NACHI

CUTTING TOOLS

DRILLS
END MILLS
TAPS

NACHI

Contributing to Progress in the World of Product Manufacturing

NACHI Cutting Tools

NACHI-FUJIKOSHI CORP. is a pioneer of precision cutting tools in Japan and one of the leading manufacturers of tools worldwide. No manufacturer of cutting tools anywhere in the world, exercises greater control over the quality of its products than NACHI. NACHI quality starts with the material itself because the High Speed Steel, premium Cobalt High Speed Steel, Powder High Speed Steel, and Cermet we use comes from our own mills. The technology of the coating, such as Mixed Component multi-layer coating and Diamond coating (thin film diamond) has been developed specifically for our cutting tools.

Cutting tools are basic products for the machine industries. Successful performance of machine tools cannot be expected without precise cutting tools and high quality. NACHI pursues the highest quality 100% of the time. NACHI is the first Japanese cutting tool manufacturer to be awarded the prestigious honor of the Deming Award for Quality.

NACHI AMERICA'S CUTTING TOOL DIVISION produces drills, endmills and taps designed to meet and exceed the exacting requirements of the industry's highest-precision machine tools. NACHI has long been a leader not only in tool design but in coatings that add durability and extend cutting life. Our tools are built to perform with precision and provide our customers with efficient, cost-effective solutions.

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toolsengineer@nachiamerica.com
www.nachiamerica.com

For additional Cutting Tool Options visit our parent company site:
www.nachi-fujikoshi.co.jp

North America Headquarters - Greenwood, Indiana

We have a history of ninety years as a world-famous integrated manufacturer, with the renowned brand “NACHI”. With the continuous production system, from high class special steels to finished products, our well-coordinated techniques stand high in public estimation.

Manufacturing & Re-Grind Facilities, Greenwood, Indiana

Technical Center, Duluth, Georgia

Technical Center, Fremont, California

Sales Office & Warehouse, Cerritos, California

Sales Office & Warehouse, Concord, Ontario, Canada

Sales Office & Warehouse, Queretaro, Mexico

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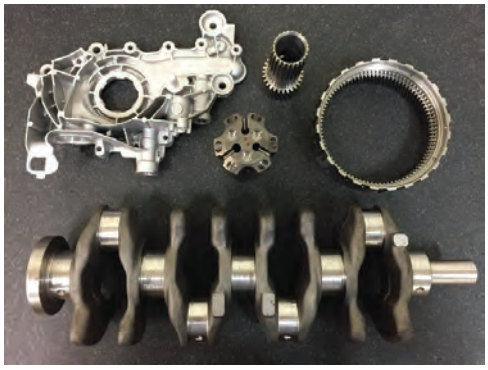
Fax: 52-442-153-2435

Greenwood Facilities Technical Center & Regrind Services

Nachi America has a testing center devoted to R&D of new and existing product, as well as providing test cuts for customer applications. As your cutting tool provider, Nachi America is dedicated to providing the best data and solution to your manufacturing process. Nachi America's facility in Greenwood, IN has the capacity to regrind tools. Contact your local sales representative for more information or contact a tools engineer through Technical Support.



Common Formulas

SFM = RPM x Diameter x 0.2618
RPM = (SFM x 3.82) / Diameter
Inch Per Minute = IPR x RPM
Inch Per Minute = IPT x # of Flutes x RPM
Inch Per Revolution = IPM / RPM
Inch Per Tooth = IPM / (RPM x # of Flutes)
Cutting % = IPR / Diameter * 100
Material Removal Rate = WOC x DOC x IPM
Mill Tapping Feedrate = 1/TPI x RPM

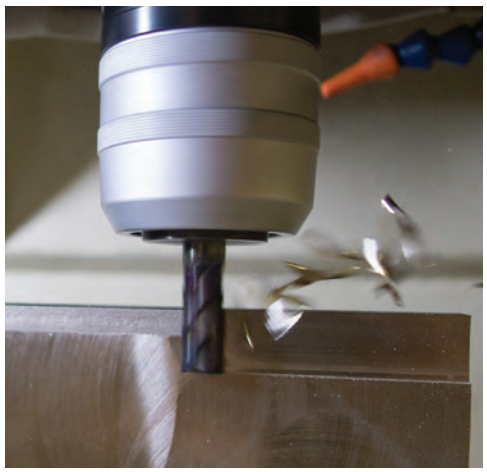
Technical Assistance

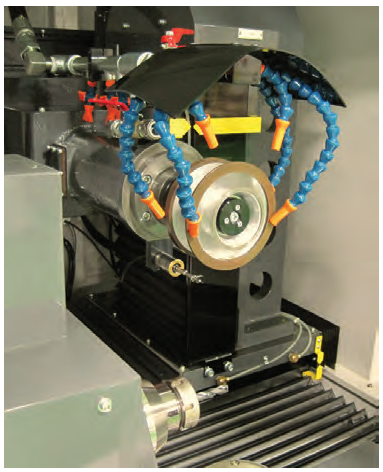
toolsengineer@nachiamerica.com
(888) 340-8665
(317) 530-1003
www.nachiamerica.com/cutting-tools/

Regrind Facilities:

Regrinds are available on most of the NACHI line of cutting tools, as well as regrinds on competitor cutting tools.

**when regrinding competitor tools, Nachi America cannot guarantee to hold to original specification of competitor.*





TECHNICAL DATA

General technical information regarding materials and icons used throughout the catalog
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CARBIDE DRILLS

Images, technical information, EDP numbers, Feeds & Speeds for all Carbide Drill products
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HSS DRILLS

Images, technical information, EDP numbers, Feeds & Speeds for all High Speed Steel Drill products
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CARBIDE END MILLS

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HSS END MILLS

Images, technical information, EDP numbers, Feeds & Speeds for all High Speed Steel End mill products
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TAPS

Images, technical information, EDP numbers, Feeds & Speeds for all Tap products
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REFERENCE

General reference charts for material symbols and hardness for all cutting tool products
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Material and Heat Treatment

Clean Steel

Material and heat treatment are major factors in determining the performances of the **High-Speed Steel** tool. To provide high quality HSS tools, NACHI-FUJIKOSHI has a steel mill to manufacture the HSS steels conforming to individual requirements for our in-house use as well as for outside sales.

Electric arc furnace

Clean Heat Treatment

In the field of heat treatment, we are producing and marketing vacuum heat treatment furnaces, which are highly evaluated among users both in Japan and abroad. Further, through technical tie-ups with Sumitomo Electric Industries Co., Ltd., we use cemented carbide materials best suited to individual requirements.

Vacuum carbonizing furnace, vacuum degreasing washer, coating equipment and coating process

High-Speed Tool

Main high-speed tools and their applications

Classification	Steel Type Symbol			Chemical Component						Application
	JIS	AISI	NACHI	C	Mo	W	Cr	V	Co	
High-Speed Steel	SKH10	T 15	HS55T	1.5		12	4	5	5	Basic steel type, cutting tool
	SKH51	M 2	SKH51	0.85	5	6	4	2		Drill, broach, others in general
	—	M33	HM33	0.9	9.5	1.5	4	1.2	8	Drill, gear cutting tool, others in general
	—	M34	HM34	0.9	8	2	4	2	8	Cutting tool, others in general
	SKH55	M35	HS53M	1.05	5.5	6	4	2.5	5	Cutting tool, others in general
	SKH57	—	HS93R	1.25	3.5	10	4	3.5	10	Tool material
	SKH59	M42	HS96H	1.1	9.5	1.5	4	1.2	8	End milling cutter and others
			HS97R	1.1	5.5	7.5	4	1.8	9	End milling cutter, tap
Powdered High-Speed Steel			FAX18	1.1	9.5	1.5	4	1.2	8	Saws and others
			FAX31	1.3	5.5	6	4	3		General
			FAX38	1.3	5	6	4	3	8	Gear cutting tool, tap, others in general
			FAX55	1.6		12	4	5	5	Gear cutting tool, broach, others in general
			FAX90	2.6	3.5	10	4	8.5	10	General (high alloy material)
Alloy Tool Steel	SKS 7		SKS 7	1.15		2.2	0.3			Hack saw, etc.
	SKD11		SKD11	1.5	1		12	0.4		Molding tools including dies and molds
	SKD61		SKD61	0.4	1.3		5	1	Sil	

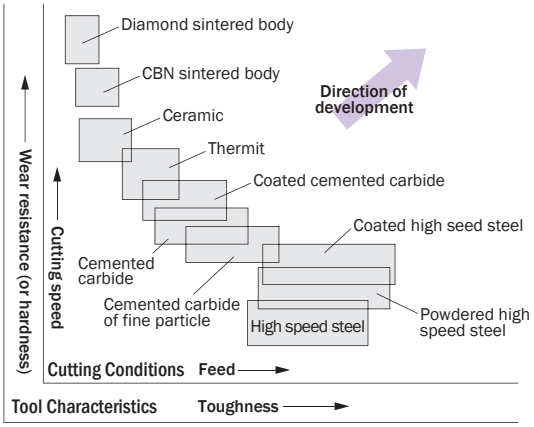
Effects of major alloy components

W : Hard double carbide is formed to ensure improved wear resistance
Mo : Fine carbide and improved toughness to ensure improved wear resistance
Cr : Tissue stabilization factor (upgraded solubility)
V : Extended and improved wear resistance of secondary carbon
C : Enhanced carbon formation factor and hardening properties
Co : Best suited to heavy-duty cutting due to improved heat resistance

Material and Heat Treatment

Characteristics of Various Tool Materials

It is important that tool materials are characterized by excellent resistance to chipping or breakage. Selection is made from among various types of tool materials in conformity to the workpiece and machining method. NACHI's integrated production system, covering the entire range from materials to tool, produces tool materials meeting each of your requirements.



Type	Symbol	(Example)	Production Method	Features
Carbon Tool Steel	SK ☐	SK 3	Tool steel where carbon is put into iron to enable hardening.	Less expensive, but low hardness at a high temperature.
Alloy Tool Steel	SKS ☐ SKD ☐	SKS 7 SKD 11	Tool steel with its wear resistance improved by alloy steel such as iron, Cr and W.	
High Speed Steel	SKH ☐	SKH 51 SKH 55	Tool steel with wear resistance and toughness improved by hard carbide created by mixing W, Mo, Cr and V with iron.	The steel type with much Co content is called cobalt high speed tool characterized by excellent heat resistance.
Powdered High Speed Steel	NACHI symbol FAX ☐	FAX 38 FAX 55	Fine powder of the high speed steel sintered by the powder metallurgy. This method can also be used to manufacture the type of steep containing such components as V and Co.	The tissue is minute, uniform and tough. Further, excellent wear resistance is provided by such components.
Cemented Carbide	K ☐ P ☐	K 10 P 20	The major component is W. It is manufactured by sintering the TiC, TaC and Co (bonding agent) according to powder metallurgy method.	Very hard at a high temperature and excellent in wear resistance, but chips easily.
Ultrafine Grain Cemented Carbine	Z ☐	Z 20	Cemented carbide characterized in that the particle diameter of carbide such as W, Ti and Ta does not exceed 1 micron.	The toughness is higher than that of cemented carbide, but wear resistance is lower.
Thermit	NACHI symbol NAX ☐	NAX T NAX LL	The main components are carbide such as Ti and Ta, nitride and carbonitride. They are sintered with Ni and Co (binder) by powder metallurgy to produce Thermit.	Excellent in resistance to wear, heat and deposition, but susceptible to chipping. Used for high-speed cutting.
Ceramic			A sintered body (porcelain). Available in two types; alumina type mainly consisting of Al2O3 and silicon type mainly consisting of Si2N4.	Excellent wear resistance but poor toughness.
CBN Sintered Body	NACHI symbol BM ☐ BC ☐	BM 10 BC 30B	Manufactured by sintering the powder of CBN, the hardest second only to diamond, at a high temperature under super high pressure. Excellent hardness even at a high temperature.	Reaction with metal occurs very rarely. Characterized by excellent stability at a high temperature.
Diamond Sintered Body	NACHI symbol DM ☐	DM 10 DM 10F	A polycrystalline body formed by sintering powdered diamond at a high temperature under super high pressure. Characterized by excellent hardness.	Chemically stable to the workpiece made of material other than iron.

Hardness of High-Hardness Material

GUIDE TO MARK (TOOL SPECIFICATION)

	Mark	Explanation
Coating	G	G (TiN) Coating
	SG	SG (TiCN multi layer) Coating
	AG	AG (TiAlN multi layer) Coating
	AQ EX	AQ (ALCRN Base, multi layer) Coating
	AQ Mill	AQ Mill (AlTiN Base, nano layer) Coating
	GS	GS (TiAlN multi layer) Coating
	DLC	DLC Coating
	DIA	Diamond Coating
Tool Materials	HSS	High Speed Steels
	HSS Co	Cobalt High Speed Steels ⚠
	FMX	Fine Melting HSS ⚠
	FAX	High Grade Powder HSS ⚠
	PREMIUM	Vanadium HSS
	HSSE-V	Vanadium HSS
	HSSE	Cobalt/Vanadium HSS ⚠
	Carbide	Tungsten Carbide ⚠
Helix Angle	24°~30°	Helix Angle

⚠ **WARNING:** This product can expose you to chemicals including cobalt, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov

	Mark	Explanation
Flutes of Drills	HELIX N	Normal Helix Flutes
	HELIX H	High Helix Flutes
	HELIX L	Low Helix Flutes
	Variable V	Variable Helix Flutes
Drill Dimension	118°	Point Angle of Drills
		Drill Length is from Center Point
		Drill Length is from Corner Point
	OIL HOLE	Oil-hole Drills
	3FLUTE	Three Flutes Drills
Lip Relief of Drills	Conical	Shape of Lip Relief is Conical
	2RAKE	Shape of Lip Relief is Two Rake
	3RAKE	Shape of Lip Relief is Three Rake
Thinning of Drills	S-type	S-type Thinning
	N-type	Notch Thinning
	X-type	X-type Thinning
	X-type	
	XH-type	XH-type Thinning
	2RAKE+X	2Rake Relief & X-type Thinning
	2RAKE+XR	2Rake Relief & XR-type Thinning
	2RAKE+3F	3 Flutes Drills & 3F-type Thinning

GUIDE TO MARK (TOOL SPECIFICATION)

	Mark	Explanation
Tolerance of Drills Dia.		Tolerance of Drills Diameter is js6
		Tolerance of Drills Diameter is h7
		Tolerance of Drills Diameter is h8
Tolerance of Shank Dia.		Tolerance of Shank Diameter
Flutes of End Mills		Sharp Corner Type End Mills
		2 Flutes Square End Mills (Center Cut)
		3 Flutes Square End Mills (Center Cut)
		4 Flutes Square End Mills (Center Cut)
		4 Flutes Square (Center Cut)
		5 Flutes Square End Mills (Center Cut)
		6 Flutes Square End Mills (Center Cut)
		6 Flutes Square (Center Cut)
		8 Flutes Square (Center Cut)
		4 Flutes Square End Mills (with Center Hole)
		5 Flutes Square End Mills (with Center Hole)
		6 Flutes Square End Mills (with Center Hole)
		Multiple Flutes (over 8) Square End mills (with Center Hole)
		2 Flutes Radius End Mills (Center Cut)

	Mark	Explanation
Flutes of End Mills		4 Flutes Radius End mills (Center Cut)
		2 Flutes Ball Nose End mills (Center Cut)
		3 Flutes Ball Nose End mills (Center Cut)
		4 Flutes Ball Nose End mills (Center Cut)
		5 Flutes Ball Nose End mills (Center Cut)
		6 Flutes Ball Nose End mills (Center Cut)
Type of Taps		Cutting Taps
		Forming Taps
Flutes of Taps		Straight Flutes Taps
		Spiral Pointed Taps
		Normal Helix Flutes Taps
		High Helix Flutes Taps
		Low Helix Flutes Taps
Chamfer of Taps		Chamfer Length is 2.5P to 3P
		Chamfer Length is 4P to 5P (for through hole)
		Chamfer Length is 1.5P (for blind hole)
		Chamfer Length is 7P to 10 P (for through hole)
		Chamfer Length is 2.5P
		Cutting Taps for Taper Pipe
		Cutting Taps for Straight Pipe

VISUAL INDEX

DRILLS
END MILLS
TAPS

Specs/Sizes
Speeds/Feeds

AQUA DRILL EX STUB LENGTH

Carbide | AQ EX | h8 | 135° | 30° | h6

List 9600 Metric Sizes
List 9601 Fractional Sizes

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AQUA DRILL EX JOBBER LENGTH

Carbide | AQ EX | h8 | 135° | 30° | h6

List 9602 Metric Sizes
List 9603 Fractional Sizes

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P53

AQUA DRILL EX OIL HOLE 3D

Carbide | AQ EX | h7 | 135° | 24° ~30° | h6 | OIL HOLE

List 9604 Metric Sizes
List 9605 Fractional Sizes
*** New Micro Sizes!**

P54, 55
P57

AQUA DRILL EX OIL HOLE 5D

Carbide | AQ EX | h7 | 135° | 24° ~30° | h6 | OIL HOLE

List 9606 Metric Sizes
List 9607 Fractional Sizes
*** New Micro Sizes!**

P56, 57
P57

AQUA DRILL EX OIL HOLE 8D

Carbide | AQ EX | h7 | 135° | 24° ~30° | h6 | OIL HOLE

List 9608 Metric Sizes
List 9609 Fractional Sizes

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Specs/Sizes
Speeds/Feeds

AQUA DRILL EX OIL HOLE 10D

Carbide | AQ EX | 24°~30° | h7 | 140° | h6 | OIL HOLE

List 9612 Metric Sizes

P60
P63

AQUA DRILL EX OIL HOLE 15D

Carbide | AQ EX | 24°~30° | h7 | 140° | h6 | OIL HOLE

List 9614 Metric Sizes
List 9615 Fractional Sizes

NEW

P61
p63

AQUA DRILL EX OIL HOLE 20D

Carbide | AQ EX | 24°~30° | h7 | 140° | h6 | OIL HOLE

List 9616 Metric Sizes
List 9617 Fractional Sizes

NEW

P62
p63

AQUA DRILL EX OIL HOLE 25D

Carbide | AQ EX | 24°~30° | h7 | 140° | h6 | OIL HOLE

List 9618 Metric Sizes
List 9619 Fractional Sizes

NEW

P64
p65

AQUA DRILL EX OIL HOLE 30D

Carbide | AQ EX | 24°~30° | h7 | 140° | h6 | OIL HOLE

List 9620 Metric Sizes
List 9621 Fractional Sizes

NEW

P65
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AQUA DRILL EX OIL HOLE 40D

Carbide | AQ EX | 24°~30° | h7 | 140° | h6 | OIL HOLE

List 9626 Metric Sizes
List 9627 Fractional Sizes

NEW

P66
p66

AQUA DRILL EX OIL HOLE PILOT

Specs/Sizes
Speeds/Feeds

Carbide | AQ EX | 24°~30° | h7 | 150° | h6 | OIL HOLE

Pilot Drill for
L9612, L9614, L9616, L9618, L9620, L9628

List 9622 Metric Sizes
List 9623 Fractional Sizes

NEW

P67
P68

AQUA DRILL EX OIL HOLE 3 FLUTE 3D

Carbide | AQ EX | 24°~30° | js6 | 140° | h6 | OIL HOLE

List 9826

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P70

AQUA DRILL EX OIL HOLE 3 FLUTE 5D

Carbide | AQ EX | 24°~30° | js6 | 140° | h6 | OIL HOLE

List 9820

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P70

AQUA DRILL MICRO

Carbide | AQ | HELIX N | 140° | 2RAKE+X

List 9544 Metric Sizes

*** NON-COOLANT ***

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Specs/Sizes
Speeds/Feeds

AQUA DRILL EX FLAT STUB LENGTH

Carbide | AQ EX | 20° | h7 | 180° | h6

List 9610 Metric Sizes
List 9611 Fractional Sizes

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AQUA DRILL EX FLAT RADIUS

Carbide | AQ EX | 20° | h7 | 180° | h6

List 9830 Metric Sizes
List 9831 Fractional Sizes

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AQUA DRILL EX FLAT REGULAR

Carbide | AQ EX | 20° | h7 | 180° | h6

List 9818 Metric Sizes
List 9819 Fractional Sizes

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AQUA DRILL EX FLAT LONG SHANK

Carbide | AQ EX | 20° | h7 | 180° | h6

List 9816 Metric Sizes
List 9817 Fractional Sizes

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P79

AQUA DRILL EX FLAT OIL HOLE 3D

Carbide | AQ EX | 24°~30° | h7 | 180° | h6 | OIL HOLE

List 9812 Metric Sizes
List 9813 Fractional Sizes
*** New Micro Sizes!**

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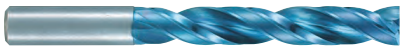
AQUA DRILL EX FLAT OIL HOLE 5D

Carbide | AQ EX | 24°~30° | h7 | 180° | h6 | OIL HOLE

List 9814 Metric Sizes
List 9815 Fractional Sizes
*** New Micro Sizes!**



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AQUA DRILL EX FLAT SUPER STUB

Carbide | AQ EX | 20° | h7 | 180° | h6

List 9628

NEW *** Japan stock item**

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AQUA DRILL EX STARTING DRILL

Carbide | AQ EX | 25° | h7

List 9624

NEW

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P86

Specs/Sizes
Speeds/Feeds

AG STARTING DRILL

HSS Co | AG | 25° | h7

List 6502

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AG STARTING DRILL EXTENDED LENGTH

HSS Co | AG | 25° | h7

List 6504

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SG-ESS DRILL MICRO

FAX | SG | h7 | HELIX N | 118° | h7

List 7572P Metric Sizes

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SG-ESS DRILL STUB LENGTH

FAX | SG | h7 | HELIX N | 118° | 135° >1.9 | 3RAKE

List 7572P Metric Sizes
List 7573P Fractional, Wire, Letter Sizes

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SG-ESR DRILL

FAX | SG | h7 | HELIX N | 135° | 2RAKE+X

List 7574P Metric Sizes
List 7575P Fractional, Wire, Letter Sizes

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*Replacing AG-SUS Drill L6594P, 6595P and SG-ES Drill L7570P, L7571P

SG DRILL OIL HOLE

FAX | SG | h8 | HELIX N | 135° | 2RAKE+X | OIL HOLE

List 7596P Metric Sizes
List 7591P Fractional Sizes

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SG-ES DRILL JOBBER LENGTH

FAX | SG | h7 | HELIX N | 135° | 2RAKE+X

List 7570P Metric Sizes
List 7571P Fractional, Wire, Letter Sizes

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*Series being DISCONTINUED, See L7574P & 7575P for replacement

Specs/Sizes
Speeds/Feeds

AG-SUS DRILL SHORT

FMX AG h7 H 135° 2RAKE 3RAKE >1.9

List 6596P Metric Sizes

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AG-SUS DRILL REGULAR

FMX AG h7 H 135° 2RAKE 3RAKE >1.4

List 6594P Metric Sizes
List 6595P Fractional Sizes

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*Series being DISCONTINUED, See L7574P & 7575P for replacement

AG POWER LONG DRILL

HSS Co AG h8 H 118° XH-type

List 6540P Metric Sizes
List 6541P Fractional Sizes

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DLC DRILL

HSS DLC h7 H 135° 2RAKE 3RAKE >1.4

List 544 Metric Sizes

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DLC DRILL MICRO

Carbide DLC h7 H 120° 2RAKE

List 9524 Metric Sizes

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DLC DRILL REGULAR

Carbide DLC h7 H 118° 2RAKE

List 9520 Metric Sizes

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STRAIGHT SHANK DRILLS

STRAIGHT SHANK DRILL SCREW MACHINE LENGTH

HSS h8 N 118° S-type Conical >1/2

List 561 General Purpose
Letter, Fractional & Wire Gauge Sizes

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HSS G h8 N 118° Conical

List 561P General Purpose
Fractional & Wire Gauge Sizes

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HSS h8 N 135° X-type Conical >5/64

List 563 Aircraft NAS907-C
Letter, Fractional & Wire Gauge Sizes

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HSS Co h8 N 135° X-type Conical >5/64

List 6563 Aircraft NAS907-C
Letter, Fractional & Wire Gauge Sizes

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STRAIGHT SHANK DRILL JOBBER LENGTH

Specs/Sizes
Speeds/Feeds

HSS h8 HELIX N 118° S-type >1/2 Conical

List 501A General Purpose
Letter, Fractional & Wire Gauge Sizes

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HSS h8 HELIX N 108° 118° S-type Conical
>0.55 >13.0

List 500 Metric Sizes

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P 132

HSS h8 HELIX N 118° S-type >1/2 Conical

List 501 General Purpose
Letter, Fractional & Wire Gauge Sizes

P**115**
P 132

HSS Co h8 HELIX N 135° X-type >5/64 Conical

List 6501 Aircraft NAS907-J
Letter, Fractional & Wire Gauge Sizes

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STRAIGHT SHANK DRILL COBALT

HSS Co h8 HELIX H 135° X-type >1.5 Conical

List 6520 Metric Sizes

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STRAIGHT SHANK DRILL G STANDARD

HSS G h8 HELIX N 118° X-type >3 Conical

List 520P Metric Sizes

P**118**
P 132

STRAIGHT SHANK DRILL JOBBER LENGTH

HSS G h8 HELIX N 118° S-type >1/2 Conical

List 501P General Purpose
Fractional & Wire Gauge Sizes

P**119**
P 132

HSS G h8 HELIX H 135° XH-type

List 517P Parabolic
Fractional & Wire Gauge Sizes

P**120**
P 133

HSS DRILLS

STRAIGHT SHANK DRILL TAPER LENGTH

Specs/Sizes
Speeds/Feeds

List 531 General Purpose Fractional Sizes

P121
P132

List 6531 General Purpose Fractional Sizes

P122
P132

List 545P Parabolic Style Fractional Sizes

P123
P133

STRAIGHT SHANK DRILL EXTRA LENGTH

List 551 Fractional Sizes

P124
P133

List 6551 Parabolic Tang Drive Fractional Sizes

P125
P133

STRAIGHT SHANK DRILL OIL HOLE

List 581 Fractional Sizes

P126
P134

TAPER SHANK DRILLS

TAPER SHANK DRILL REGULAR LENGTH

Specs/Sizes Speeds/Feeds

HSS h8 HELIX N 118° S-type >1/2 Conical

List 601 Fractional Sizes

P127
P135

TAPER SHANK DRILL EXTRA LENGTH

HSS h8 HELIX N 118° S-type >1/2 Conical

List 651 Fractional Sizes

P128
P133

TAPER SHANK DRILL OIL HOLE

HSS Co h8 HELIX N 118° N-type OIL HOLE

List 683 Fractional Sizes

P129
P135

SPECIALTY DRILLS

SILVER AND DEMING DRILL

Specs/Sizes Speeds/Feeds

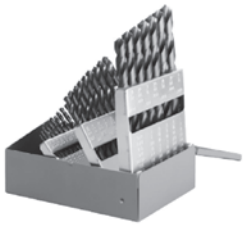
HSS h8 HELIX N 118° S-type >23/32 Conical

List 575 Fractional Sizes

P130
P135

DRILL SET JOBBER LENGTH

List 599 Letter, Fractional & Wire Gauge Sizes



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TECHNICAL REFERENCE / DRILLS

P136-139

HIGH PERFORMANCE END MILLS

Specs/Sizes
Speeds/Feeds

AQUA V MILL FOUR FLUTE

Carbide · AQ Mill · h6 · Variable V

List 9701 Fractional Sizes
List 9702 Metric Sizes

NEW

P152
P157, 158

AQUA V MILL FOUR FLUTE CORNER RADIUS

Carbide · AQ Mill · h6 · Variable V

List 9703 Fractional Sizes
List 9704 Metric Sizes

NEW

P153
P157, 158

AQUA V MILL FIVE FLUTE

Carbide · AQ Mill · h6 · Variable V

List 9705 Fractional Sizes
List 9706 Metric Sizes

NEW

P154
P159, 160

AQUA V MILL FIVE FLUTE CORNER RADIUS

Carbide · AQ Mill · h6 · Variable V

List 9707 Fractional Sizes
List 9708 Metric Sizes

NEW

P155
P159, 160

AQUA V MILL FIVE FLUTE BALL NOSE

Carbide · AQ Mill · h6 · Variable V

List 9709 Fractional Sizes
List 9710 Metric Sizes

NEW

P156
P159, 160

AQUA MILL HARD

Carbide · AQ Mill · h6 · HELIX H · > 1/2, >12

List 9711 Fractional Sizes
List 9712 Metric Sizes

NEW

P161
P164

AQUA MILL HARD CORNER RADIUS

Carbide · AQ Mill · h6 · HELIX H · > 1/2, 4,6,8

List 9713 Fractional Sizes
List 9714 Metric Sizes

NEW

P162
P164

AQUA MILL HARD BALL NOSE

Carbide · AQ Mill · h6 · HELIX L

List 9715 Fractional Sizes
List 9716 Metric Sizes

NEW

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P165

ALH MILL

Carbide h6 HELIX H

List 9717 Fractional Sizes
List 9718 Metric Sizes

NEW

Specs/Sizes
Speeds/Feeds

P166
P169, 170

ALH MILL CORNER RADIUS

Carbide h6 HELIX H

List 9719 Fractional Sizes
List 9720 Metric Sizes

NEW

P167
p169, 170

ALH MILL BALL NOSE

Carbide h6 HELIX H

List 9721 Fractional Sizes
List 9722 Metric Sizes

NEW

P168
p169, 170

NEW NACHI End Mill Series

Specs/Sizes
Speeds/Feeds

DLC MILL

HSS Co | DLC | HELIX H

List 6231HD Fractional Sizes

P171
p171

AG-MILL ROUGHING

HSS Co | AG | HELIX N

List 6485 Fractional Sizes

P172
p172

AG-MILL HEAVY

HSS Co | AG | HELIX H

List 6403 Fractional Sizes

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p173

ROUGHING AND FINISHING (HEAVY DUTY) END MILL

HSS Co | HELIX N

List 6367

P174
p175

HSS Co | SG | HELIX N

List 6367X

P174
p175

ROUGHING (HOG) END MILL

HSS Co | HELIX N

List 6303

P176
p178

HSS Co | SG | HELIX N

List 6303X

P176
p178

HSS Co | HELIX N

List 6307

P177
p178

Specs/Sizes
Speeds/Feeds

TWO FLUTE END MILL SINGLE END

HSS Co · HELIX N

List 6231

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p181

HSS Co · SG · HELIX N

List 6231X

P179
p181

TWO FLUTE END MILL LONG SINGLE END

HSS Co · HELIX N

List 6233

P180
p181

TWO FLUTE END MILL SINGLE END

HSS Co · HELIX N

List 6230

P180
p181

FOUR FLUTE END MILL SINGLE END

HSS Co · HELIX N

List 6210

P182
p185

MULTI FLUTE END MILL REGULAR SINGLE END, CENTER CUTTING

HSS Co · HELIX N

List 6211M

P183
p185

HSS Co · SG · HELIX N

List 6211X

P183
p186

MULTI FLUTE END MILL LONG SINGLE END, CENTER CUTTING

HSS Co · HELIX N

List 6213

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p185

TECHNICAL REFERENCE / END MILLS

P187-189

HIGH PERFORMANCE TAPS

SGSP-DIN TAP SPIRAL FLUTED

FAX SG 45° TAPS FLUTE NH MB CHAMFER

List 6800 Metric Sizes
List 6801 Machine Screw and Fractional Sizes

NEW

Specs/Sizes Speeds/Feeds

P200, 201
p200

SGPO-DIN TAP SPIRAL POINTED

FAX SG TAPS FLUTE SP P CHAMFER

List 6802 Metric Sizes
List 6803 Fractional and Machine Screw Sizes

NEW

P202, 203
p202

SG LO TAP SPIRAL FLUTED

HSSE SG TAPS FLUTE L MB CHAMFER

List 6958 Metric Sizes
List 6959 Fractional and Machine Screw Sizes

P204, 205
p204

DLC TAFLET TAP THREAD FORMING

HSSE-V DLC B CHAMFER

List 6956 Metric Sizes
List 6955 Fractional Sizes
List 6957 Machine Screw Sizes

P206, 207
p206

VIPER TAFLET

VIPER TAFLET FOR STEEL

Specs/Sizes Speeds/Feeds

HSSE-V P CHAMFER B CHAMFER

List 996 Metric Sizes

P208
p213

HSSE-V P CHAMFER B CHAMFER

List 995 Fractional Sizes
List 995 Machine Screw Sizes

P209, 210
p213

TAPS

VTP TAPS

VTP TAP SPIRAL FLUTED

HSSE-V · TAPS FLUTE NH · MB CHAMFER

List 980	Metric Sizes
List 981	Fractional Sizes
List 983	Machine Screw Sizes

Specs/Sizes Speeds/Feeds

P211 p213
P212 p213

*Replacing Viper T Series Taps

VTP TAP SPIRAL POINTED

HSSE-V · TAPS FLUTE SP · P CHAMFER

List 982	Metric Sizes
List 971	Fractional Sizes
List 973	Machine Screw Sizes

P211 p213
P213 p213

*Replacing Viper T Series Taps

VIPER T-SERIES

VIPER T SERIES SPIRAL FLUTED

HSSE-V · TAPS FLUTE NH · MB CHAMFER — General Purpose

List 7980	Metric Sizes
List 7981	Fractional and Machine Screw Sizes

Specs/Sizes Speeds/Feeds

P214 p219
P215 p219

*Series being DISCONTINUED, See VTP Series for replacement

VIPER T SERIES SPIRAL POINTED

HSSE-V · TAPS FLUTE SP · P CHAMFER — General Purpose

List 7970	Metric Sizes
List 7971	Fractional and Machine Screw Sizes

P214 p219
P216 p219

*Series being DISCONTINUED, See VTP Series for replacement

VIPER T TAP SERIES SPIRAL FLUTED

HSSE · TAPS FLUTE NH · MB CHAMFER

List 7982	Metric Sizes
List 7987	Fractional and Machine Screw Sizes

P217 p219
P218 p219

*Series being DISCONTINUED, See VTP Series for replacement

VIPER T TAP SERIES SPIRAL POINTED

HSSE · TAPS FLUTE SP · P CHAMFER

List 7972	Metric Sizes
List 7977	Fractional and Machine Screw Sizes

P217 p219
P219 p219

*Series being DISCONTINUED, See VTP Series for replacement

STANDARD TAPS

Specs/Sizes
Speeds/Feeds

STANDARD HAND TAP

HSS · TAPS FLUTE ST · T CHAMFER · P CHAMFER · B CHAMFER

List 911 Fractional Sizes

P220 p228

HSS · TAPS FLUTE ST · T CHAMFER · P CHAMFER · B CHAMFER

List 913 Machine Screw Size

P221 p228

STANDARD TAP SPIRAL POINTED

HSS · TAPS FLUTE SP · P CHAMFER

List 921 Fractional Sizes

P222 p228

STANDARD HAND TAP FOR CAST IRON

HSS · TAPS FLUTE ST · P CHAMFER · B CHAMFER

List 969

P222 p228

STANDARD TAP SPIRAL POINTED

HSS · TAPS FLUTE SP · P CHAMFER

List 923 Machine Screw Sizes

P223 p228

STANDARD HAND TAP

HSS · TAPS FLUTE ST · T CHAMFER · P CHAMFER · B CHAMFER

List 910 Metric Sizes

P224 p228

STANDARD TAP SPIRAL POINTED

HSS · TAPS FLUTE SP · P CHAMFER

List 920 Metric Sizes

P224 p228

TAPER PIPE TAPS

Specs/Sizes
Speeds/Feeds

TAPER PIPE TAP STRAIGHT FLUTED

HSS | TAPS FLUTE ST | TAPER PIPE

List 941 (NPT)
List No. 941D (NPTF)

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p228

TAPER PIPE TAP INTERRUPTED

HSS | TAPS FLUTE ST | TAPER PIPE

List No. 943 (NPT)
List No. 943D (NPTF)

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TAPER PIPE TAP SPIRAL FLUTED

HSSE-V | TAPS FLUTE L | TAPER PIPE

List 947 (NPT)
List No. 947D (NPTF)

P226
p228

STRAIGHT PIPE TAP STRAIGHT FLUTED

HSS | TAPS FLUTE ST | STRAIGHT PIPE

List No. 945 (NPS)
List No. 945D (NPSF)

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p228

TAPER PIPE TAP SHORT PROJECTION

HSS | TAPS FLUTE ST | TAPER PIPE

List 959 (NPT)
List No. 959D (NPTF)

P227
p228

TAPER PIPE TAP 6” EXTENSION

HSS | TAPS FLUTE ST | TAPER PIPE

List 957 (NPT)

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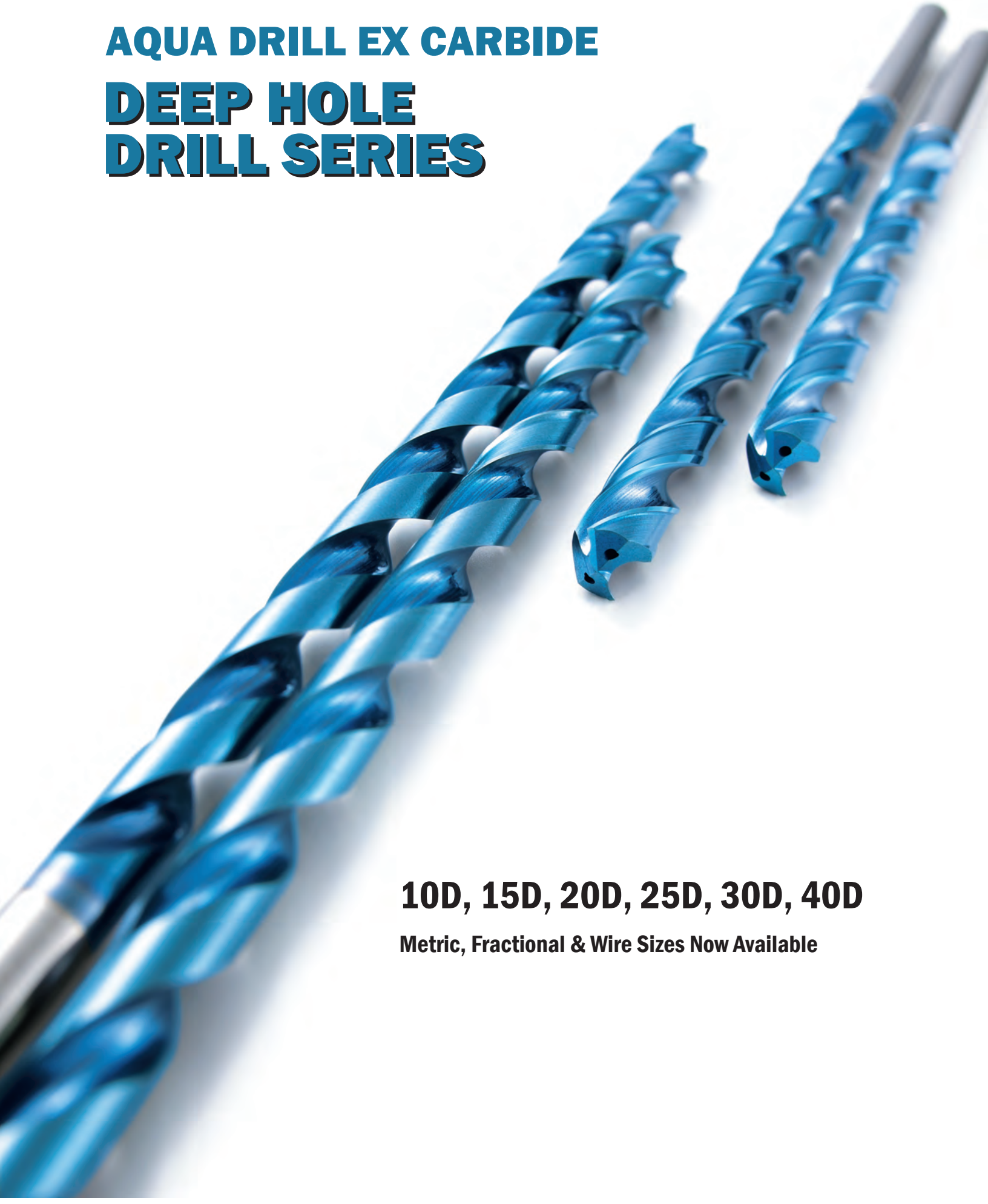
p228

TECHNICAL REFERENCE / TAPS

P228-238

AQUA DRILL EX CARBIDE

DEEP HOLE DRILL SERIES



10D, 15D, 20D, 25D, 30D, 40D

Metric, Fractional & Wire Sizes Now Available

DRILLS

Features

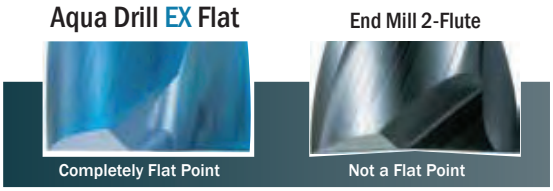
- One drill does it all - eliminates the need to use a “center drill” or “end mill” on inclined or curved surfaces.
- True 180° flat cutting edges create minimal exit burr in tubing and thin plates
- Ideally suited for flat bottom applications in the Oil, Gas, Automotive and General Industries.
- “Double Margin” for stable and precision drilling.

New Features on 3D/5D/Extd. Length:

- Double Margin
- Corner Chamfer
- Added Stability & Tool Life

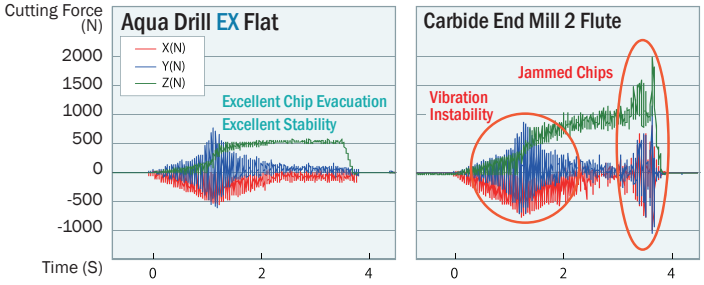
180° True Flat Face

One cut to produce accurate counter bore surface



Drilling Performance of Aqua Drill EX Flat

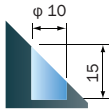
Excellent Hole Drilling Performance



AQDEXZ 10.0 Test Data

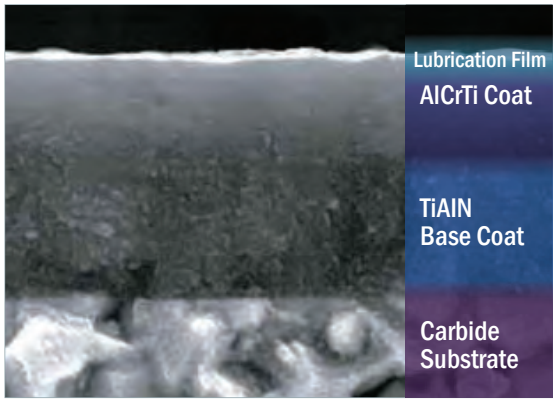
Cutting Condition

Tool	AQDEXZ 10.0
(SFM) RPM	(250) 2400
(IPR) IPM	(.002) 6.0
Material	Carbon Steel
Coolant	Water Soluble

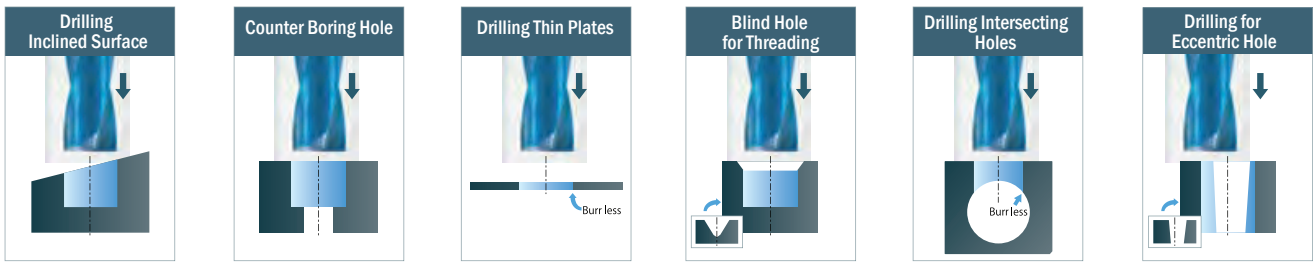


Aqua EX Coating

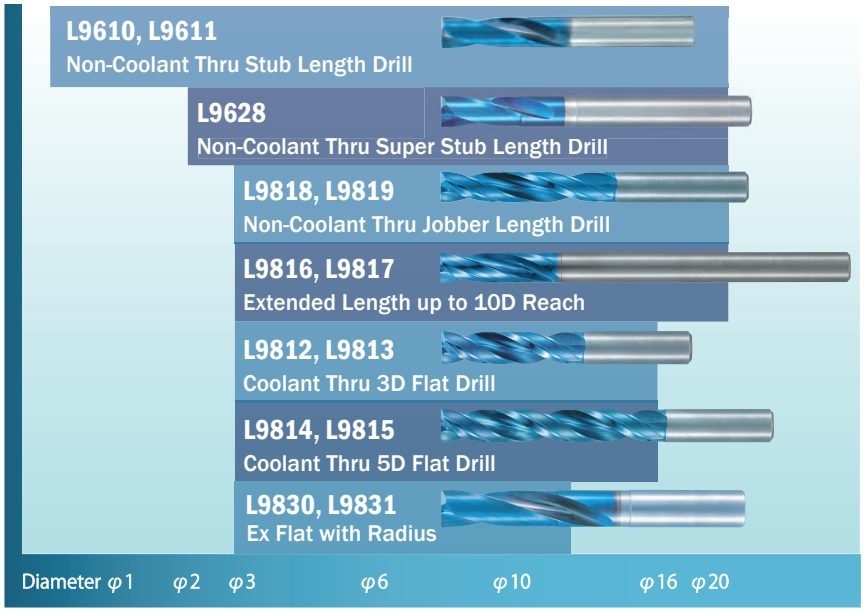
Improved Heat & Wear Resistance



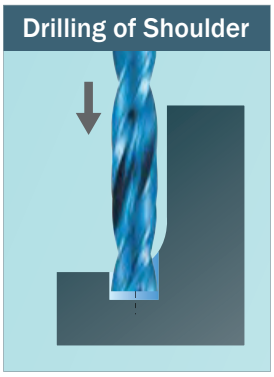
One Step Drilling with Minimal Burr

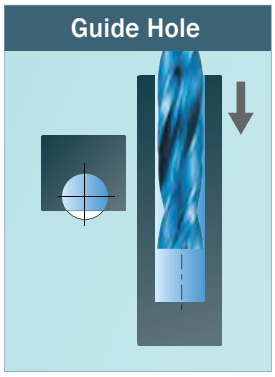


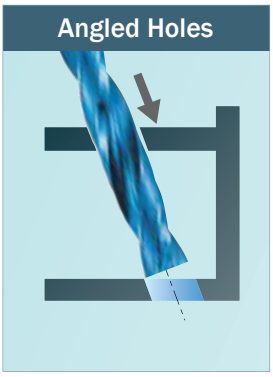
SS400 Wear after 105m (4100")

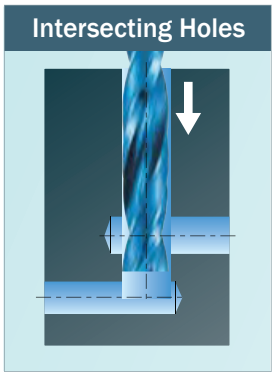


List No.	Diameter Metric	Diameter Fractional
L9610 L9611	0.2 - 20.0	1/8 - 3/4
L9628	2.0 - 20.0	
L9818 L9819	3.0 - 20.0	1/8 - 3/4
L9816 L9817	3.0 - 20.0	1/8 - 3/4
L9812 L9813	3.0 - 16.0	1/8 - 3/4
L9814 L9815	3.0 - 16.0	1/8 - 5/8
L9830 L9831	3.0 - 12.0	1/8 - 3/4









Applicable Work Materials

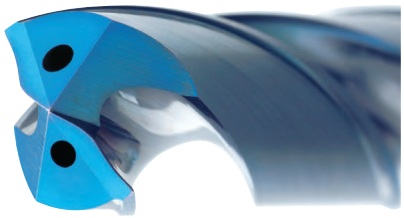
Work Material	Structural Steels	Carbon Steels	Pre-Hardened Steels Alloy Steels	Hardened Steels Mold Steels	Hardened Steels		Stainless Steels		Titanium Alloys Nickel Alloys	Cast Irons	Aluminum Alloys	Copper Alloys
	SS400	S45C	SCM/NAK	30~40HRC	40~50HRC	50~60HRC	SUS304/SUS316	SUS420		FC/FCD	AC/ADC	CU
AQDEXZ AQDEXZR AQDEXZLS	○	○	○	○	●			○		○	●	●
AQDEXZOH3D AQDEXZOH5D	○	○	○	○	●		●	○	●	○	○	○

○: Great ●: Good

*More information for **Aqua Drill EX Flat** can be found on pages 73-85*

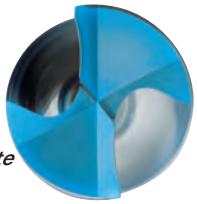
Features

- Designed for consistent high performance drilling in stainless steels to high temperature alloys.
- Unique J-shape flute design helps to generate easy chip break up.
- Smooth flute polishing facilitates fluid chip evacuation.
- Deep pockets ensure minimal chip packing.



Aqua EX Drill Series Coating

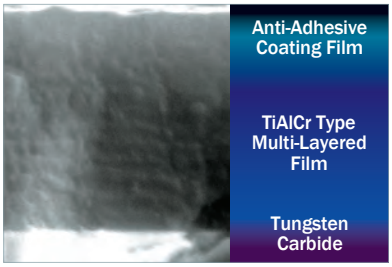
- Aqua EX coating is designed for superior performance in both dry and wet conditions.
- EX = Exotic materials, extreme conditions.
- Engineered to withstand heavy wear and maintain consistent performance.



Smooth Flute *Deep Pocket*

True Blue

AQUA EX Coating

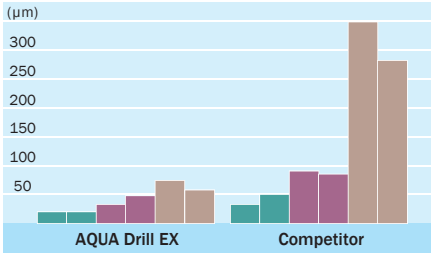


Flowing curve

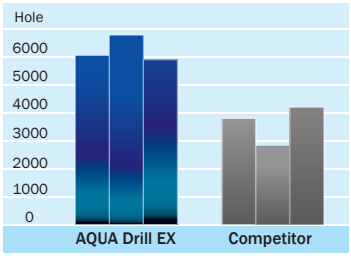
Long Tool Life

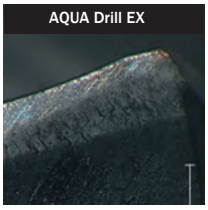
Cutting Resistance is Low

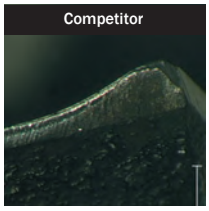
Durability Comparison



Durability Comparison
(Service Life)

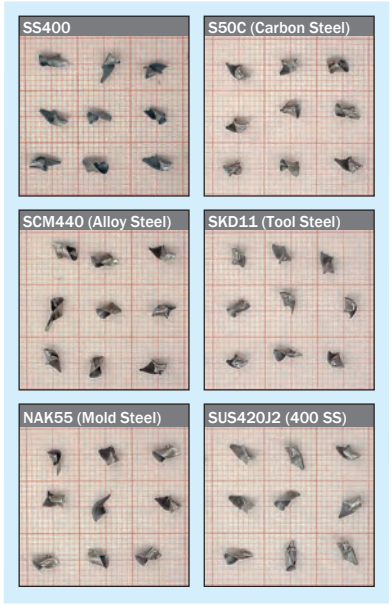






Cutting Condition	
Tool	AQDEXR6.0 (L9602)
Speed	100m/min (RPM=5300)
Feed	0.18mm/rev (960mm/min)
Feed	0.007 IPR / 21.0 IPM
Work Material	S50C (Carbon Steel)
Cutting Fluid	Water Soluble

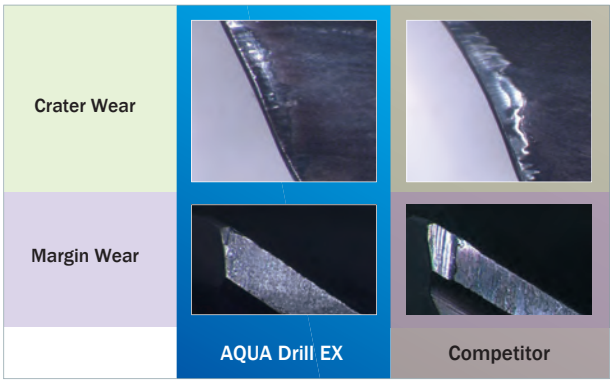
Fine Chips with AQUA DRILL EX



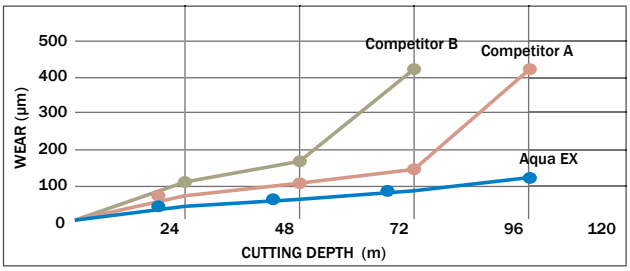
Tool Life Features

Delicate Cut - Tough Heart

Comparison of Wear After 625 Holes in 304 SS



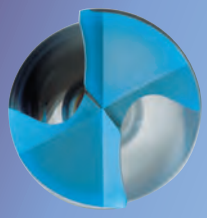
Comparison of Wear on 304 SS



Cutting Condition					
Tool	Ø9.0 5D	**Feed**	640mm/min (IPR = 0.008 / IPM = 25)	**Work Material**	304 Stainless
Speed	90m/min (RPM = 3,200)	**Depth**	40mm (1.57")	**Cutting Fluid**	Water Soluble

NEW AQUA DRILL EX DESIGN VS. AQUA DRILL

AQUA Drill EX (New Design)



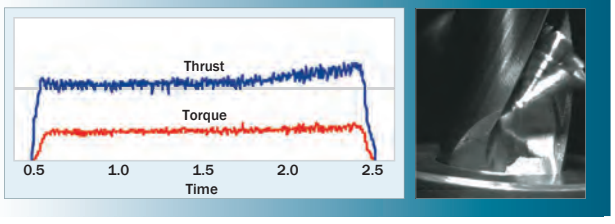
- Engineered to handle the full range of applications.
- Aqua EX coating stands up to the highest temperatures.
- Optimal design for hard materials like Nickel / Titanium alloys.
- From start to finish designed with optimum chip evacuation in mind.

AQUA Drill (Old Design)

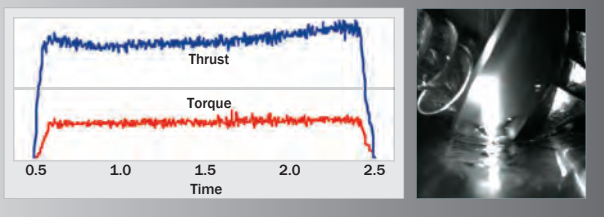
- Special cutting edge shape has superior wear resistance.
- High web thickness to increase tool rigidity
- Innovative AQUA coating was the first of it's kind.
- Not suitable for Stainless Steel

TORQUE / THRUST COMPARISON

AQUA Drill EX



Competitor

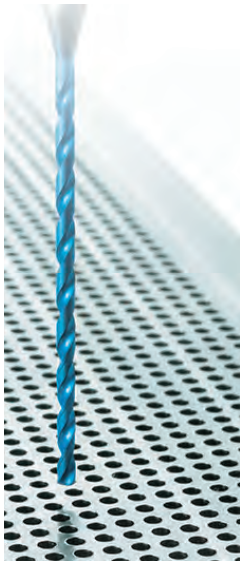


Consistent Thrust & Torque with Aqua Drill EX

*More information for **Aqua Drill EX** can be found on pages 50-59*

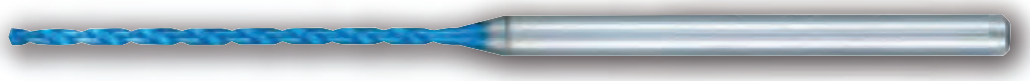
Features

- Oil-Hole Drills for high efficiency drilling of small diameter deep holes
- Stable drilling of small diameter holes with new cutting edge geometry and large oil holes for efficient chip evacuation
- Suitable for wide work materials like Carbon Steels, Alloy Steels and Stainless Steels
- Multi-layered Aqua Ex Coating (TiALN+TiAlCr) plus anti-adhesive coating film for added lubrication

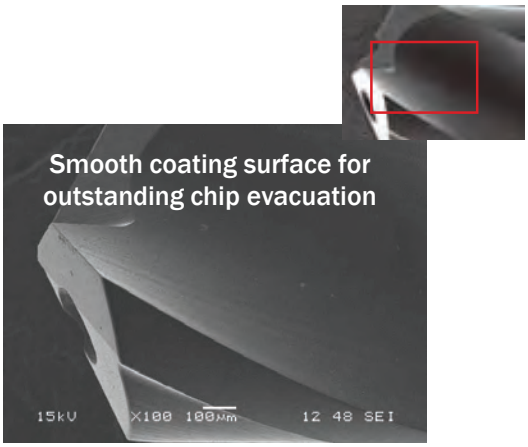


Performance

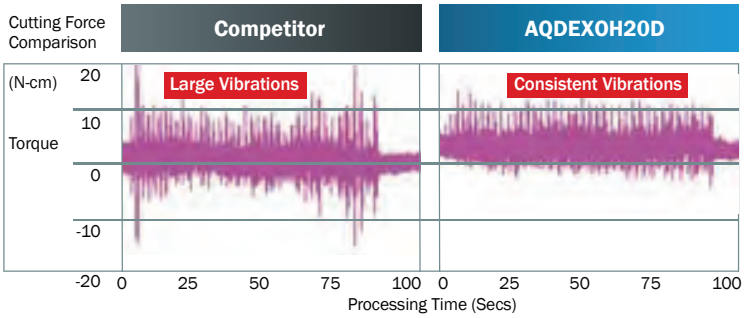
- New Oil Hole Design delivers coolant directly to the cutting edges
- New Cutting-Edge geometry breaks chips effectively
- Extremely smooth Aqua EX coating evacuates chips smoothly



Smooth Drill Flute Surface



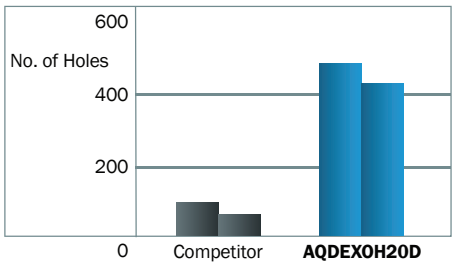
Stable Drilling of Deep Holes

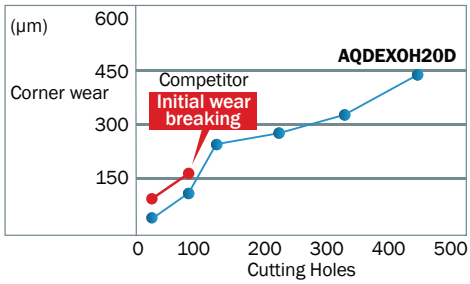


Cutting Condition

Tool Ø	Ø1.8	**Coolant Type**	Water Soluble - Coolant Thru
Cutting Speed	150 SFM (45m/min)	**Hole Depth**	38.1 mm (1.5") (20D) Blind Hole
Feed	0.003 IPR (310mm/min)	**Step Feed Interval**	0.17" (0.45 mm) / 0.25D
Work Material	Carbon Steel (S50C)	**Guide Hole**	AQDEXOHPLT01815 for 1.8 mm Hole

Long Tool Life





Cutting Condition

Tool Ø	Ø2.0
Cutting Speed	150 SFM (45m/min)
Feed/Speed	0.003 IPR (310mm/min)
Hole Depth	38.1 mm (1.5") (20D) Blind Hole
Step Feed Interval	0.17" (0.45 mm) / 0.25D
Coolant Type	Water Soluble - Coolant Thru
Guide Hole	AQDEXOHPLT02015 for 2.0 mm Hole

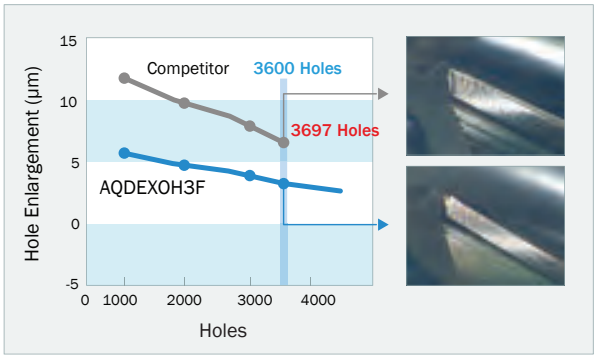
*More information for **Aqua Drill EX Micro Coolant Thru** can be found on pages 60-66*

Features

- High Precision drilling as deep as 5xD of drill.
- High accuracy achieved at high feed rate with optimized cutting edge form and superior drilling balance of 3-flutes.
- Multi-layered Aqua EX Coating (TiAlN + TiAlCr)
- Anti-adhesive coating film for added lubrication

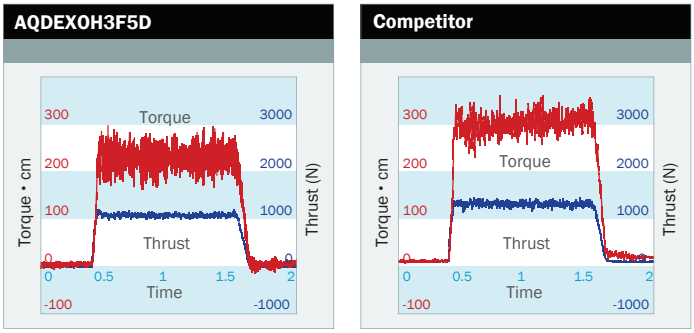
Performance

Hole Enlargement

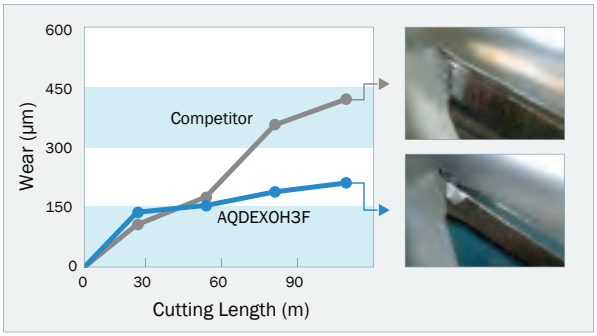


Comparison of Cutting Force

Cutting force is small, and controls amount of oversize.



SS400 Wear After 105m (4100")



Cutting Condition

Tools Ø	Ø6	400 Stainless (SS400)	Work Material
Speed	328 SFM (100m/min)	Water Soluble	Type of Coolant
Feed	50 IPM 1280mm/min (0.24mm/rev)	30mm - 1.2" (5D)	Depth/Blind Hole

Cutting Condition

Tools Ø	Ø6	Carbon Steel (S50C)	Work Material
Speed	400 SFM (120m/min)	Water Soluble	Type of Coolant
Feed	59 IPM 1500mm/min (0.24mm/rev)	30mm - 1.2" (5D)	Depth/Blind Hole

SUS304 Wear After 60m (2360")

Cutting Condition

Tools Ø	Ø6	304 Stainless (SUS304)	Work Material
Speed	164 SFM (50m/min)	Water Soluble	Type of Coolant
Feed	18 IPM 480mm/min (0.18mm/rev)	30mm - 1.2" (5D)	Depth/Blind Hole

Applicable Work Materials

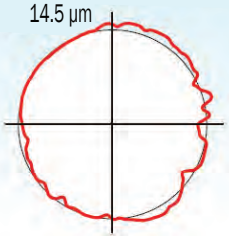
Structural Steels	Carbon Steels	Pre-Hardened Steels Alloy Steels	Hardened Steels Mold Steels	Hardened Steels		Stainless Steels		Titanium Alloys Nickel Alloys	Cast Irons	Aluminum Alloys	Copper Alloys
SS400	S45C/S50C	SCR/NAK	30～40HRC	40～50HRC	50～65HRC	SUS304/SUS316	SUS420		FCD/FC	AC/ADC	Cu
○	○	○	○	○	X	●	●	X	●	●	●

○ Great ● Good X Not Suitable

Performance

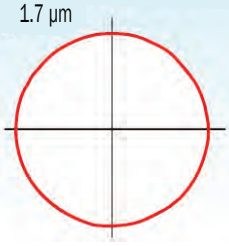
2-Flute Drill

Cutting Speed	150 SFM (45m/min)
Feed Speed	0.010 IPR - 12 IPM (300mm/min)
Roundness	14.5 µm



AQDEXOH3F

Cutting Speed	170 SFM (50m/min)
Feed Speed	0.017 IPR - 22 IPM (570mm/min)
Roundness	1.7 µm



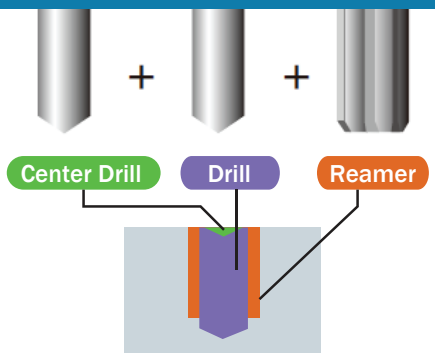
Cutting Condition

Tool Diameter	Ø 12 mm
Hole Depth/Blind Hole	36 mm (1.4")
Work Material	SUS304
Cutting Fluid	Water Soluble

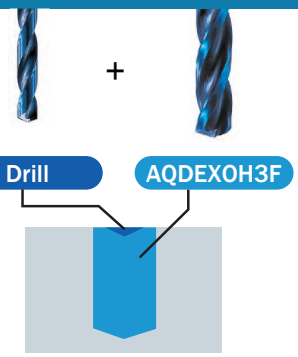
Superior Hole Finish

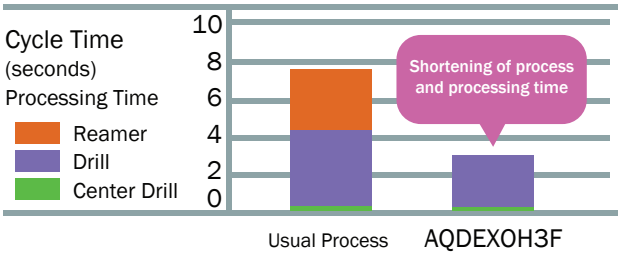
Streamline Process & Reduce Cycle Time

Usual Process



AQDEX OH3F





Cutting Condition

Diameter of Hole	Ø12 H7
Hole Depth	20 mm
Work Material	Carbon Steel

*More information for **Aqua Drill EX Oil-Hole 3 Flute** can be found on pages 69, 70*

Features

- Utilizes a high accuracy shape of lip relief (3 rake, 2 rake + x-thinning)
- Made from premium powder metal with Composite Multi-Layer SG Coating (TiCN)
- End mill style shanks for highly precise and accurate drilling

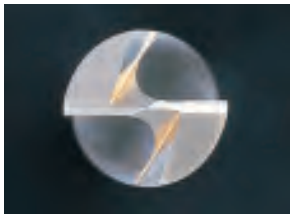
Work Materials

- Structural Steels
- Alloy Steels
- Cast Irons
- Carbon Steels
- Stainless Steels
- Aluminum Alloys

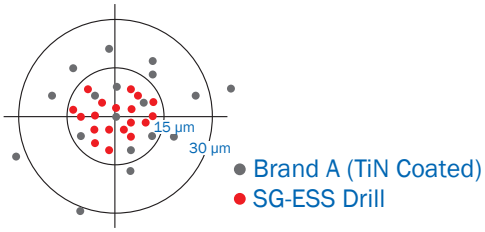
Performance

- Streamline the process and reduce machining time dramatically.
- Eliminate the center drill operation with our SG-ESS drills (Stub length)
- Stable positioning within 0.0006" (15µm)
- Faster feed & speed rates than regular HSS-Co drills
- Better cost performance than carbide drills

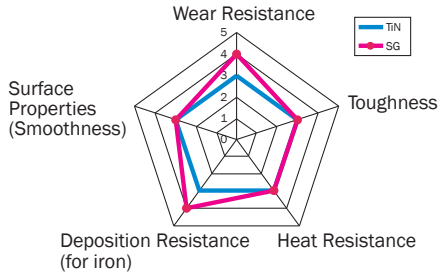
SG-ESS Drills (Stub Length)
Self Centering Point:



Positioning

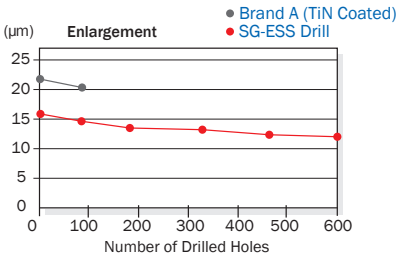


Characteristics of SG Coating



Composite multi-layer film coating method characterized by improved wear resistance as compared to TiN.

Performance and Cutting Data of SG Drill Series



Cutting Condition

Drill Dia	9.0mm.
Hole Depth	32mm
Cutting Speed	20m/min. (65.6 SFM)
Feed	142mm/min (5.6 IPM)
Work Piece Material	Alloy steel (300HB)
Machine	Vertical machining center

*More information for **SG ESS Drill** can be found on pages 88-93*

Features

- Premium PM-Cobalt Substrate with composite SG Coating (Tin+Ticn)
- Equals Solid Carbide Drill in performance due to tough PM Cobalt Substrate

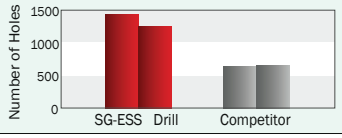
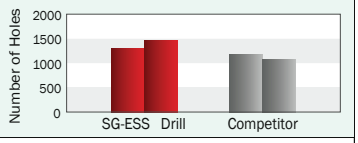
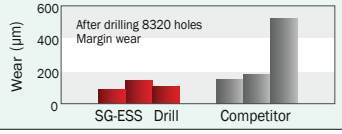
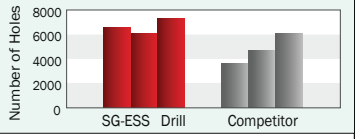
Work Materials

- Structural Steels
- Alloy Steels
- Cast Irons
- Carbon Steels
- Stainless Steels
- Aluminum Alloys

Performance

- 30 - 40% more tool life than conventional HSS/HSCO micro drills.
- 3mm diameter end mill style shanks for highly precise and accurate drilling.
- Precision ground end mill style shank for accurate and precision drilling.

Drilling Performance of SG-ESS Micro Drill

Diameter	Carbon Steel	304 Stainless Steel
0.5 mm	 **SFM (RPM)** 80 (15,500) **Feed** 0.0006 ipr / 9.3 ipm **Hole Depth** 1.5mm (Blind Hole) **Cutting Fluid** Water solube	 **SFM (RPM)** 26 (5000) **Feed** 0.0004 ipr / 2.0 ipm **Hole Depth** 1.5mm (Blind Hole) 0.25mm-peck depth **Cutting Fluid** Water Solube
0.99 mm	 **SFM (RPM)** 80 (8,000) **Feed** 0.0015 ipr / 12 ipm **Hole Depth** 1.5mm (Blind Hole) **Cutting Fluid** Water Solube	 **SFM (RPM)** 30 (3,200) **Feed** 0.001 ipr / 2.5 ipm **Hole Depth** 3mm (Blind Hole) 0.5mm-peck depth **Cutting Fluid** Water Solube

Applicable Work Materials

Drill Name	Structural Steels	Carbon Steels	Alloy Steels Pre-hardened Steels	Hardened Steels Mold Steels	Hardened Steels		Stainless Steels		Titanium Alloys Nickel Alloys	Cast Irons	Aluminum Alloys	Copper Alloys
	SS400	S45C/S50C	SCR/NAK	30~40HRC	40~50HRC	50~65HRC	304SS/316SS	400-Series		FCD/FC	AC/ADC	Cu
SGESS Drill	○	○	○	○	X	X	○	○	●	○	○	○

○: Great ●: Good X: Not Suitable

*More information for **SG Micro Drill** can be found on pages 88-93*

Features

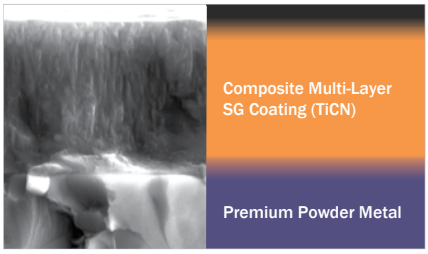
- 4-Facet self-centering point
- Designed & Engineered for drilling Stainless Steel & Hi-Temp Alloys
- Made from Premium powdered metal cobalt substrate
- Composite Multi-layer SG Coating (Tin+TiCN)
- Precision ground end mill style shank for accurate and precision drilling.

Work Materials

- Hi-temp Alloys
- Stainless Steels
- Alloy Steels
- Aluminum Alloys
- Carbon Steels
- Cast Irons
- Structural Steels
- Brass & Bronze

Performance

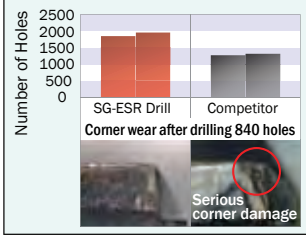
- Equals Solid Carbide drill in performance in Stainless, Inconel & Titanium.
- 30 ~ 40% Cheaper than Carbide Drills
- Self-centering point eliminates need for center drill operations.



SG Coating (Tin+TiCN)

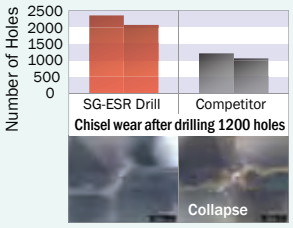
Well Suited for Drilling:

Tool Life in Carbon Steel



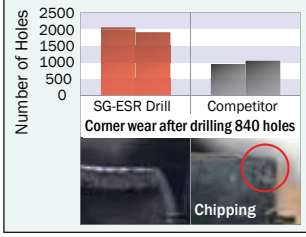
Cutting Condition	
Drill Diameter	6mm
SFM (RPM)	130 (2100)
Feed	0.008 ipr / 16.5 ipm
Work Material	Carbon Steel
Hole Depth	19mm (Through Hole)
Cutting Fluid	Water soluble

Tool Life in Alloy Steel



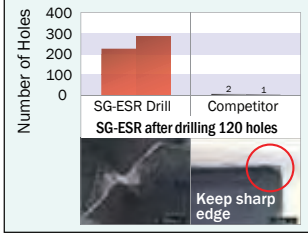
Cutting Condition	
Drill Diameter	2mm
SFM (RPM)	90 (4,400)
Feed	0.004 ipr / 15.7 ipm
Work Material	Alloy Steel (32 HRC)
Hole Depth	6mm (Blind Hole)
Cutting Fluid	Water Soluble

Tool Life in 400-Series Stainless



Cutting Condition	
Drill Diameter	6mm
SFM (RPM)	130 (2100)
Feed	0.007 ipr / 15.7 ipm
Work Material	400-Series Stainless
Hole Depth	19mm (Through Hole)
Cutting Fluid	Water soluble

Tool Life in 304 Stainless Steel



Cutting Condition	
Drill Diameter	12mm
SFM (RPM)	40 (320)
Feed	0.010 ipr / 3.1 ipm
Work Material	304 Stainless Steel
Hole Depth	28mm (Through Hole)
Cutting Fluid	Water soluble

Applicable Work Materials

Drill Name	Structural Steels	Carbon Steels	Alloy Steels Pre-hardened Steels	Hardened Steels Mold Steels	Hardened Steels		Stainless Steels		Titanium Alloys Nickel Alloys	Cast Irons	Aluminum Alloys	Copper Alloys
	SS400	S45C/S50C	SCR/NAK	30~40HRC	40~50HRC	50~65HRC	304SS/316SS	400-Series		FCD/FC	AC/ADC	Cu
SGESR Drill	○	○	○	●	X	X	○	○	●	○	○	○

○: Great ●: Good X: Not Suitable

*More information for **SG ESR Drill** can be found on pages 94-96*

Features

New Style Parabolic Drills

- Flute geometry and coating enables non pecking deep hole drilling up to 20XD.
- AG Coating (TiAlN) and HSS-Co material increases tool life.

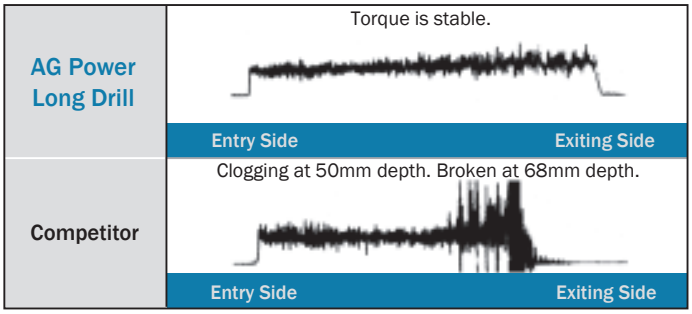
Work Materials

- Carbon Steels
- Mold Steels
- Cast Irons
- Alloy Steels
- Hardened Steels (under 40HRC)

Performance

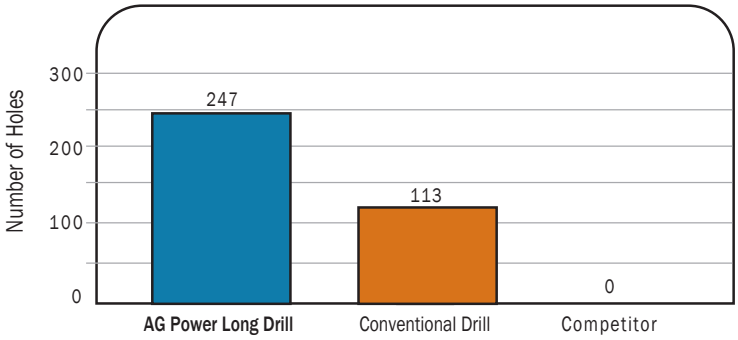
AG Power Long Drill vs. Standard Drill

Stable Torque



Cutting Condition	
Drill Dia.	6 mm (0.236in)
Material	1050 (217HB) S50C
Hole Depth	102 mm (4.01in : 17D) through
Speed	1590 rpm (98 SFM)
Feed	0.1mm/rev (6.26 IPM)
Pecking	non
Coolant	Emulsion

Long Tool Life



*More information for **AG Power Long Drill** can be found on pages 103, 104*

Features

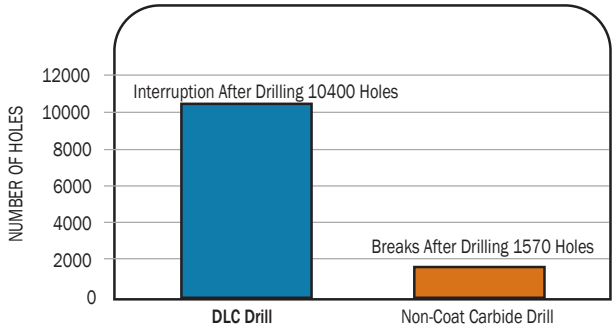
- Utilizes high accuracy shape of lip relief (2 rake thinning)
- Utilizes flute geometry resulting in excellent chip control and dry milling with no edge build-up
- End mill style shanks for highly precise and accurate drilling

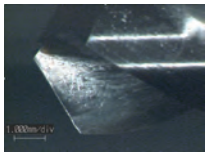
Work Materials

- Aluminums
- Aluminum Alloy Casting
- Copper Alloys
- Aluminum Alloys
- Aluminum Alloy Die-Casting

Performance

Wet Drilling By DLC Drill

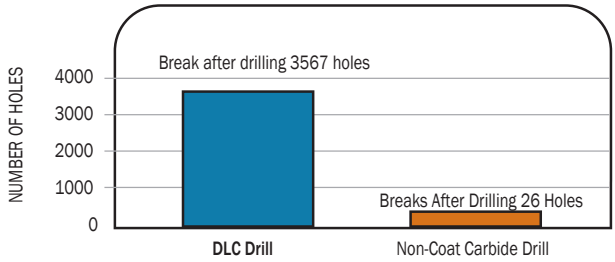


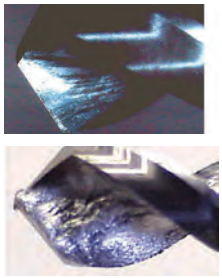


Small wear after drilling 10400 holes

Cutting Condition	
Drill Dia.	5.5 mm (0.2165 in)
Material	AlMg2.5 (A5052)
Hole Depth	27.5 mm (1.06 in) blind
Speed	100m/min (328 SFM)
Feed	0.08mm/rev (18.26 IPM)
Coolant	Emulsion

Dry Drilling By DLC Drill





Cutting Condition	
Drill Dia.	5.5 mm (0.2165 in)
Material	ADC12
Hole Depth	16.5 mm (0.65 in) blind
Speed	100m/min (328 SFM)
Feed	0.08mm/rev (18.26 IPM)
Coolant	Dry

Reading Your Drill Chips

When drilling, your chips will tell you a story. It is a common thought that running a drill at a slower feed or speed is “safer”, but that is not always the case. Sometimes, it can even be worse than running the drill too fast.

0.5% Dc | 2.0% Dc | 1.0% Dc | 3.0% Dc

Chip shape will tell you a lot. The ideal shape for a chip can be described as “6’s and 9’s”. This means that the chip is short, like the tail of a 6, but curls up. Above there is an example of chips from some carbon steel. These pictures show that a slow speed did not help with tool life, but actually created improper chips that led to a decrease in tool life and poor quality hole. To the right, there is an example of how too slow a feed can cause the chisel of the drill to walk, creating an imperfect hole.

1.0% Dc | 2.0% Dc | 3.0% Dc

*More information for **DLC Drill** can be found on pages 105-108*

HIGH PERFORMANCE DRILLS

LIST No.		Drill Name	Material	Coating		Stock Size	Product Page
Aqua Drill EX							
9600, 9601		**Stub Length**	Carbide	AQUA EX	Metric Fractional	2.0 to 16.0 1/8 to 5/8	p.50, 51
9602, 9603		**Jobber Length**			Metric Fractional	2.0 to 16.0 1/8 to 5/8	p.52, 53
Aqua Drill EX Oil Hole							
9604, 9605		**3D**			Metric Fractional	1.0 to 16.0 1/8 to 5/8	p.54, 55
9606, 9607		**5D**			Metric Fractional	1.0 to 16.0 1/8 to 5/8	p.56, 57
9608, 9609		**8D**			Metric Fractional	3.0 to 16.0 1/8 to 5/8	p.58, 59
9612		**10D**			Metric	1.0 to 12.0	p.60
9614, 9615		**15D**			Metric Fractional	1.0 to 12.0 1/8 to 9/16	p.61
9616, 9617		**20D**			Metric Fractional	1.0 to 10.0 1/8 to 25/64	p.62
9618, 9619		**25D**			Metric Fractional	3.0 to 8.0 1/8 to 3/8	p.64
9620, 9621		**30D**			Metric Fractional	3.0 to 8.0 1/8 to 5/16	p.65
9626, 9627		**40D**			Metric Fractional	3.0 to 7.0 1/8 to 5/16	p.66
9622, 9623		**Pilot**			Metric Fractional	1.015 to 12.03 1/8 to 9/16	p.67
Aqua Drill EX Oil Hole 3 Flute							
9826		**3D**			Metric	3.0 to 16.0	p.69
9820		**5D**			Metric	3.0 to 16.0	p.70
Aqua Drill Micro							
9544		**Micro**	Carbide	AQUA	Metric	.20 to 1.99	p.71, 72
Aqua Drill EX Flat							
9610, 9611		**Stub Length**	Carbide	AQUA EX	Metric Fractional	0.2 to 20.0 1/8 to 3/4	p.73, 74
9830, 9831		**Radius**			Metric Fractional	3.0 to 12.0 1/8 to 3/4	p.75
9818, 9819		**Jobber Length**			Metric Fractional	3.0 to 20.0 1/8 to 3/4	p.77
9816, 9817		**Long Shank**			Metric Fractional	3.0 to 20.0 1/8 to 3/4	p.78
Aqua Drill EX Flat Oil Hole							
9812, 9813		**3D**			Metric Fractional	1.0 to 16.0 1/8 to 3/4	p.80, 81
9814, 9815		**5D**			Metric Fractional	1.0 to 16.0 1/8 to 5/8	p.82, 83
Aqua Drill EX							
9628		**Super Stub**			Metric	2.0 to 20.0	p.84, 85
9624		**Starter**			Metric	3.0 to 20.0	p.86

Continue to next page...

● : Great ○ : Good △ : OK

LIST No.	Cutting Condition Page	Workpiece Material																	
		Carbon Steel		Alloy Steel	Die Steel	Hardened Steel			Stainless Steel		Titanium Alloys	Nickel Alloys	Cast Iron		Aluminum			Copper Alloys
		Low Carbon	High Carbon			HRc			Austenitic	Martensitic			Soft	Hard	6061	Casting	High Si	
		1010, 1018	1045, 1065	4140, 4330	D2	up to 35	35 to 45	45 to 65	300 Series	400 Series			< 200HB	> 200HB	7075	Si ≤ 12%	Si > 13%	
Aqua Drill EX																		
9600 9601	p.51	●	●	●	●	○	△		●	●	●	●	○	△	○	○	△	○
9602 9603	p.53	●	●	●	●	○	△		●	●	●	●	○	△	○	○	△	○
Aqua Drill EX Oil Hole																		
9604 9605	p.57	●	●	●	●	○	△		●	●	●	●	△	○	○	○	△	○
9606 9607	p.57	●	●	●	●	○	△		●	●	●	●	○	○	○	○	△	○
9608 9609	p.59	●	●	●	●	△			●	●	●	●	●	○	○	○	△	○
9612	p.63	●	●	●	●	●			●	●	○	○	●	●	○	○	○	○
9614 9615	p.63	●	●	●	●	●			●	●	○	○	●	●	○	○	○	○
9616 9617	p.63	●	●	●	●	●			●	●	○	○	●	●	○	○	○	○
9618 9619	p.65	●	●	●	●	●			●	●	○	○	●	●	○	○	○	○
9620 9621	p.65	●	●	●	●	●			●	●	○	○	●	●	○	○	○	○
9626 9627	p.66	●	●	●	●	●			●	●	○	○	●	●	○	○	○	○
9622 9623	p.68	●	●	●	●	●			●	●	○	○	●	●	○	○	○	○
Aqua Drill EX 3 Flute																		
9826	p.70	●	●	●	●	●	●	△	●	●			○	△		△	△	
9820	p.70	●	●	●	●	●	●	△	●	●			○	△		△	△	
Aqua Micro Drill																		
9544	p.72	●	●	●	●	●	○	△	●	●	○	○	○	△	△	△	△	△
Aqua Drill EX Flat																		
9610 9611	p.76	●	●	●	●	○			△	●	○	△	○	○	○	○	△	○
9830 9831	p.76	●	●	●	●	○	△		△	●	○	△	○	○	○	○	△	○
9818 9819	p.79	●	●	●	●	△			△	●	○	△	○	○	○	○	○	○
9816 9817	p.79	●	●	●	●	△			△	●	○	△	○	○	○	○	○	○
Aqua Drill EX Flat Oil Hole																		
9812 9813	p.81	●	●	●	●	△	△		●	●	○	○	●	○	○	○	○	○
9814 9815	p.83	●	●	●	●	●	△		●	●	○	○	●	○	○	○	○	○
Aqua Drill EX																		
9628	p.85	●	●	●	●	○			△	●	○	△	○	○	○	○	△	○
9624	p.86	●	●	●	●	○			△	●	○	△	○	○	○	○	△	○

*Some sizes do not meet this preference. Please make sure of flute length of each size before use.

HIGH PERFORMANCE DRILLS

LIST No.		Drill Name	Material	Coating		Stock Size	Product Page
AG Drill							
6502		**Starting Drill**	HSS-Co	AG	Metric	3.0 to 20.0	p.87
6504		**Starting Drill Ext. Length**			Metric	3.0 to 12.0	p.87
SG Drill							
7572P		**Micro**	PM-HSS	SG	Metric	0.5 to 20.0	p.88-93
7572P, 7573P		**Stub Length**			Metric Fractional Letter Wire	0.5 to 20.0 3/64 to 3/4 B to Z #1 to #76	p.88-93
7574P, 7575P		**SG-ESR**			Metric Fractional Letter Wire	2.0 to 32.0 3/32 to 3/4 B to Z #1 to #45	p.94, 95
7596P, 7591P		**Oil Hole**			Metric Fractional	5.0 to 20.0 15/64 to 3/4	p.97
7570P, 7571P		**SG-ES Jobber Length**			Metric Fractional Letter Wire	2.0 to 20.0 3/32 to 3/4 B to Z #1 to #45	p.98, 99
AG Drill							
6596P		**Short**	FMX	AG	Metric	1.0 to 20.0	p.100
6594P, 6595P		**Regular**			Metric Fractional	1.0 to 20.0 3/32 to 3/4	p.101, 102
6540P, 6541P		**Parabolic Power Long**	HSS-Co		Series 1 Metric Fractional Series 2 Metric Fractional Series 3 Metric Fractional	1.0 to 13.0 1/8 to 3/8 1.0 to 10.0 1/8 to 3/8 3.0 to 10.0 1/8 to 5/16	p.103
DLC Drill							
544			HSS	DLC	Metric	1.0 to 13.0	p.105
9524		**Micro**	Carbide		Metric	0.5 to 1.9	p.106
9520		**Regular**			Metric	2.0 to 12.0	p.107

Continue to next page...

● : Great ○: Good △: OK

LIST No.	Cutting Condition Page	Workpiece Material																
		Carbon Steel		Alloy Steel	Die Steel	Hardened Steel			Stainless Steel		Titanium Alloys	Nickel Alloys	Cast Iron		Aluminum			Copper Alloys
		Low Carbon	High Carbon			HRc			Austenitic 300 Series	Martensitic 400 Series			Soft < 200HB	Hard > 200HB	6061 7075	Casting Si ≦ 12%	High Si Si > 13%	
		1010, 1018	1045, 1065	4140, 4330	D2	up to 35	35 to 45	45 to 65										
AG Drills																		
6502	–	●	●	●	●	●	○	△	●	●	○		○	○	●	●		●
6504	–	●	●	●	●	●	○	△	●	●	○		○	○	●	●		●
SG Drills																		
7572P Micro	p.93	●	●	●	●	○			●	●	●	●	○	△	○	○		○
7572P *7573P*	p.93	●	●	●	●	○			●	●	●	●	○	△	○	○	△	○
7574P *7575P*	p.96	●	●	●	●	○			●	●	●	●	○	△	○	○	△	○
7596P *7591P*	p.97	●	●	●	●	○			●	●	●	●	○		○	○		△
7570P *7571P*	p.99	●	●	●	●	○				●	○	○	△		○	○	△	△
AG Drills																		
6596P	p.102	●	●	●	●	●			●	●	○	○			○	○		○
6594P *6595P*	p.102	●	●	●	●	●			●	●	○	○			○	○		○
6540P *6541P*	p.102	●	●	●	●	△			○	○			●	○				
DLC Drills																		
544	p.106														●	○		●
9524	p.106														●	●		●
9520	p.106														●	●		●

*Some sizes do not meet this preference. Please make sure of flute length of each size before use.

STRAIGHT SHANK DRILLS

LIST No.		Drill Name	Material	Coating		Stock Size	Product Page
Screw Machine Length							
561		**Standard** **Bright**	HSS	Black Oxide	Fractional Wire Letter	3/64 to 2 #1 to #60 A to Z	p.109
561P		**Tin Coated**		TiN	Fractional Wire	1/16 to 1/2 #1 to #52	p.110
563		**Aircraft NAS 907-C**		Black Oxide	Fractional Wire Letter	3/64 to 1/2 #1 to #52 A to Z	p.111
6563		**Cobalt**	HSS-Co	Black Oxide	Fractional Wire Letter	3/64 to 1/2 #1 to #52 A to Z	p.112

Continue to next page...

●: Great ○: Good △: OK

LIST No.	Cutting Condition Page	Workpiece Material																
		Carbon Steel		Alloy Steel	Die Steel	Hardened Steel			Stainless Steel		Titanium Alloys	Nickel Alloys	Cast Iron		Aluminum			Copper Alloys
		Low Carbon	High Carbon			HRc			Austenitic	Martensitic			Soft	Hard	6061	Casting	High Si	
		1010, 1018	1045, 1065	4140, 4330	D2	up to 35	35 to 45	45 to 65	300 Series	400 Series			< 200HB	> 200HB	7075	Si ≤ 12%	Si > 13%	
Screw Machine Length																		
561	p.132	○	○	○												△		△
561P	p.132	○	○	○	△				△	△	△	△	○	△	△	△		△
563	p.132	○	○	○					△	△	△	△	△	△	△	△		△
6563	p.132	○	○	○	△				△	○	○	△	△	△	△	△		△

*Some sizes do not meet this preference. Please make sure of flute length of each size before use.

STRAIGHT SHANK DRILLS

LIST No.		Drill Name	Material	Coating		Stock Size	Product Page
Jobber Length							
501A		**Bright**	HSS	Bright	Fractional Wire Letter	1/64 to 11/16 #1 to #80 A to Z	p.113
500		**Standard**		Black Oxide	Metric	0.2 to 17.5	p.114
501					Fractional Wire Letter	3/64 to 11/16 #1 to #60 A to Z	p.115
6501		**Aircraft NAS 907-J**	HSS-Co	Black Oxide	Fractional Wire Letter	1/64 to 1/2 #1 to #80 A to Z	p.116
6520		**Cobalt**	HSS-Co	Black Oxide	Metric	0.5 to 13.0	p.117
520P		**G Standard**	HSS	TiN	Metric	0.5 to 13.0	p.118
501P		**Tin Coated**			Fractional Wire	1/16 to 1/2 #1 to #52	p.119
517P		**Parabolic**	HSS	TiN	Fractional Wire	1/16 to 1/2 #1 to #52	p.120
Taper Length							
531		**Standard**	HSS	Black Oxide	Fractional	1/64 to 1/2	p.121
6531		**Cobalt**	HSS-Co		Fractional	1/16 to 3/4	p.122
545P		**Parabolic**	HSS	TiN	Fractional	1/16 to 1/2	p.123
Extra Length							
551		**12”**	HSS	Bright	Fractional	1/8 to 1	p.124
551		**18”**			Fractional	1/8 to 1	p.124
6551		**10”**	HSS-Co	Black Oxide	Fractional	3/16 to 1/2	p.125
Oil Hole							
581			HSS-Co	Bright	Fractional	3/8 to 1-1/2	p.126

Continue to next page...

● : Great　○ : Good　△ : OK

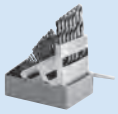
LIST No.	Cutting Condition Page	Workpiece Material																	
		Carbon Steel		Alloy Steel	Die Steel	Hardened Steel			Stainless Steel		Titanium Alloys	Nickel Alloys	Cast Iron		Aluminum			Copper Alloys
		Low Carbon	High Carbon			HRc			Austenitic	Martensitic			Soft	Hard	6061	Casting	High Si	
		1010, 1018	1045, 1065	4140, 4330	D2	up to 35	35 to 45	45 to 65	300 Series	400 Series			< 200HB	>200HB	7075	Si ≦ 12%	Si > 13%	
Jobber Length																		
501A	p.132	○	○	○									△		△	△		△
500	p.132	○	○	○									△	△	△	△		△
501	p.132	○	○	○									△	△	△	△		△
6501	p.132	○	○	○	△				△	○	○	△	△	△	△	△		△
6520	p.132		○	○	△				○	○	△	△			△	△		△
520P	p.132	○	●	●	△				△	△	△	△	○	△	△	△		△
501P	p.132	○	●	●	△				△	△	△	△	○	△	△	△		△
517P	p.133	○	●	●	△					△			○	△	△	△		△
Taper Length																		
531	p.132	○	○	○						△					△	△		△
6531	p.132	○	○	○	△				△	○			△		△	△		△
545P	p.133	○	●	●	△					△			○	△	△	△		△
Extra Length																		
551	p.133	○	○	○									△		○	△		△
551	p.133	○	○	○									△		○			
6551	p.133	○	○	○	△				△	○			△		△	△		△
Oil Hole Drill																		
581	p.134		○	○	○				△	○	○	△	○	△	△	△		△

*Some sizes do not meet this preference. Please make sure of the flute length of each size before use.

TAPER SHANK DRILLS

LIST No.		Drill Name	Material	Coating		Stock Size	Product Page
Taper Shank Drill							
601		**Regular**	HSS-Co	Black Oxide	Fractional	9/32 to 3-1/2	p.127
651		**Extra Length 18"**		Bright	Fractional	1/4 to 2	p.128
651		**Extra Length 24"**			Fractional	5/16 to 2-1/2	p.128
683		**Oil Hole**	HSS	Bright	Fractional	3/8 to 1-1/2	p.129

SPECIALTY DRILLS

LIST No.		Drill Name	Material	Coating		Stock Size	Product Page
Silver & Deming Drill							
575			HSS	Bright	Fractional	1/2 to 1-1/2	p.130
Drill Set							
599		**Jobber Length**	HSS-Co	Black Oxide, Bright	Several	Several	p.131

Continue to next page...

● : Great　○ : Good　△ : OK

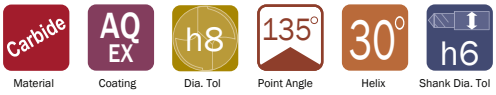
LIST No.	Cutting Condition Page	Workpiece Material																
		Carbon Steel		Alloy Steel	Die Steel	Hardened Steel			Stainless Steel		Titanium Alloys	Nickel Alloys	Cast Iron		Aluminum			Copper Alloys
		Low Carbon	High Carbon			HRc			Austenitic	Martensitic			Soft	Hard	6061	Casting	High Si	
		1010,1018	1045,1065	4140,4330	D2	up to 35	35 to 45	45 to 65	300 Series	400 Series			< 200HB	> 200HB	7075	Si ≦ 12%	Si > 13%	
Taper Shank Drills																		
601	p.135	○	○	○									△		△	△		△
651	p.133	○	○	○											○	△		△
651	p.133	○	○	○											○	△		△
683	p.135		●	●	●				△	○	○	△	○	△	△	△		△

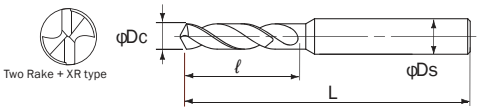
● : Great　○ : Good　△ : OK

LIST No.	Cutting Condition Page	Workpiece Material																
		Carbon Steel		Alloy Steel	Die Steel	Hardened Steel			Stainless Steel		Titanium Alloys	Nickel Alloys	Cast Iron		Aluminum			Copper Alloys
		Low Carbon	High Carbon			HRc			Austenitic	Martensitic			Soft	Hard	6061	Casting	High Si	
		1010,1018	1045,1065	4140,4330	D2	up to 35	35 to 45	45 to 65	300 Series	400 Series			< 200HB	> 200HB	7075	Si ≦ 12%	Si > 13%	
Silver & Deming Drill																		
575	p.135	○	○	○												△		△
Jobber Length / Set Drills																		
599	–	○	○	○	△								△		△	△		△

*Some sizes do not meet this preference. Please make sure of the flute length of each size before use.

Aqua Drill EX Stub Length





L9600 Metric Sizes

L9601 Fractional, Wire & Letter Sizes

Non-coolant Thru

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0700710	2.00		0.0787	8			•
0700727	2.10		0.0827				•
0700733	2.20		0.0866				•
0700740	2.30		0.0906	10			•
0700756	2.40		0.0945				•
0700762	2.50		0.0984		45	3	•
0700779	2.60		0.1024				•
0700785	2.70		0.1063				•
0700791	2.80		0.1102	13			•
0700807	2.90		0.1142				•
0700813	3.00		0.1181				•
0700820	3.10		0.1220				•
1481500	3.18	1/8	0.1250				•
0700836	3.20		0.1260	19			•
0700842	3.30		0.1299				•
0700859	3.40		0.1339				•
0700865	3.50		0.1378				•
1481517	3.57	9/64	0.1406		54	4	•
0700871	3.60		0.1417				•
0700888	3.70		0.1457				•
0700894	3.80		0.1496	21			•
0700900	3.90		0.1535				•
1481523	3.97	5/32	0.1563				•
0700916	4.00		0.1575				•
1482267	4.04	#21	0.1590				•
1482273	4.09	#20	0.1610				•
0700922	4.10		0.1614				•
0700939	4.20		0.1654	23			•
0700945	4.30		0.1693				•
1481530	4.37	11/64	0.1719				•
0700951	4.40		0.1732		61	5	•
0700968	4.50		0.1772				•
0700974	4.60		0.1811				•
0700980	4.70		0.1850				•
1481546	4.76	3/16	0.1875				•
0700997	4.80		0.1890				•
0701001	4.90		0.1929				•
0701018	5.00		0.1969	25			•
0701024	5.10		0.2008				•
1482280	5.11	#7	0.2010				•
1481552	5.16	13/64	0.2031				•
0701030	5.20		0.2047				•
0701047	5.30		0.2087				•
0701053	5.40		0.2126				•
1482296	5.41	#3	0.2130	27			•
0701060	5.50		0.2165	25			•
1481569	5.56	7/32	0.2188		65	6	•
0701076	5.60		0.2205				•
1482301	5.61	#2	0.2210				•
0701082	5.70		0.2244	27			•
0701099	5.80		0.2283				•
0701104	5.90		0.2323				•
1481575	5.95	15/64	0.2344				•
0701110	6.00		0.2362				•
0701127	6.10		0.2402	31	73	7	•
0701133	6.20		0.2441				•

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0701140	6.30		0.2480				•
1481581	6.35	1/4	0.2500	31			•
0701156	6.40		0.2520				•
0701162	6.50		0.2559				•
1482318	6.53	F	0.2570		73	7	•
0701179	6.60		0.2598				•
0701185	6.70		0.2638				•
1481598	6.75	17/64	0.2656				•
0701191	6.80		0.2677				•
0701207	6.90		0.2717				•
1482324	6.91	I	0.2720		78	8	•
0701213	7.00		0.2756	33	73	7	•
1482330	7.04	J	0.2770				•
0701220	7.10		0.2795				•
1481603	7.14	9/32	0.2813				•
0701236	7.20		0.2835				•
0701242	7.30		0.2874				•
0701259	7.40		0.2913				•
0701265	7.50		0.2953		78	8	•
1481610	7.54	19/64	0.2969				•
0701271	7.60		0.2992				•
0701288	7.70		0.3031				•
0701294	7.80		0.3071				•
0701300	7.90		0.3110				•
1481626	7.94	5/16	0.3125				•
0701316	8.00		0.3150	36			•
0701322	8.10		0.3189				•
0701339	8.20		0.3228				•
1482347	8.20	P	0.3230				•
0701345	8.30		0.3268				•
1481632	8.33	21/64	0.3281				•
0701351	8.40		0.3307				•
1482353	8.43	Q	0.3320	38	82	9	•
0701368	8.50		0.3346	36			•
0701374	8.60		0.3386				•
0701380	8.70		0.3425				•
1481649	8.73	11/32	0.3438				•
0701397	8.80		0.3465				•
0701402	8.90		0.3504	38			•
0701419	9.00		0.3543				•
0701425	9.10		0.3583				•
1481655	9.13	23/64	0.3594				•
0701431	9.20		0.3622				•
0701448	9.30		0.3661				•
1482360	9.35	U	0.3680	41			•
0701454	9.40		0.3701	38			•
0701460	9.50		0.3740		87	10	•
1481661	9.53	3/8	0.3750				•
0701477	9.60		0.3780				•
0701483	9.70		0.3819				•
0701490	9.80		0.3858				•
0701505	9.90		0.3898	41			•
1481678	9.92	25/64	0.3906				•
0701511	10.00		0.3937				•
0701528	10.10		0.3976		93	11	•
0701534	10.20		0.4016				•

L9600 Metric Sizes
L9601 Fractional, Wire & Letter Sizes

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0701534	10.20		0.4016				•
0701540	10.30		0.4055				•
1481684	10.32	13/32	0.4063	41			•
0701557	10.40		0.4094				•
0701563	10.50		0.4134				•
0701570	10.60		0.4173		93	11	•
0701586	10.70		0.4213				•
1481690	10.72	27/64	0.4219				•
0701592	10.80		0.4252				•
0701608	10.90		0.4291				•
0701614	11.00		0.4331	45			•
0701620	11.10		0.4370				•
1481706	11.11	7/16	0.4375				•
0701637	11.20		0.4409				•
0701643	11.30		0.4449				•
0701650	11.40		0.4488				•
0701666	11.50		0.4528				•
1481712	11.51	29/64	0.4531			12	•
0701672	11.60		0.4567				•
0701689	11.70		0.4606				•
0701695	11.80		0.4646				•
0701700	11.90		0.4685				•
1481729	11.91	15/32	0.4688				•
0701717	12.00		0.4724	47	100		•
0701723	12.10		0.4764				•
0701730	12.20		0.4803				•
0701746	12.30		0.4843				•
1481735	12.30	31/64	0.4844				•
0701752	12.40		0.4882				•
0701769	12.50		0.4921			13	•
0701775	12.60		0.4961				•
0701781	12.70		0.5000				•
1481741	12.70	1/2	0.5000	49			•
0701798	12.80		0.5039				•
0701803	12.90		0.5079				•
0701810	13.00		0.5118				•
1481758	13.10	33/64	0.5156	50		14	•

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0701826	13.10		0.5157				•
0701832	13.20		0.5197				•
0701849	13.30		0.5236	50			•
0701855	13.40		0.5276				•
1481764	13.49	17/32	0.5313				•
0701861	13.50		0.5315		105	14	•
0701878	13.60		0.5354				•
0701884	13.70		0.5394				•
0701890	13.80		0.5433				•
1481770	13.89	35/64	0.5469				•
0701906	13.90		0.5472				•
0701912	14.00		0.5512	52			•
0701929	14.10		0.5551				•
0701935	14.20		0.5591				•
1481787	14.29	9/16	0.5625				•
0701941	14.30		0.5630				•
0701958	14.40		0.5669				•
0701964	14.50		0.5709		108	15	•
0701970	14.60		0.5748				•
1481793	14.68	37/64	0.5781				•
0701987	14.70		0.5787				•
0701993	14.80		0.5827				•
0702008	14.90		0.5866				•
0702014	15.00		0.5906				•
1481809	15.08	19/32	0.5938	53			•
0702020	15.10		0.5945				•
0702037	15.20		0.5984				•
0702043	15.30		0.6024				•
0702050	15.40		0.6063				•
1481815	15.48	39/64	0.6094				•
0702066	15.50		0.6102		112	16	•
0702072	15.60		0.6142				•
0702089	15.70		0.6181				•
0702095	15.80		0.6220	55			•
1481821	15.88	5/8	0.6250				•
0702100	15.90		0.6260				•
0702117	16.00		0.6299				•

* Package Quantity: 1 per tube.

Standard Drilling Conditions

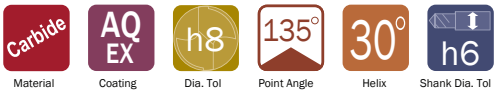
Work Material / Speed (SFM) / Drilling Dia.			Cast Irons Carbon Steels		Alloy Steels (20~30 HRC)		Mold Steels Hardened Steels (30-40 Hrc)		Hardened Steels (40-50 Hrc)		Ductile Cast Irons		Stainless Steel (300-Series Stainless)		Nickel Alloys, Titanium Alloys, PH Stainless		Aluminum Alloys	
			260-270 SFM		210-220 SFM		110-120 SFM		80-90 SFM		180-190 SFM		100-105 SFM		80-90 SFM		275-300 SFM	
Metric	Fractional	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3		0.1181	8500	0.003	7000	0.003	3700	0.003	2700	0.003	6000	0.003	3200	0.002	2900	0.002	9700	0.004
3.175	1/8	0.1250	8100	0.003	6700	0.003	3500	0.003	2600	0.003	5700	0.003	3100	0.002	2800	0.002	9200	0.004
4		0.1575	6500	0.004	5200	0.004	2800	0.004	2100	0.003	4400	0.004	2400	0.002	2200	0.003	7300	0.005
4.763	3/16	0.1875	5400	0.005	4400	0.005	2400	0.005	1700	0.004	3800	0.005	2000	0.003	1900	0.003	6200	0.006
5		0.1969	5100	0.005	4100	0.005	2200	0.005	1600	0.004	3600	0.005	1900	0.003	1750	0.003	5900	0.006
6		0.2362	4300	0.006	3500	0.006	1800	0.006	1300	0.005	2900	0.006	1600	0.004	1450	0.004	4900	0.007
6.35	1/4	0.2500	4100	0.006	3400	0.006	1800	0.006	1300	0.005	2800	0.006	1600	0.004	1400	0.004	4700	0.007
7.938	5/16	0.3125	3300	0.008	2700	0.008	1500	0.007	1000	0.007	2300	0.008	1300	0.005	1100	0.005	3800	0.009
8		0.3150	3200	0.008	2600	0.008	1400	0.007	900	0.007	2200	0.008	1200	0.005	1090	0.005	3700	0.009
9.525	3/8	0.3750	2800	0.010	2300	0.010	1200	0.009	900	0.008	1900	0.009	1100	0.006	1000	0.006	3100	0.010
10		0.3937	2600	0.010	2100	0.010	1100	0.009	800	0.008	1800	0.009	1000	0.006	870	0.006	2900	0.010
12		0.4724	2100	0.011	1700	0.011	950	0.010	700	0.009	1500	0.010	800	0.006	730	0.007	2200	0.013
12.7	1/2	0.5000	2000	0.012	1700	0.012	900	0.011	700	0.010	1500	0.011	800	0.006	700	0.006	2100	0.014
14		0.5512	1800	0.012	1500	0.012	800	0.011	600	0.011	1300	0.011	700	0.007	620	0.008	1900	0.014
16		0.6299	1600	0.014	1300	0.013	700	0.012	500	0.011	1100	0.013	600	0.008	550	0.009	1700	0.015

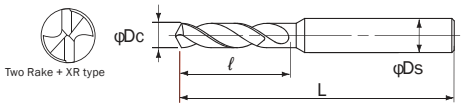
Drill Dia. (mm/inches)

Note: 1) Utilize the standard drilling conditions shown in the catalogs just a general guide when starting operation.
2) Adjust drilling conditions if required if any vibration or unusual sound occurs when cutting.
3) When using low speed machines, use the maximum speed and adjust the feed rate.
4) Use of water soluble cutting fluid is recommended.
5) In case of dry drilling - use Air blow and reduce feeds/speeds by 30%

Formulas: $RPM = \frac{SFM \times 3.82}{\text{Drill Dia.}}$ Feed rate (in/min) : RPM x IPR

Aqua Drill EX Jobber Length





L9602 Metric Sizes
L9603 Fractional, Wire & Letter Sizes

Non-coolant Thru

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0702123	2.00		0.0787	15			•
0702130	2.10		0.0827				•
0702146	2.20		0.0866				•
0702152	2.30		0.0906	17			•
0702169	2.40		0.0945				•
0702175	2.50		0.0984		49	3	•
0702181	2.60		0.1024				•
0702198	2.70		0.1063				•
0702203	2.80		0.1102	19			•
0702210	2.90		0.1142				•
0702226	3.00		0.1181				•
0702232	3.10		0.1220				•
1481838	3.18	1/8	0.1250				•
0702249	3.20		0.1260	24			•
0702255	3.30		0.1299				•
0702261	3.40		0.1339				•
0702278	3.50		0.1378				•
1481844	3.57	9/64	0.1406		60	4	•
0702284	3.60		0.1417				•
0702290	3.70		0.1457				•
0702306	3.80		0.1496	27			•
0702312	3.90		0.1535				•
1481850	3.97	5/32	0.1563				•
0702329	4.00		0.1575				•
1482376	4.04	#21	0.1590				•
1482382	4.09	#20	0.1610				•
0702335	4.10		0.1614				•
0702341	4.20		0.1654	31			•
0702358	4.30		0.1693				•
1481867	4.37	11/64	0.1719				•
0702364	4.40		0.1732		76	5	•
0702370	4.50		0.1772				•
0702387	4.60		0.1811				•
0702393	4.70		0.1850				•
1481873	4.76	3/16	0.1875	38			•
0702409	4.80		0.1890				•
0702415	4.90		0.1929				•
0702421	5.00		0.1969				•
0702438	5.10		0.2008				•
1482399	5.11	#7	0.2010				•
1481880	5.16	13/64	0.2031	39			•
0702444	5.20		0.2047				•
0702450	5.30		0.2087				•
0702467	5.40		0.2126				•
1482404	5.41	#3	0.2130	41			•
0702473	5.50		0.2165	39			•
1481896	5.56	7/32	0.2188		81	6	•
0702480	5.60		0.2205				•
1482410	5.61	#2	0.2210				•
0702496	5.70		0.2244	41			•
0702501	5.80		0.2283				•
0702518	5.90		0.2323				•
1481901	5.95	15/64	0.2344				•
0702524	6.00		0.2362				•
0702530	6.10		0.2402	42	83	7	•
0702547	6.20		0.2441				•

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0702553	6.30		0.2480				•
1481918	6.35	1/4	0.2500	42			•
0702560	6.40		0.2520				•
0702576	6.50		0.2559				•
1482427	6.53	F	0.2570		83	7	•
0702582	6.60		0.2598				•
0702599	6.70		0.2638	43			•
1481924	6.75	17/64	0.2656				•
0702604	6.80		0.2677				•
0702610	6.90		0.2717				•
1482433	6.91	I	0.2720	45	90	8	•
0702627	7.00		0.2756	43	83	7	•
1482440	7.04	J	0.2770				•
0702633	7.10		0.2795				•
1481930	7.14	9/32	0.2813				•
0702640	7.20		0.2835	45			•
0702656	7.30		0.2874				•
0702662	7.40		0.2913				•
0702679	7.50		0.2953		90	8	•
1481947	7.54	19/64	0.2969				•
0702685	7.60		0.2992				•
0702691	7.70		0.3031				•
0702707	7.80		0.3071	48			•
0702713	7.90		0.3110				•
1481953	7.94	5/16	0.3125				•
0702720	8.00		0.3150				•
0702736	8.10		0.3189				•
0702742	8.20		0.3228				•
1482456	8.20	P	0.3230	53			•
0702759	8.30		0.3268				•
1481960	8.33	21/64	0.3281				•
0702765	8.40		0.3307				•
1482462	8.43	Q	0.3320	55	98	9	•
0702771	8.50		0.3346	53			•
0702788	8.60		0.3386				•
0702794	8.70		0.3425				•
1481976	8.73	11/32	0.3438	55			•
0702800	8.80		0.3465				•
0702816	8.90		0.3504				•
0702822	9.00		0.3543				•
0702839	9.10		0.3583				•
1481982	9.13	23/64	0.3594	58			•
0702845	9.20		0.3622				•
0702851	9.30		0.3661				•
1482479	9.35	U	0.3680	60			•
0702868	9.40		0.3701	58			•
0702874	9.50		0.3740		105	10	•
1481999	9.53	3/8	0.3750				•
0702880	9.60		0.3780				•
0702897	9.70		0.3819				•
0702902	9.80		0.3858	60			•
0702919	9.90		0.3898				•
1482003	9.92	25/64	0.3906				•
0702925	10.00		0.3937				•
0702931	10.10		0.3976	66	114	11	•
0702948	10.20		0.4016				•

L9602 Metric Sizes
L9603 Fractional, Wire & Letter Sizes

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0702954	10.30		0.4055	66	114	11	•
1482010	10.32	13/32	0.4063				•
0702960	10.40		0.4094				•
0702977	10.50		0.4134				•
0702983	10.60		0.4173	68			•
0702990	10.70		0.4213				•
1482026	10.72	27/64	0.4219				•
0703004	10.80		0.4252				•
0703010	10.90		0.4291				•
0703027	11.00		0.4331				•
0703033	11.10		0.4370	71	121	12	•
1482032	11.11	7/16	0.4375				•
0703040	11.20		0.4409				•
0703056	11.30		0.4449				•
0703062	11.40		0.4488				•
0703079	11.50		0.4528				•
1482049	11.51	29/64	0.4531	73			•
0703085	11.60		0.4567				•
0703091	11.70		0.4606				•
0703107	11.80		0.4646				•
0703113	11.90		0.4685				•
1482055	11.91	15/32	0.4688				•
0703120	12.00		0.4724				•
0703136	12.10		0.4764	76	137	13	•
0703142	12.20		0.4803				•
0703159	12.30		0.4843				•
1480780	12.30	31/64	0.4844				•
0703165	12.40		0.4882				•
0703171	12.50		0.4921				•
0703188	12.60		0.4961	78			•
0703194	12.70		0.5000				•
1480797	12.70	1/2	0.5000				•
0703200	12.80		0.5039				•
0703216	12.90		0.5079				•
0703222	13.00		0.5118				•
1480802	13.10	33/64	0.5156	84	147	14	•
0703239	13.10		0.5157				•

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0703245	13.20		0.5197	84	147	14	•
0703251	13.30		0.5236				•
0703268	13.40		0.5276				•
1480819	10.30	17/32	0.5313				•
0703274	13.50		0.5315				•
0703280	13.60		0.5354	86			•
0703297	13.70		0.5394				•
0703302	13.80		0.5433				•
1480825	13.89	35/64	0.5469	89	153		•
0703319	13.90		0.5472	86	147		•
0703325	14.00		0.5512				•
0703331	14.10		0.5551	89	153	15	•
0703348	14.20		0.5591				•
1480831	14.29	9/16	0.5625				•
0703354	14.30		0.5630				•
0703360	14.40		0.5669				•
0703377	14.50		0.5709				•
0703383	14.60		0.5748	91			•
1480848	14.68	37/64	0.5781	89			•
0703390	14.70		0.5787	91			•
0703405	14.80		0.5827				•
0703411	14.90		0.5866				•
0703428	15.00		0.5906				•
1480854	15.08	19/32	0.5938	96	160	16	•
0703434	15.10		0.5945	94			•
0703440	15.20		0.5984				•
0703457	15.30		0.6024				•
0703463	15.40		0.6063				•
1480860	15.48	39/64	0.6094	96			•
0703470	15.50		0.6102	94			•
0703486	15.60		0.6142	96			•
0703492	15.70		0.6181				•
0703508	15.80		0.6220				•
1480877	15.88	5/8	0.6250				•
0703514	15.90		0.6260				•
0703520	16.00		0.6299				•

* Package Quantity: 1 per tube.

Standard Drilling Conditions

Work Material / Speed (SFM) / Drilling Dia.				Cast Irons Carbon Steels		Alloy Steels (20~30 HRC)		Mold Steels Hardened Steels (30-40 Hrc)		Hardened Steels (40-50 Hrc)		Ductile Cast Irons		Stainless Steel (300-Series Stainless)		Nickel Alloys, Titanium Alloys, PH Stainless		Aluminum Alloys	
				260-270 SFM		210-220 SFM		110-120 SFM		80-90 SFM		180-190 SFM		100-105 SFM		80-90 SFM		275-300 SFM	
	Metric	Fractional	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
Drill Dia. (mm/ inches)	3		0.1181	8500	0.003	7000	0.003	3700	0.002	2700	0.002	6000	0.003	3200	0.002	2900	0.002	9700	0.004
	3.175	1/8	0.1250	8100	0.003	6700	0.003	3500	0.002	2600	0.002	5700	0.003	3100	0.002	2800	0.002	9200	0.004
	4		0.1575	6500	0.004	5200	0.004	2800	0.003	2100	0.003	4400	0.004	2400	0.002	2200	0.002	7300	0.005
	4.763	3/16	0.1875	5400	0.004	4400	0.004	2400	0.004	1700	0.003	3800	0.005	2000	0.003	1900	0.003	6200	0.006
	5		0.1969	5100	0.005	4100	0.005	2200	0.004	1600	0.003	3600	0.005	1900	0.003	1750	0.003	5900	0.006
	6		0.2362	4300	0.005	3500	0.005	1800	0.005	1300	0.004	2900	0.006	1600	0.003	1450	0.003	4900	0.007
	6.35	1/4	0.2500	4100	0.006	3400	0.006	1800	0.005	1300	0.004	2800	0.006	1600	0.003	1400	0.003	4700	0.008
	7.938	5/16	0.3125	3300	0.007	2700	0.007	1500	0.006	1000	0.006	2300	0.008	1300	0.004	1100	0.004	3800	0.009
	8		0.3150	3200	0.007	2600	0.007	1400	0.006	900	0.006	2200	0.008	1200	0.005	1090	0.005	3700	0.009
	9.525	3/8	0.3750	2800	0.008	2300	0.008	1200	0.007	900	0.006	1900	0.009	1100	0.005	1000	0.005	3100	0.009
	10		0.3937	2600	0.008	2100	0.009	1100	0.008	800	0.007	1800	0.009	1000	0.005	870	0.005	2900	0.010
	12		0.4724	2100	0.010	1700	0.010	950	0.008	700	0.007	1500	0.010	800	0.006	730	0.006	2200	0.011
	12.7	1/2	0.5000	2000	0.010	1700	0.010	900	0.009	700	0.007	1500	0.010	800	0.006	700	0.006	2100	0.012
	14		0.5512	1800	0.011	1500	0.011	800	0.009	600	0.008	1300	0.012	700	0.006	620	0.006	1900	0.013
	16		0.6299	1600	0.012	1300	0.012	700	0.010	500	0.009	1100	0.013	600	0.007	550	0.007	1700	0.014

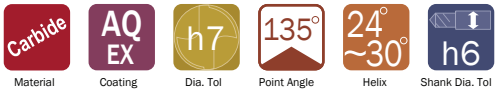
Note: 1) Utilize the standard drilling conditions shown in the catalogs just a general guide when starting operation.
2) Adjust drilling conditions if required if any vibration or unusual sound occurs when cutting.
3) When using low speed machines, use the maximum speed and adjust the feed rate.
4) Use of water soluble cutting fluid is recommended.
5) In case of dry drilling - use Air blow and reduce feeds/speeds by 30%

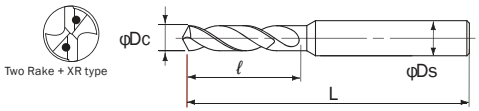
⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Formulas: $RPM = \frac{SFM \times 3.82}{\text{Drill Dia.}}$ Feed rate (in/min) : RPM x IPR

CARBIDE DRILLS

Aqua Drill EX Oil Hole 3D





L9604 Metric Sizes - **Including NEW MICRO Sizes!**
L9605 Fractional, Wire & Letter Sizes

Coolant Thru

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0754470	1.00		0.0394	6	54		•
0754492	1.10		0.0433	7			•
0754514	1.20		0.0472	8			•
0754537	1.30		0.0512	9	55		•
0754550	1.40		0.0551	10			•
0754572	1.50		0.0591				•
0754595	1.60		0.0630	11			•
0754617	1.70		0.0669				•
0754630	1.80		0.0709		58		•
0754652	1.90		0.0748	12			•
0754675	2.00		0.0787			3	•
0754698	2.10		0.0827				•
0754710	2.20		0.0866	13			•
0754732	2.30		0.0906		63		•
0754755	2.40		0.0945	14			•
0754778	2.50		0.0984	15			•
0754790	2.60		0.1024	16			•
0754812	2.70		0.1063				•
0754835	2.80		0.1102	17.5	68		•
0754858	2.90		0.1142				•
0704212	3.00		0.1181	17			•
0704229	3.10		0.1220				•
1480883	3.18	1/8	0.1250				•
0704235	3.20		0.1260	20			•
0704241	3.30		0.1299				•
0704258	3.40		0.1339				•
0704264	3.50		0.1378				•
1480890	3.57	9/64	0.1406		72	4	•
0704270	3.60		0.1417				•
0704287	3.70		0.1457				•
0704293	3.80		0.1496	22			•
0704309	3.90		0.1535				•
1480905	3.97	5/32	0.1563				•
0704315	4.00		0.1575				•
1482485	4.04	#21	0.1590	27			•
1482491	4.09	#20	0.1610				•
0704321	4.10		0.1614				•
0704338	4.20		0.1654	25			•
0704344	4.30		0.1693				•
1480911	4.37	11/64	0.1719	27			•
0704350	4.40		0.1732				•
0704367	4.50		0.1772	25	80	5	•
0704373	4.60		0.1811				•
0704380	4.70		0.1850				•
1480928	4.76	3/16	0.1875				•
0704396	4.80		0.1890				•
0704401	4.90		0.1929				•
0704418	5.00		0.1969	27			•
0704424	5.10		0.2008				•
1482507	5.11	#7	0.2010				•
1480934	5.16	13/64	0.2031				•
0704430	5.20		0.2047				•
0704447	5.30		0.2087				•
0704453	5.40		0.2126				•
1482513	5.41	#3	0.2130	30			•
0704460	5.50		0.2165	27			•
1480940	5.56	7/32	0.2188		82	6	•
0704476	5.60		0.2205				•
1482520	5.61	#2	0.2210				•
0704482	5.70		0.2244	30			•
0704499	5.80		0.2283				•

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0704504	5.90		0.2323				•
1480957	5.95	15/64	0.2344	30	82	6	•
0704510	6.00		0.2362				•
0704527	6.10		0.2402				•
0704533	6.20		0.2441				•
0704540	6.30		0.2480	32			•
1480963	6.35	1/4	0.2500				•
0704556	6.40		0.2520				•
0704562	6.50		0.2559		88	7	•
1482536	6.53	F	0.2570				•
0704579	6.60		0.2598				•
0704585	6.70		0.2638	35			•
1480970	6.75	17/64	0.2656				•
0704591	6.80		0.2677				•
0704607	6.90		0.2717				•
1482542	6.91	I	0.2720	37	94	8	•
0704613	7.00		0.2756	35	88	7	•
1482559	7.04	J	0.2770				•
0704620	7.10		0.2795				•
1480986	7.14	9/32	0.2813				•
0704636	7.20		0.2835	37			•
0704642	7.30		0.2874				•
0704659	7.40		0.2913				•
0704665	7.50		0.2953		94	8	•
1480992	7.54	19/64	0.2969				•
0704671	7.60		0.2992				•
0704688	7.70		0.3031				•
0704694	7.80		0.3071	40			•
0704700	7.90		0.3110				•
1481007	7.94	5/16	0.3125				•
0704716	8.00		0.3150				•
0704722	8.10		0.3189				•
0704739	8.20		0.3228				•
1482565	8.20	P	0.3230				•
0704745	8.30		0.3268	42			•
1481013	8.33	21/64	0.3281				•
0704751	8.40		0.3307				•
1482571	8.43	Q	0.3320		100	9	•
0704768	8.50		0.3346				•
0704774	8.60		0.3386				•
0704780	8.70		0.3425				•
1481020	8.73	11/32	0.3438	45			•
0704797	8.80		0.3465				•
0704802	8.90		0.3504				•
0704819	9.00		0.3543				•
0704825	9.10		0.3583				•
1481036	9.13	23/64	0.3594	47			•
0704831	9.20		0.3622				•
0704848	9.30		0.3661				•
1482588	9.35	U	0.3680	50			•
0704854	9.40		0.3701	47			•
0704860	9.50		0.3740		106	10	•
1481042	9.53	3/8	0.3750				•
0704877	9.60		0.3780				•
0704883	9.70		0.3819				•
0704890	9.80		0.3858	50			•
0704905	9.90		0.3898				•
1481059	9.92	25/64	0.3906				•
0704911	10.00		0.3937				•
0704928	10.10		0.3976	52	116	11	•
0704934	10.20		0.4016				•

L9604 Metric Sizes

L9605 Fractional, Wire & Letter Sizes

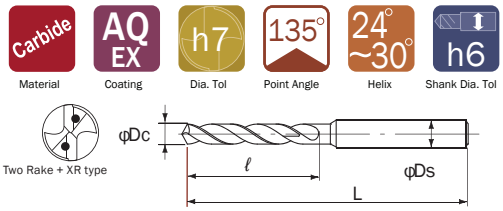
EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0704940	10.30		0.4055	52	116	11	•
1481065	10.32	13/32	0.4063				•
0704957	10.40		0.4094				•
0704963	10.50		0.4134				•
0704970	10.60		0.4173	55			•
0704986	10.70		0.4213				•
1481071	10.72	27/64	0.4219				•
0704992	10.80		0.4252				•
0705007	10.90		0.4291				•
0705013	11.00		0.4331				•
0705020	11.10		0.4370	57	122	12	•
1481088	11.11	7/16	0.4375				•
0705036	11.20		0.4409				•
0705042	11.30		0.4449				•
0705059	11.40		0.4488				•
0705065	11.50		0.4528				•
1481094	11.51	29/64	0.4531	60			•
0705071	11.60		0.4567				•
0705088	11.70		0.4606				•
0705094	11.80		0.4646				•
0705100	11.90		0.4685				•
1481100	11.91	15/32	0.4688				•
0705116	12.00		0.4724				•
0705122	12.10		0.4764	62	128	13	•
0705139	12.20		0.4803				•
0705145	12.30		0.4843				•
1481116	12.30	31/64	0.4844				•
0705151	12.40		0.4882				•
0705168	12.50		0.4921				•
0705174	12.60		0.4961	65			•
0705180	12.70		0.5000				•
1481122	12.70	1/2	0.5000				•
0705197	12.80		0.5039				•
0705202	12.90		0.5079				•
0705219	13.00		0.5118				•
1481139	13.10	33/64	0.5156	67	134	14	•
0705225	13.10		0.5157				•

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0705231	13.20		0.5197	67	134	14	•
0705248	13.30		0.5236				•
0705254	13.40		0.5276				•
1481145	13.49	17/32	0.5313				•
0705260	13.50		0.5315				•
0705277	13.60		0.5354	70			•
0705283	13.70		0.5394				•
0705290	13.80		0.5433				•
1481151	13.89	35/64	0.5469				•
0705305	13.90		0.5472				•
0705311	14.00		0.5512				•
0705328	14.10		0.5551	72	140	15	•
0705334	14.20		0.5591				•
1481168	14.29	9/16	0.5625				•
0705340	14.30		0.5630				•
0705357	14.40		0.5669				•
0705363	14.50		0.5709				•
0705370	14.60		0.5748	75			•
1481174	14.68	37/64	0.5781				•
0705386	14.70		0.5787				•
0705392	14.80		0.5827				•
0705408	14.90		0.5866				•
0705414	15.00		0.5906				•
1481180	15.08	19/32	0.5938				•
0705420	15.10		0.5945	77	146	16	•
0705437	15.20		0.5984				•
0705443	15.30		0.6024				•
0705450	15.40		0.6063				•
1481197	15.48	39/64	0.6094				•
0705466	15.50		0.6102				•
0705472	15.60		0.6142	80			•
0705489	15.70		0.6181				•
0705495	15.80		0.6220				•
1481202	15.88	5/8	0.6250				•
0705500	15.90		0.6260				•
0705517	16.00		0.6299				•

* Package Quantity: 1 per tube.

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Aqua Drill EX Oil Hole 5D



L9606 Metric Sizes - **Including NEW MICRO Sizes!**
L9607 Fractional, Wire & Letter Sizes

Coolant Thru

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0737203	1.00		0.0394	8	56		•
0737210	1.10		0.0433	9			•
0737226	1.20		0.0472	10			•
0737232	1.30		0.0512	11	58		•
0737249	1.40		0.0551	12			•
0737255	1.50		0.0591	13			•
0737261	1.60		0.0630	14			•
0737278	1.70		0.0669				•
0737284	1.80		0.0709	15	62		•
0737290	1.90		0.0748			3	•
0737306	2.00		0.0787	16			•
0737312	2.10		0.0827	17			•
0737329	2.20		0.0866	18			•
0737335	2.30		0.0906		68		•
0737341	2.40		0.0945	19			•
0737358	2.50		0.0984	20			•
0737364	2.60		0.1024	21			•
0737370	2.70		0.1063	22			•
0737387	2.80		0.1102		78		•
0737393	2.90		0.1142	23			•
0705523	3.00		0.1181	28			•
0705530	3.10		0.1220				•
1481219	3.18	1/8	0.1250				•
0705546	3.20		0.1260	32			•
0705552	3.30		0.1299				•
0705569	3.40		0.1339				•
0705575	3.50		0.1378				•
1481225	3.57	9/64	0.1406		86	4	•
0705581	3.60		0.1417				•
0705598	3.70		0.1457				•
0705603	3.80		0.1496	36			•
0705610	3.90		0.1535				•
1481231	3.97	5/32	0.1563				•
0705626	4.00		0.1575				•
1482594	4.04	#21	0.1590				•
1482600	4.09	#20	0.1610				•
0705632	4.10		0.1614				•
0705649	4.20		0.1654	40			•
0705655	4.30		0.1693				•
1481248	4.37	11/64	0.1719				•
0705661	4.40		0.1732		98	5	•
0705678	4.50		0.1772				•
0705684	4.60		0.1811				•
0705690	4.70		0.1850				•
1481254	4.76	3/16	0.1875				•
0705706	4.80		0.1890				•
0705712	4.90		0.1929				•
0705729	5.00		0.1969	44			•
0705735	5.10		0.2008				•
1482616	5.11	#7	0.2010				•
1481260	5.16	13/64	0.2031				•
0705741	5.20		0.2047				•
0705758	5.30		0.2087		100	6	•
0705764	5.40		0.2126				•
1482622	5.41	#3	0.2130	48			•
0705770	5.50		0.2165	44			•
1481277	5.56	7/32	0.2188	48			•
0705787	5.60		0.2205				•
1482639	5.61	#2	0.2210	52	109	7	•
0705793	5.70		0.2244	48	100	6	•
0705809	5.80		0.2283				•

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0705815	5.90		0.2323				•
1481283	5.95	15/64	0.2344	48	100	6	•
0705821	6.00		0.2362				•
0705838	6.10		0.2402				•
0705844	6.20		0.2441				•
0705850	6.30		0.2480	52			•
1481290	6.35	1/4	0.2500				•
0705867	6.40		0.2520				•
0705873	6.50		0.2559		109	7	•
1482645	6.53	F	0.2570				•
0705880	6.60		0.2598				•
0705896	6.70		0.2638	56			•
1481305	6.75	17/64	0.2656				•
0705901	6.80		0.2677				•
0705918	6.90		0.2717				•
1482651	6.91	I	0.2720	60	118	8	•
0705924	7.00		0.2756	56	109	7	•
1482668	7.04	J	0.2770				•
0705930	7.10		0.2795				•
1481311	7.14	9/32	0.2813				•
0705947	7.20		0.2835	60			•
0705953	7.30		0.2874				•
0705960	7.40		0.2913				•
0705976	7.50		0.2953				•
1481328	7.54	19/64	0.2969		118	8	•
0705982	7.60		0.2992				•
0705999	7.70		0.3031				•
0706003	7.80		0.3071	64			•
0706010	7.90		0.3110				•
1481334	7.94	5/16	0.3125				•
0706026	8.00		0.3150				•
0706032	8.10		0.3189				•
0706049	8.20		0.3228				•
1482674	8.20	P	0.3230	68			•
0706055	8.30		0.3268				•
1481340	8.33	21/64	0.3281				•
0706061	8.40		0.3307				•
1482680	8.43	Q	0.3320	72	127	9	•
0706078	8.50		0.3346	68			•
0706084	8.60		0.3386				•
0706090	8.70		0.3425				•
1481357	8.73	11/32	0.3438	72			•
0706106	8.80		0.3465				•
0706112	8.90		0.3504				•
0706129	9.00		0.3543				•
0706135	9.10		0.3583				•
1481363	9.13	23/64	0.3594	76			•
0706141	9.20		0.3622				•
0706158	9.30		0.3661				•
1482697	9.35	U	0.3680	80			•
0706164	9.40		0.3701	76			•
0706170	9.50		0.3740		136	10	•
1481370	9.53	3/8	0.3750				•
0706187	9.60		0.3780				•
0706193	9.70		0.3819				•
0706209	9.80		0.3858	80			•
0706215	9.90		0.3898				•
1481386	9.92	25/64	0.3906				•
0706221	10.00		0.3937				•
0706238	10.10		0.3976	84	149	11	•
0706244	10.20		0.4016				•

L9606 Metric Sizes
L9607 Fractional, Wire & Letter Sizes

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0706250	10.30		0.4055				•
1481392	10.32	13/32	0.4063				•
0706267	10.40		0.4094	84			•
0706273	10.50		0.4134				•
0706280	10.60		0.4173		149	11	•
0706296	10.70		0.4213				•
1481408	10.72	27/64	0.4219	88			•
0706301	10.80		0.4252				•
0706318	10.90		0.4291				•
0706324	11.00		0.4331				•
0706330	11.10		0.4370				•
1481414	11.11	7/16	0.4375				•
0706347	11.20		0.4409	92			•
0706353	11.30		0.4449				•
0706360	11.40		0.4488				•
0706376	11.50		0.4528				•
1481420	11.51	29/64	0.4531		158	12	•
0706382	11.60		0.4567				•
0706399	11.70		0.4606				•
0706404	11.80		0.4646	96			•
0706410	11.90		0.4685				•
1481437	11.91	15/32	0.4688				•
0706427	12.00		0.4724				•
0706433	12.10		0.4764				•
0706440	12.20		0.4803				•
0706456	12.30		0.4843	100			•
1481443	12.30	31/64	0.4844				•
0706462	12.40		0.4882				•
0706479	12.50		0.4921		167	13	•
0706485	12.60		0.4961				•
0706491	12.70		0.5000				•
1481450	12.70	1/2	0.5000	104			•
0706507	12.80		0.5039				•
0706513	12.90		0.5079				•
0706520	13.00		0.5118				•
1481466	13.10	33/64	0.5156	108	176	14	•
0706536	13.10		0.5157				•

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0706542	13.20		0.5197				•
0706559	13.30		0.5236				•
0706565	13.40		0.5276	108			•
1481472	13.49	17/32	0.5313				•
0706571	13.50		0.5315				•
0706588	13.60		0.5354		176	14	•
0706594	13.70		0.5394				•
0706600	13.80		0.5433	112			•
1481489	13.89	35/64	0.5469				•
0706616	13.90		0.5472				•
0706622	14.00		0.5512				•
0706639	14.10		0.5551				•
0706645	14.20		0.5591				•
1481495	14.29	9/16	0.5625	116			•
0706651	14.30		0.5630				•
0706668	14.40		0.5669				•
0706674	14.50		0.5709		185	15	•
0706680	14.60		0.5748				•
1480418	14.68	37/64	0.5781				•
0706697	14.70		0.5787	120			•
0706702	14.80		0.5827				•
0706719	14.90		0.5866				•
0706725	15.00		0.5906				•
1480424	15.08	19/32	0.5938				•
0706731	15.10		0.5945				•
0706748	15.20		0.5984				•
0706754	15.30		0.6024	124			•
0706760	15.40		0.6063				•
1480430	15.48	39/64	0.6094				•
0706777	15.50		0.6102		194	16	•
0706783	15.60		0.6142				•
0706790	15.70		0.6181				•
0706805	15.80		0.6220	128			•
1480447	15.88	5/8	0.6250				•
0706811	15.90		0.6260				•
0706828	16.00		0.6299				•

CARBIDE DRILLS

Standard Drilling Conditions

List 9604, 9605, 9606, 9607

* Package Quantity: 1 per tube.

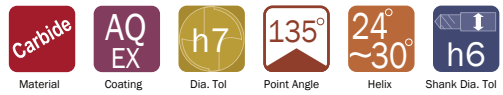
⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

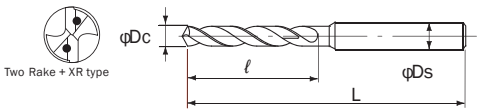
Work Material			Cast Irons Carbon Steels		Alloy Steels (20~30 HRC)		Mold Steels (30-35 Hrc)		Hardened Steels		Ductile Cast Irons		Stainless Steel (300-Series)		Nickel Alloys, Titanium Alloys		Aluminum	
Speed (SFM)			160-200 SFM		140-180 SFM		130-165 SFM		95-115 SFM		130-165 SFM		90-115 SFM		30-45 SFM		255-310 SFM	
Drilling Dia.																		
Metric	Fractional	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
1		0.0393	15700	0.0009	14100	0.0008	12600	0.0006	9400	0.0005	12600	0.0008	9400	0.0005	3150	0.0004	25000	0.0003
1.5		0.0590	10500	0.0013	9450	0.0012	8400	0.0009	6300	0.0007	8400	0.0012	6300	0.0007	2100	0.0006	16500	0.0005
2		0.0787	7900	0.0017	7100	0.0016	6300	0.0012	4700	0.0009	6300	0.0016	4750	0.0010	1650	0.0008	12400	0.0008
2.5		0.0984	7600	0.0024	7000	0.0021	6300	0.0013	4400	0.0014	6300	0.0021	4400	0.0015	1650	0.0012	12000	0.0022
Speed (SFM)			390-410 SFM		325-340 SFM		255-265 SFM		160-170 SFM		325-340 SFM		255-265 SFM		95-105 SFM		255-325 SFM	
3		0.1181	12700	0.004	10600	0.004	8500	0.004	5300	0.002	10600	0.004	6000	0.004	3200	0.002	10500	0.004
3.175	1/8	0.1250	12000	0.004	10100	0.004	8100	0.004	5100	0.003	10100	0.004	8100	0.003	3100	0.002	10000	0.004
4		0.1575	9600	0.005	8000	0.005	6400	0.005	4000	0.003	8000	0.005	6400	0.004	2400	0.003	7500	0.005
4.763	3/16	0.1875	8100	0.006	6800	0.006	5400	0.006	3400	0.004	6800	0.006	5400	0.005	2100	0.004	6300	0.006
5		0.1969	7700	0.006	6400	0.006	5100	0.006	3300	0.004	6400	0.006	5100	0.005	2000	0.004	6000	0.006
6		0.2362	6400	0.007	5300	0.007	4200	0.007	2700	0.005	5300	0.007	4200	0.006	1600	0.005	5000	0.007
6.35	1/4	0.2500	6100	0.007	5100	0.007	4000	0.007	2600	0.005	5100	0.007	4000	0.006	1600	0.005	4800	0.008
7.938	5/16	0.3125	4900	0.009	4100	0.008	3300	0.008	2100	0.006	4100	0.008	3300	0.007	1300	0.005	3800	0.009
8		0.3150	4800	0.009	4000	0.009	3200	0.009	2000	0.006	4000	0.009	3200	0.008	1200	0.006	3700	0.009
9.525	3/8	0.3750	4000	0.009	3400	0.009	2700	0.009	1700	0.007	3400	0.009	2700	0.008	1000	0.007	2700	0.012
10		0.3937	3800	0.010	3200	0.010	2500	0.010	1600	0.007	3200	0.010	2500	0.009	950	0.007	2500	0.012
12		0.4724	3200	0.010	2700	0.010	2100	0.010	1300	0.009	2700	0.010	2100	0.009	800	0.009	2100	0.013
12.7	1/2	0.5000	3100	0.010	2600	0.010	2000	0.010	1300	0.009	2600	0.010	2000	0.010	800	0.009	2000	0.013
14		0.5512	2900	0.010	2400	0.011	1900	0.011	1200	0.009	2400	0.010	1900	0.010	800	0.008	1900	0.013
16		0.6299	2400	0.012	2000	0.012	1600	0.012	1000	0.010	2000	0.012	1600	0.012	600	0.010	1700	0.014

Drill Dia. (mm/inches)

• Please see page 59 for Notes

Aqua Drill EX Oil Hole 8D





L9608 Metric Sizes
L9609 Fractional, Wire & Letter Sizes

Coolant Thru

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0706834	3.00		0.1181	33	81	3	•
0706840	3.10		0.1220	38	92	4	•
1480453	3.18	1/8	0.1250				•
0706857	3.20		0.1260				•
0706863	3.30		0.1299				•
0706870	3.40		0.1339				•
0706886	3.50		0.1378				•
1480460	3.57	9/64	0.1406	44			•
0706892	3.60		0.1417				•
0706908	3.70		0.1457				•
0706914	3.80		0.1496				•
0706920	3.90		0.1535				•
1480476	3.97	5/32	0.1563				•
0706937	4.00		0.1575				•
1482702	4.04	#21	0.1590	49	105	5	•
1482719	4.09	#20	0.1610				•
0706943	4.10		0.1614				•
0706950	4.20		0.1654				•
0706966	4.30		0.1693				•
1480482	4.37	11/64	0.1719				•
0706972	4.40		0.1732				•
0706989	4.50		0.1772				•
0706995	4.60		0.1811	55			•
0707000	4.70		0.1850				•
1480499	4.76	3/16	0.1875				•
0707016	4.80		0.1890				•
0707022	4.90		0.1929				•
0707039	5.00		0.1969				•
0707045	5.10		0.2008	60	118	6	•
1482725	5.11	#7	0.2010				•
1480504	5.16	13/64	0.2031				•
0707051	5.20		0.2047				•
0707068	5.30		0.2087				•
0707074	5.40		0.2126				•
1482731	5.41	#3	0.2130	66			•
0707080	5.50		0.2165	60			•
1480510	5.56	7/32	0.2188	66			•
0707097	5.60		0.2205				•
1482748	5.61	#2	0.2210				•
0707102	5.70		0.2244				•
0707119	5.80		0.2283				•
0707125	5.90		0.2323				•
1480527	5.95	15/64	0.2344				•
0707131	6.00		0.2362				•
0707148	6.10		0.2402	71	130	7	•
0707154	6.20		0.2441				•
0707160	6.30		0.2480				•
1480533	6.35	1/4	0.2500				•
0707177	6.40		0.2520				•
0707183	6.50		0.2559				•
1482754	6.53	F	0.2570	77			•
0707190	6.60		0.2598				•
0707205	6.70		0.2638				•
1480540	6.75	17/64	0.2656				•
0707211	6.80		0.2677				•
0707228	6.90		0.2717				•

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
1482760	6.91	I	0.2720	82	142	8	•
0707234	7.00		0.2756	77	130	7	•
1482777	7.04	J	0.2770	82	142	8	•
0707240	7.10		0.2795				•
1480556	7.14	9/32	0.2813				•
0707257	7.20		0.2835				•
0707263	7.30		0.2874				•
0707270	7.40		0.2913				•
0707286	7.50		0.2953				•
1480562	7.54	19/64	0.2969	88			•
0707292	7.60		0.2992				•
0707308	7.70		0.3031				•
0707314	7.80		0.3071				•
0707320	7.90		0.3110				•
1480579	7.94	5/16	0.3125				•
0707337	8.00		0.3150				•
0707343	8.10		0.3189	93	154	9	•
0707350	8.20		0.3228				•
1482783	8.20	P	0.3230				•
0707366	8.30		0.3268				•
1480585	8.33	21/64	0.3281				•
0707372	8.40		0.3307				•
1482790	8.43	Q	0.3320				•
0707389	8.50		0.3346				•
0707395	8.60		0.3386	99			•
0707400	8.70		0.3425				•
1480591	8.73	11/32	0.3438				•
0707417	8.80		0.3465				•
0707423	8.90		0.3504				•
0707430	9.00		0.3543				•
0707446	9.10		0.3583	104	166	10	•
1480607	9.13	23/64	0.3594				•
0707452	9.20		0.3622				•
0707469	9.30		0.3661				•
1482805	9.35	U	0.3680	110			•
0707475	9.40		0.3701	104			•
0707481	9.50		0.3740				•
1480613	9.53	3/8	0.3750	110			•
0707498	9.60		0.3780				•
0707503	9.70		0.3819				•
0707510	9.80		0.3858				•
0707526	9.90		0.3898				•
1480620	9.92	25/64	0.3906				•
0707532	10.00		0.3937				•
0707549	10.10		0.3976	115	182	11	•
0707555	10.20		0.4016				•
0707561	10.30		0.4055				•
1480636	10.32	13/32	0.4063				•
0707578	10.40		0.4094				•
0707584	10.50		0.4134				•
0707590	10.60		0.4173	121			•
0707606	10.70		0.4213				•
1480642	10.72	27/64	0.4219				•
0707612	10.80		0.4252				•
0707629	10.90		0.4291				•
0707635	11.00		0.4331				•

L9608 Metric Sizes

L9609 Fractional, Wire & Letter Sizes

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0707641	11.10		0.4370	126	194	12	•
1480659	11.11	7/16	0.4375				•
0707658	11.20		0.4409				•
0707664	11.30		0.4449				•
0707670	11.40		0.4488				•
0707687	11.50		0.4528				•
1480665	11.51	29/64	0.4531	132			•
0707693	11.60		0.4567				•
0707709	11.70		0.4606				•
0707715	11.80		0.4646				•
0707721	11.90		0.4685				•
1480671	11.91	15/32	0.4688				•
0707738	12.00		0.4724				•
0707744	12.10		0.4764	137	206	13	•
0707750	12.20		0.4803				•
0707767	12.30		0.4843				•
1480688	12.30	31/64	0.4844				•
0707773	12.40		0.4882				•
0707780	12.50		0.4921				•
0707796	12.60		0.4961	143			•
0707801	12.70		0.5000				•
1480694	12.70	1/2	0.5000				•
0707818	12.80		0.5039				•
0707824	12.90		0.5079				•
0707830	13.00		0.5118				•
1480700	13.10	33/64	0.5156	148	218	14	•
0707847	13.10		0.5157				•
0707853	13.20		0.5197				•
0707860	13.30		0.5236				•
0707876	13.40		0.5276				•
1480716	13.49	17/32	0.5313				•
0707882	13.50		0.5315				•

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0707899	13.60		0.5354	154	218	14	•
0707904	13.70		0.5394				•
0707910	13.80		0.5433				•
1480722	13.89	35/64	0.5469				•
0707927	13.90		0.5472				•
0707933	14.00		0.5512				•
0707940	14.10		0.5551	159	230	15	•
0707956	14.20		0.5591				•
1480739	14.29	9/16	0.5625				•
0707962	14.30		0.5630				•
0707979	14.40		0.5669				•
0707985	14.50		0.5709				•
0707991	14.60		0.5748	165			•
1480745	14.68	37/64	0.5781	159			•
0708006	14.70		0.5787	165			•
0708012	14.80		0.5827				•
0708029	14.90		0.5866				•
0708035	15.00		0.5906				•
1480751	15.08	19/32	0.5938	170	242	16	•
0708041	15.10		0.5945				•
0708058	15.20		0.5984				•
0708064	15.30		0.6024				•
0708070	15.40		0.6063				•
1480768	15.48	39/64	0.6094				•
0708087	15.50		0.6102				•
0708093	15.60		0.6142	176			•
0708109	15.70		0.6181				•
0708115	15.80		0.6220				•
1480774	15.88	5/8	0.6250				•
0708121	15.90		0.6260				•
0708138	16.00		0.6299				•

* Package Quantity: 1 per tube.

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Drilling Conditions

Work Material			Cast Irons Carbon Steels		Alloy Steels (20~30 HRC)		Mold Steels Hardened Steels (30-40 Hrc)		Hardened Steels (40-50 Hrc)		Ductile Cast Irons		Stainless Steel (300-Series Stainless)		Nickel Alloys, Titanium Alloys, PH Stainless		Aluminum Alloys	
Speed (SFM)			390-420 SFM		330-335 SFM		255-265 SFM		160-165 SFM		320-330 SFM		255-265 SFM		100-110 SFM		280-320 SFM	
Drilling Dia.																		
Metric	Fractional	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3		0.1181	12700	0.003	10600	0.003	8500	0.003	5300	0.002	10600	0.003	8500	0.003	3200	0.002	10500	0.003
3.175	1/8	0.1250	12000	0.003	10100	0.003	8100	0.003	5100	0.002	10100	0.003	8100	0.003	3100	0.002	10000	0.003
4		0.1575	9600	0.004	8000	0.004	6400	0.004	4000	0.003	8000	0.004	6400	0.004	2400	0.003	7500	0.004
4.763	3/16	0.1875	8100	0.005	6800	0.005	5400	0.004	3400	0.003	6800	0.004	5400	0.004	2100	0.003	6300	0.005
5		0.1969	7700	0.005	6400	0.005	5100	0.005	3300	0.004	6400	0.005	5100	0.005	2000	0.003	6000	0.006
6		0.2362	6400	0.005	5300	0.006	4200	0.006	2700	0.004	5300	0.005	4200	0.006	1600	0.004	5000	0.007
6.35	1/4	0.2500	6100	0.006	5100	0.006	4000	0.006	2600	0.005	5100	0.006	4000	0.006	1600	0.004	4800	0.007
7.938	5/16	0.3125	4900	0.007	4100	0.008	3300	0.007	2100	0.006	4100	0.007	3300	0.007	1300	0.005	3800	0.008
8		0.3150	4800	0.007	4000	0.008	3200	0.007	2000	0.006	4000	0.007	3200	0.007	1200	0.006	3700	0.009
9.525	3/8	0.3750	4000	0.008	3400	0.008	2700	0.008	1700	0.007	3400	0.008	2700	0.007	1000	0.007	2700	0.010
10		0.3937	3800	0.008	3200	0.009	2500	0.008	1600	0.007	3200	0.008	2500	0.008	950	0.007	2500	0.011
12		0.4724	3200	0.009	2700	0.009	2100	0.009	1300	0.008	2700	0.009	2100	0.009	800	0.007	2100	0.012
12.7	1/2	0.5000	3100	0.009	2600	0.010	2000	0.009	1300	0.008	2600	0.009	2000	0.010	800	0.007	2000	0.012
14		0.5512	2900	0.009	2400	0.010	1900	0.009	1200	0.009	2400	0.010	1900	0.010	800	0.007	1900	0.012
16		0.6299	2400	0.011	2000	0.011	1600	0.011	1000	0.010	2000	0.011	1600	0.012	600	0.009	1700	0.013

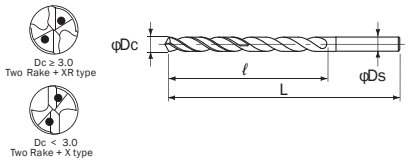
Drill Dia. (mm/inches)

Note: 1) Utilize the standard drilling conditions shown in the catalogs just a general guide when starting operation.
2) Adjust drilling conditions if required if any vibration or unusual sound occurs when cutting.
3) When using low speed machines, use the maximum speed and adjust the feed rate.
4) Use of water soluble cutting fluid is recommended.
5) In case of dry drilling - use Air blow and reduce feeds/speeds by 30%

Formulas: $RPM = \frac{SFM \times 3.82}{\text{Drill Dia.}}$ Feed rate (in/min) : RPM x IPR

Aqua Drill EX Oil Hole 10D

Carbide Material | AQ EX Coating | h7 Dia. Tol | 140° Point Angle | 26°~30° Helix | h6 Shank Dia. Tol



LIST 9612

Unit = mm

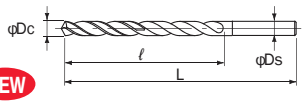
• U.S. stock item

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0733673	1.00		0.0394	13	61		•
0733680	1.10		0.0433	14			•
0733696	1.20		0.0472	16			•
0733701	1.30		0.0512	17	63		•
0733718	1.40		0.0551	18			•
0733724	1.50		0.0591	20			•
0733730	1.60		0.0630	21			•
0733747	1.70		0.0669	22			•
0733753	1.80		0.0709	23	70		•
0733760	1.90		0.0748	25			•
0733776	2.00		0.0787	26		3	•
0733782	2.10		0.0827	27			•
0733799	2.20		0.0866	29			•
0733804	2.30		0.0906	30	80		•
0733810	2.40		0.0945	31			•
0733827	2.50		0.0984	33			•
0733833	2.60		0.1024	34			•
0733840	2.70		0.1063	35			•
0733856	2.80		0.1102	36	89		•
0733862	2.90		0.1142	38			•
0726519	3.00		0.1181	39			•
0729788	3.10		0.1220				•
0729794	3.20		0.1260				•
0729800	3.30		0.1299	46	96		•
0729816	3.40		0.1339				•
0726525	3.50		0.1378			4	•
0729822	3.60		0.1417				•
0729839	3.70		0.1457				•
0729845	3.80		0.1496	52	102		•
0729851	3.90		0.1535				•
0726531	4.00		0.1575				•
0729868	4.10		0.1614				•
0729874	4.20		0.1654				•
0729880	4.30		0.1693	59	109		•
0729897	4.40		0.1732				•
0726548	4.50		0.1772			5	•
0729902	4.60		0.1811				•
0729919	4.70		0.1850				•
0729925	4.80		0.1890	65	115		•
0729931	4.90		0.1929				•
0726554	5.00		0.1969				•
0729948	5.10		0.2008				•
0729954	5.20		0.2047				•
0729960	5.30		0.2087	72	122		•
0729977	5.40		0.2126				•
0726560	5.50		0.2165				•
0729983	5.60		0.2205			6	•
0729990	5.70		0.2244				•
0730003	5.80		0.2283	78	128		•
0730010	5.90		0.2323				•
0726577	6.00		0.2361				•
0730026	6.10		0.2402				•
0730032	6.20		0.2441				•
0730049	6.30		0.2480	85	135	7	•
0730055	6.40		0.2520				•
0726583	6.50		0.2559				•
0730061	6.60		0.2598				•
0730078	6.70		0.2638				•
0730084	6.80		0.2677	91	141	7	•
0730090	6.90		0.2717				•
0726590	7.00		0.2756				•
0730106	7.10		0.2795				•
0730112	7.20		0.2835				•
0730129	7.30		0.2874	98	148		•
0730135	7.40		0.2913				•
0726605	7.50		0.2953			8	•
0730141	7.60		0.2992				•
0730158	7.70		0.3031				•
0730164	7.80		0.3071	104	154		•
0730170	7.90		0.3110				•
0726611	8.00		0.3150				•
0730187	8.10		0.3189				•
0730193	8.20		0.3228				•
0730209	8.30		0.3268	111	161		•
0730215	8.40		0.3307				•
0726628	8.50		0.3346			9	•
0730221	8.60		0.3386				•
0730238	8.70		0.3425				•
0730244	8.80		0.3465	117	167		•
0730250	8.90		0.3504				•
0726634	9.00		0.3543				•
0730267	9.10		0.3583				•
0730273	9.20		0.3622				•
0730280	9.30		0.3661	124	174		•
0730296	9.40		0.3701				•
0726640	9.50		0.3740			10	•
0730301	9.60		0.3780				•
0730318	9.70		0.3819				•
0730324	9.80		0.3858	130	180		•
0730330	9.90		0.3898				•
0726657	10.00		0.3937				•
0730347	10.10		0.3976				•
0730353	10.20		0.4016				•
0730360	10.30		0.4055	137	197		•
0730376	10.40		0.4094				•
0726663	10.50		0.4134			11	•
0730382	10.60		0.4173				•
0730399	10.70		0.4213				•
0730404	10.80		0.4252	143	203		•
0730410	10.90		0.4291				•
0726670	11.00		0.4331				•
0730427	11.10		0.4370				•
0730433	11.20		0.4409				•
0730440	11.30		0.4449	150	210		•
0730456	11.40		0.4488				•
0726686	11.50		0.4528			12	•
0730462	11.60		0.4567				•
0730479	11.70		0.4606				•
0730485	11.80		0.4646	156	216		•
0730491	11.90		0.4685				•
0726692	12.00		0.4724				•

Aqua Drill EX Oil Hole 15D

Carbide Material | AQ EX Coating | h7 Dia. Tol | 140° Point Angle | 26°~30° Helix | h6 Shank Dia. Tol

Dc < 3.0 Two Rake + X type | Dc ≥ 3.0 Two Rake + XR type

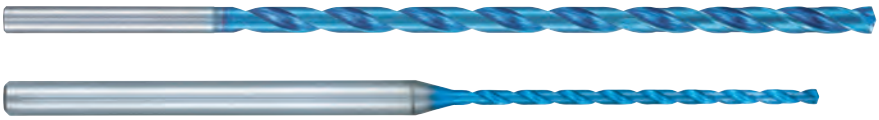


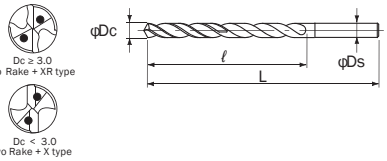
NEW

LIST 9614 Metric sizes LIST 9615 Fractional sizes • U.S. stock item ■ Special order

EDP #	Size	Wire/Fractional/Ltr Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0733879	1.00		0.0394	18	66		•
0733885	1.10		0.0433	20			•
0733891	1.20		0.0472	22			•
0733907	1.30		0.0512	23	71		•
0733913	1.40		0.0551	25			•
0733920	1.50		0.0591	27			•
0733936	1.60		0.0630	29			•
0733942	1.70		0.0669	31			•
0733959	1.80		0.0709	32	80		•
0733965	1.90		0.0748	34			•
0733971	2.00		0.0787	36		3	•
0733988	2.10		0.0827	38			•
0733994	2.20		0.0866	40			•
0734009	2.30		0.0906	41	93		•
0734015	2.40		0.0945	43			•
0734021	2.50		0.0984	45			•
0734038	2.60		0.1024	47			•
0734044	2.70		0.1063	49			•
0734050	2.80		0.1102	50	104		•
0734067	2.90		0.1142	52			•
0726708	3.00		0.1181	52			•
0730507	3.10		0.1220				•
1519137	3.18	1/8	0.1250				•
0730513	3.20		0.1260	63	113		•
0730520	3.30		0.1299				•
0720536	3.40		0.1339				•
0726714	3.50		0.1378				•
1519143	3.57	9/64	0.1400			4	•
0730542	3.60		0.1417				•
0730559	3.70		0.1457				•
0730565	3.80		0.1496	72	122		•
0730571	3.90		0.1535				•
1519150	3.97	5/32	0.1563				•
0726720	4.00		0.1575				•
0730588	4.10		0.1614				•
0730594	4.20		0.1654				•
0730600	4.30		0.1693	81	131		•
1519166	4.37	11/64	0.1718				•
0730616	4.40		0.1732				•
0726737	4.50		0.1772			5	•
0730622	4.60		0.1811				•
0730639	4.70		0.1850				•
1519172	4.76	3/16	0.1875	90	140		•
0730645	4.80		0.1890				•
0730651	4.90		0.1929				•
0726743	5.00		0.1969				•
0730668	5.10		0.2008				•
1519189	5.16	13/64	0.2031				•
0730674	5.20		0.2047				•
0730680	5.30		0.2087	99	149		•
0730697	5.40		0.2126				•
1519195	5.41	#3	0.2129				•
0726750	5.50		0.2165			6	•
1519200	5.56	7/32	0.2188				•
0730702	5.60		0.2205				•
0730719	5.70		0.2244				•
0730725	5.80		0.2283	108	158		•
0730731	5.90		0.2323				•
1519217	5.95	15/64	0.2343				•
0726766	6.00		0.2361				•
0730748	6.10		0.2402				•
0730754	6.20		0.2441				•
0730760	6.30		0.2480	117	167		•
1519223	6.35	1/4	0.2500			7	•
0730777	6.40		0.2520				•
0726772	6.50		0.2559				•
0730783	6.60		0.2598	126	176		•
0730790	6.70		0.2638				•
	6.75	17/64	0.2656				■
0730805	6.80		0.2677	126	176	7	•
0730811	6.90		0.2717				•
0726789	7.00		0.2756				•
0730828	7.10		0.2795				•
1519230	7.14	9/32	0.2813				•
0730834	7.20		0.2835				•
0730840	7.30		0.2874	135	185		•
0730857	7.40		0.2913				•
0726795	7.50		0.2953				•
	7.54	19/64	0.2968			8	■
0730863	7.60		0.2992				•
0730870	7.70		0.3031				•
0730886	7.80		0.3071	144	194		•
0730892	7.90		0.3110				•
1519246	7.94	5/16	0.3125				•
0726800	8.00		0.3150				•
0730908	8.10		0.3189				•
0730914	8.20		0.3228				•
0730920	8.30		0.3268	153	203		•
	8.33	21/64	0.3281				■
0730937	8.40		0.3307				•
0726817	8.50		0.3346			9	•
0730943	8.60		0.3386				•
0730950	8.70		0.3425				•
1519252	8.73	11/32	0.3438	162	212		•
0730966	8.80		0.3465				•
0730972	8.90		0.3504				•
0726823	9.00		0.3543				•
0730989	9.10		0.3583				•
1519269	9.13	23/64	0.3593				•
0730995	9.20		0.3622	171	221		•
0731000	9.30		0.3661				•
0731016	9.40		0.3701				•
0726830	9.50		0.3740				•
1519275	9.53	3/8	0.3750			10	•
0731022	9.60		0.3780				•
0731039	9.70		0.3819				•
0731045	9.80		0.3858	180	230		•
0731051	9.90		0.3898				•
1519281	9.92	25/64	0.3906				•
0726846	10.00		0.3937				•
0731068	10.10		0.3976				•
0731074	10.20		0.4016				•
0731080	10.30		0.4055	189	249		•
0731097	10.40		0.4094				•
0726852	10.50		0.4134				•
0731102	10.60		0.4173			11	•
0731119	10.70		0.4213				•
	10.72	27/64	0.4219	198	258		■
0731125	10.80		0.4252				•
0731131	10.90		0.4291				•
0726869	11.00		0.4331				•
0731148	11.10		0.4370				•
	11.11	7/16	0.4375				■
0731154	11.20		0.4409	207	267		•
0731160	11.30		0.4449				•
0731177	11.40		0.4488				•
0726875	11.50		0.4528			12	•
	11.51	29/64	0.4531				■
0731183	11.60		0.4567				•
0731190	11.70		0.4606	216	276		•
0731205	11.80		0.4646				•
0731211	11.90		0.4685				•
0726881	12.00		0.4724				•
1519298	12.70	1/2	0.5000	234	294	13	•
1519303	13.49	17/32	0.5312	243	303	14	•
	14.28	9/16	0.5625	261	321	15	■

Aqua Drill EX Oil Hole 20D





LIST 9616 Metric sizes
LIST 9617 Fractional sizes

• U.S. stock item ■ Special order

NEW

CARBIDE DRILLS

EDP #	Size	Fractional Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0734073	1.00		0.0394	23	71		•
0734080	1.10		0.0433	25			•
0734096	1.20		0.0472	28			•
0734101	1.30		0.0512	30	78		•
0734118	1.40		0.0551	32			•
0734124	1.50		0.0591	35			•
0734130	1.60		0.0630	37			•
0734147	1.70		0.0669	39			•
0734153	1.80		0.0709	41	90		•
0734160	1.90		0.0748	44			•
0734176	2.00		0.0787	46		3	•
0734182	2.10		0.0827	48			•
0734199	2.20		0.0866	51			•
0734204	2.30		0.0906	53	105		•
0734210	2.40		0.0945	55			•
0734227	2.50		0.0984	58			•
0734233	2.60		0.1024	60			•
0734240	2.70		0.1063	62			•
0734256	2.80		0.1102	64	119		•
0734262	2.90		0.1142	67			•
0726898	3.00		0.1181	69			•
0731228	3.10		0.1220				•
1519310	3.18	1/8	0.1250				•
0731234	3.20		0.1260	81	131		•
0731240	3.30		0.1299				•
0731257	3.40		0.1339				•
0726903	3.50		0.1378				•
1519326	3.57	9/64	0.1400			4	•
0731263	3.60		0.1417				•
0731270	3.70		0.1457				•
0731286	3.80		0.1496	92	142		•
0731292	3.90		0.1535				•
1519332	3.97	5/32	0.1563				•
0726910	4.00		0.1575				•
0731308	4.10		0.1614				•
0731314	4.20		0.1654				•
0731320	4.30		0.1693	104	154		•
1519349	4.37	11/64	0.1718				•
0731337	4.40		0.1732				•
0726926	4.50		0.1772			5	•
0731343	4.60		0.1811				•
0731350	4.70		0.1850				•
1519355	4.76	3/16	0.1875	115	165		•
0731366	4.80		0.1890				•
0731372	4.90		0.1929				•
0726932	5.00		0.1969				•
0731389	5.10		0.2008				•
	5.15	13/64	0.2031				■
0731395	5.20		0.2047				•
0731400	5.30		0.2087	127	177		•
0731417	5.40		0.2126			6	•
1519361	5.41	#3	0.2129				•
0726949	5.50		0.2165				•
1519378	5.56	7/32	0.2188	138	188		•
0731423	5.60		0.2205				•

EDP #	Size	Fractional Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0731430	5.70		0.2244				•
0731446	5.80		0.2283				•
0731452	5.90		0.2323	138	188	6	•
	5.95	15/64	0.2343				■
0726955	6.00		0.2361				•
0731469	6.10		0.2402				•
0731475	6.20		0.2441				•
0731481	6.30		0.2480	150	200		•
1519384	6.35	1/4	0.2500				•
0731498	6.40		0.2520				•
0726961	6.50		0.2559			7	•
0731503	6.60		0.2598				•
0731510	6.70		0.2638				•
1519390	6.75	17/64	0.2656	161	211		•
0731526	6.80		0.2677				•
0731532	6.90		0.2717				•
0726978	7.00		0.2756				•
0731549	7.10		0.2795				•
	7.14	9/32	0.2813				■
0731555	7.20		0.2835	173	223		•
0731561	7.30		0.2874				•
0731578	7.40		0.2913				•
0726984	7.50		0.2953				•
1519406	7.54	19/64	0.2968			8	•
0731584	7.60		0.2992				•
0731590	7.70		0.3031				•
0731606	7.80		0.3071	184	234		•
0731612	7.90		0.3110				•
1519412	7.94	5/16	0.3125				•
0726990	8.00		0.3150				•
0731629	8.10		0.3189				•
0731635	8.20		0.3228				•
0731641	8.30		0.3268	196	246		•
1519429	8.33	21/64	0.3281				•
0731658	8.40		0.3307				•
0727005	8.50		0.3346			9	•
0731664	8.60		0.3386				•
0731670	8.70		0.3425				•
1519435	8.73	11/32	0.3438	207	257		•
0731687	8.80		0.3465				•
0731693	8.90		0.3504				•
0727011	9.00		0.3543				•
0731709	9.10		0.3583				•
	9.13	23/64	0.3593				■
0731715	9.20		0.3622	219	269		•
0731721	9.30		0.3661				•
0731738	9.40		0.3701				•
0727028	9.50		0.3740				•
1519441	9.53	3/8	0.3750			10	•
0731744	9.60		0.3780				•
0731750	9.70		0.3819				•
0731767	9.80		0.3858	230	280		•
0731773	9.90		0.3898				•
1519458	9.92	25/64	0.3906				•
0727034	10.00		0.3937				•

Drilling Conditions - Wet

L9612, L9614, L9615, L9616, L9617 (10XD, 15XD, 20XD)

Work Material / Speed (SFM) / Drilling Dia.		Structural Steels Carbon Steels (~200HB)		Alloy Steels Heat Treated Steels (20~30 HRC)		Mold Steels Hardened Steels (30-40 Hrc)		Ductile Cast Irons		Stainless Steel	
		145-180 SFM		130-165 SFM		115-150 SFM		115-150 SFM		80-100 SFM	
Metric	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
1.0	0.0394	14300	0.0009	12700	0.0008	6350	0.0011	11150	0.0008	7950	0.0004
1.5	0.0591	9550	0.0013	8500	0.0012	4250	0.0016	7400	0.0012	5300	0.0006
2.0	0.0787	7150	0.0020	6350	0.0020	3200	0.0020	5550	0.0020	4000	0.0008
2.5	0.0984	7000	0.0030	6350	0.0020	3200	0.0030	5700	0.0020	3800	0.0015
Speed (SFM)		230-260 SFM		350-400 SFM		200-230 SFM		115-150 SFM		200-230 SFM	
3.0	0.1181	11500	0.0040	7600	0.0030	6700	0.0030	6700	0.0040	6700	0.0030
4.0	0.1575	8600	0.0050	5700	0.0040	5000	0.0040	5000	0.0050	5000	0.0030
5.0	0.1969	7600	0.0070	5100	0.0050	4500	0.0050	4500	0.0060	4500	0.0040
6.0	0.2362	6400	0.0080	4200	0.0060	3700	0.0060	3700	0.0070	3700	0.0050
7.0	0.2756	5500	0.0090	3600	0.0070	3200	0.0070	3200	0.0080	3200	0.0060
8.0	0.3150	4800	0.0100	3200	0.0080	2800	0.0080	2800	0.0090	2800	0.0070
9.0	0.3543	4200	0.0110	2800	0.0090	2500	0.0090	2500	0.0100	2500	0.0070
10.0	0.3937	3800	0.0110	2500	0.0090	2200	0.0090	2200	0.0110	2200	0.0080
11.0	0.4331	3500	0.0120	2300	0.0100	2000	0.0100	2000	0.0120	2000	0.0080
12.0	0.4724	3200	0.0120	2100	0.0100	1900	0.0100	1900	0.0120	1900	0.0080

Drill Dia. (mm/inches)

Warnings on using the drilling condition tables

1. Adjust drilling condition according to the rigidity of machine or work clamp state.
2. The table values condition are for drilling with water-soluble cutting fluid or mist.
3. Reduce RPM and feed speeds by 30% for non-water-soluble cutting fluid.
4. Use the internal lubricating oil hole.
5. Non-step drilling is possible. However, a work material and drilling condition to chip removal may be worse. In that case, add step feed or review the drilling condition. For holes deeper than 20D in stainless steels, recommend in step feed.
6. In step feed, return to the entrance hole.
7. Step feed interval is about 0.5～1×D.
8. Recommend pre-drilling of guide holes. Depth is 2～3×D.
9. Recommend the AQDEXOHPLT for guide drilling. Recommend the diameter that is 0.03mm larger than the deep hole drill.

Drilling Conditions - MQL

L9612, L9614, L9615, L9616, L9617 (10XD, 15XD, 20XD)

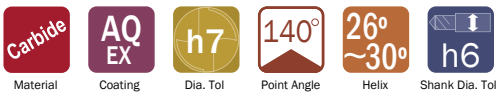
Work Material / Drilling Dia.		Structural Steels Carbon Steels (~200HB)		Alloy Steels Heat Treated Steels (20~30 HRC)		Mold Steels Hardened Steels (30-40 Hrc)		Ductile Cast Irons	
Metric	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3.0	0.1181	7600	0.004	7600	0.003	5700	0.003	5700	0.004
4.0	0.1575	5700	0.005	5000	0.004	4300	0.004	4300	0.005
5.0	0.1969	5100	0.006	4450	0.005	3800	0.005	3800	0.006
6.0	0.2362	4200	0.008	3700	0.006	3200	0.006	3200	0.007
7.0	0.2756	3600	0.009	3200	0.007	2700	0.007	2700	0.008
8.0	0.3150	3200	0.010	2800	0.008	2400	0.008	2400	0.009
9.0	0.3543	2800	0.011	2500	0.009	2100	0.009	2100	0.010
10.0	0.3937	2550	0.011	2200	0.009	1900	0.009	1900	0.011
11.0	0.4331	2300	0.012	2000	0.010	1700	0.010	1700	0.012
12.0	0.4724	2100	0.012	1900	0.010	1600	0.010	1600	0.012

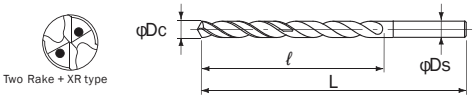
Drill Dia. (mm/inches)

Warnings on using the drilling condition tables

1. Adjust drilling condition according to the rigidity of machine or work clamp state.
2. The table values condition are for drilling with MQL.
3. Non-step drilling is possible. However, a work material and drilling condition to chip removal may be worse. In that case, add step feed or review the drilling condition.
4. In step feed, return to the entrance hole.
5. Step feed interval is about 0.5～1×D.
6. Recommend pre-drilling of guide holes. Depth is 2～3×D.
7. Recommend the AQDEXOHPLT for guide drilling. Recommend the diameter that is 0.03mm larger than the deep hole drill.
8. It is non-application for stainless. Please drill with Wet.

Aqua Drill EX Oil Hole 25D





LIST 9618 Metric sizes
LIST 9619 Fractional sizes

• U.S. stock item ■ Special order

NEW

EDP #	Size	Fractional Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0727040	3.00		0.1181	84	134	3	•
0731780	3.10		0.1220	98	148	4	•
1519464	3.18	1/8	0.1250				•
0731796	3.20		0.1260				•
0731801	3.30		0.1299				•
0731818	3.40		0.1339				•
0727057	3.50		0.1378				•
	3.57	9/64	0.1400	112	162		■
0731824	3.60		0.1417				•
0731830	3.70		0.1457				•
0731847	3.80		0.1496				•
0731853	3.90		0.1535				•
1519470	3.97	5/32	0.1563				•
0727063	4.00		0.1575				•
0731860	4.10		0.1614	126	176	5	•
0731876	4.20		0.1654				•
0731882	4.30		0.1693				•
	4.37	11/64	0.1718				■
0731899	4.40		0.1732				•
0727070	4.50		0.1772				•
0731904	4.60		0.1811	190	140		•
0731910	4.70		0.1850				•
1519487	4.76	3/16	0.1875				•
0731927	4.80		0.1890				•
0731933	4.90		0.1929				•
0727086	5.00		0.1969				•
0731940	5.10		0.2008	154	204	6	•
	5.16	13/64	0.2031				■
0731956	5.20		0.2047				•
0731962	5.30		0.2087				•
0731979	5.40		0.2126				•
1519493	5.41	#3	0.2129				•
0727092	5.50		0.2165				•

EDP #	Size	Fractional Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
	5.56	7/32	0.2188	168	218	6	■
0731985	5.60		0.2205				•
0731991	5.70		0.2244				•
0732006	5.80		0.2283				•
0732012	5.90		0.2323				•
	5.95	15/64	0.2343				■
0727108	6.00		0.2361				•
0732029	6.10		0.2402	182	232	7	•
0732035	6.20		0.2441				•
0732041	6.30		0.2480				•
1519509	6.35	1/4	0.2500				•
0732058	6.40		0.2520				•
0727114	6.50		0.2559				•
0732064	6.60		0.2598	196	246		•
0732070	6.70		0.2638				•
	6.75	17/64	0.2656				■
0732087	6.80		0.2677				•
0732093	6.90		0.2717				•
0727120	7.00		0.2756				•
0732109	7.10		0.2795	210	260	8	•
	7.14	9/32	0.2813				■
0732115	7.20		0.2835				•
0732121	7.30		0.2874				•
0732138	7.40		0.2913				•
0727137	7.50		0.2953				•
	7.54	19/64	0.2968	224	274		■
0732144	7.60		0.2992				•
0732150	7.70		0.3031				•
0732167	7.80		0.3071				•
0732173	7.90		0.3110				•
1519515	7.94	5/16	0.3125				•
0727143	8.00		0.3150				•
1519521	9.53	3/8	0.3750	280	330	10	•

Aqua Drill EX Oil Hole 30D

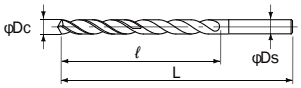
Carbide (Material) | AQ EX (Coating) | h7 (Dia. Tol) | 140° (Point Angle) | 26°~30° (Helix) | h6 (Shank Dia. Tol)

LIST 9620 Metric sizes
LIST 9621 Fractional sizes

• U.S. stock item ■ Special order

NEW

Two Rake + XR type



EDP #	Size	Fractional Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
0727150	3.00		0.1181	99	149	4	•
0732180	3.10		0.1220	116	166		•
1519464	3.18	1/8	0.1250				•
0732196	3.20		0.1260				•
0732201	3.30		0.1299				•
0732218	3.40		0.1339				•
0727166	3.50		0.1378				•
	3.57	9/64	0.1400	132	182		■
0732224	3.60		0.1417				•
0732230	3.70		0.1457				•
0732247	3.80		0.1496				•
0732253	3.90		0.1535				•
1519544	3.97	5/32	0.1563				•
0727172	4.00		0.1575				•
0732260	4.10		0.1614	149	199	5	•
0732276	4.20		0.1654				•
0732282	4.30		0.1693				•
	4.37	11/64	0.1718				■
0732299	4.40		0.1732				•
0727189	4.50		0.1772				•
0732304	4.60		0.1811	165	215		•
0732310	4.70		0.1850				•
1519550	4.76	3/16	0.1875				•
0732327	4.80		0.1890				•
0732333	4.90		0.1929				•
0727195	5.00		0.1969				•
0732340	5.10		0.2008	182	232	6	•
	5.16	13/64	0.2031				■
0732356	5.20		0.2047				•
0732362	5.30		0.2087				•
0732379	5.40		0.2126				•
	5.41	#3	0.2129				■
0727200	5.50		0.2165				•

EDP #	Size	Fractional Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
	5.56	7/32	0.2188	198	248	6	■
0732385	5.60		0.2205				•
0732391	5.70		0.2244				•
0732407	5.80		0.2283				•
0732413	5.90		0.2323				•
	5.95	15/64	0.2343			7	■
0727217	6.00		0.2361				•
0732420	6.10		0.2402	215	265		•
0732436	6.20		0.2441				•
0732442	6.30		0.2480				•
1519509	6.35	1/4	0.2500				•
0732459	6.40		0.2520				•
0727223	6.50		0.2559				•
0732465	6.60		0.2598	231	281		•
0732471	6.70		0.2638				•
	6.75	17/64	0.2656				■
0732488	6.80		0.2677				•
0732494	6.90		0.2717				•
0727230	7.00		0.2756				•
0732500	7.10		0.2795	248	298	8	•
	7.14	9/32	0.2813				■
0732516	7.20		0.2835				•
0732522	7.30		0.2874				•
0732539	7.40		0.2913				•
0727246	7.50		0.2953				•
	7.54	19/64	0.2968	264	314		■
0732545	7.60		0.2992				•
0732551	7.70		0.3031				•
0732568	7.80		0.3071				•
0732574	7.90		0.3110				•
	7.94	5/16	0.3125				■
0727252	8.00		0.3150				•

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Drilling Conditions - Wet

L9618, L9619, L9620, L9621 (25D, 30D)

Work Material / Drilling Dia.		Structural Steels Carbon Steels (~200HB)		Alloy Steels Heat Treated Steels (20~30 HRC)		Mold Steels Hardened Steels (30-40 Hrc)		Ductile Cast Irons		Stainless Steel	
Metric	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3.0	0.1181	11500	0.004	7600	0.003	6700	0.003	6700	0.004	6700	0.003
4.0	0.1575	8600	0.005	5700	0.004	5000	0.004	5000	0.005	5000	0.004
5.0	0.1969	7600	0.006	5100	0.005	4500	0.004	4500	0.006	4500	0.005
6.0	0.2362	6400	0.007	4200	0.006	3700	0.005	3700	0.007	3700	0.007
7.0	0.2756	5500	0.008	3600	0.006	3200	0.006	3200	0.008	3200	0.008
8.0	0.3150	4800	0.009	3200	0.007	2800	0.007	2800	0.009	2800	0.009

Drill Dia. (mm/inches)

Warnings on using the drilling condition tables

1. Adjust drilling condition according to the rigidity of machine or work clamp state.
2. The table values condition are for drilling with water-soluble cutting fluid or mist.
3. Reduce RPM and feed speeds by 30% for non-water-soluble cutting fluid.
4. Use the internal lubricating oil hole.
5. Non-step drilling is possible. However, a work material and drilling condition to chip removal may be worse. In that case, add step feed or review the drilling condition. For holes deeper than 20D in stainless steels, recommend in step feed.
6. In step feed, return to the entrance hole.
7. Step feed interval is about 0.5～1×D.
8. Recommend pre-drilling of guide holes. Depth is 2～3×D.
9. Recommend the AQDEXOHPLT for guide drilling. Recommend the diameter that is 0.03mm larger than the deep hole drill.

Drilling Conditions - MQL

L9618, L9619, L9620, L9621 (25D, 30D)

Work Material / Drilling Dia.		Structural Steels Carbon Steels (~200HB)		Alloy Steels Heat Treated Steels (20~30 HRC)		Mold Steels Hardened Steels (30-40 Hrc)		Ductile Cast Irons	
Metric	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3.0	0.1181	7700	0.004	6700	0.003	5700	0.003	5700	0.003
4.0	0.1575	5700	0.005	5000	0.004	4300	0.004	4300	0.004
5.0	0.1969	5100	0.006	4450	0.005	3800	0.005	3800	0.006
6.0	0.2362	4200	0.007	3700	0.005	3200	0.005	3200	0.007
7.0	0.2756	3600	0.008	3200	0.006	2700	0.006	2700	0.008
8.0	0.3150	3200	0.009	2800	0.007	2400	0.007	2400	0.009

Drill Dia. (mm/inches)

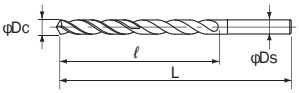
Warnings on using the drilling condition tables

1. Adjust drilling condition according to the rigidity of machine or work clamp state.
2. The table values condition are for drilling with MQL.
3. Non-step drilling is possible. However, a work material and drilling condition to chip removal may be worse. In that case, add step feed or review the drilling condition.
4. In step feed, return to the entrance hole.
5. Step feed interval is about 0.5～1×D.
6. Recommend pre-drilling of guide holes. Depth is 2～3×D.
7. Recommend the AQDEXOHPLT for guide drilling. Recommend the diameter that is 0.03mm larger than the deep hole drill.
8. It is non-application for stainless. Please drill with Wet.

Aqua Drill EX Oil Hole 40D

Carbide (Material) | AQ EX (Coating) | h7 (Dia. Tol) | 140° (Point Angle) | 26°~30° (Helix) | h6 (Shank Dia. Tol)

Two Rake + XR type



LIST 9626 Metric sizes

LIST 9627 Fractional sizes

• U.S. stock item ■ Special order

NEW

EDP #	Size	Fractional Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
1519573	3.00		0.1181	129	179		•
	3.10		0.1220				■
1519618	3.18	1/8	0.1250				•
	3.20		0.1260	151	201		■
	3.30		0.1299				■
	3.40		0.1339				■
	3.50		0.1378			4	■
1519580	3.57	9/64	0.1563				•
	3.60		0.1417				■
	3.70		0.1457				■
	3.80		0.1496	172	222		■
	3.90		0.1535				■
1519624	3.97	5/32	0.1563				•
1519596	4.00		0.1575				•
	4.10		0.1614				■
	4.20		0.1654				■
	4.30		0.1693	194	244		■
	4.40		0.1732			5	■
	4.50		0.1772				■
	4.60		0.1811				■
	4.70		0.1850	215	265		■
1519630	4.76	3/16	0.1875				•

EDP #	Size	Fractional Equivalent	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc			ℓ	L	Ds	
	4.80		0.1890				■
	4.90		0.1929	215	265	5	■
	5.00		0.1969				■
1519601	5.50		0.2165				•
	5.60		0.2205				■
	5.70		0.2244	258	308	6	■
	5.80		0.2283				■
	5.90		0.2323				■
	6.00		0.2361				■
	6.10		0.2402				■
	6.20		0.2441				■
	6.30		0.2480	280	330		■
1519647	6.35	1/4	0.2500				•
	6.40		0.2520				■
	6.50		0.2559			7	■
	6.60		0.2598				■
	6.70		0.2638				■
	6.80		0.2677	301	351		■
	6.90		0.2717				■
	7.00		0.2756				■
1519653	7.94	5/16	0.3125	344	394	8	•

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Drilling Conditions - Wet

Work Material / Drilling Dia.		Structural Steels Carbon Steels (~200HB)		Alloy Steels Heat Treated Steels (20~30 HRC)		Mold Steels Hardened Steels (30-40 Hrc)		Ductile Cast Irons		Stainless Steel	
Metric	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
Drill Dia. (mm/inches) 3.0	0.1181	9600	0.003	6400	0.002	5500	0.002	5500	0.003	5500	0.002
4.0	0.1575	7200	0.004	4800	0.003	4200	0.003	4200	0.003	4200	0.003
5.0	0.1969	6400	0.005	4300	0.004	3700	0.004	3700	0.004	3700	0.003
6.0	0.2362	5300	0.006	3600	0.004	3100	0.004	3100	0.005	3100	0.004
7.0	0.2756	4600	0.007	3000	0.005	2600	0.005	2600	0.006	2600	0.005
7.5	0.2953	4200	0.007	2900	0.005	2500	0.005	2500	0.006	2500	0.005

Warnings on using the drilling condition tables

1. Adjust drilling condition according to the rigidity of machine or work clamp state.
2. The table values condition are for drilling with water-soluble cutting fluid or mist.
3. Reduce RPM and feed speeds by 30% for non-water-soluble cutting fluid.
4. Use the internal lubricating oil hole.
5. Non-step drilling is possible. However, a work material and drilling condition to chip removal may be worse. In that case, add step feed or review the drilling condition. For holes deeper than 20D in stainless steels, recommend in step feed.
6. In step feed, return to the entrance hole.
7. Step feed interval is about 0.5～1×D.
8. Recommend pre-drilling of guide holes. Depth is 2～3×D.
9. Recommend the AQDEXOHPLT for guide drilling. Recommend the diameter that is 0.03mm larger than the deep hole drill.

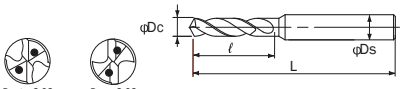
Drilling Conditions - MQL

Work Material / Drilling Dia.		Structural Steels Carbon Steels (~200HB)		Alloy Steels Heat Treated Steels (20~30 HRC)		Mold Steels Hardened Steels (30-40 Hrc)		Ductile Cast Irons	
Metric	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
Drill Dia. (mm/inches) 3.0	0.1181	6400	0.003	5600	0.002	4800	0.002	4800	0.003
4.0	0.1575	4800	0.004	4200	0.003	3600	0.003	3600	0.003
5.0	0.1969	4200	0.005	3700	0.004	3200	0.004	3200	0.004
6.0	0.2362	3500	0.006	3100	0.004	2600	0.005	2600	0.005
7.0	0.2756	3000	0.007	2600	0.005	2300	0.005	2300	0.006
7.5	0.2953	2800	0.007	2500	0.006	2100	0.006	2100	0.007

Warnings on using the drilling condition tables

1. Adjust drilling condition according to the rigidity of machine or work clamp state.
2. The table values condition are for drilling with MQL.
3. Non-step drilling is possible. However, a work material and drilling condition to chip removal may be worse. In that case, add step feed or review the drilling condition.
4. In step feed, return to the entrance hole.
5. Step feed interval is about 0.5～1×D.
6. Recommend pre-drilling of guide holes. Depth is 2～3×D.
7. Recommend the AQDEXOHPLT for guide drilling. Recommend the diameter that is 0.03mm larger than the deep hole drill.
8. It is non-application for stainless. Please drill with Wet.

Aqua Drill EX Oil Hole Pilot



Dc ≥ 3.03 Two Rake + XR type

Dc < 3.03 Two Rake + X type

LIST 9622 Metric sizes LIST 9623 Fractional sizes

***For use with all Nachi Deep Hole Drills**

NEW

List #	EDP #	Size	Decimal Equivalent	For Φ	Flute Length	Overall Length	Shank Dia.	Stock
		Dc			ℓ	L	Ds	
9622	0734279	1.015	0.0400		3.3	54		•
9622	0734285	1.115	0.0439		3.6			•
9622	0734291	1.215	0.0478		3.9			•
9622	0734307	1.315	0.0518		4.2	56		•
9622	0734313	1.415	0.0557		4.6			•
9622	0734320	1.515	0.0596		4.9			•
9622	0734336	1.615	0.0636		5.2			•
9622	0734342	1.715	0.0675		5.5			•
9622	0734359	1.815	0.0715		5.8	60		•
9622	0734365	1.915	0.0754		6.2			•
9622	0734371	2.015	0.0793		9.0		3	•
9622	0734388	2.115	0.0833					•
9622	0734394	2.215	0.0872		11.0	63		•
9622	0734400	2.315	0.0911					•
9622	0734416	2.415	0.0951					•
9622	0734422	2.515	0.0990		12.0			•
9622	0734439	2.615	0.1030					•
9622	0734445	2.715	0.1069			68		•
9622	0734451	2.815	0.1108		14.0			•
9622	0734468	2.915	0.1148					•
9622	0727624	3.030	0.1193					•
9622	0732952	3.130	0.1232					•
9623	1519660	3.205	0.1262	1/8	15.0			•
9622	0732969	3.230	0.1272					•
9622	0732975	3.330	0.1311					•
9622	0732981	3.430	0.1350		16.0			•
9622	0727630	3.530	0.1390					•
9623	1519676	3.601	0.1418	9/64	15.0	72	4	•
9622	0732998	3.630	0.1429		16.0			•
9622	0733002	3.730	0.1469					•
9622	0733019	3.830	0.1508					•
9622	0733025	3.930	0.1547		18.0			•
9623	1519682	3.998	0.1574	5/32				•
9622	0727647	4.030	0.1587					•
9622	0733031	4.130	0.1626					•
9622	0733048	4.230	0.1665		19.0			•
9622	0733054	4.330	0.1705					•
9623	1519699	4.395	0.1730	11/64				•
9622	0733060	4.430	0.1744		21.0			•
9622	0727653	4.530	0.1783					•
9622	0733077	4.630	0.1823			80	5	•
9622	0733083	4.730	0.1862					•
9623	1519704	4.792	0.1887	3/16	22.0			•
9622	0733090	4.830	0.1902					•
9622	0733105	4.930	0.1941					•
9622	0727660	5.030	0.1980		23.0			•
9622	0733111	5.130	0.2020					•
9623	1519710	5.189	0.2043	13/64	24.0			•
9622	0733128	5.230	0.2059					•
9622	0733134	5.330	0.2098					•
9622	0733140	5.430	0.2138					•
9623	1519727	5.440	0.2142	#3				•
9622	0727676	5.530	0.2177		25.0	82	6	•
9623	1519733	5.586	0.2199	7/32				•
9622	0733157	5.630	0.2217					•
9622	0733163	5.730	0.2256					•
9622	0733170	5.830	0.2295					•
9622	0733186	5.930	0.2335		27.0			•
9623	1519740	5.983	0.2356	15/64				•
9622	0727682	6.030	0.2374					•
9622	0733192	6.130	0.2413					•
9622	0733208	6.230	0.2453		28.0			•
9622	0733214	6.330	0.2492					•
9623	1519756	6.380	0.2512	1/4		88	7	•
9622	0733220	6.430	0.2531					•
9622	0727699	6.530	0.2571		30.0			•
9622	0733237	6.630	0.2610					•
9622	0733243	6.730	0.2650		31.0			•

List #	EDP #	Size	Decimal Equivalent	For Φ	Flute Length	Overall Length	Shank Dia.	Stock
		Dc			ℓ	L	Ds	
9623	1519762	6.777	0.2668	17/64	31.0	88	7	•
9622	0733250	6.830	0.2689					•
9622	0733266	6.930	0.2728					•
9622	0727704	7.030	0.2768		32.0			•
9622	0733272	7.130	0.2807					•
9623	1519779	7.173	0.2824	9/32	33.0			•
9622	0733289	7.230	0.2846					•
9622	0733295	7.330	0.2886					•
9622	0733300	7.430	0.2925					•
9622	0727710	7.530	0.2965		34.0			•
9623	1519785	7.571	0.2981	19/64		94	8	•
9622	0733317	7.630	0.3004					•
9622	0733323	7.730	0.3043					•
9622	0733330	7.830	0.3083					•
9622	0733346	7.930	0.3122		36.0			•
9623	1519791	7.967	0.3137	5/16				•
9622	0727727	8.030	0.3161					•
9622	0733352	8.130	0.3201					•
9622	0733369	8.230	0.3240		37.0			•
9622	0733375	8.330	0.3280					•
9623	1519807	8.364	0.3293	21/64				•
9622	0733381	8.430	0.3319					•
9622	0727733	8.530	0.3358		39.0			•
9622	0733398	8.630	0.3398			100	9	•
9622	0733403	8.730	0.3437					•
9623	1519813	8.761	0.3449	11/32	40.0			•
9622	0733410	8.830	0.3476					•
9622	0733426	8.930	0.3516					•
9622	0727740	9.030	0.3555		41.0			•
9622	0733432	9.130	0.3594					•
9623	1519820	9.158	0.3606	23/64	42.0			•
9622	0733449	9.230	0.3634					•
9622	0733455	9.330	0.3673					•
9622	0733461	9.430	0.3713					•
9622	0727756	9.530	0.3752		43.0			•
9623	1519836	9.555	0.3762	3/8		106	10	•
9622	0733478	9.630	0.3791					•
9622	0733484	9.730	0.3831					•
9622	0733490	9.830	0.3870					•
9622	0733506	9.930	0.3909		45.0			•
9623	1519842	9.951	0.3918	25/64				•
9622	0727762	10.030	0.3949					•
9622	0733512	10.130	0.3988					•
9622	0733529	10.230	0.4028		46.0			•
9622	0733535	10.330	0.4067					•
9622	0733541	10.430	0.4106					•
9622	0727779	10.530	0.4146		48.0			•
9622	0733558	10.630	0.4185			116	11	•
9622	0733564	10.730	0.4224					•
9623	1545117	10.745	0.4230	27/64				•
9622	0733570	10.830	0.4264		49.0			•
9622	0733587	10.930	0.4303					•
9622	0727785	11.030	0.4343					•
9622	0733593	11.130	0.4382		50.0			•
9623	1545123	11.142	0.4387	7/16	52.0			•
9622	0733609	11.230	0.4421		51.0			•
9622	0733615	11.330	0.4461					•
9622	0733621	11.430	0.4500					•
9622	0727791	11.530	0.4539		52.0			•
9623	1545130	11.549	0.4547	29/64		122	12	•
9622	0733638	11.630	0.4579					•
9622	0733644	11.730	0.4618					•
9622	0733650	11.830	0.4657		54.0			•
9622	0733667	11.930	0.4697					•
9622	0727807	12.030	0.4736					•
9623	1519859	12.730	0.5012	1/2	57.0	127	13	•
9623	1519865	13.524	0.5324	17/32	62.0	132	14	•
9623	1545146	14.318	0.5637	9/16	65.0	140	15	•

Drilling Conditions - Wet

L9622, L9623

Work Material / Drilling Dia.		Structural Steels Carbon Steels (~200HB)		Alloy Steels Heat Treated Steels (20~30 HRC)		Mold Steels Hardened Steels (30~40 HRC)		Hardened Steels		Ductile Cast Irons		Stainless Steels		Nickel Alloys Titanium Alloys (30~40 HRC)	
Drill Dia. (mm/inches) Metric	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
1.015	0.0400	15700	0.0010	14100	0.0010	12500	0.0008	9400	0.0006	12550	0.0010	9400	0.0005	3150	0.0004
1.515	0.0596	10500	0.0015	9450	0.0015	8400	0.0012	6300	0.0009	8400	0.0015	6300	0.0007	2100	0.0006
2.015	0.0793	7900	0.0020	4100	0.0030	6300	0.0020	4750	0.0012	6300	0.0020	4750	0.0010	1550	0.0008
2.515	0.0990	7600	0.0030	6950	0.0030	6300	0.0020	4400	0.0020	6300	0.0030	4400	0.0015	1650	0.0012
3.03	0.1193	10500	0.0040	7600	0.0040	6800	0.0030	4200	0.0030	8400	0.0040	6800	0.0030	2650	0.0020
4.03	0.1587	7900	0.0050	6300	0.0050	5100	0.0040	3150	0.0030	6300	0.0050	5100	0.0040	2000	0.0030
5.03	0.1980	6350	0.0060	5050	0.0060	4100	0.0050	2550	0.0040	5050	0.0060	4100	0.0050	1600	0.0040
6.03	0.2374	5300	0.0070	4200	0.0070	3400	0.0060	2100	0.0050	4200	0.0070	3400	0.0060	1300	0.0050
7.03	0.2768	4550	0.0080	3600	0.0080	2950	0.0060	1800	0.0050	3600	0.0080	2950	0.0070	1150	0.0050
8.03	0.3161	4000	0.0090	3150	0.0090	2600	0.0070	1600	0.0060	3150	0.0090	2600	0.0080	1000	0.0060
9.03	0.3555	3550	0.0090	2800	0.0090	2300	0.0070	1400	0.0060	2800	0.0090	2300	0.0090	900	0.0060
10.03	0.3949	3200	0.0100	2550	0.0100	2050	0.0080	1250	0.0070	2550	0.0100	2050	0.0090	800	0.0070
11.03	0.4343	2900	0.0110	2300	0.0110	1900	0.0090	1150	0.0080	2300	0.0110	1900	0.0090	720	0.0080
12.03	0.4736	2650	0.0100	2100	0.0100	1700	0.0090	1050	0.0070	2100	0.0100	1700	0.0090	650	0.0080

Warnings on using the drilling condition tables
1. Adjust drilling condition according to the rigidity of machine or work clamp state.
2. Wet condition are for drilling with water soluble cutting fluid.
3. In non water soluble cutting fluid, reduce the rotation and feed by 20%.
4. Use on internal coolant.

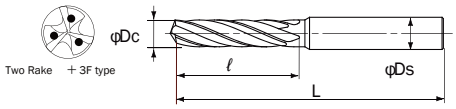
Drilling Conditions - MQL

L9622, L9623

Work Material / Drilling Dia.		Structural Steels Carbon Steels (~200HB)		Alloy Steels Heat Treated Steels (20~30 HRC)		Mold Steels Hardened Steels (30~40 HRC)		Hardened Steels (40~50 HRC)		Ductile Cast Irons	
Drill Dia. (mm/inches) Metric	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3.03	0.1193	6800	0.003	7600	0.003	5250	0.003	2600	0.002	5800	0.003
4.03	0.1587	5100	0.004	4350	0.004	3950	0.004	2000	0.003	4350	0.005
5.03	0.1980	4100	0.005	3500	0.005	3150	0.004	1600	0.004	3500	0.006
6.03	0.2374	3400	0.006	2900	0.006	2650	0.005	1300	0.004	2900	0.006
7.03	0.2768	2950	0.007	2500	0.007	2250	0.006	1150	0.005	2500	0.007
8.03	0.3161	2600	0.008	2200	0.008	2000	0.006	1000	0.006	2200	0.008
9.03	0.3555	2300	0.008	1950	0.008	1750	0.007	900	0.006	1950	0.008
10.03	0.3949	2050	0.009	1750	0.009	1600	0.007	800	0.006	1750	0.009
11.03	0.4343	1900	0.010	1600	0.010	1450	0.008	700	0.007	1600	0.010
12.03	0.4736	1700	0.009	1450	0.009	1300	0.008	650	0.007	1450	0.010

Warnings on using the drilling condition tables
1. Adjust drilling condition according to the rigidity of machine or work clamp state.
2. The table values condition are for drilling with MQL.
3. Non-step drilling is possible. However, a work material and drilling condition to chip removal may be worse. In that case, add step feed or review the drilling condition.

Aqua Drill EX Oil Hole 3 Flute 3D



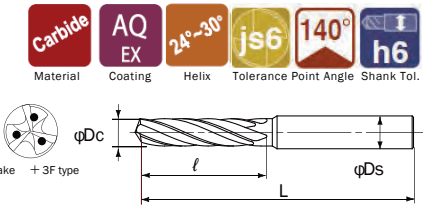
LIST 9826

• U.S. stock item

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc		ℓ	L	Ds	
0723876	3.0	0.1181	17	68	3	•
0728483	3.1	0.1220	20	72	4	•
0728490	3.2	0.1260				•
0728505	3.3	0.1299				•
0723882	3.4	0.1339				•
0723899	3.5	0.1378				•
0728511	3.6	0.1417	22			•
0728528	3.7	0.1457				•
0728534	3.8	0.1496				•
0728540	3.9	0.1535				•
0723904	4.0	0.1575				•
0728557	4.1	0.1614	25	80	5	•
0728563	4.2	0.1654				•
0723910	4.3	0.1693				•
0729736	4.4	0.1732				•
0723927	4.5	0.1772				•
0728570	4.6	0.1811	27			•
0728586	4.7	0.1850				•
0728592	4.8	0.1890				•
0728608	4.9	0.1929				•
0723933	5.0	0.1969				•
0723940	5.1	0.2008		82	6	•
0728614	5.2	0.2047				•
0728620	5.3	0.2087				•
0728637	5.4	0.2126				•
0723956	5.5	0.2165				•
0728643	5.6	0.2205	30			•
0728650	5.7	0.2244				•
0728666	5.8	0.2283				•
0728672	5.9	0.2323				•
0723962	6.0	0.2362				•
0728689	6.1	0.2402	32	88	7	•
0728695	6.2	0.2441				•
0728700	6.3	0.2480				•
0728717	6.4	0.2520				•
0723979	6.5	0.2559				•
0728723	6.6	0.2598	35			•
0728730	6.7	0.2638				•
0723985	6.8	0.2677				•
0723991	6.9	0.2717				•
0724006	7.0	0.2756				•
0729742	7.1	0.2795	37	94	8	•
0729759	7.2	0.2835				•
0729765	7.3	0.2874				•
0729771	7.4	0.2913				•
0724012	7.5	0.2953				•
0728746	7.6	0.2992	40			•
0728752	7.7	0.3031				•
0728769	7.8	0.3071				•
0728775	7.9	0.3110				•
0724029	8.0	0.3150				•

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc		ℓ	L	Ds	
0728781	8.1	0.3189	42	100	9	•
0728798	8.2	0.3228				•
0728803	8.3	0.3268				•
0728810	8.4	0.3307				•
0724035	8.5	0.3346				•
0724041	8.6	0.3386	45			•
0728826	8.7	0.3425				•
0728832	8.8	0.3465				•
0728849	8.9	0.3504				•
0724058	9.0	0.3543				•
0728855	9.1	0.3583	47	106	10	•
0728861	9.2	0.3622				•
0728878	9.3	0.3661				•
0728884	9.4	0.3701				•
0724064	9.5	0.3740				•
0728890	9.6	0.3780	50			•
0728906	9.7	0.3819				•
0728912	9.8	0.3858				•
0728929	9.9	0.3898				•
0724070	10.0	0.3937				•
0728935	10.1	0.3976	52	116	11	•
0728941	10.2	0.4016				•
0724087	10.3	0.4055				•
0728958	10.4	0.4094				•
0724093	10.5	0.4134				•
0728964	10.6	0.4173	55			•
0728970	10.7	0.4213				•
0728987	10.8	0.4252				•
0728993	10.9	0.4291				•
0724109	11.0	0.4331				•
0729008	11.1	0.4370	57	122	12	•
0729014	11.2	0.4409				•
0729020	11.3	0.4449				•
0729037	11.4	0.4488				•
0724115	11.5	0.4528				•
0729043	11.6	0.4567	60			•
0729050	11.7	0.4606				•
0729066	11.8	0.4646				•
0729072	11.9	0.4685				•
0724121	12.0	0.4724				•
0724138	12.1	0.4764	62	128	13	•
0724144	12.5	0.4921				•
0724150	13.0	0.5118	65			•
0724167	13.5	0.5315	67	134	14	•
0724173	14.0	0.5512	70			•
0724180	14.1	0.5551	72	140	15	•
0724196	14.5	0.5709				•
0724201	15.0	0.5906	75			•
0724218	15.5	0.6102	77	146	16	•
0724224	15.6	0.6142	80			•
0724230	16.0	0.6299				•

Aqua Drill EX Oil Hole 3 Flute 5D



LIST 9820

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc		ℓ	L	Ds	
0724247	3.0	0.1181	28	78	3	•
0729089	3.1	0.1220	32	86	4	•
0729095	3.2	0.1260				•
0729100	3.3	0.1299				•
0724253	3.4	0.1339				•
0724260	3.5	0.1378				•
0729117	3.6	0.1417	36			•
0729123	3.7	0.1457				•
0729130	3.8	0.1496				•
0729146	3.9	0.1535				•
0724276	4.0	0.1575				•
0729152	4.1	0.1614	40	98	5	•
0729169	4.2	0.1654				•
0724282	4.3	0.1693				•
0729175	4.4	0.1732				•
0724299	4.5	0.1772				•
0729181	4.6	0.1811	44	98	5	•
0729198	4.7	0.1850				•
0729203	4.8	0.1890				•
0729210	4.9	0.1929				•
0724304	5.0	0.1969				•
0724310	5.1	0.2008		100	6	•
0729226	5.2	0.2047				•
0729232	5.3	0.2087				•
0729249	5.4	0.2126				•
0724327	5.5	0.2165				•
0729255	5.6	0.2205	48			•
0729261	5.7	0.2244				•
0729278	5.8	0.2283				•
0729284	5.9	0.2323				•
0724333	6.0	0.2362				•
0729290	6.1	0.2402	52	109	7	•
0729306	6.2	0.2441				•
0729312	6.3	0.2480				•
0729329	6.4	0.2520				•
0724340	6.5	0.2559				•
0729335	6.6	0.2598	56			•
0729341	6.7	0.2638				•
0724356	6.8	0.2677				•
0724362	6.9	0.2717				•
0724379	7.0	0.2756				•
0729358	7.1	0.2795	60	118	8	•
0729364	7.2	0.2835				•
0729370	7.3	0.2874				•
0729387	7.4	0.2913				•
0724385	7.5	0.2953				•
0729393	7.6	0.2992	64			•
0729409	7.7	0.3031				•
0729415	7.8	0.3071				•
0729421	7.9	0.3110				•
0724391	8.0	0.3150				•

• U.S. stock item

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc		ℓ	L	Ds	
0729438	8.1	0.3189	68	127	9	•
0729444	8.2	0.3228				•
0729450	8.3	0.3268				•
0729467	8.4	0.3307				•
0724407	8.5	0.3346				•
0724413	8.6	0.3386	72			•
0729473	8.7	0.3425				•
0729480	8.8	0.3465				•
0729496	8.9	0.3504				•
0724420	9.0	0.3543				•
0729501	9.1	0.3583	76	136	10	•
0729518	9.2	0.3622				•
0729524	9.3	0.3661				•
0729530	9.4	0.3701				•
0724436	9.5	0.3740				•
0729547	9.6	0.3780	80			•
0729553	9.7	0.3819				•
0729560	9.8	0.3858				•
0729576	9.9	0.3898				•
0724442	10.0	0.3937				•
0729582	10.1	0.3976	84	149	11	•
0729599	10.2	0.4016				•
0724459	10.3	0.4055				•
0729604	10.4	0.4094				•
0724465	10.5	0.4134				•
0729610	10.6	0.4173	88			•
0729627	10.7	0.4213				•
0729633	10.8	0.4252				•
0729640	10.9	0.4291				•
0724471	11.0	0.4331				•
0729656	11.1	0.4370	92	158	12	•
0729662	11.2	0.4409				•
0729679	11.3	0.4449				•
0729685	11.4	0.4488				•
0724488	11.5	0.4528				•
0729691	11.6	0.4567	96			•
0729707	11.7	0.4606				•
0729713	11.8	0.4646				•
0729720	11.9	0.4685				•
0724494	12.0	0.4724				•
0724500	12.1	0.4764	100	167	13	•
0724516	12.5	0.4921				•
0724522	13.0	0.5118	104			•
0724539	13.5	0.5315	108	176	14	•
0724545	14.0	0.5512	112			•
0724551	14.1	0.5551	116	185	15	•
0724568	14.5	0.5709				•
0724574	15.0	0.5906	120			•
0724580	15.5	0.6102	124	194	16	•
0724597	15.6	0.6142	128			•
0724602	16.0	0.6299				•

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Drilling Conditions

LIST 9826, 9820

Work Material / Speed (SFM) / Drilling Diameter		Cast Irons/Carbon Steel		Alloy Steels/Pre-Hardened (20-30 HRC)		Mold Steels/Hardened Steels (30-40 HRC)		Hardened Steels (40-50 HRC)		Cast Irons		Stainless Steel (300-Series Stainless)		Cast Aluminum	
		325-330 SFM		260-265 SFM		225-230 SFM		170-175 SFM		260-265 SFM		160-165 SFM		260-450 SFM	
Metric	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3	0.118	10,700	0.005	8,500	0.005	7,450	0.004	5,600	0.005	8,500	0.005	5,300	0.004	14,800	0.007
4	0.157	8,000	0.006	6,400	0.006	5,600	0.005	4,200	0.007	6,400	0.006	4,000	0.006	11,200	0.009
6	0.236	5,300	0.010	4,250	0.009	3,750	0.008	2,800	0.011	4,250	0.009	2,650	0.008	7,400	0.010
8	0.315	4,000	0.013	3,200	0.013	2,800	0.011	2,100	0.015	3,200	0.013	2,000	0.011	5,600	0.013
10	0.394	3,200	0.016	2,550	0.016	2,250	0.014	1,700	0.018	2,550	0.016	1,600	0.014	4,500	0.016
12	0.472	2,650	0.019	2,100	0.019	1,850	0.017	1,400	0.022	2,100	0.019	1,350	0.016	3,700	0.019
14	0.551	2,250	0.020	1,800	0.020	1,600	0.016	1,200	0.022	1,800	0.019	1,150	0.016	3,200	0.022
16	0.630	2,000	0.022	1,600	0.022	1,400	0.019	1,050	0.025	1,600	0.022	1,000	0.019	2,200	0.032

Drill Dia. (mm/inches)

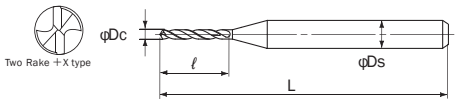
Note:

1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
2) Use the table values as starting parameters. Adjust per your machine & set up as required.
3) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
4) Use Internal Coolant. If drilling more than 3xD or 5xD use peck drill cycle (G83).
5) Peck Depth interval = 1xD

Formulas: $RPM = \frac{SFM \times 3.82}{\text{Drill Dia.}}$

Feed rate(in/min): RPM x IPR

Aqua Drill Micro Solid Carbide



L9544 Metric Sizes

Range 0.20 to 1.99

(Unit) : mm

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc		ℓ	L	Ds	
0634002	0.20	0.0079	2.5	38	3	•
0634019	0.21	0.0083				•
0634025	0.22	0.0087				•
0634031	0.23	0.0091				•
0634048	0.24	0.0094				•
0634054	0.25	0.0098				•
0634060	0.26	0.0102				•
0634077	0.27	0.0106				•
0634083	0.28	0.0110				•
0634090	0.29	0.0114				•
0634105	0.30	0.0118	3			•
0634111	0.31	0.0122				•
0634128	0.32	0.0126				•
0634134	0.33	0.0130				•
0634140	0.34	0.0134				•
0634157	0.35	0.0138	4			•
0634163	0.36	0.0142				•
0634170	0.37	0.0146				•
0634186	0.38	0.0150				•
0634192	0.39	0.0154				•
0634208	0.40	0.0157	5			•
0634214	0.41	0.0161				•
0634220	0.42	0.0165				•
0634237	0.43	0.0169				•
0634243	0.44	0.0173				•
0634250	0.45	0.0177				•
0634266	0.46	0.0181				•
0634272	0.47	0.0185				•
0634289	0.48	0.0189				•
0634295	0.49	0.0193				•
0634300	0.50	0.0197	6			•
0634317	0.51	0.0201				•
0634323	0.52	0.0205				•
0634330	0.53	0.0209				•
0634346	0.54	0.0213				•
0634352	0.55	0.0217				•
0634369	0.56	0.0220				•
0634375	0.57	0.0224				•
0634381	0.58	0.0228				•
0634398	0.59	0.0232				•
0634403	0.60	0.0236	7			•
0634410	0.61	0.0240				•
0634426	0.62	0.0244				•
0634432	0.63	0.0248				•
0634449	0.64	0.0252				•
0634455	0.65	0.0256				•
0634461	0.66	0.0260				•
0634478	0.67	0.0264				•
0634484	0.68	0.0268				•
0634490	0.69	0.0272				•
0634506	0.70	0.0276	9			•
0634512	0.71	0.0280				•
0634529	0.72	0.0283				•
0634535	0.73	0.0207				•
0634541	0.74	0.0291				•

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc		ℓ	L	Ds	
0634558	0.75	0.0295	9	38	3	•
0634564	0.76	0.0299				•
0634570	0.77	0.0303				•
0634587	0.78	0.0307				•
0634593	0.79	0.0311				•
0634609	0.80	0.0315	10			•
0634615	0.81	0.0319				•
0634621	0.82	0.0323				•
0634638	0.83	0.0327				•
0634644	0.84	0.0331				•
0634650	0.85	0.0335				•
0634667	0.86	0.0339				•
0634673	0.87	0.0343				•
0634680	0.88	0.0346				•
0634696	0.89	0.0350				•
0634701	0.90	0.0354	11			•
0634718	0.91	0.0358				•
0634724	0.92	0.0362				•
0634730	0.93	0.0366				•
0634747	0.94	0.0370				•
0634753	0.95	0.0374				•
0634760	0.96	0.0378				•
0634776	0.97	0.0382				•
0634782	0.98	0.0386				•
0634799	0.99	0.0390				•
0634804	1.00	0.0394	12			•
0634810	1.01	0.0398				•
0634827	1.02	0.0402				•
0634833	1.03	0.0406				•
0634840	1.04	0.0409				•
0634856	1.05	0.0413				•
0634862	1.06	0.0417				•
0634879	1.07	0.0421				•
0634885	1.08	0.0425				•
0634891	1.09	0.0429				•
0634907	1.10	0.0433	14	47		•
0634913	1.11	0.0437				•
0634920	1.12	0.0441				•
0634936	1.13	0.0445				•
0634942	1.14	0.0449				•
0634959	1.15	0.0453				•
0634965	1.16	0.0457				•
0634971	1.17	0.0461				•
0634988	1.18	0.0465				•
0634994	1.19	0.0469				•
0635009	1.20	0.0472	15			•
0635015	1.21	0.0476				•
0635021	1.22	0.0480				•
0635038	1.23	0.0484				•
0635044	1.24	0.0488				•
0635050	1.25	0.0492				•
0635067	1.26	0.0496				•
0635073	1.27	0.0500				•
0635080	1.28	0.0504				•
0635096	1.29	0.0508				•

L9544 Metric Sizes

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc		ℓ	L	Ds	
0635101	1.30	0.0512				•
0635118	1.31	0.0516				•
0635124	1.32	0.0520				•
0635130	1.33	0.0524				•
0635147	1.34	0.0528				•
0635153	1.35	0.0531				•
0635160	1.36	0.0535				•
0635176	1.37	0.0539				•
0635182	1.38	0.0543				•
0635199	1.39	0.0547				•
0635204	1.40	0.0551				•
0635210	1.41	0.0555				•
0635227	1.42	0.0559				•
0635233	1.43	0.0563				•
0635240	1.44	0.0567				•
0635256	1.45	0.0571				•
0635262	1.46	0.0575				•
0635279	1.47	0.0579	15	47	3	•
0635285	1.48	0.0583				•
0635291	1.49	0.0587				•
0635307	1.50	0.0591				•
0635313	1.51	0.0594				•
0635320	1.52	0.0598				•
0635336	1.53	0.0602				•
0635342	1.54	0.0606				•
0635359	1.55	0.0610				•
0635365	1.56	0.0614				•
0635371	1.57	0.0618				•
0635388	1.58	0.0622				•
0635394	1.59	0.0626				•
0635400	1.60	0.0630				•
0635416	1.61	0.0634				•
0635422	1.62	0.0638				•
0635439	1.63	0.0642				•
0635445	1.64	0.0646				•

EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.	Stock
	Dc		ℓ	L	Ds	
0635451	1.65	0.0650				•
0635468	1.66	0.0654				•
0635474	1.67	0.0657				•
0635480	1.68	0.0661				•
0635497	1.69	0.0665				•
0635502	1.70	0.0669				•
0635519	1.71	0.0673				•
0635525	1.72	0.0677				•
0635531	1.73	0.0681				•
0635548	1.74	0.0685				•
0635554	1.75	0.0689				•
0635560	1.76	0.0693				•
0635577	1.77	0.0697				•
0635583	1.78	0.0701				•
0635590	1.79	0.0705				•
0635605	1.80	0.0709				•
0635611	1.81	0.0713				•
0635628	1.82	0.0717	15	47	3	•
0635634	1.83	0.0720				•
0635640	1.84	0.0724				•
0635657	1.85	0.0728				•
0635663	1.86	0.0732				•
0635670	1.87	0.0736				•
0635686	1.88	0.0740				•
0635692	1.89	0.0744				•
0635708	1.90	0.0748				•
0635714	1.91	0.0752				•
0635720	1.92	0.0756				•
0635737	1.93	0.0760				•
0635743	1.94	0.0764				•
0635750	1.95	0.0768				•
0635766	1.96	0.0772				•
0635772	1.97	0.0776				•
0635789	1.98	0.0780				•
0635795	1.99	0.0783				•

Standard Drilling Conditions

L9544

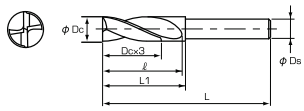
Workpiece Material / Drill Diameter		Carbon Steels Cast Irons			Alloy Steels			Die Steels Hardened Steels (30-40HRc)			Hardened Steels (40-50HRc)			Hardened Steels (50-55HRc)			Ductile Cast Irons			Stainless Steels		
Metric mm	Decimal	RPM	Feed (IPR)	Step Feed(mm)	RPM	Feed (IPR)	Step Feed(mm)	RPM	Feed (IPR)	Step Feed(mm)	RPM	Feed (IPR)	Step Feed(mm)	RPM	Feed (IPR)	Step Feed(mm)	RPM	Feed (IPR)	Step Feed(mm)	RPM	Feed (IPR)	Step Feed(mm)
0.2	0.0079	31,800	0.0001	0.1D	26,500	0.0001	0.1D	21,200	0.0001	0.1D	12,700	0.0001	0.1D	10,600	0.0001	0.1D	31,800	0.0001	0.1D	10,600	0.0001	0.1D
0.3	0.0118	31,800	0.0001		26,500	0.0001		21,200	0.0001		12,700	0.0001		10,600	0.0001		31,800	0.0001		10,600	0.0001	
0.4	0.0157	31,800	0.0002		25,900	0.0002		19,900	0.0002		12,700	0.0002		9,900	0.0002		31,800	0.0002		9,500	0.0002	
0.5	0.0197	31,800	0.0002		25,900	0.0002		19,100	0.0002		12,700	0.0002		9,500	0.0002		31,800	0.0002		9,500	0.0002	
1.0	0.0394	23,900	0.0006	0.2D	15,900	0.0006	0.2D	12,700	0.0006	0.2D	8,000	0.0005		5,600	0.0004		19,100	0.0006	0.2D	5,600	0.0006	
1.5	0.0591	21,200	0.0011		13,800	0.0011		9,500	0.0011		6,400	0.0009		4,200	0.0006		17,000	0.0011		4,200	0.0012	
1.99	0.0783	19,200	0.0019		12,800	0.0020		8,000	0.0020		5,600	0.0015		3,600	0.0008		16,000	0.0014		3,600	0.0015	

Note:
1) Utilize the standard drilling conditions shown in the catalogs just a general guide when starting operation.
2) Adjust drilling conditions if required if any vibration or unusual sound occurs when cutting.
3) When using low speed machines, use the maximum speed and adjust the feed rate.
4) Use of water soluble cutting fluid is recommended.
5) In case of drying drilling - use Air blow and reduce feeds/speeds by 30%

Formulas: $RPM = \frac{SFM \times 3.82}{\text{Drill Dia.}}$ Feed rate (in/min) : RPM x IPR

Aqua Drill EX Flat Stub

Carbide Material | AQ EX Coating | 20° Helix | h7 Dia.Tol | 180° Point Angle | h6 Shank Dia. Tolerance



L9610 **Metric Size**
L9611 **Fractional Size**

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9610	0751974	0.2	0.0079	0.66	47	0.98	3	•
L9610	0751968	0.3	0.0188	0.99		1.36		•
L9610	0751951	0.4	0.0157	1.32		1.65		•
L9610	0737198	0.5	0.0197	1.65		2.03		•
L9610	0737181	0.6	0.0236	1.98		2.32		•
L9610	0737175	0.7	0.0276	2.31		2.71		•
L9610	0737169	0.8	0.0315	2.64		2.99		•
L9610	0737152	0.9	0.0354	2.97		3.28		•
L9610	0715148	1.0	0.0394	3.3		3.6		•
L9610	0715154	1.1	0.0433	3.5		3.9		•
L9610	0715160	1.2	0.0472	3.9		4.2		•
L9610	0715177	1.3	0.0512	4.2		4.5		•
L9610	0715183	1.4	0.0551	4.6		4.9		•
L9610	0715190	1.5	0.0591	4.9	50	5.2	4	•
L9610	0715205	1.6	0.0630	5.2		5.5		•
L9610	0715211	1.7	0.0669	5.5		5.8		•
L9610	0715228	1.8	0.0709	5.8		6.1		•
L9610	0715234	1.9	0.0748	6.2		6.5		•
L9610	0711354	2.0	0.0787	9		9.8		•
L9610	0713180	2.1	0.0827	11		11.4		•
L9610	0711360	2.2	0.0866			11.4		•
L9610	0713197	2.3	0.0906			11.5		•
L9610	0713202	2.4	0.0945	12		12.6		•
L9610	0711377	2.5	0.0984			12.7		•
L9610	0713219	2.6	0.1024			12.8		•
L9610	0713225	2.7	0.1063	14		14.9		•
L9610	0713231	2.8	0.1102			15.0		•
L9610	0713248	2.9	0.1142			15.0		•
L9610	0709920	3.0	0.1181			14.4		•
L9610	0713254	3.1	0.1220	15		15.5		•
L9611	**1455595**	**1/8**	**0.1250**			**18**		•
L9610	0713260	3.2	0.1260			15.6		•
L9610	0710839	3.3	0.1299			15.7		•
L9610	0713277	3.4	0.1339	16		16.2		•
L9610	0709936	3.5	0.1378			16.3		•
L9610	0713283	3.6	0.1417			16.4		•
L9610	0713290	3.7	0.1457	18		18.0		•
L9610	0713305	3.8	0.1496			18.1		•
L9610	0713311	3.9	0.1535			18.2		•
L9611	**1455600**	**5/32**	**0.1563**			**20**		•
L9610	0709942	4.0	0.1575			18.3		•
L9610	0713328	4.1	0.1614	19	60	20.4	6	•
L9610	0710845	4.2	0.1654			20.4		•
L9610	0713334	4.3	0.1693			20.5		•
L9610	0713340	4.4	0.1732	21		22.6		•
L9610	0709959	4.5	0.1772			22.7		•
L9610	0713357	4.6	0.1811			22.8		•
L9610	0713363	4.7	0.1850	22		22.9		•
L9611	**1455617**	**3/16**	**0.1875**			**24**		•
L9610	0713370	4.8	0.1890			23.0		•
L9610	0713386	4.9	0.1929			23.0		•
L9610	0709965	5.0	0.1969	23		23.1		•
L9610	0713392	5.1	0.2008	24		26.2		•
L9610	0713408	5.2	0.2047			26.3		•
L9610	0711390	5.3	0.2087			26.4		•
L9610	0713414	5.4	0.2126	25		27.5		•
L9610	0709971	5.5	0.2165			27.6		•
L9611	**1455623**	**7/32**	**0.2188**			**28**		•
L9610	0713420	5.6	0.2205			27.7		•
L9610	0713437	5.7	0.2244	27		29.7		•
L9610	0713443	5.8	0.2283			29.8		•
L9610	0713450	5.9	0.2323			29.9		•
L9610	0709988	6.0	0.2362			30		•

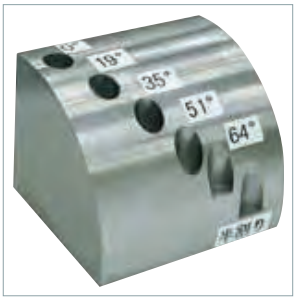
List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9610	0713466	6.1	0.2402	28	70	31	6	•
L9610	0713472	6.2	0.2441					•
L9610	0713489	6.3	0.2480					•
L9611	**1455630**	**1/4**	**0.2500**	30		33		•
L9610	0713495	6.4	0.2520					•
L9610	0709994	6.5	0.2559					•
L9610	0713500	6.6	0.2598					•
L9610	0713517	6.7	0.2638	31				•
L9610	0710851	6.8	0.2677					•
L9610	0713523	6.9	0.2717					•
L9610	0710008	7.0	0.2756	32				•
L9610	0713530	7.1	0.2795	33		36		•
L9611	**1455646**	**9/32**	**0.2812**					•
L9610	0713546	7.2	0.2835					•
L9610	0713552	7.3	0.2874					•
L9610	0713569	7.4	0.2913	34				•
L9610	0710014	7.5	0.2953					•
L9610	0713575	7.6	0.2992					•
L9610	0713581	7.7	0.3031	36		39		•
L9610	0713598	7.8	0.3071					•
L9610	0713603	7.9	0.3110					•
L9611	**1455652**	**5/16**	**0.3125**					•
L9610	0710020	8.0	0.3150					•
L9610	0713610	8.1	0.3189	37	80	40	8	•
L9610	0713626	8.2	0.3228					•
L9610	0713632	8.3	0.3268					•
L9611	**1455669**	**21/64**	**0.3281**	39		42		•
L9610	0713649	8.4	0.3307					•
L9610	0710037	8.5	0.3346					•
L9610	0713655	8.6	0.3386					•
L9610	0713661	8.7	0.3425	40				•
L9610	0711405	8.8	0.3465					•
L9610	0713678	8.9	0.3504					•
L9610	0710043	9.0	0.3543	41				•
L9610	0713684	9.1	0.3583	42		45		•
L9611	**1455675**	**23/64**	**0.3594**					•
L9610	0713690	9.2	0.3622	43				•
L9610	0713706	9.3	0.3661					•
L9610	0713712	9.4	0.3701					•
L9610	0710050	9.5	0.3740					•
L9611	**1455681**	**3/8**	**0.3750**					•
L9610	0713729	9.6	0.3780					•
L9610	0713735	9.7	0.3819	45		48		•
L9610	0713741	9.8	0.3858					•
L9610	0713758	9.9	0.3898					•
L9610	0710066	10.0	0.3937					•
L9610	0713764	10.1	0.3976	46	90	49	10	•
L9610	0713770	10.2	0.4016					•
L9610	0710868	10.3	0.4055					•
L9611	**1455698**	**13/32**	**0.4063**	48		51		•
L9610	0713787	10.4	0.4094					•
L9610	0710072	10.5	0.4134					•
L9610	0713793	10.6	0.4173					•
L9610	0713809	10.7	0.4213	49				•
L9610	0711411	10.8	0.4252					•
L9610	0713815	10.9	0.4291					•
L9610	0710089	11.0	0.4331	50		54		•
L9610	0713821	11.1	0.4370	51				•
L9611	**1455703**	**7/16**	**0.4375**					•
L9610	0713838	11.2	0.4409					•
L9610	0713844	11.3	0.4449					•
L9610	0713850	11.4	0.4488	52				•
L9610	0710095	11.5	0.4528					•

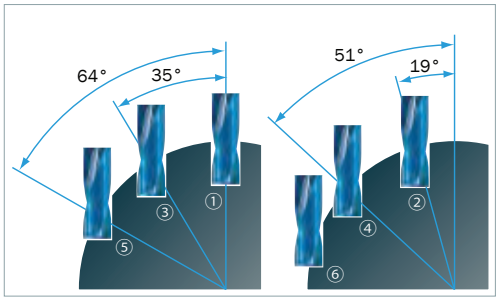
L9610 **Metric Size**
L9611 **Fractional Size**

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9611	**1455710**	**29/64**	**0.4531**	52	90	54	10	•
L9610	0713867	11.6	0.4567					•
L9610	0713873	11.7	0.4606	54		57		•
L9610	0713880	11.8	0.4646					•
L9610	0713896	11.9	0.4685					•
L9611	**1455726**	**15/32**	**0.4688**					•
L9610	0710100	12.0	0.4724		100		12	•
L9610	0724619	12.1	0.4764					•
L9610	0724625	12.2	0.4803					•
L9610	0724631	12.3	0.4843					•
L9610	0724648	12.4	0.4882					•
L9610	0710117	12.5	0.4921	57		60		•
L9610	0724654	12.6	0.4961					•
L9610	0724660	12.7	0.5000					•
L9611	**1455732**	**1/2**	**0.5000**	**58**				•
L9610	0724677	12.8	0.5039	57				•
L9610	0724683	12.9	0.5079					•
L9610	0710123	13.0	0.5118	59		63		•
L9610	0724690	13.1	0.5157					•
L9610	0724705	13.2	0.5197					•
L9610	0724711	13.3	0.5236					•
L9610	0724728	13.4	0.5276					•
L9610	0710130	13.5	0.5315	61				•
L9610	0724734	13.6	0.5354					•
L9610	0724740	13.7	0.5394					•
L9610	0724757	13.8	0.5433					•
L9610	0724763	13.9	0.5472					•
L9610	0710146	14.0	0.5512	63		66		•
L9610	0724770	14.1	0.5551					•
L9610	0724786	14.2	0.5591					•

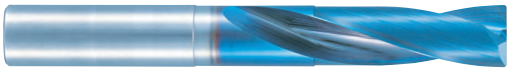
List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9611	**1455749**	**9/16**	**0.5625**	**64**	**105**	**67**	12	•
L9610	0724792	14.3	0.5630	63	100	66		•
L9610	0724808	14.4	0.5669					•
L9610	0710152	14.5	0.5709	66	105	69		•
L9610	0724814	14.6	0.5748					•
L9610	0724820	14.7	0.5787					•
L9610	0724837	14.8	0.5827					•
L9610	0724843	14.9	0.5866					•
L9610	0710169	15.0	0.5906	68				•
L9610	0724850	15.1	0.5945					•
L9610	0724866	15.2	0.5984					•
L9610	0724872	15.3	0.6024					•
L9610	0724889	15.4	0.6063					•
L9610	0710175	15.5	0.6102	70	115	72		•
L9610	0724895	15.6	0.6142					•
L9610	0724900	15.7	0.6181					•
L9610	0724917	15.8	0.6220					•
L9611	**1455755**	**5/8**	**0.6250**	**72**		**75**		•
L9610	0724923	15.9	0.6260	70		72	16	•
L9610	0710181	16.0	0.6299	72		75		•
L9610	0710198	16.5	0.6496	75		78		•
L9610	0710203	17.0	0.6693	77	125	79		•
L9611	**1455761**	**11/16**	**0.6875**	**79**		**81**		•
L9610	0710210	17.5	0.6890	79		81		•
L9610	0710226	18.0	0.7087	81		84		•
L9610	0710232	18.5	0.7283	84	135	87		•
L9610	0710249	19.0	0.7480	86		87		•
L9611	**1455778**	**3/4**	**0.7500**	**87**		**90**		•
L9610	0710255	19.5	0.7677	88	145	91		•
L9610	0710261	20.0	0.7874	90		93	20	•

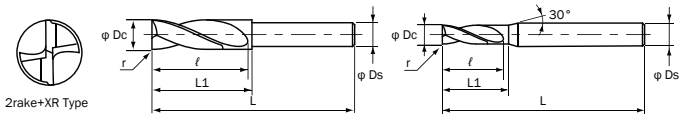
⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov





Aqua Drill EX Flat Radius





L9830 **Metric Size**
L9831 **Fractional Size**

List No.	EDP NO.	Size	Decimal Equivalent	Radius	FL	OAL	L1	Shank Dia.	Stock
		Dc		r	ℓ	L	L1	Ds	
9830	0732580	3.0	0.1181	0.3	14	50	16	6	•
9830	1490158	3.1	0.1220		15		17		•
9831	**1489960**	**1/8**	**0.1250**						•
9830	1490164	3.2	0.1260						•
9830	0732597	3.3	0.1299						•
9830	1490170	3.4	0.1339		16		18		•
9830	0732602	3.5	0.1378						•
9830	1490187	3.6	0.1417						•
9830	1490193	3.7	0.1457		18		20		•
9830	1490209	3.8	0.1496						•
9830	1490215	3.9	0.1535						•
9831	**1489977**	**5/32**	**0.1563**						•
9830	0732619	4.0	0.1575						•
9830	1490221	4.1	0.1614		19	60	21		•
9830	0732625	4.2	0.1654						•
9830	1490238	4.3	0.1693						•
9830	1490244	4.4	0.1732		21		23		•
9830	0732631	4.5	0.1772						•
9830	1490250	4.6	0.1811						•
9830	1490267	4.7	0.1850		22		24		•
9831	**1489983**	**3/16**	**0.1875**						•
9830	1490273	4.8	0.1890						•
9830	1490280	4.9	0.1929						•
9830	0732648	5.0	0.1969		23		25		•
9830	1490296	5.1	0.2008		24		26		•
9830	1490301	5.2	0.2047						•
9830	0732654	5.3	0.2087						•
9830	1490318	5.4	0.2126		25		27	6	•
9830	0732660	5.5	0.2165						•
9831	**1489990**	**7/32**	**0.2188**						•
9830	1490324	5.6	0.2205						•
9830	1490330	5.7	0.2244		27		29		•
9830	1490347	5.8	0.2283						•
9830	1490353	5.9	0.2323						•
9830	0732677	6.0	0.2362	0.4			30		•
9830	1490360	6.1	0.2402		28				•
9830	1490376	6.2	0.2441						•
9830	1490382	6.3	0.2480						•
9831	**1490003**	**1/4**	**0.2500**		30		31		•
9830	1490399	6.4	0.2520						•
9830	0732683	6.5	0.2559						•
9830	1490404	6.6	0.2598						•
9830	1490410	6.7	0.2638		31		33		•
9830	0732690	6.8	0.2677						•
9830	1490427	6.9	0.2717						•
9830	0732705	7.0	0.2756		32	70			•
9830	1490433	7.1	0.2795		33		36		•
9831	**1490010**	**9/32**	**0.2812**						•
9830	1490440	7.2	0.2835						•
9830	1490456	7.3	0.2874						•
9830	1490462	7.4	0.2913		34				•
9830	0732711	7.5	0.2953						•
9830	1490479	7.6	0.2992						•
9830	1490485	7.7	0.3031		36		39		•
9830	1490491	7.8	0.3071						•

List No.	EDP NO.	Size	Decimal Equivalent	Radius	FL	OAL	L1	Shank Dia.	Stock
		Dc		r	ℓ	L	L1	Ds	
9830	1490507	7.9	0.3110	0.4	36	70	39	6	•
9831	**1490026**	**5/16**	**0.3125**						•
9830	0732728	8.0	0.3150					8	•
9830	1490513	8.1	0.3189		37	80	40		•
9830	1490520	8.2	0.3228						•
9830	1490536	8.3	0.3268						•
9831	**1490032**	**21/64**	**0.3281**		39		42		•
9830	1490542	8.4	0.3307						•
9830	0732734	8.5	0.3346						•
9830	1490559	8.6	0.3386						•
9830	1490565	8.7	0.3425		40				•
9830	0732740	8.8	0.3465						•
9830	1490571	8.9	0.3504						•
9830	0732757	9.0	0.3543		41				•
9830	1490588	9.1	0.3583		42		44		•
9831	**1490049**	**23/64**	**0.3594**						•
9830	1490594	9.2	0.3622						•
9830	1490600	9.3	0.3661						•
9830	1490616	9.4	0.3701		43		45		•
9830	0732763	9.5	0.3740						•
9831	**1490055**	**3/8**	**0.3750**						•
9830	1490622	9.6	0.3780						•
9830	1490639	9.7	0.3819		45		48		•
9830	1490645	9.8	0.3858						•
9830	1490651	9.9	0.3898						•
9830	0732770	10.0	0.3937	0.5	46	90	49	10	•
9830	1490668	10.1	0.3976						•
9830	1490674	10.2	0.4016						•
9830	0732786	10.3	0.4055						•
9831	**1490061**	**13/32**	**0.4063**		48		51		•
9830	1490680	10.4	0.4094						•
9830	0732792	10.5	0.4134						•
9830	1490697	10.6	0.4173						•
9830	1490702	10.7	0.4213						•
9830	0732808	10.8	0.4252		49				•
9830	1490719	10.9	0.4291						•
9830	0732814	11.0	0.4331		50		54		•
9830	1490725	11.1	0.4370						•
9831	**1490078**	**7/16**	**0.4375**		51				•
9830	1490731	11.2	0.4409						•
9830	1490748	11.3	0.4449						•
9830	1490754	11.4	0.4488						•
9830	0732820	11.5	0.4528		52				•
9831	**1490084**	**29/64**	**0.4531**						•
9830	1490760	11.6	0.4567						•
9830	1490777	11.7	0.4606		54		57		•
9830	1490783	11.8	0.4646						•
9830	1490790	11.9	0.4685						•
9831	**1490090**	**15/32**	**0.4688**						•
9830	0732837	12.0	0.4724						•
9831	**1490106**	**1/2**	**0.5000**		**58**	**100**	**60**	12	•
9831	**1490112**	**9/16**	**0.5625**	0.6	**64**	**105**	**67**		•
9831	**1490129**	**5/8**	**0.6250**		**72**	**115**	**75**		•
9831	**1490135**	**11/16**	**0.6875**		**79**	**125**	**81**	16	•
9831	**1490141**	**3/4**	**0.7500**		**87**	**135**	**90**		•

Standard Drilling Conditions

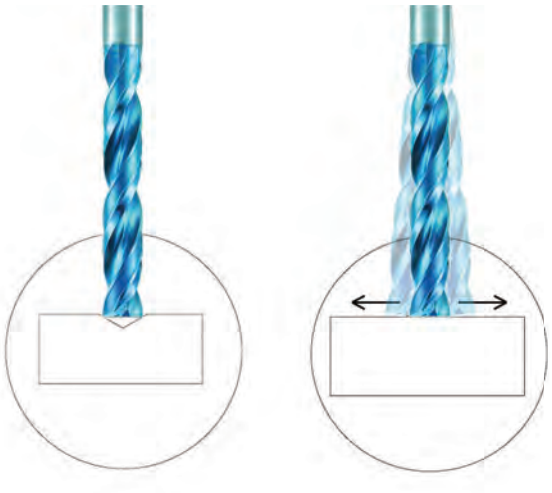
LIST 9610, 9611, 9830, 9831

Work Material / Speed (SFM) / Drill Diameter		Cast Irons / Carbon Steels		Alloy Steels (20-30 HRC)		Mold Steels/ (30-35 HRC)		Ductile Cast Irons		Stainless Steel (300 Series)		Aluminum Alloys		Aluminum Casting	
		65-230 SFM		60-200 SFM		35-120 SFM		60-200 SFM		125-500 SFM		125-500 SFM		120-350 SFM	
Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
0.2	0.007	32000	0.0001	29000	0.0001	14000	0.0001	29000	0.0001	16000	0.0001	32000	0.0002	32000	0.0001
0.5	0.019	25500	0.0001	21000	0.0001	10000	0.0001	21000	0.0001	12500	0.0002	29000	0.0004	25500	0.0033
1	0.039	19000	0.0006	15900	0.0006	6400	0.0003	15900	0.0005	9550	0.0004	24000	0.0012	19000	0.0008
1.5	0.059	25500	0.0001	21000	0.0001	10000	0.0001	21000	0.0001	7300	0.0007	29000	0.0004	25500	0.0033
2	0.078	12000	0.0009	11500	0.0009	3200	0.0007	11500	0.0009	5030	0.0014	21000	0.0016	14500	0.0013
Speed (SFM)		325-328 SFM		290-295 SFM		220-225 SFM		290-295 SFM		515-525 SFM		515-525 SFM		260-400 SFM	
3	0.118	7950	0.0020	6900	0.0020	3700	0.0020	6900	0.0015	2600	0.0020	17000	0.0025	12500	0.0020
4	0.157	5950	0.0025	5150	0.0025	2800	0.0025	5150	0.0025	1950	0.0023	12500	0.0030	9550	0.0025
5	0.197	4800	0.0035	4150	0.0035	2200	0.0030	4100	0.0030	1550	0.0026	10000	0.0040	7650	0.0035
6	0.236	4000	0.0040	3450	0.0040	1800	0.0035	3450	0.0035	1300	0.0031	8500	0.0045	6400	0.0040
8	0.315	3000	0.0055	2600	0.0055	1400	0.0050	2600	0.0045	970	0.0038	6350	0.0065	4750	0.0055
10	0.394	2400	0.0070	2050	0.0070	1100	0.0060	2050	0.0060	780	0.0047	5100	0.0080	3800	0.0070
12	0.472	2000	0.0085	1700	0.0085	950	0.0070	1700	0.0070	650	0.0057	4250	0.0095	3200	0.0080
16	0.630	1500	0.0110	1300	0.0110	700	0.0095	1300	0.0095	550	0.0063	3200	0.0125	2400	0.0110
20	0.787	1200	0.0140	1050	0.0135	550	0.0120	1050	0.0115	480	0.0066	2550	0.0155	1900	0.0135

Note : 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
2) Use the table values for drilling depths upto 2xD. Adjust cutting conditions per table based on "degree angle to be drilled."
3) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
4) Not recommended for drilling in Stainless Steel. We recommend using List9814 AQUA EX Flat OH3Dor OH5D for Stainless Steel & Hi-temp alloys.
5) Center Drill or Guide hole required. (1: Use AG Starting drill or Aqua Ex Flat drill)

Formulas : RPM $= \frac{SFM \times 3.82}{\text{Drill dia.}}$ Feed Rate (in/min) : RPM×IPR

Drilling Conditions for Angled Surfaces					
Reduction % to above table values					
Degree Angle		Reduction %		Reduction % (Multiplier)	
		RPM	Feed	RPM	Feed
0°	5°	100%	100%	Table Value	Table Value
6°	20°	50%	50%	(Table Value)x0.5	(Table Value)x0.5
21°	35°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
36°	60°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
61°		70%	30%	(Table Value)x0.3	(Table Value)x0.7

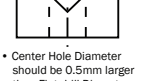


The longer a drill is, the higher the chance that it will walk. Flat bottom drills have a true 180* point. When entering on a flat surface, this amount of surface contact can cause the drill to walk. If this occurs, using a spot drill prior to the flat bottom drill will help to alleviate some of the surface contact to allow the drill to start properly.

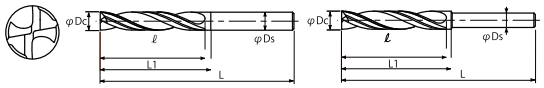
Aqua Drill EX Flat Jobber Length

L9818 Metric Size
L9819 Fractional Size

- For entry on flat surfaces, Center Drill Hole is recommended
- Center Hole Diameter should be 0.5mm larger than Flat drill Diameter



Carbide Material | AQ EX Coating | 20° Helix | h7 Dia.Tol | 180° Point Angle | h6 Shank Dia. Tolerance



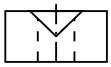
List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9818	0720751	3.0	0.1181	19	60	20	6	•
L9818	0720768	3.1	0.1220	21		23		•
L9819	1489249	1/8	0.1250					•
L9818	0720774	3.2	0.1260					•
L9818	0720780	3.3	0.1299			24		•
L9818	0720797	3.4	0.1339	23				•
L9818	0720802	3.5	0.1378					•
L9818	0720819	3.6	0.1417			25		•
L9818	0720825	3.7	0.1457	25				•
L9818	0720831	3.8	0.1496					•
L9818	0720848	3.9	0.1535					•
L9819	1489255	5/32	0.1563					•
L9818	0720854	4.0	0.1575					•
L9818	0720860	4.1	0.1614	27		29		•
L9818	0720877	4.2	0.1654					•
L9818	0720883	4.3	0.1693			30		•
L9818	0720890	4.4	0.1732	29		32		•
L9818	0720905	4.5	0.1772					•
L9818	0720911	4.6	0.1811					•
L9818	0720928	4.7	0.1850	31		33		•
L9819	1489261	3/16	0.1875					•
L9818	0720934	4.8	0.1890					•
L9818	0720940	4.9	0.1929			32		•
L9818	0720957	5.0	0.1969	32				•
L9818	0720963	5.1	0.2008	34		36		•
L9818	0720970	5.2	0.2047					•
L9818	0720986	5.3	0.2087					•
L9818	0720992	5.4	0.2126	36		37		•
L9818	0721007	5.5	0.2165					•
L9819	1489278	7/32	0.2188			39		•
L9818	0721013	5.6	0.2205					•
L9818	0721020	5.7	0.2244	38				•
L9818	0721036	5.8	0.2283					•
L9818	0721042	5.9	0.2323					•
L9818	0721059	6.0	0.2362	40		41		•
L9818	0721065	6.1	0.2402					•
L9818	0721071	6.2	0.2441					•
L9818	0721088	6.3	0.2480					•
L9819	1489284	1/4	0.2500	42	85	43		•
L9818	0721094	6.4	0.2520		70			•
L9818	0721100	6.5	0.2559					•
L9818	0721116	6.6	0.2598					•
L9818	0721122	6.7	0.2638	44		45		•
L9818	0721139	6.8	0.2677					•
L9818	0721145	6.9	0.2717					•
L9818	0721151	7.0	0.2756	46	90	47		•
L9818	0721168	7.1	0.2795					•
L9819	1489290	9/32	0.2812					•
L9818	0721174	7.2	0.2835					•
L9818	0721180	7.3	0.2874	48		49		•
L9818	0721197	7.4	0.2913					•
L9818	0721202	7.5	0.2953					•
L9818	0721219	7.6	0.2992	51		52		•
L9818	0721225	7.7	0.3031					•
L9818	0721231	7.8	0.3071					•
L9818	0721248	7.9	0.3110					•
L9819	1489306	5/16	0.3125					•
L9818	0721254	8.0	0.3150	52	100	53	8	•
L9818	0721260	8.1	0.3189					•
L9818	0721277	8.2	0.3228					•
L9818	0721283	8.3	0.3268					•
L9819	1489312	21/64	0.3281	54		55		•
L9818	0721290	8.4	0.3307					•

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9818	0721305	8.5	0.3346	54	100	55	8	•
L9818	0721311	8.6	0.3386					•
L9818	0721328	8.7	0.3425	56		57		•
L9818	0721334	8.8	0.3465					•
L9818	0721340	8.9	0.3504					•
L9818	0721357	9.0	0.3543	58		59		•
L9818	0721363	9.1	0.3583	59		60		•
L9819	1489329	23/64	0.3594					•
L9818	0721370	9.2	0.3622					•
L9818	0721386	9.3	0.3661					•
L9818	0721392	9.4	0.3701	61		62		•
L9818	0721408	9.5	0.3740					•
L9819	1489335	3/8	0.3750					•
L9818	0721414	9.6	0.3780					•
L9818	0721420	9.7	0.3819	63		64		•
L9818	0721437	9.8	0.3858					•
L9818	0721443	9.9	0.3898					•
L9818	0721450	10.0	0.3937		110	65	10	•
L9818	0721466	10.1	0.3976	65		66		•
L9818	0721472	10.2	0.4016					•
L9818	0721489	10.3	0.4055			68		•
L9819	1489341	13/32	0.4063	67				•
L9818	0721495	10.4	0.4094					•
L9818	0721500	10.5	0.4134					•
L9818	0721517	10.6	0.4173			70		•
L9818	0721523	10.7	0.4213	69				•
L9818	0721530	10.8	0.4252					•
L9818	0721546	10.9	0.4291					•
L9818	0721552	11.0	0.4331	70	115	71	10	•
L9818	0721569	11.1	0.4370	71		72		•
L9819	1489358	7/16	0.4375					•
L9818	0721575	11.2	0.4409					•
L9818	0721581	11.3	0.4449					•
L9818	0721598	11.4	0.4488	73		74		•
L9818	0721603	11.5	0.4528					•
L9819	1489364	29/64	0.4531					•
L9818	0721610	11.6	0.4567					•
L9818	0721626	11.7	0.4606	76		77		•
L9818	0721632	11.8	0.4646					•
L9818	0721649	11.9	0.4685					•
L9819	1489370	15/32	0.4688					•
L9818	0721655	12.0	0.4724			78	12	•
L9818	0721661	12.5	0.4921	80	125	81		•
L9819	1489387	1/2	0.5000	81		83		•
L9818	0721678	13.0	0.5118	82	130	83		•
L9818	0721684	13.5	0.5315	86		87		•
L9818	0721690	14.0	0.5512	88	135	89		•
L9819	1489393	9/16	0.5625	90		91		•
L9818	0721706	14.5	0.5709	92		93		•
L9818	0721712	15.0	0.5906	95	145	96		•
L9818	0721729	15.5	0.6102	98		99		•
L9819	1489409	5/8	0.6250	101		102		•
L9818	0721735	16.0	0.6299	101	160	104	16	•
L9818	0721741	16.5	0.6496	105		106		•
L9818	0721758	17.0	0.6693	108	165	109		•
L9819	1489415	11/16	0.6875	111		112		•
L9818	0721764	17.5	0.6890	111		112		•
L9818	0721770	18.0	0.7087	113	175	114		•
L9818	0721787	18.5	0.7283	118		119		•
L9818	0721793	19.0	0.7480	120	185	121		•
L9819	1489421	3/4	0.7500	122		123		•
L9818	0721809	19.5	0.7677	124		125		•
L9818	0721815	20.0	0.7874	126	195	129	20	•

* Package Qty: 1 per Tube Size

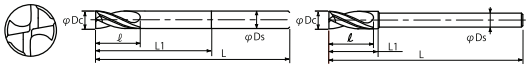
Aqua Drill EX Flat Long Shank

- For entry on flat surfaces, Center Drill Hole is recommended



- Center Hole Diameter should be 0.5mm larger than Flat drill Diameter

Carbide Material | AQ EX Coating | 20° Helix | h7 Dia.Tol | 180° Point Angle | h6 Shank Dia. Tolerance



L9816 **Metric Size**
L9817 **Fractional Size**

***Reach up to 10XD**

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9816	0717701	3.0	0.1181	14	100	30	6	•
L9816	0717718	3.1	0.1220	15		31		•
L9817	**1489438**	**1/8**	**0.1250**			**32**		•
L9816	0717724	3.2	0.1260			32		•
L9816	0717730	3.3	0.1299			33		•
L9816	0717747	3.4	0.1339	16		34		•
L9816	0717753	3.5	0.1378			35		•
L9816	0717760	3.6	0.1417			36		•
L9816	0717776	3.7	0.1457	18		37		•
L9816	0717782	3.8	0.1496			38		•
L9816	0717799	3.9	0.1535			39		•
L9817	**1489444**	**5/32**	**0.1563**			**40**		•
L9816	0717804	4.0	0.1575			40		•
L9816	0717810	4.1	0.1614	19		41		•
L9816	0717827	4.2	0.1654			42		•
L9816	0717833	4.3	0.1693			43		•
L9816	0717840	4.4	0.1732	21		44		•
L9816	0717856	4.5	0.1772			45		•
L9816	0717862	4.6	0.1811			46		•
L9816	0717879	4.7	0.1850	22		47		•
L9817	**1489450**	**3/16**	**0.1875**			**48**		•
L9816	0717885	4.8	0.1890			48		•
L9816	0717891	4.9	0.1929			49		•
L9816	0717907	5.0	0.1969	23	110	50		•
L9816	0717913	5.1	0.2008	24		51		•
L9816	0717920	5.2	0.2047			52		•
L9816	0717936	5.3	0.2087			53		•
L9816	0717942	5.4	0.2126	25		54		•
L9816	0717959	5.5	0.2165			55		•
L9817	**1489467**	**7/32**	**0.2188**			**56**		•
L9816	0717965	5.6	0.2205			56		•
L9816	0717971	5.7	0.2244	27		57		•
L9816	0717988	5.8	0.2283			58		•
L9816	0717994	5.9	0.2323			59		•
L9816	0718009	6.0	0.2362			60		•
L9816	0718015	6.1	0.2402	28	120	30		•
L9816	0718021	6.2	0.2441					•
L9816	0718038	6.3	0.2480					•
L9817	**1489473**	**1/4**	**0.2500**	30		32		•
L9816	0718044	6.4	0.2520					•
L9816	0718050	6.5	0.2559					•
L9816	0718067	6.6	0.2598					•
L9816	0718073	6.7	0.2638	31		33		•
L9816	0718080	6.8	0.2677					•
L9816	0718096	6.9	0.2717					•
L9816	0718101	7.0	0.2756	32		34		•
L9816	0718118	7.1	0.2795	33		35		•
L9817	**1489480**	**9/32**	**0.2812**					•
L9816	0718124	7.2	0.2835					•
L9816	0718130	7.3	0.2874					•
L9816	0718147	7.4	0.2913	34		36		•
L9816	0718153	7.5	0.2953					•
L9816	0718160	7.6	0.2992					•
L9816	0718176	7.7	0.3031	36		38		•
L9816	0718182	7.8	0.3071					•
L9816	0718199	7.9	0.3110					•
L9817	**1489496**	**5/16**	**0.3125**					•
L9816	0718204	8.0	0.3150		130	80	8	•
L9816	0718210	8.1	0.3189	37		39		•
L9816	0718227	8.2	0.3228					•
L9816	0718233	8.3	0.3268					•
L9817	**1489501**	**21/64**	**0.3281**	39		41		•
L9816	0718240	8.4	0.3307					•

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9816	0718256	8.5	0.3346	39	130	41	8	•
L9816	0718262	8.6	0.3386					•
L9816	0718279	8.7	0.3425	40		42		•
L9816	0718285	8.8	0.3465					•
L9816	0718291	8.9	0.3504					•
L9816	0718307	9.0	0.3543	41		43		•
L9816	0718313	9.1	0.3583	42		44		•
L9817	**1489518**	**23/64**	**0.3594**					•
L9816	0718320	9.2	0.3622					•
L9816	0718336	9.3	0.3661					•
L9816	0718342	9.4	0.3701	43		45		•
L9816	0718359	9.5	0.3740					•
L9817	**1489524**	**3/8**	**0.3750**					•
L9816	0718365	9.6	0.3780					•
L9816	0718371	9.7	0.3819	45		47		•
L9816	0718388	9.8	0.3858					•
L9816	0718394	9.9	0.3898					•
L9816	0718400	10.0	0.3937		150	100	10	•
L9816	0718416	10.1	0.3976	46		48		•
L9816	0718422	10.2	0.4016					•
L9816	0718439	10.3	0.4055					•
L9817	**1489530**	**13/32**	**0.4063**	48		50		•
L9816	0718445	10.4	0.4094					•
L9816	0718451	10.5	0.4134					•
L9816	0718468	10.6	0.4173					•
L9816	0718474	10.7	0.4213	49		51		•
L9816	0718480	10.8	0.4252					•
L9816	0718497	10.9	0.4291					•
L9816	0718502	11.0	0.4331	50		52		•
L9816	0718519	11.1	0.4370	51		53		•
L9817	**1489547**	**7/16**	**0.4375**					•
L9816	0718525	11.2	0.4409					•
L9816	0718531	11.3	0.4449					•
L9816	0718548	11.4	0.4488	52		54		•
L9816	0718554	11.5	0.4528					•
L9817	**1489553**	**29/64**	**0.4531**					•
L9816	0718560	11.6	0.4567					•
L9816	0718577	11.7	0.4606	54		56		•
L9816	0718583	11.8	0.4646					•
L9816	0718590	11.9	0.4685					•
L9817	**1489560**	**15/32**	**0.4688**					•
L9816	0718605	12.0	0.4724		170	120	12	•
L9816	0718611	12.5	0.4921	57		59		•
L9817	**1489576**	**1/2**	**0.5000**	58		60		•
L9816	0718628	13.0	0.5118	59	180	61		•
L9816	0718634	13.5	0.5315	61		63		•
L9816	0718640	14.0	0.5512	63	190	65		•
L9817	**1489582**	**9/16**	**0.5625**	64		66		•
L9816	0718657	14.5	0.5709	66		68		•
L9816	0718663	15.0	0.5906	67	200	69		•
L9816	0718670	15.5	0.6102	70		72		•
L9817	**1489599**	**5/8**	**0.6250**	72		74		•
L9816	0718686	16.0	0.6299	72	220	160		•
L9816	0718692	16.5	0.6496	75		77	16	•
L9816	0718708	17.0	0.6693	77		79		•
L9817	**1489604**	**11/16**	**0.6875**	79		81		•
L9816	0718714	17.5	0.6890	79		81		•
L9816	0718720	18.0	0.7087	81	240	83		•
L9816	0718737	18.5	0.7283	84		86		•
L9816	0718743	19.0	0.7480	86	250	88		•
L9817	**1489610**	**3/4**	**0.7500**	87		89		•
L9816	0718750	19.5	0.7677	88		90		•
L9816	0718766	20.0	0.7874	90		200	20	•

* Package Qty: 1 per Tube Size

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Drilling Conditions

LIST 9818, 9819 - AQDEXZR

Work Material / Speed (SFM) / Drill Diameter		Cast Irons / Carbon Steels		Alloy Steels (20-30 HRC)		Mold Steels/ Hardened Steels (30-35 HRC)		Ductile Cast Irons		Aluminum Alloys		Aluminum Casting	
		325-328 SFM		290-295 SFM		220-225 SFM		290-295 SFM		515-525 SFM		260-400 SFM	
Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3	0.118	10600	0.002	9500	0.002	7400	0.002	9500	0.002	17000	0.002	12700	0.002
4	0.157	7900	0.003	7100	0.002	5550	0.002	7100	0.002	12500	0.002	9500	0.003
5	0.197	6300	0.004	5700	0.003	4450	0.003	5700	0.003	10000	0.003	7600	0.004
6	0.236	5300	0.005	4750	0.004	3700	0.004	4750	0.004	8500	0.003	6400	0.005
8	0.315	3950	0.006	3550	0.005	2790	0.005	3550	0.005	6350	0.005	4780	0.006
10	0.394	3150	0.008	2860	0.006	2230	0.006	2860	0.006	5100	0.006	3800	0.008
12	0.472	2650	0.009	2390	0.007	1860	0.007	2390	0.007	4250	0.007	3180	0.009
16	0.630	1990	0.012	1790	0.009	1390	0.009	1790	0.009	3200	0.009	2390	0.013
20	0.787	1590	0.016	1430	0.012	1110	0.012	1430	0.012	2550	0.012	1910	0.016

LIST 9816, 9817 - AQDEXZLS

Work Material / Speed (SFM) / Drill Diameter		Cast Irons / Carbon Steels		Alloy Steels (20-30 HRC)		Mold Steels/ Hardened Steels (30-35 HRC)		Ductile Cast Irons		Aluminum Alloys		Aluminum Casting	
		325-328 SFM		290-295 SFM		220-225 SFM		290-295 SFM		515-525 SFM		260-400 SFM	
Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3	0.118	10600	0.003	9500	0.002	7400	0.002	9500	0.002	17000	0.002	12700	0.002
4	0.157	7900	0.004	7100	0.003	5550	0.002	7100	0.003	12500	0.002	9500	0.003
5	0.197	6300	0.005	5700	0.004	4450	0.003	5700	0.004	10000	0.003	7600	0.004
6	0.236	5300	0.006	4750	0.005	3700	0.004	4750	0.005	8500	0.003	6400	0.005
8	0.315	3950	0.008	3550	0.006	2790	0.005	3550	0.006	6350	0.005	4780	0.006
10	0.394	3150	0.010	2860	0.008	2230	0.006	2860	0.008	5100	0.006	3800	0.008
12	0.472	2650	0.012	2390	0.009	1860	0.007	2390	0.009	4250	0.007	3180	0.009
16	0.630	1990	0.016	1790	0.013	1390	0.009	1790	0.013	3200	0.009	2390	0.013
20	0.787	1590	0.020	1430	0.016	1110	0.012	1430	0.016	2550	0.012	1910	0.016

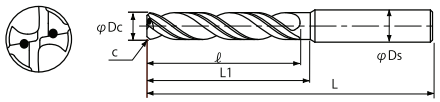
Note : 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
2) Use the table values for drilling depths upto 2xD. Adjust cutting conditions per table based on "degree angle to be drilled."
3) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
4) Not recommended for drilling in Stainless Steel. We recommend using List9814 AQUA EX Flat OH3Dor OH5D for Stainless Steel & Hi-temp alloys.
5) Center Drill or Guide hole required. (1: Use AG Starting drill or Aqua Ex Flat drill)

Formulas : RPM $= \frac{\text{SFM} \times 3.82}{\text{Drill dia.}}$ Feed Rate (in/min) : RPM×IPR

Drilling Conditions for Angled Surfaces					
Reduction % to above table values					
Degree Angle		Reduction %		Reduction % (Multiplier)	
		RPM	Feed	RPM	Feed
0°	5°	100%	100%	Table Value	Table Value
6°	20°	50%	50%	(Table Value)x0.5	(Table Value)x0.5
21°	35°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
36°	60°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
61°		70%	30%	(Table Value)x0.3	(Table Value)x0.7

Aqua Drill EX Flat Oil Hole 3D

Drill Dia (in mm)		Corner Chamfer
Above	Up to	C (mm)
	6.0	0.04
6.0	10.0	0.1
10.0		0.2



L9812 Metric Sizes - **Including NEW MICRO Sizes!**
L9813 **Fractional Size**

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9812	0760322	1.0	0.0394	4.3	55	4.6		•
L9812	0760339	1.1	0.0433	4.7		5		•
L9812	0760345	1.2	0.0472	5.2		5.5		•
L9812	0760351	1.3	0.0512	5.6		5.9		•
L9812	0760368	1.4	0.0551	6		6.3		•
L9812	0760374	1.5	0.0591	6.5	58	6.8		•
L9812	0760380	1.6	0.0630	6.9		7.2		•
L9812	0760397	1.7	0.0669	7.3		7.6		•
L9812	0760402	1.8	0.0709	7.7		8		•
L9812	0760419	1.9	0.0748	8.2		8.5	3	•
L9812	0760425	2.0	0.0787	8.6		8.9		•
L9812	0760431	2.1	0.0827	9		9.3		•
L9812	0760448	2.2	0.0866	9.5		9.8		•
L9812	0760454	2.3	0.0906	9.9	62	10.2		•
L9812	0760460	2.4	0.0945	10.3		10.6		•
L9812	0760477	2.5	0.0984	10.8		11.1		•
L9812	0760483	2.6	0.1024	11.2		11.5		•
L9812	0760490	2.7	0.1063	11.6	68	11.9		•
L9812	0760505	2.8	0.1102	12		12.3		•
L9812	0760511	2.9	0.1142	12.5		12.9		•
L9812	0718772	3.0	0.1181	14	68	15	3	•
L9812	0718789	3.1	0.1220					•
L9813	1489627	1/8	0.1250	15				•
L9812	0718795	3.2	0.1260			17		•
L9812	0718800	3.3	0.1299					•
L9812	0718817	3.4	0.1339					•
L9812	0718823	3.5	0.1378	16	72	18	4	•
L9812	0718830	3.6	0.1417					•
L9812	0718846	3.7	0.1457					•
L9812	0718852	3.8	0.1496					•
L9812	0718869	3.9	0.1535	18		19		•
L9813	1489633	5/32	0.1563					•
L9812	0718875	4.0	0.1575					•
L9812	0718881	4.1	0.1614					•
L9812	0718898	4.2	0.1654	19				•
L9812	0718903	4.3	0.1693			22		•
L9812	0718910	4.4	0.1732					•
L9812	0718926	4.5	0.1772	21		23		•
L9812	0718932	4.6	0.1811		80		5	•
L9812	0718949	4.7	0.1850					•
L9813	1489640	3/16	0.1875	22		24		•
L9812	0718955	4.8	0.1890					•
L9812	0718961	4.9	0.1929					•
L9812	0718978	5.0	0.1969	23				•
L9812	0718984	5.1	0.2008					•
L9812	0718990	5.2	0.2047	24		26		•
L9812	0719005	5.3	0.2087					•
L9812	0719011	5.4	0.2126					•
L9812	0719028	5.5	0.2165	25		27		•
L9813	1489656	7/32	0.2188		82		6	•
L9812	0719034	5.6	0.2205					•
L9812	0719040	5.7	0.2244					•
L9812	0719057	5.8	0.2283	27		28		•
L9812	0719063	5.9	0.2323					•

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9812	0719070	6.0	0.2362	27	82	28	6	•
L9812	0719086	6.1	0.2402					•
L9812	0719092	6.2	0.2441	28				•
L9812	0719108	6.3	0.2480			31		•
L9813	1489662	1/4	0.2500					•
L9812	0719114	6.4	0.2520	30				•
L9812	0719120	6.5	0.2559		88	32	7	•
L9812	0719137	6.6	0.2598					•
L9812	0719143	6.7	0.2638					•
L9812	0719150	6.8	0.2677	31		33		•
L9812	0719166	6.9	0.2717					•
L9812	0719172	7.0	0.2756	32				•
L9812	0719189	7.1	0.2795					•
L9813	1489679	9/32	0.2812	33				•
L9812	0719195	7.2	0.2835			35		•
L9812	0719200	7.3	0.2874					•
L9812	0719217	7.4	0.2913					•
L9812	0719223	7.5	0.2953	34	94	36	8	•
L9812	0719230	7.6	0.2992					•
L9812	0719246	7.7	0.3031					•
L9812	0719252	7.8	0.3071			37		•
L9812	0719269	7.9	0.3110	36				•
L9813	1489685	5/16	0.3125					•
L9812	0719275	8.0	0.3150					•
L9812	0719281	8.1	0.3189					•
L9812	0719298	8.2	0.3228	37				•
L9812	0719303	8.3	0.3268			40		•
L9813	1489691	21/64	0.3281					•
L9812	0719310	8.4	0.3307	39				•
L9812	0719326	8.5	0.3346		100	41	9	•
L9812	0719332	8.6	0.3386					•
L9812	0719349	8.7	0.3425					•
L9812	0719355	8.8	0.3465	40		42		•
L9812	0719361	8.9	0.3504					•
L9812	0719378	9.0	0.3543	41				•
L9812	0719384	9.1	0.3583					•
L9813	1489707	23/64	0.3594	42				•
L9812	0719390	9.2	0.3622			44		•
L9812	0719406	9.3	0.3661					•
L9812	0719412	9.4	0.3701					•
L9812	0719429	9.5	0.3740	43	106	45	10	•
L9813	1489713	3/8	0.3750					•
L9812	0719435	9.6	0.3780					•
L9812	0719441	9.7	0.3819			46		•
L9812	0719458	9.8	0.3858	45				•
L9812	0719464	9.9	0.3898					•
L9812	0719470	10.0	0.3937					•
L9812	0719487	10.1	0.3976	46				•
L9812	0719493	10.2	0.4016					•
L9812	0719509	10.3	0.4055			49		•
L9813	1489720	13/32	0.4063		116		11	•
L9812	0719515	10.4	0.4094	48				•
L9812	0719521	10.5	0.4134			50		•
L9812	0719538	10.6	0.4173			51		•

* Package Qty: 1 per Tube Size

L9812 **Metric Size**
L9813 **Fractional Size**

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9812	0719544	10.7	0.4213	49	116	51	11	•
L9812	0719550	10.8	0.4252					•
L9812	0719567	10.9	0.4291					•
L9812	0719573	11.0	0.4331	50				•
L9812	0719580	11.1	0.4370	51	122	53	12	•
L9813	**1489736**	**7/16**	**0.4375**					•
L9812	0719596	11.2	0.4409					•
L9812	0719601	11.3	0.4449	52		54		•
L9812	0719618	11.4	0.4488					•
L9812	0719624	11.5	0.4528					•
L9813	**1489742**	**29/64**	**0.4531**			55		•
L9812	0719630	11.6	0.4567					•
L9812	0719647	11.7	0.4606	54				•
L9812	0719653	11.8	0.4646					•
L9812	0719660	11.9	0.4685					•

* Package Qty: 1 per Tube Size

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9813	**1489759**	**15/32**	**0.4688**	54	122	55	12	•
L9812	0719676	12.0	0.4724					•
L9812	0719682	12.5	0.4921	57	128	59	13	•
L9813	**1489765**	**1/2**	**0.5000**	**58**	**128**	**60**		•
L9812	0719699	13.0	0.5118	59	128	60		•
L9812	0719704	13.5	0.5315	61	134	63	14	•
L9812	0719710	14.0	0.5512	63	134	64		•
L9813	**1489771**	**9/16**	**0.5625**	**64**	**140**	**68**	15	•
L9812	0719727	14.5	0.5709	66	140	68		•
L9812	0719733	15.0	0.5906	68	140	69		•
L9812	0719740	15.5	0.6102	70	146	72	16	•
L9813	**1489788**	**5/8**	**0.6250**	**72**	**146**	**73**		•
L9812	0719756	16.0	0.6299	72	146	73		•
L9813	**1496964**	**11/16**	**0.6875**	**74**	**146**	**75**	**18**	•
L9813	**1496970**	**3/4**	**0.7500**	**76**	**152**	**77**	**20**	•

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Drilling Conditions

LIST 9812, 9813

Work Material / Speed (SFM)		Cast Irons / Carbon Steels		Alloy Steels (20-30 HRC)		Mold Steels (30-40 HRC)		Hardened Steels (40-50 HRC)		Ductile Cast Irons		Stainless Steel (300-Series Stainless)		Nickel Alloys, Titanium Alloys, PH Stainless		Aluminum Alloys		Aluminum Casting	
Drill Diameter		160 - 200 SFM		130 - 170 SFM		95 - 140 SFM		80 - 100 SFM		130 - 165 SFM		95 - 135 SFM		70 - 80 SFM		180 - 200 SFM		160 - 185 SFM	
Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
1	0.039	15900	0.0003	12700	0.0002	9550	0.0002	7960	0.0002	12700	0.0002	9550	0.0001	6850	0.0006	18400	0.0008	15610	0.0004
1.5	0.059	10600	0.0005	8490	0.0004	6370	0.0003	5320	0.0003	8490	0.0003	6370	0.0001	4600	0.0009	12300	0.0012	10430	0.0006
2	0.079	9550	0.0007	7960	0.0005	5570	0.0004	4790	0.0004	7960	0.0004	6370	0.0002	3900	0.0012	9200	0.0014	8890	0.0007
Speed (SFM)		390 - 395 SFM		245 - 330 SFM		225 - 245 SFM		145 - 165 SFM		245 - 330 SFM		175 - 195 SFM		80 - 100 SFM		450 - 550 SFM		360 - 455 SFM	
2.5	0.098	11500	0.002	9600	0.001	9500	0.001	5750	0.001	10600	0.001	7500	0.001	3300	0.002	19400	0.004	14000	0.002
3	0.118	12700	0.003	10600	0.002	7400	0.002	5300	0.002	10600	0.002	6000	0.003	3200	0.002	16200	0.005	14800	0.004
4	0.157	9500	0.004	7900	0.003	5550	0.002	4000	0.003	7900	0.002	4500	0.004	2400	0.003	12100	0.006	11100	0.005
5	0.197	7600	0.005	6300	0.004	4450	0.003	3200	0.004	6300	0.003	3600	0.005	1900	0.004	9700	0.008	8900	0.006
6	0.236	6300	0.006	5300	0.005	3700	0.004	2700	0.004	5300	0.004	3000	0.006	1600	0.005	8100	0.010	7400	0.007
8	0.315	4800	0.008	3950	0.006	2790	0.005	2000	0.006	3950	0.005	2250	0.008	1200	0.006	6050	0.011	5570	0.009
10	0.394	3800	0.010	3150	0.008	2230	0.006	1600	0.007	3150	0.006	1800	0.010	950	0.007	4850	0.013	4460	0.012
12	0.472	3200	0.012	2650	0.009	1860	0.007	1300	0.009	2650	0.007	1500	0.012	800	0.007	4050	0.016	3710	0.014
16	0.630	2400	0.016	1990	0.013	1390	0.009	1000	0.011	1990	0.009	1100	0.016	600	0.009	3050	0.018	2790	0.019

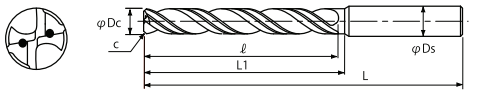
Note : 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
2) Use the table values for drilling depths upto 5xD. Adjust cutting conditions per table based on "degree angle to be drilled."
3) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
4) Center Drill or Guide hole required. (1: Use AG Starting drill or Aqua Ex Flat drill 2: For drilling guide holes in Stainless use AQUA EX Flat OH3D)

Formulas : RPM $= \frac{\text{SFM} \times 3.82}{\text{Drill dia.}}$ Feed Rate (in/min) : RPM×IPR

Drilling Conditions for Angled Surfaces					
Reduction % to above table values					
Degree Angle		Reduction %		Reduction % (Multiplier)	
		RPM	Feed	RPM	Feed
0°	5°	100%	100%	Table Value	Table Value
6°	20°	50%	50%	(Table Value)x0.5	(Table Value)x0.5
21°	35°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
36°	60°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
61°		70%	30%	(Table Value)x0.3	(Table Value)x0.7

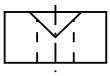
Aqua Drill EX Flat Oil Hole 5D

Carbide Material | AQ EX Coating | 24°~30° Helix | h7 Dia.Tol | 180° Point Angle | h6 Shank Dia. Tolerance



Drill Dia (in mm)		Corner Chamfer
Above	Up to	C (mm)
	6.0	0.04
6.0	10.0	0.1
10.0		0.2

- For entry on flat surfaces, Center Drill Hole is recommended



- Center Hole Diameter should be 0.5mm larger than Flat drill Diameter

L9814 Metric Sizes - **Including NEW MICRO Sizes!**
L9815 **Fractional Size**

CARBIDE DRILLS

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9814	0760528	1.0	0.0394	6.3	57	6.6	3	•
L9814	0760534	1.1	0.0433	6.9	60	7.2		•
L9814	0760540	1.2	0.0472	7.6		7.9		•
L9814	0760557	1.3	0.0512	8.2		8.5		•
L9814	0760563	1.4	0.0551	8.8		9.1		•
L9814	0760570	1.5	0.0591	9.5		9.8		•
L9814	0760586	1.6	0.0630	10.1		10.4		•
L9814	0760592	1.7	0.0669	10.7		11		•
L9814	0760608	1.8	0.0709	11.3		11.6		•
L9814	0760614	1.9	0.0748	12		12.3		•
L9814	0760620	2.0	0.0787	12.6		12.9		•
L9814	0760637	2.1	0.0827	13.2	64	13.5		•
L9814	0760643	2.2	0.0866	13.9		14.2		•
L9814	0760650	2.3	0.0906	14.5		14.8		•
L9814	0760666	2.4	0.0945	15.1		15.4		•
L9814	0760672	2.5	0.0984	15.8		16.1		•
L9814	0760689	2.6	0.1024	16.4	74	16.7		•
L9814	0760695	2.7	0.1063	17		17.3		•
L9814	0760700	2.8	0.1102	17.6		17.9		•
L9814	0760717	2.9	0.1142	18.3		18.6		•
L9814	0719762	3.0	0.1181	20	74	21	3	•
L9814	0719779	3.1	0.1220	22	80	25	4	•
L9815	**1489794**	**1/8**	**0.1250**					•
L9814	0719785	3.2	0.1260					•
L9814	0719791	3.3	0.1299					•
L9814	0719807	3.4	0.1339	24		27		•
L9814	0719813	3.5	0.1378					•
L9814	0719820	3.6	0.1417					•
L9814	0719836	3.7	0.1457					•
L9814	0719842	3.8	0.1496	26				•
L9814	0719859	3.9	0.1535					•
L9815	**1489800**	**5/32**	**0.1563**					•
L9814	0719865	4.0	0.1575					•
L9814	0719871	4.1	0.1614	28	90	30	5	•
L9814	0719888	4.2	0.1654					•
L9814	0719894	4.3	0.1693					•
L9814	0719900	4.4	0.1732	29		31		•
L9814	0719916	4.5	0.1772					•
L9814	0719922	4.6	0.1811			34		•
L9814	0719939	4.7	0.1850	32				•
L9815	**1489816**	**3/16**	**0.1875**					•
L9814	0719945	4.8	0.1890					•
L9814	0719951	4.9	0.1929					•
L9814	0719968	5.0	0.1969	33				•
L9814	0719974	5.1	0.2008	35	94	38	6	•
L9814	0719980	5.2	0.2047					•
L9814	0719997	5.3	0.2087					•
L9814	0720000	5.4	0.2126	37		39		•
L9814	0720017	5.5	0.2165					•
L9815	**1489822**	**7/32**	**0.2188**			40		•
L9814	0720023	5.6	0.2205					•
L9814	0720030	5.7	0.2244	39				•
L9814	0720046	5.8	0.2283					•
L9814	0720052	5.9	0.2323					•

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9814	0720069	6.0	0.2362	41	101	44	7	•
L9814	0720075	6.1	0.2402					•
L9814	0720081	6.2	0.2441					•
L9814	0720098	6.3	0.2480	43				•
L9815	**1489839**	**1/4**	**0.2500**					•
L9814	0720103	6.4	0.2520					•
L9814	0720110	6.5	0.2559			45		•
L9814	0720126	6.6	0.2598			46		•
L9814	0720132	6.7	0.2638	45				•
L9814	0720149	6.8	0.2677					•
L9814	0720155	6.9	0.2717					•
L9814	0720161	7.0	0.2756	46				•
L9814	0720178	7.1	0.2795	48	110	51	8	•
L9815	**1489845**	**9/32**	**0.2812**					•
L9814	0720184	7.2	0.2835					•
L9814	0720190	7.3	0.2874					•
L9814	0720206	7.4	0.2913	50		52		•
L9814	0720212	7.5	0.2953					•
L9814	0720229	7.6	0.2992			53		•
L9814	0720235	7.7	0.3031	52				•
L9814	0720241	7.8	0.3071					•
L9814	0720258	7.9	0.3110					•
L9815	**1489851**	**5/16**	**0.3125**					•
L9814	0720264	8.0	0.3150					•
L9814	0720270	8.1	0.3189	54	117	57	9	•
L9814	0720287	8.2	0.3228					•
L9814	0720293	8.3	0.3268					•
L9815	**1489868**	**21/64**	**0.3281**	56		58		•
L9814	0720309	8.4	0.3307					•
L9814	0720315	8.5	0.3346					•
L9814	0720321	8.6	0.3386			59		•
L9814	0720338	8.7	0.3425	58				•
L9814	0720344	8.8	0.3465					•
L9814	0720350	8.9	0.3504					•
L9814	0720367	9.0	0.3543	59				•
L9814	0720373	9.1	0.3583	61	126	64	10	•
L9815	**1489874**	**23/64**	**0.3594**			65		•
L9814	0720380	9.2	0.3622			64		•
L9814	0720396	9.3	0.3661					•
L9814	0720401	9.4	0.3701	63		65		•
L9814	0720418	9.5	0.3740					•
L9815	**1489880**	**3/8**	**0.3750**					•
L9814	0720424	9.6	0.3780			66		•
L9814	0720430	9.7	0.3819	65				•
L9814	0720447	9.8	0.3858					•
L9814	0720453	9.9	0.3898					•
L9814	0720460	10.0	0.3937					•
L9814	0720476	10.1	0.3976	67	138	70	11	•
L9814	0720482	10.2	0.4016					•
L9814	0720499	10.3	0.4055					•
L9815	**1489897**	**13/32**	**0.4063**	69		71		•
L9814	0720504	10.4	0.4094					•
L9814	0720510	10.5	0.4134					•
L9814	0720527	10.6	0.4173					•

* Package Qty: 1 per Tube Size

L9814 **Metric Size**
L9815 **Fractional Size**

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9814	0720533	10.7	0.4213	72	138	73	11	•
L9814	0720540	10.8	0.4252					•
L9814	0720556	10.9	0.4291					•
L9814	0720562	11.0	0.4331	73				•
L9814	0720579	11.1	0.4370	74	146	77	12	•
L9815	**1489902**	**7/16**	**0.4375**					•
L9814	0720585	11.2	0.4409					•
L9814	0720591	11.3	0.4449					•
L9814	0720607	11.4	0.4488	76		78		•
L9814	0720613	11.5	0.4528					•
L9815	**1489919**	**29/64**	**0.4531**			79		•
L9814	0720620	11.6	0.4567					•
L9814	0720636	11.7	0.4606	78				•
L9814	0720642	11.8	0.4646					•

* Package Qty: 1 per Tube Size

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9814	0720659	11.9	0.4685	78	146	79	12	•
L9815	**1489925**	**15/32**	**0.4688**					•
L9814	0720665	12.0	0.4724					•
L9814	0720671	12.5	0.4921	82	153	84	13	•
L9815	**1489931**	**1/2**	**0.5000**	**85**		**86**		•
L9814	0720688	13.0	0.5118	86		86		•
L9814	0720694	13.5	0.5315	89	162	91	14	•
L9814	0720700	14.0	0.5512	91		92		•
L9815	**1489948**	**9/16**	**0.5625**	**93**		**97**		•
L9814	0720716	14.5	0.5709	95	169	97	15	•
L9814	0720722	15.0	0.5906	98		98		•
L9814	0720739	15.5	0.6102	102		104	16	•
L9815	**1489954**	**5/8**	**0.6250**	**104**	178	**105**		•
L9814	0720745	16.0	0.6299	104		105		•

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

CARBIDE DRILLS

Standard Drilling Conditions

LIST 9814, 9815

Work Material / Speed (SFM)		Cast Irons / Carbon Steels		Alloy Steels (20-30 HRC)		Mold Steels (30-35 HRC)		Hardened Steels (40-50 HRC)		Ductile Cast Irons		Stainless Steel (300-Series Stainless)		Nickel Alloys, Titanium Alloys, PH Stainless		Aluminum Alloys		Aluminum Casting	
Drill Diameter		115 - 140 SFM		90 - 115 SFM		65 - 80 SFM		55 - 70 SFM		90 - 115 SFM		65 - 95 SFM		70 - 80 SFM		180 - 200 SFM		160 - 185 SFM	
Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
1	0.039	11130	0.0003	8890	0.0002	6685	0.0002	5572	0.0002	8890	0.0002	6685	0.0001	6850	0.0006	18400	0.0008	15610	0.0004
1.5	0.059	7420	0.0005	5943	0.0004	4459	0.0003	3724	0.0003	5943	0.0003	4459	0.0001	4600	0.0009	12300	0.0012	10430	0.0006
2	0.079	6685	0.0007	5572	0.0005	3899	0.0004	3353	0.0004	5572	0.0004	4459	0.0002	3900	0.0012	9200	0.0014	8890	0.0007
Speed (SFM)		295 - 395 SFM		245 - 330 SFM		225 - 245 SFM		145 - 165 SFM		245 - 330 SFM		185 - 195 SFM		80 - 95 SFM		450 - 550 SFM		360 - 455 SFM	
2.5	0.098	11500	0.002	9600	0.001	9500	0.001	5750	0.001	9560	0.001	7500	0.001	3300	0.002	19400	0.004	14000	0.002
3	0.118	12700	0.003	10600	0.002	7400	0.002	5350	0.002	10600	0.002	6000	0.003	3000	0.002	16200	0.005	14800	0.004
4	0.157	9000	0.004	7500	0.003	5200	0.002	3800	0.002	7900	0.002	4200	0.003	2200	0.002	12100	0.006	11100	0.005
5	0.197	7200	0.005	5900	0.004	4200	0.003	3000	0.003	6300	0.003	3400	0.004	1800	0.003	9700	0.008	8900	0.006
6	0.236	5900	0.006	5000	0.005	3500	0.003	2500	0.003	5300	0.004	2800	0.005	1500	0.004	8100	0.010	7400	0.007
8	0.315	4500	0.008	3700	0.006	2600	0.005	1900	0.005	3950	0.005	2100	0.007	1100	0.005	6050	0.011	5570	0.009
10	0.394	3600	0.010	2900	0.008	2100	0.006	1500	0.006	3150	0.006	1700	0.009	900	0.006	4850	0.013	4460	0.012
12	0.472	3000	0.012	2500	0.009	1700	0.007	1200	0.007	2650	0.007	1400	0.010	700	0.007	4050	0.016	3710	0.014
16	0.630	2200	0.016	1800	0.013	1300	0.009	900	0.010	1990	0.009	1000	0.014	500	0.009	3050	0.018	2790	0.019

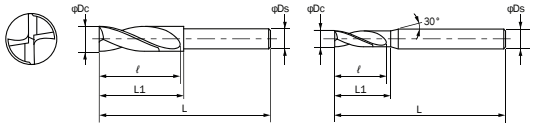
Note : 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
2) Use the table values for drilling depths upto 5xD. Adjust cutting conditions per table based on "degree angle to be drilled."
3) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
4) Center Drill or Guide hole required. (1: Use AG Starting drill or Aqua Ex Flat drill 2: For drilling guide holes in Stainless use AQUA EX Flat OH3D)

Formulas : $RPM = \frac{SFM \times 3.82}{\text{Drill dia.}}$ Feed Rate (in/min) : RPM×IPR

Drilling Conditions for Angled Surfaces					
Reduction % to above table values					
Degree Angle		Reduction %		Reduction % (Multiplier)	
		RPM	Feed	RPM	Feed
0°	5°	100%	100%	Table Value	Table Value
6°	20°	50%	50%	(Table Value)x0.5	(Table Value)x0.5
21°	35°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
36°	60°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
61°		70%	30%	(Table Value)x0.3	(Table Value)x0.7

Aqua Drill EX Flat Super Stub

Carbide (Material) | AQ EX (Coating) | h7 (Dia. Tol.) | 180° (Point Angle) | 20° (Helix) | h6 (Shank Dia.)



L9628 Metric Sizes

NEW

* Japan Stock Item

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9628	0765754	2.0	0.0787	7	50	7.8	4	•
L9628	0765760	2.1	0.0827			8.4		•
L9628	0765777	2.2	0.0866	8		8.4		•
L9628	0765783	2.3	0.0906			8.5		•
L9628	0765790	2.4	0.0945			9.6		•
L9628	0765805	2.5	0.0984	9		9.7		•
L9628	0765811	2.6	0.1024			9.8		•
L9628	0765828	2.7	0.1063	10		10.9		•
L9628	0765834	2.8	0.1102			11		•
L9628	0765840	2.9	0.1142	11		13		•
L9628	0765055	3.0	0.1181			11.4	6	•
L9628	0765061	3.1	0.1220			12.5		•
L9628	0765078	3.2	0.1260	12		12.6		•
L9628	0765084	3.3	0.1299			12.7		•
L9628	0765090	3.4	0.1339	13		13.2		•
L9628	0765106	3.5	0.1378			13.3		•
L9628	0765112	3.6	0.1417			13.4		•
L9628	0765129	3.7	0.1457			14		•
L9628	0765135	3.8	0.1496	14		14.1		•
L9628	0765141	3.9	0.1535			14.2		•
L9628	0765158	4.0	0.1575			14.3		•
L9628	0765164	4.1	0.1614	15	60	16.4		•
L9628	0765170	4.2	0.1654			16.4		•
L9628	0765187	4.3	0.1693			16.5		•
L9628	0765193	4.4	0.1732	16		17.6		•
L9628	0765209	4.5	0.1772			17.7		•
L9628	0765215	4.6	0.1811			17.8		•
L9628	0765221	4.7	0.1850	18		18.9		•
L9628	0765238	4.8	0.1890			19		•
L9628	0765244	4.9	0.1929			19		•
L9628	0765250	5.0	0.1969			19.1		•
L9628	0765267	5.1	0.2008	19		21.2		•
L9628	0765273	5.2	0.2047			21.3		•
L9628	0765280	5.3	0.2087			21.4		•
L9628	0765296	5.4	0.2126	20		22.5		•
L9628	0765301	5.5	0.2165			22.6		•
L9628	0765318	5.6	0.2205			22.7		•
L9628	0765324	5.7	0.2244	21		23.7		•
L9628	0765330	5.8	0.2283			23.8		•
L9628	0765347	5.9	0.2323			23.9		•
L9628	0765353	6.0	0.2362			24		•
L9628	0765360	6.1	0.2402	22	70	25		•
L9628	0765376	6.2	0.2441					•
L9628	0765382	6.3	0.2480					•
L9628	0765399	6.4	0.2520	23		26		•
L9628	0765404	6.5	0.2559					•
L9628	0765410	6.6	0.2598					•
L9628	0765427	6.7	0.2638	24				•
L9628	0765433	6.8	0.2677					•
L9628	0765440	6.9	0.2717					•
L9628	0765456	7.0	0.2756					•
L9628	0765462	7.1	0.2795	26		29		•
L9628	0765479	7.2	0.2835					•
L9628	0765485	7.3	0.2874					•
L9628	0765491	7.4	0.2913	27				•
L9628	0765507	7.5	0.2953					•
L9628	0765513	7.6	0.2992					•
L9628	0765520	7.7	0.3031	28		31		•
L9628	0765536	7.8	0.3071					•
L9628	0765542	7.9	0.3110					•
L9628	0765559	8.0	0.3150				8	•

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9628	0765565	8.1	0.3189	29	80	32	8	•
L9628	0765571	8.2	0.3228					•
L9628	0765588	8.3	0.3268					•
L9628	0765594	8.4	0.3307	30		33		•
L9628	0765600	8.5	0.3346					•
L9628	0765616	8.6	0.3386					•
L9628	0765622	8.7	0.3425	32		34		•
L9628	0765639	8.8	0.3465					•
L9628	0765645	8.9	0.3504					•
L9628	0765651	9.0	0.3543					•
L9628	0765668	9.1	0.3583	33		36		•
L9628	0765674	9.2	0.3622					•
L9628	0765680	9.3	0.3661					•
L9628	0764690	9.4	0.3701	34				•
L9628	0764706	9.5	0.3740					•
L9628	0764712	9.6	0.3780					•
L9628	0764729	9.7	0.3819	35		38		•
L9628	0764735	9.8	0.3858					•
L9628	0764741	9.9	0.3898					•
L9628	0764758	10.0	0.3937				10	•
L9628	0764764	10.1	0.3976	36	90	39		•
L9628	0764770	10.2	0.4016					•
L9628	0764787	10.3	0.4055					•
L9628	0764793	10.4	0.4094	37		40		•
L9628	0764809	10.5	0.4134					•
L9628	0764815	10.6	0.4173					•
L9628	0764821	10.7	0.4213	38				•
L9628	0764838	10.8	0.4252					•
L9628	0764844	10.9	0.4291					•
L9628	0764850	11.0	0.4331					•
L9628	0764867	11.1	0.4370	40		43		•
L9628	0764873	11.2	0.4409					•
L9628	0764880	11.3	0.4449					•
L9628	0764896	11.4	0.4488	41				•
L9628	0764901	11.5	0.4528					•
L9628	0764918	11.6	0.4567					•
L9628	0764924	11.7	0.4606	42		45		•
L9628	0764930	11.8	0.4646					•
L9628	0764947	11.9	0.4685					•
L9628	0764953	12.0	0.4724	43		46	12	•
L9628	0764960	12.1	0.4764					•
L9628	0764976	12.2	0.4803					•
L9628	0764982	12.3	0.4843					•
L9628	0764999	12.4	0.4882	44		47		•
L9628	0765003	12.5	0.4921					•
L9628	0765010	12.6	0.4961					•
L9628	0765026	12.7	0.5000	45				•
L9628	0765032	12.8	0.5039					•
L9628	0765049	12.9	0.5079					•
L9628	0764305	13.0	0.5118		100			•
L9628	0764311	13.1	0.5157	47		50		•
L9628	0764328	13.2	0.5197					•
L9628	0764334	13.3	0.5236					•
L9628	0764340	13.4	0.5276	48				•
L9628	0764357	13.5	0.5315					•
L9628	0764363	13.6	0.5354					•
L9628	0764370	13.7	0.5394	49		52		•
L9628	0764386	13.8	0.5433					•
L9628	0764392	13.9	0.5472					•
L9628	0764408	14.0	0.5512					•
L9628	0764414	14.1	0.5551	50	105	53		•

* Package Qty: 1 per Tube Size

L9628 Metric Size

*Japan Stock Item

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9628	0764420	14.2	0.5591	50	105	53	12	•
L9628	0764437	14.3	0.5630					•
L9628	0764443	14.4	0.5669	51		54		•
L9628	0764450	14.5	0.5709					•
L9628	0764466	14.6	0.5748					•
L9628	0764472	14.7	0.5787	52				•
L9628	0764489	14.8	0.5827					•
L9628	0764495	14.9	0.5866					•
L9628	0764500	15.0	0.5906					•
L9628	0764517	15.1	0.5945	54	115	57		•
L9628	0764523	15.2	0.5984					•
L9628	0764530	15.3	0.6024					•
L9628	0764546	15.4	0.6063	55				•
L9628	0764552	15.5	0.6102					•

* Package Qty: 1 per Tube Size

List #	EDP #	Size	Decimal Equivalent	Flute Length	Overall Length	L1	Shank Dia.	Stock
		Dc		ℓ	L	L1	Ds	
L9628	0764569	15.6	0.6142	55	115	57	12	•
L9628	0764575	15.7	0.6181	56		59		•
L9628	0764581	15.8	0.6220					•
L9628	0764598	15.9	0.6260					•
L9628	0764603	16.0	0.6299				16	•
L9628	0764610	16.5	0.6496	58		61		•
L9628	0764626	17.0	0.6693	59	125	62		•
L9628	0764632	17.5	0.6890	61		63		•
L9628	0764649	18.0	0.7087	63		66		•
L9628	0764655	18.5	0.7283	65	135	68		•
L9628	0764661	19.0	0.7480	66		68		•
L9628	0764678	19.5	0.7677	68	145	71		•
L9628	0764684	20.0	0.7874	70		73	20	•

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

CARBIDE DRILLS

Standard Drilling Conditions

LIST 9628

Work Material / Speed (SFM) / Drill Diameter		Cast Irons / Carbon Steels		Alloy Steels (20-30 HRC)		Mold Steels/ Hardened Steels (30-35 HRC)		Ductile Cast Irons		Aluminum Alloys		Aluminum Casting	
		325-328 SFM		290-295 SFM		220-225 SFM		290-295 SFM		515-525 SFM		260-400 SFM	
Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
0.2	0.007	32000	0.0001	29000	0.0001	14000	0.0001	29000	0.0001	32000	0.0002	32000	0.0001
0.5	0.019	25500	0.0001	21000	0.0001	10000	0.0001	21000	0.0001	29000	0.0004	25500	0.0033
1	0.039	19000	0.0006	15900	0.0006	6400	0.0003	15900	0.0005	24000	0.0012	19000	0.0008
2	0.078	12000	0.0009	11500	0.0009	3200	0.0007	11500	0.0009	21000	0.0016	14500	0.0013
3	0.118	7950	0.0020	6900	0.0020	3700	0.0020	6900	0.0015	17000	0.0025	12500	0.0020
4	0.157	5950	0.0025	5150	0.0025	2800	0.0025	5150	0.0025	12500	0.0030	9550	0.0025
5	0.197	4800	0.0035	4150	0.0035	2200	0.0030	4100	0.0030	10000	0.0040	7650	0.0035
6	0.236	4000	0.0040	3450	0.0040	1800	0.0035	3450	0.0035	8500	0.0045	6400	0.0040
8	0.315	3000	0.0055	2600	0.0055	1400	0.0050	2600	0.0045	6350	0.0065	4750	0.0055
10	0.394	2400	0.0070	2050	0.0070	1100	0.0060	2050	0.0060	5100	0.0080	3800	0.0070
12	0.472	2000	0.0085	1700	0.0085	950	0.0070	1700	0.0070	4250	0.0095	3200	0.0080
16	0.630	1500	0.0110	1300	0.0110	700	0.0095	1300	0.0095	3200	0.0125	2400	0.0110
20	0.787	1200	0.0140	1050	0.0135	550	0.0120	1050	0.0115	2550	0.0155	1900	0.0135

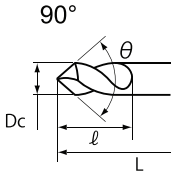
Note : 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
2) Use the table values for drilling depths upto 2xD. Adjust cutting conditions per table based on "degree angle to be drilled."
3) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
4) Not recommended for drilling in Stainless Steel. We recommend using List9814 AQUA EX Flat OH3Dor OH5D for Stainless Steel & Hi-temp alloys.
5) Center Drill or Guide hole required. (1: Use AG Starting drill or Aqua Ex Flat drill)

Formulas : RPM $= \frac{\text{SFM} \times 3.82}{\text{Drill dia.}}$ Feed Rate (in/min) : RPM×IPR

Drilling Conditions for Angled Surfaces					
Reduction % to above table values					
Degree Angle		Reduction %		Reduction % (Multiplier)	
		RPM	Feed	RPM	Feed
0°	5°	100%	100%	Table Value	Table Value
6°	20°	50%	50%	(Table Value)x0.5	(Table Value)x0.5
21°	35°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
36°	60°	70%	40%	(Table Value)x0.3	(Table Value)x0.6
61°		70%	30%	(Table Value)x0.3	(Table Value)x0.7

Aqua Drill EX Starting Drill

For use with Aqua Flat Drills (List 9819, 9817, 9815)



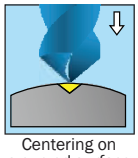
Carbide Material | AQ EX Coating | 25° Helix | h7 Shank Dia. Tol

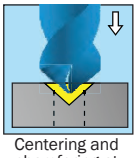
List 9624 NEW

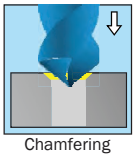
Item Code	Size	Decimal Equivalent	Drill Point Angle	Flute Length	Overall Length	Shank Dia
EDP	Dc			ℓ	L	Ds
0727355	3.0	0.1181	90°	9	48	3.0
0727361	4.0	0.1575		12	52	4.0
0727378	5.0	0.1969		14	60	5.0
0727384	6.0	0.2362		15	66	6.0
0727390	8.0	0.3150		20	79	8.0
0727406	10.0	0.3937		25	89	10.0
0727412	12.0	0.4724		30	102	12.0
0727429	16.0	0.6299		35	115	16.0
0727435	20.0	0.7874		40	131	20.0

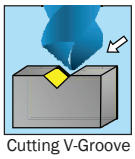
Package Qty: 1 per Tube Size

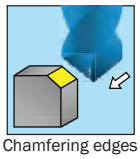
⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

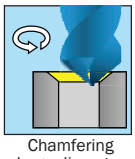

Centering on a curved surface


Centering and chamfering at the same time


Chamfering


Cutting V-Groove


Chamfering edges


Chamfering large diameter holes

Standard Drilling Conditions

Centering

Work Material / Drill Diameter		Carbon Steels / Cast Irons <20 HRC		Alloy Steels 20 ~ 30 HRC		Mold Steels 30 ~ 40 HRC		Hardened Steel 40 ~ 50 HRC		Stainless Steel 300 /Series		Aluminum Alloy Copper Alloy	
Metric mm	Decimal	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
3	0.118	7400	17.7	4800	11.4	2100	3.7	1900	2.8	2650	5.1	10600	43.3
4	0.157	5600	16.9	3600	10.2	1600	3.3	1450	2.6	2000	4.3	7950	41.3
5	0.197	4450	15.0	2850	9.4	1250	3.0	1150	2.4	1600	3.9	6350	37.4
6	0.236	3700	15.0	2400	9.4	1050	3.0	950	2.4	1300	3.9	5300	37.4
8	0.315	2800	15.0	1800	9.4	800	3.0	700	2.4	1000	3.9	4000	37.4
10	0.394	2200	13.0	1450	8.7	650	2.8	550	2.2	800	3.7	3200	31.5
12	0.472	1850	13.0	1200	8.7	530	2.8	480	2.2	650	3.7	2650	31.5
16	0.630	1400	11.4	900	7.5	400	2.6	350	2.0	500	3.5	2000	27.6
20	0.787	1100	10.2	720	6.7	320	2.6	280	2.0	400	3.1	1600	25.6

Note : 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
2) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
3) Apply sufficient cutting fluid to work area.
4) Use these cutting conditions for centering work.
5) Reduce RPM and feed rates by 20% for centering work on rolled steel or forged surfaces, curved or angled surfaces.
4) Use collet chucks or milling chucks.

Chamfering

Work Material / Drill Diameter		Carbon Steels / Cast Irons <20 HRC		Alloy Steels 20 ~ 30 HRC		Mold Steels/ Hardened Steels 30 ~ 40 HRC		Hardened Steel 40 ~ 50 HRC		Stainless Steel 300 /Series		Aluminum Alloy Copper Alloy	
Metric mm	Decimal	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
3	0.118	7400	14.2	4800	9.1	2100	2.6	1900	2.0	2650	3.9	10600	35.0
4	0.157	5600	13.4	3600	8.3	1600	2.4	1450	1.8	2000	3.3	7950	33.1
5	0.197	4450	11.8	2850	7.5	1250	2.2	1150	1.6	1600	3.1	6350	29.9
6	0.236	3700	11.8	2400	7.5	1050	2.2	950	1.6	1300	3.1	5300	29.9
8	0.315	2800	11.8	1800	7.5	800	2.2	700	1.6	1000	3.1	4000	29.9
10	0.394	2200	10.2	1450	6.9	650	2.0	550	1.4	800	3.0	3200	25.2
12	0.472	1850	10.2	1200	6.9	530	2.0	480	1.4	650	3.0	2650	25.2
16	0.630	1400	9.1	900	5.9	400	1.8	350	1.2	500	2.8	2000	22.0
20	0.787	1100	8.3	720	5.3	320	1.8	280	1.2	400	2.4	1600	20.1

Note : 1) Adjust drilling conditions according to the rigidity of machine or work clamp state.
2) Above table values are for drilling water soluble cutting fluid. For non-water soluble cutting fluid reduce the RPM and feed rates by 20%
3) Apply sufficient cutting fluid to work area.
4) Use these cutting conditions for chamfering.
5) Reduce RPM and feed rates at the same ratio if chattering occurs, because the workpiece is not rigidly mounted to the machine.
4) Use collet chucks or milling chucks.

AG Starting Drill

For use with Aqua Flat Drills (List 9819, 9817, 9815)

List 6502

90° Range 3.0 to 20.0
140° Range 3.0 to 20.0

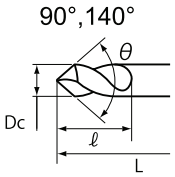
Item Code	Size	Decimal Equivalent	Drill Point Angle	Flute Length	Overall Length	Shank Dia
EDP	Dc			ℓ	L	Ds
0710358	3.0	0.1181	90°	9	48	3.0
0710364	4.0	0.1575		12	52	4.0
0712613	5.0	0.1969		14	60	5.0
0710370	6.0	0.2362		15	66	6.0
0710387	8.0	0.3150		20	79	8.0
0710393	10.0	0.3937		25	89	10.0
0710409	12.0	0.4724		30	102	12.0
0710415	16.0	0.6299		35	115	16.0
0710421	20.0	0.7874		40	131	20.0
0710518	3.0	0.1181	140°	9	48	3.0
0710524	4.0	0.1575		12	52	4.0
0712636	5.0	0.1969		14	60	5.0
0710530	6.0	0.2362		15	66	6.0
0710547	8.0	0.3150		20	79	8.0
0710553	10.0	0.3937		25	89	10.0
0710560	12.0	0.4724		30	102	12.0
0710576	16.0	0.6299		35	115	16.0
0710582	20.0	0.7874		40	131	20.0

Package Qty: 1 per Tube Size

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

AG Starting Drill Extended Length

For use with Aqua Flat Drills (List 9819, 9817, 9815)



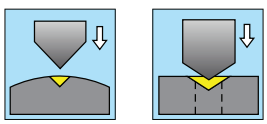
List 6504

90° Range 3.0 to 12.0
140° Range 3.0 to 12.0

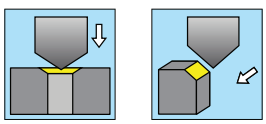
Item Code	Size	Decimal Equivalent	Drill Point Angle	Flute Length	Overall Length	Shank Dia
EDP	Dc			ℓ	L	Ds
0710656	3.0	0.1181	90°	9	75	3.0
0710662	4.0	0.1575		12	100	4.0
0712659	5.0	0.1969		14	100	5.0
0710679	6.0	0.2362		15	150	6.0
0710685	8.0	0.3150		20	150	8.0
0710691	10.0	0.3937		25	200	10.0
0710707	12.0	0.4724		30	200	12.0
0710771	3.0	0.1181	140°	9	75	3.0
0710788	4.0	0.1575		12	100	4.0
0712671	5.0	0.1969		14	100	5.0
0710794	6.0	0.2362		15	150	6.0
0710800	8.0	0.3150		20	150	8.0
0710816	10.0	0.3937		25	200	10.0
0710822	12.0	0.4724		30	200	12.0

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

AREAS OF APPLICATION FOR AG STARTING



For Pre-Drilling of Drills that have inconsistent bite and drilling holes on curved or inclined surfaces

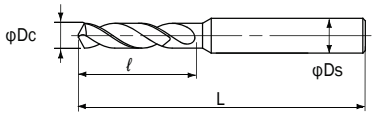


For Chamfering of Holes and Chamfering Edges

SG-ESS Drill Micro

High Performance (3xD)

SG-ESS Drill Stub Length



LIST 7572P Metric: Micro & Stub Length

LIST 7573P Fractional, Wire & Letter

Metric Range .50 to 20.0

***Replacing AG-SUS Drill Short L6596P**

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0716602	0.50	0.0197		3	38	3
0716705	0.51	0.0201	#76			
0716711	0.52	0.0205				
0716728	0.53	0.0209				
0716734	0.54	0.0213				
0716619	0.55	0.0217				
0716740	0.56	0.0220				
0716757	0.57	0.0224				
0716763	0.58	0.0228				
0716770	0.59	0.0232				
0716625	0.60	0.0236		3.5		
0716786	0.61	0.0240	#73			
0716792	0.62	0.0244				
0716808	0.63	0.0248				
0716814	0.64	0.0252				
0716631	0.65	0.0256				
0716820	0.66	0.0260	#71			
0716837	0.67	0.0264				
0716843	0.68	0.0268				
0716850	0.69	0.0272				
0716648	0.70	0.0276		4.5		
0716866	0.71	0.0280	#70			
0716872	0.72	0.0283				
0716889	0.73	0.0287				
0716895	0.74	0.0291				
0716654	0.75	0.0295				
0716900	0.76	0.0299				
0716917	0.77	0.0303				
0716923	0.78	0.0307	#68			
0716930	0.79	0.0311				
0716660	0.80	0.0315		5		
0716946	0.81	0.0319				
0716952	0.82	0.0323	#67			
0716969	0.83	0.0327				
0716975	0.84	0.0331	#66			
0716677	0.85	0.0335				
0716981	0.86	0.0339				
0716998	0.87	0.0343				
0717002	0.88	0.0346				
0717019	0.89	0.0350	#65			
0716683	0.90	0.0354		5.5		
0717025	0.91	0.0358				
0717031	0.92	0.0362				
0717048	0.93	0.0366				
0717054	0.94	0.0370	#63			
0716690	0.95	0.0374				
0717060	0.96	0.0378				
0717077	0.97	0.0382				
0717083	0.98	0.0386				
0717090	0.99	0.0390	#61			

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0573780	1.00	0.0394		6	38	3
0693862	1.01	0.0398				
0693879	1.02	0.0402	#60			
0693885	1.03	0.0406				
0693891	1.04	0.0409	#59			
0575347	1.05	0.0413				
0693907	1.06	0.0417				
0693913	1.07	0.0421	#58	7	39	
0693920	1.08	0.0425				
0693936	1.09	0.0429	#57			
0573797	1.10	0.0433				
0693942	1.11	0.0437				
0693959	1.12	0.0441				
0693965	1.13	0.0445				
0693971	1.14	0.0449				
0575353	1.15	0.0453				
0693988	1.16	0.0457				
0693994	1.17	0.0461				
0694009	1.18	0.0465	#56			
0694015	1.19	0.0469	3/64	8	40	
0573802	1.20	0.0472				
0694021	1.21	0.0476				
0694038	1.22	0.0480				
0694044	1.23	0.0484				
0694050	1.24	0.0488				
0575360	1.25	0.0492				
0694067	1.26	0.0496				
0694073	1.27	0.0500				
0694080	1.28	0.0504				
0694096	1.29	0.0508				
0573819	1.30	0.0512				
0694101	1.31	0.0516				
0694118	1.32	0.0520	#55	9	41	
0694124	1.33	0.0524				
0694130	1.34	0.0528				
0575376	1.35	0.0531				
0694147	1.36	0.0535				
0694153	1.37	0.0539				
0694160	1.38	0.0543				
0694176	1.39	0.0547				
0573825	1.40	0.0551				
0694182	1.41	0.0555				
0694199	1.42	0.0559				
0694204	1.43	0.0563				
0694210	1.44	0.0567				
0575382	1.45	0.0571				
0694227	1.46	0.0575				
0694233	1.47	0.0579				
0694240	1.48	0.0583				
0694256	1.49	0.0587				

SG-ESS Drill Stub Length

L7572P Metric

L7573P Fractional, Wire & Letter

***Replacing AG-SUS Drill Short L6596P**

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0573831	1.50	0.0591		9	41	
0694262	1.51	0.0594	#53			
0694279	1.52	0.0598				
0694285	1.53	0.0602				
0694291	1.54	0.0606				
0575399	1.55	0.0610				
0694307	1.56	0.0614				
0694313	1.57	0.0618				
0694320	1.58	0.0622				
0694336	1.59	0.0626	1/16			
0573848	1.60	0.0630		10	42	
0694342	1.61	0.0634	#52			
0694359	1.62	0.0638				
0694365	1.63	0.0642				
0694371	1.64	0.0646				
0575404	1.65	0.0650				
0694388	1.66	0.0654				
0694394	1.67	0.0657				
0694400	1.68	0.0661				
0694416	1.69	0.0665				
0573854	1.70	0.0669				
0694422	1.71	0.0673				
0694439	1.72	0.0677				
0694445	1.73	0.0681				
0694451	1.74	0.0685				
0575410	1.75	0.0689				
0694468	1.76	0.0693				
0694474	1.77	0.0697				
0694480	1.78	0.0701	#50			
0694497	1.79	0.0705				
0573860	1.80	0.0709		11	43	3
0694502	1.81	0.0713				
0694519	1.82	0.0717				
0694525	1.83	0.0720	#49			
0694531	1.84	0.0724				
0575427	1.85	0.0728				
0694548	1.86	0.0732				
0694554	1.87	0.0736				
0694560	1.88	0.0740				
0694577	1.89	0.0744				
0573877	1.90	0.0748				
0694583	1.91	0.0752				
0694590	1.92	0.0756				
0694605	1.93	0.0760	#48			
0694611	1.94	0.0764				
0575433	1.95	0.0768				
0694628	1.96	0.0772				
0694634	1.97	0.0776				
0694640	1.98	0.0780	5/64			
0694657	1.99	0.0783	#47	12	44	
0572514	2.00	0.0787				
0694663	2.01	0.0791				
0694670	2.02	0.0795				
0694686	2.03	0.0799				
0694692	2.04	0.0803				
0575440	2.05	0.0807				
0694708	2.06	0.0811	#46			
0694714	2.07	0.0815				
0694720	2.08	0.0819				
1363043	2.08	0.0820	#45	3/4	2	1/8
0694737	2.09	0.0823		12	44	3

• USA Stock Size

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0572520	2.10	0.0827				
0694743	2.11	0.0831		12	44	
0694750	2.12	0.0835				
0694766	2.13	0.0839				
0694772	2.14	0.0843				3
0575456	2.15	0.0846		13	45	
0694789	2.16	0.0850				
0694795	2.17	0.0854				
0694800	2.18	0.0858				
1363050	2.18	0.0860	#44	3/4	2	1/8
0694817	2.19	0.0862				
0572537	2.20	0.0866				
0694823	2.21	0.0870				
0694830	2.22	0.0874		13	45	3
0694846	2.23	0.0878				
0694852	2.24	0.0882				
0575462	2.25	0.0886				
0694869	2.26	0.0890				
1363066	2.26	0.0890	#43	3/4	2	1/8
0694875	2.27	0.0894				
0694881	2.28	0.0898				
0694898	2.29	0.0902				
0572543	2.30	0.0906				
0694903	2.31	0.0909		13	45	3
0694910	2.32	0.0913				
0694926	2.33	0.0917				
0694932	2.34	0.0921				
0575479	2.35	0.0925				
0694949	2.36	0.0929				
0694955	2.37	0.0933		14	46	
1363072	2.37	0.0935	#42	3/4	2	1/8
0694961	2.38	0.0937		14	46	3
1245365	2.38	0.0938	3/32	1/2	1-3/4	1/8
0694978	2.39	0.0941				
0572550	2.40	0.0945				
0694984	2.41	0.0949		14	46	3
0694990	2.42	0.0953				
0695005	2.43	0.0957				
1363089	2.44	0.0960	#41	13/16	2-1/16	1/8
0695011	2.44	0.0961				
0575485	2.45	0.0965				
0695028	2.46	0.0969		14	46	3
0695034	2.47	0.0972				
0695040	2.48	0.0976				
0695057	2.49	0.0980				
1280931	2.49	0.0980	#40	13/16	2-1/16	1/8
0572566	2.50	0.0984				
0695063	2.51	0.0988		14	46	3
0695070	2.52	0.0992				
1363095	2.53	0.0995	#39	13/16	2-1/4	1/8
0695086	2.53	0.0996				
0695092	2.54	0.1000				
0575491	2.55	0.1004		14	46	3
0695108	2.56	0.1008				
0695114	2.57	0.1012				
1363100	2.58	0.1015	#38	13/16	2-1/4	1/8
0695120	2.58	0.1016				
0695137	2.59	0.1020				
0572572	2.60	0.1024		14	46	3
0695143	2.61	0.1028				
0695150	2.62	0.1031				

0.01mm size Diameter Tolerance : 0～−.009mm

SG-ESS Drill Stub Length

L7572P Metric
L7573P Fractional, Wire & Letter

*Replacing AG-SUS Drill Short L6596P

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0695166	2.63	0.1035		14	46	3
0695172	2.64	0.1039				
1363117	2.64	0.1040	#37	13/16	2-1/4	1/8
0575507	2.65	0.1043		14	46	3
0695189	2.66	0.1047		16	48	
0695195	2.67	0.1051				
0695200	2.68	0.1055				
0695217	2.69	0.1059				
0572589	2.70	0.1063				
1245823	2.71	0.1065	#36	13/16	2-1/4	1/8
0695223	2.71	0.1067		16	48	3
0695230	2.72	0.1071				
0695246	2.73	0.1075				
0695252	2.74	0.1079				
0575513	2.75	0.1083				
0695269	2.76	0.1087				
0695275	2.77	0.1091				
0695281	2.78	0.1094				
1245371	2.78	0.1094	7/64	5/8	1-7/8	1/8
0695298	2.79	0.1098		16	48	3
0572595	2.80	0.1102				
0695303	2.81	0.1106				
0695310	2.82	0.1110				
1363130	2.82	0.1110	#34	7/8	2-5/16	1/8
0695326	2.83	0.1114		16	48	3
0695332	2.84	0.1118				
0575520	2.85	0.1122				
0695349	2.86	0.1126				
0695355	2.87	0.1130				
1363146	2.87	0.1130	#33	7/8	2-5/16	1/8
0695361	2.88	0.1134		16	48	3
0695378	2.89	0.1138				
0572600	2.90	0.1142				
0695384	2.91	0.1146				
0695390	2.92	0.1150				
0695406	2.93	0.1154				
0695412	2.94	0.1157				
0575536	2.95	0.1161				
0695429	2.96	0.1165				
0695435	2.97	0.1169				
0695441	2.98	0.1173				
0695458	2.99	0.1177				
0572617	3.00	0.1181				
0695464	3.01	0.1185		18	50	4
0695470	3.02	0.1189				
0695487	3.03	0.1193				
0695493	3.04	0.1197				
0575542	3.05	0.1201				
0695509	3.06	0.1205				
0695515	3.07	0.1209				
0695521	3.08	0.1213				
0695538	3.09	0.1217				
0572623	3.10	0.1220				
0695544	3.11	0.1224				
0695550	3.12	0.1228				
0695567	3.13	0.1232				
0695573	3.14	0.1236				
0575559	3.15	0.1240				
0695580	3.16	0.1244				
0695596	3.17	0.1248				
1245388	3.18	0.1250	1/8	3/4	2	1/8
0695601	3.18	0.1252		18	50	4
0695618	3.19	0.1256				
0572630	3.20	0.1260				
0695624	3.21	0.1264				
0695630	3.22	0.1268				
0695647	3.23	0.1272				
0695653	3.24	0.1276				
0575565	3.25	0.1280				
0695660	3.26	0.1283				
1289836	3.26	0.1285	#30	15/16	2-3/8	3/16
0695676	3.27	0.1287		18	50	4
0695682	3.28	0.1291				
0695699	3.29	0.1295				
0572646	3.30	0.1299				

• USA Stock Size

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0695704	3.31	0.1303		18	50	4
0695710	3.32	0.1307				
0695727	3.33	0.1311				
0695733	3.34	0.1315				
0575571	3.35	0.1319				
0695740	3.36	0.1323		20	52	
0695756	3.37	0.1327				
0695762	3.38	0.1331				
0695779	3.39	0.1335				
0572652	3.40	0.1339				
0695785	3.41	0.1343				
0695791	3.42	0.1346				
0695807	3.43	0.1350				
0695813	3.44	0.1354				
0575588	3.45	0.1358				
0695820	3.46	0.1362				
1245817	3.46	0.1365	#29	15/16	2-3/8	3/16
0695836	3.47	0.1366		20	52	4
0695842	3.48	0.1370				
0695859	3.49	0.1374				
0572669	3.50	0.1378				
0695865	3.51	0.1382				
0695871	3.52	0.1386				
0695888	3.53	0.1390				
0695894	3.54	0.1394				
0575594	3.55	0.1398				
0695900	3.56	0.1402				
1363169	3.57	0.1405	#28	15/16	2-3/8	3/16
0695916	3.57	0.1406		20	52	4
1245394	3.57	0.1406	9/64	13/16	2-1/8	3/16
0695922	3.58	0.1409		20	52	4
0695939	3.59	0.1413				
0572675	3.60	0.1417				
0695945	3.61	0.1421				
0695951	3.62	0.1425				
0695968	3.63	0.1429				
0695974	3.64	0.1433				
0575600	3.65	0.1437				
1363175	3.66	0.1440	#27	1	2-7/16	3/16
0695980	3.66	0.1441		20	52	4
0695997	3.67	0.1445				
0696001	3.68	0.1449				
0696018	3.69	0.1453				
0572681	3.70	0.1457				
0696024	3.71	0.1461				
0696030	3.72	0.1465				
0696047	3.73	0.1469				
1363181	3.73	0.1470	#26	1	2-7/16	3/16
0696053	3.74	0.1472		20	52	4
0575616	3.75	0.1476				
0696060	3.76	0.1480		22	54	
0696076	3.77	0.1484				
0696082	3.78	0.1488				
0696099	3.79	0.1492				
1245800	3.80	0.1495	#25	1	2-7/16	3/16
0572698	3.80	0.1496		22	54	4
0696104	3.81	0.1500				
0696110	3.82	0.1504				
0696127	3.83	0.1508				
0696133	3.84	0.1512				
0575622	3.85	0.1516				
0696140	3.86	0.1520				
1363198	3.86	0.1520	#24	1	2-7/16	3/16
0696156	3.87	0.1524		22	54	4
0696162	3.88	0.1528				
0696179	3.89	0.1531				
0572703	3.90	0.1535				
0696185	3.91	0.1539				
1363203	3.91	0.1540	#23	1	2-7/16	3/16
0696191	3.92	0.1543		22	54	4
0696207	3.93	0.1547				
0696213	3.94	0.1551				
0575639	3.95	0.1555				
0696220	3.96	0.1559				

0.01mm size Diameter Tolerance : 0 ~-.009mm

SG-ESS Drill Stub Length

L7572P Metric
L7573P Fractional, Wire & Letter

*Replacing AG-SUS Drill Short L6596P

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0696236	3.97	0.1563		22	54	4
1245400	3.97	0.1563	5/32	13/16	2-1/8	3/16
0696242	3.98	0.1567		22	54	4
1363210	3.99	0.1570	#22	1-1/16	2-7/16	3/16
0696259	3.99	0.1571			54	4
0572710	4.00	0.1575				
0696265	4.01	0.1579		22		
0696271	4.02	0.1583			66	6
0696288	4.03	0.1587				
1245795	4.04	0.1590	#21	1-1/16	2-7/16	3/16
0696294	4.04	0.1591				
0575645	4.05	0.1594				
0696300	4.06	0.1598		22	66	6
0696316	4.07	0.1602				
0696322	4.08	0.1606				
0696339	4.09	0.1610				
1363226	4.09	0.1610	#20	1-1/16	2-7/16	3/16
0572726	4.10	0.1614				
0696345	4.11	0.1618				
0696351	4.12	0.1622				
0696368	4.13	0.1626				
0696374	4.14	0.1630				
0575651	4.15	0.1634		22	66	6
0696380	4.16	0.1638				
0696397	4.17	0.1642				
0696402	4.18	0.1646				
0696419	4.19	0.1650				
0572732	4.20	0.1654				
0696425	4.21	0.1657				
1363232	4.22	0.1660	#19	1-1/16	2-7/16	3/16
0696431	4.22	0.1661				
0696448	4.23	0.1665		22		
0696454	4.24	0.1669				
0575668	4.25	0.1673				
0696460	4.26	0.1677				
0696477	4.27	0.1681				
0696483	4.28	0.1685				
0696490	4.29	0.1689			68	6
0572749	4.30	0.1693		24		
0696505	4.31	0.1697				
0696511	4.32	0.1701				
0696528	4.33	0.1705				
0696534	4.34	0.1709				
0575674	4.35	0.1713				
0696540	4.36	0.1717				
1245416	4.37	0.1719	11/64	1	2-3/8	3/16
0696557	4.37	0.1720				
0696563	4.38	0.1724				
0696570	4.39	0.1728				
0572755	4.40	0.1732				
0696586	4.41	0.1736				
0696592	4.42	0.1740				
0696608	4.43	0.1744				
0696614	4.44	0.1748				
0575680	4.45	0.1752				
0696620	4.46	0.1756				
0696637	4.47	0.1760		24	68	6
0696643	4.48	0.1764				
0696650	4.49	0.1768				
0572761	4.50	0.1772				
0696666	4.51	0.1776				
0696672	4.52	0.1780				
0696689	4.53	0.1783				
0696695	4.54	0.1787				
0575697	4.55	0.1791				
0696700	4.56	0.1795				
0696717	4.57	0.1799				
1363278	4.57	0.1800	#15	1-1/8	2-9/16	3/16
0696723	4.58	0.1803				
0696730	4.59	0.1807				
0572778	4.60	0.1811		24	68	6
0696746	4.61	0.1815				
0696752	4.62	0.1819				
1363284	4.62	0.1820	#14	1-1/8	2-9/16	3/16

• USA Stock Size

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0696769	4.63	0.1823				
0696775	4.64	0.1827				
0575702	4.65	0.1831				
0696781	4.66	0.1835				
0696798	4.67	0.1839				
0696803	4.68	0.1843				
0696810	4.69	0.1846		24	68	6
0572784	4.70	0.1850				
0696826	4.71	0.1854				
0696832	4.72	0.1858				
0696849	4.73	0.1862				
0696855	4.74	0.1866				
0575719	4.75	0.1870				
0696861	4.76	0.1874		26	70	6
1245422	4.76	0.1875	3/16	1	2-3/8	3/16
0696878	4.77	0.1878				
0696884	4.78	0.1882				
0696890	4.79	0.1886				
0572790	4.80	0.1890				
0696906	4.81	0.1894				
0696912	4.82	0.1898				
0696929	4.83	0.1902				
0696935	4.84	0.1906		26	70	6
0575725	4.85	0.1909				
0696941	4.86	0.1913				
0696958	4.87	0.1917				
0696964	4.88	0.1921				
0696970	4.89	0.1925				
0572806	4.90	0.1929				
0696987	4.91	0.1933				
1363329	4.91	0.1935	#10	1-3/16	3	1/4
0696993	4.92	0.1937				
0697008	4.93	0.1941				
0697014	4.94	0.1945		26	70	6
0575731	4.95	0.1949				
0697020	4.96	0.1953				
0697037	4.97	0.1957				
1363335	4.98	0.1960	#9	1-3/16	3	1/4
0697043	4.98	0.1961				
0697050	4.99	0.1965				
0572812	5.00	0.1969				
0697066	5.01	0.1972		26	70	6
0697072	5.02	0.1976				
0697089	5.03	0.1980				
0697095	5.04	0.1984				
0575748	5.05	0.1988				
1280954	5.05	0.1990	#8	1-3/16	3	1/4
0697100	5.06	0.1992				
0697117	5.07	0.1996				
0697123	5.08	0.2000		26	70	6
0697130	5.09	0.2004				
0572829	5.10	0.2008				
1245789	5.11	0.2010	#7	1-3/16	3	1/4
0697146	5.11	0.2012				
0697152	5.12	0.2016				
0697169	5.13	0.2020		26	70	6
0697175	5.14	0.2024				
0575754	5.15	0.2028				
0697181	5.16	0.2031				
1245439	5.16	0.2031	13/64	1-1/8	2-7/8	1/4
0697198	5.17	0.2035		26	70	6
0697203	5.18	0.2039				
1280960	5.18	0.2040	#6	1-1/4	3-1/16	1/4
0697210	5.19	0.2043				
0572835	5.20	0.2047		26	70	6
0697226	5.21	0.2051				
0697232	5.22	0.2055				
1363341	5.22	0.2055	#5	1-1/4	3-1/16	1/4
0697249	5.23	0.2059				
0697255	5.24	0.2063				
0575760	5.25	0.2067		26	70	6
0697261	5.26	0.2071				
0697278	5.27	0.2075				
0697284	5.28	0.2079				

0.01mm size Diameter Tolerance : 0 ～-.009mm

SG-ESS Drill Stub Length

L7572P Metric
L7573P Fractional, Wire & Letter

*Replacing AG-SUS Drill Short L6596P

EDP No.	Size	Decimal	Wire, Fractional & Letter Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0697290	5.29	0.2083		26	70	6
0572841	5.30	0.2087				
1363358	5.31	0.2090	#4	1-1/4	3-1/16	1/4
0697306	5.31	0.2091		28	72	6
0697312	5.32	0.2094				
0697329	5.33	0.2098				
0697335	5.34	0.2102				
0575777	5.35	0.2106				
0697341	5.36	0.2110				
0697358	5.37	0.2114				
0697364	5.38	0.2118				
0697370	5.39	0.2122				
0572858	5.40	0.2126				
0697387	5.41	0.2130				
1363364	5.41	0.2130	#3	1-1/4	3-1/16	1/4
0697393	5.42	0.2134		28	72	6
0697409	5.43	0.2138				
0697415	5.44	0.2142				
0575783	5.45	0.2146				
0697421	5.46	0.2150				
0697438	5.47	0.2154				
0697444	5.48	0.2157				
0697450	5.49	0.2161				
0572864	5.50	0.2165				
0697467	5.51	0.2169				
0697473	5.52	0.2173				
0697480	5.53	0.2177				
0697496	5.54	0.2181				
0575790	5.55	0.2185				
1245445	5.56	0.2188	7/32	1-1/8	2-7/8	1/4
0697501	5.56	0.2189		28	72	6
0697518	5.57	0.2193				
0697524	5.58	0.2197				
0697530	5.59	0.2201				
0572870	5.60	0.2205				
0697547	5.61	0.2209				
1363370	5.61	0.2210	#2	1-5/16	3-1/8	1/4
0697553	5.62	0.2213		28	72	6
0697560	5.63	0.2217				
0697576	5.64	0.2220				
0575805	5.65	0.2224				
0697582	5.66	0.2228				
0697599	5.67	0.2232				
0697604	5.68	0.2236				
0697610	5.69	0.2240				
0572887	5.70	0.2244				
0697627	5.71	0.2248				
0697633	5.72	0.2252				
0697640	5.73	0.2256				
0697656	5.74	0.2260				
0575811	5.75	0.2264				
0697662	5.76	0.2268				
0697679	5.77	0.2272				
0697685	5.78	0.2276				
0697691	5.79	0.2280				
1363387	5.79	0.2280	#1	1-5/16	3-1/8	1/4
0572893	5.80	0.2283		28	72	6
0697707	5.81	0.2287				
0697713	5.82	0.2291				
0697720	5.83	0.2295				
0697736	5.84	0.2299				
0575828	5.85	0.2303				
0697742	5.86	0.2307				
0697759	5.87	0.2311				
0697765	5.88	0.2315				
0697771	5.89	0.2319				
0572909	5.90	0.2323				
0697788	5.91	0.2327				
0697794	5.92	0.2331				
0697800	5.93	0.2335				
0697816	5.94	0.2339				
0575834	5.95	0.2343				
1245451	5.95	0.2344	15/64	1-1/4	3	1/4
0697822	5.96	0.2346		28	72	6
0697839	5.97	0.2350				
0697845	5.98	0.2354				
0697851	5.99	0.2358				
0572915	6.00	0.2362				
1363409	6.05	0.2380	B	1-3/8	3-3/16	1/4

• USA Stock Size

EDP No.	Size	Decimal	Wire/Letter Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0572921	6.10	0.2402		31	75	8
1363415	6.15	0.2420	C	1-3/8	3-3/16	1/4
0572938	6.20	0.2441		31	75	8
1363421	6.25	0.2460	D	1-3/8	3-3/16	1/4
0572944	6.30	0.2480		31	75	8
1245468	6.35	0.2500	1/4	1-1/4	3	1/4
0572950	6.40	0.2520		31	75	8
0572967	6.50	0.2559		31	75	8
1245830	6.53	0.2570	F	1-7/16	3-1/4	3/8
0572973	6.60	0.2598		31	75	8
1363444	6.63	0.2610	G	1-7/16	3-1/4	3/8
0572980	6.70	0.2638		31	75	8
1245474	6.75	0.2656	17/64	1-3/8	3-3/16	3/8
0572996	6.80	0.2677		34	78	8
0573000	6.90	0.2717		34	78	8
1363450	6.91	0.2720	I	1-1/2	3-5/16	3/8
0573017	7.00	0.2756		34	78	8
1363467	7.04	0.2770	J	1-1/2	3-5/16	3/8
0573023	7.10	0.2795		34	78	8
1245480	7.14	0.2813	9/32	1-3/8	3-3/16	3/8
0573030	7.20	0.2835		34	78	8
0573046	7.30	0.2874		34	78	8
1363473	7.37	0.2900	L	1-9/16	3-3/8	3/8
0573052	7.40	0.2913		34	78	8
1363480	7.49	0.2950	M	1-9/16	3-3/8	3/8
0573069	7.50	0.2953		34	78	8
1245497	7.54	0.2969	19/64	1-3/8	3-3/16	3/8
0573075	7.60	0.2992		37	81	8
1363496	7.67	0.3020	N	1-5/8	3-7/16	3/8
0573081	7.70	0.3031		37	81	8
0573098	7.80	0.3071				
0573103	7.90	0.3110				
1245502	7.94	0.3125	5/16	1-1/2	3-3/8	3/8
0573110	8.00	0.3150		37	81	8
1363501	8.03	0.3160	O	1-11/16	3-1/2	3/8
0573126	8.10	0.3189		37	87	10
0573132	8.20	0.3228				
0573149	8.30	0.3268				
1245519	8.33	0.3281	21/64	1-1/2	3-3/8	3/8
0573155	8.40	0.3307		37	87	10
1363524	8.43	0.3320	Q	1-11/16	3-1/2	3/8
0573161	8.50	0.3346		37	87	10
0573178	8.60	0.3386		40	90	10
1363530	8.61	0.3390	R	1-11/16	3-1/2	3/8
0573184	8.70	0.3425		40	90	10
1245525	8.73	0.3438	11/32	1-5/8	3-1/2	3/8
0573190	8.80	0.3465		40	90	10
0573206	8.90	0.3504				
0573212	9.00	0.3543				
0573229	9.10	0.3583				
1245531	9.13	0.3594	23/64	1-5/8	3-1/2	3/8
0573235	9.20	0.3622		40	90	10
0573241	9.30	0.3661		40	90	10
1280977	9.35	0.3680	U	1-13/16	3-5/8	3/8
0573258	9.40	0.3701		40	90	10
0573264	9.50	0.3740		40	90	10
1245548	9.53	0.3750	3/8	1-5/8	3-1/2	3/8
1363560	9.58	0.3770	V	1-7/8	3-31/32	1/2
0573270	9.60	0.3780		43	93	10
0573287	9.70	0.3819				
0573293	9.80	0.3858				
0573309	9.90	0.3898				
1245554	9.92	0.3906	25/64	1-11/16	3-7/8	1/2
0573315	10.00	0.3937		43	93	10
1363582	10.08	0.3970	X	1-15/16	4-1/32	1/2
0573321	10.10	0.3976		43	93	10
0573338	10.20	0.4016		43	100	12
1363599	10.26	0.4040	Y	1-15/16	4-1/32	1/2
0573344	10.30	0.4055		43	100	12
1245560	10.32	0.4063	13/32	1-11/16	3-7/8	1/2
0573350	10.40	0.4094		43	100	12
1363604	10.49	0.4130	Z	2	4-3/32	1/2
0573367	10.50	0.4134		43	100	12
0573373	10.60	0.4173		43	100	12
0573380	10.70	0.4213		47	104	12
1245577	10.72	0.4219	27/64	1-7/8	4-1/8	1/2
0573396	10.80	0.4252		47	104	12
0573401	10.90	0.4291				
0573418	11.00	0.4331				

0.01mm size Diameter Tolerance : 0 ~ −.009mm

SG-ESS Drill Stub Length

L7572P Metric
L7573P Fractional, Wire & Letter

*Replacing AG-SUS Drill Short L6596P

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0573424	11.10	0.4370		47	104	12
1245583	11.11	0.4375	7/16	1-7/8	4-1/8	1/2
0573430	11.20	0.4409		47	104	12
0573447	11.30	0.4449				
0573453	11.40	0.4488				
0573460	11.50	0.4528				
1245590	11.51	0.4531	29/64	1-7/8	4-1/8	1/2
0573476	11.60	0.4567		47	104	12
0573482	11.70	0.4606				
0573499	11.80	0.4646				
0573504	11.90	0.4685		51	108	12
1245605	11.91	0.4688	15/32	2	4-1/4	1/2
0573510	12.00	0.4724		51	108	12
0573527	12.10	0.4764				
0573533	12.20	0.4803				
0573540	12.30	0.4843				
1245611	12.30	0.4844	31/64	2	4-1/4	1/2
0573556	12.40	0.4882		51	108	12
0573562	12.50	0.4921				
0573579	12.60	0.4961				
0573585	12.70	0.5000				
1245628	12.70	0.5000	1/2	2	4-1/4	1/2
0573591	12.80	0.5039		51	108	12
0573607	12.90	0.5079				
0573613	13.00	0.5118		51	108	12
1280851	13.49	0.5313	17/32	2-7/8	5-3/16	5/8
0573620	13.50	0.5315		72	132	16
0573636	14.00	0.5512		72	132	16
1280868	14.29	0.5625	9/16	3	5-3/8	1/2
0573642	14.50	0.5709		76	136	16
0573659	15.00	0.5906		76	142	20
1280874	15.08	0.5938	19/32	3	5-5/8	3/4
0573665	15.50	0.6102		80	146	20
1280880	15.88	0.6250	5/8	3-3/16	5-3/4	3/4
0573671	16.00	0.6299		80	146	20
0573688	16.50	0.6496		84	150	20
1280897	16.67	0.6563	21/32	3-3/8	5-15/16	3/4
0573694	17.00	0.6693		84	150	20
1280902	17.46	0.6875	11/16	3-7/16	6	3/4
0573700	17.50	0.6890		87	153	20
0573716	18.00	0.7087		87	153	20
1280919	18.26	0.7188	23/32	3-7/16	6	7/8
0573722	18.50	0.7283		90	156	20
0573739	19.00	0.7480		90	164	25
1280925	19.05	0.7500	3/4	3-9/16	6-1/2	7/8
0573745	19.50	0.7677		94	168	25
0573751	20.00	0.7874		94	168	25

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Micro Drilling Conditions

Work Material	Structural Steel Carbon Steels		Alloy Steels Hardened Steels		Die Steels Hardened Steels		Stainless Steels 300-Series		Cast Iron		Aluminum Alloys Copper Alloys		Nickel Alloys Titanium Alloys	
Diameter (mm)	RPM	IPR	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM	RPM	IPM
0.5	16000	0.0006	13000	0.0005	9500	0.0003	5100	0.0004	20000	0.0006	23000	0.0005	2500	0.0003
0.99	9500	0.0012	8000	0.0009	6400	0.0008	3500	0.0007	12000	0.0013	15000	0.0013	1600	0.0006

1) Adjust drilling condition according to the rigidity of machine or work clamp state.
2) The table values are for drilling with water soluble cutting fluid.
3) Provide suffice amount cutting fluid to the cutting point and in the flute.
4) When for stainless drilling, add step feed.
5) A work material and drilling condition to chip removal may be worse. In that case, add step feed.
6) In step feed, return to the entrance hole.
7) Step feel interval is about 0.5 ~ 1 x d. In small diameter, about 0.2 ~ 0.5 x d.
8) Use a collet chuck, milling chuck.

Standard Drilling Conditions

Workpiece Material / Speed (SFM) / Drill Diameter			Structural Steels Carbon Steels		Alloy Steels		Mold Steels Stainless Steels 300 - 400 Series		Nickel Alloys Titanium Alloys		Cast Irons		Aluminum Alloys Copper Alloys Nonferrous Alloys	
			115 - 135 SFM		95 - 105 SFM		40 - 50 SFM		20 SFM		115 - 135 SFM		115 - 135 SFM	
Fractional	Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
–	1.000	0.0039	9,500	0.001	8,000	0.001	3,500	0.001	1,600	0.001	12,000	0.001	15,000	0.001
–	2.000	0.0787	5,700	0.002	4,600	0.002	1,900	0.002	800	0.001	6,300	0.003	9,700	0.003
3/32	2.381	0.0938	5,000	0.003	4,100	0.003	1,700	0.002	680	0.002	5,600	0.004	8,500	0.004
–	3.000	0.1181	4,200	0.004	3,400	0.004	1,300	0.003	530	0.002	4,700	0.005	7,200	0.005
1/8	3.175	0.1250	4,000	0.005	3,300	0.004	1,300	0.003	510	0.002	4,500	0.006	6,900	0.006
5/32	3.969	0.1563	3,200	0.006	2,600	0.005	980	0.003	410	0.003	3,600	0.007	5,500	0.007
3/16	4.763	0.1875	2,700	0.006	2,200	0.005	810	0.004	340	0.003	3,000	0.008	4,600	0.008
–	5.000	0.1969	2,500	0.007	2,000	0.006	760	0.004	320	0.003	2,800	0.008	4,300	0.008
1/4	6.350	0.2500	2,000	0.008	1,700	0.007	610	0.005	260	0.004	2,300	0.010	3,400	0.010
5/16	7.938	0.3125	1,700	0.009	1,400	0.008	490	0.006	210	0.005	1,900	0.012	2,800	0.011
–	8.000	0.3150	1,600	0.009	1,300	0.008	480	0.006	200	0.005	1,800	0.012	2,700	0.012
3/8	9.525	0.3750	1,400	0.010	1,100	0.009	400	0.007	170	0.006	1,500	0.013	2,300	0.013
–	10.000	0.3937	1,300	0.010	1,000	0.009	380	0.008	160	0.006	1,400	0.013	2,200	0.013
–	12.000	0.4724	1,100	0.011	850	0.010	320	0.009	130	0.008	1,200	0.014	1,800	0.015
1/2	12.700	0.5000	1,100	0.012	810	0.010	310	0.009	130	0.008	1,200	0.015	1,800	0.015
–	16.000	0.6299	800	0.014	640	0.012	240	0.010	100	0.009	880	0.017	1,400	0.017
–	20.000	0.7874	640	0.016	510	0.014	190	0.012	80	0.010	700	0.020	1,100	0.020
–	25.000	0.9843	510	0.019	410	0.015	150	0.013	64	0.012	560	0.023	870	0.023
–	32.000	1.2598	400	0.018	320	0.015	120	0.013	50	0.013	440	0.022	680	0.022

1) The above values apply when coolant is used in vertical machine & horizontal machine. When drilling in stainless steel and hard to cut material using pecking.
2) Adjust drilling condition when unusual vibration or different sound occurs.
3) Recommended feeds & speeds are starting points only. Actual performance will be determined by specific material, the condition of equipment being used and coolant.

Formulas: $RPM = \frac{SFM \times 3.82}{\text{Drill Diam.}}$ Feed Rate (in/min) = RPM x IPR

SG-ESR Drill

L7574P Metric

L7575P Fractional, Wire & Letter

Metric Range 2.0 to 32.0
Fractional Range 3/32 to 3/4

*Replacing AG-SUS Drill L6594P, 6595P and SG-ES Drill L7570P, L7571P

EDP No.	Size	Decimal Equivalent	Wire / Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0721821	2.00	0.0787		24	56	3
1464190	2.08	0.0820	#45	1-1/8	2-3/8	1/8
0721838	2.10	0.0827		24	56	3
1464206	2.18	0.0860	#44	1-1/8	2-3/8	1/8
0721844	2.20	0.0866		25	56	3
1464212	2.26	0.0890	#43	1-1/4	2-1/2	1/8
0721850	2.30	0.0906		25	56	3
1464229	2.37	0.0935	#42	1-1/4	2-1/2	1/8
1464739	2.38	0.0938	3/32	1-1/8	2-3/8	1/8
0721867	2.40	0.0945		30	61	3
1464235	2.44	0.0960	#41	1-3/8	2-5/8	1/8
1464241	2.49	0.0980	#40			
0721873	2.50	0.0984		30	61	3
1464258	2.53	0.0995	#39	1-3/8	2-13/16	1/8
1464264	2.58	0.1015	#38	1-7/16	2-7/8	1/8
0721880	2.60	0.1024		30	61	3
1464270	2.64	0.1040	#37	1-7/16	2-7/8	1/8
0721896	2.70	0.1063		33	64	3
1464287	2.71	0.1065	#36	1-7/16	2-7/8	1/8
1464745	2.78	0.1094	7/64	1-1/4	2-1/2	1/8
0721901	2.80	0.1102		33	64	3
1464293	2.82	0.1110	#34	1-1/2	2-15/16	1/8
1464309	2.87	0.1130	#33			
0721918	2.90	0.1142		33	64	3
0721924	3.00	0.1181				
0721930	3.10	0.1220		36	68	4
1464751	3.18	0.1250	1/8	1-3/8	2-5/8	1/8
0721947	3.20	0.1260		36	68	4
1464315	3.26	0.1285	#30	1-5/8	3-1/16	3/16
0721953	3.30	0.1299		36	68	4
0721960	3.40	0.1339		39	71	4
1464321	3.47	0.1365	#29	1-3/4	3-3/16	3/16
0721976	3.50	0.1378		39	71	4
1464338	3.57	0.1405	#28	1-3/4	3-3/16	3/16
1464768	3.57	0.1406	9/64	1-1/2	2-7/8	3/16
0721982	3.60	0.1417		39	71	4
1464344	3.66	0.1440	#27	1-7/8	3-5/16	3/16
0721999	3.70	0.1457		39	71	4
1464350	3.73	0.1470	#26	1-7/8	3-5/16	3/16
1464367	3.80	0.1495	#25			
0722003	3.80	0.1496		43	75	4
1464373	3.86	0.1520	#24	2	3-7/16	3/16
0722010	3.90	0.1535		43	75	4
1464380	3.91	0.1540	#23	2	3-7/16	3/16
1464774	3.97	0.1563	5/32	1-3/4	3-1/8	3/16
1464396	3.99	0.1570	#22	2	3-7/16	3/16
0722026	4.00	0.1575		43	75	4
1464401	4.04	0.1590	#21	2-1/8	3-9/16	3/16
1464418	4.09	0.1610	#20			
0722032	4.10	0.1614		43	85	6
0722049	4.20	0.1654				
1464424	4.22	0.1660	#19	2-1/8	3-9/16	3/16
0722055	4.30	0.1693		47	89	6
1464780	4.37	0.1719	11/64	1-7/8	3-1/4	3/16
0722061	4.40	0.1732		47	89	6
0722078	4.50	0.1772				
1464430	4.57	0.1800	#15	2-3/16	3-5/8	3/16
0722084	4.60	0.1811		47	89	6
1464447	4.62	0.1820	#14	2-3/16	3-5/8	3/16
0722090	4.70	0.1850		47	89	6
1464797	4.76	0.1875	3/16	2	3-3/8	3/16
0722106	4.80	0.1890		52	94	6
0722112	4.90	0.1929				
1464453	4.91	0.1935	#10	2-7/16	4-1/4	1/4
1464460	4.98	0.1960	#9			
0722129	5.00	0.1969		52	94	6
1464476	5.05	0.1990	#8	2-7/16	4-1/4	1/4
0722135	5.10	0.2008		52	94	6
1464482	5.11	0.2010	#7	2-7/16	4-1/4	1/4
1464802	5.16	0.2031	13/64	2-1/16	3-7/8	1/4
1464499	5.18	0.2040	#6	2-7/16	4-1/4	1/4
0722141	5.20	0.2047		52	94	6
1464504	5.22	0.2055	#5	2-1/2	4-5/16	1/4
0722158	5.30	0.2087		52	94	6
1464510	5.31	0.2090	#4	2-1/2	4-5/16	1/4
0722164	5.40	0.2126		57	99	6
1464527	5.41	0.2130	#3	2-1/2	4-5/16	1/4
0722170	5.50	0.2165		57	99	6
1464819	5.56	0.2188	7/32	2-1/16	3-7/8	1/4
0722187	5.60	0.2205		57	99	6
1464533	5.61	0.2210	#2	2-5/8	4-7/16	1/4
0722193	5.70	0.2244		57	99	6
1464540	5.79	0.2280	#1	2-5/8	4-7/16	1/4
0722209	5.80	0.2283		57	99	6
0722215	5.90	0.2323				
1464825	5.95	0.2344	15/64	2-3/8	4-1/4	1/4
0722221	6.00	0.2362		57	99	6
1464556	6.05	0.2380	B	2-3/4	4-9/16	1/4
0722238	6.10	0.2402		63	107	8
1464562	6.15	0.2420	C	2-3/4	4-9/16	1/4
0722244	6.20	0.2441		63	107	8
1464579	6.25	0.2460	D	2-3/4	4-9/16	1/4
0722250	6.30	0.2480		63	107	8
1464831	6.35	0.2500	1/4	2-3/8	4-1/4	1/4
0722267	6.40	0.2520		63	107	8
0722273	6.50	0.2559				
1464585	6.53	0.2570	F	2-7/8	4-11/16	3/8
0722280	6.60	0.2598		63	107	8
1464591	6.63	0.2610	G	2-7/8	4-11/16	3/8
0722296	6.70	0.2638		63	107	8
1464848	6.75	0.2656	17/64	2-3/4	4-5/8	3/8
0722301	6.80	0.2677		69	113	8
0722318	6.90	0.2717				
1464607	6.91	0.2720	I	2-7/8	4-11/16	3/8
0722324	7.00	0.2756		69	113	8
1464613	7.04	0.2770	J	2-7/8	4-11/16	3/8
0722330	7.10	0.2795		69	113	8
1464854	7.15	0.2813	9/32	2-3/4	4-5/8	3/8
0722347	7.20	0.2835		69	113	8
0722353	7.30	0.2874				
1464620	7.37	0.2900	L	2-15/16	4-3/4	3/8
0722360	7.40	0.2913		69	113	8
1464636	7.49	0.2950	M	3-1/16	4-7/8	3/8
0722376	7.50	0.2953		69	113	8

• USA Stock Size

1 per tube

L7574P Metric
L7575P Fractional

Metric Range 2.0 to 32.0
Fractional Range 3/32 to 3/4

***Replacing AG-SUS Drill L6594P, 6595P and SG-ES Drill L7570P, L7571P**

EDP No.	Size	Decimal Equivalent	Wire / Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
1464860	7.54	0.2969	19/64	2-7/8	4-3/4	3/8
0722382	7.60	0.2992		75	119	8
1464642	7.67	0.3020	N	3-1/16	4-7/8	3/8
0722399	7.70	0.3031		75	119	8
0722404	7.80	0.3071				
0722410	7.90	0.3110				
1464877	7.94	0.3125	5/16	2-7/8	4-3/4	3/8
0722427	8.00	0.3150		75	119	8
1464659	8.03	0.3160	O	3-3/16	5	3/8
0722433	8.10	0.3189		75	125	10
0722440	8.20	0.3228				
0722456	8.30	0.3268				
1464883	8.33	0.3281	21/64	2-7/8	4-3/4	3/8
0722462	8.40	0.3307		75	125	10
1464665	8.43	0.3320	Q	3-7/16	5-1/4	3/8
0722479	8.50	0.3346		75	125	10
0722485	8.60	0.3386		81	131	10
1464671	8.61	0.3390	R	3-7/16	5-1/4	3/8
0722491	8.70	0.3425		81	131	10
1464890	8.73	0.3438	11/32	3-1/4	5-1/8	3/8
0722507	8.80	0.3465		81	131	10
0722513	8.90	0.3504				
0722520	9.00	0.3543				
0722536	9.10	0.3583				
1464905	9.13	0.3594	23/64	3-1/4	5-1/8	3/8
0722542	9.20	0.3622		81	131	10
0722559	9.30	0.3661				
1464688	9.35	0.3680	U	3-5/8	5-7/16	3/8
0722565	9.40	0.3701		81	131	10
0722571	9.50	0.3740				
1464911	9.53	0.3750	3/8	3-1/4	5-1/8	3/8
1464694	9.58	0.3770	V	3-5/8	5-23/32	1/2
0722588	9.60	0.3780		87	137	10
0722594	9.70	0.3819				
0722600	9.80	0.3858				
0722616	9.90	0.3898				
1464928	9.92	0.3906	25/64	3-3/8	5-1/2	1/2
0722622	10.00	0.3937		87	137	10
1464700	10.08	0.3970	X	3-3/4	5-27/32	1/2
0722639	10.10	0.3976		87	144	12
0722645	10.20	0.4016				
1464716	10.26	0.4040	Y	3-7/8	5-31/32	1/2
0722651	10.30	0.4055		87	144	12
1464934	10.32	0.4063	13/32	3-3/8	5-1/2	1/2
0722668	10.40	0.4094		87	144	12
1464722	10.49	0.4130	Z	3-7/8	5-31/32	1/2
0722674	10.50	0.4134		87	144	12
0722680	10.60	0.4173				
0722697	10.70	0.4213		94	151	12
1464940	10.72	0.4219	27/64	3-3/4	5-7/8	1/2
0722702	10.80	0.4252		94	151	12
0722719	10.90	0.4291				
0722725	11.00	0.4331				
0722731	11.10	0.4370				
1464957	11.11	0.4375	7/16	3-3/4	5-7/8	1/2
0722748	11.20	0.4409		94	151	12
0722754	11.30	0.4449				
0722760	11.40	0.4488				
0722777	11.50	0.4528				
1464963	11.51	0.4531	29/64	3-3/4	5-7/8	1/2
0722783	11.60	0.4567		94	151	12
0722790	11.70	0.4606				
0722805	11.80	0.4646				

EDP No.	Size	Decimal Equivalent	Wire / Fractional Equivalent	Flute Length	Overall Length	Shank Dia.
EDP	Dc			ℓ	L	Ds
0722811	11.90	0.4685		101	158	12
1464970	11.91	0.4688	15/32	4	6-1/4	1/2
0722828	12.00	0.4724		101	158	12
0722834	12.10	0.4764				
0722840	12.20	0.4803				
0722857	12.30	0.4843				
1464986	12.30	0.4844	31/64	4	6-1/4	1/2
0722863	12.40	0.4882		101	158	12
0722870	12.50	0.4921				
0722886	12.60	0.4961				
0722892	12.70	0.5000				
1464992	12.70	0.5000	1/2	4	6-1/4	1/2
0722908	12.80	0.5039		101	158	12
0722914	12.90	0.5079				
0722920	13.00	0.5118				
1465007	13.50	0.5313	17/32	4-1/4	6-3/4	5/8
0722937	13.50	0.5315		108	168	16
0722943	14.00	0.5512				
1465013	14.29	0.5625	9/16	4-1/2	7	5/8
0722950	14.50	0.5709		114	173	16
1465020	14.68	0.5781	37/64	4-1/2	7	5/8
0722966	15.00	0.5906		114	180	20
1465036	15.08	0.5938	19/32	4-3/4	7-1/4	3/4
0722972	15.50	0.6102		120	185	20
1465042	15.88	0.6250	5/8	4-3/4	7-1/4	3/4
0722989	16.00	0.6299		120	185	20
0722995	16.50	0.6496		125	189	20
1465059	16.67	0.6563	21/32	5	7-1/2	3/4
0723000	17.00	0.6693		125	189	20
1465065	17.46	0.6875	11/16	5-1/8	7-5/8	3/4
0723016	17.50	0.6890		130	194	20
0723022	18.00	0.7087		135	206	20
1465071	18.26	0.7188	23/32	5-3/8	7-3/4	7/8
0723039	18.50	0.7283		140	210	20
0723045	19.00	0.7480		135	206	25
1465088	19.05	0.7500	3/4	5-1/2	7-7/8	7/8
0723051	19.50	0.7677		140	210	25
0723068	20.00	0.7874				
0723074	20.50	0.8071		145	214	
0723080	21.00	0.8268				
0723097	21.50	0.8465		150	218	
0723102	22.00	0.8661				
0723119	22.50	0.8858		155	223	
0723125	23.00	0.9055				
0723131	23.50	0.9252				
0723148	24.00	0.9449		160	237	32
0723154	24.50	0.9646				
0723160	25.00	0.9843		165	241	
0723177	25.50	1.0039				
0723183	26.00	1.0236				
0723190	26.50	1.0433				
0723205	27.00	1.0630		170	245	
0723211	27.50	1.0827				
0723228	28.00	1.1024				
0723234	28.50	1.1220		175	248	
0723240	29.00	1.1417				
0723257	29.50	1.1614				
0723263	30.00	1.1811				
0723270	30.50	1.2008		180	252	
0723286	31.00	1.2205				
0723292	31.50	1.2402				
0723308	32.00	1.2598		185		

• USA Stock Size

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Drilling Conditions

List 7574P, 7575P

Workpiece Material / Speed (SFM) / Drill Diameter			Structural Steels Carbon Steels		Alloy Steels		Mold Steels Stainless Steels 300 - 400 Series		Nickel Alloys Titanium Alloys		Cast Irons		Aluminum Alloys Copper Alloys Nonferrous Alloys	
			115 - 135 SFM		95 - 105 SFM		40 - 50 SFM		20 SFM		115 - 135 SFM		115 - 135 SFM	
Fractional	Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
–	2.000	0.0787	5,700	0.002	4,600	0.002	1,800	0.001	800	0.001	6,300	0.003	9,700	0.003
3/32	2.381	0.0937	5,000	0.003	4,100	0.002	1,500	0.002	700	0.001	5,600	0.003	8,500	0.003
–	3.000	0.1181	4,200	0.004	3,400	0.003	1,100	0.002	580	0.002	4,700	0.004	7,200	0.004
1/8	3.175	0.1250	4,000	0.004	3,300	0.003	1,100	0.002	550	0.002	4,500	0.005	6,900	0.005
5/32	3.969	0.1563	3,200	0.005	2,600	0.004	900	0.003	430	0.002	3,600	0.006	5,500	0.006
3/16	4.763	0.1875	2,700	0.005	2,200	0.005	790	0.004	340	0.003	3,000	0.007	4,600	0.007
–	5.000	0.1969	2,500	0.006	2,000	0.005	760	0.004	320	0.003	2,800	0.007	4,300	0.007
1/4	6.350	0.2500	2,000	0.007	1,700	0.006	610	0.005	260	0.004	2,300	0.008	3,400	0.008
5/16	7.938	0.3125	1,700	0.008	1,400	0.006	490	0.007	210	0.004	1,900	0.010	2,800	0.010
–	8.000	0.3150	1,600	0.008	1,300	0.006	480	0.007	200	0.004	1,800	0.010	2,700	0.010
3/8	9.525	0.3750	1,400	0.008	1,100	0.007	400	0.008	170	0.005	1,500	0.011	2,300	0.011
–	10.000	0.3937	1,300	0.008	1,000	0.007	380	0.008	160	0.005	1,400	0.011	2,200	0.011
–	12.000	0.4724	1,100	0.009	850	0.008	320	0.010	132	0.006	1,200	0.012	1,800	0.012
1/2	12.700	0.5000	1,100	0.010	810	0.009	310	0.010	130	0.007	1,200	0.012	1,800	0.013
–	16.000	0.6299	800	0.012	640	0.010	240	0.011	100	0.008	880	0.015	1,400	0.014
–	20.000	0.7874	640	0.014	510	0.012	190	0.012	80	0.009	700	0.017	1,100	0.016
–	25.000	0.9843	510	0.015	410	0.013	150	0.013	64	0.011	560	0.019	870	0.019
–	32.000	1.2598	400	0.015	320	0.014	120	0.015	50	0.012	440	0.019	680	0.019

1) The above values apply when coolant is used in vertical machine & horizontal machine. When drilling in stainless steel and hard to cut material using pecking.
2) Adjust drilling condition when unusual vibration or different sound occurs.
3) Recommended feeds & speeds are starting points only. Actual performance will be determined by specific material, the condition of equipment being used and coolant.

Formulas: $RPM = \frac{SFM \times 3.82}{\text{Drill Diam.}}$ Feed Rate (in/min) = RPM x IPR

SG Drill Oil Hole

L7596P Metric Range 5.0 to 20.0 mm
L7591P Fractional Range 15/64 to 3/4

EDP No.	Size	Decimal Equivalent	Fractional Equivalent	Flute Length	Overall Length
EDP	Dc			ℓ	L
1314751	5.0	0.1969		52	94
1314768	5.5	0.2165		57	99
1315065		0.2344	15/64	2-3/8	4-1/4
1314774	6.0	0.2362		57	99
1315071		0.2500	1/4	2-3/8	4-1/4
1314780	6.5	0.2559		63	107
1315088		0.2656	17/64	2-3/4	4-5/8
1314797	7.0	0.2756		69	113
1315094		0.2813	9/32	2-3/4	4-5/8
1314802	7.5	0.2953		69	113
1315100		0.2969	19/64	2-7/8	4-3/4
1315116		0.3125	5/16	2-7/8	4-3/4
1314819	8.0	0.3150		75	119
1315122		0.3281	21/64	2-7/8	4-3/4
1314825	8.5	0.3346		75	125
1315139		0.3438	11/32	3-1/4	5-1/8
1314831	9.0	0.3543		81	131
1315145		0.3594	23/64	3-1/4	5-1/8
1314848	9.5	0.3740		81	131
1315151		0.3750	3/8	3-1/4	5-1/8
1315168		0.3906	25/64	3-3/8	5-1/2
1314854	10.0	0.3937		87	137
1315174		0.4063	13/32	3-3/8	5-1/2
1314860	10.5	0.4134		87	144
1315180		0.4219	27/64	3-3/4	5-7/8
1314877	11.0	0.4331		94	151
1315197		0.4375	7/16	3-3/4	5-7/8
1314883	11.5	0.4528		94	151
1315202		0.4531	29/64	3-3/4	5-7/8

EDP No.	Size	Decimal Equivalent	Fractional Equivalent	Flute Length	Overall Length
EDP	Dc			ℓ	L
1315219		0.4688	15/32	4	6-1/4
1314890	12.0	0.4724		101	158
1315225		0.4844	31/64	4	6-1/4
1314905	12.5	0.4921		101	158
1315231		0.5000	1/2	4	6-1/4
1314911	13.0	0.5118		101	158
1315248		0.5313	17/32	4-1/4	6-3/4
1314928	13.5	0.5315		108	168
1314934	14.0	0.5512		108	168
1315254		0.5625	9/16	4-1/2	7
1314940	14.5	0.5709		114	173
1315260		0.5781	37/64	4-1/2	7
1314957	15.0	0.5906		114	180
1315277		0.5938	19/32	4-3/4	7-1/4
1314963	15.5	0.6102		120	185
1315283		0.6250	5/8	4-3/4	7-1/4
1314970	16.0	0.6299		120	185
1314986	16.5	0.6496		125	189
1315290		0.6563	21/32	5	7-1/2
1314992	17.0	0.6693		125	189
1315305		0.6875	11/16	5-1/8	7-5/8
1315007	17.5	0.6890		130	194
1315013	18.0	0.7087		130	194
1315311		0.7188	23/32	5-3/8	7-3/4
1315020	18.5	0.7283		135	198
1315036	19.0	0.7480		135	206
1315328		0.7500	3/4	5-1/2	7-7/8
1315042	19.5	0.7677		140	210
1315059	20.0	0.7874			

• USA Stock Size

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Drilling Conditions

Workpiece Material / Speed (SFM) / Drill Diameter			Structural Steels Carbon Steels		Alloy Steels		Die Steels Hardened Steels (35-45HRc)		Stainless Steels		Cast Irons		Aluminum Alloys Copper Alloys Nonferrous Alloys	
			120 - 130 SFM		105 - 110 SFM		40 - 50 SFM		60 - 70 SFM		130 - 150 SFM		200 - 230 SFM	
Fractional	Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
—	5.000	0.1969	2,400	0.007	1,900	0.006	850	0.005	1,200	0.005	2,700	0.009	4,100	0.009
1/4	6.350	0.2500	1,900	0.008	1,500	0.008	650	0.006	1,000	0.006	2,100	0.011	3,300	0.011
5/16	7.938	0.3125	1,500	0.008	1,250	0.008	550	0.007	800	0.007	1,700	0.013	2,650	0.013
—	8.000	0.3150	1,500	0.009	1,200	0.009	550	0.009	750	0.008	1,700	0.014	2,600	0.014
3/8	9.525	0.3750	1,250	0.010	1,000	0.010	500	0.009	700	0.009	1,500	0.014	2,200	0.014
—	10.000	0.3937	1,200	0.011	950	0.011	450	0.010	650	0.010	1,400	0.016	2,000	0.016
—	12.000	0.4724	1,000	0.011	800	0.011	400	0.010	550	0.010	1,200	0.016	1,700	0.016
1/2	12.700	0.5000	950	0.013	750	0.013	350	0.012	500	0.013	1,100	0.019	1,600	0.019
—	16.000	0.6299	750	0.014	600	0.014	250	0.014	400	0.015	850	0.021	1,300	0.021
—	20.000	0.7874	600	0.015	450	0.015	200	0.014	300	0.015	650	0.022	1,000	0.021

1) The above values apply when coolant is used in vertical machine & horizontal machine. When drilling in stainless steel and hard to cut material using pecking.
2) Adjust drilling condition when unusual vibration or different sound occurs.
3) Recommended feeds & speeds are starting points only. Actual performance will be determined by specific material, the condition of equipment being used and coolant.

Formulas: $RPM = \frac{SFM \times 3.82}{\text{Drill Diam.}}$ Feed Rate (in/min) = RPM x IPR

SG-ES Drill Jobber Length

L7570P Metric
L7571P Fractional, Wire & Letter

*Series being DISCONTINUED, See L7574P & 7575P for replacement

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank
EDP	Dc			ℓ	L	Ds
0562242	2.00	0.0787		24	56	3
1362339	2.08	0.0820	#45	1 1/8	2 3/8	1/8
0562259	2.10	0.0827		24	56	3
1362345	2.18	0.0860	#44	1 1/8	2 3/8	1/8
0562265	2.20	0.0866		25	56	3
1362351	2.26	0.0890	#43	1 1/4	2 1/2	1/8
0562271	2.30	0.0906		25	56	3
1362368	2.37	0.0935	#42	1 1/4	2 1/2	1/8
1245009	2.38	0.0938	3/32	1 1/8	2 3/8	1/8
0562288	2.40	0.0945		30	61	3
1362374	2.44	0.0960	#41	1 3/8	2 5/8	1/8
1362380	2.49	0.0980	#40	1 3/8	2 5/8	1/8
0562294	2.50	0.0984		30	61	3
1362397	2.53	0.0995	#39	1 3/8	2 13/16	1/8
1362402	2.58	0.1015	#38	1 7/16	2 7/8	1/8
0562300	2.60	0.1024		30	61	3
1362419	2.64	0.1040	#37	1 7/16	2 7/8	1/8
0562316	2.70	0.1063		33	64	3
1362425	2.71	0.1065	#36	1 7/16	2 7/8	1/8
1245015	2.78	0.1094	7/64	1 1/4	2 1/2	1/8
0562322	2.80	0.1102		33	64	3
1362448	2.82	0.1110	#34	1 1/2	2 15/16	1/8
1362454	2.87	0.1130	#33	1 1/2	2 15/16	1/8
0562339	2.90	0.1142		33	64	3
0562345	3.00	0.1181		33	64	3
0562351	3.10	0.1220		36	68	4
1245021	3.18	0.1250	1/8	1 3/8	2 5/8	1/8
0562368	3.20	0.1260		36	68	4
1362483	3.26	0.1285	#30	1 5/8	3 1/16	3/16
0562374	3.30	0.1299		36	68	4
0562380	3.40	0.1339		39	71	4
1362490	3.47	0.1365	#29	1 3/4	3 3/16	3/16
0562397	3.50	0.1378		39	71	4
1362505	3.57	0.1405	#28	1 3/4	3 3/16	3/16
1245038	3.57	0.1406	9/64	1 1/2	2 7/8	3/16
0562402	3.60	0.1417		39	71	4
1362511	3.66	0.1440	#27	1 7/8	3 5/16	3/16
0562419	3.70	0.1457		39	71	4
1362528	3.73	0.1470	#26	1 7/8	3 5/16	3/16
1362534	3.80	0.1495	#25	1 7/8	3 5/16	3/16
0562425	3.80	0.1496		43	75	4
1362540	3.86	0.1520	#24	2	3 7/16	3/16
0562431	3.90	0.1535		43	75	4
1362557	3.91	0.1540	#23	2	3 7/16	3/16
1245044	3.97	0.1563	5/32	1 3/4	3 1/8	3/16
1362563	3.99	0.1570	#22	2	3-7/16	3/16
0562448	4.00	0.1575		43	75	4
1362570	4.04	0.1590	#21	2-1/8	3-9/16	3/16
1362586	4.09	0.1610	#20	2-1/8	3-9/16	3/16
0562454	4.10	0.1614		43	85	6
0562460	4.20	0.1654		43	85	6
1362592	4.22	0.1660	#19	2-1/8	3-9/16	3/16
0562477	4.30	0.1693		47	89	6
1245050	4.37	0.1719	11/64	1-7/8	3-1/4	3/16
0562483	4.40	0.1732		47	89	6
0562490	4.50	0.1772		47	89	6
1362637	4.57	0.1800	#15	2-3/16	3-5/8	3/16
0562505	4.60	0.1811		47	89	6
1362643	4.62	0.1820	#14	2-3/16	3-5/8	3/16
0562511	4.70	0.1850		47	89	6
1245067	4.76	0.1875	3/16	2	3-3/8	3/16
0562528	4.80	0.1890		52	94	6
0562534	4.90	0.1929		52	94	6
1362689	4.91	0.1935	#10	2-7/16	4-1/4	1/4

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank
EDP	Dc			ℓ	L	Ds
1362695	4.98	0.1960	#9	2-7/16	4-1/4	1/4
0562540	5.00	0.1969		52	94	6
1362700	5.05	0.1990	#8	2-7/16	4-1/4	1/4
0562557	5.10	0.2008		52	94	6
1362717	5.11	0.2010	#7	2-7/16	4-1/4	1/4
1245073	5.16	0.2031	13/64	2-1/16	3-7/8	1/4
1362723	5.18	0.2040	#6	2-7/16	4-1/4	1/4
0562563	5.20	0.2047		52	94	6
1362730	5.22	0.2055	#5	2-1/2	4-5/16	1/4
0562570	5.30	0.2087		52	94	6
1362746	5.31	0.2090	#4	2-1/2	4-5/16	1/4
0562586	5.40	0.2126		57	99	6
1362752	5.41	0.2130	#3	2-1/2	4-5/16	1/4
0562592	5.50	0.2165		57	99	6
1245080	5.56	0.2188	7/32	2-1/16	3-7/8	1/4
0562608	5.60	0.2205		57	99	6
1362769	5.61	0.2210	#2	2-5/8	4-7/16	1/4
0562614	5.70	0.2244		57	99	6
1362775	5.79	0.2280	#1	2-5/8	4-7/16	1/4
0562620	5.80	0.2283		57	99	6
0562637	5.90	0.2323		57	99	6
1245096	5.95	0.2344	15/64	2-3/8	4-1/4	1/4
0562643	6.00	0.2362		57	99	6
1362798	6.05	0.2380	B	2-3/4	4-9/16	1/4
0562650	6.10	0.2402		63	107	8
1362803	6.15	0.2420	C	2-3/4	4-9/16	1/4
0562666	6.20	0.2441		63	107	8
1362810	6.25	0.2460	D	2-3/4	4-9/16	1/4
0562672	6.30	0.2480		63	107	8
1245101	6.35	0.2500	1/4	2-3/8	4-1/4	1/4
0562689	6.40	0.2520		63	107	8
0562695	6.50	0.2559		63	107	8
1362832	6.53	0.2570	F	2-7/8	4-11/16	3/8
0562700	6.60	0.2598		63	107	8
1362849	6.63	0.2610	G	2-7/8	4-11/16	3/8
0562717	6.70	0.2638		63	107	8
1245118	6.75	0.2656	17/64	2-3/4	4-5/8	3/8
0562723	6.80	0.2677		69	113	8
0562730	6.90	0.2717		69	113	8
1362855	6.91	0.2720	I	2-7/8	4-11/16	3/8
0562746	7.00	0.2756		69	113	8
1362861	7.04	0.2770	J	2-7/8	4-11/16	3/8
0562752	7.10	0.2795		69	113	8
1245124	7.14	0.2813	9/32	2-3/4	4-5/8	3/8
0562769	7.20	0.2835		69	113	8
0562775	7.30	0.2874		69	113	8
1362878	7.37	0.2900	L	2-15/16	4-3/4	3/8
0562781	7.40	0.2913		69	113	8
1362884	7.49	0.2950	M	3-1/16	4-7/8	3/8
0562798	7.50	0.2953		69	113	8
1245130	7.54	0.2969	19/64	2-7/8	4-3/4	3/8
0562803	7.60	0.2992		75	119	8
1362890	7.67	0.3020	N	3-1/16	4-7/8	3/8
0562810	7.70	0.3031		75	119	8
0562826	7.80	0.3071		75	119	8
0562832	7.90	0.3110		75	119	8
1245147	7.94	0.3125	5/16	2-7/8	4-3/4	3/8
0562849	8.00	0.3150		75	119	8
1362906	8.03	0.3160	O	3-3/16	5	3/8
0562855	8.10	0.3189				
0562861	8.20	0.3228		75	125	10
0562878	8.30	0.3268				
1245153	8.33	0.3281	21/64	2-7/8	4-3/4	3/8
0562884	8.40	0.3307		75	125	10

• USA Stock Size Not recommended for 300 Series Stainless Steel 1 per tube

L7570P Metric
L7571P Fractional & Letter

*Series being DISCONTINUED, See L7574P & 7575P for replacement

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank
EDP	Dc			ℓ	L	Ds
1362929	8.43	0.3320	Q	3-7/16	5-1/4	3/8
0562890	8.50	0.3346		75	125	10
0562906	8.60	0.3386		81	131	10
1362935	8.61	0.3390	R	3-7/16	5-1/4	3/8
0562912	8.70	0.3425		81	131	10
1245160	8.73	0.3438	11/32	3-1/4	5-1/8	3/8
0562929	8.80	0.3465		81	131	10
0562935	8.90	0.3504				
0562941	9.00	0.3543				
0562958	9.10	0.3583				
1245176	9.13	0.3594	23/64	3-1/4	5-1/8	3/8
0562964	9.20	0.3622		81	131	10
0562970	9.30	0.3661				
1362964	9.35	0.3680	U	3-5/8	5-7/16	3/8
0562987	9.40	0.3701		81	131	10
0562993	9.50	0.3740				
1245182	9.53	0.3750	3/8	3-1/4	5-1/8	3/8
1362970	9.58	0.3770	V	3-5/8	5-23/32	1/2
0563008	9.60	0.3780		87	137	10
0563014	9.70	0.3819				
0563020	9.80	0.3858				
0563037	9.90	0.3898				
1245199	9.92	0.3906	25/64	3-3/8	5-1/2	1/2
0563043	10.00	0.3937		87	137	10
1362993	10.08	0.3970	X	3-3/4	5-27/32	1/2
0563050	10.10	0.3976		87	144	12
0563066	10.20	0.4016				
1363008	10.26	0.4040	Y	3-7/8	5-31/32	1/2
0563072	10.30	0.4055		87	144	12
1245204	10.32	0.4063	13/32	3-3/8	5-1/2	1/2
0563089	10.40	0.4094		87	144	12
1363014	10.49	0.4130	Z	3-7/8	5-31/32	1/2
0563095	10.50	0.4134		87	144	12
0563100	10.60	0.4173				
0563117	10.70	0.4213		94	151	12
1245210	10.72	0.4219	27/64	3-3/4	5-7/8	1/2
0563123	10.80	0.4252		94	151	12
0563130	10.90	0.4291				
0563146	11.00	0.4331				
0563152	11.10	0.4370				
1245227	11.11	0.4375	7/16	3-3/4	5-7/8	1/2
0563169	11.20	0.4409		94	151	12
0563175	11.30	0.4449				
0563181	11.40	0.4488				

• USA Stock Size Not recommended for 300 Series Stainless Steel

EDP No.	Size	Decimal	Wire/Fractional Equivalent	Flute Length	Overall Length	Shank
EDP	Dc			ℓ	L	Ds
0563198	11.50	0.4528		94	151	12
1245233	11.51	0.4531	29/64	3-3/4	5-7/8	1/2
0563203	11.60	0.4567		94	151	12
0563210	11.70	0.4606				
0563226	11.80	0.4646				
0563232	11.90	0.4685		101	158	12
1245240	11.91	0.4688	15/32	4	6-1/4	1/2
0563249	12.00	0.4724		101	158	12
0563255	12.10	0.4764				
0563261	12.20	0.4803				
0563278	12.30	0.4843				
1245256	12.30	0.4844	31/64	4	6-1/4	1/2
0563284	12.40	0.4882		101	158	12
0563290	12.50	0.4921				
0563306	12.60	0.4961				
0563312	12.70	0.5000				
1245262	12.70	0.5000	1/2	4	6-1/4	1/2
0563329	12.80	0.5039		101	158	12
0563335	12.90	0.5079				
0563341	13.00	0.5118				
1245279	13.49	0.5313	17/32	4-1/4	6-3/4	5/8
0563358	13.50	0.5315		108	168	16
0563364	14.00	0.5512				
1245285	14.29	0.5625	9/16	4-1/2	7	5/8
0563370	14.50	0.5709		114	173	16
1245291	14.68	0.5781	37/64	4-1/2	7	5/8
0563387	15.00	0.5906		114	180	20
1245307	15.08	0.5938	19/32	4-3/4	7-1/4	3/4
0563393	15.50	0.6102		120	185	20
1245313	15.88	0.6250	5/8	4-3/4	7-1/4	3/4
0563409	16.00	0.6299		120	185	20
0563415	16.50	0.6496		125	189	20
1245320	16.67	0.6563	21/32	5	7-1/2	3/4
0563421	17.00	0.6693		125	189	20
1245336	17.46	0.6875	11/16	5-1/8	7-5/8	3/4
0563438	17.50	0.6890		130	194	20
0563444	18.00	0.7087		130	194	20
1245342	18.26	0.7188	23/32	5-3/8	7-3/4	7/8
0563450	18.50	0.7283		135	198	20
0563467	19.00	0.7480		135	206	25
1245359	19.05	0.7500	3/4	5-1/2	7-7/8	7/8
0563473	19.50	0.7677		140	210	25
0563480	20.00	0.7874				

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Drilling Conditions

Workpiece Material / Speed (SFM) / Drill Diameter			Structural Steels Carbon Steels		Alloy Steels		Die Steels Steels (35-45HRc) 400 Series, Stainless Steel		Cast Irons		Aluminum Alloys Copper Alloys Nonferrous Alloys	
			115 - 135 SFM		95 - 105 SFM		40 - 50 SFM		130 - 150 SFM		200 - 230 SFM	
Fractional	Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
—	2.000	0.0787	4600	0.002	4600	0.002	1800	0.001	6300	0.003	9700	0.003
3/32	2.381	0.0938	4000	0.003	4100	0.002	1500	0.002	4600	0.003	8500	0.003
—	3.000	0.1181	3400	0.004	3400	0.003	1100	0.002	4700	0.004	7200	0.004
1/8	3.175	0.1250	3200	0.004	3300	0.003	1100	0.002	4500	0.005	6900	0.005
5/32	3.969	0.1563	2600	0.005	2600	0.004	900	0.003	3600	0.006	5500	0.006
3/16	4.762	0.1875	2200	0.005	2200	0.005	790	0.004	3000	0.007	4600	0.007
—	5.000	0.1969	2000	0.006	2000	0.005	760	0.004	2800	0.007	4300	0.007
1/4	6.350	0.2500	1600	0.007	1700	0.006	610	0.005	2300	0.008	3400	0.008
5/16	7.938	0.3125	1400	0.008	1400	0.006	490	0.007	1900	0.010	2800	0.010
—	8.000	0.3150	1300	0.008	1300	0.006	480	0.007	1800	0.010	2700	0.010
3/8	9.525	0.3750	1200	0.008	1100	0.007	400	0.008	1500	0.011	2300	0.011
—	10.000	0.3937	1100	0.008	1000	0.007	380	0.008	1400	0.011	2200	0.011
—	12.000	0.4724	880	0.009	850	0.008	320	0.010	1200	0.012	1800	0.012
1/2	12.700	0.5000	880	0.010	810	0.009	310	0.010	1200	0.012	1800	0.013
—	16.000	0.6299	640	0.012	640	0.010	240	0.011	880	0.015	1400	0.014
—	20.000	0.7874	520	0.014	510	0.012	190	0.012	700	0.017	1100	0.016
—	25.000	0.9843	410	0.015	410	0.013	150	0.013	560	0.019	870	0.019
—	32.000	1.2598	320	0.015	320	0.014	120	0.015	440	0.019	680	0.019

• SG-ES is not recommended for 300-Series Stainless Steels.
• SG-ES is suitable drilling into 400-Series Stainless Steels.

Formulas:

$$RPM = \frac{SFM \times 3.82}{Drill\ Diam.}$$

Feed Rate (in/min) = RPM x IPR

1) The above values apply when coolant is used in vertical machine & horizontal machine. When drilling in stainless steel and hard to cut material using pecking.
2) Adjust drilling condition when unusual vibration or different sound occurs.
3) Recommended feeds & speeds are starting points only. Actual performance will be determined by specific matieral, the condition of equipment being used and coolant.

AG-SUS Drill Short

FMX AG h7 HELIX H 135° 2RAKE 3RAKE >1.9

L6596P Range 1.0 to 20.0

*Series being DISCONTINUED, See L7572P & 7573P for replacement

(Unit) : mm

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.
0646438	1.0	0.0394	6	40	3
0646444	1.1	0.0433	7		
0646450	1.2	0.0472	8		
0646467	1.3	0.0512			
0646473	1.4	0.0551	9		
0646480	1.5	0.0591			
0646496	1.6	0.0630	10	44	
0646501	1.7	0.0669			
0646518	1.8	0.0709	11		
0646524	1.9	0.0748			
0646530	2.0	0.0787	12		
0646547	2.1	0.0827			
0646553	2.2	0.0866	13		
0646560	2.3	0.0906			
0646576	2.4	0.0945	14	48	
0646582	2.5	0.0984			
0646599	2.6	0.1024			
0646604	2.7	0.1063	16		
0646610	2.8	0.1102			
0646627	2.9	0.1142			
0646633	3.0	0.1181			
0646640	3.1	0.1220	18	54	4
0646656	3.2	0.1260			
0646662	3.3	0.1299			
0646679	3.4	0.1339	20		
0646685	3.5	0.1378			
0646691	3.6	0.1417			
0646707	3.7	0.1457			
0646713	3.8	0.1496	22		
0646720	3.9	0.1535			
0646736	4.0	0.1575			
0646742	4.1	0.1614		66	6
0646759	4.2	0.1654			
0646765	4.3	0.1693	24	68	
0646771	4.4	0.1732			
0646788	4.5	0.1772			
0646794	4.6	0.1811			
0646800	4.7	0.1850			
0646816	4.8	0.1890	26	70	
0646822	4.9	0.1929			
0646839	5.0	0.1969			
0646845	5.1	0.2008			
0646851	5.2	0.2047			
0646868	5.3	0.2087			
0646874	5.4	0.2126	28	72	

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.
0646880	5.5	0.2165	28	72	6
0646897	5.6	0.2205			
0646902	5.7	0.2244			
0646919	5.8	0.2283			
0646925	5.9	0.2323			
0646931	6.0	0.2362			
0646948	6.1	0.2402	31	75	8
0646954	6.2	0.2441			
0646960	6.3	0.2480			
0646977	6.4	0.2520			
0646983	6.5	0.2559			
0646990	6.6	0.2598			
0647004	6.7	0.2638			
0647010	6.8	0.2677	34	78	
0647027	6.9	0.2717			
0647033	7.0	0.2756			
0647040	7.1	0.2795			
0647056	7.2	0.2835			
0647062	7.3	0.2874			
0647079	7.4	0.2913			
0647085	7.5	0.2953			
0647091	7.6	0.2992	37	81	
0647107	7.7	0.3031			
0647113	7.8	0.3071			
0647120	7.9	0.3110			
0647136	8.0	0.3150			
0647142	8.1	0.3189		87	10
0647159	8.2	0.3228			
0647165	8.3	0.3268			
0647171	8.4	0.3307			
0647188	8.5	0.3346			
0647194	8.6	0.3386	40	90	10
0647200	8.7	0.3425			
0647216	8.8	0.3465			
0647222	8.9	0.3504			
0647239	9.0	0.3543			
0647245	9.1	0.3583			
0647251	9.2	0.3622			
0647268	9.3	0.3661			
0647274	9.4	0.3701			
0647280	9.5	0.3740			
0647297	9.6	0.3780	43	93	
0647302	9.7	0.3819			
0647319	9.8	0.3858			
0647325	9.9	0.3898			

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.
0647331	10.0	0.3937	43	93	10
0647348	10.1	0.3976		100	12
0647354	10.2	0.4016			
0647360	10.3	0.4055			
0647377	10.4	0.4094			
0647383	10.5	0.4134			
0647390	10.6	0.4173			
0647405	10.7	0.4213	47	104	
0647411	10.8	0.4252			
0647428	10.9	0.4291			
0647434	11.0	0.4331			
0647440	11.1	0.4370			
0647457	11.2	0.4409			
0647463	11.3	0.4449			
0647470	11.4	0.4488			
0647486	11.5	0.4528			
0647492	11.6	0.4567			
0647508	11.7	0.4606			
0647514	11.8	0.4646			
0647520	11.9	0.4685	51	108	
0647537	12.0	0.4724			
0647543	12.1	0.4764			
0647550	12.2	0.4803			
0647566	12.3	0.4843			
0647572	12.4	0.4882			
0647589	12.5	0.4921			
0647595	12.6	0.4961			
0647600	12.7	0.5000			
0647617	12.8	0.5039			
0647623	12.9	0.5079			
0647630	13.0	0.5118			
0647646	13.5	0.5315	72	132	16
0647652	14.0	0.5512			
0647669	14.5	0.5709	76	136	
0647675	15.0	0.5906		142	20
0647681	15.5	0.6102	80	146	
0647698	16.0	0.6299			
0647703	16.5	0.6496	84	150	
0647710	17.0	0.6693			
0647726	17.5	0.6890	87	153	
0647732	18.0	0.7087			
0647749	18.5	0.7283	90	156	
0647755	19.0	0.7480		164	25
0647761	19.5	0.7677	94	168	25
0647778	20.0	0.7874			

1 per tube

AG-SUS Drill Regular

L6594P Metric Range 2.0 to 20.0

L6595P Fractional Range 3/32 to 3/4

*Series being DISCONTINUED, See L7574P & 7575P for replacement

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.
0632160	1.0	0.0394	12	50	3
0632177	1.1	0.0433	14		
0632183	1.2	0.0472	16		
0632190	1.3	0.0512			
0632205	1.4	0.0551	18		
0632211	1.5	0.0591			
0632228	1.6	0.0630	20	56	3
0632234	1.7	0.0669			
0632240	1.8	0.0709	22		
0632257	1.9	0.0748			
0632263	2.0	0.0787	24		
0632270	2.1	0.0827			
0632286	2.2	0.0866	25		
0632292	2.3	0.0906			
1328743	3/32	0.0938	1-1/8	2-3/8	1/8
0632308	2.4	0.0945	30	61	3
0632314	2.5	0.0984			
0632320	2.6	0.1024			
0632337	2.7	0.1063	33	64	3
1328750	7/64	0.1094	1-1/4	2-1/2	1/8
0632343	2.8	0.1102	33	64	3
0632350	2.9	0.1142			
0632366	3.0	0.1181			
0632372	3.1	0.1220	36	71	4
1328766	1/8	0.1250	1-3/8	2-5/8	1/8
0632389	3.2	0.1260	36	71	4
0632395	3.3	0.1299			
0632400	3.4	0.1339	39		
0632417	3.5	0.1378			
1328772	9/64	0.1406	1-1/2	2-7/8	3/16
0632423	3.6	0.1417	39	71	4
0632430	3.7	0.1457			
0632446	3.8	0.1496	43	75	4
0632452	3.9	0.1535			
1328789	5/32	0.1563	1-3/4	3-1/8	3/16
0632469	4.0	0.1575	43	75	4
0632475	4.1	0.1614		85	6
0632481	4.2	0.1654			
0632498	4.3	0.1693	47	89	6
1328795	11/64	0.1719	1-7/8	3-1/4	3/16
0632503	4.4	0.1732	47	89	6
0632510	4.5	0.1772			
0632526	4.6	0.1811			
0632532	4.7	0.1850			
1328800	3/16	0.1875	2	3-3/8	3/16

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia.
0632549	4.8	0.1890	52	94	6
0632555	4.9	0.1929			
0632561	5.0	0.1969			
0632578	5.1	0.2008			
1328817	13/64	0.2031	2-1/16	3-7/8	1/4
0632584	5.2	0.2047	52	94	6
0632590	5.3	0.2087			
0632606	5.4	0.2126	57	99	
0632612	5.5	0.2165			
1328823	7/32	0.2188	2-1/16	3-7/8	1/4
0632629	5.6	0.2205	57	99	6
0632635	5.7	0.2244			
0632641	5.8	0.2283			
0632658	5.9	0.2323			
1328830	15/64	0.2344	2-3/8	4-1/4	1/4
0632664	6.0	0.2362	57	99	6
0632670	6.1	0.2402	63	107	8
0632687	6.2	0.2441			
0632693	6.3	0.2480			
1328846	1/4	0.2500	2-3/8	4-1/4	1/4
0632709	6.4	0.2520	63	107	8
0632715	6.5	0.2559			
0632721	6.6	0.2598			
0632738	6.7	0.2638			
1328852	17/64	0.2656	2-3/4	4-5/8	3/8
0632744	6.8	0.2677	69	113	8
0632750	6.9	0.2717			
0632767	7.0	0.2756			
0632773	7.1	0.2795			
1328869	9/32	0.2813	2-3/4	4-5/8	3/8
0632780	7.2	0.2835	69	113	8
0632796	7.3	0.2874			
0632801	7.4	0.2913			
0632818	7.5	0.2953			
1328875	19/64	0.2969	2-7/8	4-3/4	3/8
0632824	7.6	0.2992	75	119	8
0632830	7.7	0.3031			
0632847	7.8	0.3071			
0632853	7.9	0.3110			
1328881	5/16	0.3125	2-7/8	4-3/4	3/8
0632860	8.0	0.3150	75	119	8
0632876	8.1	0.3189	75	125	10
0632882	8.2	0.3228			
0632899	8.3	0.3268			
1328898	21/64	0.3281	2-7/8	4-3/4	3/8

1 per tube

AG-SUS Drill Regular

L6594P Metric Range 2.0 to 20.0

L6595P Fractional Range 3/32 to 3/4

*Series being DISCONTINUED, See L7574P & 7575P for replacement

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Diameter
0632904	8.4	0.3307	75	125	10
0632910	8.5	0.3346			
0632927	8.6	0.3386	81	131	
0632933	8.7	0.3425			
1328903	11/32	0.3438	3-1/4	5-1/8	3/8
0632940	8.8	0.3465	81	131	10
0632956	8.9	0.3504			
0632962	9.0	0.3543			
0632979	9.1	0.3583			
1328910	23/64	0.3594	3-1/4	5-1/8	3/8
0632985	9.2	0.3622	81	131	10
0632991	9.3	0.3661			
0633006	9.4	0.3701			
0633012	9.5	0.3740			
1328926	3/8	0.3750	3-1/4	5-1/8	3/8
0633029	9.6	0.3780	87	137	10
0633035	9.7	0.3819			
0633041	9.8	0.3858			
0633058	9.9	0.3898			
1328932	25/64	0.3906	3-3/8	5-1/2	1/2
0633064	10.0	0.3937	87	137	10
0633070	10.1	0.3976		144	12
0633087	10.2	0.4016			
0633093	10.3	0.4055			
1328949	13/32	0.4063	3-3/8	5-1/2	1/2
0633109	10.4	0.4094	87	144	12
0633115	10.5	0.4134			
0633121	10.6	0.4173			
0633138	10.7	0.4213	94	151	
1328955	27/64	0.4219	3-3/4	5-7/8	1/2
0633144	10.8	0.4252	94	151	12
0633150	10.9	0.4291			
0633167	11.0	0.4331			
0633173	11.1	0.4370			
1328961	7/16	0.4375	3-3/4	5-7/8	1/2
0633180	11.2	0.4409	94	151	12
0633196	11.3	0.4449			
0633201	11.4	0.4488			
0633218	11.5	0.4528			
1328978	29/64	0.4531	3-3/4	5-7/8	1/2
0633224	11.6	0.4567	94	151	12

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Diameter
0633230	11.7	0.4606	94	151	12
0633247	11.8	0.4646			
0633253	11.9	0.4685	101	158	
1328984	15/32	0.4688	4	6-1/4	1/2
0633260	12.0	0.4724	101	158	12
0633276	12.1	0.4764			
0633282	12.2	0.4803			
0633299	12.3	0.4843			
1328990	31/64	0.4844	4	6-1/4	1/2
0633304	12.4	0.4882	101	158	12
0633310	12.5	0.4921			
0633327	12.6	0.4961			
0633333	12.7	0.5000			
1329005	1/2	0.5000	4	6-1/4	1/2
0633340	12.8	0.5039	101	158	12
0633356	12.9	0.5079			
0633362	13.0	0.5118			
1329011	17/32	0.5313	4-1/4	6-3/4	5/8
0633379	13.5	0.5315	108	168	16
0633385	14.0	0.5512			
1329028	9/16	0.5625	4-1/2	7	5/8
0633391	14.5	0.5709	114	173	16
1329034	37/64	0.5781	4-1/2	7	5/8
0633407	15.0	0.5906	114	180	20
1329040	19/32	0.5938	4-3/4	7-1/4	3/4
0633413	15.5	0.6102	120	185	20
1329057	5/8	0.6250	4-3/4	7-1/4	3/4
0633420	16.0	0.6299	120	185	20
0633436	16.5	0.6496	125	189	
1329063	21/32	0.6563	5	7-1/2	3/4
0633442	17.0	0.6693	125	189	20
1329070	11/16	0.6875	5-1/8	7-5/8	3/4
0633459	17.5	0.6890	130	194	20
0633465	18.0	0.7087			
1329086	23/32	0.7188	5-3/8	7-3/4	7/8
0633471	18.5	0.7283	135	198	20
0633488	19.0	0.7480	135	206	25
1329092	3/4	0.7500	5-1/2	7-7/8	7/8
0633494	19.5	0.7677	140	210	25
0633500	20.0	0.7874			

1 per tube

AG Power Long Drill

L6540P Metric Sizes — Series 1 Range 1.0 to 13.0 — Series 2 Range 1.0 to 10.0 — Series 3 Range 3.0 to 10.0

L6541P Fractional Sizes — Series 1 Range 1/8 to 3/8 — Series 2 Range 1/8 to 3/8 — Series 3 Range 1/8 to 5/16

Series 1

EDP	Fractional Size	Size	Decimal Equivalent	Flute Length	Overall Length
0640796		1.0000	0.0394	33	56
0640801		1.1000	0.0433	37	60
0640818		1.2000	0.0472	41	65
0640824		1.3000	0.0512		
0640830		1.4000	0.0551	45	70
0640847		1.5000	0.0591		
0640853		1.6000	0.0630	50	76
0640860		1.7000	0.0669		
0640876		1.8000	0.0709	53	80
0640882		1.9000	0.0748		
0640899		2.0000	0.0787	56	85
0640904		2.1000	0.0827		
0640910		2.2000	0.0866	59	90
0640927		2.3000	0.0906		
0640933		2.4000	0.0945	62	95
0640940		2.5000	0.0984		
0640956		2.6000	0.1024		
0640962		2.7000	0.1063	66	100
0640979		2.8000	0.1102		
0640985		2.9000	0.1142		
0640991		3.0000	0.1181		
0641006		3.1000	0.1220	69	106
1372812	1/8	3.1750	0.1250		
0641012		3.2000	0.1260		
0641029		3.3000	0.1299		
0641035		3.4000	0.1339	73	112
0641041		3.5000	0.1378		
1372829	9/64	3.5720	0.1406		
0641058		3.6000	0.1417		
0641064		3.7000	0.1457		
0641070		3.8000	0.1496	78	119
0641087		3.9000	0.1535		
1372835	5/32	3.9690	0.1563		
0641093		4.0000	0.1575		
0641109		4.1000	0.1614		
0641115		4.2000	0.1654		
0641121		4.3000	0.1693	82	126
1372841	11/64	4.3660	0.1719		
0641138		4.4000	0.1732		
0641144		4.5000	0.1772		
0641150		4.6000	0.1811		
0641167		4.7000	0.1850		
1372858	3/16	4.7620	0.1875	87	132
0641173		4.8000	0.1890		
0641180		4.9000	0.1929		
0641196		5.0000	0.1969		
0641201		5.1000	0.2008		
1372864	13/64	5.1590	0.2031		
0641218		5.2000	0.2047		
0641224		5.3000	0.2087		
0641230		5.4000	0.2126	91	139
0641247		5.5000	0.2165		
1372870	7/32	5.5560	0.2187		
0641253		5.6000	0.2205		
0641260		5.7000	0.2244		
0641276		5.8000	0.2283		
0641282		5.9000	0.2323		
0641299		6.0000	0.2362		
1372887	1/4	6.3500	0.2500	97	148
0641304		6.5000	0.2559		
1372893	17/64	6.7470	0.2656	102	156
0641310		6.8000	0.2677		
0641327		7.0000	0.2756		
1372909	9/32	7.1440	0.2813	102	156
0641333		7.5000	0.2953		
1372915	19/64	7.5410	0.2969	109	165
1372921	5/16	7.9330	0.3123		
0641340		8.0000	0.3150		
1372938	21/64	8.3340	0.3281		
0641356		8.5000	0.3346		
1372944	11/32	8.7310	0.3437	115	175
0641362		9.0000	0.3543		
1372950	23/64	9.1280	0.3594		
0641379		9.5000	0.3740		
1372967	3/8	9.5250	0.3750	121	184
0641385		10.0000	0.3937		
0641391		10.5000	0.4134		
0641407		11.0000	0.4331	128	195
0641413		11.5000	0.4528		
0641420		12.0000	0.4724	134	205
0641436		12.5000	0.4921		
0641442		13.0000	0.5118		

Series 2

EDP	Fractional Size	Size	Decimal Equivalent	Flute Length	Overall Length
0641459		1.0000	0.0394	60	100
0641465		1.1000	0.0433		
0641471		1.2000	0.0472	65	105
0641488		1.3000	0.0512		
0641494		1.4000	0.0551	70	110
0641500		1.5000	0.0591		
0641516		1.6000	0.0630	75	115
0641522		1.7000	0.0669		
0641539		1.8000	0.0709	80	120
0641545		1.9000	0.0748		
0641551		2.0000	0.0787	85	125
0641568		2.1000	0.0827		
0641574		2.2000	0.0866	90	135
0641580		2.3000	0.0906		
0641597		2.4000	0.0945	95	140
0641602		2.5000	0.0984		
0641619		2.6000	0.1024		
0641625		2.7000	0.1063	100	150
0641631		2.8000	0.1102		
0641648		2.9000	0.1142		
0641654		3.0000	0.1181		
0641660		3.1000	0.1220	105	155
1372973	1/8	3.1750	0.1250		
0641677		3.2000	0.1260		
0641683		3.3000	0.1299		
0641690		3.4000	0.1339	115	165
0641705		3.5000	0.1378		
1372980	9/64	3.5720	0.1406		
0641711		3.6000	0.1417		
0641728		3.7000	0.1457		
0641734		3.8000	0.1496	120	175
0641740		3.9000	0.1535		
1372996	5/32	3.9690	0.1563		
0641757		4.0000	0.1575		
0641763		4.1000	0.1614		
0641770		4.2000	0.1654		
0641786		4.3000	0.1693	125	185
1373000	11/64	4.3660	0.1719		
0641792		4.4000	0.1732		
0641808		4.5000	0.1772		
0641814		4.6000	0.1811		
0641820		4.7000	0.1850	125	185
1373017	3/16	4.7620	0.1875	135	195
0641837		4.8000	0.1890		
0641843		4.9000	0.1929		
0641850		5.0000	0.1969		
0641866		5.1000	0.2008		
1373023	13/64	5.1590	0.2031		
0641872		5.2000	0.2047		
0641889		5.3000	0.2087		
0641895		5.4000	0.2126	140	205
0641900		5.5000	0.2165		
1373030	7/32	5.5600	0.2187		
0641917		5.6000	0.2205		
0641923		5.7000	0.2244		
0641930		5.8000	0.2283		
0641946		5.9000	0.2323		
0641952		6.0000	0.2362		
1373046	1/4	6.3500	0.2500	150	215
0641969		6.5000	0.2559		
1373052	17/64	6.7470	0.2656	155	225
0641975		6.8000	0.2677		
0641981		7.0000	0.2756		
1373069	9/32	7.1440	0.2813		
0641998		7.5000	0.2953		
1373075	19/64	7.5410	0.2969	165	240
1373081	5/16	7.9330	0.3123		
0642002		8.0000	0.3150		
1373098	21/64	8.3340	0.3281		
0642019		8.5000	0.3346		
1373103	11/32	8.7310	0.3437	175	250
0642025		9.0000	0.3543		
1373110	23/64	9.1280	0.3594		
0642031		9.5000	0.3740		
1373126	3/8	9.5250	0.3750	185	265
0642048		10.0000	0.3937		

Series 3

EDP	Fractional Size	Size	Decimal Equivalent	Flute Length	Overall Length
0642054		3.0000	0.1181	130	190
1373132	1/8	3.1750	0.1250	135	200
0642060		3.5000	0.1378	145	210
1373149	9/64	3.5720	0.1406		
1373155	5/32	3.9690	0.1563	150	220
0642077		4.0000	0.1575		
1373161	11/64	4.3660	0.1719	160	235
0642083		4.5000	0.1772		
1373178	3/16	4.7620	0.1875	170	245
0642090		5.0000	0.1969		
0642105		5.5000	0.2165	180	260
1373184	7/32	5.5600	0.2187		
0642111		6.0000	0.2362		
1373190	1/4	6.3500	0.2500	190	275
0642128		6.5000	0.2559		
0642134		7.0000	0.2756	200	290
0642140		7.5000	0.2953		
1373206	5/16	7.9330	0.3123	210	305
0642157		8.0000	0.3150		
0642163		8.5000	0.3346		
0642170		9.0000	0.3543	220	320
0642186		9.5000	0.3740		
0642192		10.0000	0.3937	235	340

1 per tube

*Metric Size is Japan item: Please allow 2-3 weeks delivery

Standard Drilling Conditions

List No. 6596P

List No. 6594P, 6595P

Workpiece Material / Speed (SFM) / Drill Diameter			Austenitic Stainless Steels 304, 316		Austenitic Stainless Steels 304N		Martensitic Stainless Steels 420, 440		Ferritic Stainless Steels 405, 430		Low Carbon Steels	
			40 - 50 SFM		30 - 40 SFM		50 - 60 SFM		50 - 65 SFM		100 - 115 SFM	
Fractional	Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
—	1	0.0394	4,300	0.001	3,300	0.001	5,300	0.001	5,300	0.001	10,600	0.001
—	2	0.0787	2,100	0.003	1,700	0.002	2,650	0.002	2,650	0.001	5,300	0.003
3/32	2.381	0.0938	1,800	0.003	1,400	0.003	2,240	0.003	2,240	0.001	4,450	0.004
—	3	0.1181	1,400	0.004	1,100	0.004	1,770	0.004	1,750	0.001	3,500	0.005
1/8	3.175	0.1250	1,300	0.005	1,000	0.004	1,680	0.004	1,650	0.002	3,300	0.006
5/32	3.969	0.1563	1,100	0.006	850	0.005	1,340	0.004	1,340	0.002	2,650	0.007
3/16	4.763	0.1875	900	0.007	700	0.005	1,120	0.004	1,120	0.002	2,250	0.008
—	5	0.1969	850	0.007	670	0.006	1,050	0.004	1,060	0.002	2,100	0.008
1/4	6.35	0.2500	650	0.008	530	0.007	840	0.005	840	0.003	1,680	0.010
5/16	7.938	0.3125	550	0.009	420	0.008	670	0.007	650	0.003	1,350	0.012
—	8	0.3150	550	0.009	400	0.008	650	0.007	650	0.003	1,300	0.012
3/8	9.525	0.3750	450	0.010	350	0.009	560	0.008	560	0.004	1,100	0.012
—	10	0.3937	430	0.010	340	0.009	530	0.008	500	0.004	1,000	0.013
—	12	0.4724	360	0.011	280	0.010	440	0.009	450	0.005	850	0.014
1/2	12.7	0.5000	340	0.011	260	0.010	420	0.009	420	0.005	800	0.015
—	16	0.6299	270	0.014	210	0.012	330	0.011	330	0.007	650	0.017
3/4	19.05	0.7500	220	0.016	200	0.015	280	0.016	280	0.016	550	0.015
—	20	0.7874	210	0.016	170	0.014	260	0.012	250	0.008	500	0.020

1) The above values apply when coolant is used in vertical machine & horizontal machine.
2) Adjust drilling condition when unusual vibration or different sound occurs.
3) Recommended feeds and speeds are starting points only. Actual performance will be determined by specific material, the condition of equipment being used and coolant.

Formulas: RPM = $\frac{\text{SFM x 3.82}}{\text{Drill dia.'}}$ Feed Rate (in/min)= RPM x IPR

Standard Drilling Conditions

List No. 6540P, 6541P

Workpiece Material / Speed (SFM) / Drill Diameter			Structural Steels, Carbon Steels		Alloy Steels		Hardened Steels, (-40 HRc), Tool Steels		Stainless Steels 300-400 Series		Cast Irons	
			40 - 80 SFM		25 - 50 SFM		16 - 35 SFM		30 - 40 SFM		42 - 82 SFM	
Fractional	Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
—	1	0.0394	5,800	0.0007	3,300	0.0007	2,400	0.0005	2,900	0.0006	6,000	0.0008
—	2	0.0787	2,900	0.002	1,600	0.002	1,200	0.002	1,400	0.0015	3,000	0.002
—	3	0.1181	1,950	0.003	1,100	0.003	800	0.002	950	0.002	2,000	0.003
1/8	3.175	0.1250	1,800	0.003	1,000	0.003	750	0.002	900	0.002	1,800	0.003
3/16	4.763	0.1875	1,200	0.005	700	0.005	500	0.004	600	0.003	1,200	0.005
—	5	0.1969	1,100	0.005	650	0.005	480	0.004	550	0.004	1,200	0.006
—	6	0.2362	970	0.006	550	0.006	400	0.005	450	0.004	1,000	0.007
1/4	6.350	0.2500	900	0.006	500	0.006	350	0.005	450	0.004	950	0.008
9/32	7.144	0.2813	800	0.007	450	0.007	350	0.005	400	0.005	850	0.009
5/16	7.938	0.3125	700	0.008	400	0.008	300	0.006	350	0.006	800	0.010
—	8	0.3150	700	0.008	400	0.008	300	0.006	350	0.006	750	0.009
23/64	9	0.3594	650	0.009	350	0.009	250	0.007	300	0.007	700	0.010
—	10	0.3937	600	0.010	350	0.009	250	0.008	300	0.007	650	0.013
—	13	0.5118	550	0.009	300	0.009	200	0.008	250	0.008	600	0.011

1) Pilot Hole is required. It is recommended to use same diameter or up to 0.1mm larger than diamter of the long drill. The depth of cut of the pilot hole is 1 to 2 times diameter of the drill diameter.
2) Above drilling table is applied to Series 1 & 2. In case of series 3 & 4, reduce the RPM and feed to 80% of table values.
3) Use pecking when drilling in Stainless Steel & Hardened Steels.
4) Recommended feeds and speeds are starting points only. Actual performance will be determined by specific material, the condition of equipment being used and coolant.

Formulas: RPM = $\frac{\text{SFM x 3.82}}{\text{Drill dia.'}}$ Feed Rate (in/min)= RPM x IPR

DLC Drill

L544 High Performance - DLC Coated

Range 1.0 to 13.0

(Unit) : mm

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia
0642426	1.0000	0.0394	12	50	3
0642432	1.1000	0.0433	14		
0642449	1.2000	0.0472	16		
0642455	1.3000	0.0512			
0642461	1.4000	0.0551	18		
0642478	1.5000	0.0591			
0642484	1.6000	0.0630	20	56	
0642490	1.7000	0.0669			
0642506	1.8000	0.0709	22		
0642512	1.9000	0.0748			
0642529	2.0000	0.0787	24		
0642535	2.1000	0.0827			
0642541	2.2000	0.0866	25		
0642558	2.3000	0.0906			
0642564	2.4000	0.0945	30	64	
0642570	2.5000	0.0984			
0642587	2.6000	0.1024			
0642593	2.7000	0.1063	33		
0642609	2.8000	0.1102			
0642615	2.9000	0.1142			
0642621	3.0000	0.1181			
0642638	3.1000	0.1220	36	71	4
0642644	3.2000	0.1260			
0642650	3.3000	0.1299			
0642667	3.4000	0.1339	39		
0642673	3.5000	0.1378			
0642680	3.6000	0.1417			
0642696	3.7000	0.1457			
0642701	3.8000	0.1496	43	75	
0642718	3.9000	0.1535			
0642724	4.0000	0.1575			
0642730	4.1000	0.1614		89	6
0642747	4.2000	0.1654			
0642753	4.3000	0.1693	47		
0642760	4.4000	0.1732			
0642776	4.5000	0.1772			
0642782	4.6000	0.1811			
0642799	4.7000	0.1850			
0642804	4.8000	0.1890	52	94	
0642810	4.9000	0.1929			
0642827	5.0000	0.1969			
0642833	5.1000	0.2008			
0642840	5.2000	0.2047			
0642856	5.3000	0.2087			
0642862	5.4000	0.2126	57	99	
0642879	5.5000	0.2165			
0642885	5.6000	0.2205			
0642891	5.7000	0.2244			
0642907	5.8000	0.2283			
0642913	5.9000	0.2323			
0642920	6.0000	0.2362			
0642936	6.1000	0.2402	63	107	8
0642942	6.2000	0.2441			
0642959	6.3000	0.2480			
0642965	6.4000	0.2520			
0642971	6.5000	0.2559			
0642988	6.6000	0.2598			
0642994	6.7000	0.2638			
0643009	6.8000	0.2677	69	113	
0643015	6.9000	0.2717			
0643021	7.0000	0.2756			

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia
0643038	7.1000	0.2795	69	113	8
0643044	7.2000	0.2835			
0643050	7.3000	0.2874			
0643067	7.4000	0.2913			
0643073	7.5000	0.2953			
0643080	7.6000	0.2992	75	119	
0643096	7.7000	0.3031			
0643101	7.8000	0.3071			
0643118	7.9000	0.3110			
0643124	8.0000	0.3150			
0643130	8.1000	0.3189		125	10
0643147	8.2000	0.3228			
0643153	8.3000	0.3268			
0643160	8.4000	0.3307			
0643176	8.5000	0.3346			
0643182	8.6000	0.3386	81	131	
0643199	8.7000	0.3425			
0643204	8.8000	0.3465			
0643210	8.9000	0.3504			
0643227	9.0000	0.3543			
0643233	9.1000	0.3583			
0643240	9.2000	0.3622			
0643256	9.3000	0.3661			
0643262	9.4000	0.3701			
0643279	9.5000	0.3740			
0643285	9.6000	0.3780	87	137	
0643291	9.7000	0.3819			
0643307	9.8000	0.3858			
0643313	9.9000	0.3898			
0643320	10.0000	0.3937			
0643336	10.1000	0.3976		144	12
0643342	10.2000	0.4016			
0643359	10.3000	0.4055			
0643365	10.4000	0.4094			
0643371	10.5000	0.4134			
0643388	10.6000	0.4173			
0643394	10.7000	0.4213	94	151	
0643400	10.8000	0.4252			
0643416	10.9000	0.4291			
0643422	11.0000	0.4331			
0643439	11.1000	0.4370			
0643445	11.2000	0.4409			
0643451	11.3000	0.4449			
0643468	11.4000	0.4488			
0643474	11.5000	0.4528			
0643480	11.6000	0.4567			
0643497	11.7000	0.4606			
0643502	11.8000	0.4646			
0643519	11.9000	0.4685	101	158	
0643525	12.0000	0.4724			
0643531	12.1000	0.4764			
0643548	12.2000	0.4803			
0643554	12.3000	0.4843			
0643560	12.4000	0.4882			
0643577	12.5000	0.4921			
0643583	12.6000	0.4961			
0643590	12.7000	0.5000			
0643605	12.8000	0.5039			
0643611	12.9000	0.5079			
0643628	13.0000	0.5118			

1 per tube

*JAPAN STOCK ITEM : Please allow 2-3 weeks delivery

DLC Drill Micro

L9524 High Performance - DLC Coated

Range 0.5 to 1.9 (Unit) : mm

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia
0626747	0.5000	0.0197	6	44	3
0626753	0.6000	0.0236	7		
0626760	0.7000	0.0276	9		
0626776	0.8000	0.0315	10		
0626782	0.9000	0.0354	11		
0626799	1.0000	0.0394	12	47	
0626804	1.1000	0.0433	14		
0626810	1.2000	0.0472	15		
0626827	1.3000	0.0512			
0626833	1.4000	0.0551			
0626840	1.5000	0.0591			
0626856	1.6000	0.0630			
0626862	1.7000	0.0669			
0626879	1.8000	0.0709			
0626885	1.9000	0.0748			

1 per tube

*JAPAN STOCK ITEM : Please allow 2-3 weeks delivery

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

DLC Drill Regular

L9520 High Performance - DLC Coated

Range 2.0 to 12.0

(Unit) : mm

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia
0626346	2.0000	0.0787	15	47	3
0626352	2.1000	0.0827			
0626369	2.2000	0.0866	16	48	
0626375	2.3000	0.0906			
0626381	2.4000	0.0945	17	49	
0626398	2.5000	0.0984			
0626403	2.6000	0.1024			
0626410	2.7000	0.1063	19	51	
0626426	2.8000	0.1102			
0626432	2.9000	0.1142			
0626449	3.0000	0.1181			
0626455	3.1000	0.1220	21	53	4
0626461	3.2000	0.1260			
0626478	3.3000	0.1299			
0626484	3.4000	0.1339	24	56	
0626490	3.5000	0.1378			
0626506	3.6000	0.1417			
0626512	3.7000	0.1457			
0626529	3.8000	0.1496	27	59	
0626535	3.9000	0.1535			
0626541	4.0000	0.1575			
0626558	4.1000	0.1614		71	6
0626564	4.2000	0.1654			
0626570	4.3000	0.1693	31	75	
0626587	4.4000	0.1732			
0626593	4.5000	0.1772			
0626609	4.6000	0.1811			
0626615	4.7000	0.1850			
0626621	4.8000	0.1890	33	77	
0626638	4.9000	0.1929			
0626644	5.0000	0.1969	38	82	
0626650	5.1000	0.2008			
0626667	5.2000	0.2047			
0626673	5.3000	0.2087			

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia
0626680	5.4000	0.2126	38	82	6
0626696	5.5000	0.2165			
0626701	5.6000	0.2205	41	85	
0626718	5.7000	0.2244			
0626724	5.8000	0.2283			
0626730	5.9000	0.2323			
0625734	6.0000	0.2362			
0625740	6.1000	0.2402			8
0625757	6.2000	0.2441			
0625763	6.3000	0.2480			
0625770	6.4000	0.2520			
0625786	6.5000	0.2559			
0625792	6.6000	0.2598	43	87	
0625808	6.7000	0.2638			
0625814	6.8000	0.2677			
0625820	6.9000	0.2717			
0625837	7.0000	0.2756			
0625843	7.1000	0.2795	45	89	
0625850	7.2000	0.2835			
0625866	7.3000	0.2874			
0625872	7.4000	0.2913			
0625889	7.5000	0.2953			
0625895	7.6000	0.2992	48	92	
0625900	7.7000	0.3031			
0625917	7.8000	0.3071			
0625923	7.9000	0.3110			
0625930	8.0000	0.3150			
0625946	8.1000	0.3189	53	103	10
0625952	8.2000	0.3228			
0625969	8.3000	0.3268			
0625975	8.4000	0.3307			
0625981	8.5000	0.3346			
0625998	8.6000	0.3386	55	105	
0626002	8.7000	0.3425			

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Shank Dia
0626019	8.8000	0.3465	55	105	10
0626025	8.9000	0.3504			
0626031	9.0000	0.3543	58	108	
0626048	9.1000	0.3583			
0626054	9.2000	0.3622			
0626060	9.3000	0.3661			
0626077	9.4000	0.3701			
0626083	9.5000	0.3740			
0626090	9.6000	0.3780	60	110	
0626105	9.7000	0.3819			
0626111	9.8000	0.3858			
0626128	9.9000	0.3898			
0626134	10.0000	0.3937			
0626140	10.1000	0.3976	66	123	12
0626157	10.2000	0.4016			
0626163	10.3000	0.4055			
0626170	10.4000	0.4094			
0626186	10.5000	0.4134			
0626192	10.6000	0.4173	68	125	
0626208	10.7000	0.4213			
0626214	10.8000	0.4252			
0626220	10.9000	0.4291			
0626237	11.0000	0.4331			
0626243	11.1000	0.4370	71	128	
0626250	11.2000	0.4409			
0626266	11.3000	0.4449			
0626272	11.4000	0.4488			
0626289	11.5000	0.4528			
0626295	11.6000	0.4567	73	130	
0626300	11.7000	0.4606			
0626317	11.8000	0.4646			
0626323	11.9000	0.4685			
0626330	12.0000	0.4724			

1 per tube

*JAPAN STOCK ITEM : Please allow 2-3 weeks delivery

Standard Drilling Condition

L544

Drilling in Wet Condition

Workpiece Material / Speed (SFM) / Drill Diameter		Aluminum 1017		Aluminum Alloys						Aluminum Alloy Casting		Copper Alloys	
				4032, 6061		5052		7075					
		330 - 390 SFM		210 - 260 SFM		280 - 330 SFM		210 - 260 SFM		210 - 260 SFM		150 - 200 SFM	
Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
1	0.0394	30,600	0.001	20,400	0.001	25,500	0.001	20,400	0.001	20,400	0.001	15,300	0.001
2	0.0787	19,100	0.002	12,700	0.002	15,900	0.002	12,700	0.002	12,700	0.002	9,600	0.002
3	0.1181	12,700	0.003	8,500	0.003	10,600	0.003	8,500	0.002	8,500	0.002	6,400	0.002
5	0.1969	7,600	0.005	5,100	0.005	6,400	0.005	5,100	0.004	5,100	0.004	3,800	0.004
8	0.3150	4,800	0.008	3,200	0.008	4,000	0.008	3,200	0.006	3,200	0.006	2,400	0.006
10	0.3937	3,800	0.010	2,500	0.010	3,200	0.010	2,500	0.008	2,500	0.008	1,900	0.008
12	0.4724	3,200	0.012	2,100	0.012	2,700	0.012	2,100	0.009	2,100	0.009	1,600	0.009
16	0.6299	2,400	0.013	1,600	0.013	2,000	0.013	1,600	0.010	1,600	0.010	1,200	0.010
20	0.7874	1,900	0.012	1,300	0.012	1,600	0.012	1,300	0.009	1,300	0.009	1,000	0.009

1) The table values are for drilling with water soulble cutting fluid.
2) DLC-HSS Drills are used in Nonferrous Metals such as Aluminum or Copper alloys.
3) Adjust drilling condition when unusual vibration or different sound occurs.
4) If drilling a deep hole over 3 times drill diameter, use pecking.

Standard Drilling Condition

L9524, L9520

Drilling in Wet & Semi Dry (Mist Coolant) Condition

Workpiece Material / Speed (SFM) / Drill Diameter		Aluminum 1017		Aluminum Alloys						Aluminum Alloy Casting		Copper Alloys	
				4032, 6061		5052		7075					
		650 - 820 SFM		330 - 500 SFM		500 - 650 SFM		500 - 650 SFM		430 - 590 SFM		260 - 330 SFM	
Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
0.5	0.0197	60,000	0.0002	58,000	0.0002	60,000	0.0002	60,000	0.0003	60,000	0.0003	38,000	0.0003
1	0.0394	50,000	0.0006	38,000	0.0006	50,000	0.0006	50,000	0.0007	48,000	0.0007	25,000	0.0007
2	0.0787	40,000	0.0014	24,000	0.0014	32,000	0.0015	32,000	0.0016	29,000	0.0016	16,000	0.0016
3	0.1181	26,500	0.0021	16,000	0.0021	21,000	0.0022	21,000	0.0024	19,000	0.0025	10,500	0.0024
5	0.1969	16,000	0.003	9,600	0.004	12,700	0.004	12,700	0.004	11,500	0.004	6,400	0.004
8	0.3150	10,000	0.006	6,000	0.006	8,000	0.006	8,000	0.006	7,200	0.007	4,000	0.006
10	0.3937	8,000	0.007	4,800	0.007	6,400	0.007	6,400	0.008	5,700	0.008	3,200	0.008
12	0.4724	6,600	0.008	4,000	0.008	5,300	0.009	5,300	0.010	4,800	0.010	2,650	0.010

Drilling in Dry Condition

Workpiece Material / Speed (SFM) / Drill Diameter		Aluminum 1017		Aluminum Alloys						Aluminum Alloy Casting		Copper Alloys	
				4032, 6061		5052		7075					
		--		210 - 260 SFM		280 - 330 SFM		330 - 390 SFM		280 - 330 SFM		164 - 196 SFM	
Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
0.5	0.0197	Not Used		30,000	0.0002	38,000	0.0002	45,000	0.0002	38,000	0.0002	22,000	0.0002
1	0.0394			20,000	0.0004	25,000	0.0004	30,000	0.0005	25,000	0.0005	15,000	0.0005
2	0.0787			12,500	0.0010	16,000	0.0010	19,000	0.0012	16,000	0.0012	9,500	0.0012
3	0.1181			8,500	0.0015	10,600	0.0016	12,700	0.0018	10,600	0.0018	6,400	0.0017
5	0.1969			5,100	0.0025	6,400	0.0026	7,600	0.003	6,400	0.003	3,800	0.003
8	0.3150			3,200	0.004	4,000	0.004	4,800	0.005	4,000	0.005	2,400	0.005
10	0.3937			2,550	0.005	3,200	0.005	3,800	0.006	3,200	0.006	1,900	0.006
12	0.4724			2,100	0.006	2,650	0.006	3,200	0.007	2,650	0.007	1,600	0.007

1) DLC Drills are used in Nonferrous Metals such as Aluminum or Copper Alloys.
2) Adjust drilling condition when unusual vibration or different sound occurs.
3) When using low speed machines, use the maximum speed and adjust the feed rate.

Screw Machine Length Bright

HSS h8 HELIX N 118° S-type >1/2 Conical

L561 General Purpose

Fractional: Range 3/64" to 2"
Wire: Range #1 to #60
Letter Range: A to Z

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1061218		#60		0.0400	1/2	1 3/8
1061224		#59		0.0410		
1061230		#58		0.0420		
1061247		#57		0.0430		
1061253		#56		0.0465		
1265486	3/64			0.0469		
1061276		#55		0.0520	5/8	1 5/8
1061282		#54		0.0550		
1061299		#53		0.0595		
1265492	1/16			0.0625		
1061310		#52		0.0635	11/16	1 11/16
1061327		#51		0.0670		
1061333		#50		0.0700		
1061340		#49		0.0730		
1061356		#48		0.0760		
1265508	5/64			0.0781		
1061379		#47		0.0785	3/4	1 3/4
1061385		#46		0.0810		
1061391		#45		0.0820		
1061407		#44		0.0860		
1061413		#43		0.0890		
1061420		#42		0.0935		
1265514	3/32			0.0938		
1061442		#41		0.0960	13/16	1 13/16
1061459		#40		0.0980		
1061465		#39		0.0995		
1061471		#38		0.1015		
1061488		#37		0.1040		
1061494		#36		0.1065		
1265520	7/64			0.1094		
1061516		#35		0.1100	7/8	1 7/8
1061522		#34		0.1110		
1061539		#33		0.1130		
1061545		#32		0.1160		
1061551		#31		0.1200		
1265537	1/8			0.1250		
1061568		#30		0.1285	15/16	1 15/16
1061574		#29		0.1360		
1061580		#28		0.1405		
1265543	9/64			0.1406		
1061602		#27		0.1440	1	2 1/16
1061619		#26		0.1470		
1061625		#25		0.1495		
1061631		#24		0.1520		
1061648		#23		0.1540		
1265550	5/32			0.1563		
1061660		#22		0.1570	1 1/16	2 1/8
1061677		#21		0.1590		
1061683		#20		0.1610		
1061690		#19		0.1660		
1061705		#18		0.1695		
1265566	11/64			0.1719		
1061728		#17		0.1730	1 1/8	2 3/16
1061734		#16		0.1770		
1061740		#15		0.1800		
1061757		#14		0.1820		
1061763		#13		0.1850		
1265572	3/16			0.1875		
1061786		#12		0.1890	1 3/16	2 1/4

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1004080		#11		0.1910	1 3/16	2 1/4
1061792		#10		0.1935		
1061808		#9		0.1960		
1061814		#8		0.1990		
1061820		#7		0.2010		
1265589	13/64			0.2031		
1061843		#6		0.2040	1 1/4	2 3/8
1061850		#5		0.2055		
1061866		#4		0.2090		
1061872		#3		0.2130		
1265595	7/32			0.2188		
1061895		#2		0.2210	1 5/16	2 7/16
1061900		#1		0.2285		
1061917			A	0.2340		
1265600	15/64			0.2344		
1061930			B	0.2380	1 3/8	2 1/2
1061946			C	0.2420		
1061952			D	0.2460		
1265617	1/4			0.2500		
1061975			E	0.2500		
1061981			F	0.2570	1 7/16	2 5/8
1061998			G	0.2610		
1265623	17/64			0.2656		
1062019			H	0.2660	1 1/2	2 11/16
1062025			I	0.2720		
1062031			J	0.2770		
1062048			K	0.2810		
1265630	9/32			0.2813		
1062060			L	0.2900	1 9/16	2 3/4
1062077			M	0.2950		
1265646	19/64			0.2969		
1062090			N	0.3020	1 5/8	2 13/16
1265652	5/16			0.3125		
1062111			O	0.3160	1 11/16	2 15/16
1062128			P	0.3230		
1265669	21/64			0.3281		
1062140			Q	0.3320		3
1062157			R	0.3390		
1265675	11/32			0.3438		
1062170			S	0.3480	1 3/4	3 1/16
1062186			T	0.3580		
1265681	23/64			0.3594		
1062208			U	0.3680	1 13/16	3 1/8
1265698	3/8			0.3750		
1062220			V	0.3770	1 7/8	3 1/4
1062237			W	0.3860		
1265703	25/64			0.3906		
1062250			X	0.3970	1 15/16	3 5/16
1062266			Y	0.4040		
1265710	13/32			0.4063		
1062289			Z	0.4130	2	3 3/8
1265726	27/64			0.4219		
1265732	7/16			0.4375	2 1/16	3 7/16

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1265749	29/64			0.4531	2 1/8	3 9/16
1265755	15/32			0.4688		3 5/8
1265761	31/64			0.4844	2 3/16	3 11/16
1265778	1/2			0.5000	2 1/4	3 3/4
1265784	33/64			0.5156	2 3/8	3 7/8
1265790	17/32			0.5313		
1265806	35/64			0.5469	2 1/2	4
1265812	9/16			0.5625		
1265829	37/64			0.5781	2 5/8	4 1/8
1265835	19/32			0.5938		
1265841	39/64			0.6094	2 3/4	4 1/4
1265858	5/8			0.6250		
1265864	41/64			0.6406	2 7/8	4 1/2
1265870	21/32			0.6563		
1265887	43/64			0.6719		4 5/8
1265893	11/16			0.6875		
1265909	45/64			0.7031	3	4 3/4
1265915	23/32			0.7188		
1265921	47/64			0.7344	3 1/8	5
1265938	3/4			0.7500		
1265944	49/64			0.7656	3 1/4	5 1/8
1265950	25/32			0.7813		
1265967	51/64			0.7969	3 3/8	5 1/4
1265973	13/16			0.8125		
1265980	53/64			0.8281	3 1/2	5 3/8
1265996	27/32			0.8438		
1266000	55/64			0.8594		5 1/2
1266017	7/8			0.8750		
1266023	57/64			0.8906	3 5/8	5 5/8
1266030	29/32			0.9063		
1266046	59/64			0.9219	3 3/4	5 3/4
1266052	15/16			0.9375		
1266069	61/64			0.9531	3 7/8	5 7/8
1266075	31/32			0.9688		
1266081	63/64			0.9844	4	6
1266098	1			1.0000		
1266103	1 1/16			1.0625		6 1/4
1266110	1 1/8			1.1250		6 3/8
1266126	1 3/16			1.1875	4 1/4	6 5/8
1266132	1 1/4			1.2500	4 3/8	6 3/4
1266149	1 5/16			1.3125		7
1266155	1 3/8			1.3750	4 1/2	7 1/8
1266161	1 7/16			1.4375	4 3/4	7 3/8
1266178	1 1/2			1.5000	4 7/8	7 1/2
1266184	1 9/16			1.5625		7 3/4
1266190	1 5/8			1.6250		
1266206	1 11/16			1.6875	5 1/8	8
1266212	1 3/4			1.7500		
1266229	1 13/16			1.8125	5 3/8	8 1/4
1266235	1 7/8			1.8750	5 5/8	
1266241	1 15/16			1.9375		8 1/2
1266258	2			2.0000		

Fractional sizes: Sizes 3/64 to 5/16 in package of 10; 21/64 to 1/2 in package of 5
Wire gauge sizes: All sizes in package of 10
Letter sizes: A to N in package of 10; O to Z in package of 5

Screw Machine Length Tin Coated

HSS G h8 HELIX N 118° X-type Conical >5/64

L561P General Purpose

Fractional: Range 1/16" to 1/2"
Wire: Range #1 to #52

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1087629	1/16			0.0625	5/8	1 5/8
1019049		#52		0.0635	11/16	1 11/16
1019112		#51		0.0670		
1019215		#50		0.0700		
1019324		#49		0.0730		
1019347		#48		0.0760		
1087635	5/64			0.0781		
1019410		#47		0.0785	3/4	1 3/4
1019433		#46		0.0810		
1019456		#45		0.0820		
1019520		#44		0.0860		
1019594		#43		0.0890		
1019651		#42		0.0935		
1087641	3/32			0.0938		
1019805		#41		0.0960	13/16	1 13/16
1019863		#40		0.0980		
1019892		#39		0.0995		
1020096		#38		0.1015		
1020124		#37		0.1040		
1020199		#36		0.1065		
1087658	7/64			0.1094		
1020371		#35		0.1100	7/8	1 7/8
1020416		#34		0.1110		
1020468		#33		0.1130		
1020480		#32		0.1160		
1020502		#31		0.1200		
1087664	1/8			0.1250		
1020548		#30		0.1285	15/16	1 15/16
1020560		#29		0.1360		
1020583		#28		0.1405		
1087670	9/64			0.1406		
1020611		#27		0.1440	1	2 1/16
1020634		#26		0.1470		
1020663		#25		0.1495		
1020708		#24		0.1520		
1020720		#23		0.1540		
1087687	5/32			0.1563		2 1/8
1020795		#22		0.1570	1 1/16	
1020846		#21		0.1590		
1020869		#20		0.1610		
1020898		#19		0.1660		

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1020961		#18		0.1695	1 1/16	2 1/8
1087693	11/64			0.1719		
1021034		#17		0.1730	1 1/8	2 3/16
1021092		#16		0.1770		
1021200		#15		0.1800		
1021230		#14		0.1820		
1021252		#13		0.1850		
1087709	3/16			0.1875		
1021303		#12		0.1890	1 3/16	2 1/4
1021355		#11		0.1910		
1021493		#10		0.1935		
1021521		#9		0.1960		
1021567		#8		0.1990		
1021601		#7		0.2010		
1087715	13/64			0.2031		
1021653		#6		0.2040	1 1/4	2 3/8
1021676		#5		0.2055		
1021699		#4		0.2090		
1021710		#3		0.2130		
1087721	7/32			0.2188		
1021762		#2		0.2210	1 5/16	2 7/16
1021791		#1		0.2285		
1087738	15/64			0.2344		
1087744	1/4			0.2500	1 3/8	2 1/2
1087750	17/64			0.2656	1 7/16	2 5/8
1087767	9/32			0.2813	1 1/2	2 11/16
1087773	19/64			0.2969	1 9/16	2 3/4
1087780	5/16			0.3125	1 5/8	2 13/16
1087796	21/64			0.3281	1 11/16	2 15/16
1087801	11/32			0.3438		3
1087818	23/64			0.3594	1 3/4	3 1/16
1087824	3/8			0.3750	1 13/16	3 1/8
1087830	25/64			0.3906	1 7/8	3 1/4
1087847	13/32			0.4063	1 5/16	3 5/16
1087853	27/64			0.4219	2	3 3/8
1087860	7/16			0.4375	2 1/16	3 7/16
1087876	29/64			0.4531	2 1/8	3 9/16
1087882	15/32			0.4688		3 5/8
1087899	31/64			0.4844	2 3/16	3 11/16
1087904	1/2			0.5000	2 1/4	3 3/4

Fractional sizes: Sizes 3/64 to 5/16 in package of 10; 21/64 to 1/2 in package of 5
Wire gauge sizes: All sizes in package of 10

Screw Machine Length Aircraft

HSS h8 HELIX N 135° S-type Conical
>5/64

L563 Aircraft NAS907-C - Black Oxide

Fractional Range: 3/64" to 1/2"
Range: #1 to #52
Letter: Range A to Z

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1050626	3/64			0.0469	1/2	1 3/8
1050632	1/16			0.0625	5/8	1 5/8
1050649		#52		0.0635	11/16	1 11/16
1050655		#51		0.0670		
1050661		#50		0.0700		
1050678		#49		0.0730		
1050684		#48		0.0760		
1050690	5/64			0.0781		
1050706		#47		0.0785	3/4	1 3/4
1050712		#46		0.0810		
1050729		#45		0.0820		
1050735		#44		0.0860		
1050741		#43		0.0890		
1050758		#42		0.0935		
1050764	3/32			0.0938		
1050770		#41		0.0960	13/16	1 13/16
1050787		#40		0.0980		
1050793		#39		0.0995		
1050809		#38		0.1015		
1050815		#37		0.1040		
1050821		#36		0.1065		
1050838	7/64			0.1094		
1050844		#35		0.1100	7/8	1 7/8
1050850		#34		0.1110		
1050867		#33		0.1130		
1050873		#32		0.1160		
1050880		#31		0.1200		
1050896	1/8			0.1250		
1050901		#30		0.1285	15/16	1 15/16
1059812		#29		0.1360		
1050918		#28		0.1405		
1050924	9/64			0.1406		
1050930		#27		0.1440	1	2 1/16
1050947		#26		0.1470		
1050953		#25		0.1495		
1050960		#24		0.1520		
1050976		#23		0.1540		
1059829	5/32			0.1563		2 1/8
1050982		#22		0.1570	1 1/16	
1050999		#21		0.1590		
1059835		#20		0.1610		
1051003		#19		0.1660		
1051010		#18		0.1695		
1059841	11/64			0.1719		
1051026		#17		0.1730	1 1/8	2 3/16
1051032		#16		0.1770		
1051049		#15		0.1800		
1051055		#14		0.1820		
1051061		#13		0.1850		
1051078	3/16			0.1875		
1051084		#12		0.1890	1 3/16	2 1/4
1051090		#11		0.1910		
1051106		#10		0.1935		
1051112		#9		0.1960		

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1051129		#8		0.1990	1 3/16	2 1/4
1051135		#7		0.2010		
1059858	13/64			0.2031		
1051141		#6		0.2040	1 1/4	2 3/8
1051158		#5		0.2055		
1051164		#4		0.2090		
1051170		#3		0.2130		
1051187	7/32			0.2188		
1051193		#2		0.2210	1 5/16	2 7/16
1051209		#1		0.2285		
1051215			A	0.2340		
1051221	15/64			0.2344		
1051238			B	0.2380	1 3/8	2 1/2
1051244			C	0.2420		
1051250			D	0.2460		
1051267	1/4			0.2500		
1051273			E	0.2500		
1051280			F	0.2570	1 7/16	2 5/8
1051296			G	0.2610		
1051301	17/64			0.2656		
1059864			H	0.2660	1 1/2	2 11/16
1051318			I	0.2720		
1051324			J	0.2770		
1051330			K	0.2810		
1051347	9/32			0.2813		
1051353			L	0.2900	1 9/16	2 3/4
1051360			M	0.2950		
1051376	19/64			0.2969		
1051382			N	0.3020	1 5/8	2 13/16
1051399	5/16			0.3125		
1051404			O	0.3160	1 11/16	2 15/16
1051410			P	0.3230		
1051427	21/64			0.3281		
1051433			Q	0.3320	1 11/16	3
1051440			R	0.3390		
1051456	11/32			0.3438		
1051462			S	0.3480	1 3/4	3 1/16
1051479			T	0.3580		
1051485	23/64			0.3594		
1051491			U	0.3680	1 13/16	3 1/8
1059870	3/8			0.3750		
1051507			V	0.3770	1 7/8	3 1/4
1051513			W	0.3860		
1051520	25/64			0.3906		
1051536			X	0.3970	1 15/16	3 5/16
1051542			Y	0.4040		
1051559	13/32			0.4063		
1051565			Z	0.4130	2	3 3/8
1051571	27/64			0.4219		
1051588	7/16			0.4375	2 1/16	3 7/16
1051594	29/64			0.4531	2 1/8	3 9/16
1051600	15/32			0.4688		3 5/8
1051616	31/64			0.4844	2 3/16	3 11/16
1051622	1/2			0.5000	2 1/4	3 3/4

Fractional sizes: Sizes 3/64 to 5/16 in package of 10; 21/64 to 1/2 in package of 5
Wire gauge sizes: All sizes in package of 10
Letter sizes: A to N in package of 10; O to Z in package of 5

Screw Machine Length Cobalt

HSS Co | h8 | HELIX N | 135° | X-type >5/64 >#53 | Conical

L6563 Aircraft NAS907-C - Cobalt

Fractional: Bright Finish 3/64 to 7/64 Black Oxide 1/8 to 1/2
Wire: Bright Finish #32 to #52 Black Oxide #1 to #31
Letter: Range A to Z

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1080704	3/64			0.0469	1/2	1 3/8
1080710	1/16			0.0625	5/8	1 5/8
1081259		#52		0.0635	11/16	1 11/16
1081265		#51		0.0670		
1081271		#50		0.0700		
1081288		#49		0.0730		
1081294		#48		0.0760		
1080727	5/64			0.0781		
1081300		#47		0.0785	3/4	1 3/4
1081316		#46		0.0810		
1081322		#45		0.0820		
1081339		#44		0.0860		
1081345		#43		0.0890		
1081351		#42		0.0935		
1080733	3/32			0.0938		
1081368		#41		0.0960	13/16	1 13/16
1081374		#40		0.0980		
1081380		#39		0.0995		
1081397		#38		0.1015		
1081402		#37		0.1040		
1081419		#36		0.1065		
1080740	7/64			0.1094		
1081425		#35		0.1100	7/8	1 7/8
1081431		#34		0.1110		
1081448		#33		0.1130		
1081454		#32		0.1160		
1081460		#31		0.1200		
1080756	1/8			0.1250		
1081477		#30		0.1285	15/16	1 15/16
1081483		#29		0.1360		
1081490		#28		0.1405		
1080762	9/64			0.1406		
1081505		#27		0.1440	1	2 1/16
1081511		#26		0.1470		
1081528		#25		0.1495		
1081534		#24		0.1520		
1081540		#23		0.1540		

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1080779	5/32			0.1563	1	2 1/8
1081557		#22		0.1570	1 1/16	2 1/8
1081563		#21		0.1590		
1081570		#20		0.1610		
1081586		#19		0.1660		
1081592		#18		0.1695		
1080785	11/64			0.1719		
1081608		#17		0.1730	1 1/8	2 3/16
1081614		#16		0.1770		
1081620		#15		0.1800		
1081637		#14		0.1820		
1081643		#13		0.1850		
1080791	3/16			0.1875		
1081650		#12		0.1890	1 3/16	2 1/4
1081666		#11		0.1910		
1081672		#10		0.1935		
1081689		#9		0.1960		
1081695		#8		0.1990		
1081700		#7		0.2010		
1080807	13/64			0.2031		
1081717		#6		0.2040	1 1/4	2 3/8
1081723		#5		0.2055		
1081730		#4		0.2090		
1081746		#3		0.2130		
1080813	7/32			0.2188		
1081752		#2		0.2210	1 5/16	2 7/16
1081769		#1		0.2285		
1081001			A	0.2340		
1080820	15/64			0.2344		
1081018			B	0.2380	1 3/8	2 1/2
1081024			C	0.2420		
1146978			D	0.2460		
1080836	1/4			0.2500		
1081030			E	0.2500		
1081047			F	0.2570	1 7/16	2 5/8
1081053			G	0.2610		
1080842	17/64			0.2656		

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1081060			H	0.2660	1 1/2	2 11/16
1081076			I	0.2720		
1081082			J	0.2770		
1081099			K	0.2810		
1080859	9/32			0.2813		
1081104			L	0.2900	1 9/16	2 3/4
1081110			M	0.2950		
1080865	19/64			0.2969		
1081127			N	0.3020	1 5/8	2 13/16
1080871	5/16			0.3125		
1081133			O	0.3160	1 11/16	2 15/16
1081140			P	0.3230		
1080888	21/64			0.3281		
1081156			Q	0.3320		3
1081162			R	0.3390		
1080894	11/32			0.3438		
1081179			S	0.3480	1 3/4	3 1/16
1081185			T	0.3580		
1080900	23/64			0.3594		
1081191			U	0.3680	1 13/16	3 1/8
1080916	3/8			0.3750		
1081207			V	0.3770	1 7/8	3 1/4
1081213			W	0.3860		
1080922	25/64			0.3906		
1081220			X	0.3970	1 15/16	3 5/16
1081236			Y	0.4040		
1080939	13/32			0.4063		
1081242			Z	0.4130	2	3 3/8
1080945	27/64			0.4219		
1080951	7/16			0.4375	2 1/16	3 7/16
1080968	29/64			0.4531	2 1/8	3 9/16
1080974	15/32			0.4688		3 5/8
1080980	31/64			0.4844	2 3/16	3 11/16
1080997	1/2			0.5000	2 1/4	3 3/4

Fractional sizes: Sizes 3/64 to 5/16 in package of 10; 21/64 to 1/2 in package of 5
Wire gauge sizes: All sizes in package of 10
Letter sizes: A to N in package of 10; O to Z in package of 5

Straight Shank Jobber Length Bright

HSS h8 HELIX N 118° S-type >1/2 Conical

L501A General Purpose

Fractional: Range 1/64" to 11/16"
Wire: Range #1 to #80
Letter: Range A to Z

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
0010870		#80		0.0135	1/8	3/4
0010886		#79		0.0145		
0010892	1/64			0.0156	3/16	7/8
0010908		#78		0.0160		
0010914		#77		0.0180		
0010920		#76		0.0200		
0010937		#75		0.0210	1/4	1
0010943		#74		0.0225		
0010950		#73		0.0240	5/16	1 1/8
0010966		#72		0.0250		
0010972		#71		0.0260	3/8	1 1/4
0010989		#70		0.0280		
0010995		#69		0.0292	1/2	1 3/8
0011000		#68		0.0310		
0011016	1/32			0.0313		
0011022		#67		0.0320		
0011039		#66		0.0330		
0011045		#65		0.0350	5/8	1 1/2
0011051		#64		0.0360		
0011068		#63		0.0370		
0011074		#62		0.0380		
0011080		#61		0.0390	11/16	1 5/8
0545092		#60		0.0400		
0545108		#59		0.0410		
0545114		#58		0.0420		
0545120		#57		0.0430	3/4	1 3/4
0545137		#56		0.0465		
0543593	3/64			0.0469		
0545143		#55		0.0520	7/8	1 7/8
0545150		#54		0.0550		
0545166		#53		0.0595		
0543609	1/16			0.0625		
0545172		#52		0.0635	1	2
0545189		#51		0.0670		
0545195		#50		0.0700		
0545200		#49		0.0730		
0545217		#48		0.0760		
0543615	5/64			0.0781		
0545223		#47		0.0785		
0545230		#46		0.0810	1 1/8	2 1/8
0545246		#45		0.0820		
0545252		#44		0.0860		
0545269		#43		0.0890	1 1/4	2 1/4
0545275		#42		0.0935		
0543621	3/32			0.0938		
0545281		#41		0.0960	1 3/8	2 3/8
0545298		#40		0.0980		
0545303		#39		0.0995		
0545310		#38		0.1015	1 7/16	2 1/2
0545326		#37		0.1040		
0545332		#36		0.1065	1 7/16	2 1/2
0543638	7/64			0.1094	1 1/2	2 5/8
0545349		#35		0.1100		
0545355		#34		0.1110		
0545361		#33		0.1130		
0545378		#32		0.1160	1 5/8	2 3/4
0545384		#31		0.1200		
0543644	1/8			0.1250		
0545390		#30		0.1285		
0545406		#29		0.1360	1 3/4	2 7/8
0545412		#28		0.1405		
0543650	9/64			0.1406		
0545429		#27		0.1440	1 7/8	3
0545435		#26		0.1470		
0545441		#25		0.1495		
0545458		#24		0.1520	2	3 1/8
0545464		#23		0.1540		
0543667	5/32			0.1563		
0545470		#22		0.1570		
0545487		#21		0.1590	2 1/8	3 1/4
0545493		#20		0.1610		
0545509		#19		0.1660		
0545515		#18		0.1695		
0545521		#17		0.1700	2 3/16	3 3/8
0543673	11/64			0.1719	2 1/8	3 1/4
0545538		#16		0.1730	2 3/16	3 3/8
0545544		#15		0.1800		
0545550		#14		0.1820		
0545567		#13		0.1850	2 5/16	3 1/2
0543680	3/16			0.1875		
0545573		#12		0.1890		
0545580		#11		0.1910		
0545596		#10		0.1935	2 7/16	3 5/8
0545601		#9		0.1960		
0545618		#8		0.1990		
0545624		#7		0.2010		
0543696	13/64			0.2031		
0545630		#6		0.2040	2 1/2	3 3/4
0545647		#5		0.2055		
0545653		#4		0.2090		
0545660		#3		0.2130		
0543701	7/32			0.2188		
0545676		#2		0.2210	2 5/8	3 7/8
0545682		#1		0.2280		
0545699			A	0.2340		
0543718	15/64			0.2344		
0545704			B	0.2380	2 3/4	4
0545710			C	0.2420		
0545727			D	0.2460		
0543724	1/4			0.2500		
0545733			E	0.2500	2 3/4	4
0545740			F	0.2570	2 7/8	4 1/8
0545756			G	0.2610		
0543730	17/64			0.2656		
0545762			H	0.2660		
0545779			I	0.2720		
0545785			J	0.2770		
0545791			K	0.2810	2 15/16	4 1/4
0543747	9/32			0.2813		
0545807			L	0.2900		
0545813			M	0.2950	3 1/16	4 3/8
0543753	19/64			0.2969		
0545820			N	0.3020	3 3/16	4 1/2
0543760	5/16			0.3125		
0545836			O	0.3160		
0545842			P	0.3230	3 5/16	4 5/8
0543776	21/64			0.3281		
0545859			Q	0.3320	3 7/16	4 3/4
0545865			R	0.3390		
0543782	11/32			0.3438		
0545871			S	0.3480	3 1/2	4 7/8
0545888			T	0.3580		
0543799	23/64			0.3594		
0545894			U	0.3680	3 5/8	5
0543804	3/8			0.3750		
0545900			V	0.3770		
0545916			W	0.3860	3 3/4	5 1/8
0543810	25/64			0.3906		
0545922			X	0.3970		
0545939			Y	0.4040	3 7/8	5 1/4
0543827	13/32			0.4063		
0545945			Z	0.4130		
0543833	27/64			0.4219	3 15/16	5 3/8
0543840	7/16			0.4375	4 1/16	5 1/2
0543856	29/64			0.4531	4 3/16	5 5/8
0543862	15/32			0.4688	4 5/16	5 3/4
0543879	31/64			0.4844	4 3/8	5 7/8
0543885	1/2			0.5000	4 1/2	6
1131784	33/64			0.5156	4 13/16	6 5/8
1131790	17/32			0.5313		
1131806	35/64			0.5469		
1131812	9/16			0.5625		
1131829	37/64			0.5781		
1131835	19/32			0.5938	5 3/16	7 1/8
1131841	39/64			0.6094		
1131858	5/8			0.6250		
1131864	41/64			0.6406		
1131870	21/32			0.6563		
1131887	43/64			0.6719	5 5/8	7 5/8
1131893	11/16			0.6875		

Fractional sizes: Sizes 1/64 to 5/16 in package of 10; 21/64 to 1/2 in package of 5; 33/64 to 11/16 in package of 2
Wire gauge sizes: All sizes in package of 10
Letter sizes: A to N in package of 10; O to Z in package of 5

Straight Shank Jobber Length

HSS h8 HELIX N 108° 118° S-type Conical
>0.55 >13.0

L500 General Purpose, Metric

Bright Finish 0.2 to 1.95 mm
Black Oxide 2.0 to 17.5 mm

(Unit) : mm

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	EDP	Size	Decimal Equivalent	Flute Length	Overall Length	EDP	Size	Decimal Equivalent	Flute Length	Overall Length
0121256	0.2000	0.0079	3	19	0004333	2.8000	0.1102	39	67	0004917	7.5000	0.2953	78	111
0345266	0.2200	0.0087	3.5	20	0156256	2.8500	0.1122			0004930	7.6000	0.2992		
0062423	0.2500	0.0098			0004340	2.9000	0.1142	42	71	0004946	7.7000	0.3031	81	114
0345403	0.2800	0.0110			0159123	2.9500	0.1161			0141194	7.7500	0.3051		
0062417	0.3000	0.0118			0004356	3.0000	0.1181			0004952	7.8000	0.3071		
0345478	0.3200	0.0126	5.5	24	0004362	3.1000	0.1220			0004969	7.9000	0.3110		
0062400	0.3500	0.0138			0004385	3.2000	0.1260			0004981	8.0000	0.3150		
0345570	0.3800	0.0150			0159713	3.2500	0.1280			0004998	8.1000	0.3189	84	117
0062395	0.4000	0.0157			0004391	3.3000	0.1299	45	73	0005002	8.2000	0.3228		
0346474	0.4200	0.0165	7.5	27	0004407	3.4000	0.1339			0142957	8.2500	0.3248		
0062389	0.4500	0.0177			0118957	3.5000	0.1378			0005019	8.3000	0.3268		
0346560	0.4800	0.0189			0004436	3.6000	0.1417	48	76	0005031	8.4000	0.3307	87	121
0062372	0.5000	0.0197			0004442	3.7000	0.1457			0005048	8.5000	0.3346		
0062366	0.5500	0.0217	8.5	30	0159880	3.7500	0.1476			0005054	8.6000	0.3386		
0062350	0.6000	0.0236			0004459	3.8000	0.1496			0005060	8.7000	0.3425		
0062343	0.6500	0.0256	10	32	0004465	3.9000	0.1535	51	79	0143151	8.7500	0.3445	89	124
0062337	0.7000	0.0276			0004488	4.0000	0.1575	54	83	0005083	8.8000	0.3465		
0062320	0.7500	0.0295	11	34	0004494	4.1000	0.1614			0005090	8.9000	0.3504		
0062314	0.8000	0.0315			0004500	4.2000	0.1654			0005105	9.0000	0.3543		
0062308	0.8500	0.0335	13	36	0159931	4.2500	0.1673			0005111	9.1000	0.3583		
0062292	0.9000	0.0354			0004516	4.3000	0.1693			0005134	9.2000	0.3622	92	127
0062286	0.9500	0.0374	18	40	0004539	4.4000	0.1732	56	86	0143517	9.2500	0.3642		
0062270	1.0000	0.0394			0004545	4.5000	0.1772			0005140	9.3000	0.3661		
0128870	1.0500	0.0413	20	42	0004551	4.6000	0.1811			0005157	9.4000	0.3701		
0062263	1.1000	0.0433			0004568	4.7000	0.1850	59	89	0005163	9.5000	0.3740		
0129641	1.1500	0.0453			0160090	4.7500	0.1870			0005186	9.6000	0.3780	95	130
0062257	1.2000	0.0472			0004580	4.8000	0.1890			0005192	9.7000	0.3819		
0130298	1.2500	0.0492	22	45	0004597	4.9000	0.1929	62	92	0144244	9.7500	0.3839		
0062240	1.3000	0.0512			0004602	5.0000	0.1969			0005208	9.8000	0.3858		
0131271	1.3500	0.0531	23	48	0004619	5.1000	0.2008			0005214	9.9000	0.3898		
0062234	1.4000	0.0551			0004631	5.2000	0.2047	64	95	0005237	10.0000	0.3937		
0132473	1.4500	0.0571			0160347	5.2500	0.2067			0005250	10.2000	0.4016	98	133
0062228	1.5000	0.0591			0004648	5.3000	0.2087			0144410	10.2500	0.4035		
0133280	1.5500	0.0610	25	50	0004654	5.4000	0.2126			0005295	10.5000	0.4134	100	137
0062211	1.6000	0.0630			0004660	5.5000	0.2165			0144651	10.7500	0.4232		
0134098	1.6500	0.0650			0004683	5.6000	0.2205	67	98	0005330	10.8000	0.4252	103	140
0062205	1.7000	0.0669			0004690	5.7000	0.2244			0005352	11.0000	0.4331		
0135254	1.7500	0.0689	28	52	0160600	5.7500	0.2264			0005381	11.2000	0.4409	106	143
0062190	1.8000	0.0709			0004705	5.8000	0.2283			0145074	11.2500	0.4429		
0136870	1.8500	0.0728			0004711	5.9000	0.2323			0005410	11.5000	0.4528		
0062183	1.9000	0.0748			0004734	6.0000	0.2362	70	102	0145635	11.7500	0.4626	109	146
0138728	1.9500	0.0768	29	55	0004740	6.1000	0.2402			0005455	11.8000	0.4646		
0004230	2.0000	0.0787			0004757	6.2000	0.2441			0005484	12.0000	0.4724	111	149
0139856	2.0500	0.0807			0140640	6.2500	0.2461			0005506	12.2000	0.4803		
0004247	2.1000	0.0827			0004763	6.3000	0.2480			0147317	12.2500	0.4823		
0143632	2.1500	0.0846			0004786	6.4000	0.2520	73	105	0005541	12.5000	0.4921	114	152
0004253	2.2000	0.0866	33	58	0004792	6.5000	0.2559			0147804	12.7500	0.5020		
0144536	2.2500	0.0886			0004808	6.6000	0.2598			0005587	12.8000	0.5039		
0004260	2.3000	0.0906			0004814	6.7000	0.2638			0005609	13.0000	0.5118		
0146385	2.3500	0.0925			0140713	6.7500	0.2657			0005615	13.5000	0.5315	122	168
0004282	2.4000	0.0945	35	61	0004837	6.8000	0.2677			0005638	14.0000	0.5512		
0147810	2.4500	0.0965			0004843	6.9000	0.2717			0005644	14.5000	0.5709		
0004299	2.5000	0.0984			0004850	7.0000	0.2756			0005650	15.0000	0.5906	132	181
0149355	2.5500	0.1004	37	64	0004866	7.1000	0.2795	75	108	0005667	15.5000	0.6102		
0004304	2.6000	0.1024			0004889	7.2000	0.2835			0005673	16.0000	0.6299		
0151450	2.6500	0.1043			0140977	7.2500	0.2854			0005680	16.5000	0.6496		
0004310	2.7000	0.1063			0004895	7.3000	0.2874			0005701	17.0000	0.6693	143	194
0152995	2.7500	0.1083	39	67	0004900	7.4000	0.2913	78	111	0005718	17.5000	0.6890		

0.2 to 8.0 in package of 10; 8.1 to 13.0 in package of 5; 13.5 to 17.50 in package of 2

Straight Shank Jobber Length

HSS h8 HELIX N 118° S-type >1/2 Conical

L501 General Purpose, Fractional, Wire & Letter

Fractional: Range 3/64" to 11/16"
Wire: Range #1 to #60
Letter: Range A to Z

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
0011097		#60		0.0400	11/16	1 5/8
0011102		#59		0.0410		
0011119		#58		0.0420		
0011125		#57		0.0430	3/4	1 3/4
0011131		#56		0.0465		
0011148	3/64			0.0469		
0011154		#55		0.0520	7/8	1 7/8
0011160		#54		0.0550		
0011177		#53		0.0595		
0011183	1/16			0.0625		
0011190		#52		0.0635		
0011205		#51		0.0670	1	2
0011211		#50		0.0700		
0011228		#49		0.0730		
0011234		#48		0.0760		
0011240	5/64			0.0781		
0011257		#47		0.0785		
0011263		#46		0.0810	1 1/8	2 1/8
0011270		#45		0.0820		
0011286		#44		0.0860		
0011292		#43		0.0890	1 1/4	2 1/4
0011308		#42		0.0935		
0011314	3/32			0.0938		
0011320		#41		0.0960	1 3/8	2 3/8
0590530		#40		0.0980		
0011343		#39		0.0995		
0011350		#38		0.1015	1 7/16	2 1/2
0011366		#37		0.1040		
0011372		#36		0.1065		
0011389	7/64			0.1094	1 1/2	2 5/8
0011395		#35		0.1100		
0011400		#34		0.1110		
0011417		#33		0.1130		
0011423		#32		0.1160	1 5/8	2 3/4
0011430		#31		0.1200		
0011446	1/8			0.1250		
0011452		#30		0.1285		
0011469		#29		0.1360	1 3/4	2 7/8
0011475		#28		0.1405		
0011481	9/64			0.1406		
0011498		#27		0.1440	1 7/8	3
0011503		#26		0.1470		
0011510		#25		0.1495		
0011526		#24		0.1520	2	3 1/8
0011532		#23		0.1540		
0011549	5/32			0.1563		
0011555		#22		0.1570		
0011561		#21		0.1590	2 1/8	3 1/4
0011578		#20		0.1610		
0011584		#19		0.1660		
0011590		#18		0.1695		
0011612		#16		0.1700	2 3/16	3 3/8
0011606	11/64			0.1719	2 1/8	3 1/4
0011629		#17		0.1730	2 3/16	3 3/8
0011635		#15		0.1800		
0011641		#14		0.1820		
0011658		#13		0.1850	2 5/16	3 1/2
0011664	3/16			0.1875		
0011670		#12		0.1890		
0011687		#11		0.1910		
0011693		#10		0.1935	2 7/16	3 5/8
0011709		#9		0.1960		
0011715		#8		0.1990		
0011721		#7		0.2010		
0011738	13/64			0.2031		
0011744		#6		0.2040	2 1/2	3 3/4
0011750		#5		0.2055		
0011767		#4		0.2090		
0011773		#3		0.2130		
0011780	7/32			0.2188		
0011796		#2		0.2210	2 5/8	3 7/8
0011801		#1		0.2280		
0553836			A	0.2340		
0011818	15/64			0.2344		
0553842			B	0.2380	2 3/4	4
0553859			C	0.2420		
0553865			D	0.2460		
0553871			E	0.2500		
0011824	1/4			0.2500		
0553888			F	0.2570	2 7/8	4 1/8
0553894			G	0.2610		
0011830	17/64			0.2656		
0553900			H	0.2660		
0553916			I	0.2720		
0553922			J	0.2770		
0553939			K	0.2810	2 15/16	4 1/4
0011847	9/32			0.2813	2 15/16	4 1/4
0553945			L	0.2900		
0553951			M	0.2950	3 1/16	4 3/8
0011853	19/64			0.2969		
0553968			N	0.3020		
0011860	5/16			0.3125	3 3/16	4 1/2
0553974			O	0.3160		
0553980			P	0.3230	3 5/16	4 5/8
0011876	21/64			0.3281		
0553997			Q	0.3320	3 7/16	4 3/4
0554001			R	0.3390		
0011882	11/32			0.3438		
0554018			S	0.3480	3 1/2	4 7/8
0554024			T	0.3580		
0011899	23/64			0.3594		
0554030			U	0.3680	3 5/8	5
0011904	3/8			0.3750		
0554047			V	0.3770		
0554053			W	0.3860	3 3/4	5 1/8
0011910	25/64			0.3906		
0554060			X	0.3970		
0554076			Y	0.4040	3 7/8	5 1/4
0011927	13/32			0.4063		
0554082			Z	0.4130		
0011933	27/64			0.4219	3 15/16	5 3/8
0011940	7/16			0.4375	4 1/16	5 1/2
0011956	29/64			0.4531	4 3/16	5 5/8
0011962	15/32			0.4688	4 5/16	5 3/4
0011979	31/64			0.4844	4 3/8	5 7/8
0011985	1/2			0.5000	4 1/2	6
1131669	33/64			0.5156	4 13/16	6 5/8
1131675	17/32			0.5313		
1131681	35/64			0.5469		
1131698	9/16			0.5625		
1131703	37/64			0.5781		
1131710	19/32			0.5938	5 3/16	7 1/8
1131726	39/64			0.6094		
1131732	5/8			0.6250		
1131749	41/64			0.6406		
1131755	21/32			0.6563		
1131761	43/64			0.6719	5 5/8	7 5/8
1131778	11/16			0.6875		

Fractional sizes: Sizes 1/64 to 5/16 in package of 10; 21/64 to 1/2 in package of 5; 33/64 to 11/16 in package of 2
Wire gauge sizes: All sizes in package of 10
Letter sizes: A to N in package of 10; O to Z in package of 5

Straight Shank Jobber Length Aircraft

HSS Co | h8 | HELIX N | 135° | X-type >5/64 | Conical

L6501 Aircraft NAS907-J, Fractional, Wire & Letter

Fractional: Range 1/64" to 1/2"
Wire: Range #1 to #80
Letter: Range A to Z

EDP	Size			Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire	Letter			
1056762		#80		0.0135	1/8	3/4
1056779		#79		0.0145		
1056785	1/64			0.0156	3/16	7/8
1056791		#78		0.0160		
1056807		#77		0.0180		
1056813		#76		0.0200		
1056820		#75		0.0210	1/4	1
1056836		#74		0.0225		
1056842		#73		0.0240	5/16	1 1/8
1056865		#72		0.0250		
1056859		#71		0.0260	3/8	1 1/4
1056871		#70		0.0280		
1056888		#69		0.0292	1/2	1 3/8
1056894		#68		0.0310		
1056900	1/32			0.0313		
1056916		#67		0.0320		
1056922		#66		0.0330		
1056939		#65		0.0350	5/8	1 1/2
1056945		#64		0.0360		
1056951		#63		0.0370		
1056968		#62		0.0380		
1053889		#61		0.0390	11/16	1 5/8
1059950		#60		0.0400		
1059967		#59		0.0410		
1059973		#58		0.0420		
1059980		#57		0.0430	3/4	1 3/4
1059996		#56		0.0465		
1053895	3/64			0.0469		
1060000		#55		0.0520	7/8	1 7/8
1060016		#54		0.0550		
1060022		#53		0.0595		
1053900	1/16			0.0625		
1060039		#52		0.0635	1	2
1060045		#51		0.0670		
1060051		#50		0.0700		
1060068		#49		0.0730		
1060074		#48		0.0760		
1053923	5/64			0.0781		
1060080		#47		0.0785		
1060097		#46		0.0810	1 1/8	2 1/8
1060102		#45		0.0820		
1060119		#44		0.0860		
1060125		#43		0.0890	1 1/4	2 1/4
1060131		#42		0.0935		
1053946	3/32			0.0938		
1060148		#41		0.0960	1 3/8	2 3/8
1060154		#40		0.0980	1 3/8	2 3/8
1060160		#39		0.0995		
1060177		#38		0.1015	1 7/16	2 1/2
1060183		#37		0.1040		
1060190		#36		0.1065		
1053969	7/64			0.1094	1 1/2	2 5/8
1060205		#35		0.1100		
1060211		#34		0.1110		
1060228		#33		0.1130		
1060234		#32		0.1160	1 5/8	2 3/4
1060240		#31		0.1200		
1060257	1/8			0.1250		
1060263		#30		0.1285		
1060270		#29		0.1360	1 3/4	2 7/8
1060286		#28		0.1405		
1060292	9/64			0.1406		
1060308		#27		0.1440	1 7/8	3
1060314		#26		0.1470		
1060320		#25		0.1495		
1060337		#24		0.1520	2	3 1/8
1060343		#23		0.1540		
1060350	5/32			0.1563		
1060366		#22		0.1570		
1060372		#21		0.1590	2 1/8	3 1/4
1060389		#20		0.1610		
1060395		#19		0.1660		
1060400		#18		0.1695		
1060423		#17		0.1700	2 3/16	3 3/8
1060417	11/64			0.1719	2 1/8	3 1/4
1060430		#16		0.1730	2 3/16	3 3/8
1060446		#15		0.1800		
1060452		#14		0.1820		
1060469		#13		0.1850	2 5/16	3 1/2
1060475	3/16			0.1875		
1060481		#12		0.1890		
1060498		#11		0.1910		
1060503		#10		0.1935	2 7/16	3 5/8
1060510		#9		0.1960		
1060526		#8		0.1990		
1060532		#7		0.2010		
1060549	13/64			0.2031		
1060555		#6		0.2040	2 1/2	3 3/4
1060561		#5		0.2055		
1060578		#4		0.2090		
1060584		#3		0.2130		
1060590	7/32			0.2188		
1060606		#2		0.2210	2 5/8	3 7/8
1060612		#1		0.2280		
1054054			A	0.2340		
1060629	15/64			0.2344		
1054077			B	0.2380	2 3/4	4
1054083			C	0.2420		
1054090			D	0.2460		
1060635	1/4			0.2500		
1054111			E	0.2500		
1054128			F	0.2570	2 7/8	4 1/8
1054134			G	0.2610		
1060641	17/64			0.2656		
1054157			H	0.2660		
1054163			I	0.2720		
1054170			J	0.2770		
1054186			K	0.2810	2 15/16	4 1/4
1060658	9/32			0.2813		
1054208			L	0.2900		
1054214			M	0.2950	3 1/16	4 3/8
1060664	19/64			0.2969		
1054237			N	0.3020		
1060670	5/16			0.3125	3 3/16	4 1/2
1054250			O	0.3160		
1054266			P	0.3230	3 5/16	4 5/8
1060687	21/64			0.3281		
1054289			Q	0.3320	3 7/16	4 3/4
1054295			R	0.3390		
1060693	11/32			0.3438		
1054317			S	0.3480	3 1/2	4 7/8
1054323			T	0.3580		
1060709	23/64			0.3594		
1054346			U	0.3680	3 5/8	5
1060715	3/8			0.3750		
1054369			V	0.3770		
1054375			W	0.3860	3 3/4	5 1/8
1060721	25/64			0.3906		
1054398			X	0.3970		
1054403			Y	0.4040	3 7/8	5 1/4
1060738	13/32			0.4063		
1054426			Z	0.4130		
1060744	27/64			0.4219	3 15/16	5 3/8
1060750	7/16			0.4375	4 1/16	5 1/2
1060767	29/64			0.4531	4 3/16	5 5/8
1060773	15/32			0.4688	4 5/16	5 3/4
1060780	31/64			0.4844	4 3/8	5 7/8
1060796	1/2			0.5000	4 1/2	6

Fractional sizes: Sizes 1/64 to 5/16 in package of 10; 21/64 to 1/2 in package of 5; 33/64 to 11/16 in package of 2
Wire gauge sizes: All sizes in package of 10
Letter sizes: A to N in package of 10; O to Z in package of 5

Straight Shank Jobber Length Cobalt

L6520 General Purpose, Metric

Bright Finish 0.5 to 1.9 mm
Black Oxide 2.0 to 13.0 mm

(Unit) : mm

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
0084008	0.5000	0.0197	5	30
0084037	0.6000	0.0236	5.5	30
0084066	0.7000	0.0276	7.5	32
0084123	0.8000	0.0315	8	34
0084249	0.9000	0.0354	9	36
0046687	1.0000	0.0394	10	40
0046693	1.1000	0.0433	11	42
0046709	1.2000	0.0472	13	
0046715	1.3000	0.0512		45
0046721	1.4000	0.0551	14.5	48
0046738	1.5000	0.0591		
0046744	1.6000	0.0630	16	50
0046750	1.7000	0.0669		
0046767	1.8000	0.0709	17.5	52
0046773	1.9000	0.0748		
0046780	2.0000	0.0787	20	55
0046796	2.1000	0.0827		
0046801	2.2000	0.0866	23	58
0046818	2.3000	0.0906		
0046824	2.4000	0.0945	24.5	61
0046830	2.5000	0.0984		
0046847	2.6000	0.1024	26	64
0046853	2.7000	0.1063		
0046860	2.8000	0.1102	27	67
0046876	2.9000	0.1142	29.5	71
0046882	3.0000	0.1181		
0046899	3.1000	0.1220		
0046904	3.2000	0.1260		
0046910	3.3000	0.1299	31.5	73
0046927	3.4000	0.1339		
0046933	3.5000	0.1378		
0046940	3.6000	0.1417	33.5	76
0046956	3.7000	0.1457		
0046962	3.8000	0.1496		
0046979	3.9000	0.1535	36	79
0046985	4.0000	0.1575	38	83
0046991	4.1000	0.1614		
0047006	4.2000	0.1654		
0047012	4.3000	0.1693		
0047029	4.4000	0.1732	39	86
0047035	4.5000	0.1772		
0047041	4.6000	0.1811		
0047058	4.7000	0.1850	41	89
0047064	4.8000	0.1890		
0047070	4.9000	0.1929	43	92
0047087	5.0000	0.1969		
0047093	5.1000	0.2008		
0047109	5.2000	0.2047	45	95
0047115	5.3000	0.2087		
0047121	5.4000	0.2126		
0047138	5.5000	0.2165		
0047144	5.6000	0.2205	47	98
0047150	5.7000	0.2244		
0047167	5.8000	0.2283		
0047173	5.9000	0.2323		
0047180	6.0000	0.2362	49	102
0047196	6.1000	0.2402		
0047201	6.2000	0.2441		
0047218	6.3000	0.2480		
0047224	6.4000	0.2520	51	105
0047230	6.5000	0.2559		
0047247	6.6000	0.2598		
0047253	6.7000	0.2638		
0047260	6.8000	0.2677		
0047276	6.9000	0.2717		
0047282	7.0000	0.2756		
0047299	7.1000	0.2795	53	108
0047304	7.2000	0.2835		
0047310	7.3000	0.2874		
0047327	7.4000	0.2913	55	111
0047333	7.5000	0.2953		
0047340	7.6000	0.2992		
0047356	7.7000	0.3031		
0047362	7.8000	0.3071	57	114
0047379	7.9000	0.3110		
0047385	8.0000	0.3150		
0047391	8.1000	0.3189	59	117
0047407	8.2000	0.3228		
0047413	8.3000	0.3268		
0047420	8.4000	0.3307	61	121
0047436	8.5000	0.3346		
0047442	8.6000	0.3386		
0047459	8.7000	0.3425		
0047465	8.8000	0.3465	63	124
0047471	8.9000	0.3504	63	124
0047488	9.0000	0.3543		
0047494	9.1000	0.3583		
0047500	9.2000	0.3622	65	127
0047516	9.3000	0.3661		
0047522	9.4000	0.3701		
0047539	9.5000	0.3740		
0047545	9.6000	0.3780	67	130
0047551	9.7000	0.3819		
0047568	9.8000	0.3858		
0047574	9.9000	0.3898		
0047580	10.0000	0.3937		
0047597	10.1000	0.3976	69	133
0047602	10.2000	0.4016		
0047619	10.3000	0.4055		
0047625	10.4000	0.4094		
0047631	10.5000	0.4134	70	137
0047648	10.6000	0.4173		
0047654	10.7000	0.4213		
0047660	10.8000	0.4252	72	140
0047677	10.9000	0.4291		
0047683	11.0000	0.4331		
0047690	11.1000	0.4370		
0047705	11.2000	0.4409	75	143
0047711	11.3000	0.4449		
0047728	11.4000	0.4488		
0047734	11.5000	0.4528		
0047740	11.6000	0.4567	77	146
0047757	11.7000	0.4606		
0047763	11.8000	0.4646		
0047770	11.9000	0.4685		
0047786	12.0000	0.4724	78	149
0047792	12.1000	0.4764		
0047808	12.2000	0.4803		
0047814	12.3000	0.4843		
0047820	12.4000	0.4882	80	152
0047837	12.5000	0.4921		
0047843	12.6000	0.4961		
0047850	12.7000	0.5000		
0047866	12.8000	0.5039		
0047872	12.9000	0.5079		
0047889	13.0000	0.5118		

0.5 to 8.0 in package of 10; 8.1 to 13.0 in package of 5
*JAPAN STOCK ITEM : Please allow 2-3 weeks delivery

Straight Shank G Standard

L520P General Purpose, Tin Coated

Range 0.5 to 13.0 mm

(Unit) : mm

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	EDP	Size	Decimal Equivalent	Flute Length	Overall Length	EDP	Size	Decimal Equivalent	Flute Length	Overall Length
0579926	0.5000	0.0197	6	22	0162260	4.7000	0.1850	47	80	0168010	8.9000	0.3504		
0579932	0.6000	0.0236	7	24	0162304	4.8000	0.1890			0168136	9.0000	0.3543		
0579949	0.7000	0.0276	9	28	0162465	4.9000	0.1929			0168348	9.1000	0.3583		
0579955	0.8000	0.0315	10	30	0162516	5.0000	0.1969	52	86	0168405	9.2000	0.3622	81	125
0579961	0.9000	0.0354	11	32	0162539	5.1000	0.2008			0168537	9.3000	0.3661		
0156560	1.0000	0.0394	12	34	0162786	5.2000	0.2047			0168630	9.4000	0.3701		
0156577	1.1000	0.0433	14	36	0162952	5.3000	0.2087			0168938	9.5000	0.3740		
0156611	1.2000	0.0472	16	38	0163048	5.4000	0.2126			0171140	9.6000	0.3780		
0156932	1.3000	0.0512			0163054	5.5000	0.2165			0172176	9.7000	0.3819		
0157086	1.4000	0.0551	18	40	0163490	5.6000	0.2205			0172307	9.8000	0.3858		
0157269	1.5000	0.0591			0163680	5.7000	0.2244	57	93	0172313	9.9000	0.3898		
0157647	1.6000	0.0630	20	43	0163730	5.8000	0.2283			0172359	10.0000	0.3937		
0157653	1.7000	0.0669			0164124	5.9000	0.2323			0172670	10.1000	0.3976	87	133
0157660	1.8000	0.0709	22	46	0164153	6.0000	0.2362			0172766	10.2000	0.4016		
0157894	1.9000	0.0748			0164359	6.1000	0.2402			0172823	10.3000	0.4055		
0157968	2.0000	0.0787	24	49	0164394	6.2000	0.2441			0172898	10.4000	0.4094		
0158024	2.1000	0.0827			0164480	6.3000	0.2480			0172910	10.5000	0.4134		
0158030	2.2000	0.0866	27	53	0164548	6.4000	0.2520	63	101	0173005	10.6000	0.4173		
0158133	2.3000	0.0906			0164554	6.5000	0.2559			0173040	10.7000	0.4213		
0158140	2.4000	0.0945	30	57	0164852	6.6000	0.2598			0173057	10.8000	0.4252		
0158179	2.5000	0.0984			0165303	6.7000	0.2638			0174592	10.9000	0.4291		
0158419	2.6000	0.1024			0165378	6.8000	0.2677			0176194	11.0000	0.4331		
0158832	2.7000	0.1063	33	61	0165390	6.9000	0.2717			0177607	11.1000	0.4370		
0158970	2.8000	0.1102			0165429	7.0000	0.2756			0178632	11.2000	0.4409	94	142
0158987	2.9000	0.1142			0165441	7.1000	0.2795	69	109	0180009	11.3000	0.4449		
0159181	3.0000	0.1181			0165470	7.2000	0.2835			0180021	11.4000	0.4488		
0159261	3.1000	0.1220	36	65	0165515	7.3000	0.2874			0180160	11.5000	0.4528		
0159312	3.2000	0.1260			0165630	7.4000	0.2913			0180388	11.6000	0.4567		
0159358	3.3000	0.1299			0165865	7.5000	0.2953			0180400	11.7000	0.4606		
0160520	3.4000	0.1339	39	70	0165980	7.6000	0.2992			0181493	11.8000	0.4646		
0161446	3.5000	0.1378			0166047	7.7000	0.3031			0181836	11.9000	0.4685		
0161481	3.6000	0.1417			0166053	7.8000	0.3071			0182300	12.0000	0.4724		
0161503	3.7000	0.1457			0166425	7.9000	0.3110			0182592	12.1000	0.4764		
0161510	3.8000	0.1496	43	75	0166563	8.0000	0.3150	75	117	0183050	12.2000	0.4803		
0161526	3.9000	0.1535			0166700	8.1000	0.3189			0183146	12.3000	0.4843		
0161549	4.0000	0.1575			0166878	8.2000	0.3228			0183249	12.4000	0.4882	101	151
0161561	4.1000	0.1614			0166964	8.3000	0.3268			0184165	12.5000	0.4921		
0161693	4.2000	0.1654			0167089	8.4000	0.3307			0184537	12.6000	0.4961		
0161750	4.3000	0.1693	47	80	0167152	8.5000	0.3346			0184566	12.7000	0.5000		
0161773	4.4000	0.1732			0167226	8.6000	0.3386			0184572	12.8000	0.5039		
0161780	4.5000	0.1772			0167335	8.7000	0.3425	81	125	0184589	12.9000	0.5079		
0161818	4.6000	0.1811			0167341	8.8000	0.3465			0184595	13.0000	0.5118		

0.5 to 1.9 - 10 per package; 2.0 to 13.0 - 1 per package

*JAPAN STOCK ITEM : Please allow 2-3 weeks delivery

Straight Shank Jobber Length Tin Coated

HSS G h8 HELIX N 118° S-type >1/2 Conical

L501P General Purpose

Fractional: Range 1/16" to 1/2"
Wire: Range #1 to #52

EDP	Size		Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire			
1047548	1/16		0.0625	7/8	1 7/8
1001039		#52	0.0635		
1001068		#51	0.0670	1	2
1001102		#50	0.0700		
1001125		#49	0.0730		
1001131		#48	0.0760		
1143985	5/64		0.0781		
1001154		#47	0.0785		
1001160		#46	0.0810	1 1/8	2 1/8
1001177		#45	0.0820		
1001190		#44	0.0860		
1001205		#43	0.0890	1 1/4	2 1/4
1001211		#42	0.0935		
1226503	3/32		0.0938		
1001234		#41	0.0960	1 3/8	2 3/8
1001240		#40	0.0980		
1001270		#39	0.0995		
1001308		#38	0.1015	1 7/16	2 1/2
1001337		#37	0.1040		
1001395		#36	0.1065		
1141626	7/64		0.1094	1 1/2	2 5/8
1001475		#35	0.1100		
1001481		#34	0.1110		
1001498		#33	0.1130		
1001503		#32	0.1160	1 5/8	2 3/4
1001510		#31	0.1200		
1144006	1/8		0.1250		
1001532		#30	0.1285		
1001549		#29	0.1360	1 3/4	2 7/8
1001584		#28	0.1405		
1143991	9/64		0.1406		
1001606		#27	0.1440	1 7/8	3
1001612		#26	0.1470		
1001635		#25	0.1495		
1001693		#24	0.1520	2	3 1/8
1001744		#23	0.1540		
1141598	5/32		0.1563		
1001933		#22	0.1570		
1001956		#21	0.1590	2 1/8	3 1/4
1002012		#20	0.1610		

EDP	Size		Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire			
1002167		#19	0.1660	2 1/8	3 1/4
1002173		#18	0.1695		
1002247		#16	0.1700	2 3/16	3 3/8
1226510	11/64		0.1719	2 1/8	3 1/4
1002260		#17	0.1730	2 3/16	3 3/8
1002310		#15	0.1800		
1002385		#14	0.1820		
1002420		#13	0.1850	2 5/16	3 1/2
1226526	3/16		0.1875		
1002734		#12	0.1890		
1002770		#11	0.1910		
1002814		#10	0.1935	2 7/16	3 5/8
1002837		#9	0.1960		
1002889		#8	0.1990		
1002952		#7	0.2010		
1174858	13/64		0.2031		
1002998		#6	0.2040	2 1/2	3 3/4
1003186		#5	0.2055		
1003192		#4	0.2090		
1003208		#3	0.2130		
1226532	7/32		0.2188		
1003237		#2	0.2210	2 5/8	3 7/8
1003300		#1	0.2280		
1141632	15/64		0.2344		
1226549	1/4		0.2500	2 3/4	4
1141603	17/64		0.2656	2 7/8	4 1/8
1144029	9/32		0.2813	2 15/16	4 1/4
1141610	19/64		0.2969	3 1/16	4 3/8
1141649	5/16		0.3125	3 3/16	4 1/2
1086513	21/64		0.3281	3 5/16	4 5/8
1086520	11/32		0.3438	3 7/16	4 3/4
1086536	23/64		0.3594	3 1/2	4 7/8
1086542	3/8		0.3750	3 5/8	5
1086559	25/64		0.3906	3 3/4	5 1/8
1086565	13/32		0.4063	3 7/8	5 1/4
1086571	27/64		0.4219	3 15/16	5 3/8
1086588	7/16		0.4375	4 1/16	5 1/2
1086594	29/64		0.4531	4 3/16	5 5/8
1086600	15/32		0.4688	4 5/16	5 3/4
1086616	31/64		0.4844	4 3/8	5 7/8
1086622	1/2		0.5000	4 1/2	6

Fractional sizes: Sizes 1/64 to 5/16 in package of 10; 21/64 to 1/2 in package of 5; 33/64 to 11/16 in package of 2
Wire gauge sizes: All sizes in package of 10

Straight Shank Jobber Length Parabolic

HSS G h8 HELIX H 135° XH-type >1/2

L517P Tin Coated

Fractional: Range 1/16" to 1/2"
Wire: Range #1 to #52

EDP	Size		Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire			
1019026	1/16		0.0625	7/8	1 7/8
1019055		#52	0.0635		
1019158		#51	0.0670	1	2
1019318		#50	0.0700		
1019330		#49	0.0730		
1019382		#48	0.0760		
1019399	5/64		0.0781		
1019427		#47	0.0785		
1019440		#46	0.0810	1 1/8	2 1/8
1019462		#45	0.0820		
1019559		#44	0.0860		
1019645		#43	0.0890	1 1/4	2 1/4
1019748		#42	0.0935		
1019783	3/32		0.0938		
1019840		#41	0.0960	1 3/8	2 3/8
1019870		#40	0.0980		
1020015		#39	0.0995		
1020118		#38	0.1015	1 7/16	2 1/2
1020153		#37	0.1040		
1020233		#36	0.1065		
1020279	7/64		0.1094	1 1/2	2 5/8
1020394		#35	0.1100		
1020451		#34	0.1110		
1020474		#33	0.1130		
1020497		#32	0.1160	1 5/8	2 3/4
1020519		#31	0.1200		
1020531	1/8		0.1250		
1020554		#30	0.1285		
1020577		#29	0.1360	1 3/4	2 7/8
1020590		#28	0.1405		
1020605	9/64		0.1406		
1020628		#27	0.1440	1 7/8	3
1020640		#26	0.1470		
1020686		#25	0.1495		
1020714		#24	0.1520	2	3 1/8
1020737		#23	0.1540		
1020750	5/32		0.1563		
1020817		#22	0.1570		
1020852		#21	0.1590	2 1/8	3 1/4
1020881		#20	0.1610		

EDP	Size		Decimal Equivalent	Flute Length	Overall Length
	Fractional	Wire			
1020932		#19	0.1660	2 1/8	3 1/4
1020990		#18	0.1695		
1021057		#17	0.1700	2 3/16	3 3/8
1021028	11/64		0.1719	2 1/8	3 1/4
1021166		#16	0.1730	2 3/16	3 3/8
1021217		#15	0.1800		
1021246		#14	0.1820		
1021275		#13	0.1850	2 5/16	3 1/2
1021281	3/16		0.1875		
1021310		#12	0.1890		
1021384		#11	0.1910		
1021515		#10	0.1935	2 7/16	3 5/8
1021544		#9	0.1960		
1021596		#8	0.1990		
1021630		#7	0.2010		
1021647	13/64		0.2031		
1021660		#6	0.2040	2 1/2	3 3/4
1021682		#5	0.2055		
1021704		#4	0.2090		
1021727		#3	0.2130		
1021733	7/32		0.2188		
1021779		#2	0.2210	2 5/8	3 7/8
1021820		#1	0.2280		
1021836	15/64		0.2344		
1021842	1/4		0.2500	2 3/4	4
1021871	17/64		0.2656	2 7/8	4 1/8
1021888	9/32		0.2813	2 15/16	4 1/4
1021894	19/64		0.2969	3 1/16	4 3/8
1021900	5/16		0.3125	3 3/16	4 1/2
1021922	21/64		0.3281	3 5/16	4 5/8
1021939	11/32		0.3438	3 7/16	4 3/4
1021951	23/64		0.3594	3 1/2	4 7/8
1021968	3/8		0.3750	3 5/8	5
1021974	25/64		0.3906	3 3/4	5 1/8
1021997	13/32		0.4063	3 7/8	5 1/4
1022001	27/64		0.4219	3 15/16	5 3/8
1022018	7/16		0.4375	4 1/16	5 1/2
1022024	29/64		0.4531	4 3/16	5 5/8
1022030	15/32		0.4688	4 5/16	5 3/4
1022047	31/64		0.4844	4 3/8	5 7/8
1022053	1/2		0.5000	4 1/2	6

Fractional sizes: Sizes 1/64 to 5/16 in package of 10;
21/64 to 1/2 in package of 5; 33/64 to 11/16 in package of 2
Wire gauge sizes: All sizes in package of 10

Straight Shank Taper Length

L531 General Purpose, Black Oxide

Range 1/64" to 1/2"

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
1278436	1/64	0.0156	5/16	1 1/2
1266264	1/32	0.0313	3/4	2
1266270	3/64	0.0469	1 1/8	2 1/4
1266287	1/16	0.0625	1 3/4	3
1266293	5/64	0.0781	2	3 3/4
1266309	3/32	0.0938	2 1/4	4 1/4
1266315	7/64	0.1094	2 1/2	4 5/8
1266321	1/8	0.1250	2 3/4	5 1/8
1266338	9/64	0.1406	3	5 3/8
1266344	5/32	0.1563		
1266350	11/64	0.1719	3 3/8	5 3/4
1266367	3/16	0.1875		
1266373	13/64	0.2031	3 5/8	6
1266380	7/32	0.2188		
1266396	15/64	0.2344	3 3/4	6 1/8
1266401	1/4	0.2500		
1266418	17/64	0.2656	3 7/8	6 1/4
1266424	9/32	0.2813		
1266430	19/64	0.2969	4	6 3/8
1266447	5/16	0.3125		
1266453	21/64	0.3281	4 1/8	6 1/2
1266460	11/32	0.3438		
1266476	23/64	0.3594	4 1/4	6 3/4
1266482	3/8	0.3750		
1266499	25/64	0.3906	4 3/8	7
1266504	13/32	0.4063		
1266510	27/64	0.4219	4 5/8	7 1/4
1266527	7/16	0.4375		
1266533	29/64	0.4531	4 3/4	7 1/2
1266540	15/32	0.4688		
1266556	31/64	0.4844		7 3/4
1266562	1/2	0.5000		

Sizes 1/64 to 5/16 in package of 10;
21/64 to 1/2 in pckage of 5

Straight Shank Taper Length Cobalt

L6531 General Purpose

Range 1/16" to 3/4"

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
1053917	1/16	0.0625	1 3/4	3
1053930	5/64	0.0781	2	3 3/4
1053952	3/32	0.0938	2 1/4	4 1/4
1053975	7/64	0.1094	2 1/2	4 5/8
1053981	1/8	0.1250	2 3/4	5 1/8
1053998	9/64	0.1406	3	5 3/8
1054002	5/32	0.1563		
1054019	11/64	0.1719	3 3/8	5 3/4
1054025	3/16	0.1875		
1054031	13/64	0.2031	3 5/8	6
1054048	7/32	0.2188		
1054060	15/64	0.2344	3 3/4	6 1/8
1054105	1/4	0.2500		
1054140	17/64	0.2656	3 7/8	6 1/4
1054192	9/32	0.2813		
1054220	19/64	0.2969	4	6 3/8
1054243	5/16	0.3125		
1054272	21/64	0.3281	4 1/8	6 1/2
1054300	11/32	0.3438		
1054330	23/64	0.3594	4 1/4	6 3/4
1054352	3/8	0.3750		
1054381	25/64	0.3906	4 3/8	7
1054410	13/32	0.4063		
1054432	27/64	0.4219	4 5/8	7 1/4
1054449	7/16	0.4375		
1054455	29/64	0.4531	4 3/4	7 1/2
1054461	15/32	0.4688		
1054478	31/64	0.4844		7 3/4
1054484	1/2	0.5000		
1058198	33/64	0.5156		8
1058261	17/32	0.5313		
1058312	35/64	0.5469	4 7/8	8 1/4
1058387	9/16	0.5625		
1058450	37/64	0.5781		8 3/4
1058524	19/32	0.5938		
1058582	39/64	0.6094		
1058656	5/8	0.6250		
1058713	41/64	0.6406	5 1/8	9
1058765	21/32	0.6563		
1058822	43/64	0.6719	5 3/8	9 1/4
1058874	11/16	0.6875		
1058925	45/64	0.7031	5 5/8	9 1/2
1058954	23/32	0.7188		
1058990	47/64	0.7344	5 7/8	9 3/4
1059027	3/4	0.7500		

Sizes 1/64 to 5/16 in package of 10; 21/64 to 1/2 in package of 5

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Straight Shank Taper Length Tin Coated

L545P Parabolic Style

Range: 1/16" to 1/2"

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
1001016	1/16	0.0625	1 3/4	3
1001148	5/64	0.0781	2	3 3/4
1001228	3/32	0.0938	2 1/4	4 1/4
1001446	7/64	0.1094	2 1/2	4 5/8
1001526	1/8	0.1250	2 3/4	5 1/8
1001590	9/64	0.1406	3	5 3/8
1001899	5/32	0.1563		
1002218	11/64	0.1719	3 3/8	5 3/4
1002436	3/16	0.1875		
1002975	13/64	0.2031	3 5/8	6
1003214	7/32	0.2188		
1003403	15/64	0.2344	3 3/4	6 1/8
1003455	1/4	0.2500		
1003541	17/64	0.2656	3 7/8	6 1/4
1003609	9/32	0.2813		
1003615	19/64	0.2969	4	6 3/8
1003621	5/16	0.3125		
1003667	21/64	0.3281	4 1/8	6 1/2
1003673	11/32	0.3438		
1003885	23/64	0.3594	4 1/4	6 3/4
1003920	3/8	0.3750		
1003936	25/64	0.3906	4 3/8	7
1004038	13/32	0.4063		
1004130	27/64	0.4219	4 5/8	7 1/4
1004176	7/16	0.4375		
1004199	29/64	0.4531	4 3/4	7 1/2
1004256	15/32	0.4688		
1004285	31/64	0.4844		7 3/4
1004291	1/2	0.5000		

Sizes 1/64 to 5/16 in package of 10;
21/64 to 1/2 in package of 5

Straight Shank Extra Length

L551 General Purpose, Bright

Range 1/8" to 1"
Overall Length 12" and 18"

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
1054490	1/8	0.1250	9	12
1054506	9/64	0.1406		
1054512	5/32	0.1563		
1054529	11/64	0.1719		
1054535	3/16	0.1875		
1054558	13/64	0.2031		
1054570	7/32	0.2188		
1054593	15/64	0.2344		
1054615	1/4	0.2500		
1054638	17/64	0.2656		
1054650	9/32	0.2813		
1054673	19/64	0.2969		
1054696	5/16	0.3125		
1054718	21/64	0.3281		
1054730	11/32	0.3438		
1054753	23/64	0.3594		
1054776	3/8	0.3750		
1054799	25/64	0.3906		
1054810	13/32	0.4063		
1054833	27/64	0.4219		
1054856	7/16	0.4375		
1054879	29/64	0.4531		
1054891	15/32	0.4688		
1054913	31/64	0.4844		
1054936	1/2	0.5000		
1058226	33/64	0.5156		
1058290	17/32	0.5313		
1058341	35/64	0.5469		
1058415	9/16	0.5625		
1058480	37/64	0.5781		
1058553	19/32	0.5938		
1058610	39/64	0.6094		
1058685	5/8	0.6250		
1058800	21/32	0.6563		
1058902	11/16	0.6875		
1058977	23/32	0.7188		
1059040	3/4	0.7500		
1059120	13/16	0.8125		
1059200	7/8	0.8750		

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
1059280	15/16	0.9375	9	12
1059354	1	1.0000		
1054541	3/16	0.1875	14	18
1054564	13/64	0.2031		
1054587	7/32	0.2188		
1054609	15/64	0.2344		
1054621	1/4	0.2500		
1054644	17/64	0.2656		
1054667	9/32	0.2813		
1054680	19/64	0.2969		
1054701	5/16	0.3125		
1054724	21/64	0.3281		
1054747	11/32	0.3438		
1054760	23/64	0.3594		
1054782	3/8	0.3750		
1054804	25/64	0.3906		
1054827	13/32	0.4063		
1054840	27/64	0.4219		
1054862	7/16	0.4375		
1054885	29/64	0.4531		
1054907	15/32	0.4688		
1054920	31/64	0.4844		
1054942	1/2	0.5000		
1058210	33/64	0.5156		
1058284	17/32	0.5313		
1058335	35/64	0.5469		
1058409	9/16	0.5625		
1058473	37/64	0.5781		
1058547	19/32	0.5938		
1058604	39/64	0.6094		
1058679	5/8	0.6250		
1058788	21/32	0.6563		
1058897	11/16	0.6875		
1058960	23/32	0.7188		
1059033	3/4	0.7500		
1059113	13/16	0.8125		
1059194	7/8	0.8750		
1059274	15/16	0.9375		
1059348	1	1.0000		

1 per box

Straight Shank Extra Length Parabolic

L6551 Black Oxide

Range 3/16 to 1/2
Overall Length 10”

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
1010087	3/16	0.1875	7	10
1010109	13/64	0.2031		
1010150	7/32	0.2188		
1010173	15/64	0.2344		
1010196	1/4	0.2500		
1005275	17/64	0.2656		
1005281	9/32	0.2813		
1005298	19/64	0.2969		
1005303	5/16	0.3125		
1005310	21/64	0.3281		
1005326	11/32	0.3438		
1005332	23/64	0.3594		
1005349	3/8	0.3750		
1010333	25/64	0.3906		
1010362	13/32	0.4063		
1010391	27/64	0.4219		
1005390	7/16	0.4375		
1005406	29/64	0.4531		
1010465	15/32	0.4688		
1005435	31/64	0.4844		
1008040	1/2	0.5000		

1 per box

Straight Shank Oil Hole

L581 M35 Cobalt, Bright

Range 3/8 to 1 1/2

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
1056974	3/8	0.3750	4 1/4	6 3/4
1056997	25/64	0.3906	4 3/8	7
1057018	13/32	0.4063		
1057030	27/64	0.4219	4 5/8	7 1/4
1061093	7/16	0.4375		
1057060	29/64	0.4531	4 7/8	7 1/2
1061109	15/32	0.4688		
1057099	31/64	0.4844	5	7 3/4
1057110	1/2	0.5000		
1057133	33/64	0.5156	5 1/4	8
1057156	17/32	0.5313		
1057179	35/64	0.5469	5 3/8	8 1/4
1057191	9/16	0.5625		
1057213	37/64	0.5781	5 5/8	8 1/2
1057236	19/32	0.5938		
1057259	39/64	0.6094	5 3/4	8 3/4
1057271	5/8	0.6250		
1146307	41/64	0.6406	5 7/8	9
1057316	21/32	0.6563		
1057339	43/64	0.6719	6	9 1/4
1057351	11/16	0.6875		
1057374	45/64	0.7031	6 3/16	9 1/2
1057397	23/32	0.7188		
1057419	47/64	0.7344	6 3/8	9 3/4
1061115	3/4	0.7500		
1057448	49/64	0.7656	6 1/2	9 7/8
1057460	25/32	0.7813		
1057483	51/64	0.7969	6 5/8	10

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
1057505	13/16	0.8125	6 5/8	10
1057528	53/64	0.8281	6 3/4	10 1/4
1057540	27/32	0.8438		
1057563	55/64	0.8594	7	10 1/2
1061121	7/8	0.8750		
1057592	57/64	0.8906		10 5/8
1057614	29/32	0.9063		
1057637	59/64	0.9219		10 3/4
1057650	15/16	0.9375		
1057672	61/64	0.9531	7 1/8	10 7/8
1057695	31/32	0.9688		
1057717	63/64	0.9844	7 3/16	11
1057730	1	1.0000		
1057752	1 1/64	1.0156	7 5/16	11 1/8
1057769	1 1/32	1.0313		
1057775	1 3/64	1.0469	7 3/8	11 1/4
1057781	1 1/16	1.0625		
1057803	1 3/32	1.0938	7 5/8	11 1/2
1057810	1 1/8	1.1250	7 7/8	11 3/4
1057832	1 5/32	1.1563	8	11 7/8
1057849	1 3/16	1.1875	8 1/8	12
1057861	1 7/32	1.2188		12 1/8
1057878	1 1/4	1.2500	8 1/2	12 1/2
1057890	1 5/16	1.3125	9 1/4	14 1/4
1057912	1 3/8	1.3750	9 1/2	14 1/2
1057935	1 7/16	1.4375	9 5/8	14 3/4
1057958	1 1/2	1.5000	9 7/8	15

1 per box

Taper Shank Regular Length

L601 General Purpose, Black Oxide

Range 9/32" to 3 1/2"

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Taper Shank
1267305	9/32	0.2813	3	6 1/4	1
1267328	19/64	0.2969	3 1/8	6 3/8	
1267357	5/16	0.3125			
1267363	21/64	0.3281	3 1/4	6 1/2	
1267370	11/32	0.3438			
1267386	23/64	0.3594	3 1/2	6 3/4	
1267392	3/8	0.3750			
1267408	25/64	0.3906	3 5/8	7	
1267414	13/32	0.4063			
1268221	27/64	0.4219	3 7/8	7 1/4	
1268238	7/16	0.4375			
1268250	29/64	0.4531	4 1/8	7 1/2	
1268296	15/32	0.4688			
1268318	31/64	0.4844	4 3/8	8 1/4	2
1268330	1/2	0.5000			
1268353	33/64	0.5156	4 5/8	8 1/2	
1268376	17/32	0.5313			
1268399	35/64	0.5469	4 7/8	8 3/4	
1268410	9/16	0.5625			
1268433	37/64	0.5781			
1268456	19/32	0.5938			
1268479	39/64	0.6094			
1268507	5/8	0.6250			
1268513	41/64	0.6406	5 1/8	9	
1268536	21/32	0.6563			
1268565	43/64	0.6719	5 3/8	9 1/4	
1268588	11/16	0.6875			
1268600	45/64	0.7031	5 5/8	9 1/2	
1268639	23/32	0.7188			
1268668	47/64	0.7344	5 7/8	9 3/4	
1268680	3/4	0.7500			
1268702	49/64	0.7656	6	9 7/8	
1268725	25/32	0.7813			
1268886	51/64	0.7969	6 1/8	10 3/4	3
1268892	13/16	0.8125			
1268908	53/64	0.8281			
1268914	27/32	0.8438			
1268920	55/64	0.8594			
1268943	7/8	0.8750			
1268972	57/64	0.8906			
1268995	29/32	0.9063			
1269022	59/64	0.9219			
1269051	15/16	0.9375			
1269080	61/64	0.9531	6 3/8	11	

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Taper Shank
1269097	31/32	0.9688	6 3/8	11	3
1269125	63/64	0.9844			
1269160	1	1.0000			
1269205	1 1/64	1.0156	6 1/2	11 1/8	
1269234	1 1/32	1.0313			
1269240	1 3/64	1.0469	6 5/8	11 1/4	
1269263	1 1/16	1.0625			
1269286	1 5/64	1.0781	6 7/8	12 1/2	4
1269314	1 3/32	1.0938			
1269337	1 7/64	1.1094	7 1/8	12 3/4	
1269366	1 1/8	1.1250			
1269400	1 9/64	1.1406	7 1/4	12 7/8	
1269430	1 5/32	1.1563			
1269469	1 11/64	1.1719	7 3/8	13	
1269498	1 3/16	1.1875			
1269526	1 13/64	1.2031	7 1/2	13 1/8	
1269664	1 7/32	1.2188			
1269709	1 15/64	1.2344	7 7/8	13 1/2	
1269773	1 1/4	1.2500			
1269830	1 17/64	1.2656	8 1/2	14 1/8	
1269899	1 9/32	1.2813			
1269910	1 19/64	1.2969	8 5/8	14 1/4	
1269927	1 5/16	1.3125			
1269933	1 21/64	1.3281	8 3/4	14 3/8	
1269940	1 11/32	1.3438			
1269956	1 23/64	1.3594	8 7/8	14 1/2	
1269962	1 3/8	1.3750			
1269979	1 25/64	1.3906	9	14 5/8	
1269985	1 13/32	1.4063			
1269991	1 27/64	1.4219	9 1/8	14 3/4	
1270005	1 7/16	1.4375			
1270011	1 29/64	1.4531	9 1/4	14 7/8	
1270028	1 15/32	1.4688			
1270034	1 31/64	1.4844	9 3/8	15	
1270040	1 1/2	1.5000			
1270057	1 33/64	1.5156		16 3/8	5
1270063	1 17/32	1.5313			
1270070	1 35/64	1.5469	9 5/8	16 5/8	
1270086	1 9/16	1.5625			
1270092	1 37/64	1.5781	9 7/8		
1270108	1 19/32	1.5938		16 7/8	
1270114	1 39/64	1.6094	10	17	
1270120	1 5/8	1.6250			
1270246	1 41/64	1.6406	10 1/8	17 1/8	

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Taper Shank
1270269	1 21/32	1.6563	10 1/8	17 1/8	5
1270275	1 43/64	1.6719			
1270281	1 11/16	1.6875			
1270298	1 45/64	1.7031			
1270303	1 23/32	1.7188			
1270332	1 47/64	1.7344			
1270361	1 3/4	1.7500			
1270390	1 25/32	1.7813			
1270429	1 13/16	1.8125			
1270458	1 27/32	1.8438			
1270487	1 7/8	1.8750	10 3/8	17 3/8	
1270515	1 29/32	1.9063			
1270630	1 15/16	1.9375			
1270660	1 31/32	1.9688			
1270699	2	2.0000			
1270727	2 1/32	2.0313			
1270762	2 1/16	2.0625	10 1/4		
1270785	2 3/32	2.0938			
1270807	2 1/8	2.1250			
1270836	2 5/32	2.1563			
1270859	2 3/16	2.1875			
1270865	2 7/32	2.2188	10 1/8		
1270871	2 1/4	2.2500			
1270888	2 5/16	2.3125			
1270894	2 3/8	2.3750			
1270900	2 7/16	2.4375	11 1/4	18 3/4	
1270916	2 1/2	2.5000			
1270922	2 9/16	2.5625	11 7/8	19 1/2	
1270939	2 5/8	2.6250			
1270945	2 11/16	2.6875	12 3/4	20 3/8	
1270951	2 3/4	2.7500			
1270968	2 13/16	2.8125	13 3/8	21 1/8	
1270974	2 7/8	2.8750			
1270980	2 15/16	2.9375	14	21 3/4	
1270997	3	3.0000			
1271001	3 1/16	3.0625	14 5/8	24 1/2	6
1271018	3 1/8	3.1250			
1271024	3 3/16	3.1875			
1271030	3 1/4	3.2500	15 1/2	25 1/2	
1271047	3 5/16	3.3125			
1271076	3 3/8	3.3750			
1271127	3 7/16	3.4375			
1271179	3 1/2	3.5000	16 3/8	26 1/2	

1 per box

Taper Shank Extra Length

HSS h8 HELIX N 118° S-type >1/2 Conical

L651 Bright

Range 1/4 to 2 1/2
Overall Length 18”

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Overall Length	Taper Shank
1057970	1/4	0.2500	14	18		1
1057987	17/64	0.2656	14			
1057993	9/32	0.2813	14			
1058008	19/64	0.2969	14			
1058014	5/16	0.3125	14			
1058020	5/16	0.3125	20		24	
1058037	21/64	0.3281	14	18		
1058043	11/32	0.3438	14			
1058050	23/64	0.3594	14			
1058066	3/8	0.3750	14			
1058072	3/8	0.3750	20		24	
1058089	25/64	0.3906	14	18		
1058095	13/32	0.4063	14			
1058100	27/64	0.4219	14			
1058117	7/16	0.4375	14			
1058123	7/16	0.4375	20		24	
1058130	29/64	0.4531	14	18		
1058146	15/32	0.4688	14			
1058152	31/64	0.4844	14			2
1058169	1/2	0.5000	14			
1058175	1/2	0.5000	20		24	
1058181	33/64	0.5156	14	18		
1061138	33/64	0.5156	20		24	
1058249	17/32	0.5313	14	18		
1058255	17/32	0.5313	20		24	
1061144	35/64	0.5469	14	18		
1058364	9/16	0.5625	14			
1058370	9/16	0.5625	20		24	
1058438	37/64	0.5781	14	18		
1058444	37/64	0.5781	20		24	
1058501	19/32	0.5938	14	18		
1058518	19/32	0.5938	20		24	
1058576	39/64	0.6094	14	18		
1058633	5/8	0.6250	14			
1058640	5/8	0.6250	20		24	
1058707	41/64	0.6406	14	18		
1058742	21/32	0.6563	14			
1058759	21/32	0.6563	20		24	
1058816	43/64	0.6719	14	18		
1058851	11/16	0.6875	14			
1058868	11/16	0.6875	20		24	
1058919	45/64	0.7031	14	18		
1058931	23/32	0.7188	14			
1058948	23/32	0.7188	20		24	
1058983	47/64	0.7344	14	18		
1059004	3/4	0.7500	14			
1059010	3/4	0.7500	20		24	
1059056	49/64	0.7656	14	18		
1059062	25/32	0.7813	14			
1059079	25/32	0.7813	20		24	
1059085	51/64	0.7969	13	18		3
1059091	13/16	0.8125	13			
1059107	13/16	0.8125	19		24	
1059136	53/64	0.8281	13	18		
1059142	27/32	0.8438	13			
1059159	27/32	0.8438	19		24	
1059165	55/64	0.8594	13	18		

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Overall Length	Taper Shank
1059171	7/8	0.8750	13	18		3
1059188	7/8	0.8750	19		24	
1059216	57/64	0.8906	13	18		
1059222	29/32	0.9063	13			
1059239	29/32	0.9063	19		24	
1059245	59/64	0.9219	13	18		
1059251	15/16	0.9375	13			
1059268	15/16	0.9375	19		24	
1059297	61/64	0.9531	13	18		
1059302	31/32	0.9688	13			
1059319	31/32	0.9688	19		24	
1059325	63/64	0.9844	13	18		
1061167	1	1.0000	13			
1059331	1	1.0000	19		24	
1059360	1 1/32	1.0313	13	18		
1059377	1 1/16	1.0625	13			
1059383	1 1/16	1.0625	19		24	
1059390	1 3/32	1.0938	12	18		4
1059405	1 1/8	1.1250	12			
1059411	1 1/8	1.1250	19		24	
1059428	1 5/32	1.1563	12	18		
1229743	1 5/32	1.1563	18		24	
1059434	1 3/16	1.1875	12	18		
1059440	1 3/16	1.1875	18		24	
1059457	1 7/32	1.2188	12	18		
1229750	1 7/32	1.2188	18		24	
1059463	1 1/4	1.2500	12	18		
1059470	1 1/4	1.2500	18		24	
1059486	1 9/32	1.2813	12	18		
1059492	1 5/16	1.3125	12			
1059508	1 5/16	1.3125	18		24	
1059514	1 11/32	1.3438	12	18		
1059520	1 3/8	1.3750	12			
1059537	1 3/8	1.3750	18		24	
1059543	1 13/32	1.4063	12	18		
1059550	1 7/16	1.4375	12			
1059566	1 7/16	1.4375	18		24	
1059572	1 15/32	1.4688	12	18		
1059589	1 1/2	1.5000	12			
1059595	1 1/2	1.5000	18		24	5
1059600	1 9/16	1.5625	10 1/2	18		
1059617	1 9/16	1.5625	17		24	
1059623	1 5/8	1.6250	10 1/2	18		
1059630	1 5/8	1.6250	17		24	
1059646	1 11/16	1.6875	10 1/2	18		
1059652	1 11/16	1.6875	17		24	
1059669	1 3/4	1.7500	10 1/2	18		
1059675	1 3/4	1.7500	17		24	
1059681	1 7/8	1.8750	10 1/2	18		
1059698	1 7/8	1.8750	17		24	
1059703	2	2.0000	10 1/2	18		
1061173	2	2.0000	17	24		
1059726	2 1/16	2.0625	17			
1059749	2 1/8	2.1250	17			
1059761	2 1/4	2.2500	17			
1159848	2 3/8	2.3750	17			
1059784	2 1/2	2.5000	17			

1 per box

Taper Shank Oil Hole

L683 M35 Cobalt, Bright

Range 3/8 to 1 1/2

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Taper Shank
1056980	3/8	0.3750	4 1/4	8 1/8	2
1057001	25/64	0.3906	4 3/8	8 1/4	
1057024	13/32	0.4063			
1057047	27/64	0.4219	4 5/8	8 1/2	
1057053	7/16	0.4375			
1057076	29/64	0.4531	4 7/8	8 3/4	
1057082	15/32	0.4688			
1057104	31/64	0.4844	5	9 5/8	3
1057127	1/2	0.5000			
1057140	33/64	0.5156	5 1/8	9 3/4	
1057162	17/32	0.5313			
1057185	35/64	0.5469	5 1/4	9 7/8	
1057207	9/16	0.5625			
1057220	37/64	0.5781	5 1/2	10 1/8	
1057242	19/32	0.5938			
1057265	39/64	0.6094	5 5/8	10 1/4	
1057288	5/8	0.6250			
1057300	41/64	0.6406	5 3/4	10 3/8	
1057322	21/32	0.6563			
1057345	43/64	0.6719	5 7/8	10 1/2	
1057368	11/16	0.6875			
1057380	45/64	0.7031	6 1/8	10 3/4	
1057402	23/32	0.7188			
1057425	47/64	0.7344	6 1/4	10 7/8	
1057431	3/4	0.7500			

1 per box

EDP	Size	Decimal Equivalent	Flute Length	Overall Length	Taper Shank
1057454	49/64	0.7656	6 3/8	11	3
1057477	25/32	0.7813			
1057490	51/64	0.7969	6 1/2	11 1/8	
1057511	13/16	0.8125			
1057534	53/64	0.8281	6 5/8	11 1/4	
1057557	27/32	0.8438			
1057570	55/64	0.8594	6 7/8	11 1/2	
1057586	7/8	0.8750			
1057608	57/64	0.8906			
1057620	29/32	0.9063			
1057643	59/64	0.9219			
1057666	15/16	0.9375			
1057689	61/64	0.9531	7	11 5/8	
1057700	31/32	0.9688			
1057723	63/64	0.9844	7 1/8	11 3/4	
1057746	1	1.0000			
1057798	1 1/16	1.0625	7 1/4	12 7/8	4
1057826	1 1/8	1.1250	7 3/4	13 3/8	
1057855	1 3/16	1.1875	8	13 5/8	
1057884	1 1/4	1.2500	8 1/4	13 7/8	
1057906	1 5/16	1.3125	9 1/8	14 3/4	
1057929	1 3/8	1.3750	9 3/8	15	
1057941	1 7/16	1.4375	9 1/2	15 1/8	
1057964	1 1/2	1.5000	9 3/4	15 3/8	

Silver and Deming

L575 High Speed Steel, Bright

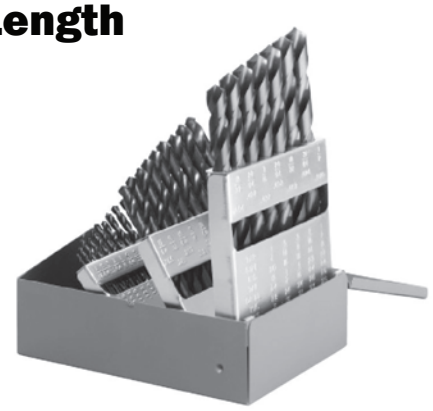
Shank Diameter 1/2" by 2 1/2" long
Range 1/2 to 1 1/2

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
1023604	1/2	0.5000	3 1/8	6
1015599	33/64	0.5156		
1016600	17/32	0.5312		
1015604	35/64	0.5469		
1023839	9/16	0.5625		
1015640	37/64	0.5781		
1023925	19/32	0.5938		
1062352	39/64	0.6094		
1024062	5/8	0.6250		
1015656	41/64	0.6406		
1024194	21/32	0.6562		
1015685	43/64	0.6719		
1024319	11/16	0.6875		
1015765	45/64	0.7031		
1024550	23/32	0.7187		
1015771	47/64	0.7344		
1024909	3/4	0.7500		
1015788	49/64	0.7656	3	6
1025178	25/32	0.7812		
1015822	51/64	0.7969		
1025642	13/16	0.8125		
1015839	53/64	0.8281		
1026408	27/32	0.8438		
1015845	55/64	0.8594		
1027250	7/8	0.8750		

EDP	Size	Decimal Equivalent	Flute Length	Overall Length
1015851	57/64	0.8906	3	6
1027857	29/32	0.9062		
1015874	59/64	0.9219		
1028148	15/16	0.9375		
1015897	61/64	0.9531		
1028498	31/32	0.9687		
1015902	63/64	0.9844		
1028721	1	1.0000		
1015919	1 1/32	1.0312		
1029391	1 1/16	1.0625		
1015925	1 3/32	1.0938		
1029757	1 1/8	1.1250		
1015948	1 5/32	1.1562		
1030300	1 3/16	1.1875		
1015954	1 7/32	1.2188		
1030993	1 1/4	1.1250		
1005922	1 9/32	1.2812	2 3/4	6
1005939	1 5/16	1.3125		
1011054	1 11/32	1.3438		
1005951	1 3/8	1.3750		
1011140	1 13/32	1.4062		
1005968	1 7/16	1.4375		
1011163	1 15/32	1.4688		
1005974	1 1/2	1.5000		

1 per box

Drill Set Jobber Length



L599 Black Oxide

EDP	HIGH SPEED DRILL SETS	SET NO.
Fractional Sizes	**Fractional Sizes**	
3599013	1/16” To 1/4” By 64ths	S13
3599015	1/16” To 1/2” By 32nds	S15
3599021	1/16” To 3/8” By 64ths	S21
3599129	1/16” To 1/2” By 64ths	S29
Wire Gauge Sizes	**Wire Gauge Sizes**	
3599060	No.1 To No. 60	S60
3599020	No.61 To No. 80	S20
Letter Sizes	**Letter Sizes**	
3599026	A To Z	S26
Combination Sizes	**Combination Sizes**	
3599115	S29, S60, S26	S115
EDP	**COBALT DRILL SETS**	**SET NO.**
Fractional Sizes	**Fractional Sizes**	
3599029	1/16” To 1/2” By 64ths	C29

Standard Drilling Conditions

Straight Shank

Screw Machine Length L561, L563
Jobber Length L500, L501, L501A, L599
Taper Length L531

Straight Shank Cobalt

Screw Machine Length L6563
Jobber Length L6501, L6520, L599
Taper Length L6531

Workpiece Material / Speed (SFM) / Drill Diameter			Carbon Steels		Alloy Steels Hardened Steels		Mold Steels Stainless Steels		Titanium Alloys[1] High Temperature[1] Alloys		Cast Irons		Aluminum Alloys Nonferrous Metals	
			50 - 65 SFM		40 - 52 SFM		30 - 40 SFM		10 - 20 SFM		55 - 72 SFM		83 - 115 SFM	
Fractional	Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
–	1	0.0394	4,800	0.0008	3,800	0.0007	2,900	0.0006	1,500	0.0003	5,300	0.0010	8,100	0.0007
1/16	1.588	0.0625	3,400	0.0013	2,700	0.0011	2,100	0.0009	1,000	0.0005	3,800	0.0015	5,800	0.0011
–	2	0.0787	2,900	0.0016	2,300	0.0013	1,700	0.0012	720	0.0006	3,200	0.0020	4,900	0.0014
–	3	0.1181	2,100	0.0028	1,700	0.0023	1,300	0.0021	480	0.0009	2,300	0.0034	3,600	0.0024
1/8	3.175	0.1250	2,000	0.0029	1,700	0.0023	1,200	0.0022	460	0.0010	2,200	0.0036	3,500	0.0025
–	5	0.1969	1,300	0.0042	1,000	0.0037	760	0.0033	290	0.0015	1,400	0.0053	2,200	0.0038
1/4	6.35	0.2500	1,100	0.0047	800	0.0044	610	0.0038	230	0.0020	1,120	0.0064	1,750	0.0044
–	8	0.3150	800	0.0059	640	0.0050	480	0.0044	180	0.0025	900	0.0074	1,400	0.0051
3/8	9.525	0.3750	680	0.0065	540	0.0055	400	0.0049	160	0.0030	740	0.0082	1,200	0.0054
–	10	0.3937	640	0.0068	510	0.0057	380	0.0050	150	0.0032	700	0.0084	1,100	0.0057
–	12	0.4724	530	0.0074	420	0.0064	320	0.0057	120	0.0040	580	0.0095	900	0.0066
1/2	12.7	0.5000	510	0.0076	400	0.0066	310	0.0057	120	0.0043	550	0.0099	860	0.0069
5/8	15.875	0.6250	410	0.0089	330	0.0076	250	0.0065	100	0.0050	450	0.0115	690	0.0086
–	16	0.6299	400	0.0091	320	0.0078	240	0.0067	90	0.0050	440	0.0116	680	0.0087

1) The cutting condition of Titanium Alloys and Nickel Alloys are for HSS-Co drills only.
2) The above values apply when coolant is used in a vertical machine. In a horizontal machine or deep hole, use pecking.
3) Adjust drilling condition when unusual vibration or different sound occurs.

Standard Drilling Conditions

Straight Shank TiN Coated

Screw Machine Length L561P
Jobber Length L501P, L520P

Workpiece Material / Speed (SFM) / Drill Diameter			Carbon Steels		Alloy Steels		Die Steels Hardened Steels Stainless Steels		Cast Irons		Aluminum Alloys Nonferrous Metals	
			60 - 85 SFM		47 - 65 SFM		36 - 48 SFM		66 - 90 SFM		100 - 140 SFM	
Fractional	Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
–	1	0.0394	5,800	0.0008	4,600	0.0007	3,500	0.0006	6,400	0.0010	9,800	0.0007
1/16	1.588	0.0625	4,100	0.0013	3,200	0.0011	2,500	0.0009	4,400	0.0015	7,000	0.0011
–	2	0.0787	3,500	0.0016	2,800	0.00 13	2,000	0.0012	3,800	0.0020	5,900	0.0014
–	3	0.1181	2,500	0.0028	2,000	0.00 23	1,500	0.0021	2,800	0.0034	4,300	0.0024
1/8	3.175	0.1250	2,400	0.0029	2,000	0.0023	1,400	0.0022	2,600	0.0036	4,200	0.0025
–	5	0.1969	1,600	0.0042	1,200	0.0037	910	0.0033	1,700	0.0053	2,600	0.0038
1/4	6.35	0.2500	1,300	0.0047	1,000	0.0044	730	0.0038	1,300	0.0064	2,100	0.0044
–	8	0.3150	1,000	0.0059	770	0.00 50	580	0.0044	1,100	0.0074	1,700	0.0051
3/8	9.525	0.3750	820	0.0065	650	0.00 55	480	0.0049	890	0.0082	1,400	0.0054
–	10	0.3937	770	0.0068	610	0.0057	460	0.0050	840	0.0084	1,300	0.0057
–	12	0.4724	640	0.0074	500	0.0064	380	0.0057	700	0.0095	1,100	0.0066
1/2	12.7	0.5000	610	0.0076	490	0.00 66	370	0.0057	670	0.0099	1,000	0.0069
5/8	15.875	0.6250	500	0.0089	400	0.00 76	300	0.0065	540	0.0115	830	0.0086
–	16	0.6299	480	0.0091	380	0.00 78	290	0.0067	530	0.0116	820	0.0087

1) The above values apply when coolant is used in a vertical machine. In a horizontal machine or deep hole, use pecking.
2) Adjust drilling condition when unusual vibration or different sound occurs.

Standard Drilling Conditions

Straight Shank Parabolic Style TiN Coated

Jobber Length L517P
Taper Length L545P

Workpiece Material / Speed (SFM)			Carbon Steels		Alloy Steels		Die Steels Hardened Steels Stainless Steels		Cast Irons	
Drill Diameter			60 - 85 SFM		47 - 65 SFM		36 - 48 SFM		66 - 90 SFM	
Fractional	Metric mm	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
–	1	0.0394	5,800	0.0011	4,600	0.0009	3,500	0.0008	6,400	0.0014
1/16	1.588	0.0625	4,100	0.0018	3,200	0.0014	2,500	0.0012	4,400	0.0021
–	2	0.0787	3,500	0.0023	2,800	0.0017	2,000	0.0015	3,800	0.0028
–	3	0.1181	2,500	0.0039	2,000	0.0030	1,500	0.0027	2,800	0.0048
1/8	3.175	0.1250	2,400	0.0041	2,000	0.0030	1,400	0.0029	2,600	0.0050
–	5	0.1969	1,600	0.0059	1,200	0.0048	910	0.0042	1,700	0.0075
1/4	6.35	0.2500	1,300	0.0066	1,000	0.0057	730	0.0049	1,300	0.0089
–	8	0.3150	1,000	0.0083	770	0.0066	580	0.0058	1,100	0.0104
3/8	9.525	0.3750	820	0.0091	650	0.0072	480	0.0063	890	0.0115
–	10	0.3937	770	0.0095	610	0.0074	460	0.0065	840	0.0118
–	12	0.4724	640	0.0104	500	0.0083	380	0.0074	700	0.0133
1/2	12.7	0.5000	610	0.0107	490	0.0086	370	0.0075	670	0.0139
5/8	15.875	0.6250	500	0.0124	400	0.0099	300	0.0085	540	0.0161
–	16	0.6299	480	0.0127	380	0.0101	290	0.0087	530	0.0163

1) The above values apply when coolant is used in a vertical machine. In a horizontal machine or deep hole, use pecking.
2) Adjust drilling condition when unusual vibration or different sound occurs.

Standard Drilling Conditions

Straight Shank Parabolic Style TiN Coated

Straight Shank Extra Length L551, L6551
Taper Shank Extra Length L651

Workpiece Material / Speed (SFM)		Carbon Steels		Alloy Steels Hardened Steels		Stainless Steels		Cast Irons		Brass Nonferrous Metals	
Drill Diameter		44 - 55 SFM		32 - 40 SFM		32 - 40 SFM		52 - 65 SFM		48 - 60 SFM	
Fractional	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
1/16	0.0625	2,700	0.0020	2,000	0.0010	2,000	0.0015	3,200	0.0015	3,000	0.0020
1/8	0.1250	1,600	0.0038	1,200	0.0018	1,200	0.0025	1,800	0.0025	1,700	0.0036
3/16	0.1875	1,200	0.0052	820	0.0025	820	0.0035	1,400	0.0035	1,300	0.0050
1/4	0.2500	850	0.0065	620	0.0030	620	0.0048	1,000	0.0048	1,000	0.0063
5/16	0.3125	680	0.0075	490	0.0035	490	0.0055	800	0.0055	740	0.0078
3/8	0.3750	570	0.0090	410	0.0040	410	0.0060	670	0.0060	620	0.0090
1/2	0.5000	430	0.0110	310	0.0052	310	0.0080	500	0.0080	460	0.0110
5/8	0.6250	340	0.0120	250	0.0060	250	0.0090	400	0.0090	370	0.0120
3/4	0.7500	290	0.0130	210	0.0070	210	0.0100	340	0.0100	310	0.0130
1	1.0000	220	0.0140	160	0.0080	160	0.0110	250	0.0110	230	0.0140

1) The above values apply when coolant is used in a vertical machine. In a horizontal machine or deep hole, use pecking.
2) Adjust drilling condition when unusual vibration or different sound occurs.

Standard Drilling Conditions
Straight Shank Oil Hole Cobalt L581

Workpiece Material / Speed (SFM) / Drill Diameter		Carbon Steels		Alloy Steels		Die Steels Hardened Steels Stainless Steels		Cast Irons		Aluminum Alloys Nonferrous Alloys	
		55 - 66 SFM		44 - 52 SFM		32 - 40 SFM		61 - 73 SFM		94 - 114 SFM	
Fractional	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
1/16	0.0625	3,400	0.0016	2,700	0.0013	2,100	0.0011	3,800	0.0018	5,800	0.0013
1/8	0.1250	2,000	0.0035	1,700	0.0027	1,200	0.0027	2,200	0.0043	3,500	0.0030
1/4	0.2500	1,100	0.0056	800	0.0052	610	0.0046	1,120	0.0076	1,750	0.0053
3/8	0.3750	680	0.0078	540	0.0066	400	0.0058	740	0.0099	1,200	0.0065
1/2	0.5000	510	0.0091	400	0.0079	310	0.0069	550	0.0119	860	0.0082
5/8	0.6250	410	0.0106	330	0.0091	250	0.0079	450	0.0138	690	0.0103

1) The above values apply when coolant is used in a vertical machine. In a horizontal machine or deep hole, use pecking.
2) Adjust drilling condition when unusual vibration or different sound occurs.

Standard Drilling Conditions

Taper Shank Regular Shank / Core L601
Silver and Deming L575

Workpiece Material / Speed (SFM) / Drill Diameter		Carbon Steels		Alloy Steels		Die Steels Hardened Steels Stainless Steels		Cast Irons		Aluminum Alloys Nonferrous Alloys	
		55 - 65 SFM		50 - 60 SFM		35 - 45 SFM		65 - 80 SFM		100 - 110 SFM	
Fractional	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
1/8	0.1250	2,000	0.003	1,900	0.003	1,400	0.002	2,500	0.004	3,400	0.003
3/16	0.1875	1,400	0.004	1,300	0.004	920	0.003	1,700	0.005	2,300	0.005
1/4	0.2500	1,000	0.004	920	0.005	690	0.004	1,300	0.007	1,700	0.006
5/16	0.3125	800	0.004	740	0.005	560	0.005	980	0.008	1,400	0.008
3/8	0.3750	670	0.007	620	0.006	460	0.005	820	0.008	1,200	0.008
7/16	0.4375	570	0.007	530	0.006	400	0.005	700	0.009	970	0.009
1/2	0.5000	500	0.008	460	0.006	350	0.006	620	0.010	850	0.009
5/8	0.6250	400	0.009	370	0.008	280	0.007	490	0.012	680	0.012
3/4	0.7500	340	0.010	310	0.009	230	0.008	410	0.013	570	0.013
7/8	0.8750	290	0.011	270	0.009	200	0.008	350	0.014	490	0.014
1	1.0000	250	0.012	230	0.010	180	0.009	310	0.015	430	0.014
1 1/8	1.1250	230	0.012	210	0.011	160	0.010	280	0.016	380	0.015
1 1/4	1.2500	200	0.014	190	0.011	140	0.010	250	0.016	340	0.016
1 3/8	1.3750	190	0.014	170	0.012	130	0.010	230	0.017	310	0.017
1 1/2	1.5000	170	0.014	160	0.012	120	0.011	210	0.017	290	0.017
1 5/8	1.6250	160	0.015	150	0.013	110	0.011	190	0.017	260	0.017
1 3/4	1.7500	150	0.016	140	0.013	100	0.011	180	0.018	250	0.018
1 7/8	1.8750	140	0.016	130	0.014	100	0.012	170	0.019	230	0.019
2	2.0000	130	0.016	120	0.014	90	0.012	160	0.020	220	0.020

Taper Shank Oil Hole Drills / Cobalt List No. 683

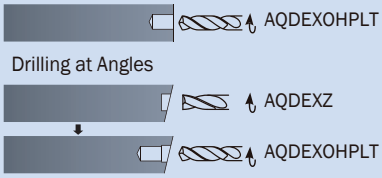
Workpiece Material / Speed (SFM) / Drill Diameter		Carbon Steels		Alloy Steels Hardened Steels		Mold Steels Stainless Steels		Cast Irons		Aluminum Alloys Nonferrous Metals	
		55 - 65 SFM		50 - 60 SFM		35 - 45 SFM		65 - 80 SFM		100 - 110 SFM	
Fractional	Decimal	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)	RPM	Feed (IPR)
3/8	0.3750	680	0.008	620	0.007	460	0.006	820	0.010	1,200	0.010
7/16	0.4375	580	0.009	530	0.007	400	0.006	700	0.011	970	0.011
1/2	0.5000	510	0.009	460	0.008	350	0.007	620	0.012	850	0.012
5/8	0.6250	410	0.011	370	0.010	280	0.008	490	0.014	680	0.014
23/32	0.7188	360	0.012	320	0.010	240	0.009	430	0.015	590	0.014
3/4	0.7500	340	0.013	310	0.011	230	0.009	410	0.015	570	0.015
7/8	0.8750	290	0.013	270	0.011	200	0.010	350	0.017	490	0.017
1	1.0000	260	0.014	230	0.012	180	0.011	310	0.018	430	0.018
1 1/4	1.2500	210	0.016	190	0.013	140	0.011	250	0.019	340	0.019
1 1/2	1.5000	170	0.017	160	0.014	120	0.012	210	0.021	290	0.021

1) The above values apply when coolant is used in a vertical machine. In a horizontal machine or deep hole, use pecking.
2) Adjust drilling condition when unusual vibration or different sound occurs.

Deep Hole Drilling Guide

Aqua Drill EX Oil Hole 10D, 15D, 20D, 25D, 30D, 40D, PLT

1. Use Guide Hole Drill (AQDEXOHPLT)



- We recommend pre-drilling with guide hole drill. Hole depth 1D - 2D
- We recommend using AQEXOHPLT for guide hole drilling. Select one with a diameter 0.015mm larger than deep hole drill
- If drilling at an angle use Aqua EX flat drill (AQDEXZ) to create a flat surface and then use Pilot Drill

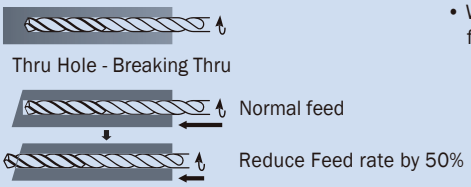
2. Deep Hole Drilling into Guide Hole

- Penetrate into the guide hole at 50% lower RPM until 0.5-1.0mm (0.02”-0.04”) from depth of guide

3. Deep Hole Drilling

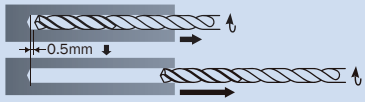
- Start Drilling at recommended Speeds & Feeds

4. Deep Hole Drilling (Breaking Thru or Blind Hole)



- When breaking thru for a thru hole reduce feed rate by 50% to prevent drill from breaking

5. Retracting Drill from the Hole



- After drilling is complete, decrease RPM and pull the drill back through the hole

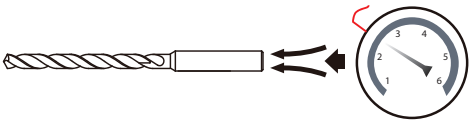
Precautions for Small Diameter Drills

1. Handling of Cutting Fluid

- To prevent Coolant holes from being blocked use a fine mesh filter. (Recommended Filtration efficiency 5µm)
- Water Soluble cutting fluid is recommended

2. Minimum Coolant pressure requirement

- Minimum coolant pressure requirement = 300 psi or 2.0 Mpa
- Above recommended pressure will enable stable machining
- If using non-water soluble cutting oils, higher pressure might be required



Recommended Coolant Pressure 1000 psi, Minimum 300 psi

3. ATC

- To reduce shock and vibration, reduce ATC feed if required

GUIDELINES FOR TROUBLESHOOTING TWIST DRILL PROBLEMS

○ **Remedial measure is highly effective**

● **Remedial measure is relatively effective**

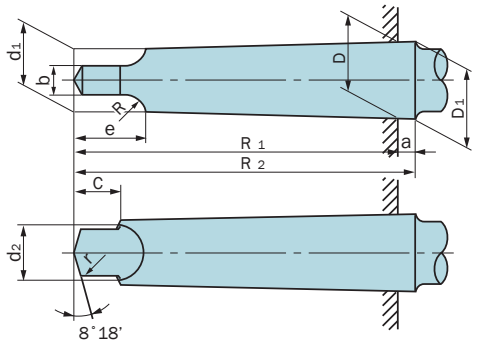
Problems	Solution	Possible Cause: Trouble with device	Faulty jig, clamp, or fixture	Faulty tool (design)	Faulty tool (regrinding)	Faulty tool holder	Defect in workplace	Unsatisfactory cutting conditions	Faulty coolant or lubricating system	Faulty process design
Oversize holes	Reduce material build up on cutting lips and flutes				(22)		24		29 30 31 32	
	Reduce difference in cutting resistance between right and left cutting lips		(4) (5B) 7	13B	● 9 0 (21)	2 8				
Curved hole or drilled off center	Prevent defective leading	(3)	3 ● 4 (5B) 7		13A 21	8			26B (27)	6 33
	Increase drill rigidity			(10)						
	Reduce difference in cutting resistance between right and left cutting lips				17B 19					
Distorted Holes	Prevent rifling		● 4		18B 19					
	Reduce irregular motion		3 7	(23)	● 20 (21)	8		26A		33
	Eliminate clogging with chips			9A 11 14 15						34
Hole position shift			(3) ● 4		20 21	8		27		33
Rough Finish or tearing in hole	Reduce galling (material build up on cutting lips)				22		(24)		29 30 31 32	
	Reduce wear				13A 19			25B		
	Reduce chatter and vibration	1	4 7	9A (23)	20 21			26A		33
Breakage of drill	Eliminate clogging with chips			9A 11 (14) 15				● 26A (36)		34
	Increase drill rigidity			(10) 23	17			● 26B		
	Reduce feed at breakthrough	1 (2)	(7)		(20) 18			● 28		
	Prevent drill deflection		3 ● 4 5B 7		13A 19 21			26B		
Abnormal wear of drill corner edge	Reduce wear			12 16	18A		24	● 25B ● 26B		
	Prevent drill deflection	(2)	(7)					26B		
Wrapping of chip around drill	Increase or decrease helix angle and cutting speed from the recommended angle and speed	(34)	5A	9 ● 11 14				26A		

GUIDELINES FOR TROUBLESHOOTING TWIST DRILL PROBLEMS

No.	Remedial action and important points
1	Increase rigidity (column and spindle) of machine tool.
2	Take steps to insure a steady feed (particularly components with pneumatic or hydraulic controls).
3	Increase accuracy of alignment of bushing. (Increase alignment of preliminary hole and spindle for hole with large diameter.)
4	Use bushing and reduce bushing clearance.
5 5A: 5B:	Clearance between workpiece to be drilled and bushing Widen this clearance. Narrow this clearance.
6	Rotate workpiece instead of tool.
7	Secure workpiece or replace fixture on the workpiece with fittings that have less clamp distortion.
8	Check contact of drill taper (clean) and reduce run-out of holder and spindle.
9 9A: 9B:	Helix angle Increase this angle. Decrease this angle.
10	Shorten overall length and flute length to Increase rigidity.
11	Provide chipbreaker.
12	Use surface treatment.
13	Point angle
13A: 13B:	Increase this angle Decrease this angle.
14	Increase flute width ratio.
15	Use oil-hole drill.
16	Upgrade material of tool.
17 17A: 17B:	Back taper Increase back taper. Decrease back taper (Check a slight decrease in diameter from point to back).
18 18A: 18B:	Lip relief angle Increase this angle. Decrease this angle.

No.	Remedial action and important points
19	Eliminate relative lip height (difference in cutting resistance between right and left cutting edges).
20	Thinning (take care to prevent excessive thinning).
21	Eliminate unevenly chiseled areas.
22	Rework worn margin completely.
23	Increase web thickness.
24	Check workpiece to be drilled, for proper grain structure and heat treatment. (HB: 180 or more)
25 25A: 25B:	Cutting speed Increase this speed. Decrease this speed.
26 26A: 26B:	Feed Increase feed rate. Decrease feed rate.
27	Decrease feed at entrance to workpiece.
28	Decrease feed at exit from workpiece.
29	Use non-water-soluble coolant.
30	Use sulfuric or chloric extreme-pressure oils.
31	Increase quantity of coolant discharged.
32	Feed oil in correct direction.
33	Drill center hole in preceding process.
34	Effect intermittent feed. (Narrow step for deep holes.)
35	Select such helix angle and end angle that cutting
36	Decrease feed rate for deep holes

TAPER SHANK WITH TENON



Morse taper	Taper		Angle on Side	Taper Shank with Tenon																
				D(2)	a	D1(3)	d1(3)	d2		R 1		R 2		b		C(4)	e		R	r
								Basic size	Tolerance	Basic size	Tolerance	Basic size	Tolerance	Basic size	Tolerance		Basic size	Tolerance	Max.	
0	1/19.212	0.05205	1°29'27"	9.045	3	9.201	6.104	6	0 −0.3	56.5	0 −1.2	59.5	0 −1.9	3.9	0 −0.180	6.5	10.5	0 −1.1	4	1
1	1/20.047	0.04988	1°25'43"	12.065	3.5	12.240	8.972	8.7	0 −0.3	62.0	0 −1.2	65.5	0 −1.9	5.2	0 −0.180	8.5	13.5	0 −1.1	5	1.2
2	1/20.020	0.04995	1°25'50"	17.780	5	18.030	14.034	13.5	0 −0.43	75.0	0 −1.2	80	0 −1.9	6.3	0 −0.220	10	16	0 −1.1	6	1.6
3	1/19.922	0.05020	1°26'16"	23.825	5	24.076	19.107	18.5	0 −0.52	94.0	0 −1.4	99	0 −2.2	7.9	0 −0.220	13	20	0 −1.3	7	2
4	1/19.254	0.05194	1°29'15"	31.267	6.5	31.605	25.164	24.5	0 −0.52	117.5	0 −1.4	124	0 −2.5	11.9	0 −0.270	16	24	0 −1.3	8	2.5
5	1/19.002	0.05263	1°30'26"	44.399	6.5	44.741	36.531	35.7	0 −0.62	149.5	0 −1.6	156	0 −2.5	15.9	0 −0.270	19	29	0 −1.3	10	3
6	1/19.180	0.05214	1°29'36"	63.348	8	63.765	52.399	51.0	0 −0.74	210.0	0 −1.85	218	0 −2.9	19	0 −0.330	27	40	0 −1.6	13	4

Tolerance of Drill Diameter

Unit : 0.001mm

Diameter (mm)		Under 3.0 D≦3	Above 3.0 Under 6.0 3<D≦6	Above 6.0 Under 10 6<D≦10	Above 10 Under 18 10<D≦18	Above 18 Under 30 18<D≦30	Above 30 Under 50 30<D≦50	Above 50 Under 80 50<D≦80	Above 80 Under 120 80<D≦120
Tolerance	js6	±3	±4	±4.5	±5.5	±6.5	±8	±8.5	±11
	h6	0 −6	0 −8	0 −9	0 −11	0 −13	0 −16	0 −19	0 −22
	h7	0 −10	0 −12	0 −15	0 −18	0 −21	0 −25	0 −30	0 −35
	h8	0 −14	0 −18	0 −22	0 −27	0 −33	0 −39	0 −46	0 −54

END MILLS

Aqua V Mill - 4 Flute

Features

- Variable helix, variable index to reduce vibrations and chatter
- Excellent at HSM/HEM
- Versatile across a range of materials
- Available in Square End, Corner Radius
- Aqua Mill Nano-layer Coating for high heat and wear resistance

Work Materials

- Cast Iron
- Tool Steel
- Titanium
- Carbon Steel
- 300/400 Series SS
- High Temp Alloys
- Alloy Steel
- PH SS

Performance

For High Performance Machining of a Range of Materials

Aqua V Mill - 5 Flute

Features

- Variable helix, variable index to reduce vibrations and chatter
- Excellent at HSM/HEM
- 5 Flute Design for faster feed rates and better surface finishes
- Available in Square End, Corner Radius and Ball End
- Aqua Mill Nano-layer Coating for high heat and wear resistance

Work Materials

- Cast Iron
- Tool Steel
- Titanium
- Carbon Steel
- 300/400 Series SS
- High Temp Alloys
- Alloy Steel
- PH SS

Performance

For High Performance Machining of a Range of Materials

*More information for **Aqua V Mill & V Mill 5 Flute** can be found on pages 152-160*

Aqua Mill Hard

Features

- Excellent for HSM of hardened steels up to 70 HRC
- Thick core and wide land width for increased rigidity
- Available in Square End, Corner Radius, and Ball End
- Aqua Mill Nano-layer Coating for high heat and wear resistance

Work Materials

- Tool steels 50+ HRC
- Hardened Steels 50+ HRC
- High Speed Steels

Performance

For Machining Hard Materials 50-70 HRC

ALH Mill

Features

- Cylindrical land allows for great surface finishes and high feed rates
- 3 Flutes allow for faster feed rates while not sacrificing chip evacuation
- High polished flutes help shear and clear chips
- Available in Square End, Corner Radius, and Ball End
- Available with coating through our 72 hour modification service

Work Materials

- Aluminum alloys
- Aluminum castings
- Copper Alloys
- Magnesium

Performance

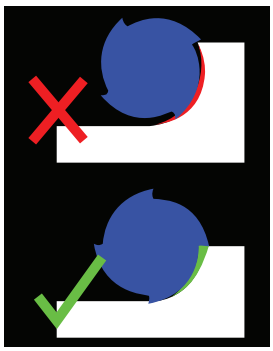
For Aluminum and Non-ferrous Materials

*More information for **Aqua Mill Hard** can be found on pages 161-165*
*More information for **ALH Mill** can be found on pages 166-170*

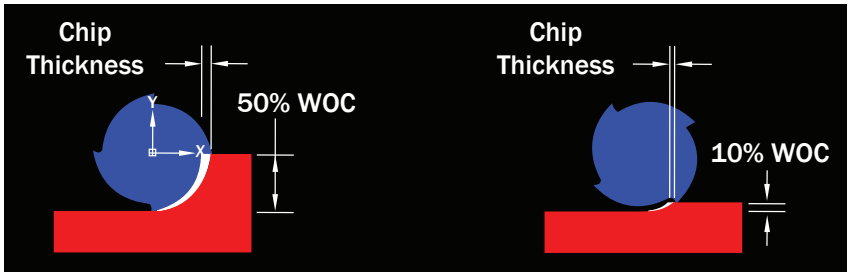
Shaping Up Your Chips

Chip Load vs. Chip Thickness

Chip shape plays an important role in proper performance, chip evacuation, and heat management while milling. A thick-to-thin chip shape is ideal. This is created when radial width of cut is 50% or less. This is a part of the reason slotting can be so hard on cutters.



Chip load and chip thickness are commonly mistaken as being one and the same. This stems from traditional toolpaths engaging half of cutter diameter. As a round tool comes around to shear a chip, width of cut plays an important role in how thick that chip will be.



Now comes the fun part- compensating for chip thinning allows for increased feed rates. As radial width of cut decreases, feed rate increases to maintain the same chip thickness. Use the formula below to find your ideal cutting condition.

$$\text{Adjusted Feed Rate} = \frac{IPT \times D}{2 \times \sqrt{(D \times RDOC) - RDOC}}$$

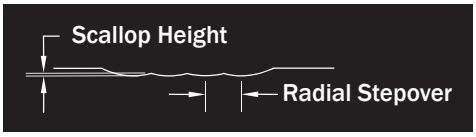
IPT = IPT @ 50% RDOC
D = Cutter Diameter
RDOC = Radial Depth of Cut

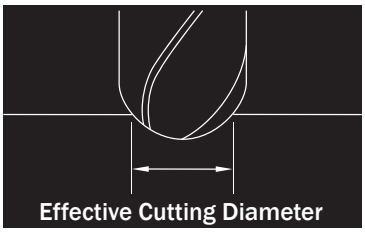
Ball Nose End Mill

Ball nose end mills are commonly used for finishing contoured surfaces. Being a full radius end, depth of cut determines effective cutting diameter. Calculating the effective cutting diameter is necessary to determine proper feed and speed adjustments.

$$\text{Effective Cutting Diameter} = 2 \times \sqrt{ADOC \times (D\text{-}ADOC)}$$

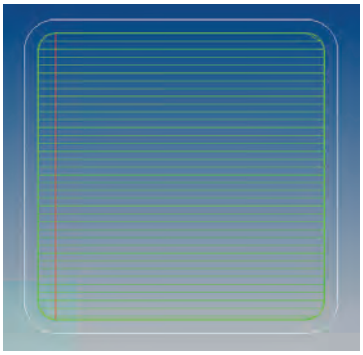
Radial stepover is a major variable in determining surface finish. This will create a “scallop height”.

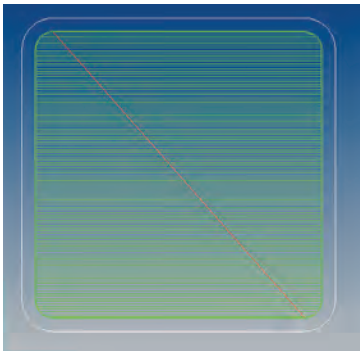




High Speed Machining

High Performance Tooling





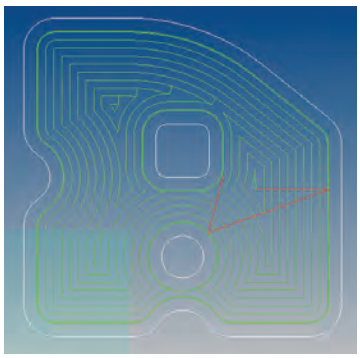
Machining 300 Series Stainless Steel

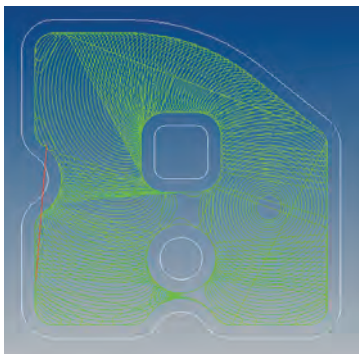
Traditional Strategy	HSM Strategy
½" 4 Flute End Mill	½" 4 Flute End Mill
290 SFM	720 SFM
0.0027 IPT	0.0046 IPT
0.5XD Axial DOC	1.5XD Axial DOC
0.3XD Radial WOC	0.1XD Radial WOC
30 Minute Cycle	18 Minute Cycle

High Speed Machining is a strategy used to decrease cycle time and increase tool life. HSM uses light radial width of cut and heavy axial depth of cut to remove a lot of material quickly. The light radial width of cut allows for faster feed rates. Using as much of the full LOC of the end mill promotes better work distribution through the flutes and leads to increased tool life. Along with increased feed rates, increased surface speed is also desirable with HSM. Because the tool is engaging less material, less heat is generated. SFM can be increased to achieve even faster cycle time.

High Efficiency Machining

HSM Meets Modern CAM





Machining 300 Series Stainless Steel

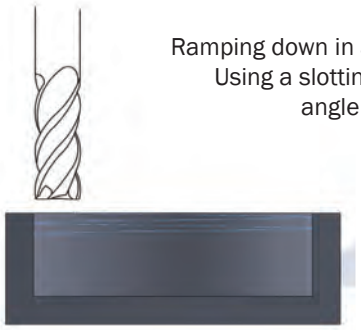
Traditional Strategy	HSM Strategy
½" 4 Flute End Mill	½" 4 Flute End Mill
290 SFM	720 SFM
0.0027 IPT	0.0046 IPT
0.5XD Axial DOC	1.5XD Axial DOC
0.3XD Radial WOC	0.1XD Radial WOC
22 Minute Cycle	11 Minute Cycle

High Efficiency Machining is a strategy combining HSM and modern CAM software capabilities. HEM strategy uses paths that create consistent chip load, avoiding sharp turns and crunching in corners. Utilizing chip thinning calculation, light radial depths of cut allow for faster feed rates with the same actual chip thickness. This not only allows for parts to be machined faster, but also is much easier on tooling.

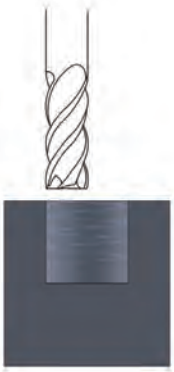
Entry Methods

Plunge • Ramp • Helix • Pilot

The simplest way, and harshest way, to enter a pocket is to plunge into the part. Using a decreased feed rate, plunge to the desired depth and then start milling. This is extremely rough on tools and will lead to a short tool life, especially in harder materials.



Ramping down in a straight line offers an advantage over plunging. Using a slotting speed/feed and ramping down at a 1-3 degree angle promote less tool wear than traditional plunging.



Helical ramp entry has always been known as a preferred method to enter a pocket. Using a slotting speed/feed and helixing down at a 1-3 degree angle promote less tool wear than traditional plunging.

Another common method to enter a pocket is to drill a pilot hole using a standard point drill. This leaves a drill point angle at the bottom of the pocket that must be cleaned up with the end mill.

Nachi offers a unique solution to pilot the starting hole with our Aqua EX Flat Bottom Drill. Creating this pilot hole allows for plunging straight down and getting to work. This eliminates the need to mill out a drill point angle at the bottom of the pocket. This is the fastest way, and the best method for tool life.

Finishing Methods

Radial width of cut can play an important role in finishing. When taking a finish pass, it is important to keep the cutter engaged enough that it does not chatter. Two common methods can be used to eliminate chatter.

Taking a heavier cut can engage the tool more and prevent it from vibrating too much.

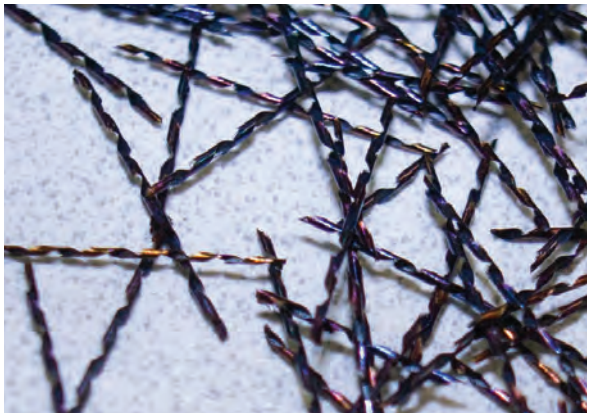
Tipping the balance between RPM and feed rate can engage the tool more to decrease vibration. Try decreasing RPM 5 or 10%, or increasing feed rate 5 or 10%.

Hard Milling

Read Your Chips

When hard milling, it is important to use air blow rather than coolant. Due to the high heat generated while machining hard materials, using coolant can cause a pulsating hot and cold effect that causes the carbide to fracture.

✓Good



✓Good

It is important to read your chips while hard milling. The goal is to machine just enough material to pull the heat out in the chip. This will cause the chips to discolor, being blue, gold, purple, etc.

✗ Bad

A chip that is silver in color is a good indicator that the heat generated from milling is being left in the material and in the tool. This will lead to decreased tool life. This can also indicate that the tool is worn and near the end of it's life.

End Mill Modifications

Nachi America offers a 72 hour turn around modification service on our full line of carbide end mills.

Weldon flats, corner radius, and different coatings can be applied using the EDP # from the table below.

Chip breakers can be added, as well. Since there are many different configurations for these, call for pricing based on the details of your request.

End Mill Alerations (Fractional)					
Weldon Flat		Corner Radius or Chamfer		Coating	
EDP #	Shank Ø	EDP #	Shank Ø	EDP #	Shank Ø
ALT100031	0.1250	ALT100039	0.1250	ALT100047	0.1250
ALT100032	0.1875	ALT100040	0.1875	ALT100048	0.1875
ALT100033	0.2500	ALT100041	0.2500	ALT100049	0.2500
ALT100034	0.3125	ALT100042	0.3125	ALT100050	0.3125
ALT100035	0.3750	ALT100043	0.3750	ALT100051	0.3750
ALT100036	0.5000	ALT100044	0.5000	ALT100052	0.5000
ALT100037	0.6250	ALT100045	0.6250	ALT100053	0.6250
ALT100038	0.7500	ALT100046	0.7500	ALT100054	0.7500

End Mill Alerations (Metric)					
Weldon Flat		Corner Radius or Chamfer		Coating	
EDP #	Shank Ø	EDP #	Shank Ø	EDP #	Shank Ø
ALT100001	3	ALT100011	3	ALT100021	3
ALT100002	4	ALT100012	4	ALT100022	4
ALT100003	5	ALT100013	5	ALT100023	5
ALT100004	6	ALT100014	6	ALT100024	6
ALT100005	8	ALT100015	8	ALT100025	8
ALT100006	10	ALT100016	10	ALT100026	10
ALT100007	12	ALT100017	12	ALT100027	12
ALT100008	16	ALT100018	16	ALT100028	16
ALT100009	18	ALT100019	18	ALT100029	18
ALT100010	20	ALT100020	20	ALT100030	20

*** Contact your local sales rep or email: toolsengineer@nachiamerica.com for any questions regarding the End Mill Modification service.**

HIGH PERFORMANCE END MILLS

LIST No		End Mills Name	Material	Coating		Stock Size	Product Page
Aqua V Mill							
9701 9702		**4 Flute**	Carbide	Aqua Mill	Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.152
9703 9704		**4 Flute Corner Radius**			Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.153
9705 9706		**5 Flute**			Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.154
9707 9708		**5 Flute Corner Radius**			Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.155
9709 9710		**5 Flute Ball Nose**			Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.156
Aqua Mill Hard							
9711 9712		**Square End**			Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.161
9713 9714		**Corner Radius**			Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.162
9715 9716		**Ball Nose**			Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.163
ALH Mill							
9717 9718		**ALH Square End**	Carbide	Bright	Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.166
9719 9720		**ALH Corner Radius**			Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.167
9721 9722		**ALH Ball Nose**			Fractional Metric	1/8 to 3/4 3.0 - 20.0	p.168

●: Great ○ : Good △: OK

LIST No	Cutting Condition Page	Side Milling			Grooving			Profile Milling	Rib Process	Workpiece Material																	
		Rough	Semi-Finish	Finish	Rough	Semi-Finish	Finish			Structural Steel	Carbon Steel		Alloy Steel	Pre-Hardened Steel	Die Steel	Hardened Steel			Stainless Steel		Titanium Alloys	Nickel Alloys	Cast Iron	Aluminum		Copper Alloys
											Low Carbon 1010,1018	High Carbon 1045,1065			HRc 30 to 45	HRc 45 to 55	HRc 55 to 60	HRc 60 to 65	Austenitic 300 Series	Martensitic 400 Series				Casting Si ≦ 12%	High Si Si >13%	
Aqua V Mill																											
9701 9702	p.157,158	●	●	●	○	○	○	●	△	●	●	●	●	●	●				●	●	●	●	●	●	△	●
9703 9704	p.157,158	●	●	●	○	○	○	●	△	●	●	●	●	●	●				●	●	●	●	●	●	△	●
9705 9706	p.159,160	●	●	●	○	○	○	●	○	●	●	●	●	●	●				●	●	●	●	●	●	△	●
9707 9708	p.159,160	●	●	●	△	△	△	●	○	●	●	●	●	●	●				●	●	●	●	●	●	△	○
9709 9710	p.159,160	●	●	●				●		●	●	●	●	●	●				●	●	●	●	●	●	△	○
Aqua Mill Hard																											
9711 9712	p.164	●	●	●				●								●	●	●								
9713 9714	p.164	●	●	●				●								●	●	●								
9715 9716	p.165	●	●	●				●								●	●	●								
ALH Mill																											
9717 9718	p.169,170	●	●	●	●	●	●	●	○															●	●	●
9719 9720	p.169,170	●	●	●	●	●	●	●	○															●	●	●
9721 9722	p.169,170	●	●	●	●	●	●	●	○															●	●	●

COATED HIGH SPEED STEEL END MILLS

LIST No		End Mills Name	Material	Coating		Stock Size	Product Page
DLC-Mill							
6231HD			HSS-Co	DLC	Fractional	1/8 to 1	p.171
AG-Mill Roughing							
6485			HSS-Co	AG	Fractional	1/4 to 2	p.172
AG-Mill Heavy							
6403					Fractional	1/4 to 2	p.173

COATED END MILLS

LIST No		End Mill Name	Material	Coating		Stock Size	Product Page
SG							
6367X		**Roughing & Finishing**	HSS-Co	SG	Fractional	1/4 to 2	p.174
6303X		**Roughing**			Fractional	1/4 to 2	p.176
6231X		**2 Flute**			Fractional	1/8 to 1-1/2	p.179
6211X		**Multi-Flute**			Fractional	1/8 to 1-1/2	p.183

NON COATED END MILLS

LIST No		End Mill Name	Material		Stock Size	Product Page
High Speed Steel						
6367		**Roughing & Finishing**	HSS-Co	Fractional	1/4 to 3	p.174
6303		**Roughing**		Fractional	1/4 to 2	p.176
6307		**Roughing**		Fractional	1/4 to 2	p.177
6231		**2 Flute**	HSS	Fractional	1/8 to 2	p.179
6233		**2 Flute Long**	HSS-Co	Fractional	1/4 to 2	p.180
6230		**Regular Single End**		Metric	1.0 to 30.0	p.180
6210		**4 Flute**		Metric	2.5 to 50.0	p.182
6211M		**Multi-Flute**		Fractional	1/8 to 2	p.183
6213		**Multi-Flute Long**	HSS	Fractional	1/4 to 1-1/4	p.184

●: Great ○ : Good △: OK

LIST No	Cutting Condition Page	Side Milling			Grooving			Profile Milling	Rib Process	Workpiece Material																
		Rough	Semi-Finish	Finish	Rough	Semi-Finish	Finish			Structural Steel	Carbon Steel		Alloy Steel	Pre-hardened Steel	Die Steel	Hardened Steel			Stainless Steel		Titanium Alloys	Nickel Alloys	Cast Iron	Aluminum		Copper Alloys
											Low Carbon 1010,1018	High Carbon 1045,1065			HRc 30 to 45	HRc 45 to 55	HRc 55 to 60	HRc 60 to 65	Austenitic 300 Series	Martensitic 400 Series				Casting Si ≦ 12%	High Si Si >13%	
DLC-Mill																										
6231HD	p.171		●	●		●	●																	●		○
AG-Mill Roughing																										
6485	p.172	●			●					●	●	●	●	○	○				●	●	●	●	○	○		○
AG-Mill Heavy																										
6403	p.173	●	●		●	●				●	●	●	●	○	○				●	●	●	●	○	○		○

●: Great ○ : Good △: OK

LIST No	Cutting Condition Page	Side Milling			Grooving			Profile Milling	Rib Process	Workpiece Material																
		Rough	Semi-Finish	Finish	Rough	Semi-Finish	Finish			Structural Steel	Carbon Steel		Alloy Steel	Pre-Hardened Steel	Die Steel	Hardened Steel			Stainless Steel		Titanium Alloys	Nickel Alloys	Cast Iron	Aluminum		Copper Alloys
											Low Carbon 1010,1018	High Carbon 1045,1065			HRc 30 to 45	HRc 45 to 55	HRc 55 to 60	HRc 60 to 65	Austenitic 300 Series	Martensitic 400 Series				Casting Si ≦ 12%	High Si Si >13%	
SG																										
6367X	p.175	●	●		●	●				●	●	●	○	○									△	△	△	△
6303X	p.178	●			●					●	●	●	○	○									△	△	△	△
6231X	p.181					○	●			●	●	●	○	○									△	△	△	△
6211X	p.186		○	●						●	●	●	○	○									△	△	△	△

●: Great ○ : Good △: OK

LIST No	Cutting Condition Page	Side Milling			Grooving			Profile Milling	Rib Process	Workpiece Material																
		Rough	Semi-Finish	Finish	Rough	Semi-Finish	Finish			Structural Steel	Carbon Steel		Alloy Steel	Pre-Hardened Steel	Die Steel	Hardened Steel			Stainless Steel		Titanium Alloys	Nickel Alloys	Cast Iron	Aluminum		Copper Alloys
											Low Carbon 1010,1018	High Carbon 1045,1065			HRc 30 to 45	HRc 45 to 55	HRc 55 to 60	HRc 60 to 65	Austenitic 300 Series	Martensitic 400 Series				Casting Si ≦ 12%	High Si Si >13%	
High Speed Steel																										
6367	p.175	○	○							○	○	○	○	○									○	△	△	○
6303	p.178	○								○	○	○	○	○									○	△	△	○
6307	p.178	○			○					○	○	○	○	○									○	△	△	○
6231	p.181					○	○			○	○	○	○	○									○	△	△	○
6233	p.181					○	○			○	○	○	○	○									○	△	△	○
6230	p.181					○	○			○	○	○	○	○									○	△	△	○
6210	p.185		○	○			△			○	○	○	○	○									○	△	△	○
6211M	p.185		○	○			△			○	○	○	○	○									○	△	△	○
6213	p.185		○	○			△			○	○	○	○	○									○	△	△	○

Aqua V Mill - 4 Flute

List No. 9701

Fractional Sizes

(Unit) : mm

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000138	1/8	0.3750	1.5	4
41000139	3/16	0.4375	2.0	4
41000140	1/4	0.5000	2.5	4
41000141	5/16	0.8125	2.5	4
41000142	3/8	0.8750	2.5	4
41000143	3/8	1.1250	3.0	4
41000144	1/2	1.0000	3.0	4
41000145	1/2	1.2500	3.25	4
41000146	5/8	1.2500	3.5	4
41000147	3/4	1.5000	4.0	4

List No. 9702

Metric sizes

(Unit) : mm

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000001	3	8	57	4
41000002	4	11	57	4
41000003	5	11	57	4
41000004	6	13	57	4
41000005	8	19	70	4
41000006	10	22	70	4
41000007	12	26	75	4
41000008	16	32	90	4
41000009	18	38	100	4
41000010	20	45	100	4

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Aqua V Mill - 4 Flute Corner Radius

List No. 9703 Fractional sizes

EDP	Cutting Diameter	Length of Cut	Overall Length	0.015 CR	0.030 CR	0.060 CR	.120 CR	Flutes
41000181	1/8	0.3750	1.50	X				4
41000182	3/16	0.4375	2.00		X			4
41000183	1/4	0.5000	2.50		X			4
41000184	5/16	0.8125	2.50		X			4
41000185	3/8	0.8750	2.50		X			4
41000186	1/2	1.0000	3.00		X			4
41000187	1/2	1.2500	3.25		X			4
41000189	1/2	1.0000	3.00			X		4
41000190	1/2	1.0000	3.00				X	4
41000191	5/8	1.2500	3.50		X			4
41000192	5/8	1.2500	3.50			X		4
41000193	5/8	1.2500	3.50				X	4
41000194	3/4	1.5000	4.00		X			4
41000195	3/4	1.5000	4.00			X		4
41000196	3/4	1.5000	4.00				X	4

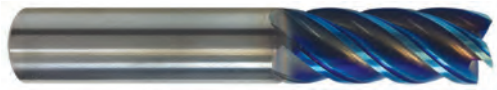
List No. 9704 Metric Sizes

(Unit) : mm

EDP	Cutting Diameter	Length of Cut	Overall Length	0.3 CR	0.5 CR	1.0 CR	2.0 CR	Flutes
41000021	3	8	57	X				4
41000022	4	11	57	X				4
41000023	5	11	57		X			4
41000024	6	13	57		X			4
41000025	8	19	70		X			4
41000026	8	19	70			X		4
41000027	10	22	80		X			4
41000028	10	22	80			X		4
41000029	12	26	90		X			4
41000030	12	26	90			X		4
41000031	12	26	90				X	4
41000032	16	32	90			X		4
41000033	16	32	90				X	4
41000034	18	38	100			X		4
41000035	18	38	100				X	4
41000036	20	45	100				X	4

1 per tube

Aqua V Mill - 5 Flute



List No. 9705 Fractional Sizes

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000148	1/8	0.2500	1.50	5
41000149	1/8	0.5000	1.50	5
41000150	1/8	0.7500	2.50	5
41000151	3/16	0.3125	2.00	5
41000152	3/16	0.5625	2.00	5
41000153	3/16	0.7500	2.50	5
41000154	1/4	0.3750	2.00	5
41000155	1/4	0.7500	2.50	5
41000156	1/4	1.1250	3.00	5
41000157	5/16	0.4375	2.00	5
41000158	5/16	0.8125	2.50	5
41000159	5/16	1.2500	3.00	5
41000160	5/16	2.1250	4.00	5
41000161	3/8	0.5000	2.00	5
41000162	3/8	1.0000	2.50	5
41000163	3/8	1.2500	3.00	5
41000164	3/8	1.6250	4.00	5
41000165	3/8	2.5000	6.00	5
41000166	1/2	0.6250	2.50	5
41000167	1/2	1.0000	3.00	5
41000168	1/2	1.2500	3.00	5
41000169	1/2	1.6250	4.00	5
41000170	1/2	2.1250	4.00	5
41000171	1/2	3.2500	6.00	5
41000172	5/8	0.7500	3.00	5
41000173	5/8	1.6250	3.50	5
41000174	5/8	2.1250	4.00	5
41000175	5/8	2.6250	5.00	5
41000176	5/8	3.2500	6.00	5
41000177	3/4	1.0000	3.00	5
41000178	3/4	1.6250	4.00	5
41000179	3/4	2.3750	5.00	5
41000180	3/4	3.2500	6.00	5

List No. 9706 Metric Sizes

(Unit) : mm

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000011	3	8	57	5
41000012	4	11	57	5
41000013	5	11	57	5
41000014	6	13	57	5
41000015	8	19	70	5
41000016	10	22	70	5
41000017	12	26	75	5
41000018	16	32	90	5
41000019	18	38	100	5
41000020	20	45	100	5

1 per tube

Aqua V Mill - 5 Flute Corner Radius

List No. 9707

Fractional sizes

EDP	Cutting Dia.	Length of Cut	Overall Length	0.015 CR	0.030 CR	0.060 CR	0.120 CR	Flutes
41000197	1/8	0.2500	1.50	X				5
41000198	1/8	0.5000	1.50	X				5
41000199	1/8	0.7500	2.50	X				5
41000200	3/16	0.3125	2.00		X			5
41000201	3/16	0.5625	2.00		X			5
41000202	3/16	0.7500	2.50		X			5
41000203	1/4	0.3750	2.00			X		5
41000204	1/4	0.7500	2.50			X		5
41000205	1/4	1.1250	3.00			X		5
41000206	5/16	0.4375	2.00		X			5
41000207	5/16	0.4375	2.00			X		5
41000208	5/16	0.8125	2.50		X			5
41000209	5/16	0.8125	2.50			X		5
41000210	5/16	1.2500	3.00		X			5
41000211	5/16	2.1250	4.00		X			5
41000212	3/8	0.5000	2.00		X			5
41000213	3/8	0.5000	2.00			X		5
41000214	3/8	1.0000	2.50		X			5
41000215	3/8	1.0000	2.50			X		5
41000216	3/8	1.0000	2.50				X	5
41000217	3/8	1.2500	3.00			X		5
41000218	3/8	1.6250	4.00			X		5
41000219	3/8	2.5000	6.00			X		5
41000220	1/2	0.6250	2.50		X			5
41000221	1/2	0.6250	2.50			X		5
41000222	1/2	0.6250	2.50				X	5
41000223	1/2	1.0000	3.00		X			5
41000224	1/2	1.0000	3.00			X		5
41000225	1/2	1.0000	3.00				X	5
41000226	1/2	1.2500	3.00		X			5
41000227	1/2	1.6250	4.00		X			5
41000228	1/2	2.1250	4.00		X			5
41000229	1/2	3.2500	6.00		X			5
41000230	5/8	0.7500	3.00		X			5
41000231	5/8	0.7500	3.00			X		5
41000232	5/8	1.6250	3.50		X			5
41000233	5/8	1.6250	3.50			X		5
41000234	5/8	1.6250	3.50				X	5
41000235	5/8	2.1250	4.00		X			5
41000236	5/8	2.6250	5.00		X			5
41000237	5/8	3.2500	6.00		X			5
41000238	3/4	1.0000	3.00		X			5
41000239	3/4	1.0000	3.00			X		5
41000240	3/4	1.0000	3.00				X	5
41000241	3/4	1.6250	4.00		X			5
41000242	3/4	1.6250	4.00			X		5
41000243	3/4	1.6250	4.00				X	5
41000244	3/4	2.3750	5.00		X			5
41000245	3/4	3.2500	6.00		X			5

List No. 9708

Metric sizes

(Unit) : mm

EDP	Cutting Dia.	Length of Cut	Overall Length	0.3 CR	0.5 CR	1.0 CR	2.0 CR	Flutes
41000037	3	8	57	X				5
41000038	4	11	57	X				5
41000039	5	11	57		X			5
41000040	6	13	57		X			5
41000041	8	19	70		X			5
41000042	8	19	70			X		5
41000043	10	22	80		X			5
41000044	10	22	80			X		5
41000045	12	26	90		X			5
41000046	12	26	90			X		5
41000047	12	26	90				X	5
41000048	16	32	90			X		5
41000049	16	32	90				X	5
41000050	18	38	100			X		5
41000051	18	38	100				X	5
41000052	20	45	100				X	5

1 per tube

Aqua V Mill - 5 Flute Ball Nose

List No. 9709

Fractional Sizes

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000246	1/8	0.2500	1.5	5
41000247	1/8	0.5000	1.5	5
41000248	1/8	0.7500	2.5	5
41000249	3/16	0.3125	2.0	5
41000250	3/16	0.5625	2.0	5
41000251	3/16	0.7500	2.5	5
41000252	1/4	0.3750	2.0	5
41000253	1/4	0.7500	2.5	5
41000254	1/4	1.1250	3.0	5
41000255	5/16	0.4375	2.0	5
41000256	5/16	0.8125	2.5	5
41000257	5/16	1.2500	3.0	5
41000258	3/8	0.5000	2.0	5
41000259	3/8	1.0000	2.5	5
41000260	3/8	1.2500	3.0	5

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000261	3/8	1.6250	3.5	5
41000262	3/8	1.6250	6.0	5
41000263	1/2	0.6250	2.5	5
41000264	1/2	1.0000	3.0	5
41000265	1/2	1.2500	3.0	5
41000266	1/2	1.6250	4.0	5
41000267	1/2	1.6250	6.0	5
41000268	5/8	0.7500	3.0	5
41000269	5/8	1.6250	3.5	5
41000270	5/8	2.1250	4.0	5
41000271	5/8	2.1250	6.0	5
41000272	3/4	1.0000	3.0	5
41000273	3/4	1.6250	4.0	5
41000274	3/4	2.3750	5.0	5
41000275	3/4	2.3750	6.0	5

List No. 9710

Metric Sizes

(Unit) : mm

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000053	3	8	57	5
41000054	4	11	57	5
41000055	5	11	57	5
41000056	6	13	57	5
41000057	8	19	70	5
41000058	10	22	90	5
41000059	12	26	90	5
41000060	16	32	100	5
41000061	18	38	100	5
41000062	20	45	100	5

1 per tube

Standard Milling Conditions

Aqua V Mill 4 Flute List No. 9701, 9702, 9703, 9704

Side Milling

Work Material	Cast Irons			Carbon Steels 1018/1020			Medium Alloy Steels 4130/4140			Tool Steels <40 HRC			Stainless Steels 400 Series			Stainless Steels 300 Series			Stainless Steels PH			Titanium Alloys			High Temp Alloys Inconel, Haynes, etc.		
Milling Conditions	440-500 SFM			470-510 SFM			410-450 SFM			410-450 SFM			410-450 SFM			360-390 SFM			330-360 SFM			200-250 SFM			75-100 SFM		
Mill Diam.	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3	16200	0.00076	49.2	16500	0.0010	66.0	14500	0.00076	44.0	14500	0.00071	41.5	14500	0.00071	41.5	12500	0.00076	37.8	11500	0.00066	30.3	8100	0.00059	19.2	3250	0.00065	8.4
1/8	15300	0.0008	49.0	15500	0.00109	67.4	13750	0.0008	44.0	13750	0.00076	41.5	13750	0.00076	41.5	11900	0.00080	38.1	11000	0.00069	30.5	7650	0.00063	19.2	3050	0.00069	8.4
4	12100	0.0010	48.4	12500	0.00129	64.6	11000	0.0010	44.0	11000	0.00094	41.5	11000	0.00094	41.5	9450	0.00101	38.1	8700	0.00085	29.6	6050	0.00079	19.1	2500	0.00086	8.6
3/16	10200	0.00118	47.9	10400	0.00148	61.6	9200	0.00118	43.2	9200	0.00112	41.1	9200	0.00112	41.1	7950	0.00120	38.2	7300	0.0010	29.2	5100	0.00094	19.1	2050	0.00102	8.4
5	9700	0.00123	47.8	9900	0.00154	61.0	8700	0.00123	42.9	8700	0.00117	40.8	8700	0.00117	40.8	7600	0.00126	38.3	7000	0.0010	28.0	4850	0.00100	19.4	1950	0.00107	8.4
6	8100	0.00147	47.5	8250	0.00179	59.0	7300	0.00147	42.8	7300	0.0014	40.9	7300	0.0014	40.9	6300	0.00151	38.1	5800	0.00124	28.7	4050	0.00118	19.1	1600	0.00129	8.2
1/4	7650	0.00155	47.4	7800	0.00188	58.5	6900	0.00155	42.8	6900	0.00148	40.8	6900	0.00148	40.8	6000	0.00160	38.4	5500	0.00131	28.7	3800	0.00125	19.0	1550	0.00136	8.4
5/16	6100	0.00193	47.0	6200	0.00227	56.3	5500	0.00193	42.4	5500	0.00184	40.5	5500	0.00184	40.5	4800	0.0020	38.4	4400	0.00161	28.4	3050	0.00156	19.1	1200	0.00170	8.1
8	6050	0.00194	46.9	6200	0.00228	56.7	5450	0.00194	42.3	5450	0.00186	40.5	5450	0.00186	40.5	4700	0.0020	37.6	4400	0.00162	28.6	3050	0.00158	19.2	1200	0.00171	8.2
3/8	5100	0.0023	46.9	5200	0.00266	55.4	4600	0.0023	42.3	4600	0.00221	40.6	4600	0.00221	40.6	4000	0.00240	38.4	3700	0.00192	28.4	2550	0.00188	19.1	1000	0.00204	8.1
10	4850	0.00241	46.8	4950	0.00278	55.1	4400	0.00241	42.5	4400	0.00231	40.7	4400	0.00231	40.7	3800	0.00252	38.3	3500	0.0020	28.0	2400	0.00197	18.9	1000	0.00214	8.5
7/16	4350	0.00268	46.5	4450	0.00306	54.4	3900	0.00268	41.7	3900	0.00257	40.1	3900	0.00257	40.1	3400	0.00280	38.1	3100	0.00222	27.6	2200	0.00219	19.3	900	0.00237	8.5
12	4050	0.00288	46.7	4100	0.00328	53.7	3650	0.00288	42.1	3650	0.00277	40.4	3650	0.00277	40.4	3150	0.00302	38.1	2900	0.00239	27.8	2000	0.00236	18.9	800	0.00256	8.2
1/2	3800	0.00305	46.4	3900	0.00345	53.8	3400	0.00305	41.5	3400	0.00293	39.8	3400	0.00293	39.8	3000	0.00320	38.4	2800	0.00253	28.3	1900	0.00250	19.0	750	0.00271	8.1
9/16	3400	0.00343	46.6	3450	0.00384	53.0	3050	0.00343	41.8	3050	0.00329	40.2	3050	0.00329	40.2	2650	0.00360	38.2	2500	0.00284	28.4	1700	0.00281	19.1	700	0.00305	8.5
5/8	3050	0.0038	46.4	3100	0.00424	52.5	2750	0.0038	41.8	2750	0.00366	40.2	2750	0.00366	40.2	2400	0.0040	38.4	2200	0.00314	27.7	1500	0.00313	18.8	600	0.00339	8.1
16	3000	0.00383	46.0	3100	0.00427	52.9	2750	0.00383	42.1	2750	0.00368	40.5	2750	0.00368	40.5	2350	0.0040	37.6	2200	0.00317	27.9	1500	0.00315	18.9	600	0.00341	8.2
3/4	2550	0.00455	46.4	2600	0.0050	52.0	2300	0.00455	41.9	2300	0.00438	40.3	2300	0.00438	40.3	2000	0.00480	38.4	1800	0.00376	27.0	1300	0.00375	19.5	500	0.00406	8.1
20	2400	0.00477	45.8	2500	0.00526	52.6	2200	0.00477	42.0	2200	0.0046	40.5	2200	0.0046	40.5	1900	0.0050	38.0	1800	0.00394	28.4	1200	0.00394	18.9	500	0.00426	8.5
Depth of Cut a_a	1.5D																										
Depth of Cut a_r	0.5D									0.3D															0.25D		

Finishing

Work Material	Cast Irons			Carbon Steels 1018/1020			Medium Alloy Steels 4130/4140			Tool Steels <40 HRC			Stainless Steels 400 Series			Stainless Steels 300 Series			Stainless Steels PH			Titanium Alloys			High Temp Alloys Inconel, Haynes, etc.		
Milling Conditions	490-540 SFM			550-600 SFM			490-540 SFM			490-540 SFM			490-540 SFM			450-500 SFM			400-450 SFM			250-300 SFM			75-120 SFM		
Mill Diam.	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3	17500	0.0007	51.0	19400	0.0009	68.3	17500	0.0008	55.2	17500	0.0007	51.0	17500	0.0007	51.0	16200	0.0008	51.1	14500	0.0006	37.4	9700	0.0006	25.0	3900	0.0007	11.5
1/8	16500	0.0008	50.8	18300	0.0009	68.1	16500	0.0008	55.0	16500	0.0008	50.8	16500	0.0008	50.8	15300	0.0008	51.0	13800	0.0007	37.5	9200	0.0007	25.0	3650	0.0008	11.4
4	13100	0.0010	50.6	14500	0.0012	67.5	13100	0.0010	54.9	13100	0.0010	50.6	13100	0.0010	50.6	12100	0.0010	50.7	10900	0.0008	37.0	7300	0.0008	24.8	2900	0.0010	11.4
3/16	11000	0.0011	50.4	12200	0.0014	67.3	11000	0.0012	54.8	11000	0.0011	50.4	11000	0.0011	50.4	10200	0.0012	50.9	9200	0.0010	37.0	6100	0.0010	24.5	2450	0.0012	11.5
5	10500	0.0012	50.5	11600	0.0014	67.2	10500	0.0013	55.0	10500	0.0012	50.5	10500	0.0012	50.5	9700	0.0013	50.8	8750	0.0011	36.9	5800	0.0011	24.5	2350	0.0012	11.5
6	8700	0.0014	50.0	9700	0.0017	67.1	8700	0.0016	54.6	8700	0.0014	50.0	8700	0.0014	50.0	8100	0.0016	50.8	7300	0.0013	36.7	4850	0.0013	24.4	1950	0.0015	11.5
1/4	8250	0.0015	50.2	9200	0.0018	67.3	8250	0.0017	54.7	8250	0.0015	50.2	8250	0.0015	50.2	7650	0.0017	50.8	6900	0.0013	36.7	4600	0.0013	24.5	1850	0.0016	11.5
5/16	6600	0.0019	50.0	7300	0.0023	66.6	6600	0.0021	54.7	6600	0.0019	50.0	6600	0.0019	50.0	6100	0.0021	50.5	5500	0.0017	36.4	3700	0.0017	24.5	1450	0.0019	11.3
8	6500	0.0019	49.7	7300	0.0023	67.1	6550	0.0021	54.7	6550	0.0019	50.0	6550	0.0019	50.0	6050	0.0021	50.5	5450	0.0017	36.4	3650	0.0017	24.4	1450	0.0020	11.4
3/8	5500	0.0023	49.9	6100	0.0027	66.6	5500	0.0025	54.6	5500	0.0023	49.9	5500	0.0023	49.9	6000	0.0025	59.6	4600	0.0020	36.4	3050	0.0020	24.2	1200	0.0023	11.2
10	5250	0.0024	50.0	5800	0.0029	66.5	5250	0.0026	54.8	5250	0.0024	50.0	5250	0.0024	50.0	4850	0.0026	50.6	4350	0.0021	36.1	2900	0.0021	24.1	1150	0.0024	11.3
7/16	4700	0.0026	49.7	5200	0.0032	66.1	4700	0.0029	54.5	4700	0.0026	49.7	4700	0.0026	49.7	4350	0.0029	50.4	3900	0.0023	36.0	2600	0.0023	24.0	1050	0.0027	11.4
12	4350	0.0029	49.7	4850	0.0034	66.6	4350	0.0031	54.4	4350	0.0029	49.7	4350	0.0029	49.7	4050	0.0031	50.7	3650	0.0025	36.3	2400	0.0025	23.9	970	0.0029	11.4
1/2	4100	0.0030	49.5	4600	0.0036	66.8	4100	0.0033	54.3	4100	0.0030	49.5	4100	0.0030	49.5	3800	0.0033	50.3	3400	0.0026	35.8	2300	0.0026	24.2	920	0.0031	11.4
9/16	3650	0.0034	49.6	4100	0.0041	66.9	3650	0.0037	54.3	3650	0.0034	49.6	3650	0.0034	49.6	3400	0.0037	50.6	3050	0.0030	36.1	2050	0.0030	24.2	820	0.0035	11.5
5/8	3300	0.0038	49.8	3650	0.0045	66.1	3300	0.0041	54.6	3300	0.0038	49.8	3300	0.0038	49.8	3050	0.0041	50.4	3750	0.0033	49.2	1850	0.0033	24.3	730	0.0039	11.3
16	3300	0.0038	50.2	2650	0.0046	48.4	3300	0.0042	55.0	3300	0.0038	50.2	3300	0.0038	50.2	3050	0.0042	50.8	2750	0.0033	36.4	1800	0.0033	23.8	730	0.0039	11.4
3/4	2750	0.0045	49.7	3050	0.0054	66.2	2750	0.0050	54.5	2750	0.0045	49.7	2750	0.0045	49.7	2550	0.0050	50.6	2300	0.0039	36.2	1550	0.0039	24.4	610	0.0047	11.4
20	2600	0.0047	49.3	2900	0.0057	66.1	2600	0.0052	54.1	2600	0.0047	49.3	2600	0.0047	49.3	2450	0.0052	51.0	2200	0.0041	36.3	1450	0.0041	23.9	580	0.0049	11.3
Depth of Cut a_a	1.5D																										
Depth of Cut a_r	0.010" - 0.015"																								0.010"		

Standard Milling Conditions

Aqua V Mill 4 Flute List No. 9701, 9702, 9703, 9704

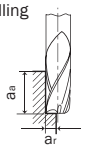
Slotting

Work Material	Cast Irons			Carbon Steels 1018/1020			Medium Alloy Steels 4130/4140			Tool Steels <40 HRC			Stainless Steels 400 Series			Stainless Steels 300 Series			Stainless Steels PH			Titanium Alloys			High Temp Alloys Inconel, Haynes, etc.		
Milling Conditions	325-375 SFM			330-380 SFM			290-340 SFM			290-340 SFM			290-340 SFM			240-290 SFM			220-270 SFM			140-190 SFM			50-75 SFM		
Mill Diam.	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3	12100	0.0005	26.1	12300	0.0006	31.7	11000	0.0006	24.9	11000	0.0006	24.9	11000	0.0006	24.9	9400	0.0006	24.2	8750	0.0005	17.6	6150	0.0005	12.4	2450	0.0005	4.8
1/8	11450	0.0006	26.1	11600	0.0007	31.6	10400	0.0006	25.0	10400	0.0006	25.0	10400	0.0006	25.0	8850	0.0007	24.1	8250	0.0005	17.5	5800	0.0005	12.3	2300	0.0005	4.8
4	9100	0.0007	26.0	9200	0.0008	31.2	8250	0.0008	24.9	8250	0.0008	24.9	8250	0.0008	24.9	7050	0.0008	23.9	6550	0.0007	17.3	4600	0.0007	12.1	1800	0.0007	4.7
3/16	7650	0.0008	25.9	7750	0.0010	31.2	6900	0.0009	24.8	6900	0.0009	24.8	6900	0.0009	24.8	5900	0.0010	23.7	5500	0.0008	17.2	3900	0.0008	12.2	1550	0.0008	4.9
5	7300	0.0009	25.9	7400	0.0011	31.2	6600	0.0009	25.0	6600	0.0009	25.0	6600	0.0009	25.0	5600	0.0011	23.6	5250	0.0008	17.2	3700	0.0008	12.1	1450	0.0008	4.8
6	6050	0.0011	25.6	6150	0.0013	31.0	5500	0.0011	24.9	5500	0.0011	24.9	5500	0.0011	24.9	4700	0.0013	23.7	4350	0.0010	17.0	3100	0.0010	12.1	1200	0.0010	4.7
1/4	5750	0.0011	25.8	5800	0.0013	30.9	5200	0.0012	25.0	5200	0.0012	25.0	5200	0.0012	25.0	4450	0.0013	23.7	4150	0.0010	17.1	2900	0.0010	11.9	1150	0.0010	4.8
5/16	4600	0.0014	25.7	4650	0.0017	30.8	4150	0.0015	24.9	4150	0.0015	24.9	4150	0.0015	24.9	3550	0.0017	23.5	3300	0.0013	16.9	2300	0.0013	11.8	950	0.0013	5.0
8	4550	0.0014	25.6	4600	0.0017	30.7	4100	0.0015	24.8	4100	0.0015	24.8	4100	0.0015	24.8	3500	0.0017	23.4	3300	0.0013	17.0	2300	0.0013	11.9	900	0.0013	4.7
3/8	3800	0.0017	25.4	3850	0.0020	30.5	3450	0.0018	24.8	3450	0.0018	24.8	3450	0.0018	24.8	2950	0.0020	23.4	2750	0.0015	16.8	1950	0.0015	11.9	750	0.0016	4.7
10	3650	0.0018	25.6	3700	0.0021	30.7	3300	0.0019	24.9	3300	0.0019	24.9	3300	0.0019	24.9	2800	0.0021	23.3	2600	0.0016	16.7	1850	0.0016	11.9	730	0.0016	4.8
7/16	3300	0.0019	25.7	3300	0.0023	30.4	3000	0.0021	25.2	3000	0.0021	25.2	3000	0.0021	25.2	2550	0.0023	23.5	2350	0.0018	16.7	1650	0.0018	11.7	650	0.0018	4.8
12	3050	0.0021	25.6	3100	0.0025	30.8	2750	0.0023	24.9	2750	0.0023	24.9	2750	0.0023	24.9	2350	0.0025	23.4	2200	0.0019	16.9	1550	0.0019	11.9	600	0.0020	4.7
1/2	2850	0.0022	25.3	2900	0.0026	30.5	2600	0.0024	25.0	2600	0.0024	25.0	2600	0.0024	25.0	2200	0.0026	23.1	2050	0.0020	16.6	1450	0.0020	11.8	570	0.0021	4.8
9/16	2550	0.0025	25.4	2600	0.0030	30.7	2300	0.0027	24.8	2300	0.0027	24.8	2300	0.0027	24.8	2000	0.0030	23.6	1850	0.0023	16.9	1300	0.0023	11.9	510	0.0024	4.8
5/8	2300	0.0028	25.5	2300	0.0033	30.2	2100	0.0030	25.2	2100	0.0030	25.2	2100	0.0030	25.2	1800	0.0033	23.6	1650	0.0025	16.7	1150	0.0025	11.6	460	0.0026	4.8
16	2300	0.0028	25.7	2300	0.0033	30.4	2050	0.0030	24.8	2050	0.0030	24.8	2050	0.0030	24.8	1750	0.0033	23.1	1650	0.0025	16.8	1150	0.0025	11.7	455	0.0026	4.8
3/4	1900	0.0033	25.2	1950	0.0039	30.7	1750	0.0036	25.2	1750	0.0036	25.2	1750	0.0036	25.2	1500	0.0039	23.6	1400	0.0030	17.0	1000	0.0030	12.1	380	0.0031	4.8
20	1800	0.0035	25.1	1850	0.0041	30.5	1650	0.0038	24.9	1650	0.0038	24.9	1650	0.0038	24.9	1400	0.0041	23.1	1300	0.0032	16.5	900	0.0032	11.4	365	0.0033	4.8
Depth of Cut a_a	0.5D									0.25D															0.15D		
Depth of Cut a_r	1.0D																										

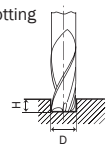
For entry, it is recommended to use slotting conditions. For more information on entry, see page 145.
Adjust milling condition when unusual vibration or sound occurs.
When using long reach tools, decrease width of cut and feed rate by 50%.

D: Dia. of Mill

Side Milling



Slotting



Standard Milling Conditions

Aqua V Mill 5 Flute

List No. 9705, 9706, 9707, 9708, 9709, 9710

Roughing

Work Material	Cast Irons			Carbon Steels 1018/1020			Medium Alloy Steels 4130/4140			Tool Steels <40 HRC			Stainless Steels 400 Series			Stainless Steels 300 Series			Stainless Steels PH			Titanium Alloys			High Temp Alloys Inconel, Haynes, etc.		
Milling Conditions	440-1000 SFM			470-1000 SFM			410-680 SFM			410-680 SFM			410-680 SFM			360-590 SFM			330-540 SFM			200-250 SFM			75-100 SFM		
Mill Diam.	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3	32300	0.0009	137.3	32300	0.0009	137.3	22000	0.0007	75.1	22000	0.0006	70.8	22000	0.0006	70.8	19000	0.0007	66.1	17400	0.0006	48.7	8100	0.0006	22.8	3250	0.0006	10.5
1/8	30600	0.0009	141.4	30600	0.0009	141.4	20800	0.0007	74.9	20800	0.0007	70.7	20800	0.0007	70.7	18000	0.0007	66.2	16500	0.0006	48.6	7650	0.0006	22.7	3050	0.0007	10.4
4	24300	0.0011	133.5	24300	0.0011	133.5	16500	0.0009	74.3	16500	0.0008	70.1	16500	0.0008	70.1	14300	0.0009	66.3	13100	0.0007	47.4	6050	0.0007	22.7	2500	0.0009	10.8
3/16	20400	0.0013	128.4	20400	0.0013	128.4	13900	0.0011	73.5	13900	0.0010	69.9	13900	0.0010	69.9	12000	0.0011	66.2	11000	0.0009	46.8	5100	0.0009	22.7	2050	0.0010	10.5
5	19400	0.0013	127.0	19400	0.0013	127.0	13200	0.0011	73.1	13200	0.0011	69.6	13200	0.0011	69.6	11400	0.0012	66.1	10500	0.0009	44.6	4850	0.0010	23.0	1950	0.0011	10.5
6	16200	0.0015	123.1	16200	0.0015	123.1	11000	0.0013	72.6	11000	0.0013	69.3	11000	0.0013	69.3	9550	0.0014	66.4	8700	0.0011	45.8	4050	0.0011	22.7	1600	0.0013	10.3
1/4	15300	0.0016	121.9	15300	0.0016	121.9	10400	0.0014	72.5	10400	0.0013	69.3	10400	0.0013	69.3	9000	0.0015	66.2	8250	0.0012	49.5	3800	0.0012	22.6	1550	0.0014	10.5
5/16	12200	0.0019	117.6	12200	0.0019	117.6	8300	0.0017	71.9	8300	0.0017	68.8	8300	0.0017	68.8	7200	0.0018	66.2	6600	0.0014	45.2	3050	0.0015	22.7	1200	0.0017	10.2
8	12100	0.0019	117.5	12100	0.0019	117.5	8250	0.0017	72.0	8250	0.0017	68.9	8250	0.0017	68.9	7150	0.0018	65.8	6550	0.0014	45.2	3050	0.0015	22.8	1200	0.0017	10.3
3/8	10200	0.0023	115.4	10200	0.0023	115.4	6950	0.0021	71.9	6950	0.0020	69.0	6950	0.0020	69.0	6000	0.0022	66.2	5500	0.0016	44.8	2550	0.0018	22.7	1000	0.0020	10.2
10	9700	0.0024	114.6	9700	0.0024	114.6	6600	0.0022	71.6	6600	0.0021	68.7	6600	0.0021	68.7	5700	0.0023	66.1	5250	0.0017	44.6	2400	0.0019	22.5	1000	0.0021	10.7
7/16	8750	0.0026	113.7	8750	0.0026	113.7	5950	0.0024	71.6	5950	0.0023	68.7	5950	0.0023	68.7	5150	0.0026	66.3	4700	0.0019	44.4	2200	0.0021	22.9	900	0.0024	10.7
12	8100	0.0028	112.8	8100	0.0028	112.8	5500	0.0026	71.4	5500	0.0025	68.6	5500	0.0025	68.6	4750	0.0028	66.1	4400	0.0020	44.8	2000	0.0022	22.4	800	0.0026	10.2
1/2	7650	0.0029	112.2	7650	0.0029	112.2	5200	0.0027	71.4	5200	0.0026	68.6	5200	0.0026	68.6	4500	0.0029	66.2	4100	0.0022	44.1	1900	0.0022	20.7	750	0.0027	10.2
9/16	6800	0.0033	111.1	6800	0.0033	111.1	4600	0.0031	70.9	4600	0.0030	68.2	4600	0.0030	68.2	4000	0.0033	66.2	3650	0.0024	44.0	1700	0.0024	20.8	700	0.0030	10.7
5/8	6100	0.0036	109.9	6100	0.0036	109.9	4150	0.0034	71.0	4150	0.0033	68.3	4150	0.0033	68.3	3600	0.0037	66.2	3300	0.0027	44.1	1500	0.0027	20.4	600	0.0034	10.2
16	6100	0.0036	110.7	6100	0.0036	110.7	4150	0.0034	71.5	4150	0.0033	68.8	4150	0.0033	68.8	3550	0.0037	65.3	3300	0.0027	44.4	1500	0.0027	20.6	600	0.0034	10.2
3/4	5100	0.0043	108.4	5100	0.0043	108.4	3450	0.0041	70.6	3450	0.0039	68.0	3450	0.0039	68.0	3000	0.0044	66.2	2750	0.0032	43.9	1300	0.0033	21.2	500	0.0041	10.2
20	4850	0.0045	108.4	4850	0.0045	108.4	3300	0.0043	70.9	3300	0.0041	68.3	3300	0.0041	68.3	2850	0.0046	65.6	2600	0.0033	43.5	1200	0.0034	20.6	500	0.0043	10.7
Depth of Cut a_a	1.5D																										
Depth of Cut a_r	0.3D																								0.25D		

Roughing - LOW SPEED (Use if RPM from High Speed Chart is > Max Machine RPM)

Work Material	Cast Irons			Carbon Steels 1018/1020			Medium Alloy Steels 4130/4140			Tool Steels <40 HRC			Stainless Steels 400 Series			Stainless Steels 300 Series			Stainless Steels PH			Titanium Alloys			High Temp Alloys Inconel, Haynes, etc.		
Milling Conditions	440-500 SFM			470-510 SFM			410-450 SFM			410-450 SFM			410-450 SFM			360-390 SFM			330-360 SFM			200-250 SFM			75-100 SFM		
Mill Diam.	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3	16200	0.0009	68.9	16500	0.0009	70.1	14500	0.0007	49.5	14500	0.0006	46.7	14500	0.0006	46.7	12500	0.0007	43.5	11500	0.0006	32.2	8100	0.0006	22.8	3250	0.0006	10.5
1/8	15300	0.0009	70.7	15500	0.0009	71.6	13750	0.0007	49.5	13750	0.0007	46.7	13750	0.0007	46.7	11900	0.0007	43.8	11000	0.0006	32.4	7650	0.0006	22.7	3050	0.0007	10.4
4	12100	0.0011	66.5	12500	0.0011	68.7	11000	0.0009	49.5	11000	0.0008	46.7	11000	0.0008	46.7	9450	0.0009	43.8	8700	0.0007	31.5	6050	0.0007	22.7	2500	0.0009	10.8
3/16	10200	0.0013	64.2	10400	0.0013	65.5	9200	0.0011	48.6	9200	0.0010	46.3	9200	0.0010	46.3	7950	0.0011	43.9	7300	0.0009	31.0	5100	0.0009	22.7	2050	0.0010	10.5
5	9700	0.0013	63.5	9900	0.0013	64.8	8700	0.0011	48.2	8700	0.0011	45.9	8700	0.0011	45.9	7600	0.0012	44.1	7000	0.0009	29.8	4850	0.0010	23.0	1950	0.0011	10.5
6	8100	0.0015	61.6	8250	0.0015	62.7	7300	0.0013	48.2	7300	0.0013	46.0	7300	0.0013	46.0	6300	0.0014	43.8	5800	0.0011	30.5	4050	0.0011	22.7	1600	0.0013	10.3
1/4	7650	0.0016	61.0	7800	0.0016	62.2	6900	0.0014	48.1	6900	0.0013	46.0	6900	0.0013	46.0	6000	0.0015	44.2	5500	0.0012	33.0	3800	0.0012	22.6	1550	0.0014	10.5
Depth of Cut a_a	1.5D																										
Depth of Cut a_r	0.3D																								0.25D		

***For Finishing Feeds/Speeds, see page 160**

Standard Milling Conditions

Aqua V Mill 5 Flute

List No. 9705, 9706, 9707, 9708, 9709, 9710

Finish

Work Material	Cast Irons			Carbon Steels 1018/1020			Medium Alloy Steels 4130/4140			Tool Steels <40 HRC			Stainless Steels 400 Series			Stainless Steels 300 Series			Stainless Steels PH			Titanium Alloys			High Temp Alloys Inconel, Haynes, etc.		
Milling Conditions	750-850 SFM			800-900 SFM			700-800 SFM			700-800 SFM			700-800 SFM			650-700 SFM			650-700 SFM			250-300 SFM			75-120 SFM		
Mill Diam.	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3	26250	0.0003	51.0	29100	0.0004	68.3	26250	0.0004	55.2	26250	0.0003	51.0	26250	0.0003	51.0	24300	0.0004	51.1	21750	0.0003	37.4	14550	0.0003	25.0	5850	0.0003	11.5
1/8	24750	0.0003	50.8	27450	0.0004	68.1	24750	0.0004	55.0	24750	0.0003	50.8	24750	0.0003	50.8	22950	0.0004	51.0	20700	0.0003	37.5	13800	0.0003	25.0	5475	0.0003	11.4
4	19650	0.0004	50.6	21750	0.0005	67.5	19650	0.0005	54.9	19650	0.0004	50.6	19650	0.0004	50.6	18150	0.0005	50.7	16350	0.0004	37.0	10950	0.0004	24.8	4350	0.0004	11.4
3/16	16500	0.0005	50.4	18300	0.0006	67.3	16500	0.0006	54.8	16500	0.0005	50.4	16500	0.0005	50.4	15300	0.0006	50.9	13800	0.0004	37.0	9150	0.0004	24.5	3675	0.0005	11.5
5	15750	0.0005	50.5	17400	0.0006	67.2	15750	0.0006	55.0	15750	0.0005	50.5	15750	0.0005	50.5	14550	0.0006	50.8	13125	0.0005	36.9	8700	0.0005	24.5	3525	0.0005	11.5
6	13050	0.0006	50.0	14550	0.0008	67.1	13050	0.0007	54.6	13050	0.0006	50.0	13050	0.0006	50.0	12150	0.0007	50.8	10950	0.0006	36.7	7275	0.0006	24.4	2925	0.0007	11.5
1/4	12375	0.0007	50.2	13800	0.0008	67.3	12375	0.0007	54.7	12375	0.0007	50.2	12375	0.0007	50.2	11475	0.0007	50.8	10350	0.0006	36.7	6900	0.0006	24.5	2775	0.0007	11.5
5/16	9900	0.0008	50.0	10950	0.0010	66.6	9900	0.0009	54.7	9900	0.0008	50.0	9900	0.0008	50.0	9150	0.0009	50.5	8250	0.0007	36.4	5550	0.0007	24.5	2175	0.0009	11.3
8	9750	0.0008	49.7	10950	0.0010	67.1	9825	0.0009	54.7	9825	0.0008	50.0	9825	0.0008	50.0	9075	0.0009	50.5	8175	0.0007	36.4	5475	0.0007	24.4	2175	0.0009	11.4
3/8	8250	0.0010	49.9	9150	0.0012	66.6	8250	0.0011	54.6	8250	0.0010	49.9	8250	0.0010	49.9	9000	0.0011	59.6	6900	0.0009	36.4	4575	0.0009	24.2	1800	0.0010	11.2
10	7875	0.0011	50.0	8700	0.0013	66.5	7875	0.0012	54.8	7875	0.0011	50.0	7875	0.0011	50.0	7275	0.0012	50.6	6525	0.0009	36.1	4350	0.0009	24.1	1725	0.0011	11.3
7/16	7050	0.0012	49.7	7800	0.0014	66.1	7050	0.0013	54.5	7050	0.0012	49.7	7050	0.0012	49.7	6525	0.0013	50.4	5850	0.0010	36.0	3900	0.0010	24.0	1575	0.0012	11.4
12	6525	0.0013	49.7	7275	0.0015	66.6	6525	0.0014	54.4	6525	0.0013	49.7	6525	0.0013	49.7	6075	0.0014	50.7	5475	0.0011	36.3	3600	0.0011	23.9	1454	0.0013	11.4
1/2	6150	0.0013	49.5	6900	0.0016	66.8	6150	0.0015	54.3	6150	0.0013	49.5	6150	0.0013	49.5	5700	0.0015	50.3	5100	0.0012	35.8	3450	0.0012	24.2	1380	0.0014	11.4
9/16	5475	0.0015	49.6	6150	0.0018	66.9	5475	0.0017	54.3	5475	0.0015	49.6	5475	0.0015	49.6	5100	0.0017	50.6	4575	0.0013	36.1	3075	0.0013	24.2	1230	0.0016	11.5
5/8	4950	0.0017	49.8	5475	0.0020	66.1	4950	0.0018	54.6	4950	0.0017	49.8	4950	0.0017	49.8	4575	0.0018	50.4	5625	0.0015	49.2	2775	0.0015	24.3	1095	0.0017	11.3
16	4950	0.0017	50.2	3975	0.0020	48.4	4950	0.0019	55.0	4950	0.0017	50.2	4950	0.0017	50.2	4575	0.0019	50.8	4125	0.0015	36.4	2700	0.0015	23.8	1095	0.0017	11.4
3/4	4125	0.0020	49.7	4575	0.0024	66.2	4125	0.0022	54.5	4125	0.0020	49.7	4125	0.0020	49.7	3825	0.0022	50.6	3450	0.0017	36.2	2325	0.0017	24.4	915	0.0021	11.4
20	3900	0.0021	49.3	4350	0.0025	66.1	3900	0.0023	54.1	3900	0.0021	49.3	3900	0.0021	49.3	3675	0.0023	51.0	3300	0.0018	36.3	2175	0.0018	23.9	870	0.0022	11.3
Depth of Cut a_a	1.5D																										
Depth of Cut a_r	0.010" - 0.015"																								0.010"		

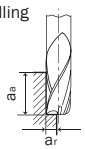
Finish - LOW SPEED (Use if RPM from High Speed Chart is > Max Machine RPM)

Work Material	Cast Irons			Carbon Steels 1018/1020			Medium Alloy Steels 4130/4140			Tool Steels <40 HRC			Stainless Steels 400 Series			Stainless Steels 300 Series			Stainless Steels PH			Titanium Alloys			High Temp Alloys Inconel, Haynes, etc.		
Milling Conditions	440-500 SFM			470-510 SFM			410-450 SFM			410-450 SFM			410-450 SFM			360-390 SFM			330-360 SFM			200-250 SFM			75-100 SFM		
Mill Diam.	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3	17500	0.0003	28.3	19400	0.0004	38.0	17500	0.0004	30.7	17500	0.0003	28.3	17500	0.0003	28.3	16200	0.0004	28.4	14500	0.0003	20.8	9700	0.0003	13.9	3900	0.0003	6.4
1/8	16500	0.0003	28.2	18300	0.0004	37.8	16500	0.0004	30.6	16500	0.0003	28.2	16500	0.0003	28.2	15300	0.0004	28.4	13800	0.0003	20.9	9200	0.0003	13.9	3650	0.0003	6.3
4	13100	0.0004	28.1	14500	0.0005	37.5	13100	0.0005	30.5	13100	0.0004	28.1	13100	0.0004	28.1	12100	0.0005	28.2	10900	0.0004	20.6	7300	0.0004	13.8	2900	0.0004	6.3
3/16	11000	0.0005	28.0	12200	0.0006	37.4	11000	0.0006	30.5	11000	0.0005	28.0	11000	0.0005	28.0	10200	0.0006	28.3	9200	0.0004	20.5	6100	0.0004	13.6	2450	0.0005	6.4
5	10500	0.0005	28.0	11600	0.0006	37.3	10500	0.0006	30.5	10500	0.0005	28.0	10500	0.0005	28.0	9700	0.0006	28.2	8750	0.0005	20.5	5800	0.0005	13.6	2350	0.0005	6.4
6	8700	0.0006	27.8	9700	0.0008	37.3	8700	0.0007	30.3	8700	0.0006	27.8	8700	0.0006	27.8	8100	0.0007	28.2	7300	0.0006	20.4	4850	0.0006	13.6	1950	0.0007	6.4
1/4	8250	0.0007	27.9	9200	0.0008	37.4	8250	0.0007	30.4	8250	0.0007	27.9	8250	0.0007	27.9	7650	0.0007	28.2	6900	0.0006	20.4	4600	0.0006	13.6	1850	0.0007	6.4
Depth of Cut a_a	1.5D																										
Depth of Cut a_r	0.010" - 0.015"																								0.010"		

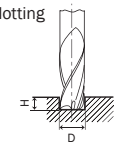
For slotting, it is recommended to use Aqua V 4 Flute.
For entry, it is recommended to use cutting conditions 50% RPM and 50% IPT. For more info on entry, see page 145.
Adjust milling condition when unusual vibration or sound occurs.
When using long reach tools, decrease width of cut and feed rate by 50%.

D: Dia. of Mill

Side Milling



Slotting



Aqua Mill Hard

> 1/2, >12

List No. 9711 Fractional Sizes

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000276	1/8	0.3750	1.5	6
41000277	3/16	0.4375	2.0	6
41000278	1/4	0.6250	2.5	6
41000279	5/16	0.8125	2.5	6
41000280	3/8	1.0000	3.0	6
41000281	1/2	1.1250	3.5	6
41000282	5/8	1.5000	4.0	8
41000283	3/4	1.7500	4.0	8

List No. 9712 Metric Sizes

(Unit) : mm

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000063	3	8	50	6
41000064	4	11	50	6
41000065	5	13	50	6
41000066	6	13	50	6
41000067	8	19	60	6
41000068	10	22	70	6
41000069	12	26	75	6
41000070	16	32	90	8
41000071	20	38	100	8

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Aqua Mill Hard Corner Radius

> 1/2, >12

List No. 9713 Fractional sizes

EDP	Cutting Diameter	Length of Cut	Overall Length	0.015 CR	0.030 CR	Neck Length	Flutes
41000284	1/8	0.3750	1.50	X			6
41000285	3/16	0.4375	2.00	X			6
41000286	1/4	0.6250	2.50	X			6
41000287	5/16	0.8125	2.50	X			6
41000288	3/8	1.0000	3.00		X		6
41000289	1/2	1.1250	3.00		X		6
41000292	3/16	0.2180	3.00	X		1.00	6
41000293	1/4	0.2810	3.00	X		1.00	6
41000294	3/8	0.4680	3.50	X		1.25	6
41000295	1/2	0.6250	4.00	X		2.25	6

List No. 9714 Metric sizes

(Unit) : mm

EDP	Cutting Diameter	Length of Cut	Overall Length	0.30 CR	0.50 CR	Neck Length	Flutes
41000072	3	8	50	X			6
41000074	4	11	50	X			6
41000076	5	13	60	X			6
41000078	6	13	60	X			6
41000080	8	19	70	X			6
41000083	10	22	70		X		6
41000085	12	26	75		X		6
41000088	5	8	60	X		15	6
41000089	6	9	65	X		20	6
41000091	10	15	100	X		30	6
41000092	12	18	100	X		35	6

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Aqua Mill Hard Ball Nose

List No. 9715 Fractional Sizes

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000298	1/8	0.1875	2.50	2
41000299	3/16	0.2810	2.50	2
41000300	1/4	0.3750	2.50	2
41000301	5/16	0.4680	2.50	2
41000302	3/8	0.5625	3.00	2
41000303	1/2	0.6250	4.00	2

List No. 9716 Metric sizes

(Unit) : mm

EDP	Cutting Diameter	Shank Diameter	Length of Cut	Overall Length	Flutes
41000093	3	4	3	50	2
41000094	6	6	6	76	2
41000095	8	8	8	90	2
41000096	10	10	10	100	2
41000097	12	12	12	100	2
41000098	16	16	16	100	2

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Milling Conditions List No. 9711, 9712, 9713, 9714

Conventional Condition

Work Material		Hardened Steels 45-55 HRC			Hardened Steels 55-60 HRC			Hardened Steels 60-65 HRC			Hardened Steels 65-70 HRC		
Milling Conditions		280-320 SFM			220-250 SFM			200-220 SFM			140-160 SFM		
Mill Diam.		RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3		10400	0.0007	41.3	8200	0.0005	25.6	7400	0.0005	21.3	5200	0.0005	15.0
1/8		9200	0.0007	41.3	7200	0.0006	25.6	6400	0.0006	21.3	4600	0.0005	15.0
5		6200	0.0014	51.2	4900	0.0011	31.9	4400	0.0010	26.4	3100	0.0010	18.5
3/16		6100	0.0014	51.2	4800	0.0011	31.9	4300	0.0010	26.4	3050	0.0010	18.5
6		5200	0.0016	51.2	4100	0.0013	31.9	3700	0.0012	26.4	2600	0.0012	18.5
1/4		4900	0.0017	51.2	3850	0.0014	31.9	3500	0.0013	26.4	2450	0.0013	18.5
5/16		3900	0.0022	51.2	3050	0.0017	31.9	2800	0.0016	26.4	1950	0.0016	18.5
8		3900	0.0022	51.2	3050	0.0017	31.9	2800	0.0016	26.4	1950	0.0016	18.5
3/8		3250	0.0026	51.2	2600	0.0020	31.9	2300	0.0019	26.4	1650	0.0019	18.5
10		3100	0.0028	51.2	2450	0.0022	31.9	2200	0.0020	26.4	1550	0.0020	18.5
12		2600	0.0033	51.2	2050	0.0026	31.9	1850	0.0024	26.4	1300	0.0024	18.5
1/2		2450	0.0035	51.2	1950	0.0027	31.9	1750	0.0025	26.4	1250	0.0025	18.5
5/8		1950	0.0041	64.0	1550	0.0032	40.0	1400	0.0030	33.1	980	0.0029	23.1
16		1950	0.0041	64.0	1530	0.0033	39.9	1400	0.0030	33.1	980	0.0029	23.1
3/4		1650	0.0045	59.3	1300	0.0036	36.9	1150	0.0032	29.9	820	0.0033	21.5
Depth of Cut	a_a	1-1.5D											
	a_r	0.07D						0.02D					
	H	0.07D						0.05D - Max 0.5mm					

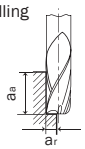
Standard Milling Conditions

High Speed Condition

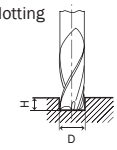
Work Material		Hardened Steels 45-55 HRC			Hardened Steels 55-60 HRC			Hardened Steels 60-65 HRC		
Milling Conditions		800-1000 SFM			600-740 SFM			400-450 SFM		
Mill Diam.		RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3		32000	0.0010	192.9	24000	0.0007	107.9	13900	0.0008	63.9
1/8		27500	0.0012	192.9	20500	0.0009	107.9	13150	0.0009	71.2
5		19200	0.0020	228.3	14300	0.0015	126.0	8350	0.0015	75.3
3/16		18300	0.0021	228.3	13700	0.0015	126.0	8750	0.0016	83.2
6		16000	0.0024	228.3	12000	0.0018	126.0	6950	0.0018	75.2
1/4		15100	0.0025	228.3	11500	0.0018	126.0	6600	0.0019	76.2
5/16		12000	0.0032	228.3	9000	0.0023	126.0	5250	0.0019	60.6
8		12000	0.0032	228.3	9000	0.0023	126.0	5200	0.0025	78.4
3/8		10000	0.0038	228.3	7500	0.0028	126.0	4400	0.0030	79.6
10		9600	0.0040	228.3	7200	0.0029	126.0	4200	0.0031	79.2
12		8000	0.0048	228.3	6000	0.0035	126.0	3500	0.0039	82.6
1/2		7550	0.0050	228.3	5750	0.0037	126.0	3300	0.0042	83.1
5/8		6000	0.0059	283.5	4500	0.0044	157.5	2600	0.0050	103.7
16		6000	0.0059	283.5	4500	0.0044	157.5	2600	0.0050	103.7
3/4		5000	0.0063	250.0	3750	0.0046	139.5	2200	0.0055	96.0
Depth of Cut	a_a	1-1.5D								
	a_r	0.03D						0.02D		

D: Dia. of Mill

Side Milling



Slotting



Recommended to run dry with air blow.
When altering depth of cut or speed, it is important to read chips in order to ensure that heat is coming off in chip.
For more info on reading chips, see page 146.
Adjust milling condition when unusual vibration or sound occurs.
When using long reach tools, decrease width of cut and feed rate by 50%.
Conventional conditions are recommended for finishing.

Standard Milling Conditions List No. 9715, 9716

Roughing Condition

Work Material		Hardened Steels D2 40-55 HRC			Hardened Steels M2 55-60 HRC			Hardened Steels M35, PM 60-65 HRC		
Milling Conditions		280-400 SFM			250-280 SFM			200-250 SFM		
Mill Diam.		RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3		11000	0.0016	36	8600	0.0012	21	7300	0.0011	17
1/8		10400	0.0017	36	8100	0.0013	21	6900	0.0012	17
5		6900	0.0026	36	5400	0.0020	21	4600	0.0018	17
3/16		6600	0.0027	36	5150	0.0021	21	4400	0.0019	17
6		5500	0.0032	36	4300	0.0025	21	3650	0.0023	17
1/4		5200	0.0034	36	4050	0.0026	21	3450	0.0024	17
5/16		4200	0.0042	35	3250	0.0033	21	2750	0.0030	17
8		4100	0.0042	34	3200	0.0033	21	2750	0.0030	17
3/8		3500	0.0049	34	2700	0.0040	21	2300	0.0036	17
10		3300	0.0050	33	2550	0.0042	21	2200	0.0038	17
12		2800	0.0060	34	2150	0.0050	21	1850	0.0045	17
1/2		2600	0.0063	33	2000	0.0053	21	1750	0.0048	17
5/8		2100	0.0079	33	1600	0.0066	21	1400	0.0060	17
16		2050	0.0080	33	1600	0.0067	21	1400	0.0060	17
3/4		1700	0.0095	32	1350	0.0079	21	1150	0.0072	17
Depth of Cut	a_a	0.025" - 0.035"			0.015" - 0.025"					
	P_f	0.25D			0.25D					

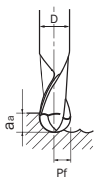
High Speed Finishing Condition

Work Material		Hardened Steels			Hardened Steels			Hardened Steels		
Milling Conditions		800-1000 SFM			700-900 SFM			600-800 SFM		
Mill Diam.		RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3		29100	0.0024	141	25900	0.0014	74	22600	0.0014	64
1/8		27500	0.0025	136	24500	0.0015	71	21400	0.0015	62
5		18300	0.0028	104	16300	0.0017	55	14250	0.0017	48
3/16		17500	0.0029	102	15500	0.0017	53	13600	0.0017	46
6		14500	0.0031	91	12950	0.0019	48	11300	0.0019	42
1/4		13750	0.0032	89	12200	0.0019	46	10700	0.0019	41
5/16		11000	0.0034	75	9800	0.0021	42	8600	0.0021	37
8		10900	0.0034	74	9700	0.0021	41	8500	0.0021	36
3/8		9200	0.0038	69	8150	0.0024	38	7200	0.0024	34
10		8700	0.0039	67	7800	0.0024	38	6800	0.0024	33
12		7300	0.0041	59	6500	0.0027	35	5700	0.0027	31
1/2		6900	0.0042	58	6100	0.0028	34	5350	0.0028	30
5/8		5500	0.0049	54	4900	0.0033	32	4300	0.0033	28
16		5500	0.0049	54	4850	0.0033	32	4250	0.0033	28
3/4		4600	0.0056	51	4100	0.0037	30	3600	0.0037	27
Depth of Cut	a_a	0.025" - 0.035"			0.015" - 0.025"					
	P_f	0.005"			0.005"					

Low Speed Finishing Condition

Work Material		Hardened Steels			Hardened Steels			Hardened Steels		
Milling Conditions		180-275 SFM			150-180 SFM			120-150 SFM		
Mill Diam.		RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3		7450	0.0007	10	5350	0.0006	6	4400	0.0006	5
1/8		7050	0.0007	10	5050	0.0006	6	4150	0.0006	5
5		4700	0.0010	10	3350	0.0009	6	2750	0.0009	5
3/16		4500	0.0011	10	3200	0.0009	6	2600	0.0009	5
6		3700	0.0013	9	2700	0.0010	6	2200	0.0010	5
1/4		3500	0.0013	9	2500	0.0011	6	2050	0.0011	5
5/16		2800	0.0016	9	2000	0.0014	5	1650	0.0014	4
8		2750	0.0016	9	2000	0.0014	5	1650	0.0014	4
3/8		2350	0.0019	9	1680	0.0016	5	1400	0.0016	4
10		2250	0.0020	9	1600	0.0017	5	1300	0.0017	4
12		1850	0.0024	9	1350	0.0020	5	1100	0.0020	4
1/2		1800	0.0025	9	1250	0.0021	5	1050	0.0021	4
5/8		1400	0.0031	9	1000	0.0026	5	850	0.0026	4
16		1400	0.0031	9	1000	0.0026	5	820	0.0026	4
3/4		1170	0.0037	9	850	0.0031	5	680	0.0031	4
Depth of Cut	a_a	0.005"			0.005"					
	P_f	0.005"			0.005"					

D:Dia. of Mill
R:Ball Radius



Recommended to run dry with air blow.
When altering depth of cut or speed, it is important to read chips in order to ensure that heat is coming off in chip.
For more info on reading chips, see page 146.
Adjust milling condition when unusual vibration or sound occurs.
When using long reach tools, decrease width of cut and feed rate by 50%.

ALH Mill

List No. 9717 Fractional sizes

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000304	1/8	0.2500	1.50	3
41000305	1/8	0.3750	2.00	3
41000306	1/8	0.5000	2.50	3
41000307	3/16	0.3125	2.00	3
41000308	3/16	0.5625	2.50	3
41000309	1/4	0.3750	2.00	3
41000310	1/4	0.5000	2.50	3
41000311	1/4	0.6250	2.50	3
41000312	1/4	1.0000	3.00	3
41000313	5/16	0.4375	2.00	3
41000314	5/16	0.6250	2.50	3
41000315	5/16	1.0000	3.00	3
41000316	5/16	1.2500	3.00	3
41000317	3/8	0.5000	2.00	3
41000318	3/8	1.0000	3.00	3

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000319	3/8	1.2500	3.50	3
41000320	3/8	1.5000	4.00	3
41000321	3/8	2.0000	4.00	3
41000322	1/2	0.6250	2.50	3
41000323	1/2	1.0000	3.00	3
41000324	1/2	1.2500	3.00	3
41000325	1/2	1.6250	4.00	3
41000326	1/2	2.0000	4.00	3
41000327	1/2	2.5000	5.00	3
41000328	5/8	0.7500	3.00	3
41000329	5/8	1.6250	3.50	3
41000330	5/8	2.1250	4.00	3
41000331	3/4	1.0000	4.00	3
41000332	3/4	1.6250	4.00	3
41000333	3/4	2.2500	5.00	3

List No. 9718 Metric sizes (Unit) : mm

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000100	3	8	57	3
41000101	4	11	57	3
41000102	5	11	57	3
41000103	6	13	57	3
41000104	8	19	70	3
41000105	10	22	70	3
41000106	12	26	75	3
41000107	12	32	94	3
41000108	16	32	90	3
41000109	18	38	90	3
41000110	20	45	100	3

1 per tube

ALH Mill Corner Radius

List No. 9719 Fractional sizes

EDP	Cutting Dia.	Length of Cut	Overall Length	0.015 CR	0.030 CR	0.060 CR	0.120 CR	Flutes
41000334	1/8	0.2500	1.5	X				3
41000335	1/8	0.3750	2.0	X				3
41000336	1/8	0.5000	2.5	X				3
41000337	3/16	0.3125	2.0		X			3
41000338	3/16	0.5625	2.5		X			3
41000339	1/4	0.3750	2.0		X			3
41000340	1/4	0.3750	2.0			X		3
41000341	1/4	0.5000	2.5		X			3
41000345	5/16	0.4375	2.0		X			3
41000346	5/16	0.4375	2.0			X		3
41000347	5/16	0.6250	2.5		X			3
41000348	5/16	1.0000	3.0		X			3
41000349	5/16	1.0000	3.0			X		3
41000350	5/16	1.2500	3.0		X			3
41000351	3/8	0.5000	2.0		X			3
41000352	3/8	0.5000	2.0			X		3
41000353	3/8	0.5000	2.0				X	3
41000354	3/8	1.0000	3.0		X			3
41000355	3/8	1.0000	3.0			X		3
41000356	3/8	1.0000	3.0				X	3
41000357	3/8	1.2500	3.5			X		3
41000358	3/8	1.5000	4.0			X		3
41000359	3/8	2.0000	4.0		X			3

EDP	Cutting Dia.	Length of Cut	Overall Length	0.015 CR	0.030 CR	0.060 CR	0.120 CR	Flutes
41000360	1/2	0.6250	2.5		X			3
41000361	1/2	0.6250	2.5			X		3
41000362	1/2	0.6250	2.5				X	3
41000363	1/2	1.0000	3.0		X			3
41000364	1/2	1.0000	3.0			X		3
41000365	1/2	1.0000	3.0				X	3
41000366	1/2	1.2500	3.0		X			3
41000367	1/2	1.6250	4.0		X			3
41000368	1/2	2.0000	4.0		X			3
41000369	1/2	2.5000	5.0		X			3
41000370	5/8	0.7500	3.0			X		3
41000371	5/8	0.7500	3.0				X	3
41000372	5/8	1.6250	3.5			X		3
41000373	5/8	1.6250	3.5				X	3
41000374	5/8	2.1250	4.0		X			3
41000375	5/8	2.5000	5.0		X			3
41000376	3/4	1.0000	4.0			X		3
41000377	3/4	1.0000	4.0				X	3
41000378	3/4	1.6250	4.0			X		3
41000379	3/4	1.6250	4.0				X	3
41000380	3/4	2.2500	5.0		X			3
41000381	3/4	3.2500	6.0		X			3

List No. 9720 Metric Sizes (Unit) : mm

EDP	Cutting Dia.	Length of Cut	Overall Length	0.3 CR	0.5 CR	1.0 CR	2.0 CR	Flutes
41000111	3	8	57	X				3
41000112	4	11	57	X				3
41000113	5	11	57	X				3
41000114	6	13	57	X				3
41000115	6	13	57		X			3
41000116	8	19	70		X			3
41000117	8	19	70			X		3
41000118	10	22	70		X			3
41000119	10	22	70			X		3
41000120	12	26	75		X			3
41000121	12	26	75			X		3
41000123	16	32	90			X		3
41000124	16	32	90				X	3
41000126	18	38	90				X	3
41000128	20	45	100				X	3

1 per tube

ALH Mill Ball Nose

List No. 9721 Fractional sizes

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000382	1/8	0.2500	1.50	3
41000383	1/8	0.3750	2.00	3
41000384	1/8	0.5000	2.50	3
41000385	3/16	0.3750	2.00	3
41000386	3/16	0.7500	2.50	3
41000387	3/16	1.0000	3.00	3
41000388	1/4	0.3750	2.00	3
41000389	1/4	0.7500	2.50	3
41000390	1/4	1.0000	3.00	3
41000391	5/16	0.8125	2.50	3

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000392	3/8	0.5000	2.00	3
41000393	3/8	1.0000	2.50	3
41000394	3/8	1.5000	3.50	3
41000395	1/2	0.6250	2.50	3
41000396	1/2	1.0000	3.00	3
41000397	1/2	1.2500	3.50	3
41000398	5/8	1.0000	3.00	3
41000399	5/8	1.6250	4.50	3
41000400	3/4	1.0000	3.00	3
41000401	3/4	1.6250	4.00	3

List No. 9722 Metric sizes

(Unit) : mm

EDP	Cutting Diameter	Length of Cut	Overall Length	Flutes
41000129	3	8	57	3
41000130	4	11	57	3
41000131	5	11	57	3
41000132	6	13	57	3
41000133	8	19	70	3
41000134	10	22	70	3
41000135	12	26	75	3
41000136	16	32	90	3
41000137	18	38	100	3

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Milling Conditions

List No. 9717, 9718, 9719, 9720, 9721, 9722

Profiling

Work Material	Aluminum 2024, 5052, 6061, 7075, etc.			Aluminum Cast			Copper Alloys		
Milling Conditions	1000-2000 SFM			600-1000 SFM			300-600 SFM		
Mill Diam.	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3	48500	0.0015	219.83	25900	0.0013	104.41	14500	0.0013	56.91
1/8	45800	0.0016	220.18	24500	0.0014	104.19	13800	0.0014	57.30
4	36400	0.0020	222.17	19400	0.0018	102.73	10900	0.0017	56.94
3/16	30600	0.0024	223.42	16300	0.0021	102.02	9200	0.0021	57.17
5	29100	0.0026	223.32	15500	0.0022	101.66	8700	0.0022	56.75
6	24300	0.0031	224.66	12900	0.0026	100.91	7300	0.0026	57.10
1/4	22900	0.0033	224.31	12200	0.0028	100.83	6900	0.0028	57.11
5/16	18300	0.0041	224.88	9800	0.0034	100.66	5500	0.0034	56.87
8	18200	0.0041	225.44	9700	0.0035	100.40	5450	0.0035	56.79
3/8	15300	0.0049	226.17	8150	0.0041	100.06	4600	0.0041	57.05
10	14600	0.0052	226.72	7800	0.0043	100.45	4400	0.0043	57.28
7/16	13100	0.0058	226.32	7000	0.0048	99.99	3900	0.0048	56.41
12	12100	0.0062	225.91	6500	0.0051	100.13	3600	0.0052	56.22
1/2	11500	0.0066	227.36	6100	0.0054	99.37	3400	0.0055	56.19
9/16	10200	0.0074	227.09	5400	0.0061	98.80	3050	0.0062	56.70
5/8	9200	0.0083	227.77	4900	0.0068	99.48	2750	0.0069	56.79
16	9100	0.0083	227.08	4850	0.0068	99.23	2700	0.0069	56.20
18	8100	0.0094	227.57	4300	0.0077	98.85	2400	0.0078	56.19
3/4	7650	0.0099	227.55	4100	0.0081	99.69	2300	0.0083	56.99
20	7300	0.0104	228.03	3900	0.0085	99.51	2200	0.0087	57.22
Depth of Cut a_a	1.5D								
Depth of Cut a_r	0.5D								

Slotting

Work Material	Aluminum			Aluminum Cast			Copper Alloys		
Milling Conditions	800-1600 SFM			500-800 SFM			250-500 SFM		
Mill Diam.	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3	38900	0.0014	167.74	21000	0.0011	66.74	12100	0.0011	38.82
1/8	36700	0.0015	167.35	19900	0.0011	66.86	11500	0.0011	38.99
4	29100	0.0019	166.72	15800	0.0014	66.64	9100	0.0014	38.65
3/16	24500	0.0023	166.85	13200	0.0017	66.13	7600	0.0017	38.30
5	23300	0.0024	166.52	12600	0.0018	66.24	7300	0.0018	38.59
6	19400	0.0029	166.14	10500	0.0021	66.11	6050	0.0021	38.27
1/4	18300	0.0030	165.80	9900	0.0022	65.93	5700	0.0022	38.13
5/16	14700	0.0038	166.26	8000	0.0028	66.48	4600	0.0028	38.36
8	14600	0.0038	166.42	7900	0.0028	66.16	4550	0.0028	38.24
3/8	12200	0.0045	165.43	6600	0.0033	65.74	3800	0.0033	37.96
10	11600	0.0047	165.11	6300	0.0035	65.86	3600	0.0035	37.74
7/16	10500	0.0053	166.01	5700	0.0039	66.18	3300	0.0039	38.41
12	9700	0.0057	165.56	5300	0.0042	66.42	3050	0.0042	38.32
1/2	9200	0.0060	166.15	5000	0.0044	66.30	2900	0.0044	38.54
9/16	8150	0.0068	165.53	4400	0.0050	65.60	2550	0.0050	38.10
5/8	7300	0.0075	164.69	4000	0.0055	66.24	2300	0.0055	38.16
16	7250	0.0076	164.84	3950	0.0056	65.93	2250	0.0056	37.62
18	6500	0.0085	166.22	3500	0.0063	65.69	2000	0.0063	37.60
3/4	6100	0.0090	165.07	3300	0.0066	65.54	1900	0.0066	37.79
20	5800	0.0095	164.76	3150	0.0069	65.67	1800	0.0070	37.58
Depth of Cut H	1D								

Finishing

Work Material	Aluminum			Aluminum Cast			Copper Alloys		
Milling Conditions	1000-2000 SFM			600-1000 SFM			300-600 SFM		
Mill Diam.	RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3	48500	0.0007	101.96	25900	0.0007	54.45	14500	0.0007	30.48
1/8	45800	0.0008	109.92	24500	0.0008	58.80	13800	0.0008	33.12
4	36400	0.0013	138.43	19400	0.0013	73.78	10900	0.0013	41.45
3/16	30600	0.0017	156.06	16300	0.0017	83.13	9200	0.0017	46.92
5	29100	0.0018	160.16	15500	0.0018	85.31	8700	0.0018	47.88
6	24300	0.0024	175.07	12900	0.0024	92.94	7300	0.0024	52.59
1/4	22900	0.0026	178.62	12200	0.0026	95.16	6900	0.0026	53.82
5/16	18300	0.0035	192.15	9800	0.0035	102.90	5500	0.0035	57.75
8	18200	0.0035	193.03	9700	0.0035	102.88	5450	0.0035	57.80
3/8	15300	0.0044	201.96	8150	0.0044	107.58	4600	0.0044	60.72
10	14600	0.0047	204.51	7800	0.0047	109.26	4400	0.0047	61.63
7/16	13100	0.0053	208.29	7000	0.0053	111.30	3900	0.0053	62.01
12	12100	0.0058	210.65	6500	0.0058	113.16	3600	0.0058	62.67
1/2	11500	0.0062	213.90	6100	0.0062	113.46	3400	0.0062	63.24
9/16	10200	0.0071	217.26	5400	0.0071	115.02	3050	0.0071	64.97
5/8	9200	0.0080	220.80	4900	0.0080	117.60	2750	0.0080	66.00
16	9100	0.0081	220.33	4850	0.0081	117.43	2700	0.0081	65.37
18	8100	0.0092	223.67	4300	0.0092	118.74	2400	0.0092	66.27
3/4	7650	0.0098	224.91	4100	0.0098	120.54	2300	0.0098	67.62
20	7300	0.0103	226.41	3900	0.0103	120.96	2200	0.0103	68.23
Depth of Cut a_a	1.5D								
Depth of Cut a_r	0.010" - 0.030"								

Standard Milling Conditions

List No. 9717, 9718, 9719, 9720, 9721, 9722

For Spindles Under 10K RPM

Profiling

Work Material		Aluminum			Aluminum Cast			Copper Alloys		
Milling Conditions		300-1500 SFM			600-1000 SFM			SFM		
Mill Diam.		RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3		10000	0.0015	45.33	10000	0.0013	40.31	10000	0.0013	39.25
1/8		10000	0.0016	48.08	10000	0.0014	42.53	10000	0.0014	41.52
4		10000	0.0020	61.03	10000	0.0018	52.95	10000	0.0017	52.24
3/16		10000	0.0024	73.01	10000	0.0021	62.59			
5		10000	0.0026	76.74	10000	0.0022	65.59			
6		10000	0.0031	92.45	10000	0.0026	78.23			
1/4		10000	0.0033	97.95	10000	0.0028	82.65			
5/16		10000	0.0041	122.89						
8		10000	0.0041	123.87						
3/8		10000	0.0049	147.83						
10		10000	0.0052	155.29						
7/16		10000	0.0058	172.76						
12		10000	0.0062	186.70						
1/2		10000	0.0066	197.70						
9/16		10000	0.0074	222.64						
Depth of Cut	a_a	1.5D								
	a_r	0.5D								

Slotting

Work Material		Aluminum			Aluminum Cast			Copper Alloys		
Milling Conditions		800-1600 SFM			500-800 SFM			250-500 SFM		
Mill Diam.		RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3		10000	0.0014	43.12	10000	0.0011	31.78	10000	0.0011	32.08
1/8		10000	0.0015	45.60	10000	0.0011	33.60	10000	0.0011	33.90
4		10000	0.0019	57.29	10000	0.0014	42.17			
3/16		10000	0.0023	68.10	10000	0.0017	50.10			
5		10000	0.0024	71.47	10000	0.0018	52.57			
6		10000	0.0029	85.64	10000	0.0021	62.96			
1/4		10000	0.0030	90.60						
5/16		10000	0.0038	113.10						
8		10000	0.0038	113.99						
3/8		10000	0.0045	135.60						
10		10000	0.0047	142.33						
7/16		10000	0.0053	158.10						
Depth of Cut	H	1D								

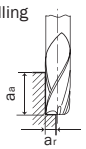
Finishing

Work Material		Aluminum			Aluminum Cast			Copper Alloys		
Milling Conditions		1000-2000 SFM			600-1000 SFM			300-600 SFM		
Mill Diam.		RPM	IPT	IPM	RPM	IPT	IPM	RPM	IPT	IPM
3		10000	0.0007	21.02	10000	0.0007	21.02	10000	0.0007	21.02
1/8		10000	0.0008	24.00	10000	0.0008	24.00	10000	0.0008	24.00
4		10000	0.0013	38.03	10000	0.0013	38.03	10000	0.0013	38.03
3/16		10000	0.0017	51.00	10000	0.0017	51.00			
5		10000	0.0018	55.04	10000	0.0018	55.04			
6		10000	0.0024	72.05	10000	0.0024	72.05			
1/4		10000	0.0026	78.00						
5/16		10000	0.0035	105.00						
8		10000	0.0035	106.06						
3/8		10000	0.0044	132.00						
10		10000	0.0047	140.08						
7/16		10000	0.0053	159.00						
Depth of Cut	a_a	1.5D								
	a_r	0.010" - 0.030"								

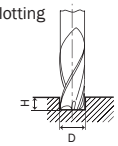
For entry, it is recommended to use slotting conditions. For more info on entry, see page 145.
Adjust milling condition when unusual vibration or sound occurs.
When using long reach tools, decrease width of cut and feed rate by 50%.

D: Dia. of Mill

Side Milling



Slotting



DLC Mill

USA STOCK ITEM*

List No. 6231HD Fractional sizes

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Overall Length
1315363	1/8	3/8	3/8	2-5/16
1315370	3/16		7/16	
1315386	1/4		5/8	2-7/16
1315392	5/16		3/4	2-1/2
1315408	3/8			
1315414	7/16		1	2-11/16
1315420	1/2	1/2	1-1/4	3-1/4
1315437	5/8	5/8	1-5/8	3-3/4
1315443	3/4	3/4		4-1/8
1315450	1	1	2	4-1/2

1 per tube

WARNING: Cancer - www.P65Warnings.ca.gov

Standard Milling Conditions List No. 6231HD

Work Material / Milling Conditions / Dia. of Mill (inch)		Aluminum 1070		Aluminum Alloys					
				4032, 6061		5052		7075	
		960 - 980 SFM		650 - 670 SFM		820 - 825 SFM		650 - 655 SFM	
		RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
1/8		30,000	31.5	19,900	14.9	25,100	22.6	19,900	11.9
3/16		20,000	38.0	13,300	17.5	16,800	26.5	13,300	14.0
1/4		15,000	39.4	10,000	17.5	12,600	26.5	9,940	13.9
5/16		12,000	39.4	8,000	21.5	10,030	32.0	7,950	16.9
3/8		10,000	45.0	6,700	22.6	8,360	33.9	6,630	17.9
7/16		8,500	47.2	5,700	23.9	7,160	37.6	5,680	19.9
1/2		7,500	47.2	5,000	25.0	6,270	37.6	4,970	19.9
5/8		6,000	47.2	4,000	25.0	5,020	37.7	3,980	19.9
3/4		5,000	47.2	3,400	25.5	4,180	37.6	3,320	19.9
1		3,700	47.2	2,500	25.0	3,140	37.7	2,490	19.9
Depth of Cut	a_a	1.5D							
	a_r	0.2D							
	H	1D							

AG Mill Roughing

List No. 6485 Fractional Sizes

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1380710	1/4	3/8	5/8	4	2-7/16
1380726	5/16		3/4		2-1/2
1380732	3/8				
1380749	1/2	1/2	1-1/4		3-1/4
1380755	5/8	5/8	1-5/8		3-3/4
1380761	3/4	3/4			3-7/8
1380778	7/8	7/8	1-7/8	5	4-1/8
1380784	1	1	2		4-1/2
1380790	1-1/4	1-1/4		6	
1380806	1-1/2				
1380812	2			8	

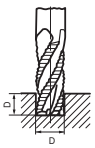
1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

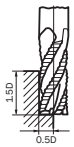
Standard Milling Conditions List No. 6485

Work Material / Milling Conditions	Structural Steels Carbon Steels		Alloy Steels Pre-Hardened Steels		Mold Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Irons		Aluminum Alloys Copper Alloys Nonferrous Alloys	
	120 - 130 SFM		90 - 100 SFM		70 - 80 SFM		60 - 65 SFM		145 - 150 SFM		280 - 285 SFM	
Dia. Of Mill (inch)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
-	2,000	10.2	1,500	7.1	1,200	3.9	1,000	3.0	2,400	12.6	4,500	47.2
1/4	1,900	10.4	1,400	7.3	1,100	4.0	950	3.1	2,200	12.6	4,300	48.3
5/16	1,500	11.0	1,200	7.5	1,000	4.6	720	3.1	1,800	13.3	3,400	51.3
-	1,500	11.0	1,200	7.5	1,000	4.7	720	3.1	1,800	13.4	3,400	51.2
3/8	1,300	11.0	1,000	7.6	760	4.6	630	3.2	1,500	13.5	2,900	51.7
-	1,200	11.0	900	7.5	720	4.7	590	3.1	1,400	13.4	2,700	51.2
-	1,000	11.0	800	7.5	600	4.7	490	3.3	1,200	13.4	2,300	51.2
1/2	950	11.0	720	7.6	570	4.7	470	3.3	1,100	13.5	2,200	51.7
-	800	11.0	610	7.5	480	4.7	400	3.3	950	13.4	1,800	51.2
5/8	760	11.0	570	7.5	460	4.7	380	3.3	900	13.5	1,700	51.3
3/4	630	11.0	480	7.5	380	4.5	320	3.3	750	13.5	1,400	50.8
-	600	11.0	450	7.1	360	4.3	290	3.1	720	13.4	1,400	51.2
7/8	540	11.8	410	8.6	330	5.3	270	3.6	640	16.3	1,200	59.2
-	480	11.4	360	7.9	290	5.1	250	3.4	550	15.4	1,100	55.1
1	470	11.4	360	7.9	290	5.0	240	3.2	560	15.7	1,100	54.4
-	400	10.2	300	7.1	240	4.3	200	3.1	470	14.2	900	51.2
1 1/4	380	11.4	290	7.7	230	4.8	190	3.5	450	15.2	860	55.6
1 1/2	320	8.0	240	4.7	190	3.4	160	2.6	370	10.1	720	38.8
-	300	6.7	250	4.3	180	2.9	150	2.0	360	9.1	670	33.1
-	240	4.3	180	2.8	140	1.8	120	1.3	290	5.9	550	20.5
2	240	5.3	180	3.7	140	2.5	120	1.7	280	7.2	540	25.9

Slotting



Side Milling



1) In dry miling which is recommended air blow, reduce the RPM and feed to 70% of above table values.
2) Adjust milling condition when unusual vibration or different sound occur.

AG Mill Heavy

List No. 6403 Fractional Sizes

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1380600	1/4	3/8	5/8	4	2-7/16
1380617	5/16		3/4		2-1/2
1380623	3/8				
1380630	1/2	1/2	1-1/4		3-1/4
1380646	5/8	5/8	1-5/8		3-3/4
1380652	3/4	3/4			3-7/8
1380669	7/8	7/8	1-7/8		4-1/8
1380675	1	1	2	6	4-1/2
1380681	1-1/4	1-1/4			
1380698	1-1/2				
1380703	2			8	

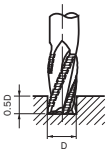
1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

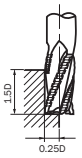
Standard Milling Conditions List No. 6403

Work Material / Milling Conditions	Structural Steels Carbon Steels		Alloy Steels Pre-Hardened Steels		Mold Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Irons		Aluminum Alloys Copper Alloys Nonferrous Alloys	
	150 - 155 SFM		115 - 125 SFM		95 - 105 SFM		75 - 80 SFM		175 - 185 SFM		330 - 350 SFM	
Dia. Of Mill (inch)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
-	5,000	11.4	3,800	7.5	3,200	5.1	2,500	3.5	5,800	30.3	10,800	52.0
-	3,000	11.4	2,300	7.5	1,900	5.1	1,600	3.5	3,500	30.3	6,500	52.0
-	2,500	11.4	1,900	7.5	1,600	5.1	1,300	3.5	2,900	31.1	5,400	52.0
1/4	2,300	11.2	1,800	7.7	1,500	5.2	1,200	3.3	2,800	31.1	5,200	53.0
5/16	1,900	11.5	1,400	7.6	1,200	5.1	1,000	3.5	2,200	31.0	4,100	52.2
-	1,900	11.4	1,400	7.5	1,200	5.1	1,000	3.5	2,200	31.1	4,100	52.0
3/8	1,600	11.5	1,200	7.7	1,000	4.9	790	3.3	1,800	31.6	3,500	53.0
-	1,500	11.8	1,200	7.9	1,000	5.1	800	3.5	1,700	31.5	3,200	52.0
-	1,300	11.4	1,000	7.9	800	5.1	600	3.5	1,400	31.1	2,800	52.0
1/2	1,200	11.2	920	7.7	760	5.3	600	3.6	1,400	31.6	2,600	51.9
-	1,000	11.4	800	7.9	600	5.1	500	3.5	1,200	31.1	2,200	52.0
5/8	940	11.2	730	7.7	610	5.3	480	3.5	1,100	30.0	2,100	52.0
3/4	780	10.5	610	7.7	510	4.7	400	3.1	920	28.9	1,700	52.0
-	750	10.2	600	7.9	500	4.7	400	3.1	900	29.1	1,700	52.0
7/8	670	9.4	520	7.0	440	4.0	340	2.6	790	26.1	1,500	46.7
-	600	8.7	500	5.9	400	3.5	300	2.4	700	22.8	1,300	38.6
1	580	10.5	460	6.3	380	4.1	300	2.7	690	26.8	1,300	46.0
-	500	7.9	400	4.7	300	3.1	250	2.0	600	20.1	1,100	33.9
1 1/4	470	7.4	370	4.4	310	3.2	240	2.5	550	16.9	1,000	29.6
1 1/2	390	7.0	310	4.1	260	3.2	200	2.1	460	10.3	870	18.7
-	370	6.7	300	4.3	220	2.9	180	2.0	450	9.1	800	15.5
-	300	4.3	240	2.8	160	1.8	120	1.3	320	5.9	620	10.5
2	290	5.1	230	3.3	150	2.2	120	1.5	310	7.3	610	13.7

Grooving



Side Milling



1) In dry miling which is recommended air blow, reduce the RPM and feed to 70% of above table values.
2) Adjust milling condition when unusual vibration or different sound occur.

Roughing and Finishing (Heavy Duty)

List No. 6367

Fractional sizes
Surface Treat, 8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1024726	1/4	3/8	5/8	4	2-7/16
1024732	5/16		3/4		2-1/2
1024761	3/8		3/4		2-1/2
1024812	1/2	1/2	1-1/4		3-1/4
1024858			2		4
1024864	5/8	5/8	1-5/8		3-3/4
1024870			2-1/2		4-5/8
1024921	3/4		1-5/8		3-3/4
1024950		3/4	1-5/8		3-7/8
1024915			3		5-1/4
1024996	7/8		1-7/8		4-1/8
1025000		7/8	1-7/8		4-1/8
1024967			3-1/2		5-3/4
1025067	1	3/4	2	6	4-1/2
1025103		1	2		4-1/2
1025023			4		6-1/2
1025190	1-1/8		2		4-1/2
1042873	1-1/4	3/4	2		4-1/2
1019565			4		6-1/2
1025212		1-1/4	2		4-1/2
1025315			4		6-1/2
1042880	1-1/2	3/4	2		4-1/2
1019600			4		6-1/2
1025350		1-1/4	2		4-1/2
1025396			4		6-1/2
1025401	1-3/4		2		4-1/2
1025418			4		6-1/2
1024282	2	2	2	8	4-1/2
1025447			4		6-1/2
1025620			4		7-3/4
1025499			6		9-3/4
1025591			8		11-3/4
1086318	2-1/2		4		7-3/4
1086324			6		9-3/4
1086330			8		11-3/4
1086347			10		13-3/4
1086353	3	2-1/2	4	10	7-3/4
1086360			6		9-3/4
1086376			8		11-3/4
1086382			10		13-3/4
1086399			12		15-3/4

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Shanks 2" and Larger Have Combination Drive
8 And 10 Flutes Are Not Center Cutting

List No. 6367X

Fractional sizes
SG Coated, 8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1175970	1/4	3/8	5/8	4	2-7/16
1175986	5/16		3/4		2-1/2
1175992	3/8		3/4		2-1/2
1176007	1/2	1/2	1-1/4		3-1/4
1176020	5/8	5/8	1-5/8		3-3/4
1176059	3/4	3/4	1-5/8		3-7/8
1176088	7/8	7/8	1-7/8		4-1/8
1176100	1	3/4	2	6	4-1/2
1176151	1	1	2		4-1/2
1176168	1		4		6-1/2
1176202	1-1/4	1-1/4	2		4-1/2
1176219	1-1/4		4		6-1/2
1176248	1-1/2		2		4-1/2
1176254	1-1/2		4		6-1/2
1176260	1-3/4		2		4-1/2
1176283	2		2	8	4-1/2
1176122	2	2	4		7-3/4

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Milling Conditions List No. 6367

Work Material / Milling Conditions / Dia. of Mill (inch)		Carbon Steels		Carbon Steels Alloy Steels		Die Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Iron		Aluminum Alloys Copper Alloys Nonferrous Alloys	
		80 SFM		60 SFM		40 SFM		33 SFM		100 SFM		200 SFM	
		RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
1/4		1,300	5.9	900	3.7	700	2.1	510	1.5	1,600	17.3	3,100	31.5
3/8		820	5.9	600	3.8	410	2.1	340	1.5	1,100	17.7	2,100	32.1
1/2		620	5.9	450	3.8	310	2.1	260	1.5	800	17.3	1,600	31.9
5/8		490	5.9	360	3.7	250	2.1	210	1.5	610	17.1	1,300	31.5
3/4		410	5.6	300	3.6	210	2.0	170	1.4	510	16.3	1,100	31.5
1		310	5.5	230	3.5	160	2.2	130	1.4	380	15.7	800	29.5
1 1/4		250	4.3	180	2.7	130	1.5	110	1.1	310	12.6	700	23.6
1 1/2		210	3.5	150	2.2	110	1.2	90	0.8	260	9.8	600	18.5
1 3/4		180	2.4	130	1.6	90	0.9	80	0.6	220	7.5	500	13.8
2		160	2.0	120	1.4	80	0.7	70	0.5	190	5.9	400	11.0
Depth of Cut	a_a	1.5D											
	a_r	0.25D											
	H	0.5D											

Standard Milling Conditions List No. 6367X

Work Material / Milling Conditions / Dia. of Mill (inch)		Carbon Steels		Alloy Steels		Die Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Iron		Aluminum Alloys Copper Alloys Nonferrous Alloys	
		118 SFM		83 SFM		70 SFM		60 SFM		130 SFM		260 SFM	
		RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
1/4		1,800	9.4	1,300	6.8	1,100	4.8	890	2.8	2,000	24.0	4,000	48.0
3/8		1,200	8.6	840	5.4	680	3.5	600	2.4	1,400	22.4	2,700	43.2
1/2		880	8.4	630	5.8	510	3.7	450	2.7	1,000	22.4	2,000	46.4
5/8		710	8.5	510	5.7	410	3.4	360	2.6	800	22.4	1,600	44.8
3/4		590	8.0	420	5.2	340	3.3	300	2.4	670	21.4	1,400	41.4
1		440	8.4	320	6.0	260	3.6	230	2.8	500	24.0	1,000	45.0
1 1/4		360	5.8	260	4.1	210	2.5	180	1.9	400	16.3	800	29.8
1 1/2		300	4.7	210	3.2	170	1.9	150	1.5	340	13.5	700	25.2
1 3/4		260	3.4	180	2.2	150	1.4	130	1.1	290	11.3	600	18.0
Depth of Cut	a_a	1.5D											
	a_r	0.25D											
	H	0.5D											

Roughing (Hog)

List No. 6303

Bright Finish, 8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1085363	1/4	3/8	5/8	4	2-7/16
1085370			1-1/4		3-1/16
1085386	5/16		3/4		2-1/2
1085392			1-3/8		3-1/8
1085408	3/8		3/4		2-1/2
1085414			1-1/2		3-1/4
1085420	1/2	1/2	1-1/4		3-1/4
1085437			2		4
1085443	5/8	5/8	1-5/8		3-3/4
1085450			2-1/2		4-5/8
1085466	3/4		1-5/8		3-7/8
1085472			3		5-1/4
1086267		3/4	1-5/8		3-7/8
1086273			3		5-1/4
1085489	7/8		1-7/8	5	4-1/8
1085495			3-1/2		5-3/4
1085500		7/8	1-7/8		4-1/8
1085517			3-1/2		5-3/4
1085523	1	3/4	2		4-1/4
1085530			1		3-1/4
1086003		1	2		4-1/2
1086010			4		6-1/2
1086026			3		5-1/2
1086032	1-1/8		2		4-1/2
1086049	1-1/4	3/4	2	6	4-1/2
1086055			4		6-1/2
1086061		1-1/4	2		4-1/2
1086078			4		6 1/2
1086084			3		5-1/2
1086090	1-1/2	3/4	2		4-1/2
1086106			4		6 1/2
1086112		1-1/4	2		4-1/2
1086129			4		6-1/2
1086135			3		5-1/2
1086141	1-3/4	3/4	2		4-1/2
1086158			4		6-1/2
1086164		1-1/4	2		4-1/2
1086170			4		6-1/2
1086187			3		5-1/2
1086193	2		2	8	4-1/2
1086209			4		6-1/2
1086215			3		5-1/2
1086221		2	4		7-3/4
1086238			6		9-3/4
1086244			8		11-3/4
1086250			3		6-3/4

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Shanks 2" And Larger Have Combination Drive

All Sizes Are Not Center Cutting

List No. 6303X

SG Coated, 8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1175510	1/4	3/8	5/8	4	2-7/16
1175533	5/16		3/4		2-1/2
1175556	3/8		3/4		2-1/2
1175579	1/2	1/2	1-1/4		3-1/4
1175585			2		4
1175591	5/8	5/8	1-5/8		3-3/4
1175607			2-1/2		4-5/8
1175636	3/4	3/4	1-5/8		3-7/8
1175642			3		5-1/4
1175659	7/8		1-7/8	5	4-1/8
1175671		7/8	1-7/8		4-1/8
1175694	1	3/4	2		4-1/4
1175716		1	2		4-1/2
1175722			4		6-1/2
1175739			3		5-1/2
1175774	1-1/4	1-1/4	2	6	4-1/2
1175780			4		6-1/2
1175797			3		5-1/2
1175825	1-1/2		2		4-1/2
1175831			4		6-1/2
1175848			3		5-1/2
1175877	1-3/4		2		4-1/2
1175883			4		6-1/2
1175890			3		5-1/2
1175905	2	2	2	8	4-1/2
1175934			4		7-3/4
1175940			6		9-3/4
1175963			3		6-3/4

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Roughing (Hog)

List No. 6307 8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1182749	1/4	3/8	5/8	3	2-7/16
1182755			1-1/4		3-1/16
1182761	5/16		3/4		2-1/2
1182778			1-3/8		3-1/8
1182784	3/8		3/4		2-1/2
1182790			1-1/2		3-1/4
1182806	1/2	1/2	1-1/4	4	3-1/4
1182812			2		4
1182829	5/8	5/8	1-5/8		3-3/4
1182835			2-1/2		4-5/8
1182841	3/4		1-5/8		3-7/8
1182864		3/4	1-5/8		3-7/8
1182887	7/8		1-7/8	5	4-1/8
1182909		7/8	1-7/8		4-1/8
1182921	1	3/4	2		4-1/4
1182944		1	2		4-1/2
1182950			4		6-1/2
1182967			3		5-1/2
1182973	1-1/8		2		4-1/2
1183000	1-1/4	1-1/4	2	6	4-1/2
1183017			4		6-1/2
1183023			3		5-1/2
1183052	1-1/2		2		4-1/2
1183069			4		6-1/2
1183075			3		5-1/2
1183103	1-3/4		2		4-1/2
1183132	2		2		4-1/2
1183149			4		6-1/2
1183161		2	4		7-3/4
1183178			6		9-3/4

1 per tube

Shanks 2” And Larger Have Combination Drive

Standard Milling Conditions List No. 6303, 6307

Work Material / Milling Conditions		Carbon Steels		Alloy Steels		Die Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Iron		Aluminum Alloys Copper Alloys Nonferrous Alloys	
		80 SFM		60 SFM		40 SFM		33 SFM		100 SFM		200 SFM	
Dia. of Mill (inch)		RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
1/4		1,300	5.1	900	3.1	700	1.7	510	1.2	1,600	6.7	3,100	26.4
3/8		820	5.1	600	3.1	410	1.7	340	1.2	1,100	6.7	2,100	26.4
1/2		620	5.1	450	3.2	310	1.7	260	1.2	800	6.7	1,600	26.4
5/8		490	5.1	360	3.1	250	1.7	210	1.2	610	6.7	1,300	26.4
3/4		410	5.1	300	3.0	210	1.7	170	1.2	510	6.7	1,100	26.4
1		310	5.1	230	3.1	160	1.8	130	1.2	380	6.7	800	26.4
1 1/4		250	4.9	180	3.1	130	1.8	110	1.2	310	6.7	700	26.4
1 1/2		210	3.5	150	2.3	110	1.3	90	0.9	260	5.3	600	21.7
1 3/4		180	2.6	130	1.6	90	0.9	80	0.6	220	3.7	500	15.7
2		160	2.4	120	1.6	80	0.9	70	0.6	190	3.5	400	14.2
Depth of Cut	a_a	1.5D											
	a_r	0.25D											
	H	0.5D											

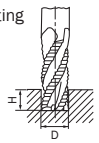
1) The above cutting speeds and feeds apply to regular end mill flute length.
For long fluted end mills please use the following factors below:

Cutting Length	Reduce Feed by
2.5 × Diameter	15%
3 × Diameter	25%
4 × Diameter	55%

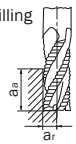
2) In dry milling, reduce the RPM and Feed 30% of values on table above. (recommended air blow)
3) Adjust drilling condition when unusual vibration or sound occurs.

D: Dia. of Mill

Slotting



Side Milling



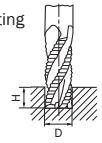
Standard Milling Conditions List No. 6303X

Work Material / Milling Conditions		Carbon Steels		Alloy Steels		Die Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Iron		Aluminum Alloys Copper Alloys Nonferrous Alloys	
		118 SFM		83 SFM		70 SFM		60 SFM		130 SFM		260 SFM	
Dia. of Mill (inch)		RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
1/4		1,800	7.2	1,300	4.7	1,100	3.5	890	2.1	2,000	9.6	4,000	36.8
3/8		1,200	7.2	840	5.0	680	2.7	600	1.9	1,400	9.0	2,700	33.5
1/2		880	7.0	630	4.8	510	2.9	450	2.0	1,000	8.8	2,000	36.0
5/8		710	7.1	510	4.5	410	3.0	360	2.1	800	8.6	1,600	35.2
3/4		590	6.8	420	4.4	340	2.7	300	2.0	670	8.6	1,400	34.7
1		440	7.8	320	5.0	260	3.4	230	2.5	500	11.3	1,000	42.5
1 1/4		360	7.6	260	5.0	210	3.3	180	2.3	400	11.0	800	40.8
1 1/2		300	5.2	210	3.2	170	2.0	150	1.5	340	7.3	700	28.6
1 3/4		260	3.6	180	2.2	150	1.4	130	1.1	290	4.9	600	19.8
—		1,900	7.1	1,300	4.3	1,100	2.8	930	2.1	2,100	8.7	4,200	35.0
Depth of Cut	a_a	1.5D											
	a_r	0.25D											
	H	0.5D											

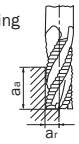
1) In dry milling , reduce the RPM and feed rate 30% of values on table above. (recommended air blow)
2) Adjust milling condition when unusual vibration or sound occurs.

D: Dia. of Mill

Slotting



Side Milling



Two Flute Single End

List No. 6231

8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Overall Length
1030592	1/8	3/8	3/8	2-5/16
1230784	5/32			
1030614	3/16		7/16	
1230790	7/32			
1030637	1/4		1/2	
1230806	9/32			
1030672	5/16		9/16	
1230812	11/32			
1030775	3/8			
1230829	13/32		13/16	2-1/2
1030781	7/16			
1230835	15/32			
1030803	1/2	1/2	1	3
1230841		3/8	13/16	2-1/2
1230858	17/32	1/2	1-1/8	3-1/8
1030810	9/16			
1030855	5/8	5/8	1-5/16	3-7/16
1230864		1/2	1-1/8	3-1/8
1030941	11/16	5/8	1-5/16	3-7/16
1230870		1/2		3-5/16
1030958	3/4	5/8		3-7/16
1230887		1/2		3-5/16
1030964		3/4		3-9/16
1226927	13/16	5/8	1-1/2	3-5/8
1031066	7/8	7/8		3-3/4
1230893		5/8		3-5/8
1031117		3/4		3-3/4
1230909	15/16	5/8		3-5/8
1031130	1	1	1-5/8	4-1/8
1031146		3/4	1-1/2	3-3/4
1230915		5/8		3-5/8
1230703		7/8		3-3/4
1031169	1-1/8	1	1-5/8	4-1/8
1230710		3/4		3-7/8
1230726		7/8		3-7/8
1031198	1-1/4	1		4-1/8
1230732		3/4		3-7/8
1230749		7/8		3-7/8
1031203		1-1/4		4-1/8
1031226	1-3/8	1		4-1/8
1230755		3/4		3-7/8
1031261	1-1/2	1		4-1/8
1230761		3/4		3-7/8
1031290		1-1/4		4-1/8
1031341	1-3/4	1-1/4		4-1/8
1031393	2	1-1/4		4-1/8

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Shanks 2" and Larger Have Combination Drive

List No. 6231X

SG Coated, 8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Overall Length
1176290	1/8	3/8	3/8	2-5/16
1176311	3/16		7/16	
1176334	1/4		1/2	
1176357	5/16		9/16	
1176370	3/8			
1176392	7/16		13/16	2-1/2
1176414	1/2	1/2	1	3
1176443	9/16	1/2	1-1/8	3-1/8
1176450	5/8	5/8	1-5/16	3-7/16
1176472	11/16			
1176495	3/4			
1176517		3/4		3-9/16
1176530	7/8	7/8	1-1/2	3-3/4
1176546		3/4		
1176569	1	1	1-5/8	4-1/8
1176575	1	3/4	1-1/2	3-3/4
1176603	1-1/8	1	1-5/8	4-1/8
1176661	1-1/4	1-1/4		
1176712	1-1/2			

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Two Flute Long Single End

List No. 6233 8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Overall Length
1043479	1/4	3/8	1	3 1/16
1043485	5/16		1 1/4	3 5/16
1043491	3/8		1 1/2	3 1/4
1043507			1	2 3/4
1043513	1/2	1/2	2	4
1043520			1 1/2	3 1/2
1043536			3	5
1043542	5/8	5/8	2	4 1/8
1043571	3/4	3/4	2 1/4	4 1/2
1043600	7/8	7/8	2 1/2	4 3/4
1043639	1	1	3	5 1/2
1043674	1 1/8			
1043680	1 1/4	1 1/4		
1043702	1 1/2			
1043725	1 3/4			
1043760	2			

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Regular Single End

List No. 6230 8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Overall Length
0107454	1.0	6.0	2.0	50.0
0107505	1.5		3.0	
0107528	2.0		7.0	
0107540	2.5			
0107730	3.0		9.0	
0107769	3.5	8.0	12.0	60.0
0107810	4.0			
0107855	4.5		15.0	
0107878	5.0			
0107935	5.5			
0107941	6.0			
0107970	6.5	10.0	20.0	65.0
0108066	7.0			
0108072	7.5			
0108089	8.0			
0108095	8.5		25.0	75.0
0108100	9.0			
0108117	9.5			
0108123	10.0			
0108249	12.0	12.0	30.0	80.0
0108278	13.0	16.0	35.0	90.0
0108358	14.0			
0108387	15.0		40.0	95.0
0108444	16.0			
0108530	17.0	20.0		105.0
0108576	19.0		45.0	110.0
0108640	20.0			
0108977	24.0	25.0	50.0	120.0
0109004	25.0			
0109027	26.0			
0109457	30.0		55.0	125.0

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Milling Conditions List No. 6231, 6233, 6230

Work Material / Milling Conditions		Carbon Steels		Alloy Steels		Die Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Iron		Aluminum Alloys Copper Alloys Nonferrous Alloys	
		85 SFM		60 SFM		40 SFM		33 SFM		100 SFM		200 SFM	
Dia. of Mill (inch)	(mm)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
—	2	4,000	3.1	2,800	2.0	2,000	1.1	1,600	0.7	4,800	9.1	9,600	16.5
—	3	2,700	3.3	1,900	2.1	1,300	1.2	1,100	0.8	3,200	9.4	6,400	17.7
1/8	3.175	2,600	3.3	1,800	2.1	1,300	1.2	1,100	0.8	3,100	9.4	6,100	17.7
3/16	4.7625	1,700	3.3	1,200	2.1	840	1.2	680	0.8	2,100	9.4	4,100	17.7
—	5	1,600	3.3	1,100	2.1	800	1.2	640	0.8	1,900	9.4	3,800	17.7
—	6	1,300	3.3	930	2.1	660	1.2	530	0.8	1,600	9.4	3,200	17.7
1/4	6.35	1,300	3.3	890	2.1	630	1.2	510	0.8	1,600	9.4	3,100	17.7
—	8	1,000	3.3	700	2.1	500	1.2	400	0.8	1,200	9.4	2,400	17.7
3/8	9.525	850	3.3	600	2.1	420	1.2	340	0.8	1,100	9.4	2,100	17.7
—	10	800	3.4	560	2.1	400	1.2	320	0.8	960	9.4	1,900	17.7
—	12	660	3.3	460	2.1	330	1.2	270	0.8	800	9.4	1,600	17.7
1/2	12.7	640	3.3	450	2.1	320	1.2	260	0.8	800	9.4	1,600	17.7
—	15	530	3.3	370	2.1	270	1.2	210	0.8	640	9.4	1,300	17.7
5/8	15.875	510	3.3	360	2.1	260	1.2	210	0.8	610	9.4	1,300	17.7
3/4	19.05	430	3.2	300	2.0	210	1.1	170	0.7	510	9.1	1,100	16.9
—	20	400	3.1	280	2.0	200	1.1	160	0.7	480	9.1	960	16.5
—	25	320	2.4	220	1.5	160	0.8	130	0.6	380	7.1	760	12.6
1	25.4	320	2.4	230	1.5	160	0.8	130	0.6	380	7.0	770	12.4
—	30	270	1.9	190	1.2	130	0.7	110	0.5	320	5.5	640	10.2
1 1/4	—	260	1.8	180	1.1	130	0.6	110	0.5	310	5.1	610	9.8
1 1/2	—	220	1.5	150	0.9	110	0.5	90	0.4	260	4.1	510	7.9
—	—	200	1.3	140	0.8	100	0.5	80	0.3	240	3.8	480	7.1
1 3/4	—	190	1.1	130	0.6	90	0.4	80	0.3	220	3.0	440	5.9
—	—	160	0.7	110	0.4	80	0.2	60	0.2	190	2.0	380	3.5
2	—	160	0.6	120	0.4	80	0.2	70	0.2	190	1.9	390	3.4
Depth of Cut	a_a	1.5D											
	a_r	0.25D											
	H	0.5D											

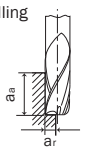
1) The above cutting speeds and feeds apply to regular end mill flute length.
For long fluted end mills please use the following factors below:

Cutting Length	Reduce Feed by
2.5 × Diameter	15%
3 × Diameter	25%
4 × Diameter	55%
5 × Diameter	65%
6 × Diameter	75%

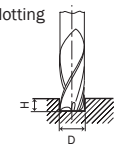
2) In dry milling, reduce the RPM and Feed 30% of values on table above. (recommended air blow)
3) Adjust drilling condition when unusual vibration or different sound occurs.

D: Dia. of Mill

Side Milling



Slotting



Standard Milling Conditions List No. 6231X

Work Material / Milling Conditions		Carbon Steels		Alloy Steels		Die Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Iron		Aluminum Alloys Copper Alloys Nonferrous Alloys	
		118 SFM		83 SFM		70 SFM		60 SFM		130 SFM		260 SFM	
Dia. of Mill (inch)		RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
1/8		3,600	5.5	2,600	3.5	2,100	2.2	1,800	1.7	4,000	15.2	8,000	28.0
3/16		2,400	5.5	1,700	3.5	1,400	2.2	1,200	1.6	2,700	15.1	5,300	28.0
1/4		1,800	5.5	1,300	3.5	1,100	2.2	890	1.7	2,000	15.4	4,000	28.0
3/8		1,200	5.5	840	3.6	680	2.2	600	1.7	1,400	15.7	2,700	28.3
1/2		880	5.5	630	3.6	510	2.2	450	1.7	1,000	15.4	2,000	28.3
5/8		710	5.5	510	3.5	410	2.2	360	1.7	800	15.3	1,600	28.0
3/4		590	5.5	420	3.5	340	2.1	300	1.6	670	14.8	1,400	27.2
1		440	3.9	320	2.6	260	1.6	230	1.2	500	11.0	1,000	20.5
1 1/4		360	3.0	260	2.0	210	1.3	180	0.9	400	8.3	800	15.0
1 1/2		300	2.6	210	1.6	170	1.0	150	0.8	340	6.7	700	12.6
Depth of Cut	a_a	1.5D											
	a_r	0.25D											
	H	0.5D											

Four Flute Single End

List No. 6210 8% Cobalt HSS

(Unit) : mm

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Overall Length
0110773	2.5	6.0	7.0	50.0
0110824	3.0		9.0	
0111282	3.5	8.0	12.0	60.0
0111327	4.0			
0111459	4.5		15.0	
0111516	5.0			
0111619	5.5			
0111660	6.0			
0111866	6.5	10.0	20.0	65.0
0112060	7.0			
0112564	7.5			
0112667	8.0			
0112680	8.5		25.0	75.0
0112696	9.0			
0112701	9.5			
0112782	10.0			
0112810	11.0	12.0	30.0	80.0
0112879	12.0			
0112891	13.0	16.0	35.0	90.0
0113067	14.0			
0113118	15.0		40.0	95.0
0113227	16.0			
0113233	17.0	20.0		105.0
0113262	18.0			
0113320	19.0		45.0	110.0
0113336	20.0			
0113497	24.0	25.0	50.0	120.0
0113577	26.0			
0113611	28.0		55.0	125.0
0113772	30.0			

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Multi-Flute Single End Center Cutting

List No. 6211M 8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1030345	1/8	3/8	3/8	4	2-5/16
1042290	3/16		1/2		2-3/8
1042305	1/4		5/8		2-7/16
1042311	5/16		3/4		2-1/2
1042328	3/8		3/4		2-1/2
1042334	1/2	1/2	1-1/4		3-1/4
1030351				6	
1042340	5/8	5/8	1-5/8	4	3-3/4
1030368				6	
1042357	3/4	3/4		4	3-7/8
1030374				6	
1042363	7/8	7/8	1-7/8	4	4-1/8
1030380				6	
1042370	1	1	2	4	4-1/2
1030402				6	
1042386	1-1/8			4	
1030419				6	
1042392	1-1/4	1-1/4		4	
1030425				6	
1042408	1-1/2			4	
1030586				6	
1042414	2				
1042850			4		

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

List No. 6211X 8% Cobalt HSS, SG Coated

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1176729	1/8	3/8	3/8		2-5/16
1176735	3/16		1/2		2-3/8
1176741	1/4		5/8		2-7/16
1176758	5/16		3/4		2-1/2
1176764	3/8				
1176770	1/2	1/2	1-1/4		3-1/4
1176787				6	
1176793	5/8	5/8	1-5/8	4	3-3/4
1176809				6	
1176815	3/4	3/4		4	3-7/8
1176821				6	

1 per tube

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1176838	7/8	7/8	1-7/8	4	4-1/8
1176844				6	
1176850	1	1	2	4	4-1/2
1176867				6	
1176873	1-1/8			4	
1176880				6	
1176896	1-1/4	1-1/4		4	
1176901				6	
1176918	1-1/2			4	
1176924				6	

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Multi-Flute Long Single End Center Cutting

List No. 6213 8% Cobalt HSS

EDP	Diameter of Mill	Shank Diameter	Length of Cut	Number of Flutes	Overall Length
1042741	1/4	3/8	1 1/4	4	3 1/16
1042758	5/16		1 3/8		3 1/8
1042764	3/8		1 1/2		3 1/4
1042770	1/2	1/2	2		4
1042787	5/8	5/8	2 1/2		4 5/8
1042793	3/4	3/4	3		5 1/4
1042809	7/8	7/8	3 1/2		5 3/4
1042815	1	1	4		6 1/2
1042821	1 1/4	1 1/4			

1 per tube

⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

Standard Milling Conditions List No. 6210, 6211M, 6213

4 Flute

Work Material / Milling Conditions		Carbon Steels		Alloy Steels		Die Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Iron		Aluminum Alloys Copper Alloys Nonferrous Alloys	
		85 SFM		60 SFM		40 SFM		33 SFM		100 SFM		200 SFM	
Dia. of Mill (inch)	(mm)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
—	3	2,700	5.1	1,900	3.1	1,300	1.8	1,100	1.2	3,200	14.2	6,400	26.4
1/8	3.175	2,600	5.1	1,800	3.1	1,300	1.8	1,100	1.2	3,100	14.2	6,100	26.4
3/16	4.7625	1,700	5.1	1,200	3.1	840	1.7	680	1.2	2,100	14.2	4,100	26.4
—	5	1,600	5.1	1,100	3.1	800	1.7	640	1.2	1,900	14.2	3,800	25.6
—	6	1,300	5.1	930	3.1	660	1.7	530	1.2	1,600	14.2	3,200	26.4
1/4	6.35	1,300	5.1	890	3.1	630	1.7	510	1.2	1,600	14.2	3,100	26.4
—	8	1,000	5.1	700	3.1	500	1.7	400	1.2	1,200	14.2	2,400	26.4
3/8	9.525	850	5.1	600	3.1	420	1.8	340	1.2	1,100	14.4	2,100	26.6
—	10	800	5.1	560	3.2	400	1.8	320	1.2	960	14.6	1,900	26.8
—	12	660	5.1	460	3.2	330	1.8	270	1.2	800	14.6	1,600	26.4
1/2	12.7	640	5.1	450	3.2	320	1.8	260	1.2	800	14.6	1,600	26.4
—	15	530	5.1	370	3.1	270	1.8	210	1.2	640	14.6	1,300	26.4
5/8	15.875	510	5.1	360	3.1	260	1.7	210	1.2	610	14.4	1,300	25.6
3/4	19.05	430	4.9	300	3.0	210	1.7	170	1.1	510	13.6	1,100	25.2
—	20	400	4.7	280	3.0	200	1.7	160	1.1	480	13.4	960	24.8
—	25	320	3.6	220	2.3	160	1.3	130	0.9	380	10.2	760	18.9
1	25.4	320	3.5	230	2.3	160	1.3	130	0.9	380	10.0	770	18.7
—	30	270	2.9	190	1.8	130	1.0	110	0.7	320	8.3	640	15.4
1 1/4	31.75	260	2.7	180	1.7	130	1.0	110	0.7	310	7.9	610	14.2
1 1/2	38.1	220	2.2	150	1.4	110	0.8	90	0.5	260	6.1	510	11.4
—	40	200	2.0	140	1.3	100	0.7	80	0.5	240	5.5	480	10.6
1 3/4	44.45	190	1.6	130	1.0	90	0.6	80	0.4	220	4.1	440	8.7
—	50	160	1.0	110	0.6	80	0.4	60	0.2	190	2.9	380	5.5
2	50.8	160	1.0	120	0.6	80	0.3	70	0.2	190	2.8	390	5.3
Depth of Cut	a_a	1.5D											
	a_r	0.25D											

Standard Milling Conditions List No. 6210, 6211M, 6213

6 Flute

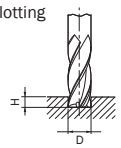
Work Material / Milling Conditions		Carbon Steels		Alloy Steels		Die Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Iron		Aluminum Alloys Copper Alloys Nonferrous Alloys	
		85 SFM		60 SFM		40 SFM		33 SFM		100 SFM		200 SFM	
Dia. of Mill (inch)		RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
1/2		640	7.7	450	4.8	320	2.7	260	1.8	800	21.9	1,600	39.6
5/8		510	7.7	360	4.6	260	2.6	210	1.8	610	21.6	1,300	38.4
3/4		430	7.4	300	4.5	210	2.5	170	1.7	510	20.4	1,100	37.8
7/8		370	6.5	260	4.0	180	2.2	150	1.5	440	17.7	900	33.1
1		320	5.3	230	3.4	160	1.9	130	1.3	380	15.1	770	28.1
1 1/4		260	4.1	180	2.6	130	1.5	110	1.0	310	11.8	610	21.3
1 1/2		220	3.2	150	2.1	110	1.2	90	0.8	260	9.2	510	17.1
2		160	1.5	120	0.9	80	0.5	70	0.3	190	4.1	390	8.0
Depth of Cut	a_a	1.5D											
	a_r	0.25D											

1) The above cutting speeds and feeds apply to regular end mill flute length.
For long fluted end mills please use the following factors below:

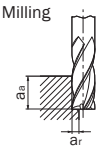
Cutting Length	Reduce Feed by
2.5 × Diameter	15%
3 × Diameter	25%
4 × Diameter	55%
5 × Diameter	65%
6 × Diameter	75%

D: Dia. of Mill

Slotting



Side Milling



2) In dry milling, reduce the RPM and Feed 30% of values on table above. (recommended air blow)
3) Adjust drilling condition when unusual vibration or different sound occurs.

Standard Milling Conditions List No. 6211X

4 Flute

Work Material / Milling Conditions / Dia. of Mill (inch)		Carbon Steels		Alloy Steels		Die Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Iron		Aluminum Alloys Copper Alloys Nonferrous Alloys	
		118 SFM		83 SFM		70 SFM		60 SFM		130 SFM		260 SFM	
		RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
1/8		3,600	8.6	2,600	5.2	2,100	2.5	1,800	2.5	4,000	20.8	8,000	38.4
3/16		2,400	6.7	1,700	4.1	1,400	2.2	1,200	1.9	2,700	17.3	5,300	31.8
1/4		1,800	7.9	1,300	4.7	1,100	3.1	900	2.5	2,000	22.4	4,000	36.8
3/8		1,200	6.7	900	4.7	700	2.8	600	2.0	1,400	19.6	2,700	33.5
1/2		880	7.4	630	4.8	510	3.1	450	2.3	1,000	20.0	1,990	37.4
5/8		710	7.4	510	4.5	410	3.0	360	2.2	800	20.8	1,590	34.3
3/4		590	6.6	420	4.4	340	2.7	300	2.0	670	18.5	1,330	31.9
1		440	4.8	320	3.1	260	2.0	230	1.5	500	13.4	1,000	24.8
1 1/4		360	3.8	260	2.5	210	1.6	180	1.2	400	10.2	800	18.9
1 1/2		300	3.1	210	1.9	170	1.2	150	0.9	340	8.2	670	15.0
Depth of Cut	a_a	1.5D											
	a_r	0.25D											

6 Flute

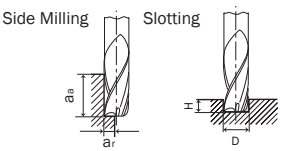
Work Material / Milling Conditions / Dia. of Mill (inch)		Carbon Steels		Alloy Steels		Die Steels Stainless Steels		Nickel Alloys Titanium Alloys		Cast Iron		Aluminum Alloys Copper Alloys Nonferrous Alloys	
		116 SFM		83 SFM		70 SFM		60 SFM		130 SFM		330 SFM	
		RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)	RPM	Feed (IPM)
1/2		880	11.1	630	7.2	510	4.6	450	3.4	1,000	30.0	2,700	56.1
5/8		710	11.1	510	6.7	410	4.4	360	3.2	800	31.2	1,990	51.5
3/4		590	9.9	420	6.6	340	4.1	300	3.1	670	27.7	1,590	47.9
1		440	7.3	320	4.7	260	3.0	230	2.3	500	20.1	1,330	37.2
1 1/4		360	5.7	260	3.7	210	2.3	180	1.7	400	15.4	1,000	28.3
1 1/2		300	4.6	210	2.9	170	1.8	150	1.4	340	12.2	800	22.5
Depth of Cut	a_a	1.5D											
	a_r	0.25D											

1) The above cutting speeds and feeds apply to regular end mill flute length.
For long fluted end mills please use the following factors below:

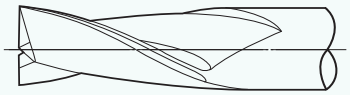
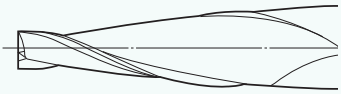
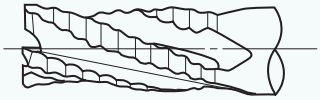
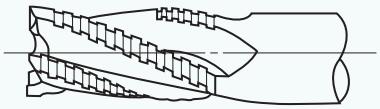
Cutting Length	Reduce Feed by
2.5 × Diameter	15%
3 × Diameter	25%
4 × Diameter	55%

2) In dry milling , reduce the RPM and Feed 30% of values on table above. (recommended air blow)
3) Adjust drilling condition when unusual vibration or different sound occurs.

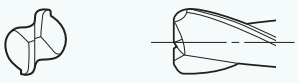
D: Dia. of Mill



The Peripheral Teeth and the Features

Type	Form	Features
Square Type		• Used for general purpose, that is slotting, side milling, etc. • Used for every cutting. That is rough cut, semi-finish cut and finish cut.
Tapered Type		• Used for milling of draft angle of die components. • The peripheral teeth is taper.
Roughing Type (HOG)		• Suitable for rough milling, because of the small cutting resistance, and small cutting chips by the wavy type nicks. • Do not use for finish milling because of too much roughness.
HEAVY Type (Roughing and Finishing)		• The cutting resistance is larger than roughing end mill, but smaller than square teeth end mill. Suitable for semi-finish milling and parts which do not require accurate tolerance.

The End Teeth and the Features

Type	Form	Features
Square Type with Center Hole		• Used for general purpose, that is slotting, side milling, etc. • Cannot be used for plunge feed.
Square Type without Center Hole		• Used for general purpose, that is slotting, side milling, etc. • Can be used for plunge feed. 2 Flutes is better than multi-flutes for plunge cut.
Ball		• Used for contour milling or copy milling of die components. • The center of teeth does not have better cutting performance because of too small chip pocket and cutting speed.
Corner Radius		• Suitable for radius shape milling for corner of die components or machine parts. • Suitable for high-speed contour milling because of it's rigidity.

1. Correct Selection of End Mills

It is necessary to choose the most suitable end mills considering cutting efficiency, accuracy and so on for high efficient machining.

Tool Material

HSS-Co (equivalent to SKH59) shows excellent performance for cutting normal steel to non-ferrous alloy and cast iron. Select coated HSS, PM-HSS, FAX or Carbide for more efficient and long lasting milling.

Number of Flutes

Generally, 2 Flute is used for slot milling because of its wide chip pocket. 4 Flute is used for side milling because of its high rigidity.

Helix Angle

Generally 30° is used because better surface finish is obtained by helix angle around 30°. Lower helix is good for keyway slotting because the slot inclination is small. The bigger is the helix, the better will be the surface finish so that the high helix end mills will be used for contour milling.

Guidance for Number of Flutes Selection

Functions	Characteristics	No. of Flutes	
		2 Flute	4 Flute
Strength	Twist Rigidity	○	◎
	Bending Rigidity	○	◎
Surface Finish	Roughness	○	◎
	Waving	○	◎
	Inclination	○	◎
Tool Life S50C (200HB)	Feed (mm/tooth) Wear	○	◎
	Constant Broken	○	◎
SKD11 (320HB)	Feed (mm/tooth) Wear	○	◎
	Constant Broken	○	◎
Chip Disposal	Chip Jam	○	◎
	Chip Exhaust	○	◎
Resharpening	Out Dia. Relief	◎	○
	End Teeth	◎	○
Form Modify	Ball Nose, Taper Form	◎	○

◎ Great ○ Good

Functions	Characteristics	No. of Flutes	
		2 Flute	4 Flute
Drilling	Counter Sink	◎	○
	Surface Roughness	◎	○
	Enlargement of Holes	◎	○
Cutting	Finishing	○	◎
	Light Duty	○	◎
	Heavy Duty	○	◎
Slotting	Chip Exhaust	◎	○
	Enlarge, Eccentricity	◎	○
	Keyway Cutting	◎	○
Side Milling	Milling Accuracy	○	◎
	Chattering Vibration	◎	○
Work Material	Alloy Steel	○	◎
	Cast Iron	○	◎
	Non-ferrous Material	◎	○
	Difficult Machining	○	◎

◎ Great ○ Good

Characteristics of End Mill Helix

Range of Helix Angle	Cutting Resistance			Surface Accuracy			Tool Life			Resharpening	
	Torque	Bending	Thrust	Roughness	Waving	Inclination	Flank Wear	Out Dia. Downsize	Breakage	Peripheral Relief	End Teeth
Low Helix	○	○	●	○	●	●	○	△	○	●	●
Standard Helix	●	●	○	●	○	○	●	○	●	●	●
High Helix	●	●	△	●	△	○	○	●	○	○	○

● Great ○ Good △ OK – Judging from usage of end mills

TROUBLE-SHOOTING GUIDE FOR END MILL PROBLEMS

	Problem	Factors	Countermeasures
Surface Roughness	Rough Finish	Chatter	• Increase rigidity of workpiece fixture • Check machine condition, horsepower (H,P) • Reduce cutting speed • Consider conventional (up-cut) milling • Use shortest possible length of tool, consider using special long reach holder
		Uneven hardness of workpiece	• Use even hardness material
		Insufficient rake or relief	• Resharpen cutter to correct geometry to suit cutting conditions
		Built-up edge, cold welding	• Remove build-up edge & cold welding • Check deterioration of cutting fluid
		Dull cutting edge	• Provide timely resharpening
		Speed too high	• Reduce cutting speed
		Improper or lack of cutting fluid	• Change cutting fluid or lubricating system
	Torn Finish	Uneven wear on teeth	• Remove wear by regrinding
		Cold welding on teeth	• Remove cold welding • Change cutting fluid
		Bruise on teeth	• Handle end mill carefully
	Waviness	Too small number of flutes Heavy cutting conditions Helix angle too big	• Try multi flute end mill, 2FLfi3FLfi4FL • Reduce amount of radial depth of cut and feed • Use lower helix angle end mill
Form Error	Squareness (Perpendicularity)	Heavy cutting conditions Excessive overhang of cutter or workpiece Angular error of fixture	• Reduce depth of cut and feed • Use shortest possible length of tool, consider using special long reach holder • Correct fixture angle
Tool Life	Short Life per Resharpening	Material too hard	• Provide proper annealing • Reduce feed and use upper grade material end mill
		Incorrect feed	• Define proper feed
		Built-up edge, cold welding	• Remove build-up edge or cold welding • Use activative cutting fluid
		Insufficient coolant	• Use proper cutting fluid • Increase rate of coolant flow
		Incorrect resharpening	• Resharpen cutter to correct geometry to suit cutting conditions
	Total Tool Life Too Short	Less number of resharpening	• Regrind relief angle smaller • Provide proper resharpening amount
		Improper time of resharpening	• Provide timely resharpening
	Excessive Wear	Material defect of workpiece	• Use evenness hardness material
		Improper rake or relief	• Resharpen cutter to correct geometry to suit cutting conditions
		Insufficient performance of end mill	• Use upper grade material end mill • Try to use coated end mill
		Unsuitable cutting fluid	• Select proper cutting fluid • Correct lubricating system
		Improper time of resharpening	• Provide timely resharpening
		Incorrect resharpening	• Improve surface roughness on resharpening • Prevent overheat of cutter grinding • Remove build-up edge and weld deposit
	Chipping or Cracking	Chatter	• Increase rigidity of workpiece fixture
		Material defect or workpiece	• Use even hardness material • Remove abnormal parts such as scale, sandtumbling etc.
		Feed too high	• Reduce feed speed
		Dull cutting edge	• Provide resharpening
		Deterioration of cutting fluid	• Provide new cutting fluid
	Breakage	Lack of rigidity in set-up	• Check component or fixture for security and rigidity
		Dull cutting edge	• Provide Resharpening
		Careless handling	• Handle end mill carefully
		Chip cram	• Remove chips by air-jet cutting fluid

SGSP - DIN
Spiral Fluted Taps

SGPO - DIN
Spiral Pointed Taps

NACHI

High Performance Tap for a Variety of Materials

Covers a wide range of applications:
Aluminum, Cast Iron, Carbon Steel,
Alloy Steel and Stainless Steel

Features:

- Made from high grade powder HSS and SG coating for longer tool life
- High flexibility for superior performance on a variety of materials, machines, and cutting conditions
- Stable cutting threads and long tool life regardless of cutting speed
- Achieves easy flow of chips while cutting on Stainless Steels, Structural Steels and Aluminum Alloys

TAPS

Features

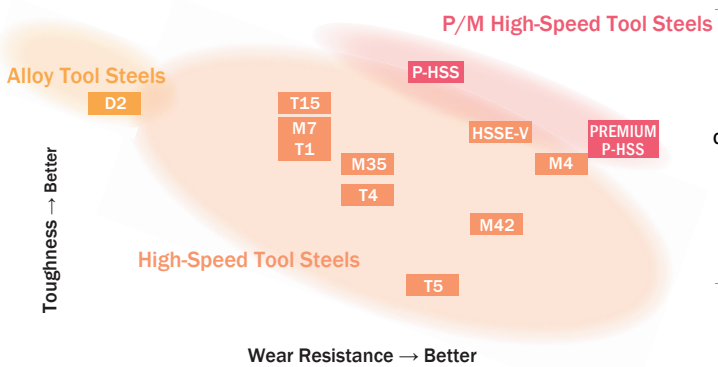
- Made from high grade powder HSS and SG coating for longer tool life
- Optimized edge and flute shape allow for stable cutting threads, high rigidity and chip ejection
- High flexibility for superior performance on a variety of materials, machines, and cutting conditions
- Stable cutting threads and long tool life regardless of cutting speed
- Achieves easy flow of chips while cutting on Stainless Steels, Structural Steels and Aluminum Alloys
- ANSI Shank DIN Overall Length

Work Materials

- Covers a wide range of applications -
  - Aluminum
  - Alloy Steel
  - Cast Iron
  - Stainless Steel
  - Carbon Steel

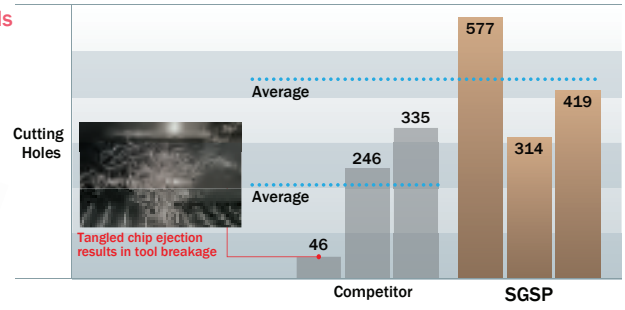
Properties

Properties of NACHI Premium P-HSS
High toughness can be obtained even at high hardness levels



Performance

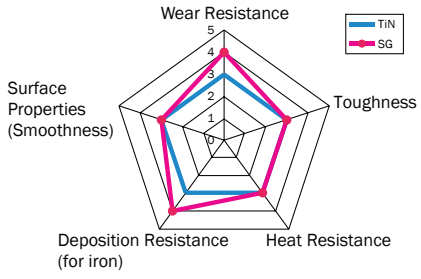
Long tool life with Stainless Steels



Tapping Condition	M6 x 1 Depth 12 mm 25 SFM	304 Stainless Vertical m/c

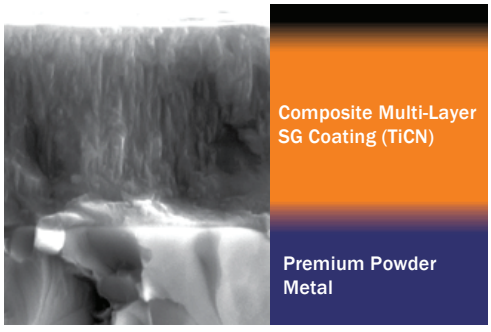
Characteristics

Characteristics of SG Coating



Composite multi-layer film coating method characterized by improved wear resistance as compared to TiN.

SG Coating (Tin + TiCN)



Application

Selection Chart

● : Great ○ : Good △ : OK

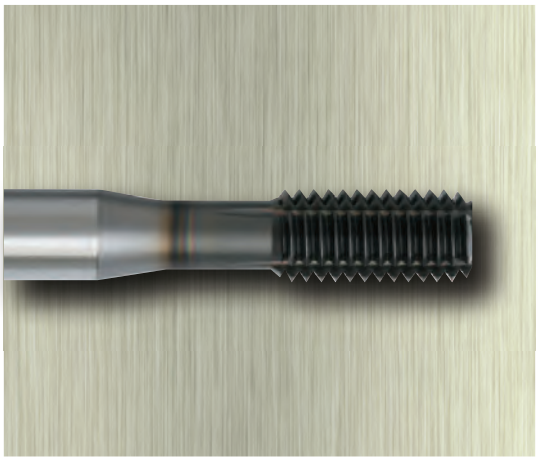
Carbon Steel			Alloy Steel	Die Steel	Aluminum	Stainless Steel			Cast Iron	Nickel	Titanium	Hardened Steel
Low Carbon 1010,1018	Medium Carbon 1035,1045	High Carbon 1065,1095	4140,4340	~20Hrc D2,H13	6061 7075	300 Series	400 Series	17-4PH	Grey Ductile	Alloy	Alloy	>35Hrc
●	●	●	●	○	○	●	○	△	○		△	

*More information for **SGSP Taps** can be found on pages 200, 201*
*More information for **SGPO Taps** can be found on pages 202, 203*

Features

- **Nachi Viper Taflet Taps** are specially engineered for steels, and require less torque than conventional coldform taps. This reduces the chance of breakage.
- **Nachi Viper Taflet Taps** are steam oxide surface treated to limit adhesion from fusion, and carries coolant to the work area. Bright finish is available when required.
- **Nachi Viper Taflet Taps** have more radial sections for higher accuracy of internal threads in steel.This compares favorably to coldform internal threads, which aren't always clean and accurate.

VIPER TAFLET



DLC Taflet

Work Materials

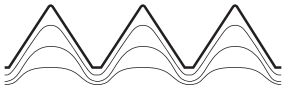
- Structural Steels
- Stainless Steels
- Carbon Steels
- Aluminum Alloys
- Alloy Steels

Performance

TAFLET

Fiber flow is:

NOT INTERRUPTED



Female thread cut by a TAFLET

Cutting Tap

Fiber flow is:

INTERRUPTED

Female thread cut by a cutting tap

Features of Taflet

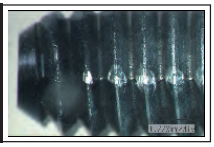
Item	Cutting Tap	Taflet	Taflet Features
Tap breakdown	×	○	Does not break because there is no groove
Trouble caused by chips	×	○	No trouble because there is no chip
Accuracy of female thread	×	○	Little variations because of cold forming tapping
Female thread surface roughness	×	○	Excellent because threads are finished by sliding over the tap surface
Tapping torque	○	×	1.5 through 2.5 times the torque of a cutting tap
Female thread strength	×	○	Excellent because fiber flow is not interrupted in plastic working
Workpiece	○	×	Limited to the material of good malleability

DLC TAFLET

Semi-Dry Tapping

Forming tap with DLC coating can be used in Aluminum, Aluminum Alloys, Die Cast Aluminum.
The tap shown below, M6x1.0, tapped 1,000 holes in A6061 with mist hole lube applied and has minimum adhesion of material.

Tapping Condition	
Size	M6x1.0
Material	A6061-T6
Speed	15 m/min (49.2 SFM)
Feed	1.0 mm/rev (0.039 IPM)
Depth of Thread	13 mm
Coolant	Mist Lube (25cc x 2 nozzle/h)

1000 Hole	

*More information for **DLC Taflet** can be found on pages 206, 207*
*More information for **Viper Taflet** can be found on pages 208-210*

Viper Taflet Taps Thread Forming

Features

- NACHI Viper Taflet taps are designed for economical and efficient tapping of steel.
- No chips are produced with Taflet Taps, the threads are formed by the displacement of the metal. Threads produced this way are generally more accurate and stronger than threads produced by conventional tapping.

Performance

Advantages of NACHI Viper Taflet Taps

Conventional coldform taps for steel require high torque. NACHI Viper Taflet taps have been specially engineered for steels and require less torque, reducing the chance of breaking.

In conventional coldform threading, rapid wear and adhesion due to high frictional heat may occur. NACHI Viper Taflet tap's steam oxide surface treatment limits adhesion from fusion and carries coolant to the work area. Bright finish is also available when required.

Conventional coldform internal threads aren't always clean and accurate. NACHI Viper Taflet taps have more radial sections for higher accuracy of internal threads in steel.

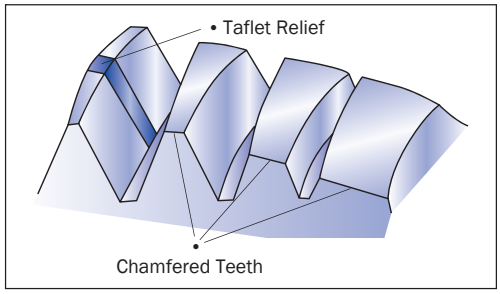
Features

- VTP Series are suitable for various material.

Work Materials

- Structural Steels
- Alloy Steels
- Aluminum Alloys
- Carbon Steels
- Stainless Steels

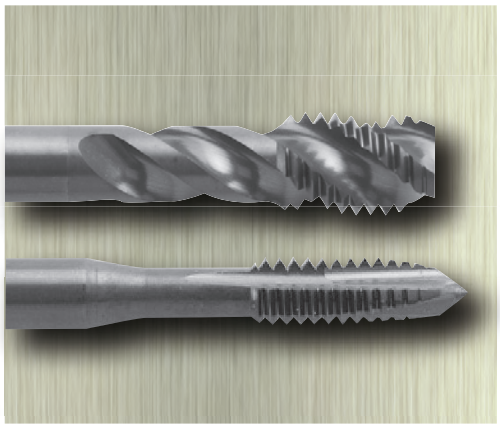
Performance



Nachi VTP Series Taps were specifically designed to overcome the major difficulties of spiral fluted taps: oversizing and chip control. An all-new approach to these limitations also provides double-action tapping - cutting with chamfered teeth, *plus cold rolled forming with a* specially engineered shape of thread that we call *Taflet Relief.*

The results provide two-fold benefits. The first is minimal or no oversized thread diameter over the entire thread length, with smooth thread surfaces. The second is smooth chip ejecion, ensuring freedome from chips for trouble-free performance, especially on machining centers and on unattended machining lines.

Conventional Taps **VTP-Series Taps**



VTP Series Taps

*More information for **VTP Series** can be found on pages 211-213*

HIGH PERFORMANCE TAPS

LIST No.			Material	Coating		Stock Size	Product Page
SGSP-DIN Spiral Fluted Taps							
6800 *6801*			P.HSS	SG	Metric Fractional Machine Screw	M3 to M24 2 to 12, 1/4 to 1	p.200 p.201
SGPO-DIN Spiral Pointed Taps							
6802 *6803*			P.HSS	SG	Metric Fractional Machine Screw	M3 to M24 2 to 12, 1/4 to 1	p.202 p.203
SG Low Spiral Taps							
6958 *6959*			HSSE	SG	Metric Fractional Machine Screw	M3 to M24 2 to 12, 1/4 to 1	p.204 p.205
DLC Taflet Thread Forming Taps							
6955 *6957* *6956*			HSSE-V	DLC	Metric Fractional Machine Screw	1/4 to 1/2 2 to 12 M2 to M12	p.206 p.207 p.207

VIPER TAFLET

LIST No.			Material	Coating		Stock Size	Product Page
Viper Taflet Thread Forming Taps							
996			HSSE-V	Black Oxide	Metric	2 to 20	p.208
995					Fractional Machine Screw	1/4 to 3/4 0 to 12	p.209 p.210

VTP TAPS

LIST No.			Material	Coating		Stock Size	Product Page
VTP / Spiral Flute							
980 *981* *983*			HSSE-V	Black Oxide	Metric Fractional Machine Screw	1/4 to 1 2 to 10 3 to 18	p.211 p.212 p.212
VTP / Spiral Point							
982 *971* *973*			HSSE-V	Black Oxide	Metric Fractional Machine Screw	1/4 to 1 2 to 10 3 to 18	p.211 p.213 p.213

● : Great ○ : Good △ : OK

LIST No.	Cutting Condition Page	Hole Condition				Workpiece Material									
		Blind Hole		Through Hole		Structural Steel (SS)	Carbon Steel	Alloy Steel (SCM, SCR)	Pre Hardened Steel	Die Steel HRc	Hardened Steel HRc		Stainless Steel	Cast Iron	Aluminum Alloy	Copper Alloy
		<1.5x Dia.	≥1.5x Dia.	<1.5x Dia.	≥1.5x Dia.					25 to 40	45 to 50	50 to 65				
SGSP-DIN Spiral Fluted Taps																
6800 *6801*	p.200						●	●		○	○	○	○	○	○	
SGPO-DIN Spiral Pointed Taps																
6802 *6803*	p.202						●	●		○	○	○	○	○	○	
SG Low Spiral Taps																
6958 *6959*	p.204	●	○	●	○				○	●	△					
DLC Taflet Thread Forming Taps																
6955 *6957* *6956*	p.206	●	○	●	○										●	●

LIST No.	Cutting Condition Page	Hole Condition				Workpiece Material									
		Blind Hole		Through Hole		Structural Steel (SS)	Carbon Steel	Alloy Steel (SCM, SCR)	Pre Hardened Steel	Die Steel HRc	Hardened Steel HRc		Stainless Steel	Cast Iron	Aluminum Alloy	Copper Alloy
		<1.5x Dia.	≥1.5x Dia.	<1.5x Dia.	≥1.5x Dia.					25 to 40	45 to 50	50 to 65				
Viper Taflet Thread Forming Taps																
995	p.213	●	○	●	○	●	●	○					○			
996	p.213	●	○	●	○	●	●	○					○			

LIST No.	Cutting Condition Page	Hole Condition				Workpiece Material									
		Blind Hole		Through Hole		Structural Steel (SS)	Carbon Steel	Alloy Steel (SCM, SCR)	Pre Hardened Steel	Die Steel HRc	Hardened Steel HRc		Stainless Steel	Cast Iron	Aluminum Alloy	Copper Alloy
		<1.5x Dia.	≥1.5x Dia.	<1.5x Dia.	≥1.5x Dia.					25 to 40	45 to 50	50 to 65				
VTP / Spiral Point																
981 *983* *980*	p.213	●	○	△	△	●	●	○	○					○	○	○
VTP / Spiral Flute																
971 *973* *982*	p.213			●	○	●	●	○	○					○	○	○

*Some sizes do not meet this preference. Please make sure of the flute length of each size before use.

VIPER T-SERIES FOR GENERAL PURPOSE

LIST No.			Material	Coating		Stock Size	Product Page
Viper T / Spiral Flute							
7980, 7981			HSSE-V	Black Oxide	Metric Fractional Machine Screw	M3 to M24 1/4 to 1 2 to 12	p.214 p.215 p.215
Viper T / Spiral Point							
7970, 7971			HSSE-V	Black Oxide	Metric Fractional Machine Screw	M3 to M24 1/4 to 1 2 to 12	p.214 p.216 p.216

VIPER T-SERIES FOR STAINLESS STEEL

LIST No.			Material	Coating		Stock Size	Product Page
Viper T / Spiral Flute							
7982, 7987			HSSE-V	Black Oxide	Metric Fractional Machine Screw	M3 to M24 1/4 to 1 2 to 12	p.217 p.218 p.218
Viper T / Spiral Point							
7972, 7977			HSSE-V	Black Oxide	Metric Fractional Machine Screw	M3 to M24 1/4 to 1 2 to 12	p.217 p.219 p.219

STANDARD TAPS

LIST No.			Material	Coating		Stock Size	Product Page
Hand Taps							
911			HSSE-V	Bright	Fractional	1/4 to 1-1/2	p.220
913			HSSE-V	Bright	Machine Screw	0 to 12	p.221
910			HSS	Bright	Metric	M2 to M30	p.224
969			HSSE-V	Black Oxide	Inch	1/4 to 3/4	p.222
Spiral Point							
923			HSS	Bright	Machine Screw	0 to 12	p.223
921			HSSE-V	Bright	Fractional	1/4 to 3/4	p.222
920			HSS	Bright	Metric	M2.5 to M16	p.224
Taper Pipe Taps							
941, 941D			HSS	Bright	NPT NPTF	1/16 to 2	p.225
943, 943D					NPT NPTF	1/8 to 1	p.225
947, 947D			HSSE-V	Black Oxide	NPT NPTF	1/16 to 1	p.226
945, 945D			HSS	Bright	NPS NPSF	1/8 to 1	p.226
959, 959D			HSS	Bright	NPT NPTF	1/8 to 1	p.227
957					NPT	1/16 to 1	p.227

● : Great ○ : Good △ : OK

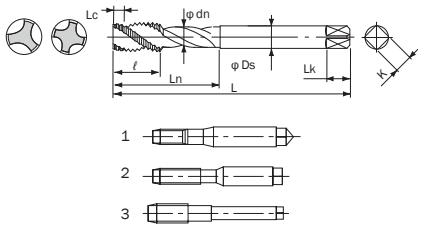
LIST No.	Cutting Condition Page	Hole Condition				Workpiece Material									
		Blind Hole		Through Hole		Structural Steel (SS)	Carbon Steel	Alloy Steel (SCM, SCR)	Pre Hardened Steel	Die Steel	Hardened Steel		Stainless Steel	Cast Iron	Aluminum Alloy	Copper Alloy
		<1.5x Dia.	≥1.5x Dia.	<1.5x Dia.	≥1.5x Dia.					HRc 25 to 40	HRc 45 to 50	HRc 50 to 65				
Viper T / Spiral Flute																
7981	p.219	●	○	△	△	○	○	○	○					○	○	○
7980	p.219															
Viper T / Spiral Point																
7971	p.219			●	●	○	○	○	○					○	○	○
7970	p.219															

LIST No.	Cutting Condition Page	Hole Condition				Workpiece Material									
		Blind Hole		Through Hole		Structural Steel (SS)	Carbon Steel	Alloy Steel (SCM, SCR)	Pre Hardened Steel	Die Steel	Hardened Steel		Stainless Steel	Cast Iron	Aluminum Alloy	Copper Alloy
		<1.5x Dia.	≥1.5x Dia.	<1.5x Dia.	≥1.5x Dia.					HRc 25 to 40	HRc 45 to 50	HRc 50 to 65				
Viper T / Spiral Flute																
7982	p.219	●	○	△	△	△	△	△	△				●	△	△	△
7987	p.219															
Viper T / Spiral Point																
7972	p.219			●	○	△	△	△	△				●	△	△	△
7977	p.219															

LIST No.	Cutting Condition Page	Hole Condition				Workpiece Material									
		Blind Hole		Through Hole		Structural Steel (SS)	Carbon Steel	Alloy Steel (SCM, SCR)	Pre Hardened Steel	Die Steel	Hardened Steel		Stainless Steel	Cast Iron	Aluminum Alloy	Copper Alloy
		<1.5x Dia.	≥1.5x Dia.	<1.5x Dia.	≥1.5x Dia.					HRc 25 to 40	HRc 45 to 50	HRc 50 to 65				
Hand Taps																
911	p.228	●	○	●	○	△	△	△	△					△	△	△
913	p.228	●	○	●	○	△	△	△	△					△	△	△
910	p.228	●	○	●	○	△	△	△	△					△	△	△
969	p.228	●	○	●	○	△	△	△	△					●		
Spiral Point																
923	p.228			●	○	△	△	△	△					△	△	△
921	p.228			●	○	△	△	△	△					△	△	△
920	p.228	●	○	●	○	△	△	△	△					△	△	△
Taper Pipe Tap																
941 *941D*	p.228	○	△	○	△	△	△	△	△					△	△	△
943 *943D*	p.228	○	△	○	△	△	△	△	△					△	△	△
947 *947D*	p.228	○	△	○	△	○	○	○	○					○	○	○
945 *945D*	p.228	○	△	○	△	○	○	○	○					○	○	○
959 *959D*	p.228	○	△	○	△	△	△	△	△					△	△	△
957	p.228	○	△	○	△	○	○	○	○					○	○	○

SGSP-DIN Spiral Fluted Tap

- Modified Bottoming Style 2.5 Thread Chamfer
- SG Coating
- DIN Overall Length
- Premium Powdered High Speed Steel



List 6800 Metric Sizes

Size	Thread Limit	EDP No	No. of Flutes	Dimensions				Style
				Overall Length	Length of Thread	Under Neck Length	Shank Dia.	
METRIC SIZES				L	ℓ	Ln	Ds	
M3 X 0.5	D3	1486233	3F	2.205	0.228	0.626	0.141	1
M4 X 0.7	D4	1486256		2.480	0.307	0.689	0.168	
M5 X 0.8		1486262		2.756	0.374	0.874	0.194	
M6 X 1.0	D5	1486279		3.150	0.453	1.000	0.255	
M8 X 1.25		1486307		3.543	0.594	1.126	0.318	2
M10 X 1.25		1486313		3.937	0.594	1.252	0.381	
M10 X 1.5	D6	1486320		3.937	0.740			
M12 X 1.25		1486336		3.937	0.634	1.425	0.367	3
M12 X 1.5		1514479		3.937	0.780			
M12 X 1.75		1486342		4.331	0.882			
M14 X 2.0	D7	1514491		4.331	1.024	1.669	0.429	
M16 X 2.0		1514513		4.331	1.024	1.748	0.480	
M18 X 2.5		1514536	4F	4.921	1.280	1.937	0.542	
M20 X 2.5		1514559		5.512	1.280	1.996	0.652	
M24 X 3.0	D8	1514594		6.299	1.535	2.323	0.760	

1 piece per package

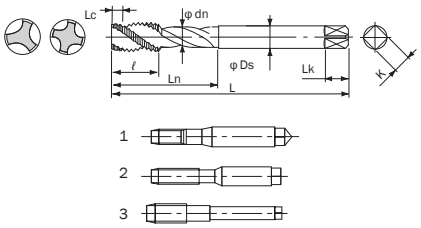
⚠ **WARNING:** Cancer - www.P65Warnings.ca.gov

SGSP Work Material & Cutting Condition Recommendations

Work Material			Tapping Speed SFM
Low Carbon Steel		1010 1018	30 - 100
Medium Carbon Steel		1035 1045	30 - 120
High Carbon Steel		1065 1095	30 - 120
Alloy Steel		4140 4130	25 - 50
Die Steel		D2 H13 (up to 20 HRC)	20 - 50
Hardened Steel		~ 35 HRC	15 - 45
Stainless Steel	Austentic	303 304 316	15 - 30
	Martenstic	410 430	15 - 25
		17-4PH	15 - 25
Aluminum		6061 7075 Casting	35 - 120
Cast Iron		Grey Nodular	30 - 80

SGSP-DIN Spiral Fluted Tap

- Modified Bottoming Style 2.5 Thread Chamfer
- SG Coating
- DIN Overall Length
- Premium Powdered High Speed Steel

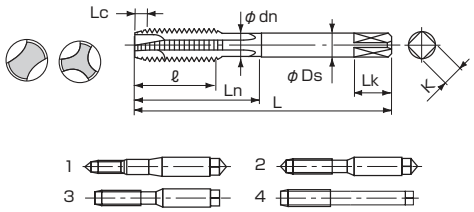


List 6801 Machine Screw & Fractional Sizes

Size	Thread Limit	No. of Flutes	EDP No	Dimensions				
				Overall Length	Length of Thread	Under Neck Length	Shank Dia.	Style
MACHINE SCREW SIZES				L	ℓ	Ln	Ds	
2-56	H2	3F	1486359	1.772	0.441	0.591	0.141	1
4-40	H2		1539499	2.205	0.272	0.563		
6-32	H2		1540459	2.205	0.374	0.689		
8-32	H2		1540465	2.480	0.374	0.752		
10-32	H2		1540471	2.756	0.496	0.874	0.194	
6-32	H3		1486439	2.205	0.374	0.689	0.168	
8-32	H3		1486451	2.480	0.374	0.752		
10-24	H3		1486474	2.756	0.496	0.874	0.194	
10-32	H3		1486480	2.756	0.374	0.874		
12-24	H3		1486497	3.150	0.496	0.937	0.220	
FRACTIONAL SIZES								
1/4 - 20	H3	3F	1486519	3.150	0.606	1.000	0.255	1
	H5		1540488	3.150	0.606			
1/4 - 28	H3		1486525	3.150	0.413			
	H4		1540494	3.150	0.413			
5/16 - 18	H3		1486531	3.543	0.697	1.126	0.318	2
	H5		1540500	3.543	0.697			
5/16 - 24	H3		1486548	3.543	0.480			
	H4		1540516	3.543	0.480			
3/8 - 16	H3		1486554	3.937	0.783	1.252	0.381	
	H5		1540522	3.937	0.783			
3/8 - 24	H3		1486560	3.543	0.480			
	H4		1540539	3.543	0.480			
7/16 - 14	H3		1486577	3.937	0.894	1.236	0.323	3
	H5		1540545	3.937	0.894			
7/16 - 20	H3		1486583	3.937	0.626			
	H5		1540551	3.937	0.626			
1/2 - 13	H3		1486590	4.331	1.024	1.425	0.367	
	H5		1540568	4.331	1.024			
1/2 - 20	H3		1486605	3.937	0.646			
	H5		1540574	3.937	0.646			
5/8 - 11	H4		1514622	4.331	1.185	1.748	0.480	
	H6		1540580	4.331	1.185			
5/8 - 18	H4		1514639	3.937	0.732			
	H6		1540597	3.937	0.732			
3/4 - 10	H4	4F	1514645	4.921	1.303	1.937	0.590	
	H6		1540602	4.921	1.303			
3/4 - 16	H4		1514651	4.331	0.827			
	H6		1540619	4.331	0.827			
1 - 8	H4		1514680	6.299	1.626	2.323	0.800	
	H6		1540625	6.299	1.626			

SGPO-DIN Spiral Pointed Tap

- Plug Style 5 Thread Chamfer
- SG Coating
- DIN Overall Length
- Premium Powdered High Speed Steel



List 6802 Metric Sizes

Nominal Size	Pitch	No. of Flutes	EDP No D3	EDP No D4	EDP No D5	EDP No D6	EDP No D7	EDP No D8	Dimensions Overall Length	Dimensions Length of Thread	Dimensions Under Neck Length	Dimensions Shank Dia.	Style
METRIC SIZES									L	ℓ	Ln	Ds	
M3	0.5	3F	1542451						2.205	0.394	0.630	0.141	
M4	0.7	3F		1542898					2.480	0.492	0.752	0.168	2
M5	0.8	3F		1542903					2.756	0.571	0.882	0.194	
M6	1.0	3F			1542910				3.150	0.669	1.000	0.255	
M8	1.25	3F			1542926				3.543	0.866	1.181	0.318	
M10	1.25	3F			1542932				3.937	0.866	1.437	0.381	3
M10	1.5	3F				1542949			3.937	1.063	1.437	0.381	
M12	1.25	3F			1542955				3.937	0.906	-	0.367	
M12	1.5	3F				1542978			3.937	1.102	-	0.367	
M12	1.75	3F				1542961			4.331	1.260	-	0.367	
M14	2.0	3F					1542468		4.331	1.260	-	0.429	4
M16	2.0	3F					1542474		4.331	1.260	-	0.480	
M18	2.5	3F					1542480		4.921	1.476	-	0.542	
M20	2.5	3F					1542497		5.512	1.476	-	0.652	
M24	3.0	3F						1542502	6.299	1.772	-	0.760	

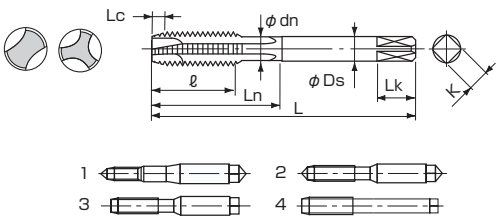
Order by EDP Number
1 piece per package

SGPO Work Material & Cutting Condition Recommendations

Work Material			Tapping Speed SFM
Low Carbon Steel		1010 1018	50 - 120
Medium Carbon Steel		1035 1045	50 - 160
High Carbon Steel		1065 1095	30 - 160
Alloy Steel		4140 4130	30 - 100
Die Steel		D2 H13 (up to 20 HRC)	25 - 50
Hardened Steel		~ 35 HRC	25 - 60
Stainless Steel	Austentic	303 304 316	15 - 50
	Martenstic	410 430	15 - 30
		17-4PH	15 - 25
Aluminum		6061 7075 Casting	50 - 160
Cast Iron		Grey Nodular	50 - 150

SGPO-DIN Spiral Pointed Tap

- Plug Style 5 Thread Chamfer
- SG Coating
- DIN Overall Length
- Premium Powdered High Speed Steel



List 6803

Machine Screw & Fractional Sizes

Nominal Size	Thread/Inch		No. of Flutes	EDP No					Dimensions				Style
	NC/UNC	NF/UNF		H2	H3	H4	H5	H6	Overall Length	Length of Thread	Under Neck Length	Shank Dia.	
MACHINE SCREW SIZES									L	ℓ	Ln	Ds	
2	56		2F	1543378					1.772	0.441	0.591	0.141	1
4	40		2F	1543384					2.205	0.469	0.602	0.141	2
6	32		3F	1542519	1542525				2.205	0.555	0.768	0.141	
8	32		3F	1542531	1542548				2.480	0.555	0.768	0.168	
10	24		3F		1542554				2.756	0.709	0.984	0.194	
		32	3F	1542560	1542577				2.756	0.555	0.984	0.194	
12	24		3F		1542583				3.150	0.709	0.984	0.220	
FRACTIONAL SIZES													
1/4	20		3F		1542590		1542605		3.150	0.850	1.181	0.255	3
		28	3F		1542611	1542628			3.150	0.618	1.181	0.255	
5/16	18		3F		1542634		1542640		3.543	0.945	1.299	0.318	
		24	3F		1542657	1542663			3.543	0.709	1.299	0.318	
3/8	16		3F		1542670		1542686		3.937	1.063	1.457	0.381	
		24	3F		1542692	1542708			3.543	0.709	1.457	0.381	
7/16	14		3F		1542714		1542720		3.937	1.142	-	0.323	4
		20	3F		1542737		1542743		3.937	0.902	-	0.323	
1/2	13		3F		1542750		1542766		4.331	1.232	-	0.367	
		20	3F		1542772		1542789		3.937	0.902	-	0.367	
5/8	11		3F			1542795		1542800	4.331	1.181	-	0.480	
		18	3F			1542817		1542823	3.937	0.835	-	0.480	
3/4	10		3F			1542830		1542846	4.921	1.299	-	0.590	
		16	3F			1542852		1542869	4.331	0.937	-	0.590	
1	8		3F			1542875		1542881	6.299	1.626	-	0.800	

Order by EDP Number

SG Lo-Spiral Fluted Tap

Modified Bottoming Style 2 1/2 to 3 Thread Lead
SG Coating

List No. 6958 Metric Sizes

*GT to H-limit conversion chart refer to Page: 235

Nominal Size (mm)	Pitch (mm)	E.D.P. Numbers					No. Of Flutes	Dimensions			Std. Pack.
		GT5	GT6	GT7	GT8	GT9		Overall Length	Length of Thread	Shank Dia.	
METRIC											
M3	0.5	59615					3	1 15/16	0.236	0.141	3
M4	0.7	59617						2 1/8	0.276	0.168	3
M5	0.8		59619					2 3/8	0.354	0.194	1
M6	1		59620					2 1/2	0.433	0.255	1
M8	1		59622					2 23/32	0.472	0.318	3
	1.25		59623								1
M10	1.25		59624					2 15/16	0.551	0.381	3
	1.5			59625							1
M12	1.25				59626			3 3/8	0.669	0.367	3
	1.75				59627						1
M14	1.5				59628			3 19/32	0.787	0.429	1
	2				59629						3
M16	1.5				59630			3 13/16	0.787	0.480	1
	2				59631						1
M18	1.5				59632		4	4 1/32	0.984	0.542	1
	2.5					59633					1
M20	1.5				59634			4 15/32	0.984	0.652	1
	2.5					59635					1
M22	1.5				59636			4 11/16	0.984	0.697	1
	2.5					59637					1
M24	1.5				59638			4 29/32	1.181	0.760	1
	3					59639					1

Order by EDP Number

Tapping Speeds

SG-Low Spiral Taps List No. 6958, 6959
SFM : Surface Feet per Minutes

Work Materials		Tapping Speed SFM
Low Carbon Steel	1010,1018	25-50
Medium Carbon Steel	1035,1045	20-50
High Carbon Steel	1065,1095	15-30
Alloy Steel	4140,4130	15-30
Die Steels	D2,H13	15-35
Hardened Die Steels (20-40HRC)	D2,H13	8-15
Stainless Steel (Austentic)	303,304,316	15-45
Stainless Steel (Martensitic)	410,430	12-20
Stainless Steel (PH) up to 35HRC	17-4PH	12-20
Titanium Alloy Up to 32HRC	6AL4V	15-20
Magnesium Alloy		40-80
Ductile Cast Irons	80-55-06	20-50
Cast Irons	Nodular,Grey	30-65

1. These are general tapping condition, may be altered by your condition.
2. These conditions are for tapping depth 1.5D. In case of deeper thread you may multiply these values by the coefficient of next table.

Thread Depth	Coefficient
Up to 1.5D	1
1.5D～2.5D	0.9
2.5D～3D	0.8
Over 3D	0.7

SG Lo-Spiral Fluted Tap

Modified Bottoming Style 2 1/2 to 3 Thread Lead
SG Coating

List No. 6959

Machine Screw & Fractional Sizes

*GT to H-limit conversion chart refer to Page: 235

Nominal Size	Thread/Inch		E.D.P. Numbers							No. of Flutes	Dimensions			Std . Pack.
	NC UNC	NF UNF	GT3	GT4	GT5	GT6	GT7	GT8	GT9		Overall Length	Length of Thread	Shank Dia.	
MACHINE SCREW SIZES														
2	56		94597							3	1 3/4	0.437	0.141	1
		64	94598											1
3	48			94599							1 13/16	0.500		1
		56	94600											1
4	40				94601						1 7/8	0.236		3
		48		94602										1
5	40				94603						1 15/16			1
		44			94604									1
6	32				94605						2	0.276		1
		40			94606									1
8	32				94607						2 1/8		0.168	3
		36			94608									1
10	24					94609					2 3/8	0.354	0.194	3
		32			94610									1
12	24					94611							0.220	1
		28				94612								1
FRACTIONAL SIZES														
1/4	20			94633			94613			3	2 1/2	0.433	0.255	1
		28		94634		94614								3
5/16	18			94635			94615				2 23/32	0.472	0.318	1
		24		94636			94616							1
3/8	16			94637				94617			2 15/16	0.551	0.381	1
		24		94638			94618							1
7/16	14							94619			3 5/32	0.709	0.323	1
		20		94639				94620						3
1/2	13			94640				94621			3 3/8	0.787	0.367	1
		20		94641				94622						1
9/16	12							94623			3 19/32	0.827	0.429	1
		18						94624						1
5/8	11								94625		3 13/16	0.905	0.480	1
		18						94626						1
3/4	10								94627	4	4 1/4	0.984	0.590	1
		16						94628						1
7/8	9								94629		4 11/16	1.102	0.697	1
		14							94630					1
1	8								94631		5 1/8	1.260	0.800	1
		12							94632					1

Order by EDP Number

DLC Taflet Thread Forming Taps

Forming TAP with DLC coating can be used in Aluminum Alloy, Die Cast Aluminum and Copper.

List No. 6956 Metric Sizes

Bottoming Style
DLC Coating

Nominal Size (mm)	Pitch (mm)	E. D. P. Numbers								Dimensions			Std. Pack.
		D3	D4	D5	D6	D7	D8	D9	D10	Overall Length	Length of Thread	Shank Dia.	
M2	0.4	91002								1 3/4	0.437	0.119	1
M2.5	0.45	91008								1 13/16	0.500	0.119	1
M3	0.5	91011								1 15/16	0.394	0.141	1
M4	0.7		91017							2 1/8	0.472	0.168	1
M5	0.8		91023							2 3/8	0.551	0.194	1
M6	1			91026				91027		2 1/2	0.591	0.255	3
M8	1.25						91035	91036		2 23/32	0.669	0.318	3
M10	1.25						91038			2 15/16	0.748	0.381	3
	1.5							91041					1
M12	1.75								91047	3 3/8	0.984	0.367	3

Order by EDP Number

Tapping Speeds

DLC Taflet Thread Forming Taps List No. 6955, 6956, 6957

Work Materials	Tapping Speed SFM
Aluminum Alloys	70 - 130

DLC Taflet Thread Forming Tap

List No. 6955 Fractional Size

Bottoming Style
DLC Coating

Nominal Size	Thread/Inch		E. D. P. Numbers								Dimensions			Std. Pack.
	NC UNC	NF UNF	H2	H3	H4	H5	H6	H7	H8	H10	Overall Length	Length of Thread	Shank Dia.	
1/4	20				97838		97912				2 1/2	0.591	0.255	1
		28			97840		97914							1
5/16	18					97873		97931			2 23/32	0.669	0.318	1
		24				97875		97933						3
3/8	16					97877		97935			2 15/16	0.748	0.381	3
		24				97879		97937						3
7/16	14					97881			97961		3 5/32	0.866	0.323	3
1/2	13					97885			97965		3 3/8	0.984	0.367	3

Order by EDP Number

List No. 6957 Machine Screw Sizes

Bottoming Style
DLC Coating

Nominal Size	Thread/Inch		E. D. P. Numbers								Dimensions			Std. Pack.
	NC UNC	NF UNF	H2	H3	H4	H5	H6	H7	H8	H10	Overall Length	Length of Thread	Shank Dia.	
2	56		97738	97776							1 3/4	0.437		3
4	40			97784		97857					1 7/8	0.354	0.141	1
6	32			97792		97865					2	0.433		1
8	32			97796		97869					2 1/8	0.472	0.168	1
10	24				97830		97904				2 3/8	0.551	0.194	3
		32			97832		97906				2 3/8	0.551		1
12	24				97834		97908				2 3/8	0.551	0.220	3

Order by EDP Number

Viper Taflet for Steel

Plug & Bottoming Style
Surface Treated

List No. 996 Metric Sizes

VANADIUM HIGH SPEED STEEL HSSE-V

Nominal Size (mm)	Pitch (mm)	Chamfer Style*	E.D.P. Numbers									Dimensions			Std . Pack.
			D3	D4	D5	D6	D7	D8	D9	D10	D11	Overall Length	Length of Thread	Shank Dia.	
M2	0.4	P	51001	–	–	–	–	–	–	–	–	1 3/4	0.437	0.119	3
		B	51002	–	–	–	–	–	–	–	–				3
M2.2	0.45	P	51004	–	–	–	–	–	–	–	–				3
		B	51005	–	–	–	–	–	–	–	–				3
M2.5	0.45	P	51007	–	–	–	–	–	–	–	–	1 13/16	0.500		3
		B	51008	–	–	–	–	–	–	–	–				3
M3	0.5	P	51010	–	–	–	–	–	–	–	–	1 15/16	0.394	0.141	1
		B	51011	–	–	–	–	–	–	–	–				1
M3.5	0.6	P	51013	–	–	–	–	–	–	–	–	2	0.433		3
		B	51014	–	–	–	–	–	–	–	–				3
M4	0.7	P	–	51016	–	–	–	–	–	–	–	2 1/8	0.472	0.168	1
		B	–	51017	–	–	–	–	–	–	–				3
M4.5	0.75	P	–	51019	–	–	–	–	–	–	–	2 3/8	0.551	0.184	3
		B	–	51020	–	–	–	–	–	–	–				3
M5	0.8	P	–	51022	–	–	–	–	–	–	–			0.194	3
		B	–	51023	–	–	–	–	–	–	–				3
M6	1	P	–	–	51025	–	–	–	–	–	–	2 1/2	0.591	0.255	3
		B	–	–	51026	–	–	–	–	–	–				1
M7	1	P	–	–	–	51028	–	–	–	–	–	2 23/32	0.669	0.318	3
		B	–	–	–	51029	–	–	–	–	–				3
M8	1	P	–	–	51031	–	–	–	–	–	–				3
		B	–	–	51032	–	–	–	–	–	–				3
	1.25	P	–	–	–	–	–	51034	–	–	–				1
		B	–	–	–	–	–	51035	–	–	–				1
M10	1.25	P	–	–	–	–	–	51037	–	–	–	2 15/16	0.748	0.381	3
		B	–	–	–	–	–	51038	–	–	–				3
	1.50	P	–	–	–	–	–	–	51040	–	–				3
		B	–	–	–	–	–	–	51041	–	–				1
M12	1.25	P	–	–	–	–	–	–	51043	–	–	3 3/8	0.984	0.367	3
		B	–	–	–	–	–	–	51044	–	–				1
	1.75	P	–	–	–	–	–	–	–	51046	–				1
		B	–	–	–	–	–	–	–	51047	–				3
M14	1.5	P	–	–	–	–	–	–	–	51049	–	3 19/32		0.429	3
		B	–	–	–	–	–	–	–	51050	–				3
	2	P	–	–	–	–	–	–	–	–	51052				3
		B	–	–	–	–	–	–	–	–	51053				3
M16	1.5	P	–	–	–	–	–	–	–	51055	–	3 13/16	1.102	0.480	3
		B	–	–	–	–	–	–	–	51056	–				1
	2	P	–	–	–	–	–	–	–	–	51058				3
		B	–	–	–	–	–	–	–	–	51059				3
M18	1.5	P	–	–	–	–	–	–	–	51061	–	4 1/32		0.542	3
		B	–	–	–	–	–	–	–	51062	–				3
	2.5	P	–	–	–	–	–	–	–	–	51064				3
		B	–	–	–	–	–	–	–	–	51065				3
M20	1.5	P	–	–	–	–	–	–	–	51067	–	4 15/32	1.181	0.652	3
		B	–	–	–	–	–	–	–	51068	–				3
	2.5	P	–	–	–	–	–	–	–	–	51070				3
		B	–	–	–	–	–	–	–	–	51071				3

Order by EDP Number

* P : Plug, B : Bottom

Viper Taflet for Steel

Plug & Bottoming Style
Surface Treated

List No. 995 Fractional Sizes

VANADIUM HIGH SPEED STEEL HSSE-V

Nominal Size	Thread/Inch		Chamfer Style*	E.D.P. Numbers						Dimensions			Std . Pack.
	NC UNC	NF UNF		H4	H5	H6	H7	H8	H10	Overall Length	Length of Thread	Shank Dia.	
1/4	20		P	77837	–	77911	–	–	77978	2 1/2	0.591	0.255	3
			B	77838	–	77912	–	–	77979				3
		28	P	77839	–	77913	–	–	77980				3
			B	77840	–	77914	–	–	77981				3
5/16	18		P	–	77872	–	77930	–	–	2 23/32	0.669	0.318	3
			B	–	77873	–	77931	–	–				3
		24	P	–	77874	–	77932	–	–				3
			B	–	77875	–	77933	–	–				3
3/8	16		P	–	77876	–	77934	–	–	2 15/16	0.748	0.381	3
			B	–	77877	–	77935	–	–				1
		24	P	–	77878	–	77936	–	–				3
			B	–	77879	–	77937	–	–				3
7/16	14		P	–	77880	–	–	77960	–	3 5/32	0.866	0.323	3
			B	–	77881	–	–	77961	–				3
		20	P	–	77882	–	–	77962	–				3
			B	–	77883	–	–	77963	–				3
1/2	13		P	–	77884	–	–	77964	–	3 3/8	0.984	0.367	3
			B	–	77885	–	–	77965	–				3
		20	P	–	77886	–	–	77966	–				3
			B	–	77887	–	–	77967	–				3
9/16	12		P	–	–	–	77946	–	77990	3 19/32	0.984	0.429	3
			B	–	–	–	77947	–	77991				3
		18	P	–	–	–	77948	–	77992				3
			B	–	–	–	77949	–	77993				3
5/8	11		P	–	–	–	77950	–	77994	3 13/16	1.102	0.480	3
			B	–	–	–	77951	–	77995				3
		18	P	–	–	–	77952	–	77996				3
			B	–	–	–	77953	–	77997				3
3/4	10		P	–	–	–	77954	–	77998	4 1/4	1.181	0.590	3
			B	–	–	–	77955	–	77999				3
		16	P	–	–	–	77956	–	78000				3
			B	–	–	–	77957	–	78001				3

Order by EDP Number

* P : Plug, B : Bottom

Viper Taflet for Steel

Plug & Bottoming Style
Surface Treated

List No. 995 Machine Screw Sizes

VANADIUM HIGH SPEED STEEL HSSE-V

Nominal Size	Thread/Inch		Chamfer Style*	E.D.P. Numbers						Dimensions			Std. Pack.
	NC UNC	NF UNF		H2	H3	H4	H5	H6	H10	Overall Length	Length of Thread	Shank Dia.	
0		80	B	77732	–	–	–	–	–	1 5/8	0.311		1
1	64		B	77734	–	–	–	–	–	1 11/16	0.374		3
		72	B	77736	–	–	–	–	–				3
2	56		B	77738	77776	–	–	–	–	1 3/4	0.437		3
		64	B	77740	77778	–	–	–	–				3
3	48		B	77742	77780	–	–	–	–	1 13/16	0.500		3
		56	B	77744	77782	–	–	–	–				3
4	40		P	–	77783	–	77856	–	–	1 7/8	0.354	0.141	3
			B	–	77784	–	77857	–	–				3
		48	P	–	77785	–	77858	–	–				3
			B	–	77786	–	77859	–	–				3
5	40		P	–	77787	–	77860	–	–	1 15/16	0.394		3
			B	–	77788	–	77861	–	–				3
		44	P	–	77789	–	77862	–	–				3
			B	–	77790	–	77863	–	–				3
6	32		P	–	77791	–	77864	–	77970	2	0.433		3
			B	–	77792	–	77865	–	77971				3
		40	P	–	77793	–	77866	–	–				3
			B	–	77794	–	77867	–	–				3
8	32		P	–	77795	–	77868	–	77972	2 1/8	0.472	0.168	3
			B	–	77796	–	77869	–	77973				3
		36	P	–	77797	–	77870	–	–				3
			B	–	77798	–	77871	–	–				3
10	24		P	–	–	77829	–	77903	77974	2 3/8	0.551	0.194	3
			B	–	–	77830	–	77904	77975				3
		32	P	–	–	77831	–	77905	77976				3
			B	–	–	77832	–	77906	77977				3
12	24		P	–	–	77833	–	77907	–			0.220	3
			B	–	–	77834	–	77908	–				3
		28	P	–	–	77835	–	77909	–				3
			B	–	–	77836	–	77910	–				3

Order by EDP Number

* P : Plug, B : Bottom

VTP Tap Spiral Fluted

Modified Bottoming Style 2-1/2 To 3 Thread Lead
Surface Treated

List No. 980 Metric Sizes

VANADIUM HIGH SPEED STEEL HSSE-V

*Replacing VIPER T Series

Nominal Size (mm)	Pitch (mm)	E.D.P. Number					No. Of Flutes	Dimensions			Std. Pack.
		D3	D4	D5	D6	D7		Overall Length	Length of Thread	Shank Dia.	
M3	0.5	54615	–	–	–	–	3	1 15/16	0.236	0.141	1
M3.5	0.6	–	54616	–	–	–		2	0.276	0.141	1
M4	0.7	–	54617	–	–	–		2 1/8	0.276	0.168	1
M5	0.8	–	54619	–	–	–		2 3/8	0.354	0.194	1
M6	1	–	–	54620	–	–		2 1/2	0.433	0.255	1
M7	1	–	–	54621	–	–		2 23/32	0.472	0.318	1
M8	1	–	–	54622	–	–					3
	1.25	–	–	54623	–	–					1
M10	1.25	–	–	54624	–	–		2 15/16	0.551	0.381	1
	1.5	–	–	–	54625	–					1
M12	1.25	–	–	54626	–	–		3 3/8	0.630	0.367	1
	1.75	–	–	–	54627	–					1
M14	1.5	–	–	–	54628	–		3 19/32	0.551	0.429	1
	2	–	–	–	–	54629			0.709		1
M16	1.5	–	–	–	54630	–		3 13/16	0.551	0.480	1
	2	–	–	–	–	54631			0.709		1
M18	1.5	–	–	–	54632	–		4 1/32	0.551	0.542	1
	2.5	–	–	–	–	54633			0.874		1

Order by EDP Number

VTP Tap Spiral Pointed

Plug Style, 4 To 5 Thread Lead
Surface Treated

List No. 982 Metric Sizes

VANADIUM HIGH SPEED STEEL HSSE-V

*Replacing VIPER T Series

Nominal Size (mm)	Pitch (mm)	E.D.P. Number					No. Of Flutes	Dimensions			Std. Pack.
		D3	D4	D5	D6	D7		Overall Length	Length of Thread	Shank Dia.	
M3	0.5	52615	–	–	–	–	3	1 15/16	0.394	0.141	1
M3.5	0.6	–	52616	–	–	–		2	0.433	0.141	1
M4	0.7	–	52617	–	–	–		2 1/8	0.472	0.168	1
M5	0.8	–	52619	–	–	–		2 3/8	0.551	0.194	1
M6	1	–	–	52620	–	–		2 1/2	0.591	0.255	1
M7	1	–	–	52621	–	–		2 23/32	0.669	0.318	3
M8	1	–	–	52622	–	–					3
	1.25	–	–	52623	–	–					1
M10	1.25	–	–	52624	–	–		2 15/16	0.748	0.381	1
	1.5	–	–	–	52625	–					1
M12	1.25	–	–	52626	–	–		3 3/8	0.984	0.367	3
	1.75	–	–	–	52627	–					1
M14	1.5	–	–	–	52628	–		3 19/32		0.429	3
	2	–	–	–	–	52629					1
M16	1.5	–	–	–	52630	–		3 13/16	1.102	0.480	3
	2	–	–	–	–	52631					1
M18	1.5	–	–	–	52632	–		4 1/32		0.542	3
	2.5	–	–	–	–	52633					3

Order by EDP Number

VTP Spiral Fluted

Modified Bottoming Style 2-1/2 To 3 Thread Lead
Surface Treated

List No. 983 Machine Screw Sizes
List No. 981 Fractional Sizes

VANADIUM HIGH SPEED STEEL HSSE-V

***Replacing VIPER T Series**

Nominal Size	Thread/Inch		E.D.P. Numbers						No. of Flutes	Dimensions			Std. Pack.
	NC UNC	NF UNF	H2	H3	H4	H5	H6	H7		Overall Length	Length of Thread	Shank Dia.	
MACHINE SCREW SIZES - L983													
2	56		88239	–	–	–	–	–	2	1 3/4	0.433	0.141	1
3	48		88240	–	–	–	–	–		1 13/16	0.500		3
4	40	48	88241 88245	88242 –	88243 –	– –	– –	– –		1 7/8	0.236		3
5	40		88253	–	–	–	–	–	3	1 15/16			3
6	32	40	– 88269	88263 –	88264 –	88265 –	88266 –	88267 –		2	0.276		3
8	32		–	88277	88278	88279	88280	88281		2 1/8		0.168	3
10	24	32	– –	88291 88299	– 88300	88292 88301	88293 –	88294 88303		2 3/8	0.354	0.194	3
12	24	28	– –	88311 88312	– –	– –	– –	– –				0.220	3
FRACTIONAL - L981													
1/4	20		–	88057	–	88060	–	88062	3	2 1/2	0.433	0.255	1
		28	–	88071	88072	88073	88074	88075					3
5/16	18		–	88081	–	88083	–	88085		2 23/32	0.472	0.318	1
		24	–	88095	88096	88097	–	88098					3
3/8	16		–	88103	–	88105	–	88107		2 15/16	0.551	0.381	1
		24	–	88111	88112	88113	–	88115					3
7/16	14		–	88117	–	88119	–	–		3 5/32	0.591	0.323	3
		20	–	88123	–	88125	–	–					1
1/2	13		–	88131	–	88133	–	88135		3 3/8	0.630	0.367	1
		20	–	88139	–	88141	–	–					1
9/16	12		–	88145	–	–	–	–		3 19/32	0.709	0.429	3
		18	–	88146	–	–	–	–					1
5/8	11		–	88149	–	88151	–	88153		3 13/16	0.748	0.480	1
		18	–	88157	–	88159	–	–					1
3/4	10		–	88167	–	–	–	88171		4 1/4	0.827	0.590	1
		16	–	88175	–	88177	–	–					1
7/8	9		–	88180	–	–	–	–	4	4 11/16	0.906	0.697	1
		14	–	88185	–	–	–	–					1
1	8	12	– –	88190 –	– 88192	– –	– –	– –		5 1/8	0.984	0.800	1

Order by EDP Number

VTP Spiral Pointed

Plug Style 4 to 5 Threads
Surface Treated

List No. 973 Machine Screw Sizes

List No. 971 Fractional Sizes

VANADIUM HIGH SPEED STEEL HSSE-V

***Replacing VIPER T Series**

Nominal Size	Thread/Inch NC UNC	Thread/Inch NF UNF	E.D.P. Numbers H2	H3	H4	H5	H6	H7	No. of Flutes	Dimensions Overall Length	Length of Thread	Shank Dia.	Std. Pack.
MACHINE SCREW SIZES - L973													
2	56		87216	87218	—	—	—	—	2	1 3/4	0.437	0.141	3
3	48		87220	—	—	—	—	—		1 13/16	0.500		3
4	40	48	87240 87245	87242 —	87243 —	87244 —	— —	— —		1 7/8	0.354		3
5	40		87252	—	—	—	—	—		1 15/16	0.394		3
6	32	40	87258 87269	87260 —	87261 —	87264 —	87265 —	87266 —		2	0.433		3
8	32		87272	87274	87275	87278	87279	87280	3	2 1/8	0.472	0.168	3
10	24	32	— 87294	87288 87296	— 87297	87290 87300	— 87301	— 87302		2 3/8	0.551	0.194	3
12	24	28	— —	87311 87312	— —	— —	— —	— —			0.500	0.220	3
FRACTIONAL SIZES - L971													
1/4	20		87052	87056	—	87060	—	87062	3	2 1/2	0.591	0.255	3
		28	87066	87068	87070	87071	87072	87073					3
5/16	18		—	87080	—	87084	—	87086		2 23/32	0.669	0.318	3
		24	—	87094	87096	87097	87098	87099					3
3/8	16		—	87102	—	87104	—	87106		2 15/16	0.748	0.381	3
		24	—	87110	87112	87113	87114	87115					3
7/16	14		—	87116	—	87120	—	—		3 5/32	0.866	0.323	3
		20	—	87122	—	87126	87127	87129					3
1/2	13		—	87130	—	87134	—	87136		3 3/8	0.984	0.367	3
		20	—	87138	—	87140	87141	87142					3
9/16	12		—	87143	—	—	—	—		3 19/32		0.429	1
		18	—	87144	—	—	—	—					1
5/8	11		—	87148	—	87152	—	87154		3 13/16	1.102	0.480	3
		18	—	87158	—	87159	—	—					3
3/4	10		—	87164	—	—	—	87167		4 1/4	1.181	0.590	3
		16	—	87168	—	87169	—	—					1
7/8	9		—	87170	—	—	—	—		4 11/16	1.299	0.697	1
		14	—	87171	—	—	—	—					3
1	8	12	— —	87172 —	— 87176	— —	— —	— —		5 1/8	1.378	0.800	1

Order by EDP Number

VTP Series Tapping Speeds

SFM: Surface Feet per Minutes

VTP Spiral Flute TAP List 980, 983, 981

Work Materials		Tapping Speed SFM
Low Carbon Steel	1010,1018	30-60
Medium Carbon Steel	1035,1045	15-40
High Carbon Steel	1065,1095	15-25
Alloy Steel	4140,4130	15-40
Die Steels	D2,H13	10-25
Hardened Die Steels (20-40HRC)	D2,H13	6-12
Stainless steel (Austentic)	303,304,316	10-25
Stainless steel (Martensitic)	410,430	10-25
Stainless steel (PH) up to 35HRC	17-4PH	8-15
Titanium Alloy Up to 32HRC	6AL4V	10-15
Magnesium Alloy		30-60
Ductile Cast Irons	80-55-06	15-40
Cast Irons	Nodular,Grey	-
Copper		15-40
Brass, Brass Casting		40-60
Bronze, Brass Casting		25-50

1. These are general tapping conditions, may be altered by your condition.
2. These conditions are for tapping depth 1.5D. In case of deeper thread you may multiply these values by the coefficient of next table

Thread Depth	Coefficient
Up to 1.5D	1
1.5D～2.5D	0.9
2.5D～3D	0.8
Over 3D	0.7

SFM: Surface Feet per Minutes

VTP Spiral Point TAP List 982, 973, 971

Work Materials		Tapping Speed SFM
Low Carbon Steel	1010,1018	35-75
Medium Carbon Steel	1035,1045	20-50
High Carbon Steel	1065,1095	15-30
Alloy Steel	4140,4130	20-50
Die Steels	D2,H13	15-30
Hardened Die Steels (20-40HRC)	D2,H13	38-15
Stainless steel (Austentic)	303,304,316	15-35
Stainless steel (Martensitic)	410,430	15-35
Stainless steel (PH) up to 35HRC	17-4PH	10-20
Titanium Alloy Up to 32HRC	6AL4V	15-20
Magnesium Alloy		40-80
Ductile Cast Irons	80-55-06	20-50
Cast Irons	Nodular,Grey	30-60
Copper		20-50
Brass, Brass Casting		50-80
Bronze, Brass Casting		30-60

1. These are general tapping conditions, may be altered by your condition.
2. These conditions are for tapping depth 1.5D. In case of deeper thread you may multiply these values by the coefficient of next table

Viper T Series Spiral Fluted

Modified Bottoming Style, 2 1/2 to 3 Thread, Surface Treated

List No. 7980

Metric Sizes, General Purpose

VANADIUM HIGH SPEED STEEL HSSE-V

*Series being DISCONTINUED, See VTP Series for replacement

Nominal Size (mm)	Pitch (mm)	E.D.P. Number					No. Of Flutes	Dimensions			Std. Pack.
		GT5	GT6	GT7	GT8	GT9		Overall Length	Length of Thread	Shank Dia.	
METRIC											
M3	0.5	57615	–	–	–	–	3	1 15/16	0.236	0.141	1
M3.5	0.6	57616	–	–	–	–		2	0.276	0.141	3
M4	0.7	57617	–	–	–	–		2 1/8	0.276	0.168	3
M5	0.8	–	57619	–	–	–		2 3/8	0.354	0.194	1
M6	1	–	57620	–	–	–		2 1/2	0.433	0.255	1
M7	1	–	57621	–	–	–		2 23/32	0.472	0.318	3
M8	1	–	57622	–	–	–					1
	1.25	–	57623	–	–	–					3
M10	1.25	–	57624	–	–	–		2 15/16	0.551	0.381	1
	1.5	–	–	57625	–	–					1
M12	1.25	–	–	–	57626	–		3 3/8	0.669	0.367	3
	1.75	–	–	–	57627	–					1
M14	1.5	–	–	–	57628	–		3 19/32	0.787	0.429	1
	2	–	–	–	57629	–					1
M16	1.5	–	–	–	57630	–		3 13/16		0.480	3
	2	–	–	–	57631	–					1
M18	1.5	–	–	–	57632	–		4 1/32		0.542	3
	2.5	–	–	–	–	57633					3
M20	1.5	–	–	–	57634	–	4	4 15/32	0.984	0.652	3
	2.5	–	–	–	–	57635					1
M22	1.5	–	–	–	57636	–		4 11/16		0.697	1
	2.5	–	–	–	–	57637					1
M24	1.5	–	–	–	57638	–		4 29/32	1.181	0.760	3
	3	–	–	–	–	57639					1

Order by EDP Number

Viper T Series Spiral Pointed

Plug Style 4 to 5 Thread, Surface Treated

List No. 7970

Metric Sizes, General Purpose

VANADIUM HIGH SPEED STEEL HSSE-V

Nominal Size (mm)	Pitch (mm)	E.D.P. Number					No. Of Flutes	Dimensions			Std. Pack.
		GT5	GT6	GT7	GT8	GT9		Overall Length	Length of Thread	Shank Dia.	
METRIC											
M3	0.5	58615	–	–	–	–	3	1 15/16	0.394	0.141	1
M3.5	0.6	58616	–	–	–	–		2	0.433	0.141	1
M4	0.7	58617	–	–	–	–		2 1/8	0.472	0.168	1
M5	0.8	–	58619	–	–	–		2 3/8	0.551	0.194	1
M6	1	–	58620	–	–	–		2 1/2	0.591	0.255	1
M7	1	–	58621	–	–	–		2 23/32	0.669	0.318	3
M8	1	–	58622	–	–	–					1
	1.25	–	58623	–	–	–					1
M10	1.25	–	58624	–	–	–		2 15/16	0.748	0.381	3
	1.5	–	–	58625	–	–					1
M12	1.25	–	–	–	58626	–		3 3/8	1.142	0.367	1
	1.75	–	–	–	58627	–					1
M14	1.5	–	–	–	58628	–		3 19/32	1.181	0.429	3
	2	–	–	–	58629	–					1
M16	1.5	–	–	–	58630	–		3 13/16	1.260	0.480	3
	2	–	–	–	58631	–					1
M18	1.5	–	–	–	58632	–		4 1/32	1.457	0.542	1
	2.5	–	–	–	–	58633					3
M20	1.5	–	–	–	58634	–		4 15/32		0.652	1
	2.5	–	–	–	–	58635					1
M22	1.5	–	–	–	58636	–	4	4 11/16	1.496	0.697	3
	2.5	–	–	–	–	58637	3				1
M24	1.5	–	–	–	58638	–	4	4 29/32	1.772	0.760	3
	3	–	–	–	–	58639	3				1

Order by EDP Number

*See conversion chart for GT limits on page 235

Viper T Series Spiral Fluted

Modified Bottoming Style, 2 1/2 To 3 Thread Lead
Surface Treated

List No. 7981 Machine Screw & Fractional Sizes, General Purpose

VANADIUM HIGH SPEED STEEL HSSE-V

*Series being DISCONTINUED, See VTP Series for replacement

Nominal Size	Thread/Inch		E.D.P. Numbers							No. of Flutes	Dimensions			Std . Pack.
	NC UNC	NF UNF	GT3	GT4	GT5	GT6	GT7	GT8	GT9		Overall Length	Length of Thread	Shank Dia.	
MACHINE SCREW SIZES														
2	56		97597	–	–	–	–	–	–	3	1 3/4	0.437	0.141	1
		64	97598	–	–	–	–	–	–					3
3	48		–	97599	–	–	–	–	–		1 13/16	0.500		1
		56	97600	–	–	–	–	–	–					3
4	40		–	–	97601	–	–	–	–		1 7/8	0.236		3
		48	–	97602	–	–	–	–	–					3
5	40		–	–	97603	–	–	–	–		1 15/16			3
		44	–	–	97604	–	–	–	–					3
6	32		–	–	97605	–	–	–	–		2	0.276		1
		40	–	–	97606	–	–	–	–					1
8	32		–	–	97607	–	–	–	–		2 1/8		0.168	1
		36	–	–	97608	–	–	–	–					3
10	24		–	–	–	97609	–	–	–		2 3/8	0.354	0.194	1
		32	–	–	97610	–	–	–	–					1
12	24		–	–	–	97611	–	–	–				0.220	3
		28	–	–	–	97612	–	–	–					1
FRACTIONAL SIZES														
1/4	20		–	97633	–	–	97613	–	–	3	2 1/2	0.433	0.255	1
		28	–	97638	–	97614	–	–	–					3
5/16	18		–	97643	–	–	97615	–	–		2 23/32	0.472	0.318	1
		24	–	97648	–	–	97616	–	–					3
3/8	16		–	97653	–	–	–	97617	–		2 15/16	0.551	0.381	1
		24	–	97658	–	–	97618	–	–					3
7/16	14		–	97663	–	–	–	97619	–		3 5/32	0.709	0.323	3
		20	–	97668	–	–	–	97620	–					1
1/2	13		–	97673	–	–	–	97621	–		3 3/8	0.787	0.367	1
		20	–	97678	–	–	–	97622	–					3
9/16	12		–	97683	–	–	–	97623	–		3 19/32	0.827	0.429	3
		18	–	97688	–	–	–	97624	–					1
5/8	11		–	97693	–	–	–	–	97625		3 13/16	0.906	0.480	1
		18	–	97698	–	–	–	97626	–					3
3/4	10		–	97705	–	–	–	–	97627		4 1/4	0.984	0.590	1
		16	–	97710	–	–	–	97628	–					1
7/8	9		–	–	97715	–	–	–	97629	4	4 11/16	1.102	0.697	1
		14	–	–	97720	–	–	–	97630					3
1	8		–	–	97725	–	–	–	97631		5 1/8	1.260	0.800	1
		12	–	–	97730	–	–	–	97632					3

Order by EDP Number

*See conversion chart for GT limits on page 235

Viper T Series Spiral Pointed

Plug Style, 4 to 5 Thread
Surface Treated

List No. 7971 Machine Screw & Fractional Sizes, General Purpose

VANADIUM HIGH SPEED STEEL HSSE-V

*Series being DISCONTINUED, See VTP Series for replacement

Nominal Size	Thread/Inch		E.D.P. Numbers							No. of Flutes	Dimensions			Std . Pack.
	NC UNC	NF UNF	GT3	GT4	GT5	GT6	GT7	GT8	GT9		Overall Length	Length of Thread	Shank Dia.	
MACHINE SCREW SIZES														
2	56		98597	–	–	–	–	–	–	2	1 3/4	0.437	0.141	3
		64	98598	–	–	–	–	–	–					3
3	48		–	98599	–	–	–	–	–		1 13/16	0.500		3
		56	98600	–	–	–	–	–	–					3
4	40		–	–	98601	–	–	–	–		1 7/8	0.354		1
		48	–	98602	–	–	–	–	–					1
5	40		–	–	98603	–	–	–	–	3	1 15/16	0.394		3
		44	–	–	98604	–	–	–	–					3
6	32		–	–	98605	–	–	–	–		2	0.433		1
		40	–	–	98606	–	–	–	–					3
8	32		–	–	98607	–	–	–	–		2 1/8	0.472	0.168	1
		36	–	–	98608	–	–	–	–					3
10	24		–	–	–	98609	–	–	–		2 3/8	0.551	0.194	1
		32	–	–	98610	–	–	–	–					1
12	24		–	–	–	98611	–	–	–				0.220	1
		28	–	–	–	98612	–	–	–					3
FRACTIONAL SIZES														
1/4	20		–	98633	–	–	98613	–	–	3	2 1/2	0.591	0.255	1
		28	–	98638	–	98614	–	–	–					3
5/16	18		–	98643	–	–	98615	–	–		2 23/32	0.669	0.318	1
		24	–	98648	–	–	98616	–	–					3
3/8	16		–	98653	–	–	–	98617	–		2 15/16	0.748	0.381	1
		24	–	98658	–	–	98618	–	–					1
7/16	14		–	98663	–	–	–	98619	–		3 5/32	0.984	0.323	3
		20	–	98668	–	–	–	98620	–					3
1/2	13		–	98673	–	–	–	98621	–		3 3/8	1.142	0.367	1
		20	–	98678	–	–	–	98622	–					3
9/16	12		–	98683	–	–	–	98623	–		3 19/32	1.181	0.429	3
		18	–	98688	–	–	–	98624	–					3
5/8	11		–	98693	–	–	–	–	98625		3 13/16	1.260	0.480	1
		18	–	98698	–	–	–	98626	–					3
3/4	10		–	98705	–	–	–	–	98627		4 1/4	1.457	0.590	1
		16	–	98710	–	–	–	98628	–					3
7/8	9		–	–	98715	–	–	–	98629		4 11/16	1.496	0.697	3
		14	–	–	98720	–	–	–	98630	4				3
1	8		–	–	98725	–	–	–	98631	3	5 1/8	1.772	0.800	1
		12	–	–	98730	–	–	–	98632	4				3

Order by EDP Number

*See conversion chart for GT limits on page 235

Viper T Series Spiral Fluted

Modified Bottoming Style 2 1/2 To 3 Thread Lead, Surface Treated

List No. 7982 Metric Sizes

VANADIUM HIGH SPEED STEEL

*Series being DISCONTINUED, See VTP Series for replacement

Nominal Size (mm)	Pitch (mm)	E.D.P. Number					No. Of Flutes	Dimensions			Std. Pack.
		GT5	GT6	GT7	GT8	GT9		Overall Length	Length of Thread	Shank Dia.	
METRIC											
M3	0.5	56615	–	–	–	–	3	1 15/16	0.236	0.141	1
M3.5	0.6	56616	–	–	–	–		2	0.276	0.141	1
M4	0.7	56617	–	–	–	–		2 1/8	0.276	0.168	1
M5	0.8	–	56619	–	–	–		2 3/8	0.354	0.194	1
M6	1	–	56620	–	–	–		2 1/2	0.433	0.255	1
M7	1	–	56621	–	–	–		2 23/32	0.472	0.318	3
M8	1	–	56622	–	–	–					3
	1.25	–	56623	–	–	–					1
M10	1.25	–	56624	–	–	–		2 15/16	0.551	0.381	1
	1.5	–	–	56625	–	–					1
M12	1.25	–	–	–	56626	–		3 3/8	0.669	0.367	1
	1.75	–	–	–	56627	–					3
M14	1.5	–	–	–	56628	–		3 19/32	0.787	0.429	1
	2	–	–	–	56629	–					1
M16	1.5	–	–	–	56630	–		3 13/16		0.480	1
	2	–	–	–	56631	–					1
M18	1.5	–	–	–	56632	–	4	4 1/32	0.984	0.542	1
	2.5	–	–	–	–	56633					3
M20	1.5	–	–	–	56634	–		4 15/32		0.652	3
	2.5	–	–	–	–	56635					1
M22	1.5	–	–	–	56636	–		4 11/16		0.697	1
	2.5	–	–	–	–	56637					1
M24	1.5	–	–	–	56638	–		4 29/32	1.181	0.760	1
	3	–	–	–	–	56639					1

Order by EDP Number

Viper T Series Spiral Pointed

Plug Style 4 to 5 Thread Lead, Surface Treated

List No. 7972 Metric Sizes

VANADIUM HIGH SPEED HSSE STEEL

Nominal Size (mm)	Pitch (mm)	E.D.P. Number					No. Of Flutes	Dimensions			Std. Pack.
		GT5	GT6	GT7	GT8	GT9		Overall Length	Length of Thread	Shank Dia.	
METRIC											
M3	0.5	55615	–	–	–	–	3	1 15/16	0.394	0.141	1
M3.5	0.6	55616	–	–	–	–		2	0.433	0.141	1
M4	0.7	55617	–	–	–	–		2 1/8	0.472	0.168	1
M5	0.8	–	55619	–	–	–		2 3/8	0.551	0.194	1
M6	1	–	55620	–	–	–		2 1/2	0.591	0.255	1
M7	1	–	55621	–	–	–		2 23/32	0.669	0.318	1
M8	1	–	55622	–	–	–					1
	1.25	–	55623	–	–	–					1
M10	1.25	–	55624	–	–	–		2 15/16	0.748	0.381	1
	1.5	–	–	55625	–	–					1
M12	1.25	–	–	–	55626	–		3 3/8	1.141	0.367	3
	1.75	–	–	–	55627	–					1
M14	1.5	–	–	–	55628	–		3 19/32	1.181	0.429	1
	2	–	–	–	55629	–					1
M16	1.5	–	–	–	55630	–		3 13/16	1.260	0.480	1
	2	–	–	–	55631	–					1
M18	1.5	–	–	–	55632	–		4 1/32	1.457	0.542	1
	2.5	–	–	–	–	55633					1
M20	1.5	–	–	–	55634	–		4 15/32	1.457	0.652	1
	2.5	–	–	–	–	55635					1
M22	1.5	–	–	–	55636	–	4	4 11/16	1.496	0.697	1
	2.5	–	–	–	–	55637	3				1
M24	1.5	–	–	–	55638	–	4	4 29/32	1.772	0.760	1
	3	–	–	–	–	55639	3				1

Order by EDP Number

*See conversion chart for GT limits on page 235

Viper T Series Spiral Fluted

Modified Bottoming Style 2 1/2 to 3 Thread Lead
Surface Treated

List No. 7987 Machine Screw & Fractional Sizes

VANADIUM HIGH SPEED STEEL HSSE

*Series being DISCONTINUED, See VTP Series for replacement

Nominal Size	Thread/Inch		E.D.P. Numbers							No. of Flutes	Dimensions			Std . Pack.
	NC UNC	NF UNF	GT3	GT4	GT5	GT6	GT7	GT8	GT9		Overall Length	Length of Thread	Shank Dia.	
MACHINE SCREW SIZES														
2	56		96597	–	–	–	–	–	–	3	1 3/4	0.437	0.141	1
		64	96598	–	–	–	–	–	–					3
3	48		–	96599	–	–	–	–	–		1 13/16	0.500		1
		56	96600	–	–	–	–	–	–					3
4	40		–	–	96601	–	–	–	–		1 7/8	0.236		1
		48	–	96602	–	–	–	–	–					1
5	40		–	–	96603	–	–	–	–		1 15/16			3
		44	–	–	96604	–	–	–	–					3
6	32		–	–	96605	–	–	–	–		2	0.276		1
		40	–	–	96606	–	–	–	–					1
8	32		–	–	96607	–	–	–	–		2 1/8		0.168	1
		36	–	–	96608	–	–	–	–					3
10	24		–	–	–	96609	–	–	–		2 3/8	0.354	0.194	1
		32	–	–	96610	–	–	–	–					1
12	24		–	–	–	96611	–	–	–				0.220	3
		28	–	–	–	96612	–	–	–					3
FRACTIONAL SIZES														
1/4	20		–	–	–	–	96613	–	–	3	2 1/2	0.433	0.255	1
		28	–	–	–	96614	–	–	–					1
5/16	18		–	–	–	–	96615	–	–		2 23/32	0.472	0.318	1
		24	–	–	–	–	96616	–	–					1
3/8	16		–	–	–	–	–	96617	–		2 15/16	0.551	0.381	1
		24	–	–	–	–	96618	–	–					1
7/16	14		–	–	–	–	–	96619	–		3 5/32	0.709	0.323	3
		20	–	–	–	–	–	96620	–					1
1/2	13		–	–	–	–	–	96621	–		3 3/8	0.787	0.367	1
		20	–	–	–	–	–	96622	–					1
9/16	12		–	–	–	–	–	96623	–		3 19/32	0.827	0.429	1
		18	–	–	–	–	–	96624	–					1
5/8	11		–	–	–	–	–	–	96625		3 13/16	0.905	0.480	1
		18	–	–	–	–	–	96626	–					1
3/4	10		–	–	–	–	–	–	96627		4 1/4	0.984	0.590	1
		16	–	–	–	–	–	96628	–					3
7/8	9		–	–	–	–	–	–	96629	4	4 11/16	1.102	0.697	1
		14	–	–	–	–	–	–	96630					1
1	8		–	–	–	–	–	–	96631		5 1/8	1.260	0.800	1
		12	–	–	–	–	–	–	96632					3

Order by EDP Number

*See conversion chart for GT limits on page 235

Viper T Series Spiral Pointed

List No. 7977 Machine Screw & Fractional Sizes

VANADIUM HIGH SPEED STEEL HSS

***Series being DISCONTINUED, See VTP Series for replacement**

Nominal Size	Thread/Inch NC UNC	Thread/Inch NF UNF	E.D.P. Numbers GT3	GT4	GT5	GT6	GT7	GT8	GT9	No. of Flutes	Dimensions Overall Length	Length of Thread	Shank Dia.	Std . Pack.
MACHINE SCREW SIZES														
2	56		95597	—	—	—	—	—	—	2	1 3/4	0.437	0.141	1
		64	95598	—	—	—	—	—	—					3
3	48		—	95599	—	—	—	—	—		1 13/16	0.500	0.141	1
		56	95600	—	—	—	—	—	—					1
4	40		—	—	95601	—	—	—	—		1 7/8	0.354	0.141	1
		48	—	95602	—	—	—	—	—					3
5	40		—	—	95603	—	—	—	—	3	1 15/16	0.394	0.141	3
		44	—	—	95604	—	—	—	—					1
6	32		—	—	95605	—	—	—	—		2	0.433	0.141	1
		40	—	—	95606	—	—	—	—					1
8	32		—	—	95607	—	—	—	—		2 1/8	0.472	0.168	3
		36	—	—	95608	—	—	—	—					3
10	24		—	—	—	95609	—	—	—		2 3/8	0.551	0.194	1
		32	—	—	95610	—	—	—	—					1
12	24		—	—	—	95611	—	—	—				0.220	1
		28	—	—	—	95612	—	—	—					3
FRACTIONAL SIZES														
1/4	20		—	—	—	—	95613	—	—		2 1/2	0.591	0.255	1
		28	—	—	—	95614	—	—	—					1
5/16	18		—	—	—	—	95615	—	—		2 23/32	0.669	0.318	1
		24	—	—	—	—	95616	—	—					3
3/8	16		—	—	—	—	—	95617	—		2 15/16	0.748	0.381	1
		24	—	—	—	—	95618	—	—					1
7/16	14		—	—	—	—	—	95619	—		3 5/32	0.984	0.323	3
		20	—	—	—	—	—	95620	—					1
1/2	13		—	—	—	—	—	95621	—	3	3 3/8	1.142	0.367	1
		20	—	—	—	—	—	95622	—					1
9/16	12		—	—	—	—	—	95623	—		3 19/32	1.181	0.429	1
		18	—	—	—	—	—	95624	—					1
5/8	11		—	—	—	—	—	—	95625		3 13/16	1.260	0.480	1
		18	—	—	—	—	—	95626	—					1
3/4	10		—	—	—	—	—	—	95627		4 1/4	1.457	0.590	1
		16	—	—	—	—	—	95628	—					1
7/8	9		—	—	—	—	—	—	95629		4 11/16	1.496	0.697	1
		14	—	—	—	—	—	—	95630	4				1
1	8		—	—	—	—	—	—	95631	3	5 1/8	1.772	0.800	1
		12	—	—	—	—	—	—	95632	4				3

*See conversion chart for GT limits on page 235

VIPER T Series Tapping Speeds

SFM: Surface Feet per Minutes

Viper T Spiral Flute TAP List 7981,7980,7987,7982

Work Materials		Tapping Speed SFM
Low Carbon Steel	1010,1018	30-60
Medium Carbon Steel	1035,1045	15-40
High Carbon Steel	1065,1095	15-25
Alloy Steel	4140,4130	15-40
Die Steels	D2,H13	10-25
Hardened Die Steels (20-40HRC)	D2,H13	6-12
Stainless steel (Austentic)	303,304,316	10-25
Stainless steel (Martensitic)	410,430	10-25
Stainless steel (PH) up to 35HRC	17-4PH	8-15
Titanium Alloy Up to 32HRC	6AL4V	10-15
Magnesium Alloy		30-60
Ductile Cast Irons	80-55-06	15-40
Cast Irons	Nodular,Grey	-
Copper		15-40
Brass, Brass Casting		40-60
Bronze, Brass Casting		25-50

1. These are general tapping conditions, may be altered by your condition.
2. These conditions are for tapping depth 1.5D. In case of deeper thread you may multiply these values by the coefficient of next table

Thread Depth	Coefficient
Up to 1.5D	1
1.5D～2.5D	0.9
2.5D～3D	0.8
Over 3D	0.7

SFM: Surface Feet per Minutes

Viper T Spiral Point TAP List7971,7970,7977,7972

Work Materials		Tapping Speed SFM
Low Carbon Steel	1010,1018	35-75
Medium Carbon Steel	1035,1045	20-50
High Carbon Steel	1065,1095	15-30
Alloy Steel	4140,4130	20-50
Die Steels	D2,H13	15-30
Hardened Die Steels (20-40HRC)	D2,H13	38-15
Stainless steel (Austentic)	303,304,316	15-35
Stainless steel (Martensitic)	410,430	15-35
Stainless steel (PH) up to 35HRC	17-4PH	10-20
Titanium Alloy Up to 32HRC	6AL4V	15-20
Magnesium Alloy		40-80
Ductile Cast Irons	80-55-06	20-50
Cast Irons	Nodular,Grey	30-60
Copper		20-50
Brass, Brass Casting		50-80
Bronze, Brass Casting		30-60

1. These are general tapping conditions, may be altered by your condition.
2. These conditions are for tapping depth 1.5D. In case of deeper thread you may multiply these values by the coefficient of next table

Standard Hand Tap

Bright Finish

List No. 911 Fractional Sizes

HIGH SPEED STEEL

Size	Thread			Pitch Diameter Limits	E.D.P.			Number of Flutes	Dimensions			Std. Pack.
					Taper	Plug	Bottom		Overall Length	Thread Length	Shank Dia.	
	UNC	UNF	UNS		L911	L911	L911					
1/4	20			H2	64059	64060	64061	4	2 1/2	1	0.255	1
	20			H3	64068	64069	64070					1
	20			H5		64075	64076					1
		28		H3	64089	64090	64091					1
		28		H4		64093	64094					3
5/16	18			H2	64098	64099	64100		2 23/32	1 1/8	0.318	3
	18			H3	64107	64108	64109					3
	18			H5		64111	64112					3
		24		H3	64122	64123	64124					3
		24		H4		64126	64127					3
3/8	16			H2	64131	64132	64133		2 15/16	1 1/4	0.381	1
	16			H3	64137	64138	64139					1
	16			H5		64141	64142					3
		24		H3	64152	64153	64154					3
		24		H4		64156	64157					3
7/16	14			H3	64167	64168	64169		3 5/32	1 7/16	0.323	3
		20		H3	64182	64183	64184					3
1/2	13			H3	64197	64198	64199		3 3/8	1 21/32	0.367	1
	13			H5		64201	64202					3
		20		H3	64212	64213	64214					3
		20		H5		64216	64217					3
9/16	12			H3	64221	64222	64223		3 19/32		0.429	3
		18		H3	64230	64231	64232					3
5/8	11			H3	64242	64243	64244		3 13/16	1 13/16	0.480	1
	11			H5		64246	64247					3
		18		H3	64254	64255	64256					3
		18		H5		64258	64259					3
11/16			11	H3	64260	64261	64262		4 1/32		0.542	3
			16	H3	64263	64264	64265					3
3/4	10			H3	64272	64273	64274		4 1/4	2	0.590	3
	10			H5		64276	64277					3
		16		H3	64284	64285	64286					1
		16		H5		64288	64289					3
7/8	9			H4	64293	64294	64295		4 11/16	2 7/32	0.697	3
		14		H4	64302	64303	64304					3
1	8			H4	64311	64312	64313		5 1/8	2 1/2	0.800	3
		12		H4	64314	64315	64316					1
			14	H4	64320	64321	64322					1
1 1/8	7			H4	64323	64324	64325		5 7/16	2 9/16	0.896	1
		12		H4	64326	64327	64328					1
1 1/4	7			H4	64329	64330	64331		5 3/4		1.021	1
		12		H4	64332	64333	64334	6				1
1 3/8	6			H4	64335	64336	64337	4	6 1/16	3	1.108	1
		12		H4	64338	64339	64340	6				1
1 1/2	6			H4	64341	64342	64343	4	6 3/8		1.233	1
		12		H4	64344	64345	64346	6				1

Order by EDP Number

Standard Hand Tap

Bright Finish

List No. 913 Machine Screw Size

HIGH SPEED STEEL

Nominal Tap Size	Threads		Pitch Diameter Limits	E.D.P. Numbers			Number of Flutes	Dimensions			Std . Pack.
	NC UNC	NF UNF		Taper L913	Plug L913	Bottom L913		Overall Length	Thread Length	Shank Dia.	
0		80	H1	64360	64361	64362	2	1 5/8	5/16	0.141	3
		80	H2		64364	64365					3
1	64		H1	64366	64367	64368		1 11/16	3/8		3
	64		H2		64370						3
		72	H1	64372	64373	64374					3
		72	H2		64376	64377					3
2	56		H1	64381	64382	64383	3	1 3/4	7/16		3
	56		H2	64387	64388	64389					3
		64	H1	64390	64391	64392					3
		64	H2	64393	64394	64395					3
3	48		H1		64397			1 13/16	1/2		3
	48		H2	64402	64403	64404					3
		56	H1		64406						3
		56	H2	64408	64409	64410					3
4	36NS		H2	64411	64412	64413		1 7/8	9/16		3
	40		H1	64417	64418	64419					3
	40		H2	64423	64424	64425					3
		48	H1		64427						3
		48	H2	64429	64430	64431					3
5	40		H1		64433	64434		1 15/16	5/8		3
	40		H2	64438	64439	64440					3
		44	H1		64442	64443					3
		44	H2	64447	64448	64449					3
6	32		H2	64459	64460	64461		2	11/16		3
	32		H3	64465	64466	64467					3
	32		H7		64469	64470					3
		40	H1		64472						3
		40	H2	64477	64478	64479					3
8	32		H2	64495	64496	64497	4	2 1/8	3/4	0.168	3
	32		H3	64504	64505	64506					3
	32		H7		64508	64509					3
		36	H1		64515						3
		36	H2	64517	64518	64519					3
10	24		H2	64532	64533	64534		2 3/8	7/8	0.194	3
	24		H3	64541	64542	64543					3
	24		H7		64548	64549					3
		32	H2	64562	64563	64564					3
		32	H3	64571	64572	64573					3
		32	H7		64578	64579					3
12	24		H3	64583	64584	64585			15/16	0.220	3
		28	H3	64589	64590	64591					3

Order by EDP Number

Standard Tap Spiral Pointed

Plug Style, Bright Finish

List No. 921 Fractional Sizes

HIGH SPEED STEEL

Nominal Tap Size	Threads per inch		Pitch Diameter Limits	E.D.P. Numbers	Number of Flutes	Dimensions			Std. Pack.
	NC UNC	NF UNF				Overall Length	Thread Length	Shank Dia.	
1/4	20		H3	67054	2	2 1/2	1	0.255	1
	20		H3	67056	3				1
		28	H3	67068	2				1
5/16	18		H3	67078		2 23/32	1 1/8	0.318	3
	18		H3	67080	3				1
		24	H3	67092	2				3
3/8	16		H2	67100	3	2 15/16	1 1/4	0.381	3
	16		H3	67102					1
	16		H5	67104					1
		24	H3	67110					1
7/16	14		H3	67116		3 5/32	1 7/16	0.323	3
		20	H3	67122					3
1/2	13		H3	67130		3 3/8	1 21/32	0.367	1
		20	H3	67138					3
9/16	12		H3	67142		3 19/32	1 21/32	0.429	1
5/8	11		H3	67148		3 13/16	1 13/16	0.480	1
3/4	10		H3	67150		4 1/4	2	0.590	1

Order by EDP Number

Standard Hand Tap for Cast Iron

Surface Treated

List No. 969 Fractional Sizes

HIGH SPEED STEEL

Size	Threads		Thread Limits	E.D.P.		Number of Flutes	Dimensions			Std. Pack.
	UNC	UNF		Plug	Bottom		Overall Length	Thread Length	Shank Dia.	
1/4	20		H3	76001	76002	4	2 1/2	1	0.255	3
	20		H5	76003	76004					3
		28	H3	76005	76006					3
5/16	18		H3	76007	76008		2 23/32	1 1/8	0.318	3
	18		H5	76009	76010					3
		24	H3	76011	76012					3
3/8	16		H3	76013	76014		2 15/16	1 1/4	0.381	3
	16		H5	76015	76016					3
		24	H3	76017	76018					3
7/16	14		H3	76019	76020		3 5/32	1 7/16	0.323	3
	14		H5	76021	76022					3
		20	H3	76023	76024					3
		20	H5	76025	76026					3
1/2	13		H3	76027	76028		3 3/8	1 21/32	0.367	3
	13		H5	76029	76030					3
		20	H3	76031	76032					3
		20	H5	76033	76034					3
9/16	12		H3	76035	76036		3 19/32	1 21/32	0.429	3
		18	H3	76037	76038					3
5/8	11		H3	76039	76040		3 13/16	1 13/16	0.480	3
		18	H3	76041	76042					3
3/4	10		H3	76043	76044		4 1/4	2	0.590	3
		16	H3	76045	76046					3

Order by EDP Number

Standard Tap Spiral Pointed

Plug Style
Bright Finish

List No. 923 Machine Screw Sizes

HIGH SPEED STEEL

Nominal Tap Size	Threads per inch		Pitch Diameter Limits	E.D.P. Numbers	Number of Flutes	Dimensions			Std. Pack.
	NC UNC	NF UNF		Plug L923		Overall Length	Thread Length	Shank Dia.	
0		80	H1	67200	2	1 5/8	5/16	0.141	1
			H2	67202					1
1	64		H1	67206		1 11/16	3/8		3
			H2	67208					3
		72	H1	67210					1
			H2	67212					1
2	56		H1	67214		1 3/4	7/16		1
			H2	67216					3
		64	H2	67224					3
3	48		H2	67228		1 13/16	1/2		3
		56	H2	67234					1
4	36NS		H2	67236		1 7/8	9/16		3
	40		H1	67238					3
			H2	67240					1
		48	H2	67248					3
5	40		H1	67250		1 15/16	5/8		3
			H2	67252					1
		44	H2	67254					3
6	32		H2	67258		2	11/16		1
			H3	67260					1
			H7	67264					3
		40	H2	67268					3
8	32		H2	67272		2 1/8	3/4	0.168	1
			H3	67274					1
			H7	67278					3
		36	H2	67282					3
10	24		H2	67286		2 3/8	7/8	0.194	1
			H3	67288					1
			H7	67290					3
		32	H2	67294					1
			H3	67296					1
			H7	67300					3
12	24		H3	67304			15/16	0.220	1

Order by EDP Number

Standard Hand Tap

Bright Finish

List No. 910 Metric Sizes

HIGH SPEED STEEL

Nominal Tap Size (mm)	Millimeter Pitch (mm)	Pitch Dia. Limits	E.D.P. Numbers			Number of Flutes	Dimensions			Std. Pack.
			Taper	Plug	Bottom		Overall Length	Thread Length	Shank Dia.	
M2	0.4	D3	54056	54057	54058	3	1 3/4	7/16	0.141	3
M3	0.5		54071	54072	54073		1 15/16	5/8	0.141	1
M3.5	0.6	D4	54074	54075	54076		2	11/16	0.141	3
M4	0.7		54080	54081	54082	4	2 1/8	3/4	0.168	1
M5	0.8		54095	54096	54097		2 3/8	7/8	0.194	1
M6	1.0	D5	54107	54108	54109		2 1/2	1	0.255	3
M7	1.0		54113	54114	54115		2 23/32	1 1/8	0.318	3
M8	1.25		54125	54126	54127		2 23/32		0.318	1
M10	1.5	D6	54140	54141	54142		2 15/16	1 1/4	0.381	1
M12	1.75		54155	54156	54157		3 3/8	1 21/32	0.367	1
M14	1.25	D5	54161	54162	54163		3 19/32		0.429	3
M14	2.0	D7	54167	54168	54169		3 19/32		0.429	3
M16	2.0		54176	54177	54178		3 13/16	1 13/16	0.480	3
M18	1.5		54182	54183	54184		4 1/32		0.542	3
M18	2.5		54188	54189	54190		4 1/32		0.542	3
M20	2.5		54200	54201	54202		4 15/32	2	0.652	3
M22	2.5		54212	54213	54214		4 11/16	2 7/32	0.697	3
M24	3.0	D8	54224	54225	54226		4 29/32		0.760	3
M27	3.0		54239	54240	54241		5 1/8	2 1/2	0.896	3
M30	3.5	D9	54251	54252	54253		5 7/16	2 9/16	1.021	1

Order by EDP Number

Standard Tap Spiral Pointed

Bright Finish

List No. 920 Metric Sizes

HIGH SPEED STEEL

Nominal Tap Size (mm)	Pitch (mm)	Pitch Diameter Limits	E.D.P. Numbers	Number of Flutes	Dimensions			Std. Pack.
					Overall Length	Thread Length	Shank Dia.	
M2.5	0.45	D3	57054	2	1 13/16	1/2	0.141	1
M3	0.50		57055		1 15/16	5/8	0.141	1
M4	0.70	D4	57058		2 1/8	3/4	0.168	1
M5	0.80		57061		2 3/8	7/8	0.194	1
M6	1.00	D5	57063		2 1/2	1	0.255	1
M8	1.25		57068		2 23/32	1 1/8	0.318	1
M10	1.50	D6	57082	3	2 15/16	1 1/4	0.381	1
M12	1.75		57073		3 3/8	1 21/32	0.367	1
M14	2.00	D7	57076		3 19/32	1 21/32	0.429	1
M16	2.00		57078		3 13/16	1 13/16	0.480	1

Order by EDP Number

Taper Pipe Tap Straight Fluted

Bright Finish

List No. 941 (NPT)
List No. 941D (NPTF) Dry Seal

Nominal Tap Size	Threads per Inch	E.D.P. Number		Number of Flutes	Dimensions					Std. Pack
		L941 NPT	L941D NPTF		Overall Length	Thread Length	Shank Dia.	Square Length	Size of Square	
1/16	27	74051	74062	4	2.1260	0.6890	0.3125	0.3740	0.2339	1
1/8		74052	74063		2.1260	0.7520	0.4375	0.3740	0.3280	1
1/8SS		74053	74064		2.1260		0.3125	0.3740	0.2339	1
1/4	18	74054	74065		2.4370	1.0630	0.5625	0.4370	0.4209	1
3/8		74055	74066		2.5630		0.7	0.5	0.5307	1
1/2	14	74056	74067		3.1260	1.3740	0.6875	0.626	0.5150	1
3/4		74057	74068	5	3.2520		0.9063	0.689	0.6787	1
1	11 1/2	74058	74069		3.7520	1.7520	1.125	0.811	0.8429	1
1 1/4		74059	74070		4		1.3125	0.9370	0.9839	1
1 1/2		74060	74071	7	4.2520		1.5	1	1.1248	1
2		74061	74072		4.5		1.875	1.126	1.4059	1

Order by EDP Number

Taper Pipe Tap Interrupted

Bright Finish

List No. 943 (NPT)
List No. 943D (NPTF) Dry Seal

Nominal Tap Size	Thread Per Inch	E.D.P. Numbers		Number of Flutes	Dimensions					Std. Pack.
		L943 NPT	L943D NPTF		Overall Length	Thread Length	Shank Dia.	Square Length	Size of Square	
1/8	27	74073	74173	5	2.126	0.752	0.4375	0.3740	0.3280	1
1/4	18	74075	74175		2.437	1.063	0.5625	0.4370	0.4209	1
3/8		74076	74176		2.563		0.7	0.5	0.5307	1
1/2	14	74077	74177		3.126	1.374	0.6875	0.626	0.5150	1
3/4		74078	74178		3.252		0.9063	0.689	0.6787	1
1	11 1/2	74079	74179		3.752	1.752	1.125	0.811	0.8429	1

Order by EDP Number

Taper Pipe Tap Spiral Fluted

Surface Treated

List No. 947 **(NPT)**
List No. 947D **(NPTF)** Dry Seal

PREMIUM TYPE STEEL

Nominal Tap Size	Thread Per Inch	E.D.P. Numbers		Number of Flutes	Dimensions					Std. Pack.
		L947 NPT	L947D NPTF		Overall Length	Thread Length	Shank Dia.	Square Length	Size of Square	
1/16	27	84051	84062	4	2.126	0.689	0.3125	0.374	0.2339	1
1/8		84052	84063		2.126	0.752	0.4375	0.374	0.3280	1
1/8SS		84053	84064		2.126		0.3125	0.374	0.2339	1
1/4	18	84054	84065		2.437	1.063	0.5625	0.437	0.4209	1
3/8		84055	84066		2.563		0.7	0.5	0.5307	1
1/2	14	84056	84067		3.126	1.374	0.6875	0.626	0.5150	1
3/4		84057	84068	5	3.252		0.9063	0.689	0.6787	1
1	11 1/2	84058	84069		3.752	1.752	1.125	0.811	0.8429	1

Order by EDP Number

Straight Pipe Tap Straight Fluted

Bright Finish

List No. 945 **(NPS)**
List No. 945D **(NPSF)** Dry Seal

HIGH SPEED STEEL

Nominal Tap Size	Threads per Inch	E.D.P. Numbers		Number of Flutes	Dimensions					Std. Pack
		L941 NPS	L941D NPSF		Overall Length	Thread Length	Shank Dia.	Square Length	Size of Square	
1/8	27	74083	74090	4	2.126	0.752	0.4375	0.3740	0.3280	1
1/4	18	74085	74092		2.437	1.063	0.5625	0.4370	0.4209	1
3/8		74086	74093		2.563		0.7	0.5	0.5307	1
1/2	14	74087	74094		3.126	1.374	0.6875	0.626	0.5150	1
3/4		74088	74095	5	3.252		0.9063	0.689	0.6787	1
1	11 1/2	74089			3.752	1.752	1.125	0.811	0.8429	1

Order by EDP Number

Taper Pipe Tap Short Projection

Bright Finish

List No. 959 (NPT)
List No. 959D (NPTF) Dry Seal
HIGH SPEED STEEL

Nominal Tap Size	Thread Per Inch	E.D.P. Numbers		Number of Flutes	Dimensions						Std. Pack.
		L959 NPT	L959D NPTF		Projection*	Overall Length	Thread Length	Shank Dia.	Square Length	Size of Square	
1/8	27	74100	74107	4	.241	2.126	0.752	0.4375	0.374	0.3280	1
1/4	18	74102	74109		.361	2.437	1.063	0.5625	0.437	0.4209	1
3/8	18	74103	74110			2.563		0.7	0.5	0.5307	1
1/2	14	74104	74111		.464	3.126	1.374	0.6875	0.626	0.5150	1
3/4	14	74105	74112	5		3.252		0.9063	0.689	0.6787	1
1	11 1/2	74106	74113		.565	3.752	1.752	1.125	0.811	0.8429	1

Order by EDP Number

*** Projection Tolerance:** **1/8" - 3/4" ..... ± 1/16"**
1" ..... ± 3/32"

Taper Pipe Tap 6" Extension

Bright Finish

List No. 957 (NPT)
HIGH SPEED STEEL

Nominal Tap Size	Threads per Inch	E.D.P. Numbers	Number of Flutes	Dimensions					Std. Pack
		L957 NPT		Overall Length	Thread Length	Shank Dia.	Square Length	Size of Square	
1/16	27	74120	4	6	0.689	0.3125	0.3740	0.2339	1
1/8		74121			0.752	0.4375	0.3740	0.3280	1
1/4	18	74123			1.063	0.5625	0.437	0.4209	1
3/8		74124				0.7	0.5	0.5307	1
1/2	14	74125			1.374	0.6875	0.626	0.5150	1
3/4		74126	5			0.9063	0.689	0.6787	1
1	11 1/2	74127			1.752	1.125	0.811	0.8429	1

Order by EDP Number

Tapping Speeds

Standard Taps

Material		Tapping Speed SFM
Aluminum Alloys		90-100
Brass		60-100
Bronze		40-60
Copper		40-60
High Temperature Alloys	Cobalt Base	5-10
	Iron Base	10-15
	Nickel Base	5-10
Iron, Ductile	Annealed	60
	as Cast	30
	Tempered	15-20
Gray	Annealed	80
	as Cast	35-60
Malleable		60
	Heat Treated	25-50
Magnesium Alloys	Annealed	175
Manganese		20
Molybdenum Alloys	Stress Relieved	50
Monel	Annealed	20
Nickel Alloys	Annealed	25
Plastics, Reinforced		25
Thermoplastics		50
Thermosetting Plastics		50
Steels, Alloys, Annealed or Cold Drawn		40-60
Quenched & Tempered		15-35
Armor Plate		10

Material		Tapping Speed SFM
(Steels Cont.)		
Carbon Steel, Plain	Annealed	40-80
	Tempered	15-40
Cast Carbon	Annealed	40-50
	Tempered	30
Cast, Corrosion Resistant	Annealed	20-30
Heat Resistant	as Cast	20-25
Low Alloy	Annealed	30-45
	Tempered	15-25
Precipitation Hardening	Treated	10-15
Stainless	Annealed	15-45
	Tempered	15-75
Free Machining	Annealed	45-75
Tool Steels, High Speed	Annealed	15-25
Water Hardening	Annealed	50
Ultra High Strength Steels	Annealed	35
	Normalized	20
	Tempered	3-7
Maraging Steels	Annealed	20-15
	Maraged	5-10
Tantalum Alloys	Stress Relieved	3
Titanium Alloys		
Commercial Pure	Annealed	40-60
Alpha & Alpha Beta Alloys	Annealed	10-25
Tungsten Alloys, Pressed & Sintered		50
Zinc Alloys	Die Cast	150

CONVERSION TABLE

Surface Feet Per Minute to Revolutions Per Minute

SFM	20	25	30	40	50	60	70	80	90	100	110	120	130	140	150
TAP SIZE	REVOLUTIONS PER MINUTE														
0	1270	1590	1910	2540	3100	3850	4450	5100	5750	6350	7000	7650	8200	8900	9550
1	1040	1310	1550	2100	2600	3140	3650	4150	4710	5200	5750	6250	6800	7300	7850
2	850	1100	1300	1750	2250	2650	3100	3550	4000	4450	4850	5350	5750	6200	6650
3	750	950	1150	1550	1900	2300	2700	3050	3450	3850	4250	4600	5000	5400	5750
4	650	850	1050	1350	1700	2050	2300	2700	3050	3400	3750	4100	4450	4750	5100
5	600	750	900	1200	1550	1850	2100	2400	2750	3100	3350	3650	3950	4250	4550
6	550	650	850	1100	1350	1650	1950	2200	2450	2750	3050	3300	3600	3850	4150
8	450	580	700	950	1150	1400	1650	1850	2100	2350	2550	2800	3000	3250	3500
10	400	500	600	800	1005	1200	1400	1600	1800	2000	2200	2400	2600	2800	3000
12	350	450	550	700	850	1050	1250	1400	1550	1750	1950	2100	2300	2450	2650
1/4	300	380	450	600	750	900	1050	1200	1350	1500	1650	1800	1950	2150	2300
5/16	250	300	350	480	600	750	850	950	1100	1250	1350	1450	1550	1700	1850
3/8	200	250	300	400	500	600	700	800	900	1000	1100	1200	1300	1400	1500
7/16	170	210	250	350	450	520	600	700	750	850	950	1050	1150	1250	1300
1/2	150	190	220	300	350	450	530	600	650	750	850	900	950	1050	1150
9/16	130	170	200	250	350	400	450	550	600	650	750	800	900	950	1050
5/8	120	150	180	250	300	350	400	450	550	600	650	750	800	850	900
3/4	100	120	150	200	250	300	350	400	450	500	550	600	650	700	750
7/8	80	100	130	170	200	250	300	350	400	450	480	520	550	600	650
1	70	90	100	150	190	230	260	300	350	380	420	450	500	530	570

The material being tapped is the primary factor in determining the most effective TAPPING SPEED. However there are a number of other factors which may require consideration. Among these are: thread pitch, thread length, percent of thread, lubrication, tap flute style and chamfer, equipment and method of tapping. The best speed is determined by experiment on the iob. The table below lists speeds which have proven satisfactory under average conditions.

Standards & Dimensions

Standard System of Marking

General

Taps, dies, and other threading tools will be marked with the nominal size, number of threads per inch, and the proper symbol to identify the thread form. These symbols are in agreement with the ANSIB94.9 1979 Standard on Nomen-clature, Definitions and Letter Symbols for Screw Threads.

Symbols used for American Threads are:

Symbol	Reference
NC	American National Coarse Thread Series
NF	American National Fine Thread Series
NEF	American National Extra Fine Thread Series
N	American National 8,12 and 16 Thread Series (8N, 12N, i6N)
NH	American (National) Hose Coupling and Fire Hose Coupling Threads
NM	National Miniature Screw Thread
NGO	American (National) Gas Outlet Thread
NS	American Special Thread
NPT	American (National) Taper Pipe Thread
NPTF	Dryseal American (National) Taper Pipe Thread
ANPT	Military Aeronautical Pipe Thread Specification MIL-P-71 05
NPS	American (National) Straight Pipe Thread
NPSC	American (National) Straight Pipe Thread in Pipe Couplings
NPSF	Dryseal American (National) Fuel Internal Straight Pipe Thread
NPSH	American (Standard) Straight Pipe Thread for Hose Couplings and Nipples
NPSI	Dryseal American (National) Intermediate Internal Straight Pipe Thread
NPSL	American (National) Internal Straight Pipe Thread for Locknut Connections (Loose Fitting Mechanical Joints)
NPSM	American (National) Internal Straight Pipe Thread for Mechanical Joints (Free Fitting)
NPTR	American (National) Internal Taper Pipe Thread for Railing Joints (Mechanical Joints)
AMO	American Standard Microscope Objective Thread
ACME C	Acme Screw Thread — Centralizing Type
ACME G	Acme Screw Thread — General Purpose Type
STUB ACME	Stub Acme Threads
NBUTT	National Buttress Screw Thread
V	A 60° "V" Thread with Truncated Crests and Roots. The Theoretical "V" Form is usually flatted several thousandths of an inch to the user's specifications.
SB	Manufacturers Stovebolt Standard Thread
STI	Special Threads for Helical Coil Wire Screw Thread Inserts.

Group Thread Taps - Limit Numbers

All standard Ground Thread Taps will be marked with the letter G to designate Ground Thread. The letter G will be followed by the letter H to designate above basic (L below basic) and a numeral to designate the Pitch Diameter limits.

Example: GH3 indicates a Group thread Tap with Pitch Diameter limits .0010 to .0015 over basic.

Pitch Diameter limits for Taps to 1" diameter inclusive.

- L1 = Basic to Basic minus .0005
- H1 = Basic to Basic plus .0005
- H2 = Basic plus .0005 to Basic plus .0010
- H3 = Basic plus .0010 to Basic plus .0015
- H4 = Basic plus .0015 to Basic plus .0020
- H5 = Basic plus .0020 to Basic plus .0025
- H6 = Basic plus .0025 to Basic plus .0030

Pitch Diameter limits for Taps over 1" diameter to 1 1/2" diameter inclusive.

- H4 = Basic plus .0010 to Basic plus .0020

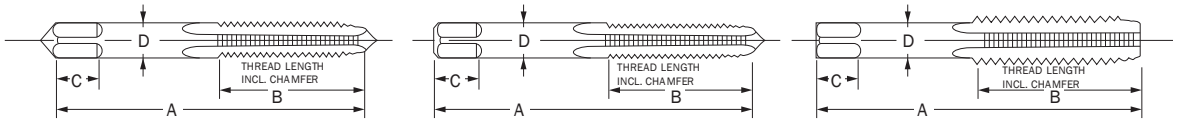
American National 8, 12, 16 and NEF Thread Series

National 8 pitch Series	1" to 2 1/4" by 1/8ths 21/4" to 6" by 1/4ths
National 12 pitch Series	1/2" to 1 1/2" 1/16ths 1 1/2" to 4" by 1/8ths 4" to 6" by 1/4thS
National 16 pitch Series	3/4" to 2 1/2" by 1/16ths 2 1/2" to 4" by 1/8ths 4" to 6" by 1/4ths

National Extra Fine Thread Series

#12	–32	1 1/6"	–18
1/4"	–32	1 1/16"	–18
5/16"	–32	1 1/18"	–18
3/8"	–32	1 3/16"	–18
7/16"	–28	1 1/4"	–18
1/2"	–28	1 5/16"	–18
9/16"	–24	1 3/8"	–18
5/8"	–24	1 7/16"	–18
11/16"	–24	1 1/2"	–18
3/4"	–20	1 9/16"	–18
13/16"	–20	1 5/8"	–18
7/8"	–20	1 11/16"	–18
15/16"	–20	1 3/4"	–16
1"	–20	2"	–16

Standard Tap Blank Dimensions



STYLE 1 STYLE 2 STYLE 3

Table 302 - General Dimensions

Nominal Diameter Range - Inches		Machine Screw Size No.	Nominal Fractional Diameter Inches	Nominal Metric Diameter Mill.	Style*	Tap Dimensions — Inches				
Over	To (Incl)					Overall Length A	Thread Length B	Square Length C	Shank Diameter D	Size of Square
.052	.065	0	1/16	M1.6	1	1 5/8	5/16	3/16	.141	.110
.065	.078	1		M1.8	1	1 11/16	3/8	3/16	.141	.110
.078	.091	2		M2,MZ2	1	1 3/4	7/16	3/16	.141	.110
.091	.104	3	3/32	M2.5	1	1 13/16	1/2	3/16	.141	.110
.104	.117	4			1	1 7/8	9/16	3/16	.141	.110
.117	.130	5	1/8	M3, M3.15	1	1 15/16	5/8	3/16	.141	.110
.130	.145	6		M3.5	1	2	11/16	3/16	.141	.110
.145	.171	8	5/32	M4	1	2 1/8	3/4	1/4	.168	.131
.171	.197	10	3/16	M4.5, M5	1	2 3/8	7/8	1/4	.194	.152
.197	.223	12	7/32		1	2 3/8	15/16	9/32	.220	.165
.223	.260	14	1/4	M6, M6.3	2	2 1/2	1	5/16	.255	.191
.260	.323		5/16	M7, M8	2	2 23/32	1 1/8	3/8	.318	.238
.323	.385		3/8	M10	2	2 15/16	1 1/4	7/16	.381	.286
.385	.448		7/16		3	3 5/32	1 7/16	13/32	.323	.242
.448	.510		1/2	MI2 M12.5	3	3 3/8	1 21/32	7/16	.367	.275
.510	.573		9/16	M14	3	3 19/32	1 21/32	1/2	.429	.322
.573	.635		5/8	M16	3	3 13/16	1 13/16	9/16	.480	.360
.635	.709		11/16	M18	3	4 1/32	1 13/16	5/8	.542	.406
.709	.760		3/4		3	4 1/4	2	11/16	.590	.442
.760	.823		13/16	M20	3	4 15/32	2	11/16	.652	.489
.823	.885		7/8	M22	3	4 11/16	2 7/32	3/4	.697	.523
.885	.948		15/16	M24	3	4 29/32	2 7/32	3/4	.760	.570
.948	1.010		1	M25	3	5 1/8	2 1/2	13/16	.800	.600
1.010	1.073		1 1/16	M27	3	5 1/8	2 1/2	7/8	.896	.672
1.073	1.135		1 1/8		3	5 7/16	2 9/16	7/8	.896	.672
1.135	1.198		1 3/16	M30	3	5 7/16	2 9/16	1	1.021	.766
1.198	1.260		1 1/4		3	5 3/4	2 9/16	1	1.021	.766
1.260	1.323		1 5/16	M33	3	5 3/4	2 9/16	1 1/16	1.108	.831
1.323	1.385		1 3/8		3	6 1/16	3	1 1/16	1.108	.831
1.385	1.448		1 7/16	M36	3	6 1/16	3	1 1/8	1.233	.925
1.448	1.510		1 1/2		3	6 3/8	3	1 1/8	1.233	.925
1.510	1.635		1 5/8	M39	3	6 11/16	3 3/16	1 1/8	1.305	.979
1.635	1.760		1 3/4	M42	3	7	3 3/16	1 1/4	1.430	1.072
1.760	1.885		1 7/8		3	7 5/16	3 9/16	1 1/4	1.519	1.139
1.885	2.010		2	M48	3	7 5/8	3 9/16	1 3/8	1.644	1.233
2.010	2.135		2 1/8		3	8	3 9/16	1 3/8	1.769	1.327
2.135	2.260		2 1/4	M56	3	8 1/4	3 9/16	1 7/16	1.894	1.420
2.260	2.385		2 3/8		3	8 1/2	4	1 7/16	2.019	1.514
2.385	2.510		2 1/2		3	8 3/4	4	1 1/2	2.100	1.575
2.510	2.635		2 5/8	M64	3	8 3/4	4	1 1/2	2.225	1.669
2.635	2.760		2 3/4		3	9 1/4	4	1 9/16	2.350	1.762
2.760	2.885		2 7/8	M72	3	9 1/4	4	1 9/16	2.475	1.856
2.885	3.010		3		3	9 3/4	4 9/16	1 5/8	2.543	1.907
3.010	3.135		3 1/8		3	9 3/4	4 9/16	1 5/8	2.668	2.001
3.135	3.260		3 1/4	M80	3	10	4 9/16	1 3/4	2.793	2.095
3.260	3.385		3 3/8		3	10	4 9/16	1 3/4	2.883	2.162
3.385	3.510		3 1/2		3	10 1/4	4 15/16	2	3.008	2.256
3.510	3.635		3 5/8	M90	3	10 1/4	4 15/16	2	3.133	2.350
3.635	3.760		3 3/4		3	10 1/2	5 5/16	2 1/8	3.217	2.413
3.760	3.885		3 7/8		3	10 1/2	5 5/16	2 1/8	3.342	2.506
3.885	4.010		4	M100	3	10 3/4	5 5/16	2 1/4	3.467	2.600

* Styles shown are for ground thread taps

Tap Recommendation for Classes 2B & 3B
Unified Inch Screw Threads

Size	Threads Per Inch		Recommended Tap Limits		Internal Thread Pitch Diameter Units		
	NC UNC	NF UNF	Class 2B	Class 3B	Min. All Classes (BASIC)	Max. Class 2B	Max. Class 3B
0	–	80	H2	H1	.0519	.0542	.0536
1	64	–	H2	H1	.0629	.0655	.0648
1	–	72	H2	H1	.0640	.0665	.0659
2	56	–	H2	H1	.0744	.0772	.0765
2	–	64	H2	H1	.0759	.0786	.0779
3	48	–	H2	H1	.0855	.0885	.0877
3	–	56	H2	H1	.0874	.0902	.0895
4	40	–	H2	H2	.0958	.0991	.0982
4	–	48	H2	H1	.0985	.1016	.1008
5	40	–	H2	H2	.1088	.1121	.1113
5	–	44	H2	H1	.1102	.1134	.1126
6	32	–	H3	H2	.1177	.1214	.1204
6	–	40	H2	H2	.1218	.1252	.1243
8	32	–	H3	H2	.1437	.1475	.1465
8	–	36	H2	H2	.1460	.1496	.1487
10	24	–	H3	H3	.1629	.1672	.1661
10	–	32	H3	H2	.1697	.1736	.1726
12	24	–	H3	H3	.1889	.1933	.1922
12	–	28	H3	H3	.1928	.1970	.1959
1/4	20	–	H5	H3	.2175	.2223	.2211
1/4	–	28	H4	H3	.2268	.2311	.2300
5/16	18	–	H5	H3	.2764	.2817	.2803
5/16	–	24	H4	H3	.2854	.2902	.2890
3/8	16	–	H5	H3	.3344	.3401	.3387
3/8	–	24	H4	H3	.3479	.3528	.3516
7/16	14	–	H5	H3	.3911	.3972	.3957
7/16	–	20	H5	H3	.4050	.4104	.4091
1/2	13	–	H5	H3	.4500	.4565	.4548
1/2	–	20	H5	H3	.4675	.4731	.4717
9/16	12	–	H5	H3	.5084	.5152	.5135
9/16	–	18	H5	H3	.5264	.5323	.5308
5/8	11	–	H5	H3	.5660	.5732	.5714
5/8	–	18	H5	H3	.5889	.5949	.5934
3/4	10	–	H5	H5	.6850	.6927	.6907
3/4	–	16	H5	H3	.7094	.7159	.7143
7/8	9	–	H6	H4	.8028	.8110	.8089
7/8	–	14	H6	H4	.8286	.8356	.8339
1	8	–	H6	H4	.9188	.9276	.9254
1	–	12	H6	H4	.9459	.9535	.9516
1	14 NS		H6	H4	.9536	.9609	.9590
1 1/8	7	–	H8	H4	1.0332	1.0416	1.0393
1 1/8	–	12	H6	H4	1.0709	1.0787	1.0768
1 1/4	7	–	H8	H4	1.1572	1.1668	1.1644
1 1/4	–	12	H6	H4	1.1959	1.2039	1.2019
1 3/8	6	–	H8	H4	1.2667	1.2771	1.2745
1 3/8	–	12	H6	H4	1.3209	1.3291	1.3270
1 1/2	6	–	H8	H4	1.3917	1.4022	1.3996
1 1/2	–	12	H6	H4	1.4459	1.4542	1.4522

The above recommended taps normally produce the Class of Thread indicated average materials when used with reasonable care. However, if the tap specified does not give a satisfactory gauge fit in the work, a choice of some other limit tap will be necessary.

Tap Drill Sizes

The following tables show the Theoretical Percentage of Thread obtained from stock sizes of drills and also the Probable Percentage after allowance for oversize drilling.

Tap	Tap Drill	Decimal Equiv. of Tap Drill	Probable Hole Size	Percent of Thread	Tap	Tap Drill	Decimal Equiv. of Tap Drill	Probable Hole Size	Percent of Thread	Tap	Tap Drill	Decimal Equiv. of Tap Drill	Probable Hole Size	Percent of Thread
0-80	56	.0465	.0480	74	8-32	29	.1360	.1389	62	3/8-16	5/16	.3125	.3160	72
	3/64	.0469	.0484	71		28	.1405	.1434	51		O	.3160	.3204	68
1-64	54	.0550	.0565	81	8-36	29	.1360	.1389	70		P	.3230	.3274	59
	53	.0595	.0610	59		28	.1405	.1434	57	3/8-24	21/64	.3281	.3325	79
1-72	53	.0595	.0610	67		9/64	.1406	.1435	57		Q	.3320	.3364	71
	1/16	.0625	.0640	50	10-24	27	.1440	.1472	79		R	.3390	.3434	58
2-56	51	.0670	.0687	74		26	.1470	.1502	74	7/16-14	T	.3580	.3626	81
	50	.0700	.0717	62		25	.1495	.1527	69		23/64	.3594	.3640	79
	49	.0730	.0747	49		24	.1520	.1552	64		U	.3680	.3726	70
2-64	50	.0700	.0717	70		23	.1540	.1572	61		3/18	.3750	.3796	62
	49	.0730	.0747	56		5/32	.1563	.1595	56		V	.3770	.3816	60
3-48	48	.0760	.0779	78		22	.1570	.1602	55	7/16-20	W	.3860	.3906	72
	5/64	.0781	.0800	70	10-32	5/32	.1563	.1595	75		25/64	.3906	.3952	65
	47	.0785	.0804	69		22	.1570	.1602	73		X	.3970	.4016	55
	46	.0810	.0829	60		21	.1590	.1622	68	1/2-13	27/64	.4219	.4216	73
	45	.0820	.0839	56		20	.1610	.1642	64		7/16	.4375	.4422	58
3-56	46	.0810	.0829	69		19	.1660	.1692	51	1/2-20	29/64	.4531	.4578	65
	45	.0820	.0839	65	12-24	11/64	.1719	.1754	75	9/16-12	15/32	.4688	.4736	82
	44	.0860	.0879	48		17	.1730	.1765	73		31/64	.4844	.4892	68
4-40	44	.0860	.0880	74		16	.1770	.1805	66	9/16-18	1/2	.5000	.5048	80
	43	.0890	.0910	65		15	.1800	.1835	60		33/64	.5156	.5204	58
	42	.0935	.0955	55		14	.1820	.1855	56	5/8-11	17/32	.5313	.5362	75
	3/32	.0938	.0958	50	12-28	16	.1770	.1805	77		35/64	.5469	.5518	62
4-48	42	.0935	.0955	61		15	.1800	.1835	70	5/8-18	9/16	.5625	.5674	80
	3/32	.0938	.0958	60		14	.1820	.1855	66		37/64	.5781	.5831	58
	41	.0960	.0980	52		13	.1850	.1885	59	3/4-10	41/64	.6406	.6456	80
5-40	40	.0980	.1003	76		3/16	.1875	.1910	54		21/32	.6563	.6613	68
	39	.0995	.1018	71	1/4-20	9	.1960	.1998	77	3/4-16	11/16	.6875	.6925	71
	38	.1015	.1038	65		8	.1990	.2028	73	7/8-9	49/64	.7656	.7708	72
	37	.1040	.1063	58		7	.2010	.2048	70		25/32	.7812	.7864	61
5-44	38	.1015	.1038	72		13/64	.2031	.2069	66	7/8-14	51/64	.7969	.8021	79
	37	.1040	.1063	63		6	.2040	.2078	65		13/16	.8125	.8177	62
	36	.1065	.1088	55		5	.2055	.2093	63	1"-8	55/64	.8594	.8653	83
6-32	37	.1040	.1063	78		4	.2090	.2128	57		7/8	.8750	.8809	73
	36	.1065	.1091	71	1/4-28	3	.2130	.2168	72		57/64	.8906	.8965	64
	7/64	.1094	.1120	64		7/32	.2188	.2226	59		29/32	.9063	.9122	54
	35	.1100	.1126	63		2	.2210	.2248	55	1"-12	29/32	.9063	.9123	81
	34	.1110	.1136	60	5/16-18	F	.2570	.2608	72		59/64	.9219	.9279	67
	33	.1130	.1156	55		G	.2610	.2651	66		15/16	.9375	.9435	52
6-40	34	.1110	.1136	75		17/64	.2656	.2697	59	1"-14	59/64	.9219	.9279	78
	33	.1130	.1156	69		H	.2660	.2701	59		15/16	.9375	.9435	61
	32	.1160	.1186	60	5/16-24	H	.2660	.2701	78					
						I	.2720	.2761	67					

Formula for Obtaining Tap Drill Sizes

(Select nearest commercial stock drill)

$$\text{Percent of Thread} = \frac{\text{Basic thread OD. x Pre-Tapping Diameter}}{2 \times (\text{Basic Height of Thread})} \times 100\%$$

- **Pre-Tapping Diameter for Cutting Taps**

$$\text{Pre-tapping Diameter} = \text{Basic thread OD.} - \frac{.01299 \times \text{Percent of Thread}}{\text{No. of threads per inch}}$$

- **Pre-Tapping Diameter for Roll Forming Taps**

$$\text{Pre-tapping Diameter} = \text{Basic thread OD.} - \frac{.0068 \times \text{Percent of Thread}}{\text{No. of threads per inch}}$$

Tap Drill Sizes

For Thread Forming Taps

Nominal Size	Threads per Inch		75% Thread			70% Thread			65% Thread			60% Thread		
	NC UNC	NF UNF	Theor. Hole Core Size	Nearest Drill Size	Dec. Equiv.	Theor. Hole Core Size	Nearest Drill Size	Dec. Equiv.	Theor. Hole Core Size	Nearest Drill Size	Dec. Equiv.	Theor. Hole Core Size	Nearest Drill Size	Dec. Equiv.
0	–	80	.0536	1.35mm	.0531	.0540	1.35mm	.0531	.0545	–	–	.0549	54	.0550
1	64	–	.0650	1.65mm	.0650	.0655	1.65mm	.0650	.0661	–	–	.0666	–	–
1	–	72	.0659	1.65mm	.0650	.0663	–	–	.0669	1.7mm	.0669	.0673	51	.0670
2	56	–	.0769	1.95mm	.0768	.0774	1.95mm	.0768	.0781	3/64	.0781	.0787	47	.0785
2	–	64	.0780	5/64	.0781	.0785	47	.0785	.0791	2.0mm	.0787	.0796	2.0mm	.0787
3	48	–	.0884	2.25mm	.0886	.0890	43	.0890	.0898	43	.0890	.0905	2.3mm	.0906
3	–	56	.0899	43	.0890	.0904	–	–	.0911	2.3mm	.0906	.0917	2.3mm	.0906
4	40	–	.0993	2.5mm	.0984	.1000	39	.0995	.1010	39	.0995	.1018	38	.1015
4	–	48	.1014	38	.1015	.1020	38	.1015	.1028	2.6mm	.1024	.1035	2.6mm	.1024
5	40	–	.1123	34	.1110	.1130	33	.1130	.1140	33	.1130	.1148	2.9mm	.1142
5	–	44	.1134	33	.1130	.1141	2.9mm	.1142	.1150	2.9mm	.1142	.1157	–	–
6	32	–	.1221	2.1mm	.1220	.1230	3.1mm	.1220	.1243	–	–	.1252	1/8	.1250
6	–	40	.1253	1/8	.1250	.1260	3.2mm	.1260	.1270	3.2mm	.1260	.1278	3.25mm	.1280
8	32	–	.1481	3.75mm	.1476	.1490	–	–	.1503	25	.1495	.1512	3.8mm	.1496
8	–	36	.1498	25	.1495	.1507	3.8mm	.1496	.1518	24	.1520	.1526	24	.1520
10	24	–	.1688	–	–	.1700	18	.1695	.1717	11/64	.1719	.1729	11/64	.1719
10	–	32	.1741	17	.1730	.1750	–	–	.1763	–	–	.1772	16	.1770
12	24	–	.1948	10	.1935	.1960	9	.1960	.1977	5.0mm	.1968	.1989	8	.1990
12	–	28	.1978	5.0mm	.1968	.1989	8	.1990	.2003	8	.1990	.2014	7	.2010
1/4	20	–	.2245	5.7mm	.2244	.2260	–	–	.2280	1	.2280	.2295	1	.2280
1/4	–	28	.2318	–	–	.2329	5.9mm	.2323	.2343	A	.2340	.2354	15/64	.2344
5/16	18	–	.2842	7.2mm	.2835	.2861	7.25mm	.2854	.2879	7.3mm	.2874	.2898	L	.2900
5/16	–	24	.2912	7.4mm	.2913	.2927	–	–	.2941	M	.2950	.2955	7.5mm	.2953
3/8	16	–	.3431	11/32	.3437	.3452	8.75mm	.3445	.3474	S	.3480	.3495	8.9mm	.3504
3/8	–	24	.3537	9.0mm	.3543	.3552	9.0mm	.3543	.3566	–	–	.3580	T	.3580
7/16	14	–	.4011	–	–	.4035	Y	–	.4059	13/32	–	.4084	–	–
7/16	–	20	.4120	Z	–	.4137	10.5mm	–	.4154	–	–	.4171	–	–
1/2	13	–	.4608	–	–	.4634	–	–	.4660	–	–	.4686	15/32	–
1/2	–	20	.4745	–	–	.4762	–	–	.4779	–	–	.4796	–	–
9/16	12	–	.5200	–	–	.5229	–	–	.5257	–	–	.5285	–	–
9/16	–	18	.5342	13.5mm	.5315	.5361	–	–	.5380	–	–	.5398	–	–
5/8	11	–	.5787	37/64	.5781	.5817	37/64	.5781	.5848	–	–	.5879	–	–
5/8	–	18	.5967	19/32	.5937	.5986	–	–	.6004	–	–	.6023	–	–
3/4	10	–	.6990	–	–	.7024	–	–	.7058	45/64	.7031	.7092	18.0mm	.7087
3/4	–	16	.7181	23/32	.7187	.7202	23/32	.7187	.7224	–	–	.7245	–	–

Nom. Dia	Pitch	Theoretical Core Hole Size						Suggested	Taps
		Min.		Max.					
				5H Class		6H Class			
		Inches	mm	Inches	mm	Inches	mm		
3	0.5	.1071	2.72	.1094	2.79	.1098	2.79	H5	H6
3.5	0.6	.1244	3.16	.1268	3.22	.1276	3.24	H5	H7
4	0.7	.1417	3.60	.1445	3.67	.1453	3.69	H6	H7
5	0.8	.1791	4.55	.1823	4.63	.1831	4.65	H6	H8
6	1	.2142	5.44	.2177	5.53	.2185	5.55	H7	H9
8	1.25	.2870	7.29	.2913	7.40	.2925	7.43	H8	H10
10	1.5	.3602	9.15	.3602	9.27	.3665	9.31	H9	H11
12	1.75	.4335	11.01	.4368	11.14	.4402	11.18	H10	H12
14	2	.5067	12.87	.5126	13.02	.5142	13.06	H11	H13
16	2	.5854	14.87	.5913	15.02	.5929	15.06	H11	H13
20	2.5	.7315	18.58	.7386	18.76	.7409	18.82	H11	H14

For Pipe Taps

Nominal Pipe Size	Threads Per Inch	NPT–NPTF (When Drilled Only)		NPT–NPTF–ANPT (When Taper Reamed)		NPS–NPSF	
		Dr. Size	Dec. Equiv.	Dr. Size	Dec. Equiv.	Dr. Size	Dec. Equiv.
1/16	27	D	.2460	15/64	.2344	1/4	.2500
1/8	27	R	.3390	21/64	.3281	11/32	.3438
1/4	18	7/16	.4375	27/64	.4219	7/16	.4375
3/8	18	37/64	.5781	9/16	.5625	37/64	.5781
1/2	14	45/64	.7031	11/16	.6875	23/32	.7188
3/4	14	59/64	.9219	57/64	.8906	59/64	.9218
1	11-1/2	1 5/32	1.1562	1 1/8	1.1250	1 5/32	1.1562
1 1/4	11-1/2	1 1/2	1.5000	1 15/32	1.4688		
1 1/2	11-1/2	1 47/64	1.7344	1 45/64	1.7031		
2	11-1/2	2 7/32	2.2188	2 3/16	2.1875		

Tap Drill Sizes (Metric)

For Cutting Taps

Unit : mm

Nominal Size	Pitch	Percentage of Thread Engagement Hole Diameter				Minor Dia. of Internal Thread
		100%	90%	80%	70%	
M2	0.4	1.57	1.61	1.65	1.70	1.567~1.679
M3	0.5	2.46	2.51	2.57	2.62	2.459~2.599
M3.5	0.6	2.85	2.92	2.98	3.05	2.850~3.010
M4	0.7	3.24	3.32	3.39	3.47	3.242~3.422
M5	0.8	4.13	4.22	4.31	4.39	4.134~4.334
M6	1	4.92	5.03	5.13	5.24	4.917~5.153
M7	1	5.92	6.03	6.13	6.24	5.917~6.153
M8	1.25	6.65	6.78	6.92	7.05	6.647~6.912
	1	6.92	7.03	7.13	7.24	6.917~7.153
M10	1.5	8.38	8.54	8.70	8.86	8.376~8.676
	1.25	8.65	8.78	8.92	9.05	8.647~8.912
M12	1.75	10.11	10.30	10.50	10.70	10.106~10.441
	1.25	10.65	10.78	10.92	11.05	10.647~10.912
M14	2	11.80	12.10	12.30	12.50	11.835~12.210
	1.25	12.65	12.78	12.92	13.05	12.647~19.912
M16	2	13.80	14.10	14.30	14.50	13.835~14.210
	1.5	14.38	14.54	14.70	14.86	14.376~14.676
M18	2.5	15.30	15.60	15.80	16.10	15.294~15.744
	1.5	16.38	16.54	16.70	16.86	16.376~16.676
M20	2.5	17.30	17.60	17.80	18.10	17.294~17.744
	1.5	18.38	18.54	18.70	18.86	18.376~18.676
M22	2.5	19.30	19.60	19.80	20.10	19.264~19.744
	1.5	20.38	20.54	20.70	20.86	20.367~20.676
M24	3	20.80	21.10	21.40	21.70	20.752~21.252
	1.5	22.38	22.54	22.70	22.86	22.376~22.676
M27	3	23.80	24.10	24.40	24.70	23.752~24.252
M30	3.5	26.20	26.60	27.00	27.30	26.211~26.711

For Thread Forming Taps

Unit : mm

Nominal Size	Pitch	Percentage of Thread Engagement Hole Diameter			
		100%	90%	80%	70%
M2	0.4	1.77	1.80	1.82	1.84
M2.2	0.45	1.94	1.97	2.00	2.02
M2.5	0.45	2.24	2.27	2.30	2.32
M3	0.5	2.72	2.74	2.77	2.80
M3.5	0.6	3.16	3.19	3.23	3.26
M4	0.7	3.60	3.64	3.68	3.72
M4.5	0.75	4.07	4.12	4.16	4.20
M5	0.8	4.55	4.59	4.64	4.68
M6	1	5.43	5.49	5.55	5.60
M7	1	6.43	6.49	6.55	6.60
M8	1.25	7.29	7.36	7.43	7.50
	1	7.43	7.49	7.55	7.60
M10	1.5	9.15	9.23	9.32	9.40
	1.25	9.29	9.36	9.43	9.50
M12	1.75	11.01	11.11	11.21	11.31
	1.25	11.29	11.36	11.43	11.50
M14	2	12.87	12.98	13.09	13.21
	1.5	13.15	13.23	13.32	13.40
M16	2	14.87	14.98	15.09	15.21
	1.5	15.15	15.23	15.32	15.40
M18	2.5	16.58	16.72	16.87	17.01
	1.5	17.15	17.23	17.32	17.40
M20	2.5	18.58	18.72	18.87	19.01
	1.5	19.15	19.23	19.32	19.40

Note:
1.Determine hole diameter by tapping test. The dimensions in this table are for reference only.

Tap Tolerance Table

GT Limits Table

Fractional, Machine screw, and Metric Taps
Over 42 TPI, or less than 0.6mm pitch

Class	MIN	MAX
GT2	0.0002	0.0008
GT3	0.0006	0.0012
GT4	0.0010	0.0016
GT5	0.0014	0.0020
GT6	0.0018	0.0024
GT7	0.0022	0.0028

Fractional, Machine Screw, and Metric Taps
Less than 42 TPI, or over 0.6mm pitch

Class	MIN	MAX
GT2	0.0000	0.0008
GT3	0.0004	0.0012
GT4	0.0008	0.0016
GT5	0.0012	0.0020
GT6	0.0016	0.0024
GT7	0.0020	0.0028
GT8	0.0024	0.0031
GT9	0.0028	0.0035
GT10	0.0031	0.0039

GT Limits Conversion Chart

Recommended tap limits for 2B and 3B

TAP SIZE	CLASS 2B		CLASS 3B	
	H LIMITS	GT LIMITS	H LIMITS	GT LIMITS
2-56	H2	GT3	H1	-
2-64	H2	GT3	H1	-
3-48	H2	GT4	H1	-
3-56	H2	GT3	H1	-
4-40	H2	GT5	H2	-
4-48	H2	GT4	H1	-
5-40	H2	GT5	H2	-
5-44	H2	GT5	H2	-
6-32	H3	GT5	H2	-
6-40	H2	GT5	H2	-
8-32	H3	GT5	H2	-
8-36	H2	GT5	H2	-
10-24	H3	GT6	H3	-
10-32	H3	GT5	H2	-
12-24	H3	GT6	H3	-
12-28	H3	GT6	H3	-
1/4-20	H5	GT7	H3	GT4
1/4-28	H4	GT6	H3	GT4
5/16-18	H5	GT7	H3	GT4
5/16-24	H4	GT7	H3	GT4
3/8-16	H5	GT8	H3	GT4
3/8-24	H4	GT7	H3	GT4
7/16-14	H5	GT8	H3	GT4
7/16-20	H5	GT8	H3	GT4
1/2-13	H5	GT8	H3	GT4
1/2-20	H5	GT8	H3	GT4
9/16-12	H5	GT8	H3	GT4
9/16-18	H5	GT8	H3	GT4
5/8-11	H5	GT9	H3	GT4
5/8-18	H5	GT8	H3	GT4
3/4-10	H5	GT9	H5	GT4
3/4-16	H5	GT8	H3	GT4
7/8-9	H6	GT9	H4	GT5
7/8-14	H6	GT9	H4	GT5
1-8	H6	GT9	H4	GT5
1-12	H6	GT9	H4	GT5

Tap Tolerance Table

H Limits Table

Fractional and Machine Screw Types

Class	MIN	MAX
H1	0.0000	0.0005
H2	0.0005	0.0010
H3	0.0010	0.0015
H4	0.0015	0.0020
H5	0.0020	0.0025
H6	0.0025	0.0030
H7	0.0030	0.0035
H8	0.0035	0.0040
H9	0.0040	0.0045
H10	0.0045	0.0050
H11	0.0050	0.0055
H12	0.0055	0.0060

D Limits Table

Metric Taps

Tap Size	D Class	MIN	MAX
M2X0.4	D3	0.0009	0.0015
M2.5X0.45	D3	0.0009	0.0015
M3X0.5	D3	0.0009	0.0015
M3.5X0.6	D4	0.0012	0.0020
M4X0.7	D4	0.0012	0.0020
M5X0.8	D4	0.0012	0.0020
M6X1	D5	0.0015	0.0025
M7X1	D5	0.0015	0.0025
M8X1	D5	0.0015	0.0025
M8X1.25	D5	0.0013	0.0025
M10X1.25	D5	0.0013	0.0025
M10X1.5	D6	0.0018	0.0030
M12X1.25	D5	0.0013	0.0025
M12X1.75	D6	0.0018	0.0030
M14X1.5	D6	0.0018	0.0030
M14X2	D7	0.0019	0.0035
M16X1.5	D6	0.0018	0.0030
M16X2.0	D7	0.0019	0.0035
M18X1.50	D6	0.0018	0.0030
M18X2.5	D7	0.0019	0.0035
M20X2.5	D7	0.0019	0.0035
M22X2.5	D7	0.0019	0.0035
M24X3.0	D8	0.0024	0.0040
M27X3.0	D8	0.0024	0.0040
M30X3.5	D9	0.0025	0.0045

Trouble-Shooting Guide for Tapping Problems

	Troubles	Factors	Countermeasures
Surface Roughness	Torn or Rough Thread	Chamfer length too short	• Increase chamfer length
		Wrong cutting angle	• Apply proper cutting angle
		Galling	• Use thread relieved taps • Reduce land width • Apply surface treatment such as steam oxide or chrome • Use proper cutting lubricant • Reduce tapping speed • Use larger drill size • Obtain proper alignment between tap and work
		Chip Packing	• Use spiral pointed or spiral fluted taps • Use larger drill size
	Chattering on Tapped Thread	Tool Free Cutting	• Avoid too narrow land width • Reduce amount of thread relief
		Tool Condition	• Reduce cuffing angle • Do not grind the bottom of the flute
Dimensional Error	Oversize Pitch Diameter	Incorrect Taps	• Use proper GH limits • Use longer chamfered taps
		Chip Packing	• Use spiral point or spiral fluted taps • Reduce number of flutes to provide extra chip room • Use National fine pitch, if applicable • Use larger drill size • If tapping a blind hole, allow deeper hole where applicable or shorten the thread length of the parts • Use proper lubricant
		Galling	• Apply proper surface treatment such as steamoxide • Use proper cutting lubricant • Reduce tapping speed • Use proper cutting angle in accordance with material being tapped. • Use larger drill size
		Operating Conditions	• Apply proper tapping speed • Correct alignment of tap and drill hole • Free cutting either tap or workpiece • Use proper tapping speed to avoid torn or rough thread • Use lead screw tapper • Use proper tapping machine with suitable power • Avoid misalignment of tap and drill hole from loose spindle or worn holder
		Tool Conditions	• Obtain proper indexing angle for the flutes at the cutting edge • Grind proper indexing angle and chamfer angle • Avoid too narrow land width • Remove burrs from reground edge
	Oversize Internal Diameter	Drill Hole Size	• Use minimum size drill hole • Avoid tapered hole • Use proper chamfered taps
		Galling	• Galling solutions I through 4 above can be applied to this specific problem

	Troubles	Factors	Countermeasures
Dimensional Error	Undersize Pitch Diameter	Incorrect Tap Selection	• Use one oversize taps 1) Use for cuffing materials such as copper alloy, aluminum alloy, and cast iron 2) Use for cuffing tubing which will have "spring back" action after tapping • Apply proper chamfer angle • Increase cutting angle
		Damaged Thread	• Use proper reversing speed to avoid damaging tapped thread on the way out of the hole
		Left over Chips	• Increase cutting performance to avoid any leftover chip in the hole • Remove leftover chip from the hole for gauge checking
	Undersize Internal Diameter	Drill Hole size	• Use maximum drill size
Tool Life	Breakage	Incorrect Tap Selection	• Use high speed steel taps • Avoid chip packing in the flutes or the bottom of hole • Use spiral pointed or spiral fluted taps or Roll Taps • Apply correct surface treatment such as steam oxide or other coating
		Excessive Tapping Torque	• Use larger drill size • Try to shorten thread length • Apply National Fine Pitch if applicable • Increase cutting angle • Apply a tap with more thread relief and reduced land width • Use spiral pointed or spiral fluted taps
		Operating Conditions	• Reduce tapping speed • Avoid misalignment between tap and the hole and tapered hole • Use floating type of tapping holder • Use tapping holder with torque adjustment • Avoid hitting bottom of the hole with tap
		Tool Condition	• Do not grind the bottom of the flutes • Avoid too narrow a land width • Do not leave sections on the reground flutes which tapping wear still remains • Regrind tool more frequently
	Chipping	Incorrect Tap Selection	• Reduce cutting angle • Use a different kind of high speed steel taps • Reduce hardness of the taps • Increase chamfer length • Avoid chip packing in the flutes or the bottom of the hole by using spiral pointed or fluted taps
		Operating Conditions	• Reduce tapping speed • Avoid misalignment between tap and hole • Avoid sudden return or reverse in blind hole tapping • Avoid galling • Use larger drill size
	Wear	Incorrect Tap Selection	• Apply specially designed taps for tapping heat treated material • Change to a type of high speed steel material contained vanadium • Apply special surface treatment such as nitriding or TiN • Increase chamfer length
		Operating Conditions	• Reduce tapping speed • Apply proper cutting lubricants • Avoid work hardened hole • Use larger drill size
		Tool Condition	• Grind proper cutting angle • Avoid hardness reduction from grind process

MATERIAL SYMBOL CHART BY STANDARD

Description	U.S.A. ASTM	U.S.A. AISI	Japan JIS	Germany DIN	ISO
General Structural Steel			SM490A		
			SM490B		
	C		SM570		
			SS400		
	A		SS330	St33	
	B				
	C				
	30				
	33				
	36				
	40				
	70		SS490	St52-3	
	C		SS540		
	D		SM490A		
	E		SM490B		
	A		SM490C		
	B		SM490Y		
	50W		SM520		
	A		SV330	Ust36	
	B		SV400		
Carbon Steel		1015	S15C	CK15	C15E4
				C15	
		1025	S25C	CK25	C25
				C25	C25E4
		1045	S45C	CK45	C45
		1046		C45	C45E4
		1050	S50C	CK50	C50
				C50	C50E4
	60		SB410	H@	P7
	65		SB450	17Mn4	P11
	A		SB450M		P28
	70		SB480		
	B		SB480M		
Alloy Steel			SCM415		
			SCM415H		
			SCM415TK		
			SCM418		18CrMo4
			SCM418H		18CrMo4
			SCM418TK		
			SCM420		
			SCM420H		
			SCM420TK		
			SCM421		
		4130	SCM430		
			SCM430TK		
			SCM432		
		4135	SCM435	34CrMo4	34CrMo4
		4137			
		4135H	SCM435H	34CrMo4	34CrMo4
		4137H			
			SCM435TK		
		4140		42CrMo4	
		4142			
		4140H	SCM440H	42CrMo4	42CrMo4
		4142H			
			SCM440TK		
		4145	SCM445		
		4147			
		4145H	SCM445H		
		4147H	SCM822		
			SCM822H		
			SCr415		16MnCr5
			SCr415H		16MnCr5
			SCr420		16MnCr5
			SCr420H		16MnCr5
			SCr420TK		
		5130	SCr430	34Cr4	34Cr4
		5132			
		5130H	SCr430H	34Cr4	34Cr4
		5132H			
		5135	SCr435	34Cr4	34Cr4
				37Cr4	37Cr4
		5135H	SCr435H	34Cr4	34Cr4
				37Cr4	37Cr4
		5140	SCr440	37Cr4	37Cr4
				41Cr4	41Cr4
		5140H	SCr440H	37Cr4	37Cr4
				41Cr4	41Cr4
		5147	SCr445		
		1522	SMn420		22Mn6
		1522H	SMn420H		22Mn6
			SMn433		
		1541H	SMn433H		36Mn6
		1541	SMn438		36Mn6
		1541H	SMn438H		36Mn6

Description	U.S.A. ASTM	U.S.A. AISI	Japan JIS	Germany DIN	ISO
Alloy Steel			SMn443		
		1541H	SMn443H		42Mn6
			SNC326		
			SNC415		
			SNC415H		
			SNC631		
			SNC631H		
			SNC815		
			SNC815H		15NiCr13
			SNC836		
		8615	SNCM220		20NiCrMo2
		8617			
		8620			
		8622			
		8617H	SNCM220H		20NiCrMo2
		8620H			
		8622H			
		8637	SNCM240		41CrNiMo2
		8640			
			SNCM415		
		4320	SNCM420		
		4320H	SNCM420H		
			SNCM431		
		4340	SNCM439		
			SNCM447		
			SNCM616		
			SNCM625		
			SNCM630		
			SNCM815		
Carbon Tool Steel			SK1		TC140
	W1-111/2		SK2		TC120
	W1-10		SK3	C105W1	TC105
	W1-9		SK4		TC90
	W1-8		SK5	C80W1	TC90
			SK6	C80W1	TC80
					TC70
			SK7	C70W2	
			SKS2	105WCr6	105WCr1
			SKS3		
			SKS4		
			SKS5		
			SKS6		
			SKS7		
			SKS8		
	F2		SKS11		
			SKS21		
			SKS31	105WCr6	105WCr1
			SKS41		
	W2-91/2		SKS43		TCV105
	W2-81/2		SKS44		
	L6		SKS51		
			SKS93		
			SKS94		
			SKS95		
	52100		SUJ2	100Cr6	1
Die Steel	D2		SKD11		
	H13		SKD61	X40CrMoV51	40CrMoV5
Tool Steel			SKT3		
			SKT4	55NiCrMoV6	55NiCrMoV2
Pipe Steel			STAM290GB	St28	
	TypeF		SGP	St33	
	1008		STKM11A	St34-2	
	A		STPT370	St35.8	
			STB340	St35.8	
				St37.8	
	E-A		STPG370	St37.0	
	A				
			STS370	St37.4	
	B		STPT410	St42.8	
	C		STB410	St42.8	
	A-1			St45.8	
	E-B		STPG410	St44.0	
	B			St44.0	
			STK400	St44-2	TS9
			STKM12B	St44-2	
			STKR400	St44-2	
			STAM390G	St44-2	
			STS410	St44.4	
			STKM14A	St45	
	1020		STKM13C	St45	
			STKM18C	St52	
			STKM19A	St52	
			STKM19C	St52	
			STK490	St52-3	TS18
			STKR490	St52-3	

Description	U.S.A.		Japan	Germany	ISO
	ASTM	AISI	JIS	DIN	
Pipe Steel			STS480	St52.4	
			STKM12A		R33
			STKM12C		
			STKM13B		
	1026		STKM14B		
	1025				
	1026		STKM14C		
			STKM15A		
			STKM15C		
			STKM16A		
			STKM16C		
	1050		STKM17A		
			STKM17C		
			STKM18A		
			STKM18B		R50
			STKM20A		
Heat Resistant Steel	S65007		SUH1		
			SUH3		
			SUH4		
			SUH11		
			SUH21		
			SUH31		
			SUH35		
	S63008		SUH36		
	S63017		SUH37		
			SUH38		
	S30900		SUH309		
	S31000		SUH310		
	N08330		SUH330		
	S40900		SUH409	X6CrTi12	1Ti
			SUH409L		
	S44600		SUH446		H7
			SUH600		
	S42200		SUH616		
	S66286		SUH660		
	R30155		SUH661		
Free Cutting Steel		1110	SUM11		
		1108	SUM12		
		1212	SUM21		9S20
		1213	SUM22	9SMn28	11SMn28
			SUM22L	9SMnPb28	11SMnPb
		1215	SUM23		
			SUM23L		
		12L14	SUM24L	9SMnPb28	11SMnPb28
			SUM25	9SMn36	12SMn35
		1117	SUM31	15S10	
			SUM31L		
			SUM32		
		1137	SUM41		
		1141	SUM42		
		1144	SUM43		44SMn28
Spring Steel		1075	SUP3		
		1078			
			SUP6		1
		9260	SUP7		1
		5155	SUP9	55Cr3	5
		5160	SUP9A		
		6150	SUP10	50CrV4	9
		51B60	SUP11A		7
			SUP12	54SiCr6	4
		4161	SUP13		8
Stainless Steel	S30400		SUS304	X5CrNi1810	11
	S40500		SUS405	X6CrAl13	2
	S42020		SUS420F		
	S43000		SUS430	X6Cr17	8
	S44002		SUS440A		
	S17400		SUS630		1
	S17700		SUS631	X7CrNiAl177	2
	S41000		SUS410	X10Cr13	3
Cast Steel	HT		SCH15		
Cast Iron	40		FC250		
	45		FC300		
Ductile Cast Iron	60-40-18		FCD400		
	80-55-06		FCD600	GGG-60	
Aluminum Alloy			A1080	Al99.8	
			A1070	Al99.7	
			A1050	Al99.5	Al99.5
	1100		A1100		Al99.0Cu
			A1200	Al99	Al99.0
	2014		A2014	AlCuSiMn	Al-Cu4SiMg
			A2017	AlCuMg1	Al-Cu4MgSi
	2014		A2017	AlCuSiMn	Al-Cu4SiMg
	2024		A2024BD	AlCuMg2	AlCu4Mg1
	2024		A2024BE	AlCuMg2	AlCu4Mg1
	2024		A2024 P	EN AW-2024	AlCu4Mg1

Description	U.S.A.		Japan	Germany	ISO
	ASTM	AISI	JIS	DIN	
Aluminum Alloy	2024		A2024 S	AlCuMg2	AlCu4Mg1
	2024		A2024 TD	AlCuMg2	
	2024		A2024 TE	AlCuMg2	AlCu4Mg1
	2024		A2024 W	AlCuMg2	AlCu4Mg1
	3003		A3003		
	5052		A5052 BD	AlMg2.5	AlMg2.5
	5052		A5052 BE		
			A5052 FH		
	5052		A5052 P	EN AW-5052	AlMg2.5
	5052		A5052 S		
	5052		A5052 TD		AlMg2.5
	5052		A5052 TE		
	5052		A5052 W	AlMg2.5	AlMg2.5
			A5056	AlMg5	
	5083		A5083	AlMg4.5Mn	Al-Mg4.5Mn0.7
	6061		A6061		Al-Mg1SiCu
	6063		A6063		Al-Mg0.7Si
	7075		A7075 BD	AlZnMgCu1.5	AlZn5.5MgCu
	7075		A7075 BE	AlZnMgCu1.5	AlZn5.5MgCu
	7075		A7075 FD	AlZnMgCu1.5	
	7075		A7075 FH	AlZnMgCu1.5	
	7075		A7075 P	EN AW-7075	AlZn5.5MgCu
	7075		A7075 S	AlZnMgCu1.5	AlZn5.5MgCu
	7075		A7075 TD	AlZnMgCu1.5	AlZn5.5MgCu
	7075		A7075 TE	AlZnMgCu1.5	AlZn5.5MgCu
Aluminum Alloy Casting	295.0		AC1A	G(GK)-AlCu4Ti	
	204.0		AC1B	G(GK)-AlCu4TiMg	Al-Cu4MgTi
			AC2A		Al-Si5Cu3
	319.0		AC2B		Al-Si6Cu4
			AC3A	G(GK)AlSi2	Al-Si12
			AC4A	G(GK)-AlSi10Mg	Al-Si10Mg
	333.0		AC4B	G(GK)-AlSiCu3	
	356.0		AC4C		Al-Si7Mg
	A356.0		AC4CH	G(GK)AlSi7Mg	Al-Si7Mg
	355.0		AC4D		Al-Si5Cu1Mg
	242.0		AC5A		Al-Cu4Ni2Mg2
	514.0		AC7A	G(GK)-AlMg5	
	520.0		AC7B		Al-Mg10
	336.0		AC8A		
			AC8B		
	332.0		AC8C		
			AC9A		
			AC9B		
	A413.0		ADC1	GD-AlSi12(Cu)	Al-Si12CuFe
	A360.0		ADC3	GD-AlSi10Mg	
	518.0		ADC5	GD-AlMg9	
			ADC6		
	A380.0		ADC10	GD-AlSi9Cu3	Al-Si8Cu3Fe
	A380.0		ADC10Z	GD-AlSi9Cu3	Al-Si9Cu3Fe
	383.0		ADC12		
	383.0		ADC12Z		
	A390.0		ADC14		
Magnesium Alloy	AZ91A		MD1A	DG-MgAl9Zn1	
	AZ91B		MD1B	DG-MgAl9Zn1	
	AZ91D		MD1D		
	AZ60A				
	AZ60B				
	AZ41A				
	AZ80A		MB3	MgAl8Zn	Mg-Al8Zn
	AM20A				
	AM50A				
	AM60B		MD2B		
	AS22A				
	AS41B				
	AE42A				
Copper, Copper Casting	C10200(B187:94)		C1020 B	OF-Cu	Cu-OF
	C10200(B152:94)		C1020 P	OF-Cu	Cu-OF
	C10200(B152:94)		C1020 R	OF-Cu	Cu-OF
Brass, Brass Casting	C26000(B36:95)		C2600 B	CuZn30 17660:83	426/1:83 CuZn30
	C26000(B36:95)		C2600 P	CuZn30 17660:83	426/1:83 CuZn30
	C26000(B36:95)		C2600 R	CuZn30 17660:83	426/1:83 CuZn30
				CuZn30 17670:83	
	C26000(B135:95)		C2600 T	CuZn30	CuZn30
	C26000(B134:93)		C2600 W	CuZn30	CuZn30
Bronze, Bronze Casting	C61400(B169:95)		C6140 P		428:83 CuAl 8Fe3

Approximate Relationship Between Various Hardness Scales

(HRC) Rockwell Hardness C Scale 150kg Brale	(HV) Diamond Pyramid Hardness Number, Vickers	(HB) Brinell Hardness 29.42kN			Rockwell Hardness			Rockwell Hardness			(Hs) Shore Scleroscope Hardness Number	Approx. Tensile Strength N/mm²	(HRC) Rockwell Hardness C Scale 150kg Brale
		Standard 10mm Ball	Hultgren 10mm Ball	Tungsten Carbide 10mm	(HRA) A Scale 588.4N (60kg) Brale	(HRB) B Scale 980.7N (100kg) 1/16" in Ball	(HRD) D Scale 980.7N (100kg) Brale	15N Superficial Load 147.1N	30N Superficial Load 294.2N	45N Superficial Load 441.3N			
68	940	—	—	—	85.6	—	76.9	93.2	84.4	75.4	97	—	68
67	900	—	—	—	85.0	—	76.1	92.9	83.6	74.2	95	—	67
66	865	—	—	—	84.5	—	75.4	92.5	82.8	73.3	92	—	66
65	832	—	—	739	83.9	—	74.5	92.2	81.9	72.0	91	—	65
64	800	—	—	722	83.4	—	73.8	91.8	81.1	71.0	88	—	64
63	772	—	—	705	82.8	—	73.0	91.4	80.1	69.9	87	—	63
62	746	—	—	688	82.3	—	72.2	91.1	79.3	68.8	85	—	62
61	720	—	—	670	81.8	—	71.5	90.7	78.4	67.7	83	—	61
60	697	—	613	654	81.2	—	70.7	90.2	77.5	66.6	81	—	60
59	674	—	599	634	80.7	—	69.9	89.8	76.6	65.5	80	—	59
58	653	—	587	615	80.1	—	69.2	89.3	75.7	64.3	78	—	58
57	633	—	575	595	79.6	—	68.5	88.9	74.8	63.2	76	—	57
56	613	—	561	577	79.0	—	67.7	88.3	73.9	62.0	75	—	56
55	595	—	546	560	78.5	—	66.9	87.9	73.0	60.9	74	2079	55
54	577	—	534	543	78.0	—	66.1	87.4	72.0	59.8	72	2010	54
53	560	—	519	525	77.4	—	65.4	86.9	71.2	58.6	71	1952	53
52	544	500	508	512	76.8	—	64.6	86.4	70.2	57.4	69	1883	52
51	528	487	494	496	76.3	—	63.8	85.9	69.4	56.1	68	1824	51
50	513	475	481	481	75.9	—	63.1	85.5	68.5	55.0	67	1755	50
49	498	464	469	469	75.2	—	62.1	85.0	67.6	53.8	66	1687	49
48	484	451	455	455	74.7	—	61.4	84.5	66.7	52.5	64	1638	48
47	471	442	443	443	74.1	—	60.8	83.9	65.8	51.4	63	1579	47
46	458	432	432	432	73.6	—	60.0	83.5	64.8	50.3	62	1530	46
45	446	421	421	421	73.1	—	59.2	83.0	64.0	49.0	60	1481	45
44	434	409	409	409	72.5	—	58.5	82.5	63.1	47.8	58	1432	44
43	423	400	400	400	72.0	—	57.7	82.0	62.2	46.7	57	1383	43
42	412	390	390	390	71.5	—	56.9	81.5	61.3	45.5	56	1334	42
41	402	381	381	381	70.9	—	56.2	80.9	60.4	44.3	55	1294	41
40	392	371	371	371	70.4	—	55.4	80.4	59.5	43.1	54	1245	40
39	382	362	362	362	69.9	—	54.6	79.9	58.6	41.9	52	1216	39
38	372	353	353	353	69.4	—	53.8	79.4	57.7	40.8	51	1177	38
37	363	344	344	344	68.9	—	53.1	78.8	56.8	39.6	50	1157	37
36	354	336	336	336	68.4	(109.0)	52.3	78.3	55.9	38.4	49	1118	36
35	345	327	327	327	67.9	(108.5)	51.5	77.7	55.0	37.2	48	1079	35
34	336	319	319	319	67.4	(108.0)	50.8	77.2	54.2	36.1	47	1059	34
33	327	311	311	311	66.8	(107.5)	50.0	76.6	53.3	34.9	46	1030	33
32	318	301	301	301	66.3	(107.0)	49.2	76.1	52.1	33.7	44	1000	32
31	310	294	294	294	65.8	(106.0)	48.4	75.6	51.3	32.5	43	981	31
30	302	286	286	286	65.3	(105.5)	47.7	75.0	50.4	31.3	42	951	30
29	294	279	279	279	64.7	(104.5)	47.0	74.5	49.5	30.1	41	932	29
28	286	271	271	271	64.3	(104.0)	46.1	73.9	48.6	28.9	41	912	28
27	279	264	264	264	63.8	(103.0)	45.2	73.3	47.7	27.8	40	883	27
26	272	258	258	258	63.3	(102.5)	44.6	72.8	46.8	26.7	38	863	26
25	266	253	253	253	62.8	(101.5)	43.8	72.2	45.9	25.5	38	843	25
24	260	247	247	247	62.4	(101.0)	43.1	71.6	45.0	24.3	37	824	24
23	254	243	243	243	62.0	100.0	42.1	71.0	44.0	23.1	36	804	23
22	248	237	237	237	61.5	99.0	41.6	70.5	43.2	22.0	35	785	22
21	243	231	231	231	61.0	98.5	40.9	69.9	42.3	20.7	35	775	21
20	238	226	226	226	60.5	97.8	40.1	69.4	41.5	19.6	34	755	20
(18)	230	219	219	219	—	96.7	—	—	—	—	33	736	(18)
(16)	222	212	212	212	—	95.5	—	—	—	—	32	706	(16)
(14)	213	203	203	203	—	93.9	—	—	—	—	31	677	(14)
(12)	204	194	194	194	—	92.3	—	—	—	—	29	647	(12)
(10)	196	187	187	187	—	90.7	—	—	—	—	28	618	(10)
(8)	188	179	179	179	—	89.5	—	—	—	—	27	598	(8)
(6)	180	171	171	171	—	87.1	—	—	—	—	26	579	(6)
(4)	173	165	165	165	—	85.5	—	—	—	—	25	549	(4)
(2)	166	158	158	158	—	83.5	—	—	—	—	24	530	(2)
(0)	160	152	152	152	—	81.7	—	—	—	—	24	520	(0)

In the above chart, figures with ( ) are not commonly used.

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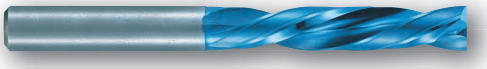
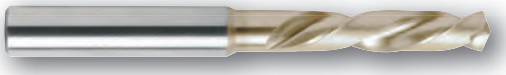
NACHI CONVERSION TABLE

Decimal	Fraction	Wire, Letter	mm	Tap Sizes To be used with drills as indicated
.0059		97	.15	
.0063		96	.16	
.0067		95	.17	
.0071		94	.18	
.0075		93	.19	
.0079		92	.2	
.0083		91		
.0087		90	.22	
.0091		89		
.0095		88		
.0098			.25	
.0100		87		
.0105		86		
.0110		85	.28	
.0115		84		
.0118			.3	
.0120		83		
.0125		82		
.0126			.32	
.0130		81		
.0135		80		
.0138			.35	
.0145		79		
.0150			.38	
.0156	1/64			
.0157			.4	
.0160		78		
.0177			.45	
.0180		77		
.0197			.5	
.0200		76		
.0210		75		
.0217			.55	
.0225		74		
.0236			.6	
.0240		73		
.0250		72		
.0256			.65	
.0260		71		
.0276			.7	
.0280		70		
.0292		69		
.0295			.75	M1x0.25
.0310		68		
.0312	1/32			
.0315			.8	
.0320		67		
.0330		66		
.0335			.85	M1.1x0.25
.0350		65		
.0354			.9	
.0360		64		
.0370		63		
.0374			.95	M1.2x0.25
.0380		62		
.0390		61		
.0394			1.0	
.0400		60		
.0410		59		
.0413			1.05	
.0420		58		
.0430		57		
.0433			1.1	M1.4x0.3
.0453			1.15	
.0465		56		
.0469	3/64			No.0-80
.0472			1.2	
.0492			1.25	M1.6x0.35
.0512			1.3	
.0520		55		
.0531			1.35	
.0550		54		
.0551			1.4	
.0571			1.45	M1.8x0.35
.0591			1.5	
.0595		53		No.1-64 No.1-72
.0610			1.55	
.0625	1/16			
.0630			1.6	M2x0.4
.0635		52		
.0650			1.65	
.0669			1.7	
.0670		51		
.0689			1.75	M2.2x0.45
.0700		50		No.2-56 No.2-64
.0709			1.8	
.0728			1.85	
.0730		49		
.0748			1.9	
.0760		48		
.0768			1.95	
.0781	5/64			
.0785		47		
.0787			2.0	
.0807			2.05	M2.5x0.45
.0810		46		
.0820		45		No.3-56
.0827			2.1	
.0846			2.15	
.0860		44		
.0866			2.2	
.0886			2.25	
.0890		43		No.4-40
.0906			2.3	
.0925			2.35	
.0935		42		No.4-48
.0938	3/32			
.0945			2.4	
.0960		41		
.0965			2.45	
.0980		40		
.0984			2.5	M3x0.5
.0995		39		
.1015		38		No.5-40
.1024			2.6	
.1040		37		No.5-44
.1063			2.7	
.1065		36		No.6-32
.1094	7/64			
.1100		35		
.1102			2.8	
.1110		34		
.1130		33		No.6-40
.1142			2.9	M3.5x0.6
.1160		32		
.1181			3.0	
.1200		31		
.1220			3.1	
.1250	1/8			
.1260			3.2	
.1285		30		
.1299			3.3	M4x0.7
.1339			3.4	
.1360		29		No.8-32 No.8-36
.1378			3.5	
.1405		28		
.1406	9/64			
.1417			3.6	
.1440		27		
.1457			3.7	M4.5x0.75
.1470		26		
.1495		25		No.10-24
.1496			3.8	
.1520		24		
.1535			3.9	
.1540		23		
.1562	5/32			
.1570		22		
.1575			4.0	
.1590		21		No.10-32
.1610		20		
.1614			4.1	
.1654			4.2	M5x0.8
.1660		19		
.1693			4.3	
.1695		18		
.1719	11/64			
.1730		17		
.1732			4.4	
.1770		16		No.12-24
.1772			4.5	
.1800		15		
.1811			4.6	
.1820		14		No.12-28
.1850		13	4.7	No.12-32
.1875	3/16			
.1890		12	4.8	
.1910		11		
.1929			4.9	
.1935		10		
.1960		9		
.1969			5.0	M6x1
.1990		8		
.2008			5.1	
.2010		7		1/4-20
.2031	13/64			
.2040		6		
.2047			5.2	
.2055		5		
.2087			5.3	
.2090		4		
.2126			5.4	
.2130		3		
.2165			5.5	
.2188	7/32			1/4-28 1/4-32
.2205			5.6	
.2210		2		
.2244			5.7	
.2280		1		
.2283			5.8	
.2323			5.9	
.2340		A		
.2344	15/64			
.2362			6.0	M7x1
.2380		B		
.2402			6.1	
.2420		C		
.2441			6.2	
.2460		D		
.2480			6.3	
.2500	1/4	E		
.2520			6.4	
.2559			6.5	
.2570		F		5/16-18
.2598			6.6	
.2610		G		
.2638			6.7	
.2656	17/64			5/16-20
.2660		H		
.2677			6.8	M8x1.25
.2717			6.9	
.2720		I		5/16-24
.2756			7.0	
.2770		J		5/16-28
.2795			7.1	
.2810		K		
.2812	9/32			5/16-32
.2835			7.2	
.2874			7.3	
.2900		L		
.2913			7.4	
.2950		M		
.2953			7.5	
.2969	19/64			
.2992			7.6	
.3020		N		
.3031			7.7	
.3071			7.8	M9x1.25
.3110			7.9	
.3125	5/16			3/8-16
.3150			8.0	
.3160		O		
.3189			8.1	
.3228			8.2	
.3230		P		
.3268			8.3	
.3281	21/64			3/8-20
.3307			8.4	
.3320		Q		
.3346			8.5	M10x1.5
.3386			8.6	
.3390		R		3/8-24
.3425			8.7	
.3438	11/32			3/8-28 3/8-32
.3465			8.8	
.3480		S		
.3504			8.9	
.3543			9.0	
.3580		T		
.3583			9.1	
.3594	23/64			
.3622			9.2	
.3661			9.3	
.3680		U		7/16-14
.3701			9.4	
.3740			9.5	
.3750	3/8			7/16-16
.3770		V		
.3780			9.6	
.3819			9.7	
.3858			9.8	
.3860		W		
.3898			9.9	
.3906	25/64			7/16-20
.3937			10.0	
.3970		X		
.4016			10.2	M12x1.75
.4040		Y		7/16-28
.4062	13/32			7/16-32
.4130		Z		
.4134			10.5	
.4219	27/64			1/2-13
.4252			10.8	
.4331			11.0	
.4375	7/16			1/2-16
.4409			11.2	
.4528			11.5	
.4531	29/64			1/2-20
.4646			11.8	
.4688	15/32			1/2-28 1/2-32
.4724			12.0	M14x2
.4803			12.2	
.4844	31/64			9/16-12
.4921			12.5	
.5000	1/2			9/16-16
.5039			12.8	
.5118			13.0	
.5156	33/64			9/16-18 9/16-20
.5197			13.2	
.5312	17/32			9/16-24 9/16-28 9/16-32 5/8-11
.5315			13.5	
.5433			13.8	
.5469	35/64			5/8-12
.5512			14.0	M16x2
.5610			14.25	
.5625	9/16			5/8-16
.5709			14.5	
.5781	37/64			5/8-18 5/8-20
.5807			14.75	
.5906			15.0	
.5938	19/32			5/8-24 5/8-28 5/8-32
.6004			15.25	
.6094	39/64			11/16-12
.6102			15.5	M18x2.5
.6201			15.75	
.6250	5/8			11/16-16
.6299			16.0	
.6398			16.25	
.6406	41/64			11/16-20
.6496			16.5	
.6562	21/32			11/16-24 11/16-28 11/16-32 3/4-10
.6594			16.75	
.6693			17.0	
.6719	43/64			3/4-12
.6791			17.25	
.6875	11/16			3/4-16
.6890			17.5	M20x2.5
.7031	45/64			3/4-20
.7087			18.0	
.7188	23/32			3/4-28 3/4-32
.7283			18.5	
.7344	47/64			13/16-12
.7480			19.0	
.7500	3/4			13/16-16
.7656	49/64			13/16-20 7/8-9
.7677			19.5	M22x2.5
.7812	25/32			13/16-28 13/16-32
.7874			20.0	
.7969	51/64			7/8-12
.8071			20.5	
.8125	13/16			7/8-14 7/8-16
.8268			21.0	M24x3
.8281	53/64			7/8-20
.8438	27/32			7/8-28 7/8-32
.8465			21.5	
.8594	55/64			15/16-12
.8661			22.0	
.8750	7/8			15/16-16 1-8
.8858			22.5	
.8906	57/64			15/16-20
.9055			23.0	
.9062	29/32			15/16-28 15/16-32
.9219	59/64			1-12
.9252			23.5	
.9375	15/16			1-16 1 1/16-8
.9449			24.0	M27x3
.9531	61/64			1-20
.9646			24.5	
.9688	31/64			1-28 1-32
.9843			25.0	
.9844	63/64			1 1/16-12 1 1/8-7
1.0000	1			1 1/16-16 1 1/8-8

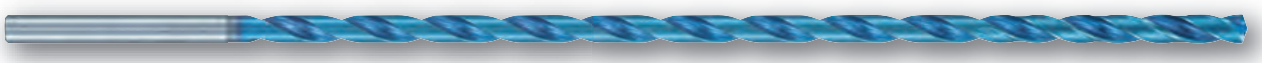


Aqua Drill EX Flat- *#1 Selling Flat Bottom Drill*



SG Drill - Powdered Metal Cobalt Drill

Aqua Drill EX Oil Hole Deep Hole Drill



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