KYOCERA
SGS Precision Tools

SGS
Solid Carbide Tools

2016 Global Product Catalog
Metric Tools

www.kyocera-sgstool.com

KYOCERA
SGS Precision Tools

SGS
Solid Carbide Tools

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 11

COATINGS 12

MILLING
High Performance End Mills. 14
End Mill Matrix. 18
High Performance Aluminum End Mills 66
General Purpose End Mills. 90

HOLE MAKING
High Performance Drills 118
General Purpose Drills 160
General Purpose Countersinks 186
General Purpose Reamers 202

ROUTING
High Performance Routers 210
General Purpose Routers 222

TECHNICAL INFORMATION
EDP Index 224
KSPT Reference Information 237
Decimal Equivalent Chart 238
Hardness Conversion Chart 239

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

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, Europe and Asia.

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
e-mail: webmaster@kyocera-sgstool.com

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

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

CHINA KSPT
Unit 301, Building A, No.200,
Jin Su Road
Jinqiao Export Processing Zone,
Pudong New Area
Shanghai 201206
China
phone: (86) 21-50589822
fax: (86) 21-50817160
e-mail: china@kyocera-sgstool.com
web: www.kyocera-sgstool.com/china

SGS TOOLWIZARD 2.0

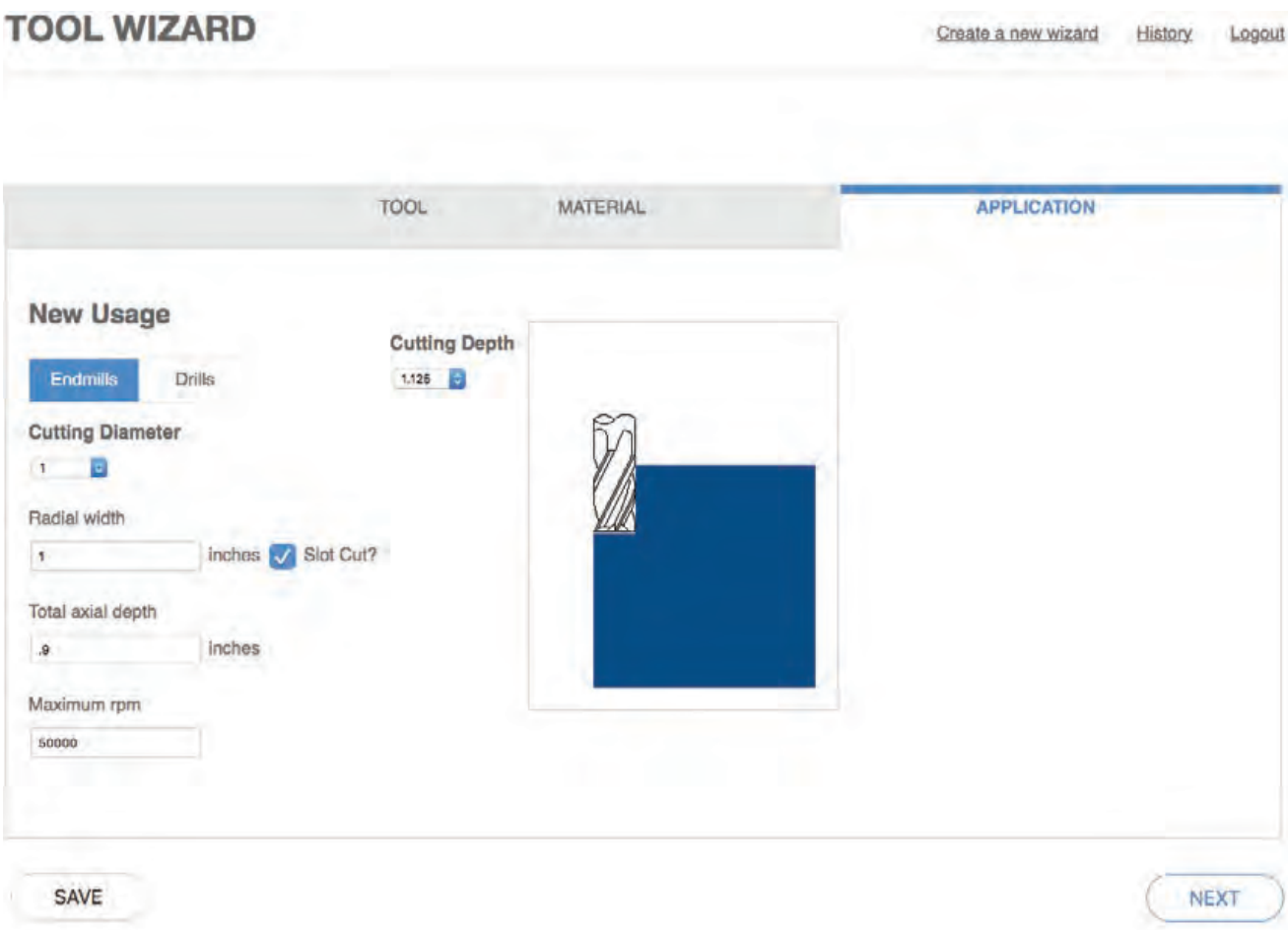
The ToolWizard is all new for 2016, featuring responsive design, filter based searching and search history tracking.

USE THE TOOLWIZARD TO:

- Calculate application parameters
- Search the SGS 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

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.
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.

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

INDUSTRY
INDUSTRIAS
INDUSTRIES

Aerospace Aeroespacial Aérospatiale	Medical Médica Médical	Power Generation Energética Production d'énergie	Automotive Automotriz Automobile	Mold & Die Moldes y matrices Moules et coquilles	Castings & Foundaries Fundición Moulages et fonderies	General Engineering Ingeniería Ingénierie générale

These icons indicate for which industry applications KSPT High Performance Products are best suited.
Estos íconos indican las aplicaciones industriales más adecuadas para los productos KSPT de alto rendimiento.
Ces icônes indiquent les applications industrielles pour lesquelles les produits haute performance KSPT sont les mieux adaptés.

Common Legend
Leyenda habitual
Légende commune

MATERIALS
MATERIALES
MATÉRIAUX

Steels Aceros Aciers	Stainless Steels Aceros Inoxidables Inox	Cast Iron Hierro Fundido Fonte	High Temp Alloys Aleaciones a Altas Temperaturas Alliages Haute Temp
Titanium Titanio Titane	Non-Ferrous No Férrico Non Ferreux	Plastics/Composites Plásticos/Resinas Plastiques/Composites	Hardened Steels Aceros Endurecidos Aciers Trempés

TOOL LENGTH
LONGITUD FRESA
LONGUEUR DE L'OUTIL

Stub Corta Court	Regular Media Moyen	Long Larga Long	Long Reach Neck Larga con cuello Gorge de dégagement longue portée	Extra Long Extra-larga Extra-long

FLUTES
FILOS
GOUJURES

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

End Mill Legend
Leyenda fresas
Légende fraise

END CONFIGURATIONS
CONFIGURACIONES DE LA PUNTA
CONFIGURATIONS TERMINALES

Ball
Esférica
Boule

Corner
Plana con borde romo
Coin

Square
Plana
Carrée

SHANK TYPE
TIPO DE VÁSTAGO
TYPE DE TIGE

Common
Normal
Commune

Straight
Recto
Droite

Weldon Flat
Weldon plano
Méplat Weldon

HAIMER Safe-Lock
HAIMER Safe-Lock
HAIMER Safe-Lock

HELIX ANGLES
ÁNGULOS HELICOIDALES
ANGLES DE L'HÉLICE

Right Spiral
Espiral sentido derecho
Spirale droite

Left Spiral
Espiral sentido izquierdo
Spirale gauche

Variable Right Spiral
Espiral sentido derecha con ángulo variable
Spirale droite variable

COOLANT OPTIONS
OPCIONES DE REFRIGERACIÓN
OPTIONS DE REFROIDISSEMENT

Internal Coolant
Refrigerante interno
Refroidissement interne

JetStream Coolant Slots
Ranuras del refrigerante JetStream
Fentes de refroidissement JetStream

RAKE ANGLE
ÁNGULO DE ATAQUE
ANGLE DE PENTE

Positive
Positivo
Positif

Neutral
Neutro
Neutre

Negative
Negativo
Négatif

Variable
Variable
Variable

ADDITIONAL GEOMETRY
CARACTERÍSTICAS GEOMÉTRICAS ADICIONALES
GÉOMÉTRIE SUPPLÉMENTAIRE

Flute Spacing Unequal
Espaciado filos desigual
Espacement inégal entre les goujoures

Chip Breaker
Rompevirutas
Brise-copeaux

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

Drill Legend
Leyenda taladros
Légende perçage

SHANK TYPE
TIPO DE VÁSTAGO
TYPE DE TIGE

Common
Normal
Commune

Straight
Recto
Droite

REACH
ALCANCE
LONGUEUR

3xD

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

5xD

5xD Reach
Alcance 5xD
Longueur 5xD

8xD

8xD Reach
Alcance 8xD
Longueur 8xD

HELIX ANGLES
ÁNGULOS HELICOIDALES
ANGLES DE L'HÉLICE

Right Spiral
Espiral sentido derecho
Spirale droite

None
Ninguno
Aucun

COOLANT OPTIONS
OPCIONES DE REFRIGERACIÓN
OPTIONS DE REFROIDISSEMENT

Internal Coolant
Refrigerante externo
Refroidissement interne

External Coolant
Refrigerante interno
Refroidissement externe

Router Legend
Leyenda ranuradores
Légende détourage

SHANK TYPE
TIPO DE VÁSTAGO
TYPE DE TIGE

Straight
Recto
Droite

RAKE ANGLE
ÁNGULO DE ATAQUE
ANGLE DE PENTE

Positive
Positivo
Positif

Neutral
Neutro
Neutre

Negative
Negativo
Négatif

Variable
Variable
Variable

HELIX ANGLES
ÁNGULOS HELICOIDALES
ANGLES DE L'HÉLICE

Right Spiral
Espiral sentido derecho
Spirale droite

Left Spiral
Espiral sentido izquierdo
Spirale gauche

ADDITIONAL GEOMETRY
CARACTERÍSTICAS GEOMÉTRICAS ADICIONALES
GÉOMÉTRIE SUPPLÉMENTAIRE

Left Hand Cut Direction
Fresado sentido izquierda
Coupe vers la gauche

Right Hand Cut Direction
Fresado sentido derecha
Coupe vers la droite

Chip Breaker
Rompevirutas
Brise-copeaux

KYOCERA
SGS Precision Tools

Coatings

	TI-NAMITE	TI-NAMITE-A	TI-NAMITE-B
Coating	Titanium (TiN)	Aluminum Titanium Nitride (AlTiN)	Titanium DiBoride (TiB2)
Identifying Color	gold	dark grey	light grey-silver
Layer Structure	Multilayer	Nano structure	Monolayer
Thickness	1–4 microns	1–4 microns	1–2 microns
Hardness (HV)	2200	3700	4000
Coefficient of Friction (Fretting)	0.4–0.65	0.30	0.45
Thermal Stability	600°C / 1112°F	1100°C / 2010°F	850°C / 1562°F
General Information	A general purpose coating with good adhesion and abrasion resistant properties. Suitable for a wide variety of materials.	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.	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.

SGS
Solid Carbide Tools

Ti-NAMITE-C	Ti-NAMITE-X ADVANCED TOOL COATING	Ti-NAMITE CRYSTALLINE DIAMOND COATING	Ti-NAMITE-M
Titanium Carbonitride (TiCN)	Proprietary (TX)	Crystalline Diamond (Diamond)	Proprietary (TM)
pink-red	black	black	copper
Multilayer	Nano Composite	Monolayer	Nano Composite
1–4 microns	1–4 microns	6–20 microns	1–4 microns
3000	3600	>8000	3600
0.3–0.45	0.45	0.15–0.2	0.45
400°C / 752°F	1150°C / 2100°F	800°C / 1470°F	1150°C / 2100°F
A very wear resistant coating with high toughness and shock resistance. Good in interrupted cuts found in applications like milling.	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.	This is the hardest coating available with the best abrasion resistance. It is carbon based so it is limited in application capabilities. It is also the most expensive with the longest processing time.	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	Z5MCR	5 Flute Rougher Corner Radius Metric	23
Z-Carb-AP	Z1MPCR	4 Flute Variable Rake Corner Radius Metric	26
	Z1MPIC	4 Flute Variable Rake Intermediate Reach Corner Radius Metric	28
	Z1MPLC	4 Flute Variable Rake Long Reach Corner Radius Metric	29
Z-Carb	Z1M	4 Flute Variable Geometry Square End Metric	32
	Z1MB	4 Flute Variable Geometry Ball End Metric	33
Z-Carb-HTA	ZH1MCR	4 Flute Variable Geometry High Temp Alloys Corner Radius Metric	36
	ZH1MCRS	4 Flute Variable Geometry High Temp Alloys Stub Corner Radius Metric	36
Z-Carb-MD	ZD1MCR	4 Flute Variable Geometry Hard Materials Long Reach Corner Radius Metric	38
Series 7	7M	4 Flute Variable Geometry Long Length Square End Metric	57
	7MB	4 Flute Variable Geometry Long Length Ball End Metric	58
V-Carb	55M	5 Flute Finisher & Semi-Finisher Square End Metric	40
	55MCR	5 Flute Finisher & Semi-Finisher Corner Radius Metric	41
	55MB	5 Flute Finisher & Semi-Finisher Ball End Metric	43
T-Carb	51M	6 Flute High Speed Machining Square End Metric	46
	51ML	6 Flute High Speed Machining Square End Long Reach Metric	47
	51MCR	6 Flute High Speed Machining Corner Radius Metric	46
	51MLC	6 Flute High Speed Machining Long Reach Corner Radius Metric	47
Multi-Carb	66M	Multi-Flute Finisher Square End Metric	50
	66MCR	Multi-Flute Finisher Corner Radius Metric	51
Turbo-Carb	56MB	2 Flute Contouring Long Reach Ball End Metric	60
Power-Carb	57M	6 Flute Finisher Square End Metric	62
Series 33	33MCR	3 Flute Difficult to Machine Materials Corner Radius Metric	54
CFRP Slow Helix	27M	2 Flute Slow Helix Square End Metric	64

Speed & Feed Recommendations listed after each series

Fresado

FRESAS DE ALTO RENDIMIENTO	SERIE	DESCRIPCIÓN	PÁGINA
Z-Carb-HPR	Z5MCR	5 filos, desbastador, radio angulado, métrico	23
Z-Carb-AP	Z1MPCR	4 filos, inclinación variable, radio angulado, métrico	26
	Z1MPIC	4 filos, inclinación variable, medio alcance, radio angulado, métrico	28
	Z1MPLC	4 filos, inclinación variable, largo alcance, radio angulado, métrico	29
Z-Carb	Z1M	4 filos, geometría variable, punta cuadrada, métrico	32
	Z1MB	4 filos, geometría variable, punta esférica, métrico	33
Z-Carb-HTA	ZH1MCR	4 filos, geometría variable, aleaciones a altas temperaturas, radio angulado, métrico	36
	ZH1MCRS	4 filos, geometría variable, aleaciones a altas temperaturas, versión corta, radio angulado, métrico	36
Z-Carb-MD	ZD1MCR	4 filos, geometría variable, materiales duros, largo alcance, radio angulado, métrico	38
Serie 7	7M	4 filos, geometría variable, longitud larga, punta cuadrada, métrico	57
	7MB	4 filos, geometría variable, longitud larga, punta esférica, métrico	58
V-Carb	55M	5 filos, acabador y semiacabador, punta cuadrada, métrico	40
	55MCR	5 filos, acabador y semiacabador, radio angulado, métrico	41
	55MB	5 filos, acabador y semiacabador, punta esférica, métrico	43
T-Carb	51M	6 filos, mecanizado de alta velocidad, punta cuadrada, métrico	46
	51ML	6 filos, mecanizado de alta velocidad, punta cuadrada, largo alcance, métrico	47
	51MCR	6 filos mecanizado de alta velocidad, radio angulado, métrico	46
	51MLC	6 filos mecanizado de alta velocidad, largo alcance, radio angulado, métrico	47
Multi-Carb	66M	Filo múltiple, acabador, punta cuadrada, métrico	50
	66MCR	Filo múltiple, acabador, radio angulado, métrico	51
Turbo-Carb	56MB	2 filos, contorneado, largo alcance, punta esférica, métrico	60
Power-Carb	57M	6 filos, acabador, punta cuadrada, métrico	62
Serie 33	33MCR	3 filos, materiales difíciles de mecanizar, radio angulado, métrico	54
Helicoidal de avance lento CFRP	27M	2 filos, helicoidal de avance lento, punta cuadrada, métrico	64

Recomendaciones de velocidades y avances mostradas tras cada serie

Fraisage

FRAISES A DETOURER UNIVERSELLES	SÉRIES	DESCRIPTION	PAGE
Z-Carb-HPR	Z5MCR	5 dents rayon en coin d'ébauche (métrique)	23
Z-Carb-AP	Z1MPCR	4 dents à vague de coupe variable rayon en coin (métrique)	26
	Z1MPIC	4 dents à vague de coupe variable portée intermédiaire rayon en coin (métrique)	28
	Z1MPLC	4 dents à vague de coupe variable longue portée rayon en coin (métrique)	29
Z-Carb	Z1M	4 dents géométrie variable à bout plat (métrique)	32
	Z1MB	4 dents géométrie variable à bout hémisphérique (métrique)	33
Z-Carb-HTA	ZH1MCR	4 dents géométrie variable alliages haute température rayon en coin (métrique)	36
	ZH1MCRS	4 dents géométrie variable, alliages haute température, longueur de l'outil court, rayon en coin (métrique)	36
Z-Carb-MD	ZD1MCR	4 dents géométrie variable matériaux durs longue portée rayon en coin (métrique)	38
Série 7	7M	4 dents géométrie variable à queue longue à bout plat (métrique)	57
	7MB	4 dents géométrie variable à queue longue à bout hémisphérique (métrique)	58
V-Carb	55M	5 dents en bout de finition et semi-finition plat (métrique)	40
	55MCR	5 dents en bout finition et semi-finition rayon en coin (métrique)	41
	55MB	5 dents en bout de finition et semi-finition hémisphérique (métrique)	43
T-Carb	51M	6 dents pour usinage grande vitesse à bout plat (métrique)	46
	51ML	6 dents pour usinage grande vitesse à bout plat longue portée (métrique)	47
	51MCR	6 dents pour usinage grande vitesse rayon en coin (métrique)	46
	51MLC	6 dents pour usinage grande vitesse longue portée rayon en coin (métrique)	47
Multi-Carb	66M	Multi-dents en bout de finition plat (métrique)	50
	66MCR	Multi-dents en bout de finition rayon en coin (métrique)	51
Turbo-Carb	56MB	2 dents contournage longue portée à bout hémisphérique (métrique)	60
Power-Carb	57M	6 dents en bout de finition plat (métrique)	62
Série 33	33MCR	3 dents usinage des matériaux difficiles rayon en coin (métrique)	54
CFRP hélice lente	27M	2 dents hélice lente à bout plat (métrique)	64

Recommandativons de vitesse et avance indiquées après chaque série

End Mill Matrix

Name	Series	Page No.	Material	# Flutes	Helix °	Flute Index	Rake	Relief
Z-Carb-HPR*	Z5	23	★ ★ ★ ★ ★	5	37	≠	+	Eccentric
Z-Carb	Z1	32	★ ★ ★ ☆ ★	4	35 / 38	≠	+	Eccentric
Z-Carb-AP	Z1P	26	★ ★ ★ ☆ ★	4	35 / 38	≠	+	Eccentric
Z-Carb-HTA	ZH1	36	☆ ☆ ★ ★ ☆	4	38 / 41	≠	+	Eccentric
Z-Carb-MD	ZD1	38	★ ★	4	42 / 45	≠	–	Eccentric
Series 33	33	54	★ ★ ★ ☆ ★	3	32 / 48	≠	+	Eccentric
T-Carb	51	46	★ ★ ★ ☆ ★	6	41	≠	+	Eccentric
Series 7	7	57	★ ★ ★ ☆ ★	4	38	≠	+	Primary / Secondary
V-Carb	55	40	★ ★ ★ ★ ★	5	45	≠	+	Primary / Secondary
Multi Carb	66	50	★ ★ ★ ☆ ★	7, 9, 11	35	=	+	Eccentric
Turbo Carb	56B	60	★ ★	2	30	=	+	Eccentric
Power-Carb	57	62	★ ★	6	45	=	–	Eccentric
S-Carb 3 Flute	43	73	★ ☆	3	38	=	+	Circ Land / Eccentric
S-Carb Chipbreaker	43CB	81	★ ☆	3	38	=	+	Circ Land / Eccentric
S-Carb 2 Flute	47	84	★ ☆	2	35	=	+	Circ Land / Eccentric
S-Carb APR	43APR	69	★	3	38	=	+	Circ Land / Eccentric
S-Carb APF	43APF	71	★	4	38 / 41	≠	+	Circ Land / Eccentric
Slow Helix	27	64	★	4	10, 12	≠	+	Primary / Secondary
CCR *	20-CCR	215	★	5, 8, 10, 12	15	=	+	Concave
CCR *	31-CCR	218	★	5, 7, 8, 10	15	=	+	Concave
PCR *	29-PCR	213	★	8, 10, 12	15	=	0	Eccentric
Compression Router	25	220	★	4, 6, 8	30	=	+	Primary / Secondary
Up Cut Router	21	222	☆ ★	2	35	=	+	Primary / Secondary
Down Cut Router	22	222	☆ ★	2	35	=	+	Primary / Secondary
Ski-Carb	44	88	★ ☆	2	45	=	+	Circ Land / Pri / Sec

Main Key
★ Primary Function
☆ Secondary Function
Coolant Required
Plunging NOT Recommended

Steel	
Stainless Steel	Coolant, Plunging NOT Recommended
Cast Iron	
High Temp Alloys	Coolant, Plunging NOT Recommended
Titanium Alloys	Coolant, Plunging NOT Recommended
Non Ferrous	Coolant
Plastics, Composites	
Hardened Steels	Plunging NOT Recommended

Coating Key
Ti-Namite-A = AlTiN
Ti-Namite-X = AlTiN-based nanocomposite
Ti-Namite-M = AlTiSiN nanocomposite
Ti-Namite-B = TiB2
Di-Namite = polycrystalline diamond

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%
Ti-Namite-M / Ti-Namite-A		☆	☆	☆	☆		★	★	★	★	★	★	★	★	★	☆	★	★	★	★	★	☆	★	★	★		
Ti-Namite-A		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	★	☆	★	★	★	★	☆		★	★	☆		
Ti-Namite-X		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	★	☆	★	★	★	★	★	☆	★	★	★	☆	
Ti-Namite-A		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	★	☆	★	★	★	★	☆		★	★	☆		
Ti-Namite-X		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	★	☆	★	★	★	★			★	★	☆		
Ti-Namite-A		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	★	☆	★	★	★	★	★	★	★	★	★	★	☆
Ti-Namite-X		☆	☆	☆	☆		★	★	★	★	☆		☆														
Ti-Namite-X		★	★	★	★	★																					
Ti-Namite-A		★	★	★	★		☆	☆			☆		☆				☆	☆									
Ti-Namite-A		★	★	★	★																						
Ti-Namite-X		★	★	★	★		★	★	☆		☆	☆					☆										
Ti-Namite-X		★	★	★	★		★	★	★		★	☆	☆				★	☆									
Ti-Namite-B		★	★	★	★		★	★	★	☆	★	★	★	★	☆		★	★	★	★	☆	☆	★	★	★	★	★
Ti-Namite-B							★	★	★	★	★	★	★	★	☆	☆	★	★	★	★	★	☆	★	★	★	★	★
Ti-Namite-B		☆	☆	☆	☆		☆	☆	☆	☆	★	★	★	★	☆		★	★	★	★	☆	☆	★	★	★	★	★
Ti-Namite-B							★	★	★	★	★	★	★	★	☆	☆	★	★	★	★	★	☆	★	★	★	★	★
Ti-Namite-B		★	★	★	★	★	★	★	★	☆																	
Di-Namite (optional)		☆	☆	☆	☆	☆					★	★	★	★	★	☆	★	★	★	★	☆	☆	★	★	☆	☆	
Di-Namite (optional)		☆	☆	☆	☆	☆					★	★	★	★	★	☆	★	★	★	★	☆	☆	★	★	☆		
Di-Namite (optional)		☆	☆	☆	☆	☆					★	★	★	★	★	★	★	★	★	★	★	★	★	★	☆		
Di-Namite (optional)		☆	☆	☆	☆	☆					★	★	★	★	★	☆	★	★	★	★	☆	☆	★	★	★	★	★
Di-Namite (optional)		★	★	★	★	★					☆	☆	☆	☆	☆	☆											
various optional		☆	☆	☆	☆	☆					★	★	★	★	★	★	★	★	★	★	★	☆	★	★	★	★	★
various optional		☆	☆	☆	☆	☆					★	★	★	★	★	★	★	★	★	★	★	☆	★	★	★	★	★
Ti-Namite-B		★	★	★	★		★	★	★	☆	★	★	★	★	☆		★	★	★	★	☆	☆	★	★	★	★	☆

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 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
Z-Carb HPR not intended for plunging

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 Rw 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 ($\frac{\downarrow}{ap}$)

Reductions to Speeds and Feeds may be necessary when:
- Rw and Ad exceed recommendations
- Using long flute or extended reach tools
- Using long tool holders
- Machining materials harder than listed

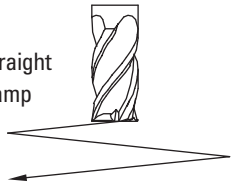
ENTRY METHODS

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 (Rw) 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 ($\frac{\downarrow}{ap}$)

Reducciones en velocidades y avances serán necesarias cuando:
- Rw y Ad exceda las recomendaciones
- Se utilicen filos largos o herramientas de largo alcance
- Se utilicen portaherramientas largos
- Se maquinen materiales más duros que los recomendados

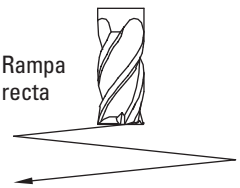
MÉTODOS DE ENTRADA

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 ap et ae sont importants
- Des dentures longues ou des séries longues sont utilisées
- Des attachement longs sont utilisés
- Lors d'usinage de matériaux durs

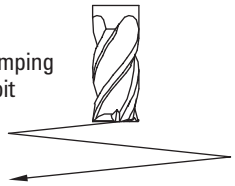
TYPES D'ENTREE MATIERE

Preperçage

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

Ramping hélicoïdal

Ramping droit

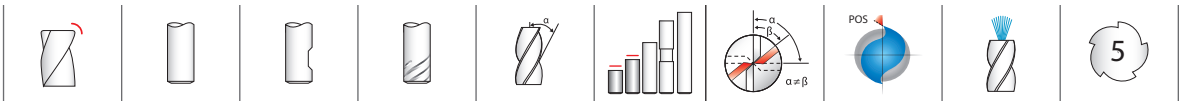


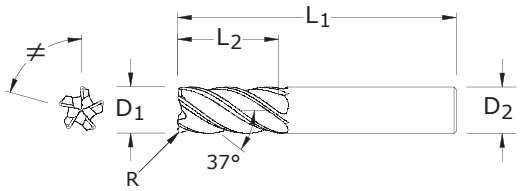
Les autres méthodes sont un ramping hélicoïdal et un ramping droit. Les angles de ramping élevés exigent une avance inférieure. Les angles de ramping inférieurs permettent les taux d'avance supérieurs et prolongeront la vie de l'outil. Utilisez des avances et vitesses de mortaisage pour les angles de 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%.

CARB-HPR
HIGH PERFORMANCE ROUGHER





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

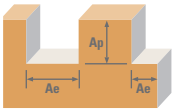
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

mm					EDP NO.						
CUTTING DIA. D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIA. 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	STOCK
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	–	–	–	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	–	47017	47025	–	●
12,0	26,0	83,0	12,0	0,76	47126	47129	–	47018	47026	–	●
12,0	26,0	83,0	12,0	1,0	47127	47130	–	47019	47027	–	●
12,0	26,0	83,0	12,0	1,5	48012	–	–	47020	47028	–	●
12,0	26,0	83,0	12,0	2,0	–	–	–	47021	47029	–	●
12,0	26,0	83,0	12,0	2,5	–	–	–	47022	47030	–	●
12,0	26,0	83,0	12,0	3,0	–	–	–	47023	47031	–	●
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)

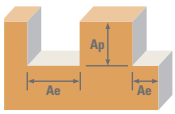
Z-Carb-HPR



	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

continued on next page

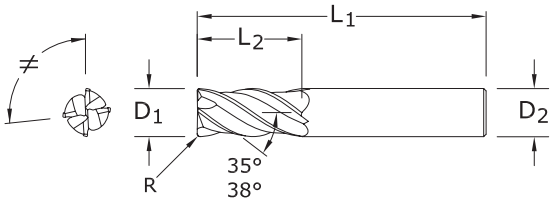
Z-Carb-HPR



	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
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 at 5 degrees or less, 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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

Z-Carb-AP



Z1MPCR

METRIC SERIES

- Patented variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Patented 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 ≤ 45 HRc (≤ 420 Bhn)

mm					EDP NO.					
CUTTING DIA. D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIA. D_2	CORNER RADIUS R	Ti-NAMITE-X	STOCK	Ti-NAMITE-X W/FLAT	STOCK	JetStream*	STOCK
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	●	–		–	

continued on next page

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

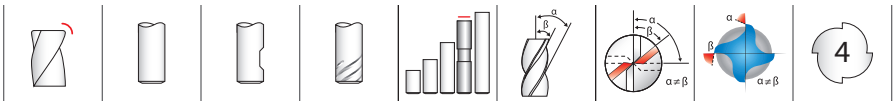
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

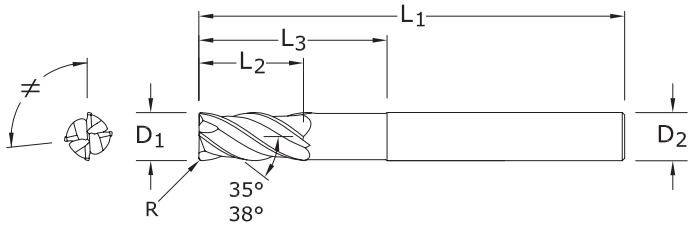
Z1MPCR
METRIC SERIES

mm					EDP NO.					
CUTTING DIA. D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIA. D_2	CORNER RADIUS R	Ti-NAMITE-X	STOCK	Ti-NAMITE-X W/FLAT	STOCK	JetStream*	STOCK
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	●

U.S. Patents 7,306,408 and 7,789,597
*JetStream Patented Coolant Technology

Z-Carb-AP





Z1MPIC
METRIC SERIES

- Patented variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Patented 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
- 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 W/FLAT	STOCK
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	■

TOLERANCES (mm)

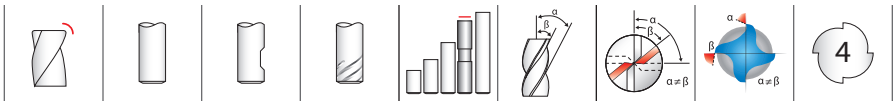
6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6
R = +0,000/–0,050

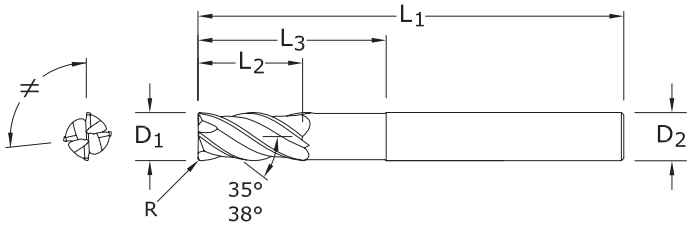
>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6
R = +0,000/–0,050

>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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery





Z1MPLC
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

>10–20 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

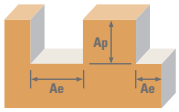
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

mm						EDP NO.			
CUTTING DIA. D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIA. D_2	REACH L_3	CORNER RADIUS R	Ti-NAMITE-X	STOCK	Ti-NAMITE-X W/FLAT	STOCK
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	46737	●	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	■

U.S. Patents 7,306,408 and 7,789,597
*JetStream Patented Coolant Technology

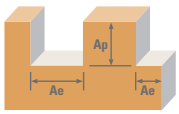
- Patented variable rake geometry alters and controls the cutting dynamic taking chatter suppression to an unprecedented level
- Patented unequal helix design aids in damaging harmonics by changing the angle at which each cutting edge enters and exits the material
- Unequal flute spacing helps to disrupt the rhythmic pattern created by the cutting edge helping to suppress damaging harmonics
- Long reach design allows for deeper and faster cuts
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

Z-Carb-AP



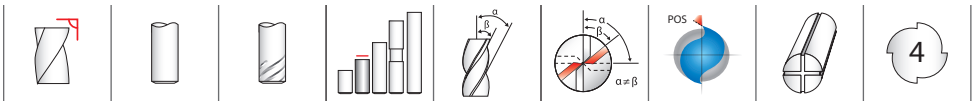
	Series Z1MPCR, Z1MPIC, Z1MPLC Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 1	3	6	8	10	12	16	20	25
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	169	RPM	53803	17934	8967	6725	5380	4484	3363	2690	2152
						(135-203)	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

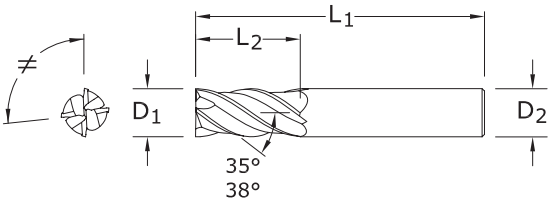
continued on next page

	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

Z-Carb





Z1M
METRIC SERIES

- Patented 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*	STOCK
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	●

*JetStream Patented Coolant Technology

TOLERANCES (mm)

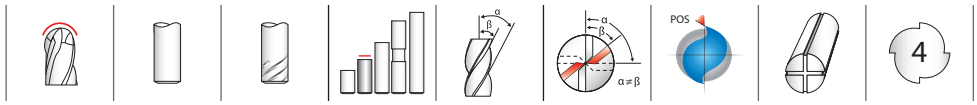
3–6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6

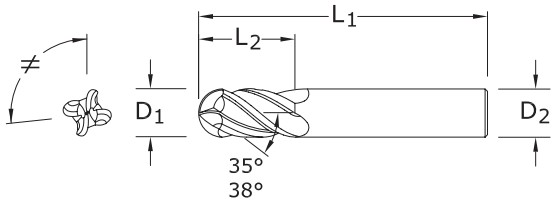
>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6

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

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery





Z1MB
METRIC SERIES

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*	STOCK
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	●

*JetStream Patented Coolant Technology

- Patented 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)

TOLERANCES (mm)

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

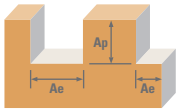
>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6

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

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

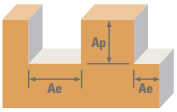
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

Z-Carb



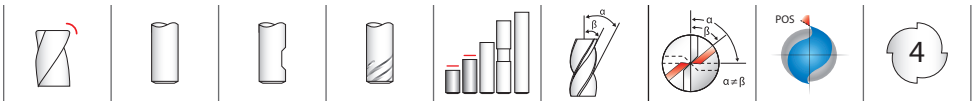
	Series Z1M, Z1MB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	16	20	25
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	169	RPM	17934	8967	6725	5380	4484	3363	2690	2152
						(135-203)	Fz	0.009	0.024	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
	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
	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

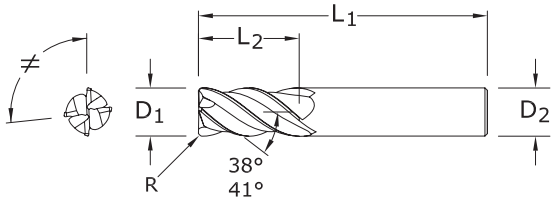
continued on next page

	Series Z1M, Z1MB Metric	Hardness		 Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	16	20	25
M	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	104	RPM	10987	5493	4120	3296	2747	2060	1648	1318
						(83-124)	Fz	0.005	0.014	0.023	0.029	0.034	0.046	0.051	0.050
							Feed (mm/min)	211	316	387	387	369	380	334	264
			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 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
- Patented 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)	STOCK
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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

ZH1MCR
METRIC SERIES

- The original Z-Carb design with an enhanced core and higher helix suited for the demands of high temperature alloys
- Patented 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	STOCK
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	●
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

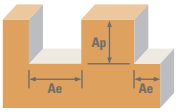
>6–10 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6
R = +0,000/–0,050

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

HIGH TEMP ALLOYS

TITANIUM

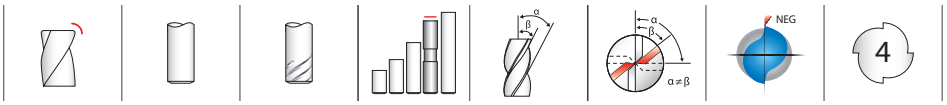
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

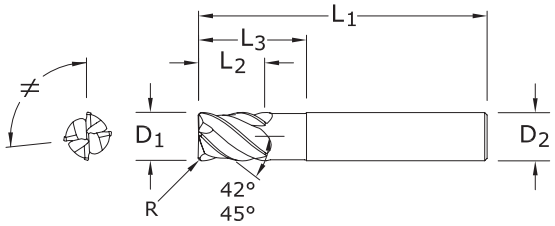


	Series ZH1MCRS, ZH1MCR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	10	12	20
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400**	≤ 300 Bhn or ≤ 32 HRc	Profile	≤ 0.5	≤ 1.5	26	RPM	1373	824	687	412
						(21-31)	Fz	0.017	0.032	0.041	0.053
							Feed (mm/min)	93	105	113	87
			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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

Z-Carb-MD





ZD1MCR

METRIC SERIES

- The original Z-Carb design with negative rake, heavy core, and higher helix for strength and shearing of hard mold & die materials
- Patented 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 ≤ 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	STOCK
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	●

TOLERANCES (mm)

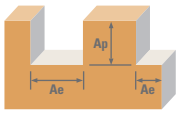
3–6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6
R = +0,000/–0,050

>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

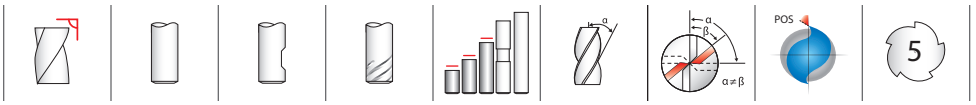
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery



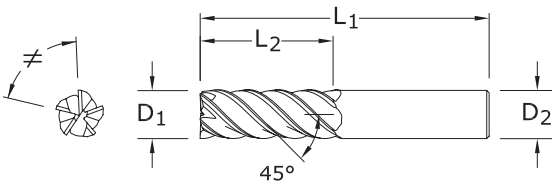
	Series ZD1MCR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	16	20
H	**TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2**	≤ 375 Bhn or ≤ 40 HRc	Profile	≤ 0.4	≤ 1	123	RPM	13087	6544	4908	3926	3272	2454	1963
						(99-148)	Fz	0.012	0.029	0.049	0.061	0.072	0.083	0.112
							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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

V-Carb



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)

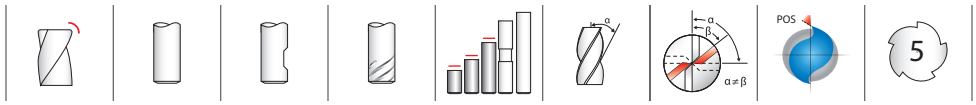
mm				EDP NO.		
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	Ti-NAMITE-A (AlTiN)	Ti-NAMITE-A (AlTiN) W/FLAT	STOCK
6,0	12,0	50,0	6,0	42606	–	●
6,0	19,0	63,0	6,0	42607	–	●
6,0	25,0	75,0	6,0	42608	–	●
8,0	12,0	50,0	8,0	42609	–	●
8,0	20,0	63,0	8,0	42610	–	●
8,0	25,0	75,0	8,0	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	–	●

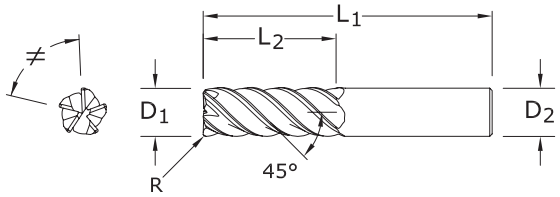
TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery





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

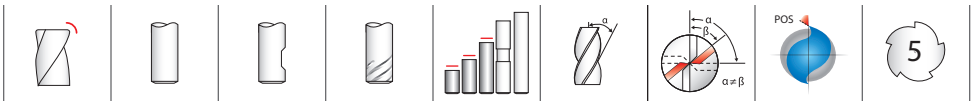
● U.S. Stock Standard

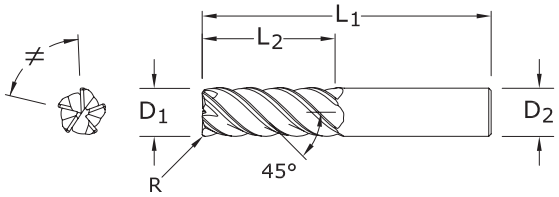
■ NOT STOCKED—Call for Delivery

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)	STOCK
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	■

continued on next page

- 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

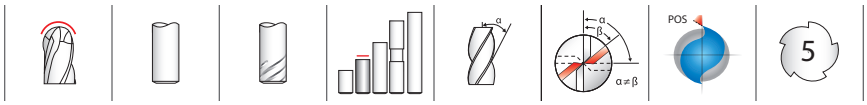
mm					EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	CORNER RADIUS R	Ti-NAMITE-A (AlTiN)	STOCK
16,0	32,0	89,0	16,0	2,5	42690	■
16,0	32,0	89,0	16,0	3,0	42691	■
16,0	32,0	89,0	16,0	4,0	42692	■
16,0	50,0	100,0	16,0	2,0	42656	■
16,0	50,0	100,0	16,0	2,5	42657	■
16,0	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	■

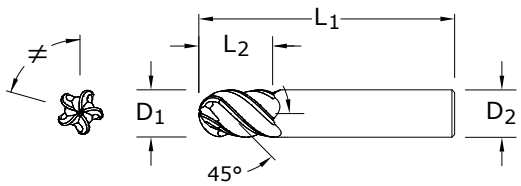
TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery





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

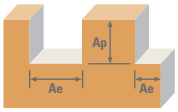
● U.S. Stock Standard

■ NOT STOCKED—Call for Delivery

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

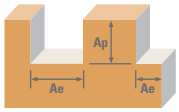
- Unequal indexing, high helix and an ideal rake and relief combination for unmatched finishing capability
- The choice when peak finish quality is the requirement
- Ball nose design ideal for finishing operations in complex workpieces
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

V-Carb



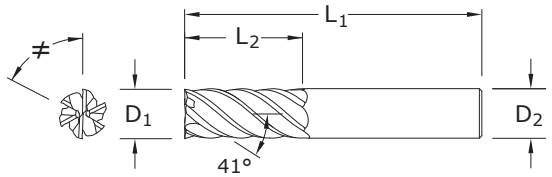
	Series 55M, 55MCR, 55MB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.25	≤ 1.5	117	RPM	6220	4665	3732	3110	2333	1866
						(94-141)	Fz	0.022	0.036	0.061	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
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

continued on next page

	Series 55M, 55MCR, 55MB Metric	Hardness		 Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20
M	STAINLESS STEELS (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
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 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
- Designed for aggressive ramping at high speeds where evacuation and load may be a contributing factor
- 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	STOCK
6,0	19,0	63,0	6,0	45100	●
8,0	20,0	63,0	8,0	45101	●
10,0	22,0	75,0	10,0	45102	●
12,0	26,0	83,0	12,0	45103	●
16,0	32,0	92,0	16,0	45104	●
20,0	38,0	104,0	20,0	45105	●

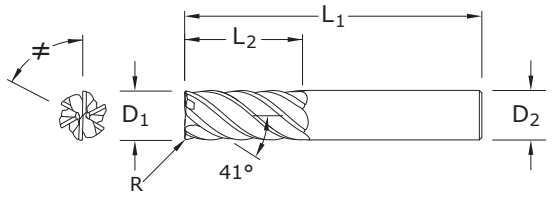
TOLERANCES (mm)

D1 = +0,000/–0,050
D2 = h6

STEELS
STAINLESS STEELS
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

51MCR
METRIC SERIES



- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Designed for aggressive ramping at high speeds where evacuation and load may be a contributing factor
- Eccentric relief provides superior strength and smoother surface finish
- Enhanced corner geometry with tight tolerance corner radii
- Recommended for materials ≤ 45 HRc (≤ 420 Bhn)

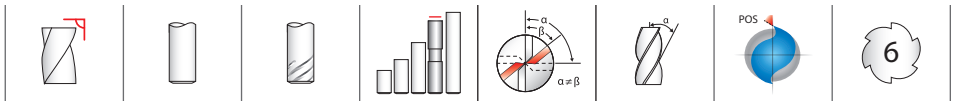
mm					EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	CORNER RADIUS R	Ti-NAMITE-X	STOCK
6,0	19,0	63,0	6,0	0,5	45112	●
8,0	20,0	63,0	8,0	0,5	45113	●
8,0	20,0	63,0	8,0	1,0	45114	●
8,0	20,0	63,0	8,0	1,2	45150	■
10,0	22,0	75,0	10,0	1,0	45115	●
10,0	22,0	75,0	10,0	1,5	45116	●
10,0	22,0	75,0	10,0	2,0	45117	●
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	●
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	●
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	●

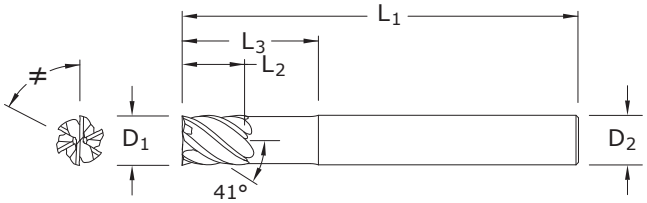
TOLERANCES (mm)

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

STEELS
STAINLESS STEELS
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery





51ML
METRIC SERIES

TOLERANCES (mm)

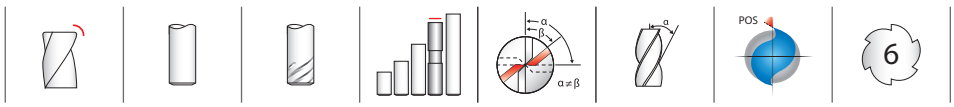
D1 = +0,000/–0,050
D2 = h6

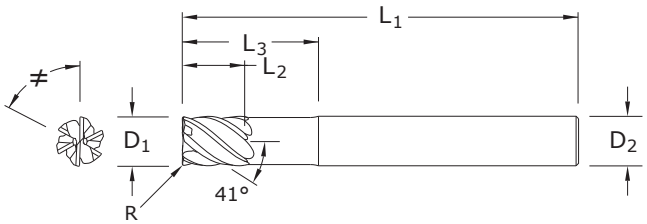
STEELS
STAINLESS STEELS
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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	STOCK
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	●

- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Designed for aggressive ramping at high speeds where evacuation and load may be a contributing factor
- 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)





51MLC
METRIC SERIES

TOLERANCES (mm)

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

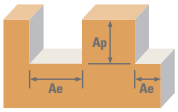
STEELS
STAINLESS STEELS
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

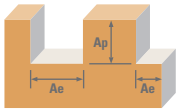
mm						EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	REACH L_3	CORNER RADIUS R	Ti-NAMITE-X	STOCK
6,0	8,0	75,0	6,0	32,0	0,5	45127	●
8,0	10,0	75,0	8,0	32,0	0,5	45128	●
8,0	10,0	75,0	8,0	32,0	1,0	45129	●
10,0	12,0	100,0	10,0	40,0	1,0	45130	●
10,0	12,0	100,0	10,0	40,0	1,5	45131	●
10,0	12,0	100,0	10,0	40,0	2,0	45132	●
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	●
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	●
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	●

- Engineered for High Speed Milling using Trochoidal and Peel Milling techniques
- Designed for aggressive ramping at high speeds where evacuation and load may be a contributing factor
- 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)

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
	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
	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
	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

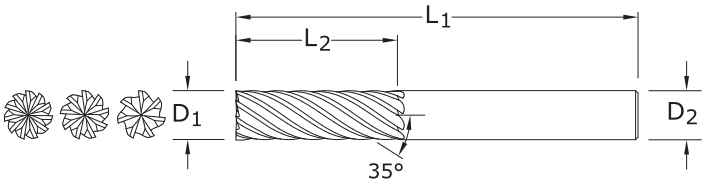
continued on next page



	Series 51M, 51MCR, 51ML, 51MLC Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20
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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

MULTI Carb
HIGH PERFORMANCE FINISHING END MILLS



66M
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
- 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	NO. OF FLUTES	Ti-NAMITE-A (AlTiN)	STOCK
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	●

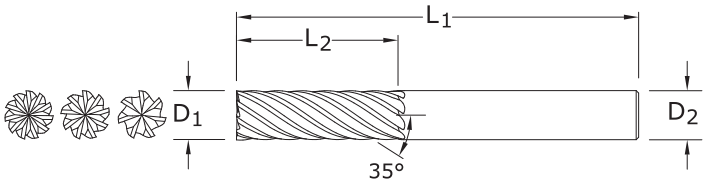
Neck Option Available

TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery



66MCR
METRIC SERIES

TOLERANCES (mm)

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

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

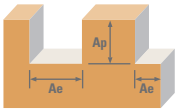
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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-A (AlTiN)	STOCK
6,0	19,0	63,0	6,0	0,5	7	46627	●
6,0	19,0	65,0	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	■
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

- 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)

Multi-Carb

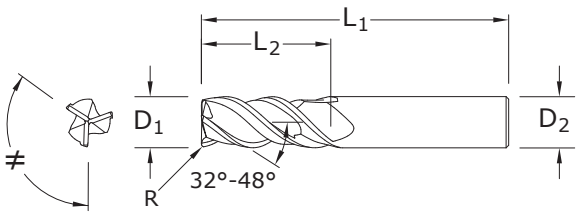


	Series 66M, 66MCR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20	25
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.05	≤ 1	194	RPM	10260	7695	6156	5130	3847	3078	2462
						(155-232)	Fz	0.029	0.047	0.059	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

continued on next page

	Series 66M, 66MCR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20	25
M	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.05	≤ 1	117	RPM	6220	4665	3732	3110	2333	1866	1493
						(94-141)	Fz	0.017	0.030	0.037	0.043	0.059	0.064	0.065
							Feed (mm/min)	731	975	975	1209	1236	1314	1067
			Finish	≤ 0.02	≤ 2	141	RPM	7465	5598	4479	3732	2799	2239	1791
						(113-169)	Fz	0.013	0.024	0.030	0.035	0.047	0.051	0.052
							Feed (mm/min)	702	17	936	1161	1187	1261	1025
	STAINLESS STEELS (PH) 13-8 PH, 15-5 PH, 17-4 PH, Custom 450	≤ 325 Bhn or ≤ 35 HRc	Profile	≤ 0.05	≤ 1	108	RPM	5736	4302	3441	2868	2151	1721	1377
						(87-130)	Fz	0.017	0.030	0.037	0.043	0.059	0.064	0.065
							Feed (mm/min)	674	899	899	1115	1140	1211	984
			Finish	≤ 0.02	≤ 2	130	RPM	6883	5162	4130	3441	2581	2065	1652
						(104-156)	Fz	0.013	0.024	0.030	0.035	0.047	0.051	0.052
							Feed (mm/min)	647	863	863	1070	1094	1163	945
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400	≤ 300 Bhn or ≤ 32 HRc	Profile	≤ 0.05	≤ 1	32	RPM	1696	1272	1018	848	636	509	407
						(26-38)	Fz	0.017	0.030	0.037	0.043	0.059	0.064	0.065
							Feed (mm/min)	199	266	213	330	337	358	291
			Finish	≤ 0.02	≤ 2	38	RPM	2036	1527	1221	1018	763	611	489
						(31-46)	Fz	0.013	0.024	0.030	0.035	0.047	0.051	0.052
							Feed (mm/min)	192	255	255	317	324	344	279
	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 718, X-750, Incoloy, Waspaloy, Hastelloy, Rene	≤ 400 Bhn or ≤ 43 HRc	Profile	≤ 0.05	≤ 1	26	RPM	1373	1030	824	687	515	412	330
						(21-31)	Fz	0.012	0.019	0.024	0.026	0.036	0.040	0.040
							Feed (mm/min)	115	138	138	163	166	181	145
			Finish	≤ 0.02	≤ 2	31	RPM	1648	1236	989	824	618	494	396
						(25-37)	Fz	0.010	0.015	0.019	0.021	0.029	0.032	0.032
							Feed (mm/min)	111	133	133	157	159	174	139
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si	≤ 350 Bhn or ≤ 38 HRc	Profile	≤ 0.05	≤ 1	119	RPM	6301	4726	3781	3151	2363	1890	1512
						(95-143)	Fz	0.019	0.032	0.040	0.050	0.067	0.072	0.073
							Feed (mm/min)	847	1059	1059	1429	1415	1497	1206
			Finish	≤ 0.02	≤ 2	143	RPM	7561	5671	4537	3781	2836	2268	1815
						(114-171)	Fz	0.015	0.026	0.032	0.040	0.053	0.058	0.058
							Feed (mm/min)	813	1016	1016	1372	1359	1437	1158
	TITANIUM ALLOYS (DIFFICULT) Ti10Al2Fe3Al, Ti5Al5V5Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti15V3 Cr3Sn3Al	≤ 440 Bhn or ≤ 47 HRc	Profile	≤ 0.05	≤ 1	43	RPM	2262	1696	1357	1131	848	679	543
						(34-51)	Fz	0.019	0.032	0.040	0.050	0.067	0.072	0.073
							Feed (mm/min)	304	380	380	513	508	537	433
			Finish	≤ 0.02	≤ 2	51	RPM	2714	2036	1629	1357	1018	814	651
						(41-61)	Fz	0.015	0.026	0.032	0.040	0.053	0.058	0.058
							Feed (mm/min)	292	365	365	492	488	516	416

Bhn (Brinell) HRc (Rockwell C)
rpm = (Vc 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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)



33MCR
METRIC 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)

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)	STOCK
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	●

TOLERANCES (mm)

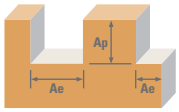
3–6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6
R = +0,000/–0,050

>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

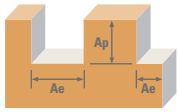
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery



	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

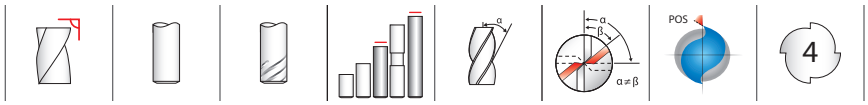
continued on next page

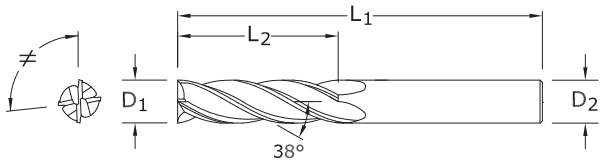
Series 33



	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
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
	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
	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
	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
	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)





TOLERANCES (mm)

D_1 = +0,000/+0,050

D_2 = h_6

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

● U.S. Stock Standard

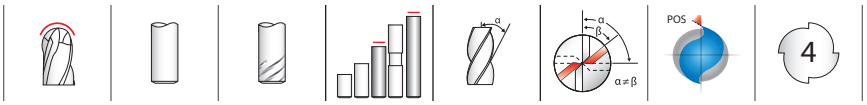
■ NOT STOCKED—Call for Delivery

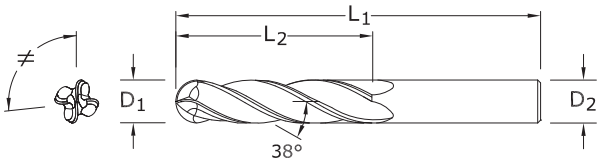
7M

METRIC SERIES

mm				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	Ti-NAMITE-X	STOCK
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	STOCK
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	●

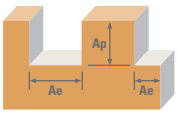
TOLERANCES (mm)

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

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

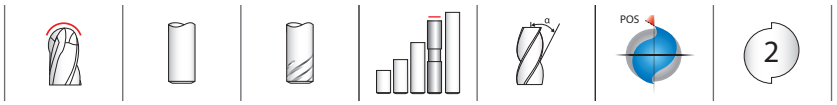
Series 7

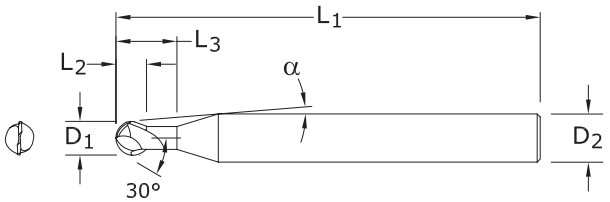


	Series 7M, 7MB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	16	20	25
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 275 Bhn or ≤ 28 HRc	Finish	≤ 0.02	≤ 2	146	RPM	15511	7755	5816	4653	3878	2908	2327	1861
						(117-176)	Fz	0.0166	0.043	0.075	0.093	0.110	0.125	0.147	0.160
							Feed (mm/min)	1030	1334	1745	1731	1706	1454	1368	1191
	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
	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
	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
	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
	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
	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
	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

Turbo-Carb





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	STOCK
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

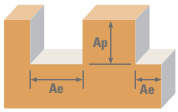
>2,5–6 DIAMETER
D_1 = +0,000/–0,030
D_2 = h_6

>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

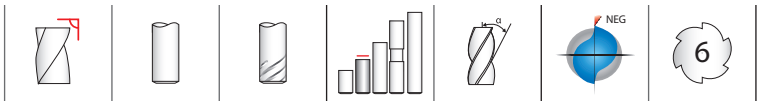
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

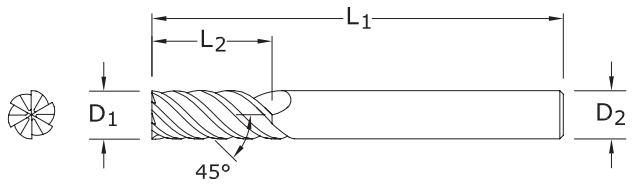


	Series 56MB Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 1	1.5	3	5	6	10	12	20
H	TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 375 Bhn or ≤ 40 HRc	Rough	≤ 0.4	≤ 0.1	191	RPM	60748	40498	20249	12150	10125	6075	5062	3037
						(153-229)	Fz	0.015	0.038	0.076	0.102	0.127	0.203	0.254	0.305
							Feed (mm/min)	1822	3078	3078	2479	2572	2466	2572	1853
			HSM	≤ 0.4	≤ 0.03	290	RPM	92235	61490	46117	18447	15372	9223	7686	4612
						(232-348)	Fz	0.018	0.043	0.084	0.112	0.117	0.224	0.279	0.330
							Feed (mm/min)	3320	5288	7748	4132	3597	4132	4289	3044
	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

Power-Carb





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	STOCK
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

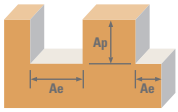
8 DIAMETER
D_1 = +0,000/–0,040
D_2 = h_6

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

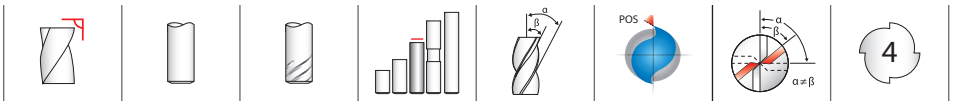
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

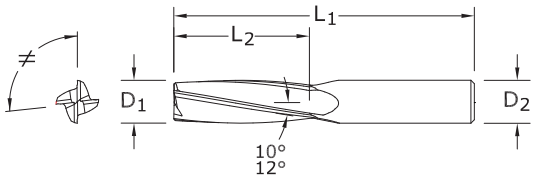


	Series 57M Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20
H	TOOL STEELS MOLD AND DIE STEEL 300M, 4340, 52100, HP-9-4-20, M50, A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 420 Bhn or ≤ 45 HRc	Slot	1	≤ 0.3	66	RPM	3499	2624	2099	1749	1312	1050
						(53-79)	Fz	0.032	0.048	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 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

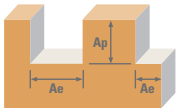
mm				EDP NO.		
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Di-NAMITE (Diamond)	STOCK
6,0	25,0	63,0	6,0	83056	83057	●
8,0	25,0	63,0	8,0	83058	83059	●
10,0	28,0	63,0	10,0	83060	83061	●
12,0	38,0	89,0	12,0	83062	83063	●
16,0	48,0	115,0	16,0	83064	83065	●

TOLERANCES (mm)

D_1 = +0,000/–0,080
D_2 = h_6

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery



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 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	43MAPR	3 Flute Advanced Productivity Rougher Metric	69
	43MAPF	4 Flute Advanced Productivity Finisher Metric	71
S-Carb (3 Flute)	43M	3 Flute Non-Ferrous Square End Metric (Unpolished Flutes)	73
	43M	3 Flute Non-Ferrous Square End Metric (Polished Flutes)	79
	43MCR	3 Flute Non-Ferrous Corner Radius Metric (Unpolished Flutes)	73
	43MCR	3 Flute Non-Ferrous Corner Radius Metric (Polished Flutes)	74
	43MCR	3 Flute Non-Ferrous Corner Radius 4xD Metric (Polished Flutes)	75
	43MLC	3 Flute Non-Ferrous Long Reach Corner Radius Metric (Unpolished Flutes)	77
	43MLC	3 Flute Non-Ferrous Long Reach Corner Radius Metric (Polished Flutes)	78
	43ML	3 Flute Non-Ferrous Square End Long Reach Metric	76
	43MB	3 Flute Non-Ferrous Ball End Metric (Polished Flutes)	80
S-Carb Rougher (3 Flute)	43MCB	3 Flute Rougher Non-Ferrous Chip Breaker Metric	81
S-Carb (2 Flute)	47M	2 Flute Non-Ferrous Square End Metric	84
	47MB	2 Flute Non-Ferrous Ball End Metric	86
	47ML	2 Flute Non-Ferrous Square End Long Reach Metric	85
	47MLB	2 Flute Non-Ferrous Ball End Long Reach Metric	86
Ski-Carb	44M	2 Flute Non-Ferrous Materials Corner Radius Metric	88

Speed & Feed Recommendations listed after each series

Fresado

FRESAS DE ALTO RENDIMIENTO PARA ALUMINIO	SERIE	DESCRIPCIÓN	PÁGINA
S-Carb APR y APF	43MAPR	3 filos, productividad avanzada, desbastador, métrico	69
	43MAPF	4 filos, productividad avanzada, acabador, métrico	71
S-Carb (3 filos)	43M	3 filos, no férrico, punta cuadrada, métrico (filos no pulidos)	73
	43M	3 filos, no férrico, punta cuadrada, métrico (filos pulidos)	79
	43MCR	3 filos, no férrico, radio angulado, métrico (filos no pulidos)	73
	43MCR	3 filos, no férrico, radio angulado, métrico (filos pulidos)	74
	43MCR	3 filos, no férrico, radio angulado 4xD, métrico (filos pulidos)	75
	43MLC	3 filos, no férrico, largo alcance, radio angulado, métrico (filos no pulidos)	77
	43MLC	3 filos, no férrico, largo alcance, radio angulado, métrico (filos pulidos)	78
	43ML	3 filos, no férrico, punta cuadrada, largo alcance, métrico	76
	43MB	3 filos, no férrico, punta esférica, métrico (filos pulidos)	80
Desbastador S-Carb (3 filos)	43MCB	3 filos, desbastador, no férrico, rompevirutas, métrico	81
S-Carb (2 filos)	47M	2 filos, no férrico, punta cuadrada, métrico	84
	47MB	2 filos, no férrico, punta esférica, métrico	86
	47ML	2 filos, no férrico, punta cuadrada, largo alcance, métrico	85
	47MLB	2 filos, no férrico, punta esférica, largo alcance, métrico	86
Ski-Carb	44M	2 filos, materiales no férricos, radio angulado, métrico	88

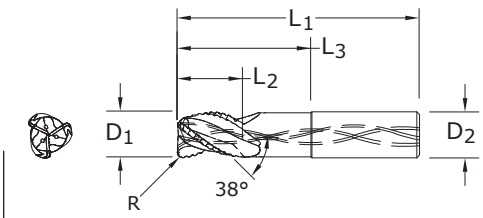
Recomendaciones de velocidades y avances mostradas tras cada serie

Fraisage

FRAISE HAUTE PERFORMANCE POUR ALUMINIUM	SÉRIES	DESCRIPTION	PAGE
S-Carb APR/APF	43MAPR	3 dents productivité avancée d'ébauche (métrique)	69
	43MAPF	4 dents productivité avancée de finition (métrique)	71
S-Carb (3 dents)	43M	3 dents non-ferreux à bout plat (métrique) (goujures non polies)	73
	43M	3 dents non-ferreux à bout plat (métrique) (goujures polies)	79
	43MCR	3 dents matériaux non-ferreux rayon en coin (métrique) (goujures non polies)	73
	43MCR	3 dents matériaux non-ferreux rayon en coin (métrique) (goujures polies)	74
	43MCR	3 dents matériaux non-ferreux rayon en coin 4xD (métrique) (goujures polies)	75
	43MLC	3 dents non-ferreux longue portée rayon en coin (métrique) (goujures non polies)	77
	43MLC	3 dents non-ferreux longue portée rayon en coin (métrique) (goujures polies)	78
	43ML	3 dents non-ferreux à bout plat longue portée (métrique)	76
	43MB	3 dents non-ferreux à bout hémisphérique (métrique) (goujures polies)	80
S-Carb d'ébauche (3 dents)	43MCB	3 dents d'ébauche non-ferreux brise-copeaux (métrique)	81
S-Carb (2 dents)	47M	2 dents non-ferreux à bout plat (métrique)	84
	47MB	2 dents non-ferreux à bout hémisphérique (métrique)	86
	47ML	2 dents non-ferreux à bout plat longue portée (métrique)	85
	47MLB	2 dents non-ferreux à bout hémisphérique longue portée (métrique)	86
Ski-Carb	44M	2 dents matériaux non-ferreux rayon en coin (métrique)	88

Recommandations de vitesse et avance indiquées après chaque série

S-Carb APR



43MAPR
METRIC SERIES

TOLERANCES (mm)

12–25 DIAMETER

D_1 = +0,010/–0,050

D_2 = h_6

NON-FERROUS

● U.S. Stock Standard

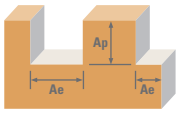
■ NOT STOCKED—Call for Delivery

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)	STOCK
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

- Ultra high-productivity rougher for Aluminum alloys, specifically for aircraft components
- Designed for machine tools with capability of 600 in^3 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)

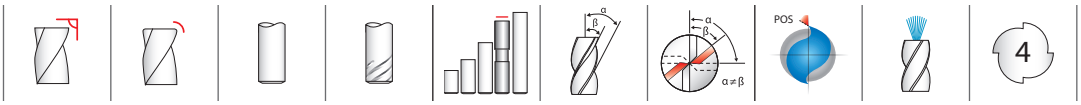
S-Carb APR

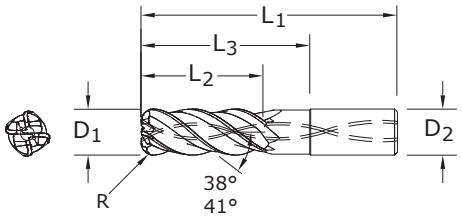


	Series 43MAPR Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 12	16	20	25
N	**ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075**	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	1500	RPM	39788	29841	23873	19098
						(1200-1800)	Fz	0.080	0.110	0.150	0.180
							Feed (mm/min)	9549	9848	10743	10313
			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)
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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

S-Carb APF





43MAPF
METRIC SERIES

TOLERANCES (mm)

6–25 DIAMETER

D_1 = +0,010/–0,050

D_2 = h_6

R = +0,000/–0,030

NON-FERROUS

● U.S. Stock Standard

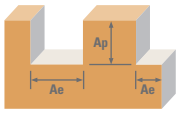
■ NOT STOCKED—Call for Delivery

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)	STOCK
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

- 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)

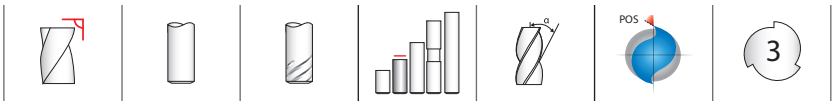
S-Carb APF

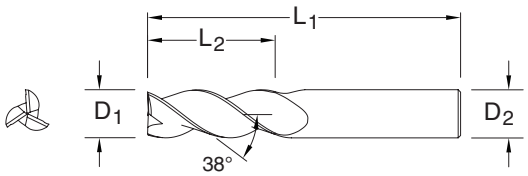


	Series 43MAPF Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	8	10	12	16	20	25
N	**ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6063, 7075**	≤ 150 Bhn or ≤ 7 HRc	Profile	≤ 0.1	≤ 2.5	800	RPM	42440	31830	25464	21220	15915	12732	10186
						(640-960)	Fz	0.050	0.055	0.060	0.070	0.100	0.140	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
							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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

CARB
Solid Carbide End Mills for Aluminum





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

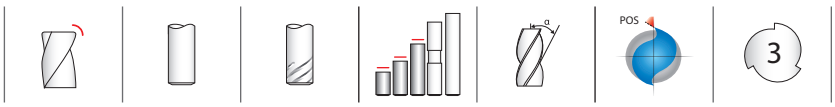
>10–18 DIAMETER
D_1 = +0,000/–0,011
D_2 = h_6

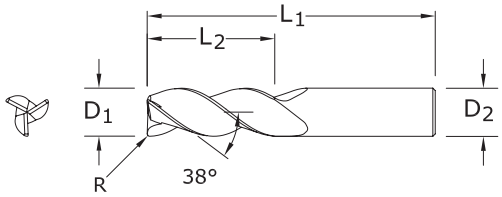
>18–20 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

NON-FERROUS
PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
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	●





43MCR
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

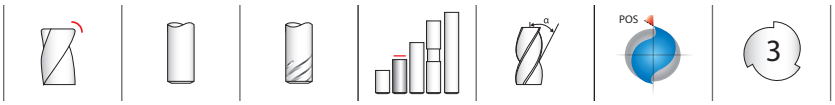
>18–25 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

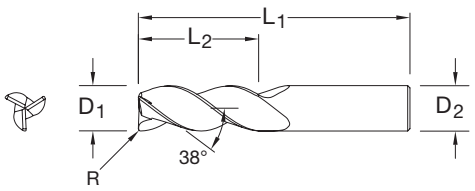
NON-FERROUS
PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
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	■
25,0	50,0	125,0	25,0	–	–	44731	■

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
- 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)	STOCK
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	●

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

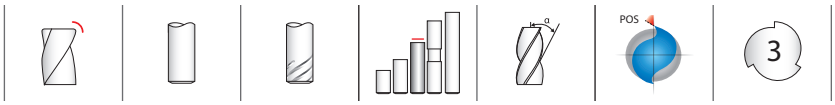
>10–18 DIAMETER
D_1 = +0,000/–0,011
D_2 = h_6
R = +0,00/–0,05

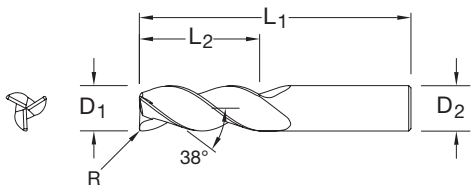
>18–20 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6
R = +0,00/–0,05

NON-FERROUS

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery





43MCR 4xD

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

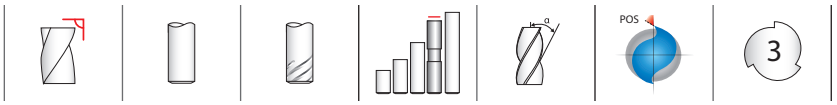
PLASTICS/COMPOSITES

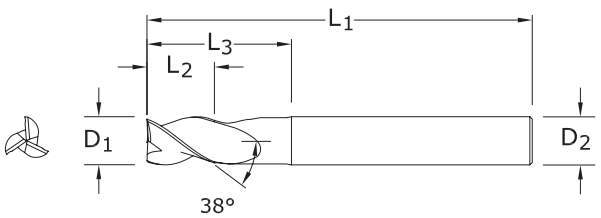
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
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	●

- 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)

S-Carb





43ML
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
- 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	Ti-NAMITE-B (TiB_2)	STOCK
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	■

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

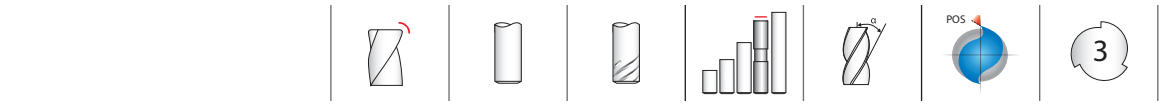
>10–18 DIAMETER
D_1 = +0,000/–0,011
D_2 = h_6

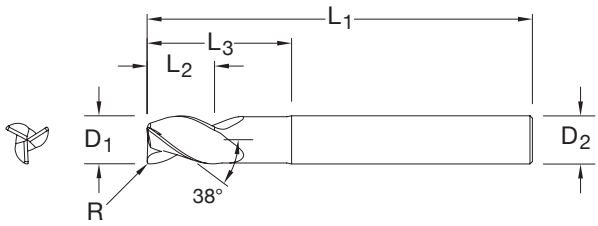
>18–20 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery





43MLC
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

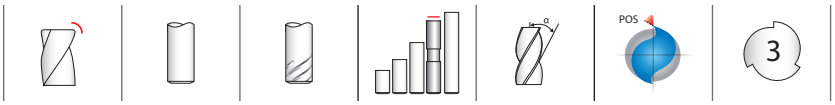
PLASTICS/COMPOSITES

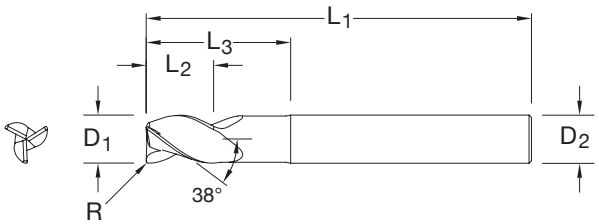
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
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	●

- 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)

S-Carb: Aero Radius Range





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
- 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)

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)	STOCK
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	●

TOLERANCES (mm)

>6–10 DIAMETER
D_1 = +0,000/–0,009
D_2 = h_6
R = +0,00/–0,05

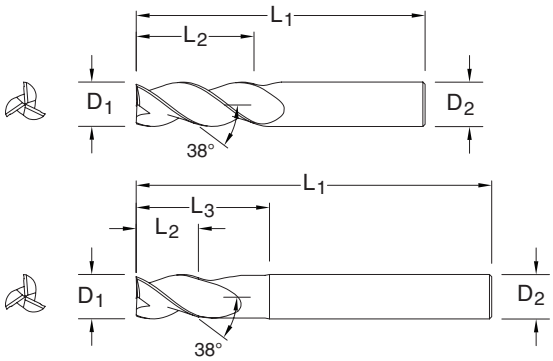
>10–18 DIAMETER
D_1 = +0,000/–0,011
D_2 = h_6
R = +0,00/–0,05

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

NON-FERROUS

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery



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

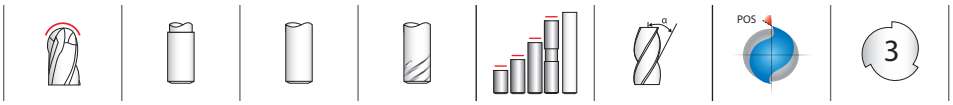
PLASTICS/COMPOSITES

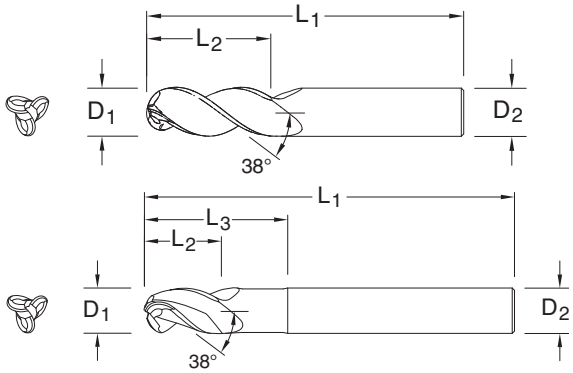
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
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





43MB
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
- 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)	STOCK
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

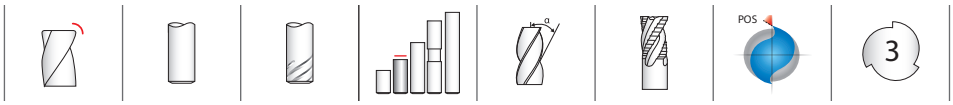
>10–18 DIAMETER
D_1 = +0,000/–0,011
D_2 = h_6

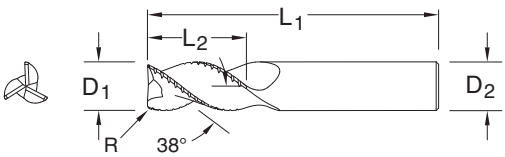
>18–25 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery





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

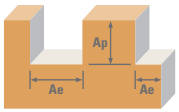
PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
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)

S-Carb

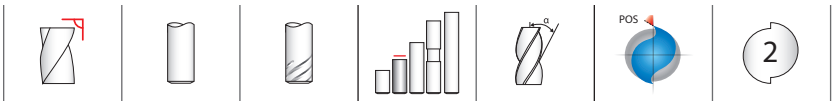
	Series 43M, 43MB, 43MCR, 43ML, 43MLC, 43MCB Metric	Hardness		 Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 3	6	10	16	20	25
N	**ALUMINUM ALLOYS 2024, 5052, 5086, 6061, 6073, 7075**	≤ 150 Bhn or ≤ 7 HRc	Slot	1	≤ 1	490	RPM	52022	26011	15607	13005	7803	6243
						(392-588)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	3371	4682	5618	5618	4370	3980
			Profile	≤ 0.5	≤ 1.5	610	RPM	64762	32381	19429	16190	9714	7771
						(488-732)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	4196	5828	6994	6994	5440	4955
			HSM	≤ 0.05	≤ 2	1005	RPM	106698	53349	32009	26674	16005	12804
						(804-1206)	Fz	0.050	0.132	0.280	0.336	0.440	0.488
							Feed (mm/min)	16131	21124	26888	26885	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	2946	2357
						(148-222)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	1273	1768	2121	2121	1650	1503
			Profile	≤ 0.5	≤ 1.5	230	RPM	24418	12209	7326	6105	3663	2930
						(184-276)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	1582	2197	2637	2637	2051	1868
			HSM	≤ 0.05	≤ 2	380	RPM	40343	20172	12103	10086	6052	4841
						(304-456)	Fz	0.050	0.132	0.280	0.336	0.440	0.488
							Feed (mm/min)	6099	7987	10166	10166	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	4220	3376
						(212-318)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	1620	2025	2701	2532	2026	1773
			Profile	≤ 0.5	≤ 1.5	330	RPM	35035	17518	10511	8759	5255	4204
						(264-396)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	2018	2522	3363	3153	2523	2207
			HSM	≤ 0.05	≤ 2	545	RPM	57861	28930	17358	14465	8679	6943
						(436-654)	Fz	0.041	0.108	0.227	0.276	0.373	0.400
							Feed (mm/min)	7082	9373	11804	11976	9721	8332

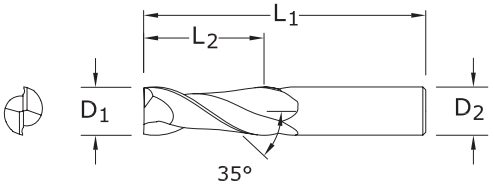
continued on next page

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	16	20	25
N	COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze	≤ 200 Bhn or ≤ 23 HRc	Slot	1	≤ 1	105	RPM	11148	5574	3344	2787	1672	1338
						(84-126)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	642	803	1070	1003	803	702
			Profile	≤ 0.5	≤ 1.5	130	RPM	13802	6901	4141	3450	2070	1656
						(104-156)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	795	994	1325	1242	994	870
			HSM	≤ 0.05	≤ 2	215	RPM	22826	11413	6848	5706	3424	2739
						(172-258)	Fz	0.041	0.108	0.227	0.276	0.373	0.400
							Feed (mm/min)	2794	3697	4656	4725	3835	3287
	PLASTICS ABS, Polycarbonate, PVC, Polypropylene		Slot	1	≤ 1	490	RPM	52022	26011	15607	13005	7803	6243
						(392-588)	Fz	0.036	0.096	0.200	0.240	0.320	0.350
							Feed (mm/min)	5618	7490	9364	9363	7491	6555
			Profile	≤ 0.5	≤ 1.5	610	RPM	64762	32381	19429	16190	9714	7771
						(488-732)	Fz	0.036	0.096	0.200	0.240	0.320	0.350
							Feed (mm/min)	6994	9325	11657	11656	9326	8160
			HSM	≤ 0.05	≤ 2	1005	RPM	106698	53349	32009	26674	16005	12804
						(804-1206)	Fz	0.082	0.216	0.453	0.552	0.733	0.800
							Feed (mm/min)	26117	34567	43532	44169	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 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)	STOCK
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

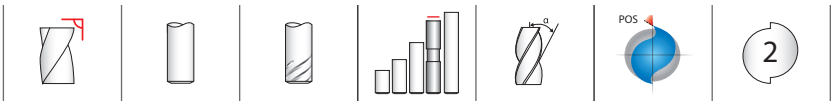
>10–18 DIAMETER
D_1 = +0,000/–0,012
D_2 = h_6

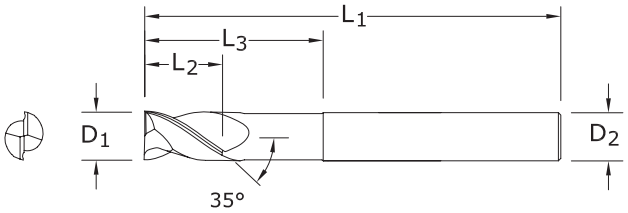
>18–25 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery





47ML
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	UNCOATED	Ti-NAMITE-B (TiB_2)	STOCK
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)

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

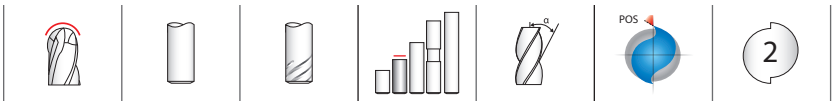
>18–20 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

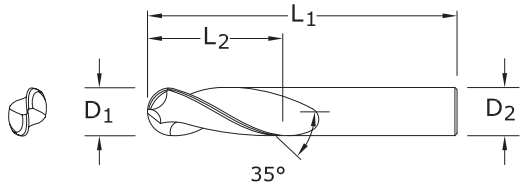
NON-FERROUS

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
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	38,0	104,0	20,0	44579	44607	●
25,0	44,0	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

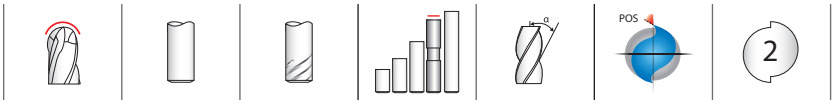
>10–18 DIAMETER
D_1 = +0,000/–0,012
D_2 = h_6

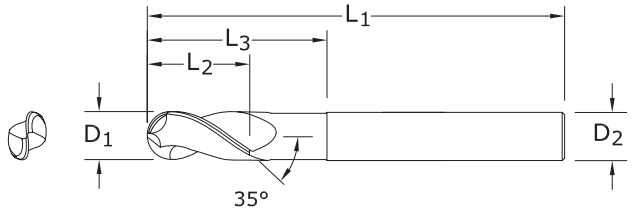
>18–25 DIAMETER
D_1 = +0,000/–0,013
D_2 = h_6

NON-FERROUS

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery





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)	STOCK
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

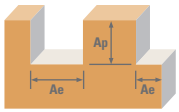
>10–18 DIAMETER
D_1 = +0,000/–0,011
D_2 = h_6

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

NON-FERROUS

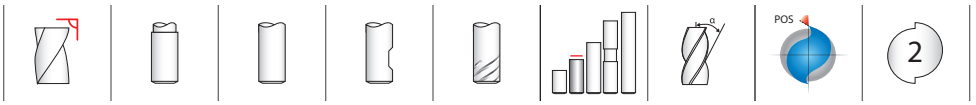
PLASTICS/COMPOSITES

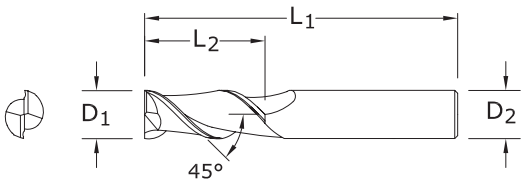
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

	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	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	7803	6243
						(392-588)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	2247	3121	3746	3745	2913	2653
			Profile	≤ 0.5	≤ 1.5	610	RPM	64762	32381	19429	16190	9714	7771
						(488-732)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	2797	3885	4663	4662	3627	3303
			HSM	≤ 0.05	≤ 2	1005	RPM	106698	53349	32009	26674	16005	12804
						(804-1206)	Fz	0.050	0.132	0.280	0.336	0.440	0.488
							Feed (mm/min)	10754	14083	17925	17924	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	2946	2357
						(148-222)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	848	1178	1414	1414	1100	1002
			Profile	≤ 0.5	≤ 1.5	230	RPM	24418	12209	7326	6105	3663	2930
						(184-276)	Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	1055	1465	1758	1758	1367	1245
			HSM	≤ 0.05	≤ 2	380	RPM	40343	20172	12103	10086	6052	4841
						(304-456)	Fz	0.050	0.132	0.280	0.336	0.440	0.488
							Feed (mm/min)	4066	5325	6778	6777	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	4220	3376
						(212-318)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	1080	1350	1801	1688	1350	1182
			Profile	≤ 0.5	≤ 1.5	330	RPM	35035	17518	10511	8759	5255	4204
						(264-396)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	1345	1682	2242	2102	1682	1472
			HSM	≤ 0.05	≤ 2	545	RPM	57861	28930	17358	14465	8679	6943
						(436-654)	Fz	0.041	0.108	0.227	0.276	0.373	0.400
							Feed (mm/min)	4721	6248	7869	7984	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	1672	1338
						(84-126)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	428	535	713	669	535	468
			Profile	≤ 0.5	≤ 1.5	130	RPM	13802	6901	4141	3450	2070	1656
						(104-156)	Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	530	662	883	828	662	580
			HSM	≤ 0.05	≤ 2	215	RPM	22826	11413	6848	5706	3424	2739
						(172-258)	Fz	0.041	0.108	0.227	0.276	0.373	0.400
							Feed (mm/min)	1862	2465	3104	3150	2556	2191
	PLASTICS ABS, Polycarbonate, PVC, Polypropylene		Slot	1	≤ 1	490	RPM	52022	26011	15607	13005	7803	6243
						(392-588)	Fz	0.036	0.096	0.200	0.240	0.320	0.350
							Feed (mm/min)	3745	4994	6243	6242	4994	4370
			Profile	≤ 0.5	≤ 1.5	610	RPM	64762	32381	19429	16190	9714	7771
						(488-732)	Fz	0.036	0.096	0.200	0.240	0.320	0.350
							Feed (mm/min)	4662	6217	7771	7771	6217	5440
			HSM	≤ 0.05	≤ 2	1005	RPM	106698	53349	32009	26674	16005	12804
						(804-1206)	Fz	0.082	0.216	0.453	0.552	0.733	0.800
							Feed (mm/min)	17412	23045	29022	29446	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

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 DIA. D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIA. D_2	CORNER RADIUS* R	UNCOATED W/FLAT	UNCOATED	Ti-NAMITE-B (TiB_2) W/FLAT	Ti-NAMITE-B (TiB_2)	STOCK
3,0	8,0	52,0	6,0	0,36–0,76	44505	49663	44506	49674	●
4,0	11,0	55,0	6,0	0,36–0,76	44509	49664	44510	49675	●
5,0	13,0	57,0	6,0	0,36–0,76	44513	49665	44514	49676	●
6,0	13,0	57,0	6,0	0,36–0,76	44517	49666	44518	49677	●
8,0	19,0	69,0	10,0	0,38–1,52	44521	49667	44522	49678	●
10,0	22,0	72,0	10,0	0,38–1,52	44525	49668	44526	49679	●
12,0	26,0	83,0	12,0	0,38–3,17	44529	49669	44530	49680	●
14,0	26,0	83,0	14,0	0,38–3,17	44533	49670	44534	49681	●
16,0	32,0	92,0	16,0	0,38–3,17	44537	49671	44538	49682	●
18,0	32,0	92,0	18,0	0,38–3,17	44541	49672	44542	49683	●
20,0	38,0	104,0	20,0	0,38–3,17	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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

	Series 44M Metric	Hardness		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, 6073, 7075**	≤ 150 Bhn ≤ 77 HRc	Slot	1	≤ 1	490 (392-588)	RPM	52022	26011	15607	13005	7803	6243
							Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	2247	3121	3746	3745	2913	2653
			Profile	≤ 0.5	≤ 1.5	610 (488-732)	RPM	64762	32381	19429	16190	9714	7771
							Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	2797	3885	4663	4662	3627	3303
			HSM	≤ 0.05	≤ 2	1005 (804-1206)	RPM	106698	53349	32009	26674	16005	12804
							Fz	0.050	0.132	0.280	0.336	0.440	0.488
							Feed (mm/min)	10754	14083	17925	17924	14084	12484
	ALUMINUM DIE CAST ALLOYS (HIGH SILICONE) A-390, A-392, B- 390	≤ 125 Bhn or ≤ 77 HRb	Slot	1	≤ 1	185 (148-222)	RPM	19641	9820	5892	4910	2946	2357
							Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	848	1178	1414	1414	1100	1002
			Profile	≤ 0.5	≤ 1.5	230 (184-276)	RPM	24418	12209	7326	6105	3663	2930
							Fz	0.022	0.060	0.120	0.144	0.187	0.213
							Feed (mm/min)	1055	1465	1758	1758	1367	1245
			HSM	≤ 0.05	≤ 2	380 (304-456)	RPM	40343	20172	12103	10086	6052	4841
							Fz	0.050	0.132	0.280	0.336	0.440	0.488
							Feed (mm/min)	4066	5325	6778	6777	5325	4720
	COPPER ALLOYS Aluminum Bronze Brass Naval Brass Red Brass	≤ 140 Bhn or ≤ 3 HRc	Slot	1	≤ 1	265 (212-318)	RPM	28134	14067	8440	7034	4220	3376
							Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	1080	1350	1801	1688	1350	1182
			Profile	≤ 0.5	≤ 1.5	330 (264-396)	RPM	35035	17518	10511	8759	5255	4204
							Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	1345	1682	2242	2102	1682	1472
			HSM	≤ 0.05	≤ 2	545 (436-654)	RPM	57861	28930	17358	14465	8679	6943
							Fz	0.041	0.108	0.227	0.276	0.373	0.400
							Feed (mm/min)	4721	6248	7869	7984	6480	5555
	COPPER ALLOYS Beryllium Copper C110, Manganese Bronze, Tin Bronze	≤ 200 Bhn or ≤ 23 HRc	Slot	1	≤ 1	105 (84-126)	RPM	11148	5574	3344	2787	1672	1338
							Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	428	535	713	669	535	468
			Profile	≤ 0.5	≤ 1.5	130 (104-156)	RPM	13802	6901	4141	3450	2070	1656
							Fz	0.019	0.048	0.107	0.120	0.160	0.175
							Feed (mm/min)	530	662	883	828	662	580
			HSM	≤ 0.05	≤ 2	215 (172-258)	RPM	22826	11413	6848	5706	3424	2739
							Fz	0.041	0.108	0.227	0.276	0.373	0.400
							Feed (mm/min)	1862	2465	3104	3150	2556	2191
	PLASTICS ABS, Polycarbonate, PVC, Polypropylene		Slot	1	≤ 1	490 (392-588)	RPM	52022	26011	15607	13005	7803	6243
							Fz	0.036	0.096	0.200	0.240	0.320	0.350
							Feed (mm/min)	3745	4994	6243	6242	4994	4370
			Profile	≤ 0.5	≤ 1.5	610 (488-732)	RPM	64762	32381	19429	16190	9714	7771
							Fz	0.036	0.096	0.200	0.240	0.320	0.350
							Feed (mm/min)	4662	6217	7771	7771	6217	5440
			HSM	≤ 0.05	≤ 2	1005 (804-1206)	RPM	106698	53349	32009	26674	16005	12804
							Fz	0.082	0.216	0.453	0.552	0.733	0.800
							Feed (mm/min)	17412	23045	29022	29446	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 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
16M	4 Flute Square End Stub Metric	102
1M	4 Flute Square End Standard Length Metric	103
1XLM	4 Flute Square End Extra Long Reach Metric	103
14M	4 Flute Double End Square Stub Metric	105
1MB	4 Flute Ball End Standard Length Metric	106
1XLMB	4 Flute Ball End Extra Long Reach Metric	106
14MB	4 Flute Double End Ball Stub Metric	107
1MCR	4 Flute Corner Radius Standard Length Metric	104
54M	4 Flute High Shear Square End Standard Length Metric	115
17M	2 Flute Square End Stub Metric	93
3M	2 Flute Square End Standard Length Metric	94
3XLM	2 Flute Square End Extra Long Reach Metric	94
59M	2 Flute Square End Long Reach Metric	95
15M	2 Flute Double End Square Stub Metric	96
3MB	2 Flute Ball End Standard Length Metric	97
3XLMB	2 Flute Ball End Extra Long Reach Metric	97
59MB	2 Flute Ball End Long Reach Metric	98
15MB	2 Flute Double End Ball Stub Metric	99
52M	2 Flute High Shear Square End Standard Length Metric	114
5M	3 Flute Square End Standard Length Metric	100
5XLM	3 Flute Square End Extra Long Reach Metric	100
5MB	3 Flute Ball End Standard Length Metric	101
5XLMB	3 Flute Ball End Extra Long Reach Metric	101
61M	Multi-Flute Coarse Pitch Rougher Metric	112
62M	Multi-Flute Fine Pitch Rougher Metric	110

Speed & Feed Recommendations listed after each series

Fresado

SERIE	DESCRIPCIÓN DE FRESAS DE USO GENERAL	PÁGINA
16M	4 filos, pieza de punta cuadrada, métrico	102
1M	4 filos, punta cuadrada, longitud estándar, métrico	103
1XLM	4 filos, punta cuadrada, alcance extralargo, métrico	103
14M	4 filos, pieza doble de punta cuadrada, métrico	105
1MB	4 filos, punta esférica, longitud estándar, métrico	106
1XLMB	4 filos, punta esférica, alcance extralargo, métrico	106
14MB	4 filos, pieza doble de punta esférica, métrico	107
1MCR	4 filos, radio angulado, longitud estándar, métrico	104
54M	4 filos, alto rendimiento, punta cuadrada, longitud estándar, métrico	115
17M	2 filos, pieza de punta cuadrada, métrico	93
3M	2 filos, punta cuadrada, longitud estándar, métrico	94
3XLM	2 filos, punta cuadrada, alcance extralargo, métrico	94
59M	2 filos, punta cuadrada, largo alcance, métrico	95
15M	2 filos, pieza doble de punta cuadrada, métrico	96
3MB	2 filos, punta esférica, longitud estándar, métrico	97
3XLMB	2 filos, punta esférica, alcance extralargo, métrico	97
59MB	2 filos, punta esférica, largo alcance, métrico	98
15MB	2 filos, pieza doble de punta esférica, métrico	99
52M	2 filos, alto rendimiento, punta cuadrada, longitud estándar, métrico	114
5M	3 filos, punta cuadrada, longitud estándar, métrico	100
5XLM	3 filos, punta cuadrada, alcance extralargo, métrico	100
5MB	3 filos, punta esférica, longitud estándar, métrico	101
5XLMB	3 filos, punta esférica, alcance extralargo, métrico	101
61M	Filo múltiple, paso grueso, desbastador, métrico	112
62M	Filo múltiple, paso fino, desbastador, métrico	110

Recomendaciones de velocidades y avances mostradas tras cada serie

Fraisage

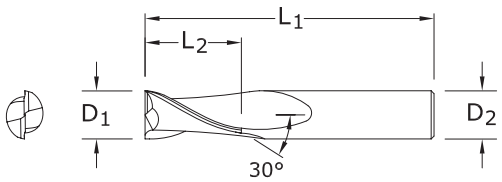
SERIES	DESCRIPTION DE FRAISES À USAGE GÉNÉRAL	PAGE
16M	4 dents à bout plat court (métrique)	102
1M	4 dents à bout plat longueur standard (métrique)	103
1XLM	4 dents à bout plat portée extra-longue (métrique)	103
14M	4 dents à double bouts plats court (métrique)	105
1MB	4 dents à bout hémisphérique longueur standard (métrique)	106
1XLMB	4 dents à bout hémisphérique portée extra-longue (métrique)	106
14MB	4 dents à double bouts hémisphériques court (métrique)	107
1MCR	4 dents rayon en coin longueur standard (métrique)	104
54M	4 dents cisaillement élevé à bout plat longueur standard (métrique)	115
17M	2 dents à bout plat court (métrique)	93
3M	2 dents à bout plat longueur standard (métrique)	94
3XLM	2 dents à bout plat portée extra-longue (métrique)	94
59M	2 dents à bout plat longue portée (métrique)	95
15M	2 dents à double bouts plats court (métrique)	96
3MB	2 dents à bout hémisphérique longueur standard (métrique)	97
3XLMB	2 dents à bout hémisphérique portée extra-longue (métrique)	97
59MB	2 dents à bout hémisphérique longue portée (métrique)	98
15MB	2 dents à double bouts hémisphériques court (métrique)	99
52M	2 dents cisaillement élevé à bout plat longueur standard (métrique)	114
5M	3 dents à bout plat longueur standard (métrique)	100
5XLM	3 dents à bout plat portée extra-longue (métrique)	100
5MB	3 dents à bout hémisphérique longueur standard (métrique)	101
5XLMB	3 dents à bout hémisphérique portée extra-longue (métrique)	101
61M	Multi-dents à pas gros d'ébauche (métrique)	112
62M	Multi-dents à pas fin d'ébauche (métrique)	110

Recommandations de vitesse et avance indiquées après chaque série

2 Flute Square End Stub

TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6



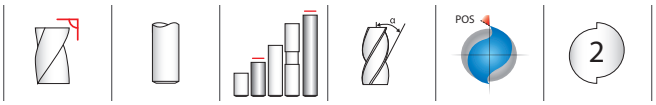
17M
METRIC SERIES

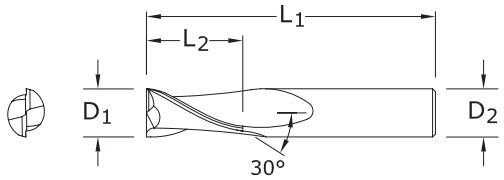
mm				EDP NO.				
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	STOCK
1,0	2,0	38,0	3,0	41705	49262	49283	49304	●
1,5	3,0	38,0	3,0	41709	49263	49284	49305	●
2,0	4,0	38,0	3,0	41713	49264	49285	49306	●
2,5	5,0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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

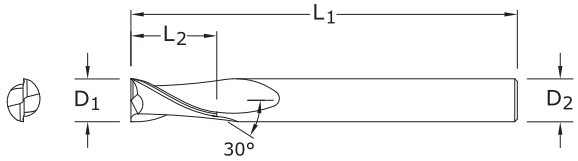
mm				EDP NO.					
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	STOCK	SERIES
1,0	4,0	38,0	3,0	40305	48628	48650	48671	●	3M
1,5	4,5	38,0	3,0	40309	48629	48651	48672	●	3M
2,0	6,3	38,0	3,0	40313	48630	48652	48673	●	3M
2,5	9,5	38,0	3,0	40317	48631	48653	48674	●	3M
3,0	12,0	38,0	3,0	40321	48632	48654	48675	●	3M
3,0	25,0	75,0	3,0	43301	49427	49440	49453	●	3XLM
3,5	12,0	50,0	4,0	40325	48633	48655	48676	●	3M
4,0	14,0	50,0	4,0	40329	48634	48656	48677	●	3M
4,0	25,0	75,0	4,0	43303	49428	49441	49454	●	3XLM
4,5	16,0	50,0	6,0	40333	48635	48657	48678	●	3M
5,0	16,0	50,0	6,0	40337	48636	48658	48679	●	3M
5,0	25,0	75,0	5,0	43307	49430	49443	49456	●	3XLM
6,0	19,0	50,0	6,0	40341	48637	48659	48680	●	3M
6,0	25,0	75,0	6,0	43305	49429	49442	49455	●	3XLM
7,0	19,0	63,0	8,0	40345	48638	48660	48681	●	3M
8,0	20,0	63,0	8,0	40349	48639	48661	48682	●	3M
8,0	25,0	75,0	8,0	43315	49431	49444	49457	●	3XLM
9,0	22,0	75,0	10,0	40353	48640	48662	48683	●	3M
10,0	22,0	75,0	10,0	40357	48641	48663	48684	●	3M
10,0	38,0	100,0	10,0	43325	49432	49445	49458	●	3XLM
11,0	25,0	75,0	12,0	40361	48642	48664	48685	●	3M
12,0	25,0	75,0	12,0	40365	48643	48665	48686	●	3M
12,0	50,0	100,0	12,0	43335	49433	49446	49459	●	3XLM
12,0	75,0	150,0	12,0	43345	49434	49447	49460	●	3XLM
14,0	32,0	89,0	14,0	40369	48644	48666	48687	●	3M
14,0	75,0	150,0	14,0	43355	49435	49448	49461	●	3XLM
16,0	32,0	89,0	16,0	40373	48645	48667	48688	●	3M
16,0	75,0	150,0	16,0	43365	49436	49449	49462	●	3XLM
18,0	38,0	100,0	18,0	40377	48646	48668	48689	●	3M
18,0	75,0	150,0	18,0	43375	49437	49450	49463	●	3XLM
20,0	38,0	100,0	20,0	40381	48647	48669	48690	●	3M
20,0	75,0	150,0	20,0	43385	49438	49451	49464	●	3XLM
25,0	38,0	100,0	25,0	40385	48648	48670	48691	●	3M
25,0	75,0	150,0	25,0	43395	49439	49452	49465	●	3XLM

2 Flute Square End Long Reach

TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



59M
METRIC SERIES

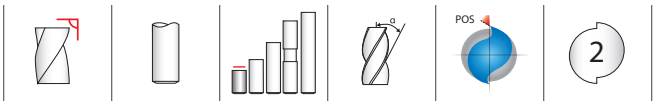
mm				EDP NO.				
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	STOCK
3,0	9,0	60,0	6,0	43910	43920	43930	43950	●
4,0	12,0	70,0	6,0	43911	43921	43931	43951	●
6,0	15,0	80,0	6,0	43912	43922	43932	43952	●
8,0	20,0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

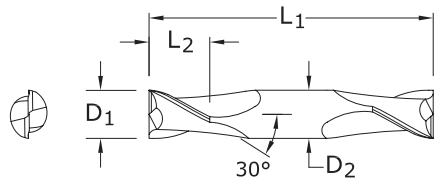
STEELS
STAINLESS STEELS
CAST IRON
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS
NON-FERROUS
PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

2 Flute Double End Mills



15M
METRIC SERIES



TOLERANCES (mm)

D_1 = +0,000/–0,050

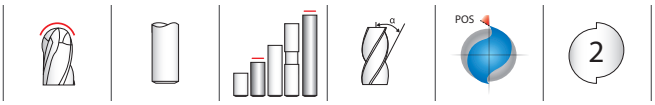
D_2 = h_6

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

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

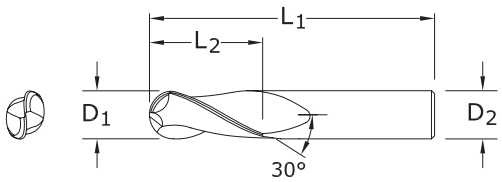
2 Flute Ball End



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



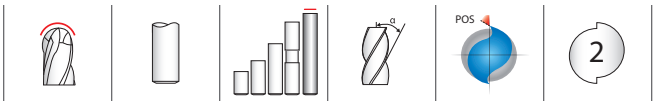
3MB • 3XLMB
METRIC SERIES

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)	STOCK	
1,0	4,0	38,0	3,0	40306	48692	48714	48735	●	3MB
1,5	4,5	38,0	3,0	40310	48693	48715	48736	●	3MB
2,0	6,3	38,0	3,0	40314	48694	48716	48737	●	3MB
2,5	9,5	38,0	3,0	40318	48695	48717	48738	●	3MB
3,0	12,0	38,0	3,0	40322	48696	48718	48739	●	3MB
3,0	25,0	75,0	3,0	43302	49544	49557	49570	●	3XLMB
3,5	12,0	50,0	4,0	40326	48697	48719	48740	●	3MB
4,0	14,0	50,0	4,0	40330	48698	48720	48741	●	3MB
4,0	25,0	75,0	4,0	43304	49545	49558	49571	●	3XLMB
4,5	16,0	50,0	6,0	40334	48699	48721	48742	●	3MB
5,0	16,0	50,0	6,0	40338	48700	48722	48743	●	3MB
5,0	25,0	75,0	5,0	43308	49547	49560	49573	●	3XLMB
6,0	19,0	50,0	6,0	40342	48701	48723	48744	●	3MB
6,0	25,0	75,0	6,0	43306	49546	49559	49572	●	3XLMB
7,0	19,0	63,0	8,0	40346	48702	48724	48745	●	3MB
8,0	20,0	63,0	8,0	40350	48703	48725	48746	●	3MB
8,0	25,0	75,0	8,0	43316	49548	49561	49574	●	3XLMB
9,0	22,0	75,0	10,0	40354	48704	48726	48747	●	3MB
10,0	22,0	75,0	10,0	40358	48705	48727	48748	●	3MB
10,0	38,0	100,0	10,0	43326	49549	49562	49575	●	3XLMB
11,0	25,0	75,0	12,0	40362	48706	48728	48749	●	3MB
12,0	25,0	75,0	12,0	40366	48707	48729	48750	●	3MB
12,0	50,0	100,0	12,0	43336	49550	49563	49576	●	3XLMB
12,0	75,0	150,0	12,0	43346	49551	49564	49577	●	3XLMB
14,0	32,0	89,0	14,0	40370	48708	48730	48751	●	3MB
14,0	75,0	150,0	14,0	43356	49552	49565	49578	●	3XLMB
16,0	32,0	89,0	16,0	40374	48709	48731	48752	●	3MB
16,0	75,0	150,0	16,0	43366	49553	49566	49579	●	3XLMB
18,0	38,0	100,0	18,0	40378	48710	48732	48753	●	3MB
18,0	75,0	150,0	18,0	43376	49554	49567	49580	●	3XLMB
20,0	38,0	100,0	20,0	40382	48711	48733	48754	●	3MB
20,0	75,0	150,0	20,0	43386	49555	49568	49581	●	3XLMB
25,0	38,0	100,0	25,0	40386	48712	48734	48755	●	3MB
25,0	75,0	150,0	25,0	43396	49556	49569	49582	●	3XLMB

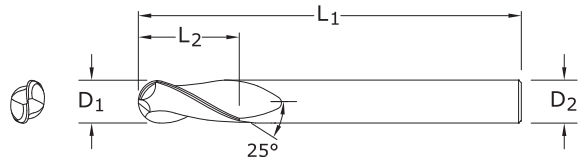
STEELS
STAINLESS STEELS
CAST IRON
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS
NON-FERROUS
PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

2 Flute Ball End Long Reach



59MB
METRIC SERIES



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6

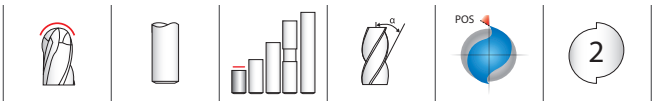
mm				EDP NO.				
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	STOCK
3,0	9,0	60,0	6,0	43900	49622	49632	49642	●
4,0	12,0	70,0	6,0	43901	49623	49633	49643	●
6,0	15,0	80,0	6,0	43902	49624	49634	49644	●
8,0	20,0	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
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- HARDENED STEELS
- NON-FERROUS
- PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

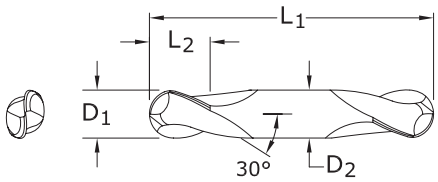
2 Flute Double End Ball End



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



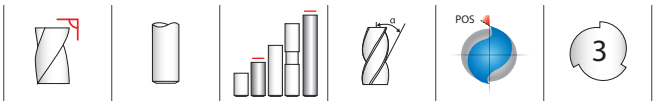
15MB
METRIC SERIES

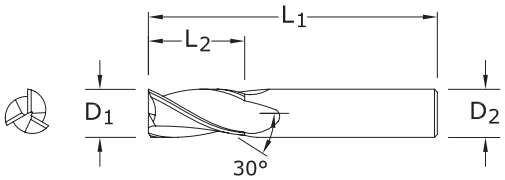
mm				EDP NO.				
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	STOCK
1,0	2,0	38,0	3,0	41506	49073	49094	49115	●
1,5	3,0	38,0	3,0	41510	49074	49095	49116	●
2,0	4,0	38,0	3,0	41514	49075	49096	49117	●
2,5	5,0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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

3 Flute Square End





5M • 5XLM
METRIC SERIES

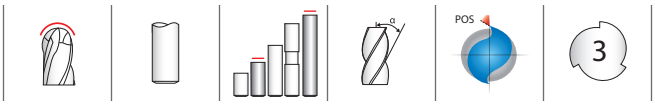
TOLERANCES (mm)
D_1 = +0,000/–0,050
D_2 = h_6

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK	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

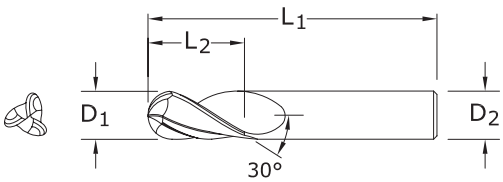
3 Flute Ball End



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)	STOCK	
1,0	4,0	38,0	3,0	40506	48820	48842	48863	●	5MB
1,5	4,5	38,0	3,0	40510	48821	48843	48864	●	5MB
2,0	6,3	38,0	3,0	40514	48822	48844	48865	●	5MB
2,5	9,5	38,0	3,0	40518	48823	48845	48866	●	5MB
3,0	12,0	38,0	3,0	40522	48824	48846	48867	●	5MB
3,0	25,0	75,0	3,0	43502	49583	49596	49609	●	5XLMB
3,5	12,0	50,0	4,0	40526	48825	48847	48868	●	5MB
4,0	14,0	50,0	4,0	40530	48826	48848	48869	●	5MB
4,0	25,0	75,0	4,0	43504	49584	49597	49610	●	5XLMB
4,5	16,0	50,0	6,0	40534	48827	48849	48870	●	5MB
5,0	16,0	50,0	6,0	40538	48828	48850	48871	●	5MB
5,0	25,0	75,0	5,0	43508	49586	49599	49612	●	5XLMB
6,0	19,0	50,0	6,0	40542	48829	48851	48872	●	5MB
6,0	25,0	75,0	6,0	43506	49585	49598	49611	●	5XLMB
7,0	19,0	63,0	8,0	40546	48830	48852	48873	●	5MB
8,0	20,0	63,0	8,0	40550	48831	48853	48874	●	5MB
8,0	25,0	75,0	8,0	43516	49587	49600	49613	●	5XLMB
9,0	22,0	75,0	10,0	40554	48832	48854	48875	●	5MB
10,0	22,0	75,0	10,0	40558	48833	48855	48876	●	5MB
10,0	38,0	100,0	10,0	43526	49588	49601	49614	●	5XLMB
11,0	25,0	75,0	12,0	40562	48834	48856	48877	●	5MB
12,0	25,0	75,0	12,0	40566	48835	48857	48878	●	5MB
12,0	50,0	100,0	12,0	43536	49589	49602	49615	●	5XLMB
12,0	75,0	150,0	12,0	43546	49590	49603	49616	●	5XLMB
14,0	32,0	89,0	14,0	40570	48836	48858	48879	●	5MB
14,0	75,0	150,0	14,0	43556	49591	49604	49617	●	5XLMB
16,0	32,0	89,0	16,0	40574	48837	48859	48880	●	5MB
16,0	75,0	150,0	16,0	43566	49592	49605	49618	●	5XLMB
18,0	38,0	100,0	18,0	40578	48838	48860	48881	●	5MB
18,0	75,0	150,0	18,0	43576	49593	49606	49619	●	5XLMB
20,0	38,0	100,0	20,0	40582	48839	48861	48882	●	5MB
20,0	75,0	150,0	20,0	43586	49594	49607	49620	●	5XLMB
25,0	38,0	100,0	25,0	40586	48840	48862	48883	●	5MB
25,0	75,0	150,0	25,0	43596	49595	49608	49621	●	5XLMB

STEELS

STAINLESS STEELS

CAST IRON

HIGH TEMP ALLOYS

TITANIUM

HARDENED STEELS

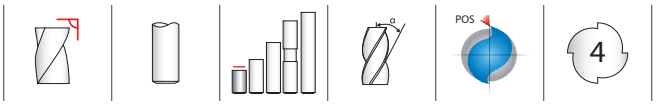
NON-FERROUS

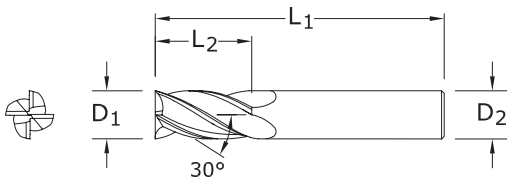
PLASTICS/COMPOSITES

● U.S. Stock Standard

■ NOT STOCKED—Call for Delivery

4 Flute Square End Stub





16M
METRIC SERIES

TOLERANCES (mm)

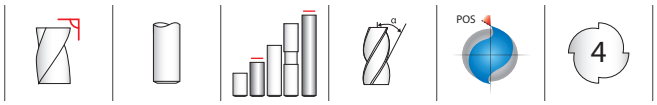
D_1 = +0,000/–0,050
D_2 = h_6

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

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

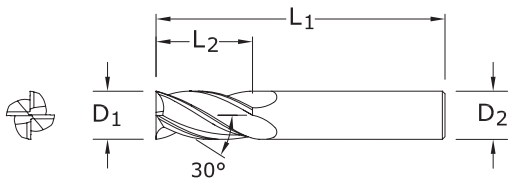
4 Flute End Mills



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



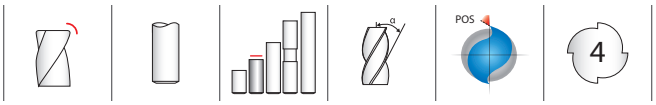
1M • 1XLM
METRIC SERIES

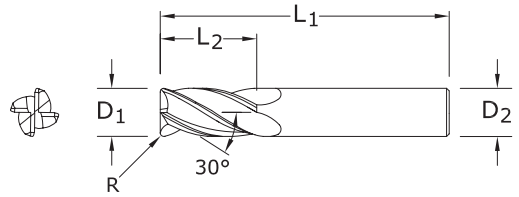
mm				EDP NO.					
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED EDP NO.	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	STOCK	SERIES
1,0	4,0	38,0	3,0	40105	48500	48522	48543	●	1M
1,5	4,5	38,0	3,0	40109	48501	48523	48544	●	1M
2,0	6,3	38,0	3,0	40113	48502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

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

4 Flute Corner Radius





1MCR
METRIC SERIES

TOLERANCES (mm)

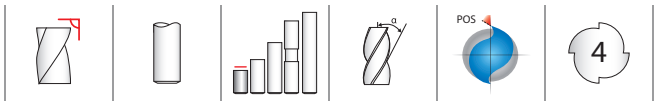
D_1 = +0,000/–0,050
D_2 = h_6
R = +0,000/–0,050

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
4,0	14,0	50,0	0,25	4,0	40000	●
4,0	14,0	50,0	0,50	4,0	40001	●
4,0	14,0	50,0	1,00	4,0	40003	●
5,0	16,0	50,0	0,25	6,0	40004	●
5,0	16,0	50,0	0,50	6,0	40005	●
5,0	16,0	50,0	1,00	6,0	40007	●
6,0	19,0	50,0	0,25	6,0	40009	●
6,0	19,0	50,0	0,50	6,0	40010	●
6,0	19,0	50,0	0,75	6,0	40011	●
6,0	19,0	50,0	1,00	6,0	40012	●
8,0	20,0	63,0	0,50	8,0	40015	●
8,0	20,0	63,0	0,75	8,0	40016	●
8,0	20,0	63,0	1,00	8,0	40017	●
8,0	20,0	63,0	1,50	8,0	40019	●
8,0	20,0	63,0	2,00	8,0	40020	●
10,0	22,0	75,0	0,50	10,0	40021	●
10,0	22,0	75,0	1,00	10,0	40023	●
10,0	22,0	75,0	1,50	10,0	40024	●
10,0	22,0	75,0	2,00	10,0	40025	●
12,0	25,0	75,0	0,50	12,0	40028	●
12,0	25,0	75,0	1,00	12,0	40030	●
12,0	25,0	75,0	1,50	12,0	40031	●
12,0	25,0	75,0	2,00	12,0	40032	●
16,0	32,0	89,0	0,50	16,0	40035	●
16,0	32,0	89,0	1,00	16,0	40037	●
16,0	32,0	89,0	1,50	16,0	40038	●
16,0	32,0	89,0	2,00	16,0	40039	●

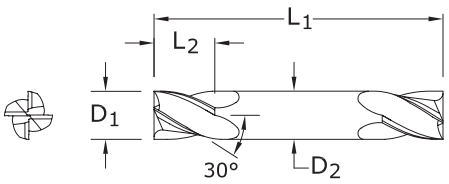
4 Flute Double End Mills



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



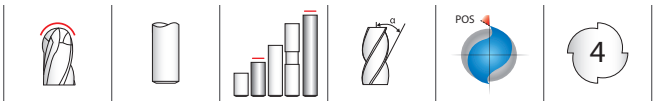
14M
METRIC SERIES

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

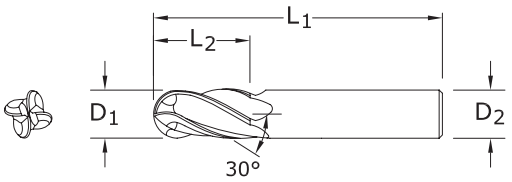
STEELS
STAINLESS STEELS
CAST IRON
HIGH TEMP ALLOYS
TITANIUM
HARDENED STEELS
NON-FERROUS
PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

4 Flute Ball End



1MB • 1XLMB
METRIC SERIES



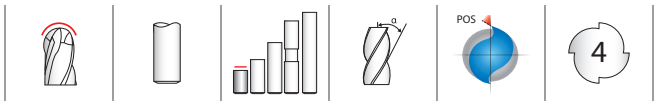
TOLERANCES (mm)
D_1 = +0,000/–0,050
D_2 = h_6

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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

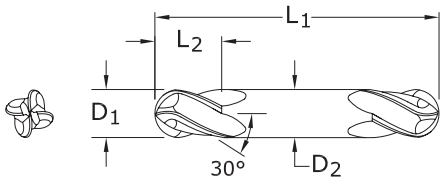
4 Flute Double End Ball End



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



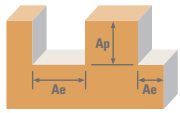
14MB
METRIC SERIES

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)	STOCK
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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

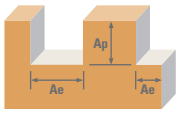
2 Flute: Square, Double, Stub, Long Reach, Ball
3 Flute: Square, Long Reach, Ball
4 Flute: Square, Double, Stub, Long Reach, Ball, Corner Radius



	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
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
							(112-168)	Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	≤ 0.50	≤ 1.5		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
							(82-123)	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)	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
							(82-123)	Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	≤ 0.50	≤ 1.5		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
							(60-90)	Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	1	≤ 1		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
							(77-115)	Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	≤ 0.50	≤ 1.5		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
							(56-84)	Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	1	≤ 1		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
							(82-123)	Fz	0.0008	0.0015	0.0031	0.007	0.019	0.040	0.048	0.064	0.070
				2	≤ 0.50	≤ 1.5		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
							(60-90)	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)	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
							(90-135)	Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	≤ 0.50	≤ 1.5		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
							(66-99)	Fz	0.0005	0.0012	0.0022	0.006	0.014	0.029	0.036	0.048	0.052
				2	1	≤ 1		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
							(62-93)	Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042
				2	≤ 0.50	≤ 1.5		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
							(45-68)	Fz	0.0005	0.0010	0.0019	0.004	0.012	0.024	0.029	0.037	0.042
				2	1	≤ 1		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

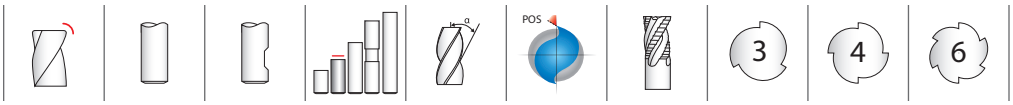


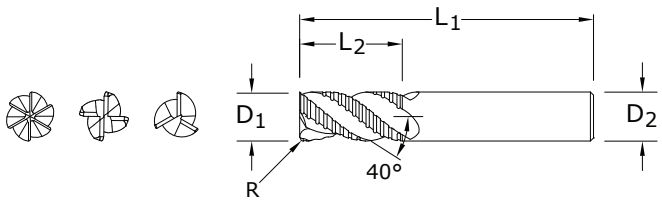
	Series 1M, 3M, 5M, 14M, 15M, 16M, 17M, 59M Metric	Hardness		Flutes	Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 0.4	0.75	1.5	3	6	10	12	20	25
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, 718, Incoloy 800, Monel 400,Rene, Waspalloy	≤ 300 Bhn or ≤ 32 HRc	Profile				20	RPM	15753	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
	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
	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
	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
	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

Single End Roughers





62M
METRIC SERIES

mm						EDP NO.			
CUTTING DIA. D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIA. D_2	CORNER RADIUS R	NO. OF FLUTES	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	STOCK
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	●

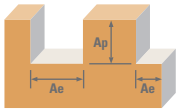
TOLERANCES h10 (mm)

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

STAINLESS STEELS
HIGH TEMP ALLOYS
TITANIUM

● U.S. Stock Standard
■ NOT STOCKED—
Call for Delivery

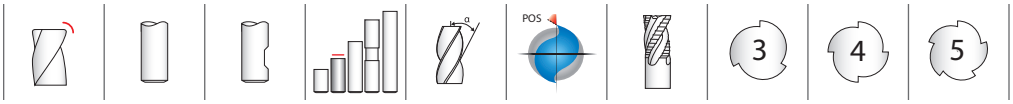
Single End Roughers

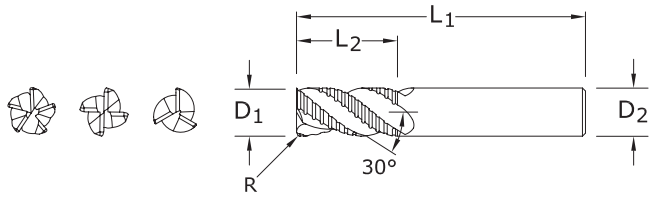


	Series 62M Metric	Hardness		Ae x D_1	Ap x D_1	Vc (m/min)		Diameter (D_1) (mm) 6	10	12	20	25
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F, 440F	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	123	RPM	6544	3926	3272	1963	1570
						(99-148)	Fz	0.014	0.029	0.036	0.051	0.053
							Feed (mm/min)	283	345	471	398	495
			Slot	1	≤ 1	99	RPM	5251	3151	2626	1575	1260
						(79-119)	Fz	0.014	0.029	0.036	0.051	0.053
							Feed (mm/min)	227	277	378	319	397
	STAINLESS STEELS (DIFFICULT) 304, 304L, 316, 316L, 17-4PH, 15-5PH, 13-4PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	Profile	≤ 0.5	≤ 1.5	85	RPM	4524	2714	2262	1357	1086
						(68-102)	Fz	0.012	0.024	0.029	0.040	0.043
							Feed (mm/min)	163	195	261	217	277
			Slot	1	≤ 1	69	RPM	3635	2181	1818	1091	872
						(55-82)	Fz	0.012	0.024	0.029	0.040	0.043
							Feed (mm/min)	131	157	209	174	222
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspalloy	≤ 300 Bhn or ≤ 32 HRc	Profile	≤ 0.5	≤ 1.5	21	RPM	1131	679	565	339	271
						(17-26)	Fz	0.010	0.021	0.024	0.035	0.035
							Feed (mm/min)	33	43	54	47	57
			Slot	1	≤ 1	17	RPM	905	543	452	271	217
						(14-20)	Fz	0.010	0.021	0.024	0.035	0.035
							Feed (mm/min)	26	35	43	38	46
	TITANIUM ALLOYS Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti10Al2Fe3Al, Ti5Al53Mo3Cr, Ti7Al4Mo, Ti3Al8V6Cr4Zr4Mo, Ti6Al6V6Sn, Ti152 Cr3Sn3Al	≤ 350 Bhn or ≤ 38 HRc	Profile	≤ 0.5	≤ 1.5	47	RPM	2504	1503	1252	751	601
						(38-57)	Fz	0.012	0.024	0.029	0.040	0.043
							Feed (mm/min)	90	108	144	120	153
			Slot	1	≤ 1	59	RPM	3151	1890	1575	945	756
						(48-71)	Fz	0.012	0.024	0.029	0.040	0.043
							Feed (mm/min)	113	136	181	151	193

Bhn (Brinell) HRc (Rockwell C)
rpm = (Vc x 1000) / (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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

Single End Roughers





61M
METRIC SERIES

mm						EDP NO.			
CUTTING DIA. D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIA. D_2	CORNER RADIUS R	NO. OF FLUTES	Ti-NAMITE (TiN)	Ti-NAMITE-C (TiCN)	Ti-NAMITE-A (AlTiN)	STOCK
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	●

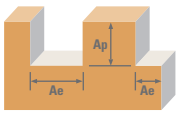
TOLERANCES h10 (mm)

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

STEELS
CAST IRON
HARDENED STEELS

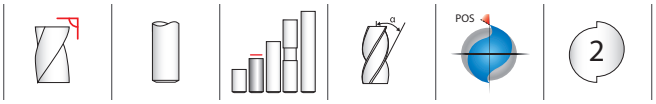
● U.S. Stock Standard
■ NOT STOCKED—
Call for Delivery

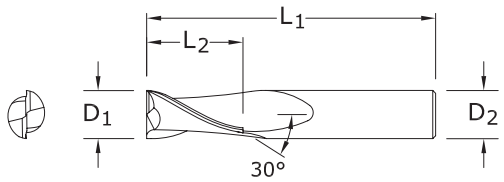
Single End Roughers

	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

2 Flute High Shear End Mills





52M
METRIC SERIES

TOLERANCES (mm)

D_1 = +0,000/–0,050
D_2 = h_6

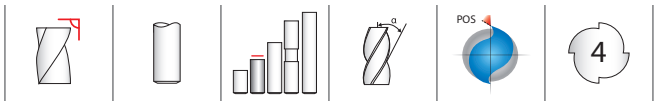
NON-FERROUS

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
3,0	7,0	38,0	3,0	45277	49829	●
3,5	7,0	57,0	6,0	45279	49830	●
4,0	8,0	57,0	6,0	45281	49831	●
4,5	8,0	57,0	6,0	45283	49832	●
5,0	10,0	57,0	6,0	45285	49833	●
6,0	10,0	57,0	6,0	45287	49834	●
8,0	16,0	63,0	8,0	45289	49835	●
10,0	19,0	72,0	10,0	45291	49836	●
12,0	22,0	83,0	12,0	45293	49837	●
14,0	22,0	83,0	14,0	45295	49838	●
16,0	26,0	92,0	16,0	45297	49839	●
20,0	32,0	104,0	20,0	45299	49840	●

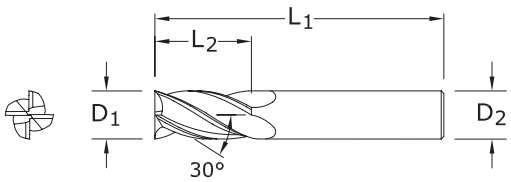
4 Flute High Shear End Mills



TOLERANCES (mm)

D_1 = +0,000/–0,050

D_2 = h_6



54M
METRIC SERIES

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)	STOCK
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	●

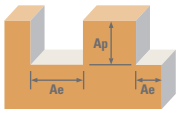
NON-FERROUS

PLASTICS/COMPOSITES

● U.S. Stock Standard

■ NOT STOCKED—Call for Delivery

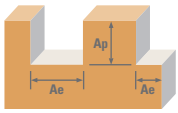
2 Flute: High Shear End Mills
4 Flute: High Shear End Mills



	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



	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 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	123
	135 (5xD)	2 Flute External Coolant Double Margin 5xD	132
Ice-Carb	140 (5xD)	2 Flute Internal Coolant 5xD	142
	140 (8xD)	2 Flute Internal Coolant 8xD	150
CFRP 8 Facet	120	2 Flute External Coolant Double Margin CFRP	158

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	123
	135 (5xD)	2 filos, refrigerante externo, doble margen, 5xD	132
Ice-Carb	140 (5xD)	2 filos, refrigerante interno, 5xD	142
	140 (8xD)	2 filos, refrigerante interno, 8xD	150
De 8 caras CFRP	120	2 filos, refrigerante externo, doble margen, CFRP	158

Recomendaciones de velocidades y avances mostradas tras cada serie

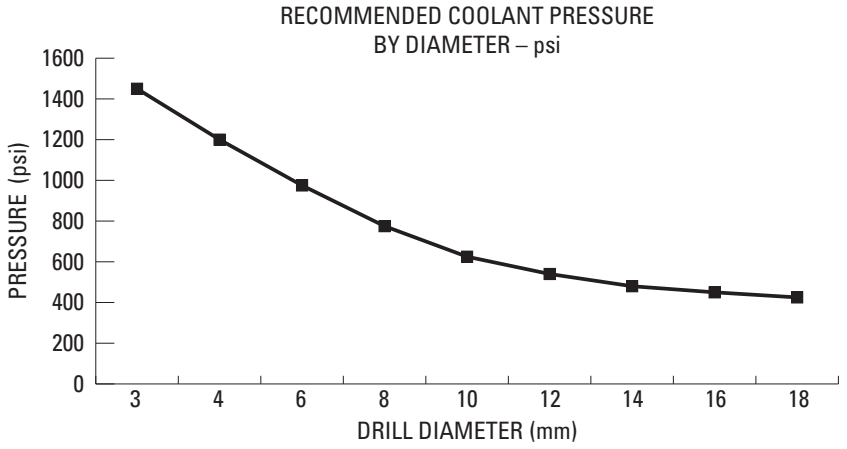
Outils de perçage

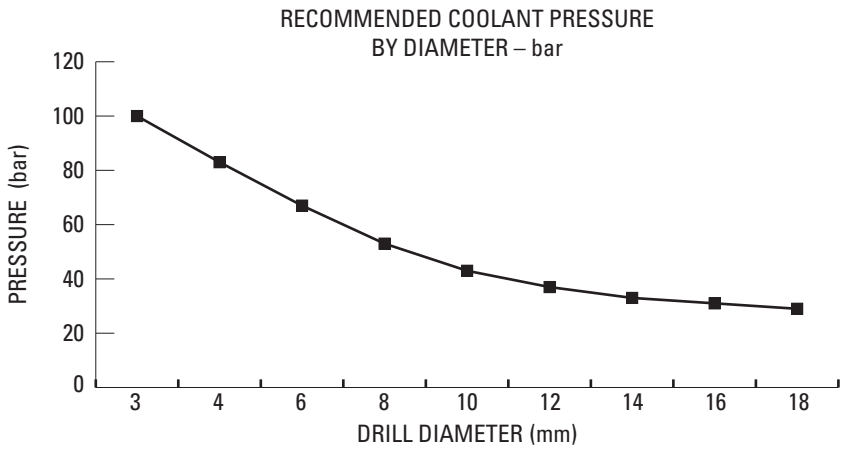
FORETS HAUTE PERFORMANCE	SÉRIES	DESCRIPTION	PAGE
Hi-PerCarb	135 (3xD)	2 dents refroidissement externe à double listel 3xD	123
	135 (5xD)	2 dents refroidissement externe à double listel 5xD	132
Ice-Carb	140 (5xD)	2 dents refroidissement interne 5xD	142
	140 (8xD)	2 dents refroidissement interne 8xD	150
CFRP à 8 facettes	120	2 dents refroidissement externe à double listel CFRP	158

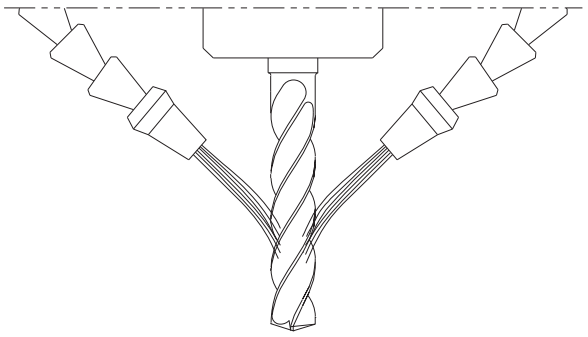
Recommandations de vitesse et avance indiquées après chaque série

Drilling Operations
Coolant Recommendations

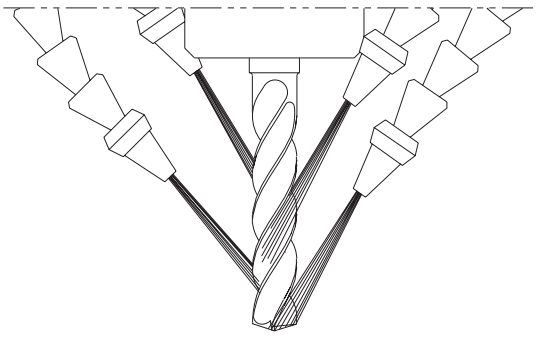
- Coolant works to mobilize chips away from the cut zone, reduce the heat created during the cutting process and minimize friction.
- It is important to optimize the coolant pressure and position in order to gain the full benefits coolant offers the cutting process.
- Proper coolant application promotes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







LARGE TIP – LOW VELOCITY
NO COVERAGE AT MAXIMUM DEPTH



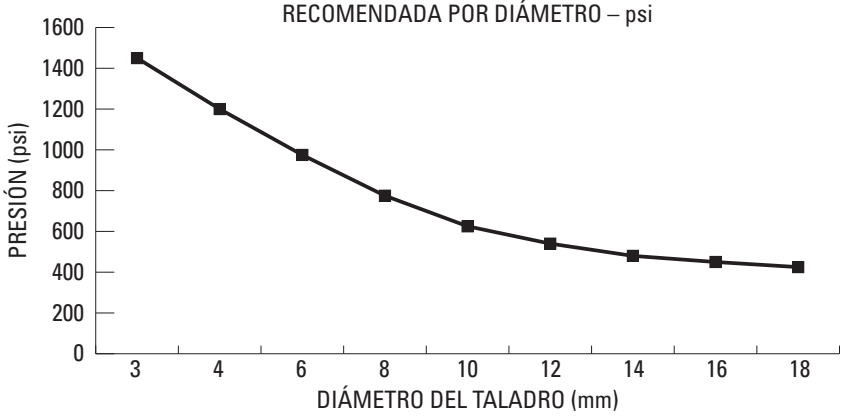
SMALL TIP – HIGH VELOCITY
COMPLETE COVERAGE

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

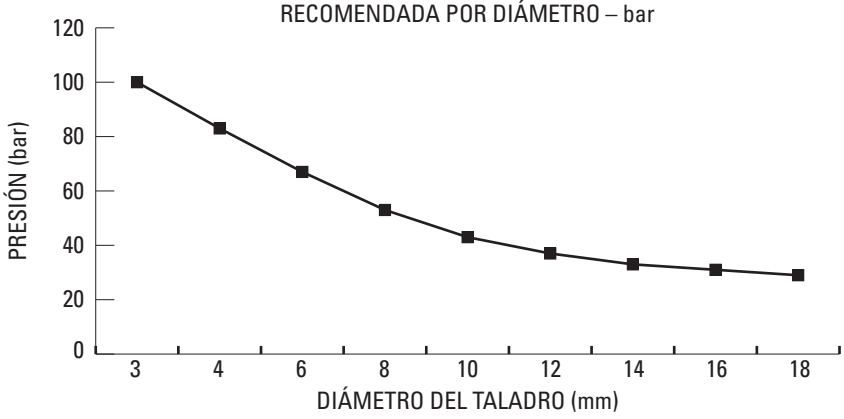
Operaciones de taladrado
Refrigerantes recomendados

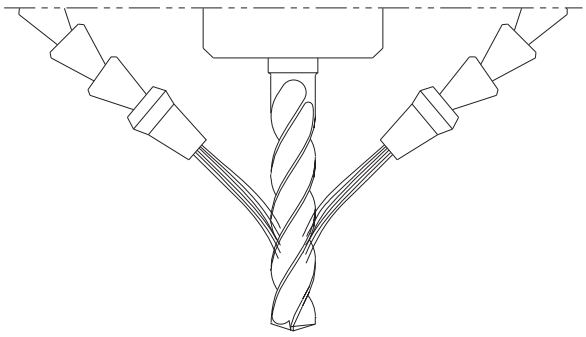
- El líquido refrigerante actúa movilizando las virutas fuera de la zona de corte, disminuyendo el calor generado durante el proceso de corte y minimizando la fricción.
- Es importante optimizar la presión del refrigerante y la posición para poder obtener todos los beneficios del refrigerante durante 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.

PRESIÓN DE REFRIGERANTE
RECOMENDADA POR DIÁMETRO – psi

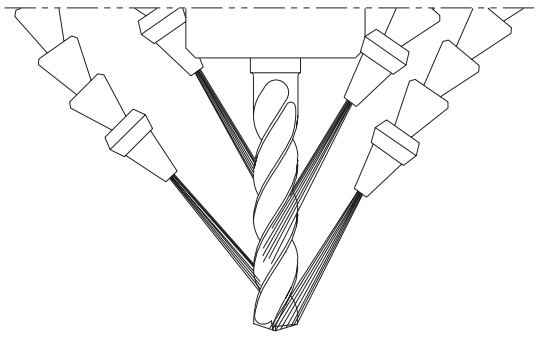


PRESIÓN DE REFRIGERANTE
RECOMENDADA POR DIÁMETRO – bar





PUNTA GRANDE – BAJA VELOCIDAD
SIN ALCANCE A PROFUNDIDAD MÁXIMA

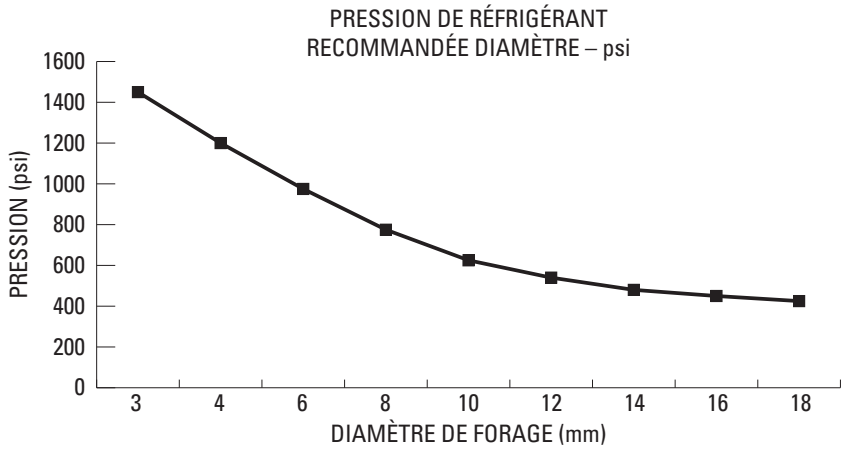


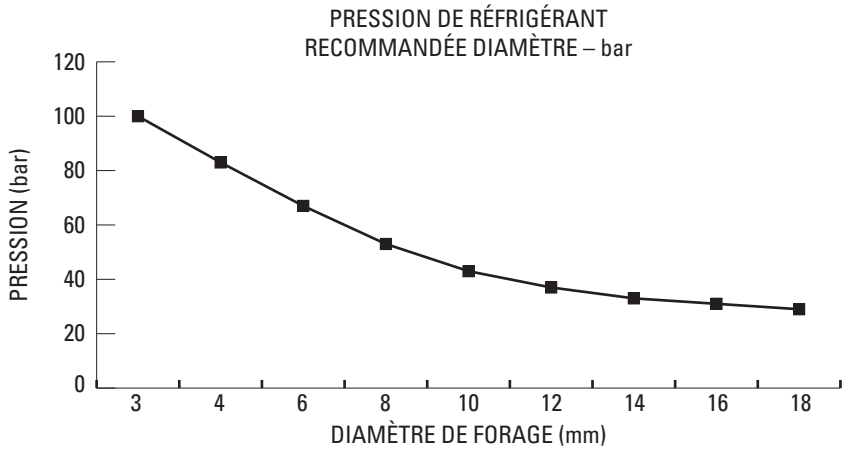
PUNTA PEQUEÑA – ALTA VELOCIDAD
COMPLETO ALCANCE

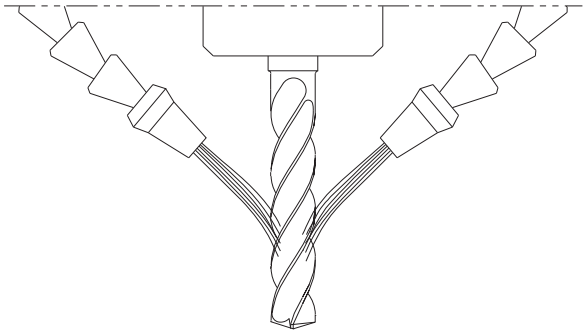
- Reducir el tamaño de la boquilla ayuda a maximizar los beneficios de refrigeración del exclusivo diseño de doble margen del taladro Hi-PerCarb aumentando la velocidad. Coloque las boquillas en línea con el segundo filo que se encuentra entre los dos márgenes y también el filo para obtener mejores resultados.

Opérations de forage
Recommandations en matière de refroidissement

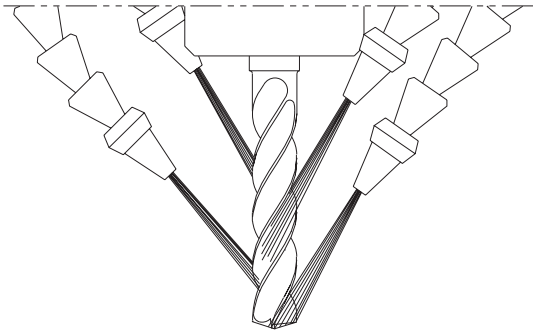
- Le réfrigérant sert à éloigner les copeaux de la zone de coupe, à réduire la chaleur dégagée durant la coupe et à minimiser la friction.
- Il est important d'optimiser la pression et la position du réfrigérant pour en retirer les bénéfices maximums durant la coupe.
- L'application adéquate de réfrigérant 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.





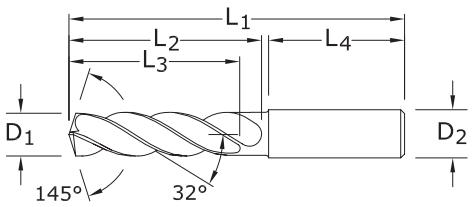


POINTE LARGE – BASSE VITESSE
PAS DE COUVERTURE À LA PROFONDEUR MAXIMUM



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.



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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
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	●

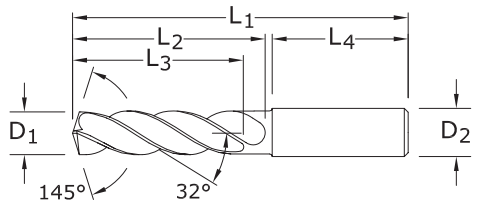
continued on next page

*Single Margin

- 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
HIGH PERFORMANCE CARBIDE DRILLS

3xD | 2



135 3xD

FRACTIONAL & METRIC SERIES

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

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
#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	●
3,8 mm	0.1496			6,0	66,0	24,0	21,0	36,0	63472	●
#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	●

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

135 3xD

FRACTIONAL & METRIC SERIES

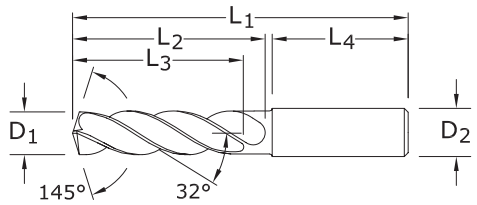
CONTINUED

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
7/32	0.2188	5.56	1/4-32	1/4	2-5/8	1	53/64	1-7/16	51341	●
5,6 mm	0.2205			6,0	66,0	28,0	24,0	36,0	63751	●
#2	0.2210	5.61		1/4	2-5/8	1	53/64	1-7/16	51781	●
5,7 mm	0.2244			6,0	66,0	28,0	24,0	36,0	63752	●
#1	0.2280	5.79		1/4	2-5/8	1	53/64	1-7/16	51782	●
5,8 mm	0.2283			6,0	66,0	28,0	24,0	36,0	63172	●
5,9 mm	0.2323			6,0	66,0	28,0	24,0	36,0	63753	●
A	0.2340	5.94		1/4	2-5/8	1	53/64	1-7/16	51601	●
15/64	0.2344	5.95		1/4	2-5/8	1	53/64	1-7/16	51342	●
6,0	0.2362	6.00	M7 X 1	6,0	66,0	28,0	24,0	36,0	63173	●
B	0.2380	6.05		1/4	3-1/8	1-5/16	1-3/64	1-7/16	51602	●
6,1 mm	0.2402			8,0	79,0	34,0	28,0	36,0	63754	●
C	0.2420	6.15		1/4	3-1/8	1-5/16	1-3/64	1-7/16	51603	●
6,2 mm	0.2441			8,0	79,0	34,0	28,0	36,0	63755	●
D	0.2460	6.25		1/4	3-1/8	1-5/16	1-3/64	1-7/16	51604	●
6,25 mm	0.2461		M7 X 0,75	8,0	79,0	34,0	28,0	36,0	63174	●
6,3 mm	0.2480			8,0	79,0	34,0	28,0	36,0	63756	●
1/4	0.2500	6.35		1/4	3-1/8	1-5/16	1-3/64	1-7/16	51343	●
E	0.2500	6.35		1/4	3-1/8	1-5/16	1-3/64	1-7/16	51605	●
6,4 mm	0.2520			8,0	79,0	34,0	28,0	36,0	63175	●
6,5 mm	0.2559			8,0	79,0	34,0	28,0	36,0	63213	●
F	0.2570	6.53	5/16-18	5/16	3-1/8	1-5/16	1-3/64	1-7/16	51344	●
6,6 mm	0.2598			8,0	79,0	34,0	28,0	36,0	63757	●
G	0.2610	6.63		5/16	3-1/8	1-5/16	1-3/64	1-7/16	51606	●
6,7 mm	0.2638			8,0	79,0	34,0	28,0	36,0	63758	●
17/64	0.2656	6.75	5/16-20	5/16	3-1/8	1-5/16	1-3/64	1-7/16	51345	●
H	0.2660	6.76		5/16	3-1/8	1-5/16	1-3/64	1-7/16	51607	●
6,8 mm	0.2677		M8 X 1,25	8,0	79,0	34,0	28,0	36,0	63176	●
6,9 mm	0.2717			8,0	79,0	34,0	28,0	36,0	63759	●
I	0.2720	6.91	5/16-24	5/16	3-1/8	1-5/16	1-3/64	1-7/16	51346	●
7,0 mm	0.2756		M8 X 1	8,0	79,0	34,0	28,0	36,0	63177	●
J	0.2770	7.04		5/16	3-1/8	1-5/16	1-3/64	1-7/16	51608	●
7,1 mm	0.2795			8,0	79,0	41,0	34,0	36,0	63760	●
K	0.2810	7.14		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51609	●
9/32	0.2812	7.14	5/16-32	5/16	3-1/8	1-9/16	1-3/16	1-7/16	51347	●
7,2 mm	0.2835			8,0	79,0	41,0	34,0	36,0	63761	●
7,25 mm	0.2854		M8 X 0,75	8,0	79,0	41,0	34,0	36,0	63178	●
7,3 mm	0.2874			8,0	79,0	41,0	34,0	36,0	63762	●
L	0.2900	7.37		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51610	●
7,4 mm	0.2913			8,0	79,0	41,0	34,0	36,0	63763	●
M	0.2950	7.49		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51611	●
7,5 mm	0.2953		M8 X 0,5	8,0	79,0	41,0	34,0	36,0	63179	●
19/64	0.2969	7.54		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51348	●
7,6 mm	0.2992			8,0	79,0	41,0	34,0	36,0	63764	●
N	0.3020	7.67		5/16	3-1/8	1-9/16	1-3/16	1-7/16	51612	●
7,7 mm	0.3031			8,0	79,0	41,0	34,0	36,0	63765	●
7,8 mm	0.3071		M9 X 1,25	8,0	79,0	41,0	34,0	36,0	63180	●
7,9 mm	0.3110			8,0	79,0	41,0	34,0	36,0	63766	●
5/16	0.3125	7.94	3/8-16	5/16	3-1/8	1-9/16	1-3/16	1-7/16	51349	●
8,0 mm	0.3150		M9 x 1	8,0	79,0	41,0	34,0	36,0	63181	●
O	0.3160	8.03		3/8	3-1/2	1-27/32	1-37/64	1-9/16	51613	●
8,1 mm	0.3189			10,0	89,0	47,0	40,0	40,0	63767	●
8,2 mm	0.3228			10,0	89,0	47,0	40,0	40,0	63768	●
P	0.3230	8.20		3/8	3-1/2	1-27/32	1-37/64	1-9/16	51614	●
8,3 mm	0.3268			10,0	89,0	47,0	40,0	40,0	63769	●
21/64	0.3281	8.33	3/8-20	3/8	3-1/2	1-27/32	1-37/64	1-9/16	51350	●
8,4 mm	0.3307			10,0	89,0	47,0	40,0	40,0	63182	●
Q	0.3320	8.43	3/8-24	3/8	3-1/2	1-27/32	1-37/64	1-9/16	51351	●
8,5 mm	0.3346		M10 X 1,5	10,0	89,0	47,0	40,0	40,0	63183	●

continued on next page

HI-PERCARB
HIGH PERFORMANCE CARBIDE DRILLS

3xD | 2



135 3xD

FRACTIONAL & METRIC SERIES

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

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
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	●

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

135 3xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
11,4 mm	0.4488			12,0	102,0	55,0	45,0	45,0	63790	●
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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

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

continued on next page

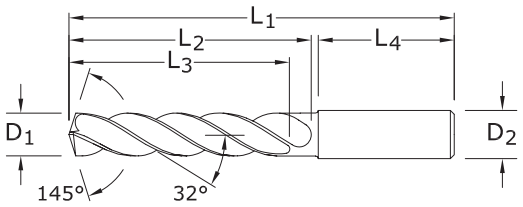
	Series 135 3D Metric	Hardness	Vc (m/min)		Diameter (D_1) (inch) 1.5	3	6	8	10	12	16	20
S	SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy	≤ 300 Bhn or ≤ 32 HRc	17	RPM	3555	1777	889	666	533	444	333	267
			(13-20)	Fr	0.010	0.020	0.039	0.053	0.066	0.079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

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 DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

135 5xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
3,5 mm	0.1378			6,0	66,0	28,0	23,0	36,0	64105	●
#28	0.1405	3.57	8-40	1/4	3	1	53/64	1- 7/16	52317	●
9/64	0.1406	3.57		1/4	3	1	53/64	1-7/16	51583	●
3,6 mm	0.1417		M4 X 0,35	6,0	66,0	28,0	23,0	36,0	64106	●
#27	0.1440	3.66		1/4	3	1	53/64	1-7/16	52318	●
3,7 mm	0.1457		M4.5 X 0,75	6,0	66,0	28,0	23,0	36,0	64107	●
#26	0.1470	3.73	3/16-24	1/4	3	1	53/64	1-7/16	52319	●
#25	0.1495	3.80	10-24	1/4	3-1/4	1-1/4	1-5/64	1-7/16	51584	●
3,8 mm	0.1496			6,0	74,0	36,0	29,0	36,0	64108	●
#24	0.1520	3.86	10-28	1/4	3-1/4	1-1/4	1-5/64	1-7/16	52321	●
3,9 mm	0.1535			6,0	74,0	36,0	29,0	36,0	64109	●
#23	0.1540	3.91		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52322	●
5/32	0.1562	3.97		1/4	3-1/4	1-1/4	1-5/64	1-7/16	51585	●
#22	0.1570	3.99	10-30	1/4	3-1/4	1-1/4	1-5/64	1-7/16	52323	●
4,0 mm	0.1575		M4,5 X 0,5	6,0	74,0	36,0	29,0	36,0	64110	●
#21	0.1590	4.04	10-32	1/4	3-1/4	1-1/4	1-5/64	1-7/16	51586	●
#20	0.1610	4.09	13/64-24	1/4	3-1/4	1-1/4	1-5/64	1-7/16	51587	●
4,1 mm	0.1614			6,0	74,0	36,0	29,0	36,0	64111	●
4,2 mm	0.1654		M5 / M5 X 0,75	6,0	74,0	36,0	29,0	36,0	64112	●
#19	0.1660	4.22		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52324	●
4,3 mm	0.1693			6,0	74,0	36,0	29,0	36,0	64113	●
#18	0.1695	4.31		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52325	●
11/64	0.1719	4.37		1/4	3-1/4	1-1/4	1-5/64	1-7/16	51588	●
#17	0.1730	4.39		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52326	●
4,4 mm	0.1732			6,0	74,0	36,0	29,0	36,0	64114	●
4,5 mm	0.1772		M5 X 0,5	6,0	74,0	36,0	29,0	36,0	64115	●
#15	0.1800	4.57		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52327	●
4,6 mm	0.1811		12-28	6,0	74,0	36,0	29,0	36,0	64116	●
#14	0.1820	4.62		1/4	3-1/4	1-1/4	1-5/64	1-7/16	52328	●
#13	0.1850	4.70	12-32	1/4	3-1/4	1-1/4	1-5/64	1-7/16	52329	●
4,7 mm	0.1850			6,0	74,0	36,0	29,0	36,0	64117	●
3/16	0.1875	4.76		1/4	3-1/4	1-3/4	1-37/64	1-7/16	51589	●
#12	0.1890	4.80	7/32-32	1/4	3-1/4	1-3/4	1-37/64	1-7/16	52330	●
4,8 mm	0.1890			6,0	82,0	44,0	35,0	36,0	64118	●
4,9 mm	0.1929			6,0	82,0	44,0	35,0	36,0	64119	●
#10	0.1935	4.91	14-20	1/4	3-1/4	1-3/4	1-37/64	1-7/16	52331	●
#9	0.1960	4.98		1/4	3-1/4	1-3/4	1-37/64	1-7/16	52332	●
5,0 mm	0.1969		M6 X 1	6,0	82,0	44,0	35,0	36,0	64120	●
#8	0.1990	5.05		1/4	3-1/4	1-3/4	1-37/64	1-7/16	52333	●
5,1 mm	0.2008			6,0	82,0	44,0	35,0	36,0	64121	●
#7	0.2010	5.11	1/4-20	1/4	3-1/4	1-3/4	1-37/64	1-7/16	51506	●
13/64	0.2031	5.16		1/4	3-1/4	1-3/4	1-37/64	1-7/16	51507	●
#6	0.2040	5.18		1/4	3 1/4	1 3/4	1 37/64	1 7/16	52334	●
5,2 mm	0.2047		M6 X 0,75	6,0	82,0	44,0	35,0	36,0	64122	●
#5	0.2055	5.22		1/4	3-1/4	1-3/4	1-37/64	1-7/16	51590	●
5,25 mm	0.2067			6,0	82,0	44,0	35,0	36,0	64123	●
5,3 mm	0.2087			6,0	82,0	44,0	35,0	36,0	64124	●
#4	0.2090	5.31	1/4-24	1/4	3-1/4	1-3/4	1-37/64	1-7/16	51508	●

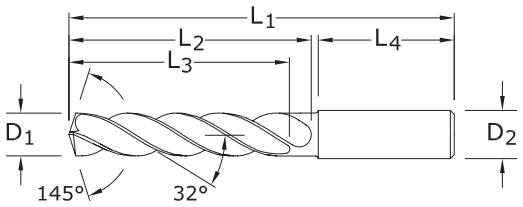
continued on next page

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 DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
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	●

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

135 5xD

FRACTIONAL & METRIC SERIES

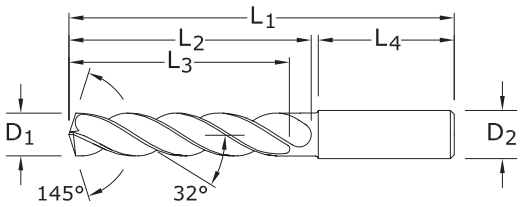
CONTINUED

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
7,25 mm	0.2854		M8 X 0,75	8,0	91,0	53,0	43,0	36,0	64145	●
7,3 mm	0.2874			8,0	91,0	53,0	43,0	36,0	64146	●
L	0.2900	7.37		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52345	●
7,4 mm	0.2913			8,0	91,0	53,0	43,0	36,0	64147	●
M	0.2950	7.49		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52346	●
7,5 mm	0.2953		M8 X 0,5	8,0	91,0	53,0	43,0	36,0	64148	●
19/64	0.2969	7.54		5/16	3-5/8	2-5/64	1-51/64	1-7/16	51516	●
7,6 mm	0.2992			8,0	91,0	53,0	43,0	36,0	64149	●
N	0.3020	7.67		5/16	3-5/8	2-5/64	1-51/64	1-7/16	52347	●
7,7 mm	0.3031			8,0	91,0	53,0	43,0	36,0	64150	●
7,8 mm	0.3071		M9 X 1,25	8,0	91,0	53,0	43,0	36,0	64151	●
7,9 mm	0.3110			8,0	91,0	53,0	43,0	36,0	64152	●
5/16	0.3125	7.94	3/8-16	5/16	3-5/8	2-5/64	1-51/64	1-7/16	51517	●
8,0 mm	0.3150		M9 X 1	8,0	91,0	53,0	43,0	36,0	64153	●
O	0.3160	8.03		3/8	4	2-13/32	2-1/8	1-9/16	52348	●
8,1 mm	0.3189			10,0	103,0	61,0	49,0	40,0	64154	●
8,2 mm	0.3228			10,0	103,0	61,0	49,0	40,0	64155	●
P	0.3230	8.20		3/8	4	2-13/32	2-1/8	1-9/16	51518	●
8,3 mm	0.3268			10,0	103,0	61,0	49,0	40,0	64156	●
21/64	0.3281	8.33	3/8-20	3/8	4	2-13/32	2-1/8	1-9/16	51519	●
8,4 mm	0.3307			10,0	103,0	61,0	49,0	40,0	64157	●
Q	0.3320	8.43	3/8-24	3/8	4	2-13/32	2-1/8	1-9/16	51520	●
8,5 mm	0.3346		M10 X 1,5	10,0	103,0	61,0	49,0	40,0	64158	●
8,6 mm	0.3386			10,0	103,0	61,0	49,0	40,0	64159	●
R	0.3390	8.61	3/8-32	3/8	4	2-13/32	2-1/8	1-9/16	52349	●
8,7 mm	0.3425		M10 X 1,25	10,0	103,0	61,0	49,0	40,0	64160	●
11/32	0.3438	8.73		3/8	4	2-13/32	2-1/8	1-9/16	51521	●
8,8 mm	0.3465			10,0	103,0	61,0	49,0	40,0	64161	●
S	0.3480	8.84		3/8	4	2-13/32	2-1/8	1-9/16	51522	●
8,9 mm	0.3504			10,0	103,0	61,0	49,0	40,0	64162	●
9,0 mm	0.3543		M10 X 1	10,0	103,0	61,0	49,0	40,0	64163	●
T	0.3580	9.09		3/8	4	2 13/32	2 1/8	1 9/16	52350	●
9,1 mm	0.3583			10,0	103,0	61,0	49,0	40,0	64164	●
23/64	0.3594	9.13		3/8	4	2-13/32	2-1/8	1-9/16	51523	●
9,2 mm	0.3622		M10 X 0,75	10,0	103,0	61,0	49,0	40,0	64165	●
9,25 mm	0.3642			10,0	103,0	61,0	49,0	40,0	64166	●
9,3 mm	0.3661			10,0	103,0	61,0	49,0	40,0	64167	●
U	0.3680	9.35	7/16-14	3/8	4	2-13/32	2-1/8	1-9/16	51524	●
9,4 mm	0.3701			10,0	103,0	61,0	49,0	40,0	64168	●
9,5 mm	0.3740		M10 X 0,5	10,0	103,0	61,0	49,0	40,0	64169	●
3/8	0.3750	9.53		3/8	4	2-13/32	2-1/8	1-9/16	51525	●
V	0.3770	9.58		1/2	4	2-13/32	2-1/8	1-9/16	52351	●
9,6 mm	0.3780			10,0	103,0	61,0	49,0	40,0	64170	●
9,7 mm	0.3819			10,0	103,0	61,0	49,0	40,0	64171	●
9,8 mm	0.3858			10,0	103,0	61,0	49,0	40,0	64172	●
W	0.3860	9.80		1/2	4	2-13/32	2-1/8	1-9/16	51526	●
9,9 mm	0.3898			10,0	103,0	61,0	49,0	40,0	64173	●
25/64	0.3906	9.92	7/16-20	1/2	4	2-13/32	2-1/8	1-9/16	51527	●

continued on next page

HI-PERCARB
HIGH PERFORMANCE CARBIDE DRILLS

5xD



135 5xD

FRACTIONAL & METRIC SERIES

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

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
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	●

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

135 5xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA. D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	SHANK LENGTH L_4	Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
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

continued on next page

	Series 135 5D Fractional	Hardness	Vc (sfm)		Diameter (D_1) (inch) 1/32	1/8	1/4	3/8	1/2	5/8	7/8
S	**SUPER ALLOYS (Nickel , Cobalt, Iron Base) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy**	≤ 300 Bhn or ≤ 32 HRc	40	RPM	4890	1222	611	407	306	244	175
			(32-48)	Fr	0.0002	0.0008	0.0016	0.0025	0.0033	0.0041	0.0057
				Feed (ipm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		≤ 400 Bhn or ≤ 43 HRc	20	RPM	2445	611	306	204	153	122	87
			(16-24)	Fr	0.0002	0.0007	0.0013	0.0020	0.0026	0.0033	0.0046
				Feed (ipm)	0.4	0.4	0.4	0.4	0.4	0.4	0.4
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	105	RPM	12835	3209	1604	1070	802	642	458
			(84-126)	Fr	0.0005	0.0018	0.0036	0.0054	0.0072	0.0090	0.0127
				Feed (ipm)	5.8	5.8	5.8	5.8	5.8	5.8	5.8
		≤ 350 Bhn or ≤ 38 HRc	80	RPM	9779	2445	1222	815	611	489	349
			(64-96)	Fr	0.0004	0.0016	0.0032	0.0048	0.0064	0.0080	0.0112
				Feed (ipm)	3.9	3.9	3.9	3.9	3.9	3.9	3.9
		≤ 440 Bhn or ≤ 47 HRc	42	RPM	5134	1284	642	428	321	257	183
			(34-50)	Fr	0.0003	0.0012	0.0025	0.0037	0.0050	0.0062	0.0087
				Feed (ipm)	1.6	1.6	1.6	1.6	1.6	1.6	1.6
N	**ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075**	≤ 80 Bhn or ≤ 47 HRb	635	RPM	77622	19406	9703	6469	4851	3881	2772
			(508-762)	Fr	0.0012	0.0049	0.0099	0.0148	0.0198	0.0247	0.0346
				Feed (ipm)	96.0	96.0	96.0	96.0	96.0	96.0	96.0
		≤ 150 Bhn or ≤ 7 HRc	540	RPM	66010	16502	8251	5501	4126	3300	2357
			(432-648)	Fr	0.0012	0.0050	0.0099	0.0149	0.0199	0.0248	0.0348
				Feed (ipm)	82.0	82.0	82.0	82.0	82.0	82.0	82.0
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	450	RPM	55008	13752	6876	4584	3438	2750	1965
			(360-540)	Fr	0.0005	0.0020	0.0040	0.0060	0.0080	0.0100	0.0140
				Feed (ipm)	27.5	27.5	27.5	27.5	27.5	27.5	27.5
		≤ 200 Bhn or ≤ 23 HRc	360	RPM	44006	11002	5501	3667	2750	2200	1572
			(288-432)	Fr	0.0005	0.0020	0.0040	0.0060	0.0080	0.0100	0.0140
				Feed (ipm)	22.0	22.0	22.0	22.0	22.0	22.0	22.0

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

Hi-PerCarb

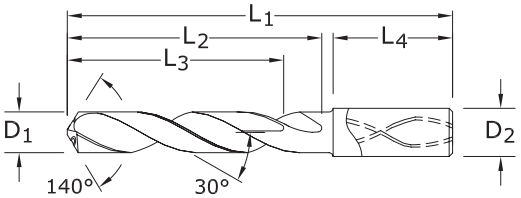
	Series 135M 5D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1.5	3	6	8	10	12	16	20
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	105	RPM	22297	11148	5574	4181	3344	2787	2090	1672
			(84-126)	Fr	0.048	0.095	0.190	0.254	0.317	0.380	0.507	0.634
				Feed (mm/min)	1060	1060	1060	1060	1060	1060	1060	1060
		≤ 275 Bhn or ≤ 28 HRc	94	RPM	20035	10017	5009	3756	3005	2504	1878	1503
			(76-113)	Fr	0.043	0.085	0.171	0.228	0.285	0.341	0.455	0.569
				Feed (mm/min)	855	855	855	855	855	855	855	855
		≤ 425 Bhn or ≤ 45 HRc	55	RPM	11633	5816	2908	2181	1745	1454	1091	872
			(44-66)	Fr	0.036	0.071	0.143	0.190	0.238	0.285	0.381	0.476
				Feed (mm/min)	415	415	415	415	415	415	415	415
	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

continued on next page

	Series 135M 5D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1.5	3	6	8	10	12	16	20
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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

ICe-Carb



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 DIA.	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm SHANK DIA.	OVERALL LENGTH	FLUTE LENGTH	CLEARED LENGTH	SHANK LENGTH	EDP NO. Ti-NAMITE-A (AlTiN)	STOCK
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	●

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

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

140 5xD

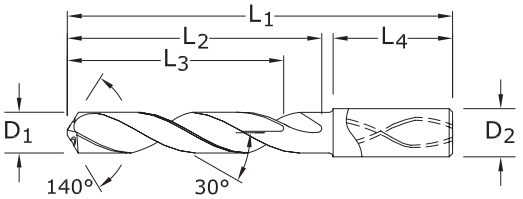
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm SHANK DIA. D_2	mm OVERALL LENGTH L_1	mm FLUTE LENGTH L_2	mm CLEARED LENGTH L_3	mm SHANK LENGTH L_4	EDP NO. Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
7/32	0.2188	5.56	1/4-32	6,0	82,0	44,0	35,0	36,0	51912	●
5,6 mm	0.2205			6,0	82,0	44,0	35,0	36,0	63924	●
5,7 mm	0.2244			6,0	82,0	44,0	35,0	36,0	63925	●
5,8 mm	0.2283			6,0	82,0	44,0	35,0	36,0	63926	●
5,9 mm	0.2323			6,0	82,0	44,0	35,0	36,0	63927	●
15/64	0.2344	5.95		6,0	82,0	44,0	35,0	36,0	51913	●
6,0 mm	0.2362		M7 X 1	6,0	82,0	44,0	35,0	36,0	63928	●
6,1 mm	0.2402			8,0	91,0	53,0	43,0	36,0	63929	●
6,2 mm	0.2441		M7 X 0,75	8,0	91,0	53,0	43,0	36,0	63930	●
6,3 mm	0.2480			8,0	91,0	53,0	43,0	36,0	63931	●
1/4	0.2500	6.35		8,0	91,0	53,0	43,0	36,0	51914	●
6,4 mm	0.2520			8,0	91,0	53,0	43,0	36,0	63932	●
6,5 mm	0.2559			8,0	91,0	53,0	43,0	36,0	63933	●
F	0.2570	6.53	5/16-18	8,0	91,0	53,0	43,0	36,0	51915	●
6,6 mm	0.2598			8,0	91,0	53,0	43,0	36,0	63934	●
6,7 mm	0.2638			8,0	91,0	53,0	43,0	36,0	63935	●
17/64	0.2656	6.75	5/16-20	8,0	91,0	53,0	43,0	36,0	51916	●
6,8 mm	0.2677		M8 X 1,25	8,0	91,0	53,0	43,0	36,0	63936	●
6,9 mm	0.2717		5/16-24	8,0	91,0	53,0	43,0	36,0	63999	●
7,0 mm	0.2756		M8 X 1	8,0	91,0	53,0	43,0	36,0	63937	●
7,1 mm	0.2795			8,0	91,0	53,0	43,0	36,0	63938	●
9/32	0.2812	7.14	5/16-32	8,0	91,0	53,0	43,0	36,0	51918	●
7,2 mm	0.2835		M8 X 0,75	8,0	91,0	53,0	43,0	36,0	63939	●
7,3 mm	0.2874			8,0	91,0	53,0	43,0	36,0	63940	●
7,4 mm	0.2913			8,0	91,0	53,0	43,0	36,0	63941	●
7,5 mm	0.2953		M8 X 0,5	8,0	91,0	53,0	43,0	36,0	63942	●
19/64	0.2969	7.54		8,0	91,0	53,0	43,0	36,0	51919	●
7,6 mm	0.2992			8,0	91,0	53,0	43,0	36,0	63943	●
7,7 mm	0.3031			8,0	91,0	53,0	43,0	36,0	63944	●
7,8 mm	0.3071		M9 X 1,25	8,0	91,0	53,0	43,0	36,0	63945	●
7,9 mm	0.3110			8,0	91,0	53,0	43,0	36,0	63946	●
5/16	0.3125	7.94	3/8-16	8,0	91,0	53,0	43,0	36,0	51920	●
8,0 mm	0.3150		M9 X 1	8,0	91,0	53,0	43,0	36,0	63947	●
8,1 mm	0.3189			10,0	103,0	61,0	49,0	40,0	63948	●
8,2 mm	0.3228			10,0	103,0	61,0	49,0	40,0	63949	●
8,3 mm	0.3268			10,0	103,0	61,0	49,0	40,0	63950	●
21/64	0.3281	8.33	3/8-20	10,0	103,0	61,0	49,0	40,0	51921	●
8,4 mm	0.3307			10,0	103,0	61,0	49,0	40,0	63951	●
Q	0.3320	8.43	3/8-24	10,0	103,0	61,0	49,0	40,0	51922	●
8,5 mm	0.3346		M10 X 1,5	10,0	103,0	61,0	49,0	40,0	63952	●
8,6 mm	0.3386			10,0	103,0	61,0	49,0	40,0	63953	●
8,7 mm	0.3425			10,0	103,0	61,0	49,0	40,0	63954	●

continued on next page

ICe-Carb



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 DIA.	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm					EDP NO.	
				SHANK DIA.	OVERALL LENGTH	FLUTE LENGTH	CLEARED LENGTH	SHANK LENGTH	Ti-NAMITE-A (AlTiN)	
D_1				D_2	L_1	L_2	L_3	L_4	EDP NO.	STOCK
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	●

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

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

140 5xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm SHANK DIA. D_2	mm OVERALL LENGTH L_1	mm FLUTE LENGTH L_2	mm CLEARED LENGTH L_3	mm SHANK LENGTH L_4	EDP NO. Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
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

continued on next page

	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
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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

ICe-Carb

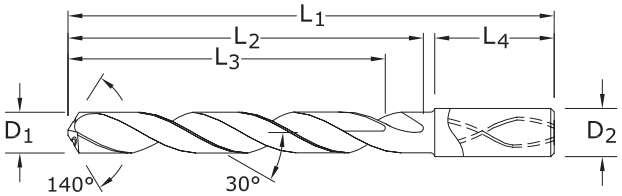
	Series 140M 5D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	14	16
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	130	RPM	13733	6867	5150	4120	3433	2943	2575
			(104-155)	Fr	0.095	0.189	0.252	0.316	0.379	0.442	0.505
				Feed (mm/min)	1300	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

continued on next page

	Series 140M 5D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	14	16
S	SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy	≤ 300 Bhn or ≤ 32 HRc	29	RPM	3070	1535	1151	921	767	658	576
			(23-35)	Fr	0.020	0.039	0.052	0.065	0.078	0.091	0.104
				Feed (mm/min)	60	60	60	60	60	60	60
		≤ 400 Bhn or ≤ 43 HRc	15	RPM	1616	808	606	485	404	346	303
			(12-18)	Fr	0.015	0.031	0.041	0.052	0.062	0.072	0.083
				Feed (mm/min)	25	25	25	25	25	25	25
	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

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 DIA.	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm SHANK DIA.	mm OVERALL LENGTH	mm FLUTE LENGTH	mm CLEARED LENGTH	mm SHANK LENGTH	EDP NO. Ti-NAMITE-A (AlTiN)	STOCK
D_1				D_2	L_1	L_2	L_3	L_4	EDP NO.	
3,0 mm	0.1181			6,0	72,0	34,0	29,0	36,0	63575	●
3,1 mm	0.1220			6,0	72,0	34,0	29,0	36,0	63576	●
1/8	0.1250	3.18		6,0	72,0	34,0	29,0	36,0	51801	●
3,2 mm	0.1260		M3,5 X 0,35	6,0	72,0	34,0	29,0	36,0	63577	●
3,3 mm	0.1299		M4 X 0,7	6,0	72,0	34,0	29,0	36,0	63578	●
3,4 mm	0.1339			6,0	72,0	34,0	29,0	36,0	63579	●
#29	0.1360	3.45	8-32,8-36	6,0	72,0	34,0	29,0	36,0	51802	●
3,5 mm	0.1378		M4 X 0,5	6,0	72,0	34,0	29,0	36,0	63580	●
9/64	0.1406	3.57		6,0	72,0	34,0	29,0	36,0	51803	●
3,6 mm	0.1417		M4 X 0,35	6,0	72,0	34,0	29,0	36,0	63581	●
3,7 mm	0.1457		M4,5 X 0,75	6,0	72,0	34,0	29,0	36,0	63582	●
3,8 mm	0.1496		10-24	6,0	81,0	43,0	36,0	36,0	63583	●
3,9 mm	0.1535			6,0	81,0	43,0	36,0	36,0	63584	●
5/32	0.1562	3.97		6,0	81,0	43,0	36,0	36,0	51804	●
4,0 mm	0.1575		M4,5 X 0,5	6,0	81,0	43,0	36,0	36,0	63585	●
#21	0.1590	4.04	10-32	6,0	81,0	43,0	36,0	36,0	51805	●
4,1 mm	0.1614			6,0	81,0	43,0	36,0	36,0	63586	●
4,2 mm	0.1654		M5 / M5 X 0,75	6,0	81,0	43,0	36,0	36,0	63587	●
4,3 mm	0.1693			6,0	81,0	43,0	36,0	36,0	63588	●
11/64	0.1719	4.37		6,0	81,0	43,0	36,0	36,0	51806	●
4,4 mm	0.1732		12-24	6,0	81,0	43,0	36,0	36,0	63589	●
4,5 mm	0.1772		M5 X 0,5	6,0	81,0	43,0	36,0	36,0	63590	●
4,6 mm	0.1811		12-28	6,0	81,0	43,0	36,0	36,0	63591	●
4,7 mm	0.1850		12-32	6,0	81,0	43,0	36,0	36,0	63592	●
3/16	0.1875	4.76		6,0	95,0	57,0	48,0	36,0	51807	●
4,8 mm	0.1890		7/32-32	6,0	95,0	57,0	48,0	36,0	63593	●
4,9 mm	0.1929			6,0	95,0	57,0	48,0	36,0	63594	●
5,0 mm	0.1969		M6 X 1	6,0	95,0	57,0	48,0	36,0	63595	●
5,1 mm	0.2008		1/4-20	6,0	95,0	57,0	48,0	36,0	63596	●
13/64	0.2031	5.16		6,0	95,0	57,0	48,0	36,0	51808	●
5,2 mm	0.2047		M6 X 0,75	6,0	95,0	57,0	48,0	36,0	63597	●
5,3 mm	0.2087			6,0	95,0	57,0	48,0	36,0	63598	●
5,4 mm	0.2126			6,0	95,0	57,0	48,0	36,0	63599	●
5,5 mm	0.2165		M6 X 0,5	6,0	95,0	57,0	48,0	36,0	63600	●

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

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

140 8xD

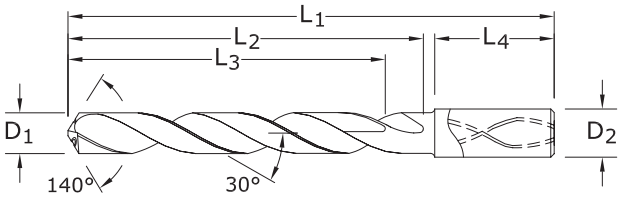
FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIA. D_1	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm SHANK DIA. D_2	mm OVERALL LENGTH L_1	mm FLUTE LENGTH L_2	mm CLEARED LENGTH L_3	mm SHANK LENGTH L_4	EDP NO. Ti-NAMITE-A (AlTiN) EDP NO.	STOCK
7/32	0.2188	5.56	1/4-32	6,0	95,0	57,0	48,0	36,0	51809	●
5,6 mm	0.2205			6,0	95,0	57,0	48,0	36,0	63601	●
5,7 mm	0.2244			6,0	95,0	57,0	48,0	36,0	63602	●
5,8 mm	0.2283			6,0	95,0	57,0	48,0	36,0	63603	●
5,9 mm	0.2323			6,0	95,0	57,0	48,0	36,0	63604	●
15/64	0.2344	5.95		6,0	95,0	57,0	48,0	36,0	51810	●
6,0 mm	0.2362		M7 X 1	6,0	95,0	57,0	48,0	36,0	63605	●
6,1 mm	0.2402			8,0	114,0	76,0	64,0	36,0	63606	●
6,2 mm	0.2441		M7 X 0,75	8,0	114,0	76,0	64,0	36,0	63607	●
6,3 mm	0.2480			8,0	114,0	76,0	64,0	36,0	63608	●
1/4	0.2500	6.35		8,0	114,0	76,0	64,0	36,0	51811	●
6,4 mm	0.2520			8,0	114,0	76,0	64,0	36,0	63609	●
6,5 mm	0.2559			8,0	114,0	76,0	64,0	36,0	63610	●
F	0.2570	6.53	5/16-18	8,0	114,0	76,0	64,0	36,0	51812	●
6,6 mm	0.2598			8,0	114,0	76,0	64,0	36,0	63611	●
6,7 mm	0.2638			8,0	114,0	76,0	64,0	36,0	63612	●
17/64	0.2656	6.75	5/16-20	8,0	114,0	76,0	64,0	36,0	51813	●
6,8 mm	0.2677		M8 X 1,25	8,0	114,0	76,0	64,0	36,0	63613	●
6,9 mm	0.2717			8,0	114,0	76,0	64,0	36,0	63614	●
7,0 mm	0.2756		M8 X 1	8,0	114,0	76,0	64,0	36,0	63615	●
7,1 mm	0.2795			8,0	114,0	76,0	64,0	36,0	63616	●
9/32	0.2812	7.14	5/16-32	8,0	114,0	76,0	64,0	36,0	51814	●
7,2 mm	0.2835		M8 X 0,75	8,0	114,0	76,0	64,0	36,0	63617	●
7,3 mm	0.2874			8,0	114,0	76,0	64,0	36,0	63618	●
7,4 mm	0.2913			8,0	114,0	76,0	64,0	36,0	63619	●
7,5 mm	0.2953		M8 X 0,5	8,0	114,0	76,0	64,0	36,0	63620	●
19/64	0.2969	7.54		8,0	114,0	76,0	64,0	36,0	51815	●
7,6 mm	0.2992			8,0	114,0	76,0	64,0	36,0	63621	●
7,7 mm	0.3031			8,0	114,0	76,0	64,0	36,0	63622	●
7,8 mm	0.3071		M9 X 1,25	8,0	114,0	76,0	64,0	36,0	63623	●
7,9 mm	0.3110			8,0	114,0	76,0	64,0	36,0	63624	●
5/16	0.3125	7.94	3/8-16	8,0	114,0	76,0	64,0	36,0	51816	●
8,0 mm	0.3150		M9 X 1	8,0	114,0	76,0	64,0	36,0	63625	●
8,1 mm	0.3189			10,0	142,0	95,0	80,0	40,0	63626	●
8,2 mm	0.3228			10,0	142,0	95,0	80,0	40,0	63627	●
8,3 mm	0.3268			10,0	142,0	95,0	80,0	40,0	63628	●
21/64	0.3281	8.33	3/8-20	10,0	142,0	95,0	80,0	40,0	51817	●
8,4 mm	0.3307			10,0	142,0	95,0	80,0	40,0	63629	●
Q	0.3320	8.43	3/8-24	10,0	142,0	95,0	80,0	40,0	51818	●
8,5 mm	0.3346		M10 X 1,5	10,0	142,0	95,0	80,0	40,0	63630	●
8,6 mm	0.3386			10,0	142,0	95,0	80,0	40,0	63631	●
8,7 mm	0.3425			10,0	142,0	95,0	80,0	40,0	63632	●

continued on next page

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)

				mm					EDP NO.	
CUTTING DIA.	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	SHANK DIA.	OVERALL LENGTH	FLUTE LENGTH	CLEARED LENGTH	SHANK LENGTH	Ti-NAMITE-A (AlTiN)	
D_1				D_2	L_1	L_2	L_3	L_4	EDP NO.	STOCK
11/32	0.3438	8.73	3/8-32	10,0	142,0	95,0	80,0	40,0	51819	●
8,8 mm	0.3465		M10 X 1,25	10,0	142,0	95,0	80,0	40,0	63633	●
8,9 mm	0.3504			10,0	142,0	95,0	80,0	40,0	63634	●
9,0 mm	0.3543		M10 X 1	10,0	142,0	95,0	80,0	40,0	63635	●
9,1 mm	0.3583			10,0	142,0	95,0	80,0	40,0	63636	●
23/64	0.3594	9.13		10,0	142,0	95,0	80,0	40,0	51820	●
9,2 mm	0.3622		M10 X 0,75	10,0	142,0	95,0	80,0	40,0	63637	●
9,3 mm	0.3661			10,0	142,0	95,0	80,0	40,0	63638	●
U	0.3680	9.35	7/16-14	10,0	142,0	95,0	80,0	40,0	51821	●
9,4 mm	0.3701			10,0	142,0	95,0	80,0	40,0	63639	●
9,5 mm	0.3740		M11 / M10 X 0,5	10,0	142,0	95,0	80,0	40,0	63640	●
3/8	0.3750	9.53		10,0	142,0	95,0	80,0	40,0	51822	●
9,6 mm	0.3780			10,0	142,0	95,0	80,0	40,0	63641	●
9,7 mm	0.3819			10,0	142,0	95,0	80,0	40,0	63642	●
9,8 mm	0.3858			10,0	142,0	95,0	80,0	40,0	63643	●
9,9 mm	0.3898			10,0	142,0	95,0	80,0	40,0	63644	●
25/64	0.3906	9.92	7/16-20	10,0	142,0	95,0	80,0	40,0	51823	●
10,0 mm	0.3937			10,0	142,0	95,0	80,0	40,0	63645	●
10,1 mm	0.3976			12,0	162,0	114,0	96,0	45,0	63646	●
10,2 mm	0.4016		M12 X 1,75	12,0	162,0	114,0	96,0	45,0	63647	●
10,3 mm	0.4055			12,0	162,0	114,0	96,0	45,0	63648	●
13/32	0.4062	10.32		12,0	162,0	114,0	96,0	45,0	51824	●
10,4 mm	0.4094			12,0	162,0	114,0	96,0	45,0	63649	●
10,5 mm	0.4134		M12 X 1,5	12,0	162,0	114,0	96,0	45,0	63650	●
10,6 mm	0.4173			12,0	162,0	114,0	96,0	45,0	63651	●
10,7 mm	0.4213			12,0	162,0	114,0	96,0	45,0	63652	●
27/64	0.4219	10.72	1/2-13	12,0	162,0	114,0	96,0	45,0	51825	●
10,8 mm	0.4252		M12 X 1,25	12,0	162,0	114,0	96,0	45,0	63653	●
10,9 mm	0.4291			12,0	162,0	114,0	96,0	45,0	63654	●
11,0 mm	0.4331		M12 X 1	12,0	162,0	114,0	96,0	45,0	63655	●
11,1 mm	0.4370			12,0	162,0	114,0	96,0	45,0	63656	●
7/16	0.4375	11.11	1/4-18NPT	12,0	162,0	114,0	96,0	45,0	51826	●

continued on next page

TOLERANCES (inch)

≤.1181 DIAMETER
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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

140 8xD

FRACTIONAL & METRIC SERIES

CONTINUED

CUTTING DIA.	DECIMAL EQUIV.	METRIC EQUIV.	TAP SIZE REFERENCE ONLY	mm					EDP NO.	
				SHANK DIA.	OVERALL LENGTH	FLUTE LENGTH	CLEARED LENGTH	SHANK LENGTH	Ti-NAMITE-A (AlTiN)	
D_1				D_2	L_1	L_2	L_3	L_4	EDP NO.	STOCK
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)		Diameter (D_1) (inch) 1/8	3/16	1/4	3/8	1/2	5/8	3/4
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	405	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

continued on next page

	Series 140 8D Fractional	Hardness	Vc (sfm)		Diameter (D_1) (inch) 1/8	3/16	1/4	3/8	1/2	5/8	3/4
S	SUPER ALLOYS (NICKEL , COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy, Monel 400, Rene, Waspaloy	≤ 300 Bhn or ≤ 32 HRc	65	RPM	1986	1324	993	662	497	397	331
			(52-78)	Fr	0.0009	0.0013	0.0017	0.0026	0.0034	0.0043	0.0051
				Feed (ipm)	1.7	1.7	1.7	1.7	1.7	1.7	1.7
		≤ 400 Bhn or ≤ 43 HRc	35	RPM	1070	713	535	357	267	214	178
			(28-42)	Fr	0.0006	0.0008	0.0011	0.0017	0.0022	0.0028	0.0034
				Feed (ipm)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	185	RPM	5654	3769	2827	1885	1413	1131	942
			(148-222)	Fr	0.0016	0.0024	0.0032	0.0048	0.0064	0.0080	0.0096
				Feed (ipm)	9.0	9.0	9.0	9.0	9.0	9.0	9.0
		≤ 350 Bhn or ≤ 38 HRc	140	RPM	4278	2852	2139	1426	1070	856	713
			(112-168)	Fr	0.0012	0.0018	0.0023	0.0035	0.0047	0.0058	0.0070
				Feed (ipm)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
		≤ 440 Bhn or ≤ 47 HRc	75	RPM	2292	1528	1146	764	573	458	382
			(60-90)	Fr	0.0010	0.0015	0.0020	0.0030	0.0040	0.0050	0.0060
				Feed (ipm)	2.3	2.3	2.3	2.3	2.3	2.3	2.3
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	730	RPM	22309	14873	11154	7436	5577	4462	3718
			(584-876)	Fr	0.0045	0.0067	0.0090	0.0134	0.0179	0.0224	0.0269
				Feed (ipm)	100.0	100.0	100.0	100.0	100.0	100.0	100.0
		≤ 150 Bhn or ≤ 7 HRc	635	RPM	19406	12937	9703	6469	4851	3881	3234
			(508-762)	Fr	0.0046	0.0070	0.0093	0.0139	0.0186	0.0232	0.0278
				Feed (ipm)	90.0	90.0	90.0	90.0	90.0	90.0	90.0
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	255	RPM	7793	5195	3896	2598	1948	1559	1299
			(204-306)	Fr	0.0018	0.0027	0.0036	0.0054	0.0072	0.0090	0.0108
				Feed (ipm)	14.0	14.0	14.0	14.0	14.0	14.0	14.0
		≤ 200 Bhn or ≤ 23 HRc	235	RPM	7182	4788	3591	2394	1795	1436	1197
			(188-282)	Fr	0.0018	0.0027	0.0036	0.0054	0.0072	0.0091	0.0109
				Feed (ipm)	13.0	13.0	13.0	13.0	13.0	13.0	13.0

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

ICe-Carb

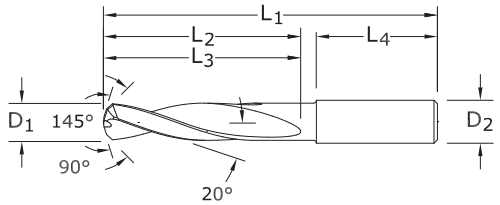
	Series 140M 8D Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	8	10	12	14	16
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	123	RPM	13087	6544	4908	3926	3272	2804	2454
			(100-170)	Fr	0.085	0.171	0.228	0.285	0.342	0.399	0.455
				Feed (mm/min)	1118	1118	1118	1118	1118	1118	1118
		≤ 275 Bhn or ≤ 28 HRc	113	RPM	11956	5978	4484	3587	2989	2562	32
			(90-135)	Fr	0.072	0.144	0.193	0.241	0.289	0.337	26.908
				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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

Series 120



120
FRACTIONAL & METRIC SERIES

- Double margin construction design stabilizes the drill for greater hole accuracy and improved surface finish in final hole
- Compound angle creates 4 cutting edges along the drill point
- Distinct double angle prevents abrasiveness of the Composite from localizing along the point

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.	STOCK
#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)

#40–1/2 DIAMETER

D_1 = +.0000/–.0005

D_2 = h_6

TOLERANCES (mm)

2,7–12 DIAMETER

D_1 = +0,000/–0,013

D_2 = h_6

PLASTICS/COMPOSITES

● U.S. Stock Standard

■ NOT STOCKED—Call for Delivery

	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
	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
	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 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
	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
	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 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	164
Short Length Self Centering (DIN6539)	108M Plus	2 Flute Short Length DIN 6539	169
Straight Flute	106	Straight Flute 140 Point Geometry	176
3 Flute with 150 Point Geometry	103	3 Flute 150 Point Geometry	180
GENERAL PURPOSE COUNTERSINKS	**SERIES**	**DESCRIPTION**	**PAGE**
Combined Drill & Countersink	301	2 Flute Straight Flute Combined Drill and Countersink Fractional	186
	301M	2 Flute Straight Flute Combined Drill and Countersink Metric	187
Single Flute Countersink	601	Single Flute Fractional	192
3 Flute Countersink	603	3 Flute Fractional	195
6 Flute Countersink	606	6 Flute Fractional	198
GENERAL PURPOSE REAMERS	**SERIES**	**DESCRIPTION**	**PAGE**
Straight Flute Reamer	201M	Metric Reamer	202
Straight Flute Accu-Reamer	200	Accu-Reamer	206

Speed & Feed Recommendations listed after each series

Taladrado

TALADROS DE USO GENERAL	SERIE	DESCRIPCIÓN	PÁGINA
2 filos	101	2 filos, espiral de avance lento	164
Autocentrante de longitud corta (DIN6539)	108M Plus	2 filos, longitud corta, DIN 6539	169
Filo recto	106	Filo recto, geometría de 140 puntos	176
3 filos con geometría de 150 puntos	103	3 filos, geometría de 150 puntos	180
TALADROS DE USO AVELLANADORES	**SERIE**	**DESCRIPCIÓN**	**PÁGINA**
Taladro y avellanador combinados	301	2 filos, filo recto, taladro y avellanador combinados, fraccional	186
	301M	2 filos, filo recto, taladro y avellanador combinados, métrico	187
Avellanador de filo único	601	Filo único, fraccional	192
Avellanador de 3 filos	603	3 filos, fraccional	195
Avellanador de 6 filos	606	6 filos, fraccional	198
TALADROS DE USO ESCARIADORES	**SERIE**	**DESCRIPCIÓN**	**PÁGINA**
Escariador de filo recto	201M	Escariador métrico	202
Escariador Accu de filo recto	200	Escariador Accu	206

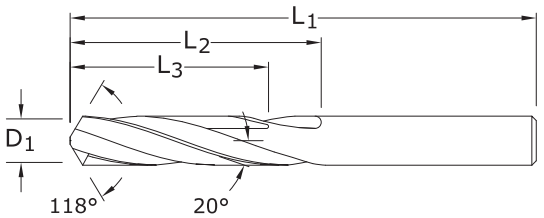
Recomendaciones de velocidades y avances mostradas tras cada serie

Outils de perçage

FORETS UNIVERSELS	SERIES	DESCRIPTION	PAGE
2 dents	101	2 dents à spirale lente	164
Court autocentrant (DIN 6539)	108M Plus	2 dents court DIN 6539	169
Denture droite	106B17	Denture droite à angle de pointe 140º	176
3 dents à angle de pointe 150º	103	3 dents à angle de pointe 150º	180
FORETS À FRAISER	**SERIES**	**DESCRIPTION**	**PAGE**
Foret et foret à fraiser combinés	301	2 dents denture droite foret et foret à fraiser combinés (fractionnel)	186
	301M	2 dents denture droite foret et foret à fraiser combinés (métrique)	187
Foret à fraiser à dent simple	601	Foret à dent simple (fractionnel)	192
Foret à fraiser 3 dents	603	3 dents (fractionnel)	195
foret à fraiser 6 dents	606	6 dents (fractionnel)	198
FORETS À ALÉSOIRS	**SERIES**	**DESCRIPTION**	**PAGE**
Alésoir denture droite	201M	Alésoir (métrique)	202
Alésoir denture droite Accu-Reamer	200	Alésoir Accu-Reamer	206

Recommandations de vitesse et avance indiquées après chaque série

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)	STOCK
#80	0.0135	0.34	3/4	3/16	5/32	51080	57076	●
#79	0.0145	0.37	3/4	3/16	5/32	51079	57077	●
1/64	0.0156	0.40	3/4	3/16	5/32	51101	57078	●
#78	0.0160	0.41	3/4	3/16	5/32	51078	57079	●
#77	0.0180	0.46	3/4	3/16	5/32	51077	57080	●
#76	0.0200	0.51	7/8	1/4	13/64	51076	57081	●
#75	0.0210	0.53	7/8	1/4	13/64	51075	57082	●
#74	0.0225	0.57	7/8	1/4	13/64	51074	57083	●
#73	0.0240	0.61	7/8	1/4	13/64	51073	57084	●
#72	0.0250	0.64	1	5/16	1/4	51072	57085	●
#71	0.0260	0.66	1	5/16	1/4	51071	57086	●
0,7 mm	0.0276		28,0	9,0	7,0	61001	68268	●
#70	0.0280	0.71	1-1/4	1/2	13/32	51070	57087	●
#69	0.0292	0.74	1-1/4	1/2	13/32	51069	57088	●
#68	0.0310	0.79	1-1/4	1/2	13/32	51068	57089	●
1/32	0.0312	0.79	1-1/4	1/2	13/32	51102	57090	●
0,8 mm	0.0315		30,0	10,0	8,0	61003	68269	●
#67	0.0320	0.81	1-1/4	1/2	13/32	51067	57091	●
#66	0.0330	0.84	1-1/4	1/2	13/32	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	●

continued on next page

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

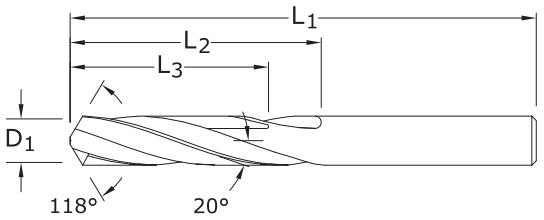
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
#51	0.0670	1.70	1-1/2	3/4	39/64	51051	57109	●
#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	●
#23	0.1540	3.91	2-1/2	1-3/8	1-7/64	51023	57142	●

continued on next page

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)	STOCK
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	●
5,7 mm	0.2244		93,0	57,0	45,0	61089	68331	●

continued on next page

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

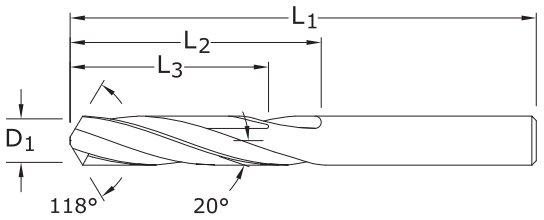
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
#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	●
R	0.3390	8.61	4	2-1/2	2	51218	57194	●

continued on next page

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)	STOCK
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

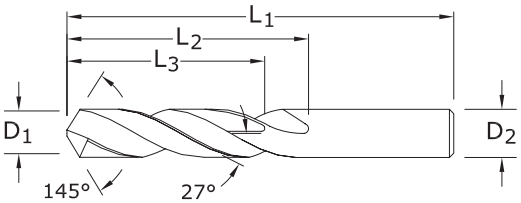
TOLERANCES (mm)

D_1 = +0,0000/–0,0127

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

Short Length Self Centering Drills • DIN 6539



108M Plus
METRIC SERIES

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

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

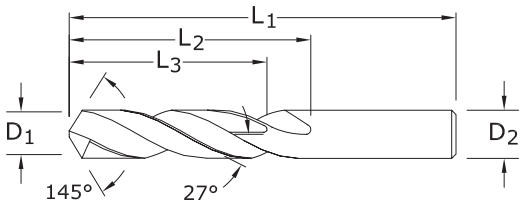
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
0,5	20,0	3,0	2,1	62001	68643	●
0,55	21,0	3,5	2,5	62003	68644	●
0,6	21,0	3,5	2,5	62005	68645	●
0,65	22,0	4,0	2,9	62007	68646	●
0,7	23,0	4,5	3,2	62009	68647	●
0,75	23,0	4,5	3,2	62011	68648	●
0,8	24,0	5,0	3,6	62013	68649	●
0,85	24,0	5,0	3,6	62015	68650	●
0,9	25,0	5,5	4,0	62017	68651	●
0,95	25,0	5,5	4,0	62019	68652	●
1,0	26,0	6,0	4,7	62021	68653	●
1,05	26,0	6,0	4,7	62023	68654	●
1,1	28,0	7,0	5,4	62025	68655	●
1,15	28,0	7,0	5,4	62027	68656	●
1,2	30,0	8,0	6,0	62029	68657	●
1,25	30,0	8,0	6,0	62031	68658	●
1,3	30,0	8,0	6,0	62033	68659	●
1,35	32,0	9,0	7,0	62035	68660	●
1,4	32,0	9,0	7,0	62037	68661	●
1,45	32,0	9,0	7,0	62039	68662	●
1,5	32,0	9,0	7,0	62041	68663	●
1,6	34,0	10,0	7,0	62043	68664	●
1,7	34,0	10,0	7,0	62045	68665	●
1,8	36,0	11,0	8,0	62047	68666	●
1,9	36,0	11,0	8,0	62049	68667	●
2,0	38,0	12,0	9,0	62051	68668	●
2,1	38,0	12,0	9,0	62053	68669	●
2,2	40,0	13,0	10,0	62055	68670	●
2,3	40,0	13,0	10,0	62057	68671	●
2,4	43,0	14,0	11,0	62059	68672	●
2,5	43,0	14,0	11,0	62061	68673	●
2,6	43,0	14,0	11,0	62063	68674	●
2,7	46,0	16,0	12,0	62065	68675	●
2,8	46,0	16,0	12,0	62067	68676	●

continued on next page

Short Length Self Centering Drills • DIN 6539

108M Plus
METRIC SERIES



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

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)	STOCK
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

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
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	●

2 Flute Drills

	Series 101 Fractional	Hardness	Vc (sfm)		Diameter (D_1) (inch) 1/64	1/32	1/16	1/8	1/4	3/8	1/2
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	265	RPM	64787	32394	16197	8098	4049	2699	2025
			(212-318)	Fr	0.00021	0.0004	0.0008	0.0017	0.0033	0.0050	0.0067
				Feed (ipm)	13.5	13.5	13.5	13.5	13.5	13.5	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)	Fz	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)	Fz	0.00019	0.0004	0.0007	0.0015	0.0030	0.0045	0.0060
				Feed (ipm)	10.5	10.5	10.5	10.5	10.5	10.5	10.5
		≤ 375 Bhn or ≤ 40 HRc	145	RPM	35450	17725	8862	4431	2216	1477	1108
			(116-174)	Fr	0.00019	0.0004	0.0007	0.0015	0.0030	0.0045	0.0060
				Feed (ipm)	6.6	6.6	6.6	6.6	6.6	6.6	6.6
		≤ 450 Bhn or ≤ 48 HRc	60	RPM	14669	7334	3667	1834	917	611	458
			(48-72)	Fr	0.00008	0.0002	0.0003	0.0007	0.0013	0.0020	0.0026
				Feed (ipm)	1.2	1.2	1.2	1.2	1.2	1.2	1.2
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc	85	RPM	20781	10390	5195	2598	1299	866	649
			(68-102)	Fr	0.00011	0.0002	0.0004	0.0009	0.0018	0.0027	0.0035
				Feed (ipm)	2.3	2.3	2.3	2.3	2.3	2.3	2.3
		≤ 375 Bhn or ≤ 40 HRc	55	RPM	13446	6723	3362	1681	840	560	420
			(44-66)	Fr	0.00005	0.0001	0.0002	0.0004	0.0008	0.0012	0.0017
				Feed (ipm)	0.7	0.7	0.7	0.7	0.7	0.7	0.7
		≤ 475 Bhn or ≤ 50 HRc	40	RPM	9779	4890	2445	1222	611	407	306
			(32-48)	Fr	0.00005	0.0001	0.0002	0.0004	0.0008	0.0012	0.0016
				Feed (ipm)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	280	RPM	68454	34227	17114	8557	4278	2852	2139
			(224-336)	Fr	0.00026	0.0005	0.0010	0.0020	0.0041	0.0061	0.0082
				Feed (ipm)	17.5	17.5	17.5	17.5	17.5	17.5	17.5
		≤ 330 Bhn or ≤ 36 HRc	250	RPM	61120	30560	15280	7640	3820	2547	1910
			(200-300)	Fr	0.00025	0.0005	0.0010	0.0020	0.0041	0.0061	0.0081
				Feed (ipm)	15.5	15.5	15.5	15.5	15.5	15.5	15.5
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 250 Bhn or ≤ 24 HRc	210	RPM	51341	25670	12835	6418	3209	2139	1604
			(168-252)	Fr	0.00015	0.0003	0.0006	0.0012	0.0024	0.0036	0.0048
				Feed (ipm)	7.7	7.7	7.7	7.7	7.7	7.7	7.7
		≤ 330 Bhn or ≤ 36 HRc	110	RPM	26893	13446	6723	3362	1681	1121	840
			(88-132)	Fr	0.00009	0.0002	0.0004	0.0007	0.0015	0.0022	0.0030
				Feed (ipm)	2.5	2.5	2.5	2.5	2.5	2.5	2.5
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	65	RPM	15891	7946	3973	1986	993	662	497
			(52-78)	Fr	0.00010	0.0002	0.0005	0.0009	0.0018	0.0025	0.0035
				Feed (ipm)	1.7	1.7	1.7	1.7	1.7	1.7	1.7
		≤ 375 Bhn or ≤ 40 HRc	55	RPM	13446	6723	3362	1681	840	560	420
			(44-66)	Fr	0.00010	0.0002	0.0004	0.0008	0.0015	0.0023	0.0031
				Feed (ipm)	1.3	1.3	1.3	1.3	1.3	1.3	1.3

continued on next page

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 = 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 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	RPM	25690	8563	4282	3211	2569	2141	1606
			(65-97)	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	RPM	12118	4039	2020	1515	1212	1010	757
			(30-46)	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	RPM	8240	2747	1373	1030	824	687	515
			(21-31)	Fz	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	RPM	22297	7432	3716	2787	2230	1858	1394
			(56-84)	Fz	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	RPM	14057	4686	2343	1757	1406	1171	879
			(35-53)	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	RPM	5816	1939	969	727	582	485	364
			(15-22)	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	RPM	8240	2747	1373	1030	824	687	515
			(21-31)	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	RPM	5332	1777	889	666	533	444	333
			(13-20)	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	RPM	3878	1293	646	485	388	323	242
			(10-15)	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	RPM	27144	9048	4524	3393	2714	2262	1696
			(68-102)	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	RPM	24235	8078	4039	3029	2424	2020	1515
			(61-91)	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	RPM	20358	6786	3393	2545	2036	1696	1272
			(51-77)	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	RPM	10664	3555	1777	1333	1066	889	666
			(27-40)	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	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
		≤ 375 Bhn or ≤ 40 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

continued on next page

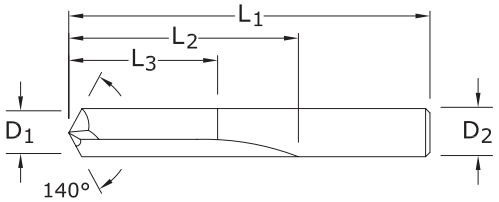
2 Flute Drills
Short Length Self Centering Drills • DIN 6539

	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 = 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 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)	STOCK
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	●

continued on next page

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

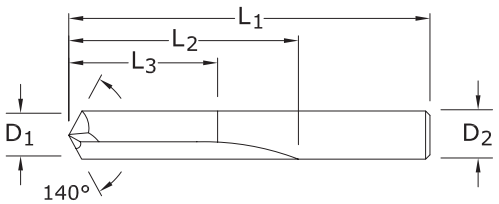
● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
#33	0.1130	2.87	1-7/8	7/8	45/64	56033	56242	●
#32	0.1160	2.95	1-7/8	7/8	45/64	56032	56241	●
3,0 mm	0.1181		46,0	16,0	12,0	66009	66010	●
#31	0.1200	3.05	1-7/8	7/8	45/64	56031	56240	●
1/8	0.1250	3.18	1-7/8	7/8	45/64	56108	56140	●
#30	0.1285	3.26	1-15/16	15/16	3/4	56030	56239	●
#29	0.1360	3.45	1-15/16	15/16	3/4	56029	56238	●
3,5 mm	0.1378		52,0	20,0	15,0	66011	66012	●
#28	0.1405	3.57	1-15/16	15/16	3/4	56028	56237	●
9/64	0.1406	3.57	1-15/16	15/16	3/4	56109	56141	●
#27	0.1440	3.66	2-1/16	1	51/64	56027	56236	●
#26	0.1470	3.73	2-1/16	1	51/64	56026	56235	●
#25	0.1495	3.80	2-1/16	1	51/64	56025	56234	●
#24	0.1520	3.86	2-1/16	1	51/64	56024	56233	●
#23	0.1540	3.91	2-1/16	1	51/64	56023	56232	●
5/32	0.1562	3.97	2-1/16	1	51/64	56110	56142	●
#22	0.1570	3.99	2-1/8	1-1/16	55/64	56022	56231	●
4,0 mm	0.1575		55,0	22,0	17,0	66013	66014	●
#21	0.1590	4.04	2-1/8	1-1/16	55/64	56021	56230	●
#20	0.1610	4.09	2-1/8	1-1/16	55/64	56020	56229	●
#19	0.1660	4.22	2-1/8	1-1/16	55/64	56019	56228	●
#18	0.1695	4.31	2-1/8	1-1/16	55/64	56018	56227	●
11/64	0.1719	4.37	2-1/8	1-1/16	55/64	56111	56143	●
#17	0.1730	4.39	2-3/16	1-1/8	29/32	56017	56226	●
#16	0.1770	4.50	2-3/16	1-1/8	29/32	56016	56225	●
4,5 mm	0.1772		58,0	24,0	18,0	66015	66016	●
#15	0.1800	4.57	2-3/16	1-1/8	29/32	56015	56224	●
#14	0.1820	4.62	2-3/16	1-1/8	29/32	56014	56223	●
#13	0.1850	4.70	2-3/16	1-1/8	29/32	56013	56222	●
3/16	0.1875	4.76	2-3/16	1-1/8	29/32	56112	56144	●
#12	0.1890	4.80	2-3/16	1-1/8	29/32	56012	56221	●
#11	0.1910	4.85	2-3/16	1-1/8	29/32	56011	56220	●
#10	0.1935	4.91	2-3/16	1-1/8	29/32	56010	56219	●
#9	0.1960	4.98	2-1/4	1-3/16	61/64	56009	56218	●
5,0 mm	0.1969		62,0	26,0	20,0	66017	66018	●
#8	0.1990	5.05	2-1/4	1-3/16	61/64	56008	56217	●
#7	0.2010	5.11	2-1/4	1-3/16	61/64	56007	56216	●
13/64	0.2031	5.16	2-1/4	1-3/16	61/64	56113	56145	●
#6	0.2040	5.18	2-3/8	1-1/4	1	56006	56215	●
#5	0.2055	5.22	2-3/8	1-1/4	1	56005	56214	●
#4	0.2090	5.31	2-3/8	1-1/4	1	56004	56213	●
#3	0.2130	5.41	2-3/8	1-1/4	1	56003	56212	●
5,5 mm	0.2165		66,0	28,0	21,0	66019	66020	●
7/32	0.2188	5.56	2-3/8	1-1/4	1	56114	56146	●
#2	0.2210	5.61	2-7/16	1-5/16	1-3/64	56002	56211	●
#1	0.2280	5.79	2-7/16	1-5/16	1-3/64	56001	56210	●

continued on next page

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)	STOCK
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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	Fz	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

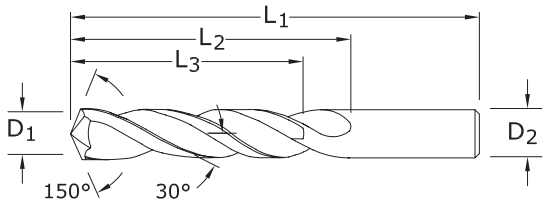
Bhn (Brinell) HRc (Rockwell C)
rpm = Vc x 3.82 / D_1
ipm = Fr x rpm
reduce speed and feed 30 percent when using uncoated drills
refer to the SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

	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)	Fz	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 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)	STOCK
#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	●

continued on next page

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

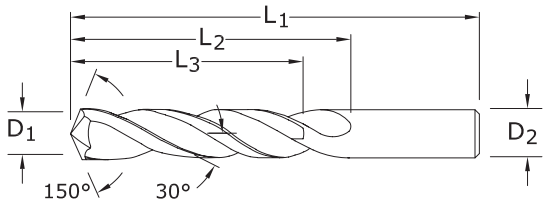
CONTINUED

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)	STOCK
#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		62,0	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	●
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	●

continued on next page

3 Flute Drills • Metric: DIN 6539

3xD (mm) | 5xD (inch) | 3



103
FRACTIONAL & METRIC SERIES

CUTTING DIAMETER D_1 / D_2	DECIMAL EQUIV.	METRIC EQUIV.	OVERALL LENGTH L_1	FLUTE LENGTH L_2	CLEARED LENGTH L_3	EDP NO. UNCOATED	EDP NO. Ti-NAMITE-A (AlTiN)	STOCK
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		89,0	40,0	29,0	63079	69022	●
11/32	0.3438	8.73	4	2-1/2	2	53122	58080	●
8,8 mm	0.3465		89,0	40,0	29,0	63022	69023	●
S	0.3480	8.84	4	2-1/2	2	53219	58081	●
8,9 mm	0.3504		84,0	40,0	29,0	63080	69024	●
9,0 mm	0.3543		84,0	40,0	29,0	63023	69025	●
T	0.3580	9.09	4-1/4	2-3/4	2-13/64	53220	58082	●

continued on next page

TOLERANCES (inch)

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	STOCK
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	●

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)	Fz	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)	Fz	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

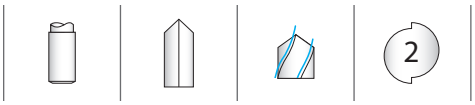
Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
rpm = Vc x 3.82 / D_1
ipm = Fr x rpm
reduce speed and feed 30 percent when using uncoated drills
reduce speed and feed for materials harder than listed
refer to the SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

3 Flute Drills

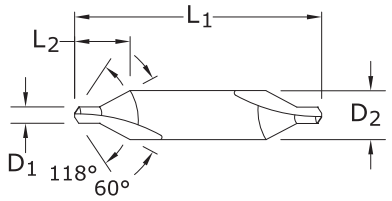
	Series 103M Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 3	6	10	12	16	20
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	90	RPM	9533	4766	2860	2383	1787	1430
			(72-108)	Fr	0.062	0.124	0.206	0.248	0.330	0.413
				Feed (mm/min)	590	590	590	590	590	590
		≤ 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)	Fz	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)	Fz	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

Combined Drill & Countersink



301
FRACTIONAL SERIES



inch				EDP NO.		
DRILL DIAMETER D_1	BODY DIAMETER D_2	OVERALL LENGTH L_1	FLUTE LENGTH L_2	UNCOATED	Ti-NAMITE-A (AlTiN)	STOCK
.025*	1/8	1-1/2	.125	57005	57015	●
1/32*	1/8	1-1/2	.130	57006	57016	●
3/64*	1/8	1-1/2	.135	57007	57017	●
5/64*	3/16	1-7/8	.200	57008	57018	●
7/64*	1/4	2	.280	57009	57019	●
1/8*	5/16	2-1/8	.340	57010	57020	●
3/16*	7/16	2-3/4	.475	57011	57021	●
7/32*	1/2	3	.540	57012	57022	●
–	–	–	–	57075	–	●

*Included in Series 301 Set (EDP No. 57075)

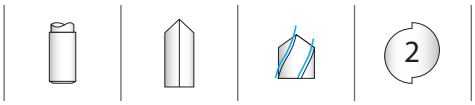
TOLERANCES (inch)

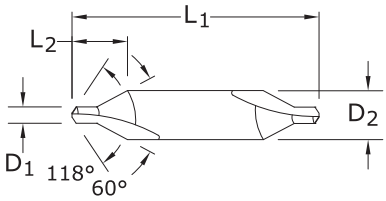
D_1 = +.003/–.000
D_2 = –.0001/–.0005

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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

Combined Drill & Countersink





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

● U.S. Stock Standard

■ NOT STOCKED—Call for Delivery

301M
METRIC SERIES

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

continued on next page

Combined Drill & Countersink

	Series 301 Fractional	Hardness	Vc (sfm)		Diameter (D_1) (inch) 1/32	5/64	1/8	3/16	7/32
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 220 Bhn or ≤ 19 HRc	40	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
	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
	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
	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 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)	Fz	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)	Fz	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

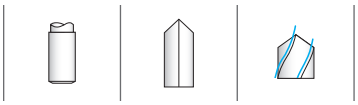
continued on next page

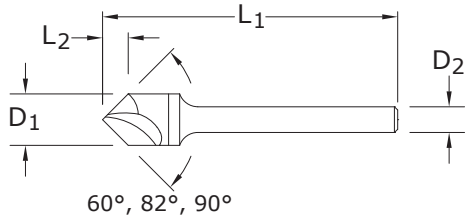
Combined Drill & Countersink

	Series 301M Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1	1.6	2.5	4	5
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 220 Bhn or ≤ 19 HRc	12	RPM	1231	969	616	388	310
			(10-15)	Fr	0.009	0.011	0.018	0.028	0.035
				Feed (mm/min)	11	11	11	11	11
		≤ 320 Bhn or ≤ 34 HRc	8	RPM	769	606	385	242	194
			(6-9)	Fr	0.008	0.010	0.016	0.025	0.031
				Feed (mm/min)	6	6	6	6	6
		≤ 425 Bhn or ≤ 45 HRc	6	RPM	616	485	308	194	155
			(5-7)	Fr	0.003	0.004	0.006	0.010	0.013
				Feed (mm/min)	2	2	2	2	2
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	26	RPM	2616	2060	1308	824	659
			(21-31)	Fr	0.016	0.020	0.032	0.051	0.064
				Feed (mm/min)	42	42	42	42	42
		≤ 350 Bhn or ≤ 38 HRc	20	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
		≤ 440 Bhn or ≤ 47 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
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	165	RPM	16619	13087	8309	5235	4188
			(132-198)	Fr	0.025	0.032	0.050	0.079	0.099
				Feed (mm/min)	415	415	415	415	415
		≤ 150 Bhn or ≤ 7 HRc	139	RPM	14003	11027	7001	4411	3529
			(111-166)	Fr	0.025	0.032	0.050	0.079	0.099
				Feed (mm/min)	350	350	350	350	350
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	58	RPM	5847	4605	2924	1842	1474
			(46-69)	Fr	0.012	0.015	0.024	0.038	0.048
				Feed (mm/min)	70	70	70	70	70
		≤ 200 Bhn or ≤ 23 HRc	53	RPM	5386	4241	2693	1696	1357
			(43-64)	Fr	0.012	0.015	0.024	0.038	0.048
				Feed (mm/min)	65	65	65	65	65
	PLASTICS Polycarbonate, PVC		152	RPM	15388	12118	7694	4847	3878
			(122-183)	Fr	0.025	0.032	0.050	0.079	0.099
				Feed (mm/min)	385	385	385	385	385

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
rpm = (Vc 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 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°	STOCK
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

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
- PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	Fz	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)	Fz	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

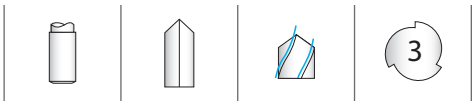
continued on next page

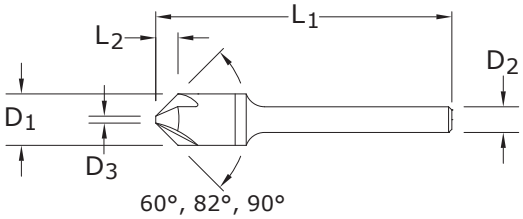
Single Flute Countersink

	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

3 Flute Countersink





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
- PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

603
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°	STOCK
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	●
5/8*	3/8	3	.153	–	74143	–	●
5/8*	3/8	3	.153	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
NOTE: D3 dimension varies based on angle. Contact KSPT representative or consult 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)	Fz	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)	Fz	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

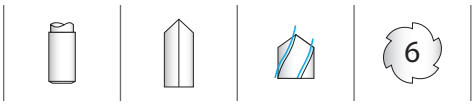
continued on next page

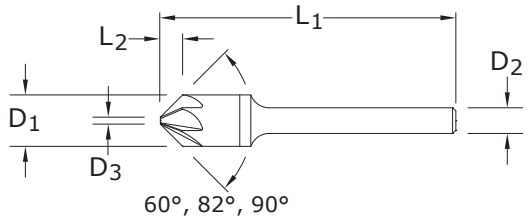
3 Flute Countersink

	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 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°	STOCK
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
NOTE: D3 dimension varies based on angle. Contact KSPT representative or consult 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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	Fz	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)	Fz	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

continued on next page

6 Flute Countersink

	Series 606 Fractional	Hardness	Vc (sfm)		Diameter (D_1) (inch) 1/8	3/16	1/4	3/8	1/2	3/4	1
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 250 Bhn or ≤ 24 HRc	53	RPM	1620	1080	810	540	405	270	202
			(42-64)	Fr	0.0006	0.0009	0.0012	0.0019	0.0025	0.0037	0.0049
				Feed (ipm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		≤ 330 Bhn or ≤ 36 HRc	46	RPM	1406	937	703	469	351	234	176
			(37-55)	Fr	0.0005	0.0007	0.0010	0.0015	0.0020	0.0030	0.0040
				Feed (ipm)	0.7	0.7	0.7	0.7	0.7	0.7	0.7
	STAINLESS STEELS (DIFFICULT) 304, 316, 321, 13-8 PH, 15-5PH, 17-4 PH, Custom 450	≤ 275 Bhn or ≤ 28 HRc	28	RPM	856	570	428	285	214	143	107
			(22-34)	Fr	0.0007	0.0011	0.0014	0.0021	0.0028	0.0042	0.0056
				Feed (IPM)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
		≤ 375 Bhn or ≤ 40 HRc	21	RPM	642	428	321	214	160	107	80
			(17-25)	Fr	0.0003	0.0005	0.0006	0.0009	0.0012	0.0019	0.0025
				Feed (IPM)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
S	SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy	≤ 220 Bhn or ≤ 19 HRc	18	RPM	550	367	275	183	138	92	69
			(14-22)	Fr	0.0005	0.0008	0.0011	0.0016	0.0022	0.0033	0.0044
				Feed (ipm)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
		≤ 320 Bhn or ≤ 34 HRc	14	RPM	428	285	214	143	107	71	53
			(11-17)	Fr	0.0005	0.0007	0.0009	0.0014	0.0019	0.0028	0.0037
				Feed (ipm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
		≤ 425 Bhn or ≤ 45 HRc	12	RPM	367	244	183	122	92	61	46
			(10-14)	Fr	0.0003	0.0004	0.0005	0.0008	0.0011	0.0016	0.0022
				Feed (ipm)	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	TITANIUM ALLOYS Pure Titanium, Ti6Al4V, Ti6Al2Sn4Zr2Mo, Ti4Al4Mo2Sn0.5Si, Ti-6Al4V	≤ 275 Bhn or ≤ 28 HRc	36	RPM	1100	733	550	367	275	183	138
			(29-43)	Fr	0.0009	0.0014	0.0018	0.0027	0.0036	0.0055	0.0073
				Feed (ipm)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		≤ 350 Bhn or ≤ 38 HRc	28	RPM	856	570	428	285	214	143	107
			(22-34)	Fr	0.0007	0.0011	0.0014	0.0021	0.0028	0.0042	0.0056
				Feed (ipm)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
		≤ 440 Bhn or ≤ 47 HRc	21	RPM	642	428	321	214	160	107	80
			(17-25)	Fr	0.0003	0.0005	0.0006	0.0009	0.0012	0.0019	0.0025
				Feed (ipm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2

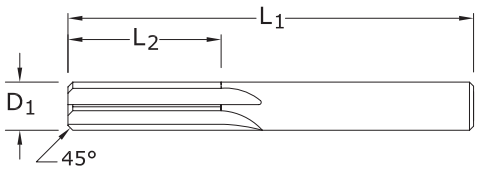
continued on next page

6 Flute Countersink

	Series 606 Fractional	Hardness	Vc (sfm)		Diameter (D_1) (inch) 1/8	3/16	1/4	3/8	1/2	3/4	1
N	**ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075**	≤ 80 Bhn or ≤ 47 HRb	225	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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

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	STOCK
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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

Straight Flute Reamer

	Series 201M Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1	2	3	4	6	8	10
P	CARBON STEELS 1018, 1040, 1080, 1090, 10L50, 1140, 1212, 12L15, 1525, 1536	≤ 175 Bhn or ≤ 7 HRc	46	RPM	14541	7271	4847	3635	2424	1818	1454
			(37-55)	Fr	0.028	0.056	0.085	0.113	0.169	0.226	0.282
				Feed (mm/min)	410	410	410	410	410	410	410
		≤ 300 Bhn or ≤ 32 HRc	23	RPM	7271	3635	2424	1818	1212	909	727
			(18-27)	Fr	0.025	0.050	0.074	0.099	0.149	0.198	0.248
				Feed (mm/min)	180	180	180	180	180	180	180
		≤ 425 Bhn or ≤ 45 HRc	17	RPM	5332	2666	1777	1333	889	666	533
			(13-20)	Fz	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)	Fz	0.024	0.048	0.072	0.096	0.144	0.192	0.240
				Feed (mm/min)	268	268	268	268	268	268	268
		≤ 375 Bhn or ≤ 40 HRc	21	RPM	6786	3393	2262	1696	1131	848	679
			(17-26)	Fr	0.024	0.048	0.072	0.096	0.144	0.192	0.240
				Feed (mm/min)	163	163	163	163	163	163	163
		≤ 450 Bhn or ≤ 48 HRc	14	RPM	4362	2181	1454	1091	727	545	436
			(11-16)	Fr	0.015	0.030	0.045	0.060	0.089	0.119	0.149
				Feed (mm/min)	65	65	65	65	65	65	65
H	TOOL STEELS A2, D2, H13, L2, M2, P20, S7, T15, W2	≤ 250 Bhn or ≤ 24 HRc	12	RPM	3878	1939	1293	969	646	485	388
			(10-15)	Fr	0.015	0.031	0.046	0.062	0.093	0.124	0.155
				Feed (mm/min)	60	60	60	60	60	60	60
		≤ 375 Bhn or ≤ 40 HRc	8	RPM	2424	1212	808	606	404	303	242
			(6-9)	Fr	0.010	0.020	0.030	0.040	0.059	0.079	0.099
				Feed (mm/min)	24	24	24	24	24	24	24
		≤ 475 Bhn or ≤ 50 HRc	6	RPM	1939	969	646	485	323	242	194
			(5-7)	Fr	0.006	0.012	0.019	0.025	0.037	0.050	0.062
				Feed (mm/min)	12	12	12	12	12	12	12
		≤ 655 Bhn or ≤ 60 HRc	4	RPM	1272	636	424	318	212	159	127
			(3-5)	Fr	0.006	0.013	0.019	0.025	0.038	0.050	0.063
				Feed (mm/min)	8	8	8	8	8	8	8
K	CAST IRONS Gray, Malleable, Ductile	≤ 220 Bhn or ≤ 19 HRc	38	RPM	12118	6059	4039	3029	2020	1515	1212
			(30-46)	Fr	0.032	0.064	0.097	0.129	0.193	0.257	0.322
				Feed (mm/min)	390	390	390	390	390	390	390
		≤ 330 Bhn or ≤ 36 HRc	29	RPM	9209	4605	3070	2302	1535	1151	921
			(23-35)	Fr	0.032	0.064	0.096	0.128	0.192	0.256	0.320
				Feed (mm/min)	295	295	295	295	295	295	295

continued on next page

Straight Flute Reamer

Series 201M Metric		Hardness	Vc (m/min)		Diameter (D_1) (mm) 1	2	3	4	6	8	10
M	STAINLESS STEELS (FREE MACHINING) 303, 416, 420F, 430F 440F	≤ 250 Bhn or ≤ 24 HRc	23	RPM	7271	3635	2424	1818	1212	909	727
			(18-27)	Fr	0.015	0.030	0.045	0.059	0.089	0.119	0.149
				Feed (mm/min)	108	108	108	108	108	108	108
		≤ 330 Bhn or ≤ 36 HRc	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

continued on next page

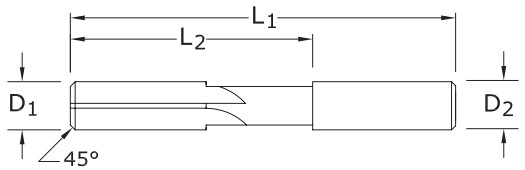
Straight Flute Reamer

	Series 201M Metric	Hardness	Vc (m/min)		Diameter (D_1) (mm) 1	2	3	4	6	8	10
N	ALUMINUM ALLOYS 2017, 2024, 356, 6061, 7075	≤ 80 Bhn or ≤ 47 HRb	82	RPM	26174	13087	8725	6544	4362	3272	2617
			(66-99)	Fr	0.040	0.080	0.120	0.160	0.240	0.320	0.400
				Feed (mm/min)	1047	1047	1047	1047	1047	1047	1047
		≤ 150 Bhn or ≤ 7 HRc	70	RPM	22297	11148	7432	5574	3716	2787	2230
			(56-84)	Fr	0.040	0.080	0.120	0.160	0.240	0.320	0.400
				Feed (mm/min)	892	892	892	892	892	892	892
	COPPER ALLOYS Alum Bronze, C110, Muntz Brass	≤ 140 Bhn or ≤ 3 HRc	35	RPM	11148	5574	3716	2787	1858	1394	1115
			(28-42)	Fr	0.020	0.041	0.061	0.081	0.122	0.163	0.204
				Feed (mm/min)	227	227	227	227	227	227	227
		≤ 200 Bhn or ≤ 23 HRc	29	RPM	9209	4605	3070	2302	1535	1151	921
			(23-35)	Fr	0.020	0.041	0.061	0.082	0.122	0.163	0.204
				Feed (mm/min)	188	188	188	188	188	188	188

Bhn (Brinell) HRc (Rockwell C) HRb (Rockwell B)
rpm = (Vc 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 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	STOCK
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

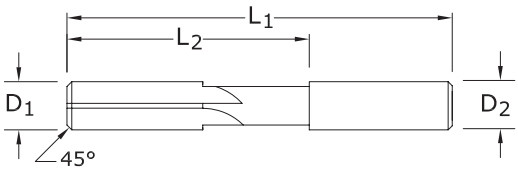
- STEELS
- STAINLESS STEELS
- CAST IRON
- HIGH TEMP ALLOYS
- TITANIUM
- NON-FERROUS
- PLASTICS/COMPOSITES
- HARDENED STEELS

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

Straight Flute Accu-Reamer

TOLERANCES (inch)

D_1 = +.0002/–.0000
D_2 = +.0002/–.0000



200
FRACTIONAL SERIES

inch				
CUTTING DIAMETER D_1	SHANK DIAMETER D_2	MAXIMUM REAM LENGTH L_2	OVERALL LENGTH L_1	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

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)	Fz	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)	Fz	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

continued on next page

Straight Flute Accu-Reamer

	Series 200 Fractional	Hardness	Vc (sfm)		Diameter (D_1) (inch) 1/16	1/8	3/16	1/4	5/16	3/8	1/2
S	**SUPER ALLOYS (NICKEL, COBALT, IRON BASE) Inconel 601, 617, 625, Incoloy 800, Monel 400, Rene, Waspaloy**	≤ 220 Bhn or ≤ 19 HRc	20	RPM	1222	611	407	306	244	204	153
			(16-24)	Fr	0.0008	0.0015	0.0023	0.0030	0.0038	0.0045	0.0060
				Feed (ipm)	1.0	0.9	0.9	0.9	0.9	0.9	0.9
		≤ 320 Bhn or ≤ 34 HRc	15	RPM	917	458	306	229	183	153	115
			(12-18)	Fr	0.0006	0.0013	0.0019	0.0025	0.0031	0.0038	0.0050
				Feed (ipm)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
		≤ 425 Bhn or ≤ 45 HRc	10	RPM	611	306	204	153	122	102	76
			(8-12)	Fr	0.0004	0.0007	0.0011	0.0015	0.0018	0.0022	0.0029
				Feed (ipm)	0.2	0.2	0.2	0.2	0.2	0.2	0.2
	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 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	29M	Multi-Flute Plastic Composite Metric	213
Carbon Composite	20M-CCR	Multi-Flute Carbon Composite Metric	215
Coarse Cut Carbon Composite	31M-CCR	Multi-Flute Coarse Composite Metric	218
Compression	25M	Multi-Flute Compression Metric	220

GENERAL PURPOSE ROUTERS	SERIES	DESCRIPTION	PAGE
Up Cut	21M	2 Flute Up Cut Metric	222
Down Cut	22M	2 Flute Down Cut Metric	222

Speed & Feed Recommendations listed after each series

Ranurado

RANURADORES DE ALTO RENDIMIENTO	SERIE	DESCRIPCIÓN	PÁGINA
Compuesto de plástico	29M	Filo múltiple, compuesto plástico, métrico	213
Compuesto de carbono	20M-CCR	Filo múltiple, compuesto de carbono, métrico	215
Compuesto de carbono de corte áspero	31M-CCR	Filo múltiple, compuesto áspero, métrico	218
Compresión	25M	Filo múltiple, compresión, métrico	220

RANURADORES DE USO GENERAL	SERIE	DESCRIPCIÓN	PÁGINA
Corte ascendente	21M	2 filos, corte ascendente, métrico	222
Corte descendente	22M	2 filos, corte descendente, métrico	222

Recomendaciones de velocidades y avances mostradas tras cada serie

Détourage

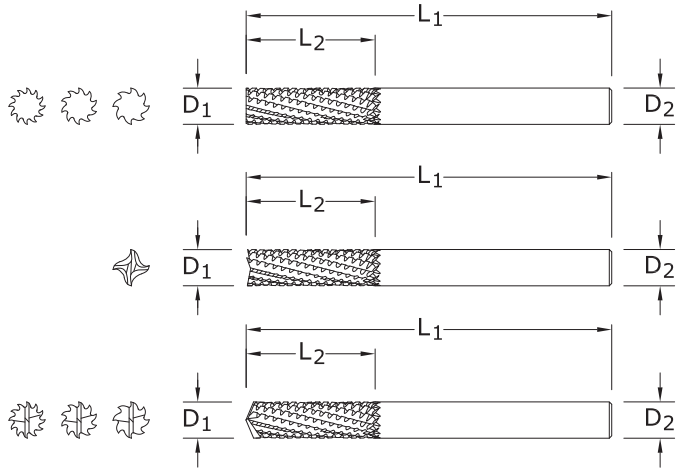
FRAISES A DETOURER HAUTE PERFORMANCE	SERIES	DESCRIPTION	PAGE
Composites plastique	29M	Multi-dents pour composites plastique (métrique)	213
Composites carbone	20M-CCR	Multi-dents pour composites carbone (métrique)	215
Pour composites carbone coupe grossière	31M-CCR	Multi-dents pour composites grossiers (métrique)	218
Compression	25M	Multi-dents de compression (métrique)	220

FRAISES À DÉTOURER UNIVERSELLES	SERIES	DESCRIPTION	PAGE
Coupe ascendante	21M	2 dents coupe ascendante (métrique)	222
Coupe descendante	22M	2 dents coupe descendante (métrique)	222

Recommandations de vitesse et avance indiquées après chaque série

PCR
Plastic Composite Router

Plastic Composite



TOLERANCES (mm)

D_1 = +0,00/–0,13

D_2 = h_6

PLASTICS/COMPOSITES

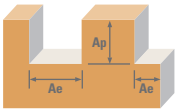
- ● U.S. Stock Standard
- ■ NOT STOCKED—Call for Delivery

29M
METRIC SERIES

mm						EDP NO.		
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	NO. OF FLUTES	END STYLE	UNCOATED	Di-NAMITE (Diamond)	STOCK
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	●

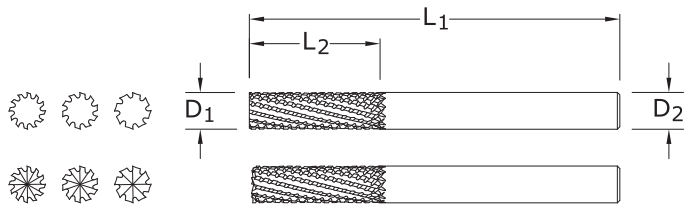
- Radial chisel edge design provides smoother cuts and enhanced tool life
- Eccentric relief and neutral rake for strength
- Excels at trimming and profiling non-filled plastics as well as glass-filled plastics

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	≤ 0.5	≤ 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 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

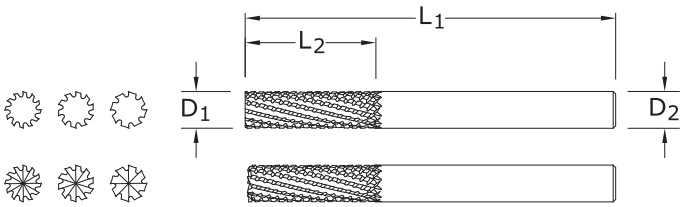
● U.S. Stock Standard

■ NOT STOCKED—Call for Delivery

mm						EDP NO.					
CUTTING DIA. D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIA. D_2	NO. OF FLUTES	END STYLE	UNCOATED	STOCK	Ti-NAMITE-B (TiB_2)	STOCK	DiNAMITE (Diamond)	STOCK
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 DIA. D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIA. D_2	NO. OF FLUTES	END STYLE	UNCOATED	DiNAMITE (Diamond)	STOCK
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

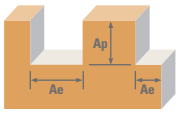
D_2 = h_6

PLASTICS/COMPOSITES

● U.S. Stock Standard

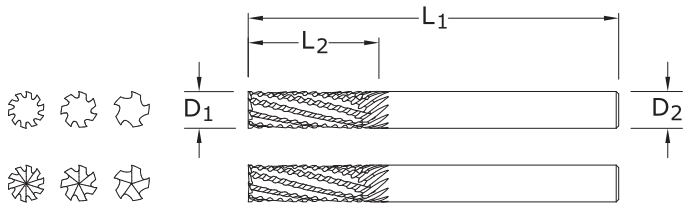
■ NOT STOCKED—Call for Delivery

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
refer to the 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 DIA. D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIA. D_2	NO. OF FLUTES	END STYLE	UNCOATED	STOCK	Ti-NAMITE-B (TiB_2)	STOCK	DiNAMITE (Diamond)	STOCK
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	●

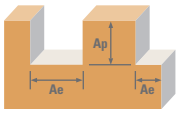
TOLERANCES (mm)

D_1 = +0,00/–0,13
D_2 = h_6

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

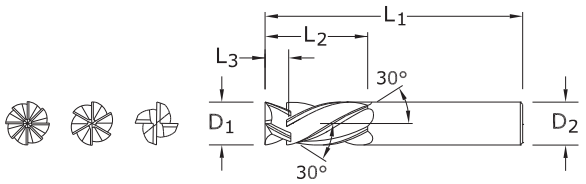
Coarse Cut Carbon Composite

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 SGS Tool Wizard for complete technical information (www.kyocera-sgstool.com)

Compression

25M
METRIC SERIES



- Compression-style helixes direct cutting forces inward, eliminating fiber breakout and delamination
- Primary/secondary relief grind for reduced friction and pressure
- Rigid, heavy core

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)	STOCK
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

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

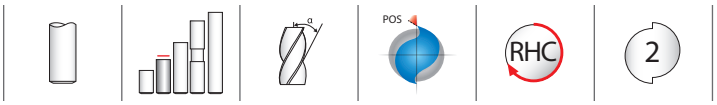
Compression

Series 25M 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)	Profile	≤ 0.5	≤ 1.5	150	RPM	7951	5963	4771	3976
					(96-164)	Fz	0.040	0.065	0.075	0.100
						Feed (mm/min)	1272	1550	2147	3181
		HSM	≤ 0.05	≤ 2	250	RPM	13252	9939	7951	6626
					(200-300)	Fz	0.095	0.145	0.175	0.235
						Feed (mm/min)	5036	5765	8349	12457
	GFRP (FIBERGLASS)	Profile	≤ 0.5	≤ 1.5	120	RPM	6361	4771	3817	3181
					(96-164)	Fz	0.040	0.065	0.075	0.100
						Feed (mm/min)	1018	1240	1717	2544
		HSM	≤ 0.05	≤ 2	200	RPM	10602	7951	6361	5301
					(160-240)	Fz	0.095	0.145	0.175	0.235
						Feed (mm/min)	4029	4612	6679	9966
	CARBON, GRAPHITE	Profile	≤ 0.5	≤ 1.5	185	RPM	9807	7355	5884	4903
					(148-222)	Fz	0.050	0.080	0.095	0.125
						Feed (mm/min)	1961	2354	3354	4903
		HSM	≤ 0.05	≤ 2	300	RPM	15903	11927	9542	7951
					(240-360)	Fz	0.115	0.185	0.220	0.290
						Feed (mm/min)	7315	8826	12595	18447
	PLASTICS	Profile	≤ 0.5	≤ 1.5	305	RPM	16168	12126	9701	8084
					(244-366)	Fz	0.050	0.080	0.095	0.125
						Feed (mm/min)	3234	3880	5529	8084
		HSM	≤ 0.05	≤ 2	505	RPM	26769	20077	16062	13385
					(404-606)	Fz	0.115	0.185	0.220	0.290
						Feed (mm/min)	12314	14857	21201	31052
	MACHINABLE CERAMICS MACHINABLE GLASS	Profile	≤ 0.5	≤ 1.5	15	RPM	795	596	477	398
					(12-18)	Fz	0.020	0.035	0.045	0.050
						Feed (mm/min)	64	83	129	159
		HSM	≤ 0.05	≤ 2	25	RPM	1325	994	795	663
					(20-30)	Fz	0.045	0.075	0.085	0.115
						Feed (mm/min)	239	298	406	610

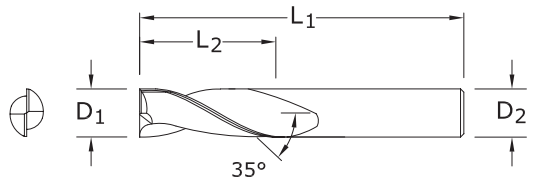
HSM (high speed machining)
rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fz x number of flutes x rpm
adjust parameters based on resin type and fiber structure
reduce speed when overheating causes melting or damage to resin
reduce feed if delamination or fraying occur

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

Up Cut



21M
METRIC SERIES



mm				EDP NO.	
CUTTING DIAMETER D_1	LENGTH OF CUT L_2	OVERALL LENGTH L_1	SHANK DIAMETER D_2	UNCOATED	STOCK
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	●

TOLERANCES (mm)

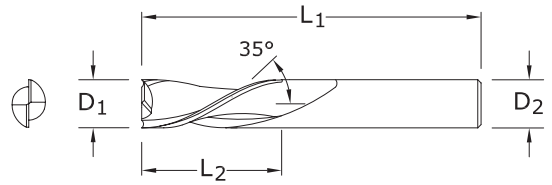
D_1 = +0,00/–0,08
D_2 = h_6

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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	STOCK
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	●

Cannot be supplied with Corner Radius Modifications

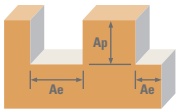
TOLERANCES (mm)

D_1 = +0,00/–0,08
D_2 = h_6

PLASTICS/COMPOSITES

● U.S. Stock Standard
■ NOT STOCKED—Call for Delivery

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)	Fz	0.020	0.040	0.065	0.075	0.115
						Feed (mm/min)	1993	1993	1943	1869	1719
		Profile	≤ 0.5	≤ 1.5	470	RPM	49828	24914	8155	4241	1509
					(376-564)	Fz	0.020	0.040	0.065	0.075	0.115
						Feed (mm/min)	1993	1993	1060	636	347
	SOFTWOODS	Slot	1	≤ 1	600	RPM	63610	31805	19083	15903	9542
					(480-720)	Fz	0.025	0.050	0.075	0.090	0.140
						Feed (mm/min)	3181	3181	2862	2862	2672
		Profile	≤ 0.5	≤ 1.5	600	RPM	63610	31805	19083	15903	303467
					(480-720)	Fz	0.025	0.050	0.075	0.090	0.140
						Feed (mm/min)	3181	3181	2862	2862	84971
	PLYWOODS	Slot	1	≤ 1	600	RPM	63610	31805	19083	15903	9542
					(480-720)	Fz	0.030	0.065	0.100	0.125	0.190
						Feed (mm/min)	3817	4135	3817	3976	3626
		Profile	≤ 0.5	≤ 1.5	600	RPM	63610	31805	19083	15903	303467
					(480-720)	Fz	0.030	0.065	0.100	0.125	0.190
						Feed (mm/min)	3817	4135	3817	3976	115318
N	PLASTICS	Slot	1	≤ 1	600	RPM	63610	31805	19083	15903	9542
					(480-720)	Fz	0.020	0.040	0.065	0.090	0.125
						Feed (mm/min)	2544	2544	2481	2862	2385
		Profile	≤ 0.5	≤ 1.5	600	RPM	63610	31805	19083	15903	9542
					(480-720)	Fz	0.020	0.040	0.065	0.090	0.125
						Feed (mm/min)	2544	2544	2481	2862	2385

rpm = (Vc x 1000) / (D_1 x 3.14)
mm/min = Fz x 2 x rpm

EDP Number Index

EDP NO.	PAGE
40000	104
40001	104
40003	104
40004	104
40005	104
40007	104
40009	104
40010	104
40011	104
40012	104
40015	104
40016	104
40017	104
40019	104
40020	104
40021	104
40023	104
40024	104
40025	104
40028	104
40030	104
40031	104
40032	104
40035	104
40037	104
40038	104
40039	104
40105	103
40106	106
40109	103
40110	106
40113	103
40114	106
40117	103
40118	106
40121	103
40122	106
40125	103
40126	106
40129	103
40130	106
40133	103
40134	106
40137	103
40138	106
40141	103
40142	106
40145	103
40146	106
40149	103
40150	106
40153	103
40154	106
40157	103
40158	106
40161	103
40162	106
40165	102
40166	106
40169	103
40170	106
40173	103
40174	106
40177	103
40178	106
40181	103
40182	106
40185	103
40186	106
40305	94
40306	97
40309	94
40310	97
40313	94
40314	97
40317	94
40318	97
40321	94
40322	97
40325	94
40326	97
40329	94
40330	97
40333	94
40334	97
40337	94
40338	97
40341	94
40342	97
40345	94
40346	97
40349	94
40350	97
40353	94
40354	97
40357	94
40358	97
40361	94
40362	97
40365	94
40366	97
40369	94
40370	97
40373	94
40374	97
40377	94
40378	97
40381	94
40382	97
40385	94
40386	97
40505	100
40506	101
40509	100
40510	101
40513	100
40514	101
40517	100
40518	101
40521	100
40522	101
40525	100
40526	101
40529	100
40530	101
40533	100
40534	101
40537	100
40538	101
40541	100
40542	101
40545	100
40546	101
40549	100
40550	101
40553	100
40554	101
40557	100
40558	101
40561	100
40562	101
40565	100
40566	101
40569	100
40570	101
40573	100
40574	101
40577	100
40578	101
40581	100
40582	101
40585	100
40586	101
41405	105
41406	107
41409	105
41410	107
41413	105
41414	107
41417	105
41418	107
41421	105
41422	107
41425	105
41426	107
41429	105
41430	107
41433	105
41434	107
41437	105
41438	107
41441	105
41442	107
41445	105
41446	107
41449	105
41450	107
41453	105
41454	107
41457	105
41458	107
41461	105
41462	107
41465	105
41466	107
41505	96
41506	99
41509	96
41510	99
41513	96
41514	99
41517	96
41518	99
41521	96
41522	99
41525	96
41526	99
41529	96
41530	99
41533	96
41534	99
41537	96
41538	99
41541	96
41542	99
41545	96
41546	99
41549	96
41550	99
41553	96
41554	99
41557	96
41558	99
41561	96
41562	99
41565	96
41566	99
41605	102
41609	102
41613	102
41617	102
41621	102
41625	102
41629	102
41633	102
41637	102
41641	102
41645	102
41649	102
41653	102
41657	102
41661	102
41665	103
41705	93
41709	93
41713	93
41717	93
41721	93
41725	93
41729	93
41733	93
41737	93
41741	93
41745	93
41749	93
41753	93
41757	93
41761	93
41765	93
42606	40
42607	40
42608	40
42609	40
42610	40
42611	40
42612	40
42613	40
42614	40
42615	40
42616	40
42617	40
42618	40
42619	40
42620	40
42621	40
42622	40
42623	40
42624	40
42625	40
42626	40
42627	40
42628	42
42630	41
42631	41
42632	42
42633	42
42648	42
42649	42
42650	42
42651	42
42652	42
42653	42
42654	42
42655	42
42656	42
42657	42
42658	42
42659	42
42660	41
42661	41
42662	41
42663	41
42664	41
42665	41
42666	41
42667	41
42668	41
42669	41
42670	41
42671	41
42672	41
42673	41
42674	41
42675	41
42676	41
42677	41
42678	41
42679	41
42680	41
42681	41
42682	41
42683	41
42684	41
42685	41
42686	41
42687	41
42688	41
42689	41
42690	42
42691	42
42692	42
42693	42
42694	42
42695	42
42696	42
42697	42
42698	42
42699	42
42700	42
42701	42
42702	42
42703	42
42704	42
42705	42
42706	76
42707	76
42708	76
42709	76
42710	76
42711	76
42712	36
42713	36
42714	36
42715	36
42716	36
42717	36
42718	27
42719	27
42721	27
42722	27
42723	27
42731	28
42732	28
42733	28
42734	28
42735	28
42736	28
42737	28
42738	28
42739	28
42750	43
42751	43
42752	43
42753	43
42754	43
42755	43
43101	103
43102	106
43103	103
43104	106
43105	103
43106	106
43107	103
43108	106
43115	103
43116	106
43125	103
43126	106
43135	103
43136	106
43145	103
43146	106
43155	103
43156	106
43165	103
43166	106
43175	103
43176	106
43185	103
43186	106
43195	103
43196	106
43301	94
43302	97
43303	94
43304	97
43305	94
43306	97
43307	94
43308	97
43315	94
43316	97
43325	94
43326	97
43335	94
43336	97
43345	94
43346	97
43355	94
43356	97
43365	94
43366	97
43375	94

EDP Number Index

EDP NO.	PAGE
43376	97
43385	94
43386	97
43395	94
43396	97
43445	54
43446	54
43447	54
43448	54
43449	54
43450	54
43451	54
43452	54
43453	54
43470	54
43471	54
43472	54
43473	54
43474	54
43475	54
43476	54
43477	54
43478	54
43479	54
43480	54
43481	54
43482	54
43483	54
43484	54
43485	54
43486	54
43487	54
43488	54
43489	54
43490	54
43491	54
43492	54
43493	54
43494	54
43495	54
43496	54
43497	54
43501	100
43502	101
43503	100
43504	101
43505	100
43506	101
43507	100
43508	101
43515	100
43516	101
43525	100
43526	101
43535	100
43536	101
43545	100
43546	101
43555	100
43556	101
43565	100
43566	101
43575	100
43576	101
43585	100
43586	101
43595	100
43596	101
43900	98
43901	98
43902	98
43903	98
43904	98
43905	98
43906	98
43907	98
43908	98
43909	98
43910	95
43911	95
43912	95
43913	95
43914	95
43915	95
43916	95
43917	95
43918	95
43919	95
43920	95
43921	95
43922	95
43923	95
43924	95
43925	95
43926	95
43927	95
43928	95
43929	95
43930	95
43931	95
43932	95
43933	95
43934	95
43935	95
43936	95
43937	95
43938	95
43939	95
43950	95
43951	95
43952	95
43953	95
43954	95
43955	95
43956	95
43957	95
43958	95
43959	95
44299	81
44300	81
44301	81
44302	81
44303	81
44304	81
44305	81
44306	81
44307	81
44308	81
44309	81
44505	88
44506	88
44509	88
44510	88
44513	88
44514	88
44517	88
44518	88
44521	88
44522	88
44525	88
44526	88
44529	88
44530	88
44533	88
44534	88
44537	88
44538	88
44541	88
44542	88
44545	88
44546	88
44550	84
44551	84
44552	84
44553	84
44554	84
44555	84
44556	84
44557	84
44558	84
44559	84
44560	84
44561	85
44562	85
44563	85
44564	85
44565	85
44566	85
44570	86
44571	86
44572	86
44573	86
44574	86
44575	86
44576	86
44577	86
44578	86
44579	86
44580	86
44581	86
44582	86
44583	86
44584	86
44585	86
44586	86
44587	84
44588	84
44589	84
44590	84
44591	84
44592	84
44593	84
44594	84
44595	84
44596	84
44597	84
44598	86
44599	86
44600	86
44601	86
44602	86
44603	86
44604	86
44605	86
44606	86
44607	86
44608	86
44609	85
44610	85
44611	85
44612	85
44613	85
44614	85
44615	86
44616	86
44617	86
44618	86
44619	86
44620	86
44627	71
44628	71
44629	71
44630	71
44631	71
44634	71
44635	71
44636	71
44637	71
44638	71
44639	71
44641	71
44642	71
44643	71
44645	69
44646	69
44647	69
44648	69
44649	69
44650	69
44652	69
44653	69
44654	69
44685	69
44686	69
44687	69
44688	69
44689	69
44690	69
44691	69
44692	69
44693	69
44694	69
44695	69
44696	69
44701	73
44702	73
44703	73
44705	73
44708	73
44711	73
44714	73
44715	73
44716	73
44717	73
44719	73
44722	73
44725	73
44728	73
44731	73
44732	73
44733	73
44734	73
44735	73
44736	73
44737	73
44739	77
44738	77
44740	77
44741	77
44745	71
44746	71
44747	71
44748	71
44749	71
44750	71
44751	71
44752	71
44753	71
44754	71
44755	71
44756	71
44757	71
44758	71
44759	71
44760	71
44761	71
44762	71
44763	71
44764	71
44765	71
44766	71
44767	71
44768	71
44769	77
44770	77
44771	77
44772	77
44773	77
44774	77
44775	77
44776	77
44777	77
44778	77
44779	77
44780	77
44781	77
44782	77
44783	77
44784	77
44785	77
44786	77
44787	77
44788	77
44789	77
44790	77
44791	77
44792	77
44793	77
44794	77
44795	77
44796	77
44797	77
44798	77
44799	77
44800	77
44801	77
44802	77
44803	77
44804	77
44805	77
44806	77
44807	77
44808	77
44809	69
44810	69
44811	69
44814	73
44815	73
44816	73
44817	73
44818	73
44819	73
44820	73
44821	73
44822	73
44823	73
44824	73
44826	73
44827	73
44828	73
44829	73
44830	73
44831	73
44832	77
44833	77
44834	77
44835	77
44836	77
44837	77
44838	77
44839	77
44840	77
44841	77
44842	74
44843	74
44844	75
44845	75
44846	74
44847	74
44848	74
44849	74
44850	75
44851	75
44852	75
44853	75
44854	74
44855	74
44856	74
44857	74
44868	74
44869	74
44870	74
44871	74
44872	75
44873	75
44874	75
44875	75
44876	75
44877	75
44878	75
44879	74
44880	75
44881	75
44882	75
44883	75
44884	75
44885	75
44886	75
44890	79
44891	79
44892	79
44893	79
44894	74

EDP Number Index

EDP NO.	PAGE
44895	79
44896	79
44897	79
44898	79
44899	79
44900	79
44901	79
44902	74
44916	80
44917	80
44918	80
44919	80
44920	80
44921	80
44922	80
44923	80
44924	80
44925	80
44926	80
44927	80
44928	80
44929	80
44930	80
44931	80
44932	80
44933	80
44934	80
44935	80
44936	80
44937	80
44938	80
44939	80
44940	80
44941	80
44942	80
44943	80
44944	80
44945	80
44950	78
44951	78
44952	78
44953	78
44954	78
44955	78
44956	78
44957	78
44958	78
44959	78
44960	78
44961	78
44962	78
44963	78
44964	78
44965	78
44966	78
44967	78
44968	78
44969	78
44970	78
44971	78
44972	78
44973	78
44974	78
45100	46
45101	46
45102	46
45103	46
45104	46
45105	46
45106	47
45107	47
45108	47
45109	47
45110	47
45111	47
45112	46
45113	46
45114	46
45115	46
45116	46
45117	46
45118	46
45119	46
45120	46
45121	46
45122	46
45123	46
45124	46
45125	46
45126	46
45127	47
45128	47
45129	47
45130	47
45131	47
45132	47
45133	47
45134	47
45135	47
45136	47
45137	47
45138	47
45139	47
45140	47
45141	47
45150	46
45277	114
45279	114
45281	114
45283	114
45285	114
45287	114
45289	114
45291	114
45293	114
45295	114
45297	114
45299	114
45477	115
45478	115
45479	115
45480	115
45481	115
45482	115
45483	115
45484	115
45485	115
45486	115
45487	115
45488	115
45489	115
45490	115
45491	115
45492	115
45493	115
45494	115
45495	115
45496	115
45497	115
45498	115
45499	115
45500	115
46106	112
46107	112
46108	112
46109	112
46110	112
46111	112
46112	112
46113	112
46114	112
46116	112
46117	112
46118	112
46120	112
46121	112
46122	112
46128	112
46129	112
46130	112
46131	112
46132	112
46133	112
46140	62
46141	62
46142	62
46143	62
46145	62
46147	62
46206	110
46207	110
46208	110
46209	110
46210	110
46211	110
46212	110
46213	110
46214	110
46216	110
46217	110
46218	110
46220	110
46221	110
46222	110
46228	110
46229	110
46230	110
46231	110
46232	110
46233	110
46343	33
46344	33
46345	33
46346	33
46347	33
46348	33
46349	33
46350	33
46351	33
46354	33
46355	33
46356	33
46357	32
46358	32
46359	32
46360	32
46362	32
46364	32
46366	32
46368	32
46370	32
46372	32
46374	32
46376	32
46450	36
46451	36
46452	36
46453	36
46454	36
46455	36
46456	36
46457	36
46458	36
46459	36
46460	36
46461	36
46462	36
46463	36
46464	36
46465	36
46466	36
46467	36
46468	36
46469	36
46470	36
46471	36
46472	36
46473	36
46474	36
46475	36
46476	36
46477	36
46478	36
46479	36
46480	36
46481	36
46493	27
46494	27
46495	27
46497	27
46498	27
46506	32
46507	32
46508	32
46509	32
46510	32
46518	33
46519	33
46520	33
46521	33
46522	33
46560	38
46561	38
46562	38
46563	38
46564	38
46565	38
46566	38
46567	38
46568	38
46620	50
46621	50
46622	50
46623	50
46624	50
46625	50
46626	50
46627	51
46628	51
46629	51
46630	51
46631	51
46632	51
46633	51
46634	51
46635	51
46636	51
46637	51
46638	51
46639	51
46640	51
46641	51
46642	51
46643	51
46644	51
46645	51
46646	51
46647	51
46648	51
46649	51
46650	51
46651	51
46652	51
46653	51
46654	51
46655	51
46656	51
46657	51
46658	51
46659	51
46660	51
46737	29
46821	29
46822	29
46823	29
46824	29
46825	29
46826	29
46827	29
46828	29
46829	29
46830	29
46831	29
46832	29
46833	29
46834	29
46835	29
46836	29
46838	29
46839	29
46840	29
46841	29
46849	26
46850	26
46851	26
46852	26
46853	26
46854	26
46855	26
46856	26
46857	26
46858	26
46859	26
46860	27
46861	27
46862	27
46863	27
46864	27
46865	27
46866	27
46867	27
46868	27
46869	27
46873	26
46874	26
46880	26
46881	26
46882	26
46884	26
46886	26
46887	26
46889	26
46890	26
46891	26
46893	27
46894	27
46895	27
46896	27
46898	27
46899	27
46900	27
46903	27
46904	27
46905	27
46909	27
46910	27
46911	27
46912	27
46913	27
46914	27
46915	27
46916	27
46917	27
46918	27
46919	27
46920	27
46921	27
46922	27
46923	27
46924	27
46925	27
46926	27
46927	27
46928	29
46929	29
46930	29
46931	29
46932	29
46933	29
46934	29
46935	29
46936	29
46937	29
46938	29
46939	29
46940	29
46941	29
46942	29
46943	29
46944	27
46945	27
46946	27
47000	23

EDP Number Index

EDP NO.	PAGE
47001	23
47002	23
47003	23
47004	23
47005	23
47006	23
47007	23
47008	23
47009	23
47010	23
47011	23
47012	23
47013	23
47014	23
47015	23
47016	23
47017	23
47018	23
47019	23
47020	23
47021	23
47022	23
47023	23
47024	23
47025	23
47026	23
47027	23
47028	23
47029	23
47030	23
47031	23
47032	23
47033	23
47034	23
47035	23
47036	23
47037	23
47038	23
47039	23
47040	23
47041	23
47042	23
47043	23
47044	23
47045	23
47046	23
47047	23
47048	23
47049	23
47050	23
47051	23
47052	23
47053	23
47054	23
47055	23
47056	23
47057	23
47058	23
47059	23
47060	23
47061	23
47062	23
47063	23
47064	23
47065	23
47066	23
47067	23
47068	23
47069	23
47070	23
47071	23
47072	23
47073	23
47074	23
47075	23
47076	23
47077	23
47078	23
47079	23
47080	23
47081	23
47082	23
47083	23
47084	23
47085	23
47086	23
47087	23
47088	23
47089	23
47090	23
47091	23
47092	23
47093	23
47094	23
47095	23
47096	23
47097	23
47120	23
47121	23
47122	23
47123	23
47124	23
47125	23
47126	23
47127	23
47128	23
47129	23
47130	23
47131	23
47132	23
47133	23
47134	23
47135	23
47136	23
47137	23
47138	23
47139	23
47140	23
47141	23
47142	23
47143	23
47144	23
47145	23
47146	23
47147	23
47148	23
48012	23
48020	23
48070	23
48500	103
48501	103
48502	103
48503	103
48504	103
48505	103
48506	103
48507	103
48508	103
48509	103
48510	103
48511	103
48512	103
48513	103
48514	103
48515	103
48516	103
48517	103
48518	103
48519	103
48520	103
48522	103
48523	103
48524	103
48525	103
48526	103
48527	103
48528	103
48529	103
48530	103
48531	103
48532	103
48533	103
48534	103
48535	103
48536	103
48537	103
48538	103
48539	103
48540	103
48541	103
48542	103
48543	103
48544	103
48545	103
48546	103
48547	103
48548	103
48549	103
48550	103
48551	103
48552	103
48553	103
48554	103
48555	103
48556	103
48557	103
48558	103
48559	103
48560	103
48561	103
48562	103
48563	103
48564	106
48565	106
48566	106
48567	106
48568	106
48569	106
48570	106
48571	106
48572	106
48573	106
48574	106
48575	106
48576	106
48577	106
48578	106
48579	106
48580	106
48581	106
48582	106
48583	106
48584	106
48586	106
48587	106
48588	106
48589	106
48590	106
48591	106
48592	106
48593	106
48594	106
48595	106
48596	106
48597	106
48598	106
48599	106
48600	106
48601	106
48602	106
48603	106
48604	106
48605	106
48606	106
48607	106
48608	106
48609	106
48610	106
48611	106
48612	106
48613	106
48614	106
48615	106
48616	106
48617	106
48618	106
48619	106
48620	106
48621	106
48622	106
48623	106
48624	106
48625	106
48626	106
48627	106
48628	94
48629	94
48630	94
48631	94
48632	94
48633	94
48634	94
48635	94
48636	94
48637	94
48638	94
48639	94
48640	94
48641	94
48642	94
48643	94
48644	94
48645	94
48646	94
48647	94
48648	94
48650	94
48651	94
48652	94
48653	94
48654	94
48655	94
48656	94
48657	94
48658	94
48659	94
48660	94
48661	94
48662	94
48663	94
48664	94
48665	94
48666	94
48667	94
48668	94
48669	94
48670	94
48671	94
48672	94
48673	94
48674	94
48675	94
48676	94
48677	94
48678	94
48679	94
48680	94
48681	94
48682	94
48683	94
48684	94
48685	94
48686	94
48687	94
48688	94
48689	94
48690	94
48691	94
48692	97
48693	97
48694	97
48695	97
48696	97
48697	97
48698	97
48699	97
48700	97
48701	97
48702	97
48703	97
48704	97
48705	97
48706	97
48707	97
48708	97
48709	97
48710	97
48711	97
48712	97
48714	97
48715	97
48716	97
48717	97
48718	97
48719	97
48720	97
48721	97
48722	97
48723	97
48724	97
48725	97
48726	97
48727	97
48728	97
48729	97
48730	97
48731	97
48732	97
48733	97
48734	97
48735	97
48736	97
48737	97
48738	97
48739	97
48740	97
48741	97
48742	97
48743	97
48744	97
48745	97
48746	97
48747	97
48748	97
48749	97
48750	97
48751	97
48752	97
48753	97
48754	97
48755	97
48756	100
48757	100
48758	100
48759	100
48760	100
48761	100
48762	100
48763	100
48764	100
48765	100
48766	100
48767	100
48768	100
48769	100
48770	100
48771	100
48772	100
48773	100
48774	100
48775	100
48776	100
48778	100
48779	100
48780	100
48781	100
48782	100
48783	100
48784	100
48785	100
48786	100
48787	100
48788	100

EDP Number Index

EDP NO.	PAGE
48789	100
48790	100
48791	100
48792	100
48793	100
48794	100
48795	100
48796	100
48797	100
48798	100
48799	100
48800	100
48801	100
48802	100
48803	100
48804	100
48805	100
48806	100
48807	100
48808	100
48809	100
48810	100
48811	100
48812	100
48813	100
48814	100
48815	100
48816	100
48817	100
48818	100
48819	100
48820	101
48821	101
48822	101
48823	101
48824	101
48825	101
48826	101
48827	101
48828	101
48829	101
48830	101
48831	101
48832	101
48833	101
48834	101
48835	101
48836	101
48837	101
48838	101
48839	101
48840	101
48842	101
48843	101
48844	101
48845	101
48846	101
48847	101
48848	101
48849	101
48850	101
48851	101
48852	101
48853	101
48854	101
48855	101
48856	101
48857	101
48858	101
48859	101
48860	101
48861	101
48862	101
48863	101
48864	101
48865	101
48866	101
48867	101
48868	101
48869	101
48870	101
48871	101
48872	101
48873	101
48874	101
48875	101
48876	101
48877	101
48878	101
48879	101
48880	101
48881	101
48882	101
48883	101
48884	105
48885	105
48886	105
48887	105
48888	105
48889	105
48890	105
48891	105
48892	105
48893	105
48894	105
48895	105
48896	105
48897	105
48898	105
48899	105
48905	105
48906	105
48907	105
48908	105
48909	105
48910	105
48911	105
48912	105
48913	105
48914	105
48915	105
48916	105
48917	105
48918	105
48919	105
48920	105
48926	105
48927	105
48928	105
48929	105
48930	105
48931	105
48932	105
48933	105
48934	105
48935	105
48936	105
48937	105
48938	105
48939	105
48940	105
48941	105
48947	107
48948	107
48949	107
48950	107
48951	107
48952	107
48953	107
48954	107
48955	107
48956	107
48957	107
48958	107
48959	107
48960	107
48961	107
48962	107
48968	107
48969	107
48970	107
48971	107
48972	107
48973	107
48974	107
48975	107
48976	107
48977	107
48978	107
48979	107
48980	107
48981	107
48982	107
48983	107
48989	107
48990	107
48991	107
48992	107
48993	107
48994	107
48995	107
48996	107
48997	107
48998	107
48999	107
49000	107
49001	107
49002	107
49003	107
49004	107
49010	96
49011	96
49012	96
49013	96
49014	96
49015	96
49016	96
49017	96
49018	96
49019	96
49020	96
49021	96
49022	96
49023	96
49024	96
49025	96
49031	96
49032	96
49033	96
49034	96
49035	96
49036	96
49037	96
49038	96
49039	96
49040	96
49041	96
49042	96
49043	96
49044	96
49045	96
49046	96
49052	96
49053	96
49054	96
49055	96
49056	96
49057	96
49058	96
49059	96
49060	96
49061	96
49062	96
49063	96
49064	96
49065	96
49066	96
49067	96
49073	99
49074	99
49075	99
49076	99
49077	99
49078	99
49079	99
49080	99
49081	99
49082	99
49083	99
49084	99
49085	99
49086	99
49087	99
49088	99
49094	99
49095	99
49096	99
49097	99
49098	99
49099	99
49100	99
49101	99
49102	99
49103	99
49104	99
49105	99
49106	99
49107	99
49108	99
49109	99
49115	99
49116	99
49117	99
49118	99
49119	99
49120	99
49121	99
49122	99
49123	99
49124	99
49125	99
49126	99
49127	99
49128	99
49129	99
49130	99
49136	102
49137	102
49138	102
49139	102
49140	102
49141	102
49142	102
49143	102
49144	102
49145	102
49146	102
49147	102
49148	102
49149	102
49150	102
49151	102
49157	102
49158	102
49159	102
49160	102
49161	102
49162	102
49163	102
49164	102
49165	102
49166	102
49167	102
49168	102
49169	102
49170	102
49171	102
49172	102
49178	102
49179	102
49180	102
49181	102
49182	102
49183	102
49184	102
49185	102
49186	102
49187	102
49188	102
49189	102
49190	102
49191	102
49192	102
49193	102
49262	93
49263	93
49264	93
49265	93
49266	93
49267	93
49268	93
49269	93
49270	93
49271	93
49272	93
49273	93
49274	93
49275	93
49276	93
49277	93
49283	93
49284	93
49285	93
49286	93
49287	93
49288	93
49289	93
49290	93
49291	93
49292	93
49293	93
49294	93
49295	93
49296	93
49297	93
49298	93
49304	93
49305	93
49306	93
49307	93
49308	93
49309	93
49310	93
49311	93
49312	93
49313	93
49314	93
49315	93
49316	93
49317	93
49318	93
49319	93
49388	103
49389	103
49390	103
49391	103
49392	103
49393	103
49394	103
49395	103
49396	103
49397	103
49398	103
49399	103
49400	103
49401	103
49402	103
49403	103
49404	103
49405	103
49406	103
49407	103
49408	103
49409	103
49410	103
49411	103
49412	103
49413	103
49414	103
49415	103
49416	103
49417	103
49418	103

EDP Number Index

EDP NO.	PAGE
49419	103
49420	103
49421	103
49422	103
49423	103
49424	103
49425	103
49426	103
49427	94
49428	94
49429	94
49430	94
49431	94
49432	94
49433	94
49434	94
49435	94
49436	94
49437	94
49438	94
49439	94
49440	94
49441	94
49442	94
49443	94
49444	94
49445	94
49446	94
49447	94
49448	94
49449	94
49450	94
49451	94
49452	94
49453	94
49454	94
49455	94
49456	94
49457	94
49458	94
49459	94
49460	94
49461	94
49462	94
49463	94
49464	94
49465	94
49466	100
49467	100
49468	100
49469	100
49470	100
49471	100
49472	100
49473	100
49474	100
49475	100
49476	100
49477	100
49478	100
49479	100
49480	100
49481	100
49482	100
49483	100
49484	100
49485	100
49486	100
49487	100
49488	100
49489	100
49490	100
49491	100
49492	100
49493	100
49494	100
49495	100
49496	100
49497	100
49498	100
49499	100
49500	100
49501	100
49502	100
49503	100
49504	100
49505	106
49506	106
49507	106
49508	106
49509	106
49510	106
49511	106
49512	106
49513	106
49514	106
49515	106
49516	106
49517	106
49518	106
49519	106
49520	106
49521	106
49522	106
49523	106
49524	106
49525	106
49526	106
49527	106
49528	106
49529	106
49530	106
49531	106
49532	106
49533	106
49534	106
49535	106
49536	106
49537	106
49538	106
49539	106
49540	106
49541	106
49542	106
49543	106
49544	97
49545	97
49546	97
49547	97
49548	97
49549	97
49550	97
49551	97
49552	97
49553	97
49554	97
49555	97
49556	97
49557	97
49558	97
49559	97
49560	97
49561	97
49562	97
49563	97
49564	97
49565	97
49566	97
49567	97
49568	97
49569	97
49570	97
49571	97
49572	97
49573	97
49574	97
49575	97
49576	97
49577	97
49578	97
49579	97
49580	97
49581	97
49582	97
49583	101
49584	101
49585	101
49586	101
49587	101
49588	101
49589	101
49590	101
49591	101
49592	101
49593	101
49594	101
49595	101
49596	101
49597	101
49598	101
49599	101
49600	101
49601	101
49602	101
49603	101
49604	101
49605	101
49606	101
49607	101
49608	101
49609	101
49610	101
49611	101
49612	101
49613	101
49614	101
49615	101
49616	101
49617	101
49618	101
49619	101
49620	101
49621	101
49622	98
49623	98
49624	98
49625	98
49626	98
49627	98
49628	98
49629	98
49630	98
49631	98
49632	98
49633	98
49634	98
49635	98
49636	98
49637	98
49638	98
49639	98
49640	98
49641	98
49642	98
49643	98
49644	98
49645	98
49646	98
49647	98
49648	98
49649	98
49650	98
49651	98
49663	88
49664	88
49665	88
49666	88
49667	88
49668	88
49669	88
49670	88
49671	88
49672	88
49673	88
49674	88
49675	88
49676	88
49677	88
49678	88
49679	88
49680	88
49681	88
49682	88
49683	88
49684	88
49829	114
49830	114
49831	114
49832	114
49833	114
49834	114
49835	114
49836	114
49837	114
49838	114
49839	114
49840	114
50000	158
50001	158
50002	158
50003	158
50004	158
50005	158
50006	158
50007	158
50008	158
50009	158
50010	158
50011	158
50012	158
50013	158
50014	158
50015	158
50016	158
50017	158
50018	158
50019	158
50020	158
50021	158
50022	158
50023	158
50024	158
50025	158
50026	158
50027	158
50028	158
50029	158
50030	158
50031	158
51001	167
51002	166
51003	166
51004	166
51005	166
51006	166
51007	166
51008	166
51009	166
51010	166
51011	166
51012	166
51013	166
51014	166
51015	166
51016	166
51017	166
51018	166
51019	166
51020	166
51021	166
51022	166
51023	165
51024	165
51025	165
51026	165
51027	165
51028	165
51029	165
51030	165
51031	165
51032	165
51033	165
51034	165
51035	165
51036	165
51037	165
51038	165
51039	165
51040	165
51041	165
51042	165
51043	165
51044	165
51045	165
51046	165
51047	165
51048	165
51049	165
51050	165
51051	165
51052	164
51053	164
51104	164
51105	165
51106	165
51107	165
51108	165
51109	165
51110	166
51111	166
51112	166
51113	166
51114	166
51115	167
51116	167
51117	167
51118	167
51119	167
51120	167
51121	167
51122	168
51123	168
51124	168
51125	168
51126	168
51127	168
51128	168
51129	168
51130	168
51131	168
51132	168
51201	167
51202	167
51203	167
51204	167
51206	167
51207	167
51208	167
51209	167
51210	167
51211	167
51212	167
51213	167
51214	167
51215	167
51216	167
51217	167
51218	167
51219	168
51220	168
51221	168
51222	168
51223	168
51224	168
51225	168
51226	168
51269	123
51270	123
51271	123
51272	123
51273	123
51274	123
51275	123

EDP Number Index

EDP NO.	PAGE
51276	123
51277	123
51278	123
51279	124
51330	123
51331	123
51332	123
51333	124
51334	124
51335	124
51336	124
51337	124
51338	124
51339	124
51340	124
51341	125
51342	125
51343	125
51344	125
51345	125
51346	125
51347	125
51348	125
51349	125
51350	125
51351	125
51352	126
51353	126
51354	126
51355	126
51356	126
51357	126
51358	126
51359	126
51360	127
51361	127
51362	127
51363	127
51364	127
51365	127
51366	127
51367	127
51368	127
51369	127
51370	127
51371	127
51372	127
51373	127
51374	127
51375	127
51506	133
51507	133
51508	133
51509	134
51510	134
51511	134
51512	134
51513	134
51514	134
51515	134
51516	135
51517	135
51518	135
51519	135
51520	135
51521	135
51522	135
51523	135
51524	135
51525	135
51526	135
51527	135
51528	136
51529	136
51530	136
51531	136
51532	136
51533	136
51534	136
51535	136
51536	136
51537	137
51538	137
51539	137
51540	137
51541	137
51542	137
51543	137
51544	137
51545	137
51580	132
51581	132
51582	132
51583	133
51584	133
51585	133
51586	133
51587	133
51588	133
51589	133
51590	133
51591	134
51592	137
51593	137
51594	137
51595	137
51596	137
51601	125
51602	125
51603	125
51604	125
51605	125
51606	125
51607	125
51608	125
51609	125
51610	125
51611	125
51612	125
51613	125
51614	125
51615	126
51616	126
51617	126
51618	126
51619	126
51620	126
51621	126
51622	126
51752	123
51753	123
51754	123
51755	123
51756	123
51757	123
51758	123
51759	123
51760	123
51761	123
51762	124
51763	124
51764	124
51765	124
51766	124
51767	124
51768	124
51769	124
51770	124
51771	124
51772	124
51773	124
51774	124
51775	124
51776	124
51777	124
51778	124
51779	124
51780	124
51781	125
51782	125
51783	127
51784	127
51785	127
51786	127
51787	127
51788	127
51789	127
51790	127
51791	127
51792	127
51801	150
51802	150
51803	150
51804	150
51805	150
51806	150
51807	150
51808	150
51809	151
51810	151
51811	151
51812	151
51813	151
51814	151
51815	151
51816	151
51817	151
51818	151
51819	152
51820	152
51821	152
51822	152
51823	152
51824	152
51825	152
51826	152
51827	153
51828	153
51829	153
51830	153
51831	153
51832	153
51833	153
51834	153
51835	153
51836	153
51901	142
51902	142
51903	142
51904	142
51905	142
51906	142
51907	142
51908	142
51910	142
51912	143
51913	143
51914	143
51915	143
51916	143
51918	143
51919	143
51920	143
51921	143
51922	143
51923	144
51924	144
51925	144
51926	144
51927	144
51928	144
51929	144
51930	144
51932	145
51933	145
51934	145
51935	145
51937	145
51938	145
51939	145
51940	145
51941	145
51942	145
52300	132
52301	132
52302	132
52303	132
52304	132
52305	132
52306	132
52307	132
52308	132
52309	132
52310	132
52311	132
52312	132
52313	132
52314	132
52315	132
52316	132
52317	133
52318	133
52319	133
52321	133
52322	133
52323	133
52324	133
52325	133
52326	133
52327	133
52328	133
52329	133
52330	133
52331	133
52332	133
52333	133
52334	133
52335	134
52336	134
52337	134
52338	134
52339	134
52340	134
52341	134
52342	134
52343	134
52344	134
52345	135
52346	135
52347	135
52348	135
52349	135
52350	135
52351	135
52352	136
52353	136
52354	136
52355	137
52356	137
52357	137
52358	137
52359	137
52360	137
53001	181
53002	181
53003	181
53004	181
53005	181
53006	181
53007	181
53008	181
53009	181
53010	181
53011	181
53012	181
53013	181
53014	181
53015	181
53016	181
53017	180
53018	180
53019	180
53020	180
53021	180
53022	180
53023	180
53024	180
53025	180
53026	180
53027	180
53028	180
53029	180
53030	180
53031	180
53032	180
53033	180
53034	180
53035	180
53036	180
53107	180
53108	180
53109	180
53110	180
53111	180
53112	181
53113	181
53114	181
53115	181
53116	181
53117	181
53118	182
53119	182
53120	182
53121	182
53122	182
53123	183
53124	183
53125	183
53126	183
53127	183
53128	183
53129	183
53130	183
53131	183
53132	183
53133	183
53134	183
53135	183
53136	183
53137	183
53201	181
53202	181
53203	181
53204	181
53206	181
53207	181
53208	181
53209	182
53210	182
53211	182
53212	182
53213	182
53214	182
53215	182
53216	182
53217	182
53218	182
53219	182
53220	182
53221	183
53222	183
53223	183
53224	183
53225	183
53226	183
56001	177
56002	177
56003	177
56004	177
56005	177
56006	177
56007	177
56008	177
56009	177
56010	177
56011	177
56012	177
56013	177
56014	177
56015	177
56016	177
56017	177
56018	177
56019	177
56020	177
56021	177
56022	177
56023	177
56024	177
56025	177
56026	177
56027	177
56028	177
56029	177
56030	177
56031	177
56032	177

EDP Number Index

EDP NO.	PAGE
56033	177
56034	176
56035	176
56036	176
56037	176
56038	176
56039	176
56040	176
56041	176
56042	176
56043	176
56044	176
56045	176
56046	176
56047	176
56048	176
56049	176
56050	176
56051	176
56052	176
56053	176
56054	176
56055	176
56056	176
56057	176
56058	176
56059	176
56060	176
56103	176
56104	176
56105	176
56106	176
56107	176
56108	177
56109	177
56110	177
56111	177
56112	177
56113	177
56114	177
56115	178
56116	178
56117	178
56118	178
56119	178
56120	178
56121	178
56122	178
56123	178
56124	178
56125	178
56126	178
56127	178
56128	178
56129	178
56130	178
56131	178
56132	178
56135	176
56136	176
56137	176
56138	176
56139	176
56140	177
56141	177
56142	177
56143	177
56144	177
56145	177
56146	177
56147	178
56148	178
56149	178
56150	178
56151	178
56152	178
56153	178
56154	178
56155	178
56156	178
56157	178
56158	178
56159	178
56160	178
56161	178
56162	178
56163	178
56164	178
56210	177
56211	177
56212	177
56213	177
56214	177
56215	177
56216	177
56217	177
56218	177
56219	177
56220	177
56221	177
56222	177
56223	177
56224	177
56225	177
56226	177
56227	177
56228	177
56229	177
56230	177
56231	177
56232	177
56233	177
56234	177
56235	177
56236	177
56237	177
56238	177
56239	177
56240	177
56241	177
56242	177
56243	176
56244	176
56245	176
56246	176
56247	176
56248	176
56249	176
56250	176
56251	176
56252	176
56253	176
56254	176
56255	176
56256	176
56257	176
56258	176
56259	176
56260	176
56261	176
56262	176
56263	176
56264	176
56265	176
56266	176
56267	176
56268	176
56269	176
57005	186
57006	186
57007	186
57008	186
57009	186
57010	186
57011	186
57012	186
57015	186
57016	186
57017	186
57018	186
57019	186
57020	186
57021	186
57022	186
57075	186
57076	164
57077	164
57078	164
57079	164
57080	164
57081	164
57082	164
57083	164
57084	164
57085	164
57086	164
57087	164
57088	164
57089	164
57090	164
57091	164
57092	164
57093	164
57094	164
57095	164
57096	164
57097	164
57098	164
57099	164
57100	164
57101	164
57102	164
57103	164
57104	164
57105	164
57106	164
57107	164
57108	164
57109	165
57110	165
57111	165
57112	165
57113	165
57114	165
57115	165
57116	165
57117	165
57118	165
57119	165
57120	165
57121	165
57122	165
57123	165
57124	165
57125	165
57126	165
57127	165
57128	165
57129	165
57130	165
57131	165
57132	165
57133	165
57134	165
57135	165
57136	165
57137	165
57138	165
57139	165
57140	165
57141	165
57142	165
57143	166
57144	166
57145	166
57146	166
57147	166
57148	166
57149	166
57150	166
57151	166
57152	166
57153	166
57154	166
57155	166
57156	166
57157	166
57158	166
57159	166
57160	166
57161	166
57162	166
57163	166
57164	166
57165	166
57166	166
57167	166
57168	166
57169	167
57170	167
57171	167
57172	167
57173	167
57174	167
57175	167
57177	167
57178	167
57179	167
57180	167
57181	167
57182	167
57183	167
57184	167
57185	167
57186	167
57187	167
57188	167
57189	167
57190	167
57191	167
57192	167
57193	167
57194	167
57195	168
57196	168
57197	168
57198	168
57199	168
57200	168
57201	168
57202	168
57203	168
57204	168
57205	168
57206	168
57207	168
57208	168
57209	168
57210	168
57211	168
57212	168
57213	168
57351	168
58011	180
58012	180
58013	180
58014	180
58015	180
58016	180
58017	180
58018	180
58019	180
58020	180
58021	180
58022	180
58023	180
58024	180
58025	180
58026	180
58027	180
58028	180
58029	180
58030	180
58031	180
58032	180
58033	180
58034	180
58035	180
58036	181
58037	181
58038	181
58039	181
58040	181
58041	181
58042	181
58043	181
58044	181
58045	181
58046	181
58047	181
58048	181
58049	181
58050	181
58051	181
58052	181
58053	181
58054	181
58055	181
58056	181
58057	181
58058	181
58059	181
58061	181
58062	181
58063	181
58064	181
58065	181
58066	182
58067	182
58068	182
58069	182
58070	182
58071	182
58072	182
58073	182
58074	182
58075	182
58076	182
58077	182
58078	182
58079	182
58080	182
58081	182
58082	182
58083	183
58084	183
58085	183
58086	183
58087	183
58088	183
58089	183
58090	183
58091	183
58092	183
58093	183
58094	183
58095	183
58096	183
58097	183
58098	183
58099	183
58100	183
58101	183
58102	183
58103	183
61011	165
61013	165
61015	165
61017	165
61019	166
61021	166
61023	166
61025	166
61027	167
61029	167
61031	167
61033	167
61035	167
61037	167
61039	168
61041	168
61043	168
61045	168

EDP Number Index

EDP NO.	PAGE
61047	168
61049	168
61051	168
61056	164
61057	164
61058	165
61059	165
61060	165
61061	165
61062	165
61063	165
61064	165
61065	165
61066	165
61067	165
61068	165
61069	165
61070	165
61071	165
61072	165
61073	165
61074	165
61075	165
61076	166
61077	166
61078	166
61079	166
61080	166
61081	166
61082	166
61083	166
61084	166
61085	166
61086	166
61087	166
61088	166
61089	166
61090	167
61091	167
61092	167
61093	167
61094	167
61095	167
61096	167
61097	167
61098	167
61099	167
61100	167
61101	167
61102	167
61103	167
61104	167
61105	167
61106	167
61107	167
61108	167
61109	167
61110	167
61111	167
61112	167
61113	168
61114	168
61115	168
61116	168
61117	168
61118	168
61119	168
61120	168
61121	168
61122	168
61123	168
61124	168
61175	168
62001	169
62003	169
62005	169
62007	169
62009	169
62011	169
62013	169
62015	169
62017	169
62019	169
62021	169
62023	169
62025	169
62027	169
62029	169
62031	169
62033	169
62035	169
62037	169
62039	169
62041	169
62043	169
62045	169
62047	169
62049	169
62051	169
62053	169
62055	169
62057	169
62059	169
62061	169
62063	169
62065	169
62066	171
62067	169
62069	170
62071	170
62073	170
62075	170
62077	170
62079	170
62081	170
62083	170
62084	171
62085	170
62087	170
62089	170
62091	170
62093	170
62095	170
62097	170
62099	170
62101	170
62102	171
62103	170
62105	170
62107	170
62109	170
62111	170
62112	171
62113	170
62115	170
62116	171
62117	170
62119	170
62121	170
62123	170
62125	170
62127	170
62129	170
62131	170
62133	171
62135	171
62137	171
62139	171
62141	171
62142	171
62143	171
62145	171
62146	171
62147	171
62149	171
62151	171
62153	171
62154	171
62155	171
62156	171
62157	171
62158	171
62159	171
62164	171
62166	171
62167	171
62168	171
62170	171
62171	171
63000	180
63001	180
63002	180
63003	180
63004	180
63005	180
63006	181
63007	181
63008	181
63009	181
63010	181
63011	181
63012	181
63013	182
63014	182
63015	182
63016	182
63017	182
63018	182
63019	182
63020	182
63021	182
63022	182
63023	182
63024	183
63025	183
63026	183
63027	183
63028	183
63029	183
63030	183
63031	183
63032	183
63033	183
63034	183
63035	183
63036	183
63037	183
63038	183
63039	183
63040	183
63041	183
63042	183
63043	183
63044	180
63045	180
63046	180
63047	180
63048	180
63049	180
63050	180
63051	180
63052	180
63053	181
63054	181
63055	181
63056	181
63057	181
63058	181
63059	181
63060	181
63061	181
63062	181
63063	181
63064	181
63065	181
63066	181
63067	181
63068	181
63069	182
63070	182
63071	182
63072	182
63073	182
63074	182
63075	182
63076	182
63077	182
63078	182
63079	182
63080	182
63081	183
63082	183
63083	183
63084	183
63085	183
63086	183
63087	183
63088	183
63089	183
63090	183
63091	183
63155	123
63156	123
63157	123
63158	123
63159	123
63160	123
63161	123
63162	124
63163	124
63164	124
63165	124
63166	124
63167	124
63168	124
63169	124
63170	124
63171	124
63172	125
63173	125
63174	125
63175	125
63176	125
63177	125
63178	125
63179	125
63180	125
63181	125
63182	125
63183	125
63184	126
63185	126
63186	126
63187	126
63188	126
63189	126
63190	126
63191	126
63192	126
63193	126
63194	127
63195	127
63196	127
63197	127
63198	127
63199	127
63200	127
63201	127
63202	127
63203	127
63204	127
63205	127
63206	127
63207	127
63208	127
63209	127
63210	127
63211	127
63212	127
63213	125
63472	124
63575	150
63576	150
63577	150
63578	150
63579	150
63580	150
63581	150
63582	150
63583	150
63584	150
63585	150
63586	150
63587	150
63588	150
63589	150
63590	150
63591	150
63592	150
63593	150
63594	150
63595	150
63596	150
63597	150
63598	150
63599	150
63600	150
63601	151
63602	151
63603	151
63604	151
63605	151
63606	151
63607	151
63608	151
63609	151
63610	151
63611	151
63612	151
63613	151
63614	151
63615	151
63616	151
63617	151
63618	151
63619	151
63620	151
63621	151
63622	151
63623	151
63624	151
63625	151
63626	151
63627	151
63628	151
63629	151
63630	151
63631	151
63632	151
63633	152
63634	152
63635	152
63636	152
63637	152
63638	152
63639	152
63640	152
63641	152
63642	152
63643	152
63644	152
63645	152
63646	152
63647	152
63648	152
63649	152
63650	152
63651	152
63652	152
63653	152
63654	152
63655	152
63656	152
63657	153
63658	153
63659	153
63660	153
63661	153
63662	153
63663	153
63664	153
63665	153
63666	153

EDP Number Index

EDP NO.	PAGE
63667	153
63668	153
63669	153
63670	153
63671	153
63672	153
63673	153
63674	153
63675	153
63676	153
63677	153
63741	123
63743	124
63744	124
63745	124
63746	124
63747	124
63748	124
63749	124
63750	124
63751	125
63752	125
63753	125
63754	125
63755	125
63756	125
63757	125
63758	125
63759	125
63760	125
63761	125
63762	125
63763	125
63764	125
63765	125
63766	125
63767	125
63768	125
63769	125
63770	126
63771	126
63772	126
63773	126
63774	126
63775	126
63776	126
63777	126
63778	126
63779	126
63780	126
63781	126
63782	126
63783	126
63784	126
63785	126
63786	126
63787	126
63788	126
63789	126
63790	127
63791	127
63792	127
63793	127
63794	127
63900	142
63901	142
63902	142
63903	142
63904	142
63905	142
63906	142
63907	142
63908	142
63909	142
63910	142
63911	142
63912	142
63913	142
63914	142
63915	142
63916	142
63917	142
63918	142
63919	142
63920	142
63921	142
63922	142
63923	142
63924	143
63925	143
63926	143
63927	143
63928	143
63929	143
63930	143
63931	143
63932	143
63933	143
63934	143
63935	143
63936	143
63937	143
63938	143
63939	143
63940	143
63941	143
63942	143
63943	143
63944	143
63945	143
63946	143
63947	143
63948	143
63949	143
63950	143
63951	143
63952	143
63953	143
63954	143
63955	144
63956	144
63957	144
63958	144
63959	144
63960	144
63961	144
63962	144
63963	144
63964	144
63965	144
63966	144
63967	144
63968	144
63969	144
63970	144
63971	144
63972	144
63973	144
63974	144
63975	144
63976	144
63977	144
63978	144
63979	144
63980	144
63981	145
63982	145
63983	145
63984	145
63985	145
63986	145
63987	145
63988	145
63989	145
63990	145
63991	145
63992	145
63993	145
63994	145
63995	145
63996	145
63997	145
63998	142
63999	143
64000	145
64001	145
64100	132
64101	132
64102	132
64103	132
64104	132
64105	133
64106	133
64107	133
64108	133
64109	133
64110	133
64111	133
64112	133
64113	133
64114	133
64115	133
64116	133
64117	133
64118	133
64119	133
64120	133
64121	133
64122	133
64123	133
64124	133
64125	134
64126	134
64127	134
64128	134
64129	134
64130	134
64131	134
64132	134
64133	134
64134	134
64135	134
64136	134
64137	134
64138	134
64139	134
64140	134
64141	134
64142	134
64143	134
64144	134
64145	135
64146	135
64147	135
64148	135
64149	135
64150	135
64151	135
64152	135
64153	135
64154	135
64155	135
64156	135
64157	135
64158	135
64159	135
64160	135
64161	135
64162	135
64163	135
64164	135
64165	135
64166	135
64167	135
64168	135
64169	135
64170	135
64171	135
64172	135
64173	135
64174	136
64175	136
64176	136
64177	136
64178	136
64179	136
64180	136
64181	136
64182	136
64183	136
64184	136
64185	136
64186	136
64187	136
64188	136
64189	136
64190	136
64191	136
64192	136
64193	136
64194	136
64195	136
64196	136
64197	136
64198	136
64199	136
64200	137
64201	137
64202	137
64203	137
64204	137
64205	137
64206	137
64207	137
64208	137
64209	137
64210	137
64211	137
64212	137
64500	123
64501	123
64502	123
64503	123
64504	123
64505	123
64506	123
64507	123
64508	123
64509	123
64510	123
64511	123
64512	123
64513	127
64514	127
64515	127
64520	132
64521	132
64522	132
64523	132
64524	132
64525	132
64526	132
64527	132
64528	132
64529	132
64530	132
64531	132
64532	132
64533	137
64534	137
64535	137
66001	176
66002	176
66003	176
66004	176
66005	176
66006	176
66007	176
66008	176
66009	177
66010	177
66011	177
66012	177
66013	177
66014	177
66015	177
66016	177
66017	177
66018	177
66019	177
66020	177
66021	178
66022	178
66023	178
66024	178
66025	178
66026	178
66027	178
66028	178
66029	178
66030	178
66031	178
66032	178
66033	178
66034	178
66035	178
66036	178
66037	178
66038	178
66039	178
66040	178
66041	178
66042	178
66043	178
66044	178
66045	178
66046	178
67005	187
67007	187
67009	187
67011	187
67013	187
67015	187
67017	187
67019	187
67021	187
67023	187
67035	187
67037	187
67039	187
67041	187
67043	187
67045	187
67047	187
67049	187
67051	187
67053	187
68268	164
68269	164
68270	164
68271	164
68272	164
68273	165
68274	165
68275	165
68276	165
68277	166
68278	166
68279	166
68280	166
68281	167
68282	167
68283	167
68284	167
68285	167
68286	167
68287	168
68288	168
68289	168
68290	168
68291	168
68292	168
68293	168
68294	164
68295	164
68296	164
68297	164
68298	164
68299	164
68300	165
68301	165
68302	165
68303	165
68304	165
68305	165
68306	165
68307	165
68308	165
68309	165
68310	165
68311	165
68312	165
68313	165
68314	165
68315	165
68316	165
68317	165

EDP Number Index

EDP NO.	PAGE
68318	166
68319	166
68320	166
68321	166
68322	166
68323	166
68324	166
68325	166
68326	166
68327	166
68328	166
68329	166
68330	166
68331	166
68332	167
68333	167
68334	167
68335	167
68336	167
68337	167
68338	167
68339	167
68340	167
68341	167
68342	167
68343	167
68344	167
68345	167
68346	167
68347	167
68348	167
68349	167
68350	167
68351	167
68352	167
68353	167
68354	167
68355	168
68356	168
68357	168
68358	168
68359	168
68360	168
68361	168
68362	168
68363	168
68364	168
68365	168
68366	168
68603	171
68604	171
68606	171
68607	171
68608	171
68609	171
68611	171
68612	171
68613	171
68614	171
68616	171
68643	169
68644	169
68645	169
68646	169
68647	169
68648	169
68649	169
68650	169
68651	169
68652	169
68653	169
68654	169
68655	169
68656	169
68657	169
68658	169
68659	169
68660	169
68661	169
68662	169
68663	169
68664	169
68665	169
68666	169
68667	169
68668	169
68669	169
68670	169
68671	169
68672	169
68673	169
68674	169
68675	169
68676	169
68677	170
68678	170
68679	170
68680	170
68681	170
68682	170
68683	170
68684	170
68685	170
68686	170
68687	170
68688	170
68689	170
68690	170
68691	170
68692	170
68693	170
68694	170
68695	170
68696	170
68697	170
68698	170
68699	170
68700	170
68701	170
68702	170
68703	170
68704	170
68705	170
68706	170
68707	170
68708	170
68709	171
68710	171
68711	171
68712	171
68713	171
68718	171
68723	171
68728	171
68733	171
68738	171
68743	171
68748	171
68753	171
68758	171
68763	171
68768	171
68773	171
68778	171
68780	171
68965	180
68966	180
68967	180
68968	180
68969	180
68970	180
68971	180
68972	180
68973	180
68974	180
68975	180
68976	180
68977	180
68978	180
68979	180
68980	181
68981	181
68982	181
68983	181
68984	181
68985	181
68986	181
68987	181
68988	181
68989	181
68990	181
68991	181
68992	181
68993	181
68994	181
68995	181
68996	181
68997	181
68998	181
68999	181
69000	181
69001	181
69002	181
69003	182
69004	182
69005	182
69006	182
69007	182
69008	182
69009	182
69010	182
69011	182
69012	182
69013	182
69014	182
69015	182
69016	182
69017	182
69018	182
69019	182
69020	182
69021	182
69022	182
69023	182
69024	182
69025	182
69026	183
69027	183
69028	183
69029	183
69030	183
69031	183
69032	183
69033	183
69034	183
69035	183
69036	183
69037	183
69038	183
69039	183
69040	183
69041	183
69042	183
69043	183
69044	183
69045	183
69046	183
69047	183
69048	183
69049	183
69050	183
69051	183
69052	183
69053	183
69054	183
69055	183
69056	183
70003	206
70004	206
70005	206
70006	206
70007	206
70008	206
70009	206
70010	206
70011	206
70012	206
70013	206
70014	206
70015	206
70016	206
70017	206
70018	206
70019	206
70020	206
70021	206
70022	206
70023	206
70024	206
70025	206
70026	206
70027	206
70028	206
70029	206
70030	206
70031	206
70032	206
70527	58
70529	58
70531	58
70533	58
70535	58
70537	58
70539	58
70540	58
70542	58
70544	58
70546	58
70548	58
70550	58
70551	57
70552	57
70553	57
70554	57
70555	57
70556	57
70557	57
70558	57
70559	57
70560	57
70561	57
70562	57
70563	57
74001	192
74004	192
74007	192
74010	192
74013	192
74016	192
74019	192
74022	192
74025	195
74028	195
74031	195
74034	195
74037	195
74040	195
74043	195
74046	195
74049	198
74052	198
74055	198
74058	198
74061	198
74064	198
74067	198
74070	198
74101	192
74104	192
74107	192
74110	192
74113	192
74116	192
74119	192
74122	192
74125	195
74128	195
74131	195
74134	195
74137	195
74140	195
74143	195
74146	195
74149	198
74152	198
74155	198
74158	198
74161	198
74164	198
74167	198
74170	198
74201	192
74204	192
74207	192
74210	192
74213	192
74216	192
74219	192
74222	192
74225	195
74228	195
74231	195
74234	195
74237	195
74240	195
74243	195
74246	195
74249	198
74252	198
74255	198
74258	198
74261	198
74264	198
74267	198
74270	198
81001	202
81003	202
81005	202
81007	202
81009	202
81011	202
81013	202
81015	202
81017	202
81019	202
81021	202
81023	202
81025	202
81027	202
81029	202
82930	215
82931	215
82932	215
82933	215
82966	215
82967	215
82968	215
82969	215
82970	215
82971	215
82972	215
82973	215
82974	218
82975	218
82976	218
82977	218
82978	218
82979	218
82980	218
82981	218
82982	218
82983	218
82984	218
82985	218
82986	218
82987	218
82988	218
82989	218
82990	220
82991	220
82992	220
82993	220
82994	220
82995	220
82996	220
82997	220
83026	215
83027	215
83028	215
83029	215

EDP Number Index

EDP NO.	PAGE
83041	215
83042	215
83043	215
83044	215
83056	64
83057	64
83058	64
83059	64
83060	64
83061	64
83062	64
83063	64
83064	64
83065	64
83070	215
83071	215
83072	215
83073	215
83100	215
83101	215
83102	215
83103	215
83104	215
83105	215
83106	215
83107	215
83108	215
83109	215
83110	215
83111	215
83200	218
83202	218
83203	218
83206	218
83207	218
83220	216
83221	216
83222	216
83223	216
83224	216
83225	216
83230	216
83231	216
83232	216
83233	216
83234	216
83235	216
84280	213
84281	213
84282	213
84283	213
84284	213
84285	213
84286	213
84287	213
84288	213
84289	213
84290	213
84291	213
85080	213
85081	213
85082	213
85083	213
85084	213
85085	213
85086	213
85087	213
85088	213
85089	213
85090	213
85091	213
90101	222
90107	222
90109	222
90113	222
90121	222
90129	222
90137	222
91101	222
91107	222
91109	222
91113	222
91121	222
91129	222
91137	222
91349	60
91350	60
91351	60
91352	60
91353	60
91354	60
91355	60
91356	60
91357	60
91358	60
91359	60
91360	60
91361	60

Notes

KSPT Reference Information

ISO H6 SPECIFICATIONS

DIAMETER	+	–	DIAMETER	+	–
≥ 1/8 - 3/16	0.00000	–0.00032	≤ 3	0,000	0,006
> 3/16 - 7/16	0.00000	–0.00035	> 3 - 6	0,000	0,008
> 7/16 - 5/8	0.00000	–0.00043	> 6 - 10	0,000	0,009
> 5/8 - 1	0.00000	–0.00051	> 10 - 18	0,000	0,011
> 1 - 1-1/4	0.00000	–0.00063	> 18 - 25	0,000	0,013

MACHINING FORMULAS

INCH FORMULAS

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
–	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
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
#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
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
–	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

SOLUTIONS AROUND THE GLOBE

KYOCERA SGS Precision Tools is an ISO-certified leader of round solid carbide cutting tool technology for the aerospace, metalworking, and automotive industries with manufacturing sites in the United States and United Kingdom. Our global network of Sales Representatives, Industrial Distributors, and Agents blanket the world selling into more than 60 countries.

LEADERS IN SOLID CARBIDE TOOL TECHNOLOGY

Brand names such as Z-Carb, S-Carb, V-Carb, Hi-PerCarb, Multi-Carb have become synonymous with high performance tooling in the machining and metalworking industry.

We're proud to have pioneered some of the world's most advanced cutting technology right here on our Northeast Ohio manufacturing campus. KSPT high performance end mills, drills and routers are increasing productivity and reducing cost around the world.

EXCEEDING CUSTOMER EXPECTATIONS

In addition to our substantial R&D facilities, we offer a portfolio of products and services that have an unparalleled track record in manufacture, supply and value at the spindle.

- Incredible batch-to-batch consistency
- Metallurgical lab dedicated to testing and rigorous quality control
- ISO-certified quality procedures
- Patented geometries that extend tool life, reduce chatter, cut cycle times, and improve part quality—even at extreme parameters
- Specialists in extreme and demanding product applications
- Comprehensive tooling services
- Experienced Field Sales Engineers who work to optimize a tool for your particular application
- Dedicated multi-lingual customer service representatives

www.kyocera-sgstool.com

KYOCERA
SGS Precision Tools

UNITED STATES OF AMERICA
KYOCERA SGS Precision Tools
P.O. Box 187
55 South Main Street
Munroe Falls, Ohio 44262 U.S.A.
customer service -
US and Canada: (330) 686-5700
fax - US & Canada: (800) 447-4017
international fax: (330) 686-2146
e-mail: webmaster@kyocera-sgstool.com

UNITED KINGDOM
KYOCERA SGS Precision Tools Europe Ltd.
10 Ashville Way
Wokingham, Berkshire
RG41 2PL England
phone: (44) 1189-795-200
fax: (44) 1189-795-295
e-mail: SalesEU@kyocera-sgstool.com

FRANCE
DOGA-KSPTE FRANCE
8, Avenue Gutenburg
78310 Maurepas
France
phone: +33 (0) 1 30 66 41 64
fax: +33 (0) 1 30 66 41 49
e-mail: sgsfrance@kyocera-sgstool.com

GERMANY
KADIGO Tool Systems
Walramstrasse 27
65510 Idstein
Germany
phone: +49 (0) 212 645573-0
fax: +49 (0) 212 380 89 693
e-mail: info@kadigo-ts.com

POLAND
KYOCERA SGS Precision Tools
phone: +48 530 432 002
e-mail: SalesEU@kyocera-sgstool.com

SPAIN
KYOCERA SGS Precision Tools IBERICA
e-mail: SalesEU@kyocera-sgstool.com

EASTERN EUROPE
SINTCOM
Sintcom Tools
95 Arsenalski Blvd.
1421 Sofia, Bulgaria
phone: (359) 283-64421
fax: (359) 286-52493
e-mail: sintcom@sintcomtools.com

RUSSIA
HALTEC
phone: (7) 495-252-05-00
e-mail: info@haltec.ru
web: www.haltec.ru

CHINA
KYOCERA SGS Precision Tools
Unit 301, Building A, No.200,
Jin Su Road
Jinqiao Export Processing Zone,
Pudong New Area
Shanghai 201206
China
phone: (86) 21-50589822
fax: (86) 21-50817160
e-mail: china@kyocera-sgstool.com
web: www.kyocera-sgstool.com/china

KSPT PRODUCTS ARE DISTRIBUTED BY:

EDP 00007 Rev 0816
KYOCERA SGS Precision Tools