Oberfräse mit mehrschneidigen Schneidekanten für Verbundkunststoff-Grobschnitt	348
	31M-CCR	Metrische Oberfräse mit mehrschneidigen Schneidekanten für Verbundkunststoff	350
Gegenläufiger Drall	25	Zöllige gegenläufige mehrschneidige Oberfräse	352
	25M	Metrische gegenläufige mehrschneidige Oberfräse	354

ALLZWECK-OBERFRÄSEN	SERIE	BESCHREIBUNG	SEITE
Gegenlauf	21	Zöllige gegenläufige Oberfräse mit 2 Schneidekanten	356
	21M	Zöllige gegenläufige Oberfräse mit 2 Schneidekanten	359
Gleichlauf	22	Zöllige gleichläufige Oberfräse mit 2 Schneidekanten	357
	22M	Zöllige gleichläufige Oberfräse mit 2 Schneidekanten	360

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

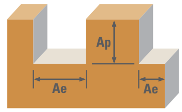
TOLERANCES (inch)

D_1 = +.000/–.005
D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Plastic Composite



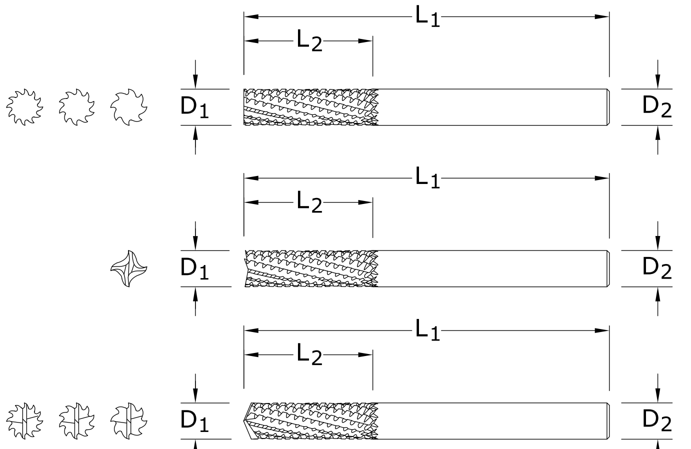
Series 29 Fractional		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/8	1/4	5/16	3/8
N — CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot	1	≤ 1	400	RPM	12224	6112	4890	4075
				(320-480)	Fr	0.0024	0.0048	0.0060	0.0072
					Feed (ipm)	29	29	29	29
	Profile	≤ 0.5	≤ 1.5	500	RPM	15280	7640	6112	5093
				(400-600)	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 x 3.82 / D_1
ipm = Fr x 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)

METRIC

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)

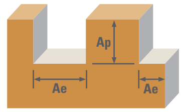
D_1 = +0,00/–0,13

D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Plastic Composite

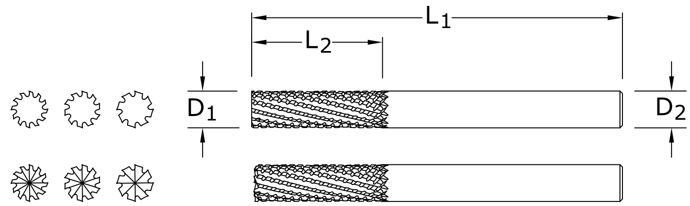


Series 29M Metric			Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10
N	CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot	1	≤ 1	120	RPM	12722	6361	4771	3817
					(96-164)	Fr	0.061	0.122	0.163	0.203
						Feed (mm/min)	776	776	776	776
		Profile	≤ 0.5	≤ 1.5	150	RPM	15903	7951	5963	4771
					(120-180)	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 x 1000) / (D_1 x 3.14)
mm/min = Fr x 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

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)
1/4	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)

D_1 = +.000/–.005

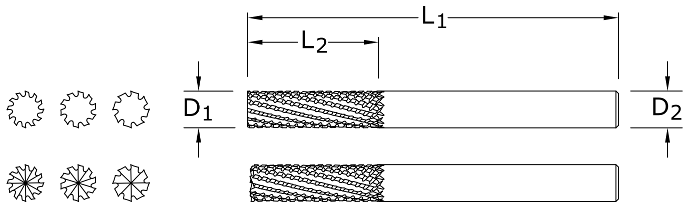
D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Carbon Composite

CARBON-FIBER COMPOSITE ROUTERS



20-CCR-LHC

FRACTIONAL SERIES

TOLERANCES (inch)

D_1 = +.000/–.005

D_2 = h_6

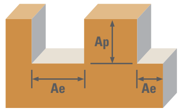
PLASTICS/COMPOSITES

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	NO. OF FLUTES	END STYLE	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

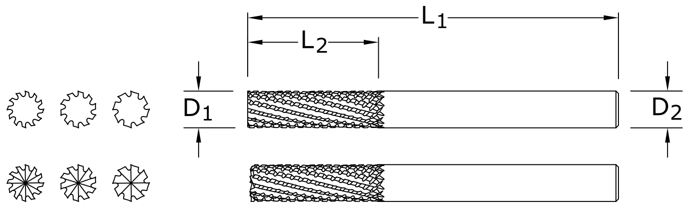
Carbon Composite



	Series 20 Fractional		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/4	5/16	3/8	1/2
N	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 x 3.82 / D_1
ipm = Fr x 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)



20M-CCR
METRIC SERIES

TOLERANCES (mm)

D_1 = +0,00/–0,13

D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

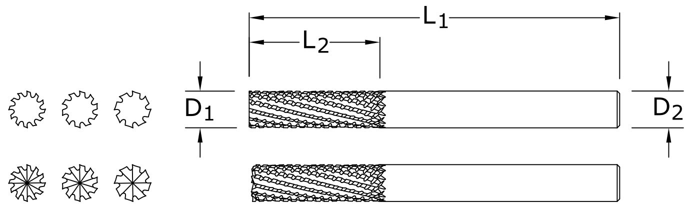
mm						EDP NO.		
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	NO. OF FLUTES	END STYLE	UNCOATED	Ti-NAMITE-B (TiB_2)	Di-NAMITE® (Diamond)
2,0	6,0	38,0	3,0	5	End Cutting	82930	83100	83070
3,0	10,0	38,0	3,0	5	End Cutting	82931	83101	83071
4,0	12,0	50,0	4,0	5	End Cutting	82932	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

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)
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)

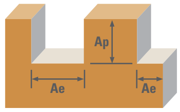
D_1 = +0,00/–0,13

D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Carbon Composite



	Series 20M Metric		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12
N	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 x 1000) / (D_1 x 3.14)
mm/min = Fr x 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
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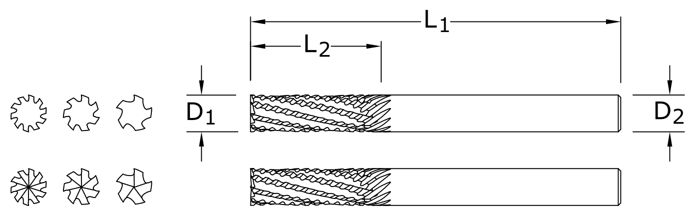
(www.kyocera-sgstool.com)

FRACTIONAL

Coarse Cut Carbon Composite

CARBON-FIBER COMPOSITE ROUTERS

RHC 5 7 8 10



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

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)
1/4	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	72966v	72967
1/2	1-1/2	3-1/2	1/2	10	No End Cutting	72968	72969

TOLERANCES (inch)

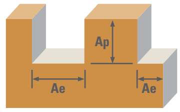
D_1 = +.000/–.005

D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Coarse Cut Carbon Composite

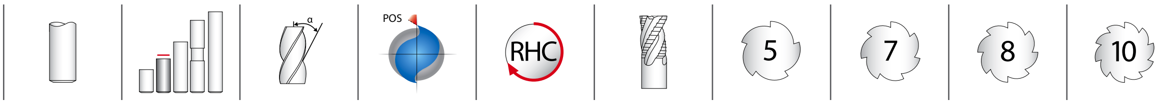


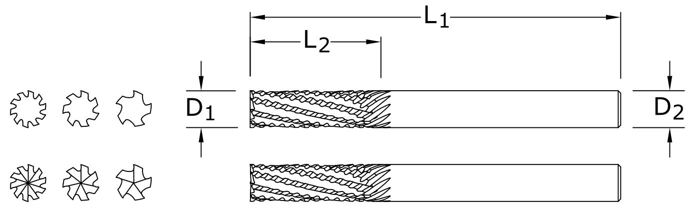
	Series 31 Fractional		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/4	5/16	3/8	1/2
N	CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot	1	≤ 1	400	RPM	6112	4890	4075	3056
					(320-480)	Fr	0.0029	0.0065	0.0088	0.0147
						Feed (ipm)	18	32	36	45
		Profile	≤ 0.5	≤ 1.5	500	RPM	7640	6112	5093	3820
					(400-600)	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 x 3.82 / D_1
ipm = Fr x 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)

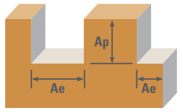
D_1 = +0,00/–0,13

D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Coarse Cut Carbon Composite

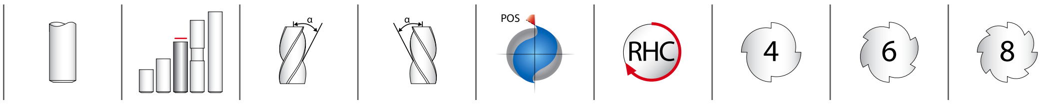


	Series 31M Metric		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12
N	CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Slot	1	≤ 1	120	RPM	6361	4771	3817	3181
					(96-164)	Fr	0.071	0.170	0.244	0.366
						Feed (mm/min)	450	810	930	1165
		Profile	≤ 0.5	≤ 1.5	150	RPM	7951	5963	4771	3976
					(120-180)	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

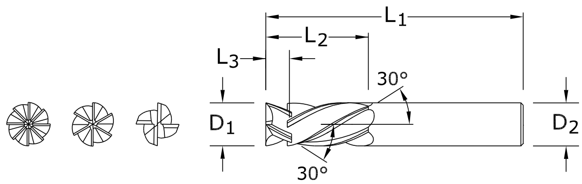
HSM (high speed machining)
rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fr x rpm
adjust parameters based on resin type and fiber structure
reduce speed when overheating causes melting or damage to resin
reduce feed if delamination or fraying occur

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



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

inch						EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	INTERSECT LENGTH L_3	NO. OF FLUTES	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)

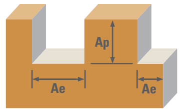
D_1 = +.000/–.003

D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Compression



Series 25 Fractional

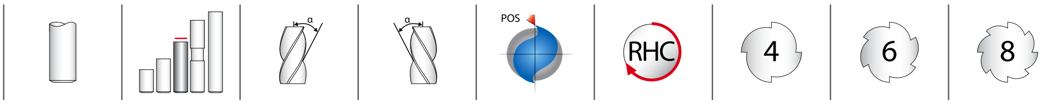
	Series 25 Fractional		$Ae \times D_1$	$Ap \times D_1$	Vc (sfm)		Diameter (D_1) (inch) 1/4	5/16	3/8	1/2
N	CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Profile	≤ 0.5	≤ 1.5	500	RPM	7640	6112	5093	3820
					(400-600)	Fr	0.0016	0.0030	0.0040	0.0048
						Feed (ipm)	49	73	122	147
		HSM	≤ 0.05	≤ 2	825	RPM	12606	10085	8404	6303
					(660-990)	Fr	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)	Fr	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)	Fr	0.0037	0.0069	0.0092	0.0110
						Feed (ipm)	149	223	371	444
	CARBON, GRAPHITE	Profile	≤ 0.5	≤ 1.5	600	RPM	9168	7334	6112	4584
					(480-720)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	0.0018	0.0034	0.0046	0.0055
						Feed (ipm)	9.4	14.1	23.9	28.6

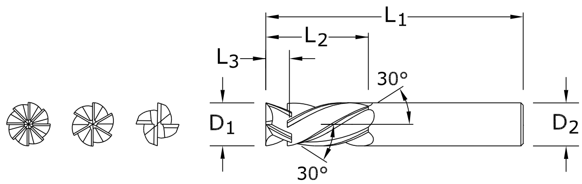
HSM (high speed machining)
rpm = Vc x 3.82 / D_1
ipm = Fz x number of flutes x rpm
adjust parameters based on resin type and fiber structure
reduce speed when overheating causes melting or damage to resin
reduce feed if delamination or fraying occur

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)

METRIC

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

mm						EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	INTERSECT LENGTH L_3	NO. OF FLUTES	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)

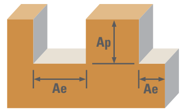
D_1 = +0,00/–0,08

D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Compression



Diameter (D_1) (mm)

Series 25M Metric		Ae x D_1	Ap x D_1	Vc (m/min)		6	8	10	12
N CFRP, AFRP (CARBON FIBER, ARAMID FIBER)	Profile	≤ 0.5	≤ 1.5	150	RPM	7951	5963	4771	3976
				(96-164)	Fr	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)	Fr	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)	Fr	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)	Fr	0.095	0.145	0.175	0.235
					Feed (mm/min)	4029	4612	6679	9966
CARBON, GRAPHITE	Profile	≤ 0.5	≤ 1.5	185	RPM	9807	7355	5884	4903
				(148-222)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	0.045	0.075	0.085	0.115
					Feed (mm/min)	239	298	406	610

HSM (high speed machining)
rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fz x number of flutes x 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
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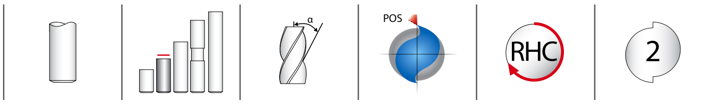
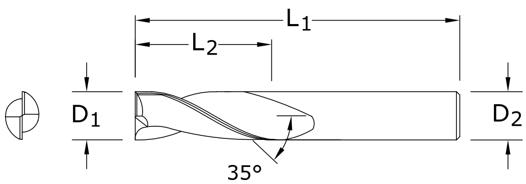
FRACTIONAL

Up Cut





21

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	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)

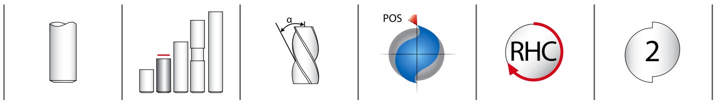
D_1 = +.000/–.003

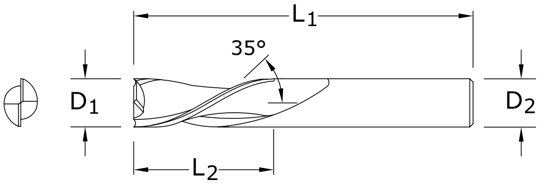
D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Down Cut





22
FRACTIONAL SERIES

TOLERANCES (inch)

D_1 = +.000/–.003

D_2 = h_6

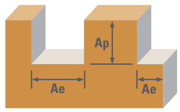
PLASTICS/COMPOSITES

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
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

FRACTIONAL

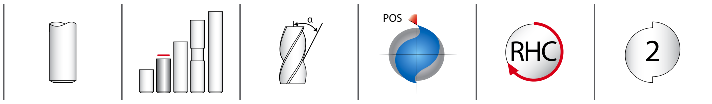
Up Cut
Down Cut

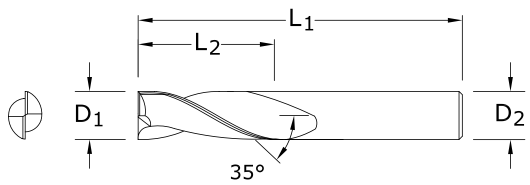


	Series 21, 22 Fractional		Ae x D_1	Ap x D_1	Vc (sfm)		Diameter (D_1) (inch) 1/8	1/4	3/8	1/2	3/4
	HARDWOODS	Slot	1	≤ 1	1550	RPM	47368	23684	15789	11842	7895
					(1240-1860)	Fr	0.0008	0.0015	0.0025	0.0030	0.0045
						Feed (ipm)	76	71	79	71	71
		Profile	≤ 0.5	≤ 1.5	1550	RPM	47368	23684	15789	11842	7895
					(1240-1860)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	0.0008	0.0017	0.0025	0.0035	0.0050
						Feed (ipm)	95	101	99	104	99

rpm = Vc x 3.82 / D_1
ipm = Fz x 2 x rpm
refer to the KYOCERA SGS Tool Wizard® for complete technical information (www.kyocera-sgstool.com)

Up Cut





21M
METRIC SERIES

TOLERANCES (mm)

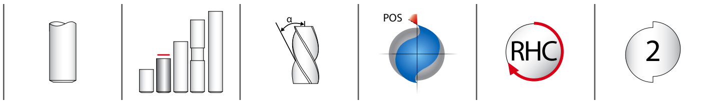
D_1 = +0,00/–0,08
D_2 = h_6

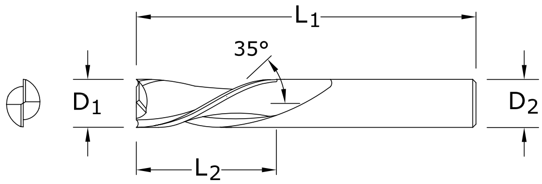
PLASTICS/COMPOSITES

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
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

Down Cut





22M
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	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

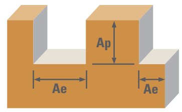
TOLERANCES (mm)

D_1 = +0,00/–0,08
D_2 = h_6

PLASTICS/COMPOSITES

For patent information visit www.ksptpatents.com

Up Cut
Down Cut



	Series 21M, 22M Metric		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	10	12	20
	HARDWOODS	Slot	1	≤ 1	470	RPM	49828	24914	14948	12457	7474
					(376-564)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	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)	Fr	0.020	0.040	0.065	0.090	0.125
						Feed (mm/min)	2544	2544	2481	2862	2385

rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fz x 2 x rpm
refer to the KYOCERA SGS Tool Wizard® for complete technical information
(www.kyocera-sgstool.com)

EDP Number Index

EDP NO.	PAGE
30000	189
30001	189
30002	189
30003	189
30004	189
30005	189
30006	189
30007	189
30008	189
30009	189
30010	189
30011	189
30012	190
30013	190
30014	190
30015	190
30016	190
30017	190
30018	190
30019	190
30020	190
30021	190
30022	190
30023	190
30024	190
30025	190
30026	190
30027	190
30028	190
30029	189
30030	190
30030	207
30031	194
30032	194
30033	194
30034	194
30035	194
30036	194
30037	194
30038	194
30039	194
30040	194
30041	194
30042	194
30043	194
30044	194
30045	194
30046	194
30047	194
30048	194
30049	194
30050	194
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30060	195
30061	195
30062	195
30063	195
30064	195
30065	195
30066	195
30067	195
30068	195
30069	194
30070	195
30070	208
30101	189
30102	194
30103	189
30104	194
30105	189
30106	194
30107	189
30108	194
30109	189
30110	194
30111	189
30112	194
30113	189
30114	194
30115	189
30116	194
30117	189
30118	194
30119	189
30120	194
30121	189
30122	194
30123	189
30124	194
30125	189
30126	194
30127	189
30128	194
30129	189
30130	194
30131	189
30132	194
30133	189
30134	194
30135	189
30136	194
30137	189
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EDP Number Index

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31989	180
31990	180
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31993	181
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33401	140
33402	140
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33406	140
33407	140
33408	140

EDP Number Index

EDP NO.	PAGE
33409	140
33410	140
33411	140
33412	140
33413	140
33415	140
33416	140
33417	140
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35626	132
35627	132
35628	132

EDP Number Index

EDP NO.	PAGE
35629	132
35630	132
35631	133
35632	133
35633	133
35634	133
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37000	26
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37128	28
37130	26

EDP NO.	PAGE
37129	28
37131	28
37132	28
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37265	27

EDP NO.	PAGE
37266	28
37267	26
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38001	191
38002	191
38003	191
38004	191
38009	191
38010	191
38011	191
38012	191
38013	191

EDP NO.	PAGE
38014	191
38019	191
38020	191
38021	191
38022	191
38023	191
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38123	191
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38126	191
38127	191

EDP NO.	PAGE
38128	191
38129	191
38130	191
38131	191
38132	191
38133	191
38134	191
38135	191
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38137	191
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38220	178
38221	178
38222	178
38223	178
38224	178
38225	178

EDP NO.	PAGE
38226	178
38231	178
38232	178
38233	178
38234	178
38235	178
38236	178
38237	178
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38331	178
38332	178
38333	178
38334	178
38335	178

EDP NO.	PAGE
38336	178
38337	178
38338	178
38339	178
38340	178
38341	178
38342	178
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38398	178
38490	37
38492	37
38496	37
38504	26
38506	26
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38517	26
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38578	27
38579	27
38580	27
38581	27
38583	27
38584	27
38585	27
38591	27
38599	28
38608	28

EDP NO.	PAGE
38617	28
39001	189
39002	194
39003	189
39004	194
39005	189
39006	194
39007	189
39008	194
39009	189
39010	194
39011	189
39012	194
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39076	195
39077	189
39078	194
39089	190
39089	207
39090	195
39101	189
39102	194
39090	208
39103	189
39104	194
39105	189

EDP Number Index

EDP NO.	PAGE
39106	194
39107	189
39108	194
39109	189
39109	208
39110	194
39111	189
39112	194
39113	189
39114	194
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39501	175
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39692	208
39701	184
39703	184
39705	184
39707	184
39709	184
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39789	207
40000	220
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40505	216
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41737	209
41741	209
41745	209
41749	209
41753	209
41757	209

EDP Number Index

EDP NO.	PAGE
41761	209
41765	209
42606	66
42607	66
42608	66
42609	66
42610	66
42611	66
42612	66
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42700	68
42701	68
42702	68
42703	68
42704	68
42705	68
42706	147

EDP NO.	PAGE
42707	147
42708	147
42709	147
42710	147
42711	147
42712	56
42713	56
42714	56
42715	56
42716	56
42717	56
42718	40
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43101	219
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43445	95
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43449	95

EDP NO.	PAGE
43450	95
43451	95
43452	95
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43501	216
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EDP NO.	PAGE
43930	211
43931	211
43932	211
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43934	211
43935	211
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44586	158
44587	156

EDP NO.	PAGE
44588	156
44589	156
44590	156
44591	156
44592	156
44593	156
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44734	144
44735	144
44736	144

EDP NO.	PAGE
44737	144
44738	148
44739	148
44740	148
44741	148
44745	128
44746	128
44747	128
44748	128
44749	128
44750	128
44751	128
44752	128
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44771	148
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44809	126
44810	126
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44814	144
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EDP NO.	PAGE
44831	144
44832	148
44833	148
44834	148
44835	148
44836	148
44837	148
44838	148
44839	148
44840	148
44841	148
44842	145
44843	145
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44934	150

EDP Number Index

EDP NO.	PAGE
44935	150
44936	150
44937	150
44938	150
44939	150
44940	150
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45100	78
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46133	228
46140	110
46141	110
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46206	226
46207	226
46208	226
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46211	226
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47000	31
47001	31
47002	31
47003	31
47004	31
47005	31
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47007	31
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47167	31
47168	31
47169	31
47170	31
47171	31
47172	31
47173	31
48003	31
48012	31
48020	31
48070	31
48500	219
48501	219
48502	219
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EDP Number Index

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EDP Number Index

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68980	305
68981	305

EDP Number Index

EDP NO.	PAGE
68982	305
68983	305
68984	305
68985	305
68986	305
68987	305
68988	305
68989	305
68990	305
68991	305
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69024	306
69025	306
69026	307
69027	307
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70003	326
70004	326
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70010	326
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72978	112
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73012	342
73013	342
73014	342
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74004	316
74007	316
74010	316
74013	316
74016	316
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74122	316
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90001	356
90005	356
90009	356
90013	356
90017	356
90021	356
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91005	357
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93282	104

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

sfm = rpm x .262 x cutting diameter

rpm = sfm x 3.82 / cutting diameter

feed (inches per tooth) = ipm / (number of teeth x rpm)

feed (inches / minute) = inches per tooth x number of teeth x rpm

feed (inches / minute) = ipr x rpm

feed (inches / revolution) = ipm / rpm

cusp height* = (tool diameter / 2) – $\sqrt{(\text{tool diameter}^2 - \text{pitch}^2) / 4}$

pitch = $\sqrt{4 \times (\text{cusp height} \times \text{tool diameter}) - 4 \times (\text{cusp height}^2)}$

mrr – milling – (in^3/min) = width of cut x depth of cut x ipm

cutting time – drilling – (minutes) = length / ipm

Metric Formulas

m/min = (3.14 x cutting diameter x rpm) / 1000

rpm = (1000 x m / min) / (3.14 x cutting diameter)

feed (mm per tooth) = millimeters per minute / (number of teeth x rpm)

feed (mm/minute) = feed per tooth x number of teeth x rpm

feed (mm/minute) = mmr x rpm

feed (mm per revolution) = mmr / rpm

cusp height* = (tool diameter / 2) –$\sqrt{(\text{tool diameter}^2 - \text{pitch}^2) / 4}$

pitch = $\sqrt{4 \times (\text{cusp height} \times \text{tool diameter}) - 4 \times (\text{cusp height}^2)}$

mrr – milling – (cm^3/min) = (width of cut x depth of cut x mm/min) / 1000

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
–	0,10	0.0039
–	0,20	0.0079
–	0,25	0.0098
–	0,30	0.0118
#80	0,34	0.0135
–	0,35	0.0138
#79	0,37	0.0145
1/64	0,40	0.0156
#78	0,41	0.0160
–	0,45	0.0177
#77	0,46	0.0180
–	0,50	0.0197
#76	0,51	0.0200
#75	0,53	0.0210
–	0,55	0.0217
#74	0,57	0.0225
–	0,60	0.0236
#73	0,61	0.0240
#72	0,64	0.0250
–	0,65	0.0256
#71	0,66	0.0260
–	0,70	0.0276
#70	0,71	0.0280
#69	0,74	0.0292
–	0,75	0.0295
#68	0,79	0.0310
1/32	0,79	0.0313
–	0,80	0.0315
#67	0,81	0.0320
#66	0,84	0.0330
–	0,85	0.0335
#65	0,89	0.0350
–	0,90	0.0354
#64	0,91	0.0360
#63	0,94	0.0370
–	0,95	0.0374
#62	0,97	0.0380
#61	0,99	0.0390
–	1,00	0.0394
#60	1,02	0.0400
#59	1,04	0.0410
–	1,05	0.0413
#58	1,07	0.0420
#57	1,09	0.0430
–	1,10	0.0433
–	1,15	0.0453
#56	1,18	0.0465
3/64	1,19	0.0469
–	1,20	0.0472
–	1,25	0.0492
–	1,30	0.0512
#55	1,32	0.0520
–	1,35	0.0531
#54	1,40	0.0550
#53	1,51	0.0595
–	1,55	0.0610
1/16	1,59	0.0625

Inch	metric	Decimal equivalent
–	1,60	0.0630
#52	1,61	0.0635
–	1,65	0.0650
#51	1,70	0.0669
–	1,75	0.0689
#50	1,78	0.0700
–	1,80	0.0709
#49	1,85	0.0728
–	1,90	0.0748
#48	1,93	0.0760
–	1,95	0.0768
5/64	1,98	0.0781
#47	1,99	0.0785
–	2,00	0.0787
–	2,05	0.0807
#46	2,06	0.0810
#45	2,08	0.0820
–	2,10	0.0827
–	2,15	0.0846
#44	2,18	0.0860
–	2,20	0.0866
–	2,25	0.0886
#43	2,26	0.0890
–	2,30	0.0906
–	2,35	0.0925
#42	2,37	0.0935
3/32	2,38	0.0938
–	2,40	0.0945
#41	2,44	0.0960
–	2,45	0.0965
#40	2,50	0.0984
#39	2,53	0.0995
#38	2,58	0.1015
–	2,60	0.1024
#37	2,64	0.1040
–	2,70	0.1063
#36	2,71	0.1065
–	2,75	0.1083
7/64	2,78	0.1094
#35	2,79	0.1100
–	2,80	0.1102
#34	2,82	0.1110
#33	2,87	0.1130
–	2,90	0.1142
#32	2,95	0.1160
–	3,00	0.1181
#31	3,05	0.1200
–	3,10	0.1220
1/8	3,18	0.1250
–	3,20	0.1260
–	3,25	0.1280
#30	3,26	0.1285
–	3,30	0.1299
–	3,40	0.1339
#29	3,45	0.1360
–	3,50	0.1378
#28	3,57	0.1405

Inch	metric	Decimal equivalent
9/64	3,57	0.1406
–	3,60	0.1417
#27	3,66	0.1440
–	3,70	0.1457
#26	3,73	0.1470
–	3,75	0.1476
#25	3,80	0.1495
–	3,80	0.1496
#24	3,86	0.1520
–	3,90	0.1535
#23	3,91	0.1540
5/32	3,97	0.1562
#22	3,99	0.1570
–	4,00	0.1575
#21	4,04	0.1590
#20	4,09	0.1610
–	4,10	0.1614
–	4,20	0.1654
#19	4,22	0.1660
–	4,25	0.1673
–	4,30	0.1693
#18	4,31	0.1695
11/64	4,37	0.1719
#17	4,39	0.1730
–	4,40	0.1732
#16	4,50	0.1770
–	4,50	0.1772
#15	4,57	0.1800
–	4,60	0.1811
#14	4,62	0.1820
#13	4,70	0.1850
–	4,75	0.1870
3/16	4,76	0.1875
#12	4,80	0.1890
#11	4,85	0.1910
–	4,90	0.1929
#10	4,91	0.1935
#9	4,98	0.1960
–	5,00	0.1969
#8	5,05	0.1990
–	5,10	0.2008
#7	5,11	0.2010
13/64	5,16	0.2031
#6	5,18	0.2040
–	5,20	0.2047
#5	5,22	0.2055
–	5,25	0.2067
–	5,3	0.2087
#4	5,31	0.2090
–	5,40	0.2126
#3	5,41	0.2130
–	5,50	0.2165
7/32	5,56	0.2188
–	5,60	0.2205
#2	5,61	0.2210
–	5,70	0.2244
–	5,75	0.2264

Inch	metric	Decimal equivalent
#1	5,79	0.2280
–	5,80	0.2283
–	5,90	0.2323
A	5,94	0.2340
15/64	5,95	0.2344
–	6,00	0.2362
B	6,05	0.2380
–	6,10	0.2402
C	6,15	0.2420
–	6,20	0.2441
D	6,25	0.2461
–	6,30	0.2480
E	6,35	0.2500
1/4	6,35	0.2500
–	6,40	0.2520
–	6,50	0.2559
F	6,53	0.2570
–	6,60	0.2598
G	6,63	0.2610
–	6,70	0.2638
17/64	6,75	0.2656
H	6,76	0.2660
–	6,80	0.2677
–	6,90	0.2717
I	6,91	0.2720
–	7,00	0.2756
J	7,04	0.2770
–	7,10	0.2795
K	7,14	0.2810
9/32	7,14	0.2812
–	7,20	0.2835
–	7,25	0.2854
–	7,30	0.2874
L	7,37	0.2900
–	7,40	0.2913
M	7,49	0.2950
–	7,50	0.2953
19/64	7,54	0.2969
–	7,60	0.2992
N	7,67	0.3020
–	7,70	0.3031
–	7,75	0.3051
–	7,80	0.3071
–	7,90	0.3110
5/16	7,94	0.3125
–	8,00	0.3150
O	8,03	0.3160
–	8,10	0.3189
–	8,20	0.3228
P	8,20	0.3230
–	8,25	0.3248
–	8,30	0.3268
21/64	8,33	0.3281
–	8,40	0.3307
Q	8,43	0.3320
–	8,50	0.3346
–	8,60	0.3386

Inch	metric	Decimal equivalent
R	8,61	0.3390
–	8,70	0.3425
11/32	8,73	0.3438
–	8,75	0.3445
–	8,80	0.3465
S	8,84	0.3480
–	8,90	0.3504
–	9,00	0.3543
T	9,09	0.3580
–	9,10	0.3583
23/64	9,13	0.3594
–	9,20	0.3622
–	9,25	0.3642
–	9,30	0.3661
U	9,35	0.3680
–	9,40	0.3701
–	9,50	0.3740
3/8	9,53	0.3750
V	9,56	0.3770
–	9,60	0.3780
–	9,70	0.3819
–	9,75	0.3839
W	9,80	0.3858
–	9,90	0.3898
25/64	9,92	0.3906
–	10,00	0.3937
X	10,08	0.3970
–	10,10	0.3976
–	10,20	0.4016
Y	10,26	0.4040
–	10,30	0.4055
13/32	10,32	0.4062
–	10,40	0.4094
Z	10,49	0.4130
–	10,50	0.4134
–	10,60	0.4173
–	10,70	0.4213
27/64	10,72	0.4219
–	10,80	0.4252
–	10,90	0.4291
–	11,00	0.4331
–	11,10	0.4370
7/16	11,11	0.4375
–	11,20	0.4409
–	11,30	0.4449
–	11,40	0.4488
–	11,50	0.4528
29/64	11,51	0.4531
–	11,60	0.4567
–	11,70	0.4606
–	11,80	0.4646
–	11,90	0.4685
15/32	11,91	0.4688
–	12,00	0.4724
31/64	12,30	0.4844
–	12,50	0.4921
1/2	12,70	0.5000

Inch	metric	Decimal equivalent
–	13,00	0.5118
33/64	13,10	0.5156
17/32	13,49	0.5312
–	13,50	0.5315
35/64	13,89	0.5469
–	14,00	0.5512
9/16	14,29	0.5625
–	14,50	0.5709
37/64	14,68	0.5781
–	15,00	0.5906
19/32	15,08	0.5938
39/64	15,48	0.6094
–	15,50	0.6102
5/8	15,88	0.6250
–	16,00	0.6299
41/64	16,27	0.6406
–	16,50	0.6496
21/32	16,67	0.6562
–	17,00	0.6693
43/64	17,07	0.6719
11/16	17,46	0.6875
–	17,50	0.6890
45/64	17,86	0.7031
–	18,00	0.7087
23/32	18,26	0.7188
–	18,50	0.7283
47/64	18,65	0.7344
–	19,00	0.7480
3/4	19,05	0.7500
49/64	19,45	0.7656
–	19,50	0.7677
25/32	19,84	0.7812
–	20,00	0.7874
51/64	20,24	0.7969
–	20,50	0.8071
13/16	20,64	0.8125
–	21,00	0.8268
53/64	21,03	0.8281
27/32	21,43	0.8438
–	21,50	0.8465
55/64	21,84	0.8594
–	22,00	0.8661
7/8	22,23	0.8750
–	22,50	0.8858
57/64	22,62	0.8906
–	23,00	0.9055
29/32	23,02	0.9062
59/64	23,42	0.9219
–	23,50	0.9252
15/16	23,81	0.9375
–	24,00	0.9449
61/64	24,21	0.9531
–	24,50	0.9646
31/32	24,61	0.9688
–	25,00	0.9843
63/64	25,00	0.9844
1	25,40	1.0000

Hardness Conversion Chart

ROCKWELL HARDNESS (HRb)	ROCKWELL HARDNESS (HRc)	BRINELL HARDNESS (HB)	VICKERS HARDNESS (HV)	TENSILE STRENGTH (N/mm2)	PSI (1000lb/in2)
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

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