



# ALLIED MACHINE & ENGINEERING

Holemaking Solutions for Today's Manufacturing



Boring



Reaming



Burnishing



Threading



Specials



## ASC 320<sup>®</sup>

► *DRILLING*

High Penetration Solid Carbide Drills

## North America

**Allied Machine**  
120 Deeds Drive  
Dover, OH 44622  
United States

**Allied Machine**  
485 West 3rd Street  
Dover, OH 44622  
United States

### ThreadMills USA™

4185 Crosstowne Ct #B  
Evans, GA 30809  
United States

### Superion™

1285 S Patton St.  
Xenia, OH 45385  
United States

## Europe

**Allied Machine Europe**  
93 Vantage Point  
Pensnett Estate  
Kingswinford  
West Midlands  
DY6 7FR, United Kingdom

### Wohlhaupter® GmbH

Maybachstrasse 4  
Postfach 1264  
72636 Frickenhausen  
Germany

## Asia

**Wohlhaupter® India**  
B-23, 2nd Floor  
B Block Community Centre  
Janakpuri, New Delhi - 110058  
India



Allied Machine & Engineering is a worldwide leader in holemaking and finishing solutions. We are committed to providing practical and dependable solutions to our customers through innovative designs and superior customer and technical support.

We continue to expand our product offering in order to provide new and different solutions. With Field Sales Engineers located around the world, we position ourselves to provide technical support on site, right at your spindle.



[www.alliedmachine.com](http://www.alliedmachine.com)



# ALLIED MACHINE & ENGINEERING

Holemaking Solutions for Today's Manufacturing

## ASC 320®

### The Foundation

Since 1941, Allied Machine & Engineering has provided dependable and practical holemaking solutions to the world. What was once a small job shop in Ohio is now a worldwide leader in cutting tool technology. With three manufacturing facilities in Ohio, one in Georgia, another in Germany, and headquarters in both the United States and Europe, Allied Machine is positioned to bring innovative solutions and technical expertise directly to the customers' hands.



### The Beginning

Harold E. Stokey founded Allied Machine & Engineering to aid the war effort, manufacturing taper bearing lock nuts for the production of M1 tanks. Years later, after a sales meeting gone wrong, Stokey possessed a warehouse stocked with spade drill inserts. He set forth into the industry that would become Allied Machine's thriving identity: holemaking.



### The T-A®

When Harold's son, William H. Stokey, became the president and CEO, he developed the Throw Away, or T-A, spade drill insert system. The T-A revolutionized the holemaking industry, launching Allied Machine ahead of the competition. Since then, numerous innovations and advancements have been created from the T-A's inspiration.



### The Innovation

Since the development of the T-A, Allied Machine has expanded its product offering to support a vast range of customer applications, including large diameter and deep hole drilling, boring, reaming, burnishing, porting, and threading.

### The People

Allied Machine understands that high quality products are only one facet of success. Our customer support is crucial to what we do, and that's why we make sure the best engineers and customer service associates are in place to assist our customers around the world.

### The Future

With over 75 years of experience, Allied Machine has encountered the challenges of growth and success. By investing in cutting edge technology and the brightest and sharpest minds, our knowledge and capabilities continue to expand and grow every day.



**Steve Stokey**  
Executive Vice President

**William H. Stokey**  
President and CEO

**Mike Stokey**  
Executive Vice President



WOHLHAUPTER®



SUPERION™

CRITERION™



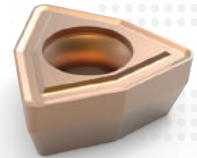
## Replaceable Insert Drills

- Reduce costs by decreasing set-up time and utilizing a single holder for the lives of multiple inserts
- Provide flexibility to quickly switch between inserts with different geometries
- Products:
  - GEN3SYS® XT | GEN3SYS® XT Pro
  - Original T-A® | GEN2 T-A®
  - High Performance | Universal



## Indexable Insert Drills

- Protect your investment and reduce your inventory with replaceable cartridges that allow the same holder to be used repeatedly
- Indexable inserts increase productivity and tool life while reducing costs
- Products:
  - 4TEX™ Drill
  - Revolution Drill®
  - Opening Drill®



## Replaceable / Indexable Insert Drills

- Allow for higher spindle speeds and take advantage of the power curve on modern CNC machines
- Achieve maximum penetration rates in deep hole drilling applications
- Holders cover a range of sizes with the replaceable heads determining the cutting diameter
- Products:
  - APX Drill



## Solid Carbide Drills

- Offer greater strength and stability when drilling tougher materials
- Available in diameters from 3mm - 20mm
- Can be made-to-order specifically for your application (Superion™ quoted specials)
  - ASC 320®
  - Superion™





## Structural Steel Solutions

- Deliver outstanding performance and durability in structural steel applications
- Designed to produce optimal results in difficult-to-machine materials
- Available in multiple lengths and diameters
- T-A® style drills have different insert geometry options to improve performance depending on material
- Products:
  - Original T-A® | GEN2 T-A®
  - GEN3SYS® XT Pro

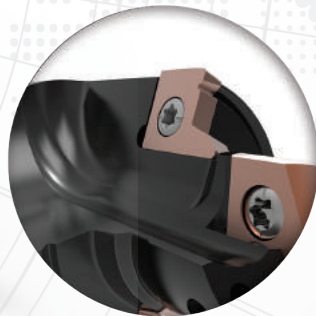
## BTA (STS) Machining Solutions

- The internal ejection system flushes chips and debris from the hole with no interference to the cutting process
- Utilizes the advantages of the T-A® drill insert
- Designed to significantly increase penetration rates over brazed heads and traditional gun drills
- Products:
  - BT-A Drill



## Hydraulic Port Contour Cutters

- Save significant time and money by performing four processes in one step
- Replaceable insert design reduces costs, inventory, and set-up times
- Available in 4 industry specifications:
  - Imperial: SAE J-1926
  - Metric: ISO 6149-1:2006
  - Military: SAE AS5202
  - John Deere: JDS-G173.1
- Products:
  - AccuPort 432®



## Enhanced Special Drilling Capabilities

- Allied Machine Engineers are available to meet with you to evaluate your application and recommend the best solution for you
- Special drilling solutions can incorporate advanced features such as adjustable diameter locations, multiple steps, additional coolant designs, special lengths and diameters, and more
- Special drills can drastically reduce your cost-per-hole and increase your overall productivity by eliminating multiple processes and increasing tool life





# WOHLHAUPTER®

## High Precision Boring Systems

- Designs available for high volume applications that increase rigidity to improve performance
- Versatile boring heads that are flexible with changing applications while maintaining excellent performance
- Provides high precision with absolute repeatability to ensure every part is held to tolerance
- Offers an industry leading modular shank connection that maintains rigidity and reduces inventory on your boring system
- Available with both digital and analog settings
- Products:
  - Wohlhaupter® Boring Tools



# CRITERION™

## Modular Boring Systems

- The modular capabilities are ideal for use across multiple different projects
- Offers versatile boring heads suitable for all job shops and tooling rooms
- Provides an economical solution for low volume and/or short-term production applications
- Offers both rough and finish boring solutions
- Products:
  - Criterion™ Boring Tools

# S.C.A.M.I.®

## Expandable Reaming Solutions

- Expandable cutting diameters accommodate for wear, which extends tool life
- Replaceable cutting heads and rings reduce waste and improve production time versus solid high speed steel and carbide reamers
- Hold tight tolerances to ensure processes are performed to accurate specifications
- Reduce tooling costs because many items are available for recondition
- Products:
  - ALVAN® Reamers

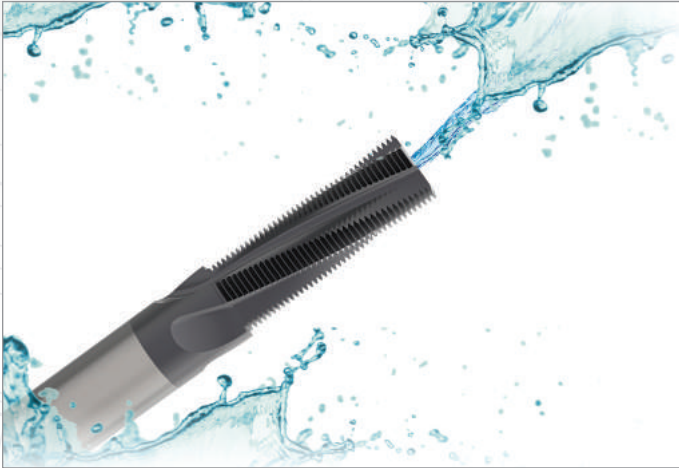


# S.C.A.M.I.®

## Roller Burnishing Solutions

- Produce excellent surface finishes
- Provide accurate size control
- Increase surface hardness
- Solutions for both through hole and blind hole applications
- Products:
  - S.C.A.M.I.® Roller Burnishing Tools





## Solid Carbide Thread Mills

- Available with coolant through options
- Cover a wide range of thread forms
- Provide optimal solutions for both high production projects and short-run applications
- Products
  - AccuThread™ 856
  - AccuThread™ T3
  - ThreadMills USA



## Replaceable Insert Thread Mills

- 3 insert lengths are available that cover a wide range of thread forms
- Holders can utilize inserts with different pitches and thread forms
- Repeatability is achieved by both the bolt-in style and the pin style locking systems
- Increase tool life by 25 - 50% with Allied Machine's AM210® coating
- Products
  - AccuThread™ 856: Bolt-in Style
  - AccuThread™ 856: Pin Style



## SPECIAL CAPABILITIES


When it comes to designing and developing special solutions for customers, Allied Machine is the top choice. If your application requires special tooling, give us a call. Our engineered specials are developed by the brightest engineers in the industry. Most of our standard tooling can be altered as specials, or we can create entirely new concepts for particularly unique applications.

One special tooling solution is Insta-Quote™, the online system that allows you to design your own special tooling 24/7. Receive a quote and drawings within minutes just by following the steps.

And with the addition of Superior™ technology and capabilities, we can customize made-to-order solid carbide tools to achieve optimal results for your applications.

Whatever your application, Allied Machine has the answer.



Insta-Quote™ 



 SUPERION™





# ASC 320®

## High Penetration Solid Carbide Drilling System

► **Diameter Range:** 0.1181" - 0.7874" (3.00mm - 20.00mm)



### Beyond the Cutting Edge

The ASC 320 range of solid carbide high penetration drills has been specifically engineered to deliver high productivity in difficult-to-machine materials, including stainless steels, Inconel, Hastelloy, and Titanium.

The unique combination of cutting edge geometry and high performance coatings provides excellent chip control, hole quality, and extended tool life, making ASC 320 ideal for use in a wide range of challenging applications and market sectors.

Extended tool life	3.5xD, 6xD, and 9xD	Excellent chip control
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### Applicable Industries



Aerospace



Agriculture



Automotive



Firearms



General  
Machining



Oil & Gas



Renewable  
Energy

Your safety and the safety of others is very important. This catalog contains important safety messages. Always read and follow all safety precautions.



This triangle is a safety hazard symbol. It alerts you to potential safety hazards that can cause tool failure and serious injury.

When you see this symbol in the catalog, look for a related safety message that may be near this triangle or referred to in the nearby text.

There are safety signal words also used in the catalog. Safety messages follow these words.

#### **WARNING**

**WARNING** (shown above) means that failure to follow the precautions in this message could result in tool failure and serious injury.

**NOTICE** means that failure to follow the precautions in this message could result in damage to the tool or machine but not result in personal injury.

**NOTE** and **IMPORTANT** are also used. These are important that you read and follow but are not safety-related.

Visit [www.alliedmachine.com](http://www.alliedmachine.com) for the most up-to-date information and procedures.



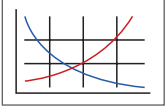
## Reference Icons

The following icons will appear throughout the catalog to help you navigate between products.



### Setup / Assembly Information

Detailed instructions and information regarding the corresponding part(s)



### Recommended Cutting Data

Speed and feed recommendations for optimum and safe drilling

## Introduction Information

Product Overview . . . . .	2
Item Number Nomenclature . . . . .	3

## Drill Length

3.5xD . . . . .	4 - 5
6xD . . . . .	6 - 9
9xD . . . . .	10 - 11

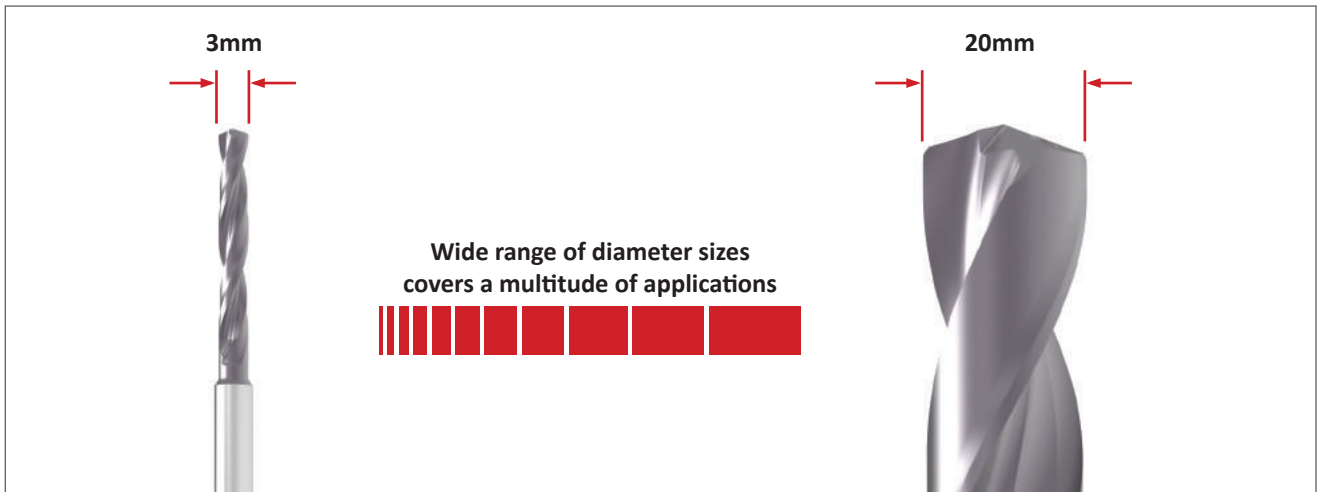
## Recommended Cutting Data

Imperial (inch) . . . . .	12
Metric (mm) . . . . .	13
Coolant Recommendations . . . . .	14

Product Overview

The Advantages

- ✓ **Ideal for a wide variety of applications**  
with the unique geometry and coating combination
- ✓ **Increased stability**  
with the reinforced shank
- ✓ **Increased tool life**
- ✓ **Excellent chip control**
- ✓ **Through coolant design**
- ✓ **Available in 3.5xD, 6xD, and 9xD lengths**



<b>P</b> Steel N/mm <sup>2</sup> <1365	<b>S</b> High Temp Materials N/mm <sup>2</sup> <1365	<b>M</b> Stainless Steel N/mm <sup>2</sup> <940	<b>H</b> Hardened Materials N/mm <sup>2</sup> <1365	<b>K</b> Cast and Ductile Iron N/mm <sup>2</sup> <1020	<b>N</b> Non-Ferrous Materials N/mm <sup>2</sup> <855
◆	◆	◆	❖	❖	❖

◆ First choice  
❖ Second choice

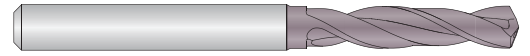
A DRILLING  
 B BORING  
 C REAMING  
 D BURNISHING  
 E THREADING  
 X SPECIALS



## Product Nomenclature

### ASC 320 Solid Carbide Drills

<b>3</b>	<b>60</b>	<b>M</b>	<b>07500</b>	<b>A21</b>	<b>M</b>
1	2	3	4	5	6



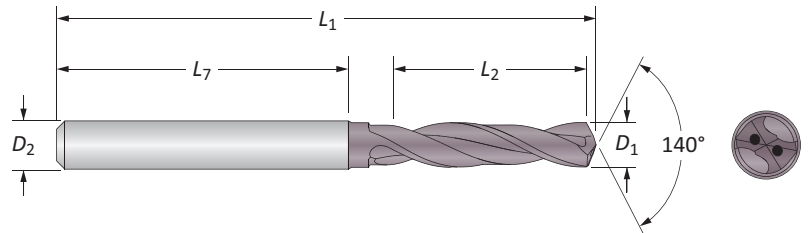
1. ASC 320®	2. Length	3. Style	4. Diameter	5. Substrate Geometry	6. Multi-Layer Coating
<b>3</b> = Solid carbide	<b>35</b> = 3.5xD <b>60</b> = 6xD <b>90</b> = 9xD	<b>E</b> = English (Imperial)  <b>M</b> = Metric	<b>07500</b> = 0.7500"	<b>A21</b> = Standard	<b>M</b> = TiAlN

#### Regrind and Recoating

The ASC 320 drills are ground and recoated by Allied Machine to maintain the high level of performance achieved with these tools. Using our services assures the best tool performance is maintained in your production process.

#### Reference Key

Symbol	Attribute
$D_1$	Drill diameter
$D_2$	Shank diameter
$L_1$	Overall length
$L_2$	Drill depth
$L_7$	Shank length



A

DRILLING

B

BORING

C

REAMING

D

BURNISHING

E

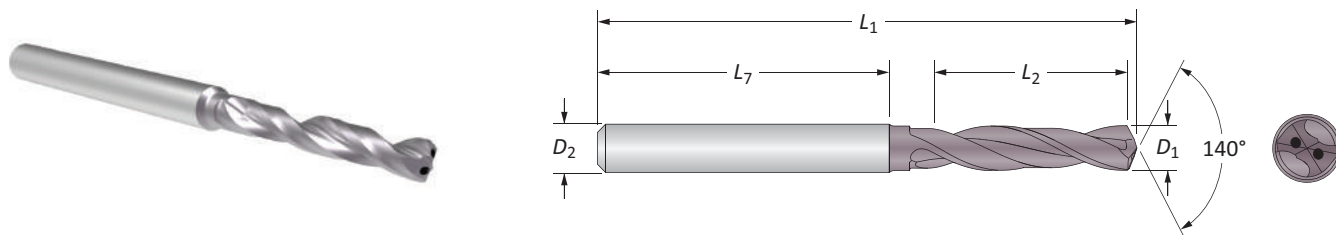
THREADING

X

SPECIALS

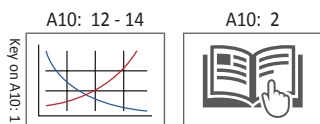
Solid Carbide Drills

3.5xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



Fractional Equivalent	D <sub>1</sub>		Tap Size*	Body				Shank		Part No.
	inch	mm		L <sub>2</sub> inch	L <sub>2</sub> mm	L <sub>1</sub> inch	L <sub>1</sub> mm	L <sub>7</sub> mm	D <sub>2</sub> mm	
1/8	0.1250	3.17	-	0.551	14	2.47	62.7	36	4	335E01250A21M
-	0.1575	4.00	-	0.551	14	2.47	62.7	36	4	335M04000A21M
-	0.1654	4.20	M5x0.8	0.827	21	2.64	67.1	36	6	335M04200A21M
11/64	0.1719	4.37	-	0.827	21	2.64	67.1	36	6	335E01719A21M
#16	0.1772	4.50	#12-24	0.827	21	2.64	67.1	36	6	335M04500A21M
-	0.1811	4.60	#12-28	0.827	21	2.64	67.1	36	6	335M04600A21M
3/16	0.1875	4.76	-	0.827	21	2.64	67.1	36	6	335E01875A21M
-	0.1969	5.00	M6x1	0.827	21	2.64	67.1	36	6	335M05000A21M
13/64	0.2031	5.16	-	0.827	21	2.64	67.1	36	6	335E02031A21M
7/32	0.2188	5.56	-	0.827	21	2.64	67.1	36	6	335E02188A21M
#1	0.2280	5.79	-	0.827	21	2.64	67.1	36	6	335E02280A21M
15/64	0.2344	5.95	-	0.827	21	2.64	67.1	36	6	335E02344A21M
-	0.2362	6.00	M7x1	0.827	21	2.64	67.1	36	6	335M06000A21M
1/4	0.2500	6.35	-	1.102	28	3.13	79.4	36	8	335E02500A21M
-	0.2559	6.50	-	1.102	28	3.13	79.4	36	8	335M06500A21M
17/64	0.2656	6.75	M8x1.25	1.102	28	3.13	79.4	36	8	335E02656A21M
-	0.2756	7.00	M8x1	1.102	28	3.13	79.4	36	8	335M07000A21M
9/32	0.2812	7.14	-	1.102	28	3.13	79.4	36	8	335E02812A21M
-	0.2874	7.30	-	1.102	28	3.13	79.4	36	8	335M07300A21M
-	0.2953	7.50	-	1.102	28	3.13	79.4	36	8	335M07500A21M
19/64	0.2969	7.54	-	1.102	28	3.13	79.4	36	8	335E02969A21M
-	0.3071	7.80	-	1.102	28	3.13	79.4	36	8	335M07800A21M
5/16	0.3125	7.94	3/8-16	1.102	28	3.13	79.4	36	8	335E03125A21M
-	0.3150	8.00	-	1.102	28	3.13	79.4	36	8	335M08000A21M
21/64	0.3281	8.33	-	1.378	35	3.57	90.7	40	10	335E03281A21M
Q	0.3320	8.43	3/8-24	1.378	35	3.57	90.7	40	10	335E03320A21M
-	0.3346	8.50	M10.1.5	1.378	35	3.57	90.7	40	10	335M08500A21M
11/32	0.3438	8.73	-	1.378	35	3.57	90.7	40	10	335E03438A21M
-	0.3465	8.80	-	1.378	35	3.57	90.7	40	10	335M08800A21M
-	0.3543	9.00	-	1.378	35	3.57	90.7	40	10	335M09000A21M
23/64	0.3594	9.13	-	1.378	35	3.57	90.7	40	10	335E03594A21M
U	0.3680	9.35	7/16-14	1.378	35	3.57	90.7	40	10	335E03680A21M
-	0.3740	9.50	-	1.378	35	3.57	90.7	40	10	335M09500A21M
3/8	0.3750	9.53	-	1.378	35	3.57	90.7	40	10	335E03750A21M
-	0.3858	9.80	-	1.378	35	3.57	90.7	40	10	335E03858A21M
25/64	0.3906	9.92	7/16-20	1.378	35	3.57	90.7	40	10	335E03906A21M
-	0.3937	10.00	-	1.378	35	3.57	90.7	40	10	335M10000A21M

\*Tap drill diameters allow approximately 75% of full thread to be produced



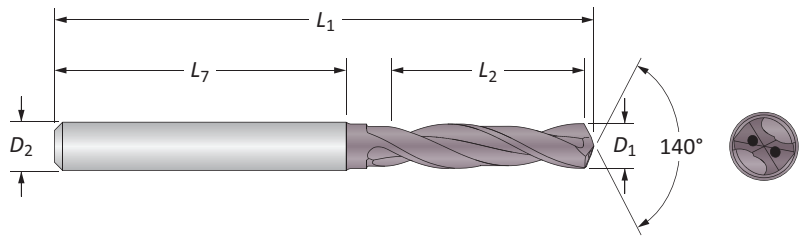
Sizes not shown are available as non-stocked standards. When ordering, please follow the examples shown below:

<b>Inch</b>	Diameter needed = 0.3450"	Part No. = 335E03450A21M
<b>Metric</b>	Diameter needed = 7.250mm	Part No. = 335M07250A21M



Solid Carbide Drills

3.5xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



Fractional Equivalent	D <sub>1</sub>		Tap Size*	Body				Shank		Part No.
	inch	mm		L <sub>2</sub> inch	L <sub>2</sub> mm	L <sub>1</sub> inch	L <sub>1</sub> mm	L <sub>7</sub> mm	D <sub>2</sub> mm	
-	0.4016	10.20	M12x1.75	1.654	42	4.18	106.1	45	12	335M10200A21M
13/32	0.4062	10.32	-	1.378	42	4.18	106.1	45	12	335E04062A21M
-	0.4134	10.50	-	1.378	42	4.18	106.1	45	12	335M10500A21M
27/64	0.4219	10.72	1/2-13	1.654	42	4.18	106.1	45	12	335E04219A21M
-	0.4331	11.00	-	1.654	42	4.18	106.1	45	12	335M11000A21M
7/16	0.4375	11.11	-	1.654	42	4.18	106.1	45	12	335E04375A21M
-	0.4528	11.50	-	1.654	42	4.18	106.1	45	12	335M11500A21M
29/64	0.4531	11.51	1/2-20	1.654	42	4.18	106.1	45	12	335E04531A21M
15/32	0.4688	11.91	-	1.654	42	4.18	106.1	45	12	335E04688A21M
-	0.4724	12.00	M14x2	1.654	42	4.18	106.1	45	12	335M12000A21M
31/64	0.4844	12.30	9/16-12	1.929	49	4.55	115.6	45	14	335E04844A21M
-	0.4921	12.50	M14x1.5	1.929	49	4.55	115.6	45	14	335M12500A21M
1/2	0.5000	12.70	-	1.929	49	4.55	115.6	45	14	335E05000A21M
-	0.5118	13.00	-	1.929	49	4.55	115.6	45	14	335M13000A21M
33/64	0.5156	13.10	9/16-18	1.929	49	4.55	115.6	45	14	335E05156A21M
17/32	0.5312	13.49	5/8-11	1.929	49	4.55	115.6	45	14	335E05312A21M
-	0.5315	13.50	-	1.929	49	4.55	115.6	45	14	335M13500A21M
-	0.5394	13.70	-	1.929	49	4.55	115.6	45	14	335M13700A21M
35/64	0.5469	13.89	5/8-12	1.929	49	4.55	115.6	45	14	335E05469A21M
-	0.5512	14.00	M16x2	1.929	49	4.55	115.6	45	14	335M14000A21M
9/16	0.5625	14.29	-	2.205	56	5.07	128.8	48	16	335E05625A21M
-	0.5709	14.50	M16x1.5	2.205	56	5.07	128.8	48	16	335M14500A21M
37/64	0.5781	14.68	5/8-18	2.205	56	5.07	128.8	48	16	335E05781A21M
-	0.5906	15.00	-	2.205	56	5.07	128.8	48	16	335M15000A21M
19/32	0.5938	15.08	-	2.205	56	5.07	128.8	48	16	335E05938A21M
39/64	0.6094	15.48	11/16-12	2.205	56	5.07	128.8	48	16	335E06094A21M
-	0.6102	15.50	M18x2.5	2.205	56	5.07	128.8	48	16	335M15500A21M
5/8	0.6250	15.88	-	2.205	56	5.07	128.8	48	16	335E06250A21M
-	0.6299	16.00	-	2.205	56	5.07	128.8	48	16	335M16000A21M
-	0.6496	16.50	M18x1.5	2.480	63	5.44	138.2	48	18	335M16500A21M
21/32	0.6563	16.67	3/4-10	2.480	63	5.44	138.2	48	18	335E06563A21M
-	0.6693	17.00	-	2.480	63	5.44	138.2	48	18	335M17000A21M
43/64	0.6719	17.07	3/4-12	2.480	63	5.44	138.2	48	18	335E06719A21M
11/16	0.6875	17.46	3/4-16	2.480	63	5.44	138.2	48	18	335E06875A21M
-	0.6890	17.50	M20x2.5	2.480	63	5.44	138.2	48	18	335M17500A21M
45/64	0.7031	17.86	-	2.480	63	5.44	138.2	48	18	335E07031A21M
-	0.7087	18.00	-	2.480	63	5.44	138.2	48	18	335M18000A21M
-	0.7283	18.50	M20x1.5	2.756	70	5.89	149.5	50	20	335M18500A21M
47/64	0.7344	18.65	-	2.756	70	5.89	149.5	50	20	335E07344A21M
-	0.7480	19.00	-	2.756	70	5.89	149.5	50	20	335M19000A21M
-	0.7580	19.25	-	2.756	70	5.89	149.5	50	20	335E07580A21M
-	0.7677	19.50	M22x2.5	2.756	70	5.89	149.5	50	20	335M19500A21M
25/32	0.7813	19.84	-	2.756	70	5.89	149.5	50	20	335E07813A21M
-	0.7874	20.00	-	2.756	70	5.89	149.5	50	20	335M20000A21M

\*Tap drill diameters allow approximately 75% of full thread to be produced

Sizes not shown are available as non-stocked standards. When ordering, please follow the examples shown below:

Inch	Diameter needed = 0.3450"	Part No. = 335E03450A21M
Metric	Diameter needed = 7.250mm	Part No. = 335M07250A21M

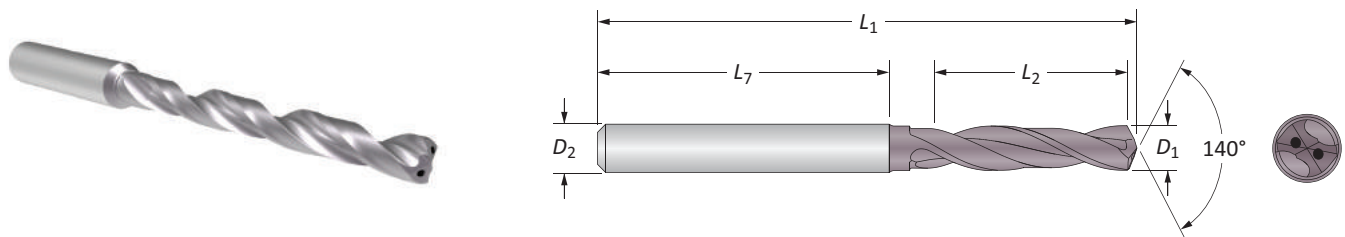
A10: 12 - 14

A10: 2

A DRILLING  
B BORING  
C REAMING  
D BURNISHING  
E THREADING  
X SPECIALS

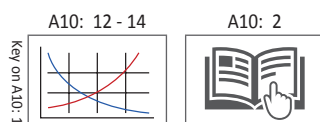
## Solid Carbide Drills

6xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



Fractional Equivalent	D <sub>1</sub>		Tap Size*	Body				Shank		Part No.
	inch	mm		L <sub>2</sub> inch	L <sub>2</sub> mm	L <sub>1</sub> inch	L <sub>1</sub> mm	L <sub>7</sub> mm	D <sub>2</sub> mm	
-	0.1181	3.00	-	0.9450	24	2.86	72.7	36	4	360M03000A21M
1/8	0.1250	3.18	-	0.9450	24	2.86	72.7	36	4	360E01250A21M
-	0.1260	3.20	-	0.9450	24	2.86	72.7	36	4	360M03200A21M
-	0.1299	3.30	M4x0.7	0.9450	24	2.86	72.7	36	4	360M03300A21M
-	0.1378	3.50	-	0.9450	24	2.86	72.7	36	4	360M03500A21M
9/64	0.1406	3.57	-	0.9450	24	2.86	72.7	36	4	360E01406A21M
#25	0.1496	3.80	#10-24	0.9450	24	2.86	72.7	36	4	360M03800A21M
5/32	0.1563	3.97	-	0.9450	24	2.86	72.7	36	4	360E01563A21M
-	0.1575	4.00	-	0.9450	24	2.86	72.7	36	4	360M04000A21M
-	0.1654	4.20	M5x0.8	1.1417	36	3.27	83.1	36	6	360M04200A21M
11/64	0.1719	4.37	-	1.1417	36	3.27	83.1	36	6	360E01719A21M
#16	0.1772	4.50	#12-24	1.1417	36	3.27	83.1	36	6	360M04500A21M
-	0.1811	4.60	#12-28	1.1417	36	3.27	83.1	36	6	360M04600A21M
-	0.1831	4.65	-	1.1417	36	3.27	83.1	36	6	360M04650A21M
3/16	0.1875	4.76	-	1.1417	36	3.27	83.1	36	6	360E01875A21M
-	0.1950	4.95	-	1.1417	36	3.27	83.1	36	6	360M04950A21M
-	0.1969	5.00	M6x1	1.1417	36	3.27	83.1	36	6	360M05000A21M
#8	0.1990	5.05	-	1.1417	36	3.27	83.1	36	6	360E01990A21M
#7	0.2010	5.11	1/4-20	1.1417	36	3.27	83.1	36	6	360E02010A21M
13/64	0.2031	5.16	-	1.1417	36	3.27	83.1	36	6	360E02031A21M
-	0.2098	5.33	-	1.1417	36	3.27	83.1	36	6	360M05330A21M
#3	0.2130	5.41	1/4-28	1.1417	36	3.27	83.1	36	6	360E02130A21M
-	0.2165	5.50	-	1.1417	36	3.27	83.1	36	6	360M05500A21M
7/32	0.2188	5.56	-	1.1417	36	3.27	83.1	36	6	360E02188A21M
#1	0.2280	5.79	-	1.1417	36	3.27	83.1	36	6	360E02280A21M
-	0.2299	5.84	-	1.1417	36	3.27	83.1	36	6	360M05840A21M
15/64	0.2344	5.95	-	1.1417	36	3.27	83.1	36	6	360E02344A21M
-	0.2362	6.00	M7x1	1.1417	36	3.27	83.1	36	6	360M06000A21M

\*Tap drill diameters allow approximately 75% of full thread to be produced



Sizes not shown are available as non-stocked standards.

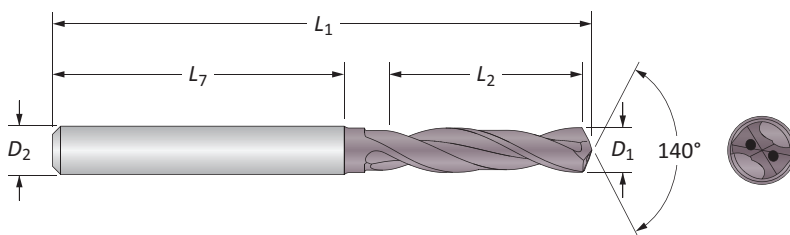
When ordering, please follow the examples shown below:

<b>Inch</b>	Diameter needed = 0.3450"	Part No. = 335E <b>03450</b> A21M
<b>Metric</b>	Diameter needed = 7.250mm	Part No. = 335M <b>07250</b> A21M



### Solid Carbide Drills

6xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)

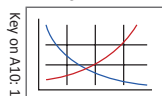


Fractional Equivalent	D <sub>1</sub>		Tap Size*	Body				Shank		Part No.
	inch	mm		L <sub>2</sub> inch	L <sub>2</sub> mm	L <sub>1</sub> inch	L <sub>1</sub> mm	L <sub>7</sub> mm	D <sub>2</sub> mm	
-	0.2398	6.09	-	1.8900	48	4.31	109.4	36	8	360M06090A21M
D	0.2460	6.25	-	1.8900	48	4.31	109.4	36	8	360E02460A21M
1/4	0.2500	6.35	-	1.8900	48	4.31	109.4	36	8	360E02500A21M
-	0.2559	6.50	-	1.8900	48	4.31	109.4	36	8	360M06500A21M
F	0.2570	6.53	5/16-18	1.8900	48	4.31	109.4	36	8	360E02570A21M
17/64	0.2656	6.75	M8x1.25	1.8900	48	4.31	109.4	36	8	360E02656A21M
-	0.2677	6.80	-	1.8900	48	4.31	109.4	36	8	360M06800A21M
I	0.2720	6.91	5/16-24	1.8900	48	4.31	109.4	36	8	360E02720A21M
-	0.2756	7.00	M8x1	1.8900	48	4.31	109.4	36	8	360M07000A21M
-	0.2795	7.10	-	1.8900	48	4.31	109.4	36	8	360M07100A21M
9/32	0.2812	7.14	-	1.8900	48	4.31	109.4	36	8	360E02812A21M
-	0.2874	7.30	-	1.8900	48	4.31	109.4	36	8	360M07300A21M
-	0.2913	7.40	-	1.8900	48	4.31	109.4	36	8	360M07400A21M
-	0.2953	7.50	-	1.890	48	4.31	109.4	36	8	360M07500A21M
19/64	0.2969	7.54	-	1.890	48	4.31	109.4	36	8	360E02969A21M
5/16	0.3125	7.94	3/8-16	1.890	48	4.31	109.4	36	8	360E03125A21M
-	0.3150	8.00	-	1.890	48	4.31	109.4	36	8	360M08000A21M
21/64	0.3281	8.33	-	2.362	60	4.56	115.4	40	10	360E03281A21M
Q	0.3320	8.43	3/8-24	2.362	60	4.56	115.4	40	10	360M08430A21M
-	0.3346	8.50	M10x1.5	2.362	60	4.56	115.4	40	10	360M08500A21M
-	0.3386	8.60	-	2.362	60	4.56	115.4	40	10	360M08600A21M
11/32	0.3438	8.73	-	2.362	60	4.56	115.4	40	10	360E03438A21M
-	0.3465	8.80	-	2.362	60	4.56	115.4	40	10	360M08800A21M
-	0.3543	9.00	-	2.362	60	4.56	115.4	40	10	360M09000A21M
23/64	0.3594	9.13	-	2.362	60	4.56	115.4	40	10	360E03594A21M
-	0.3622	9.20	-	2.362	60	4.56	115.4	40	10	360M09200A21M
U	0.3680	9.35	7/16-14	2.362	60	4.56	115.4	40	10	360E03680A21M
-	0.3730	9.47	-	2.362	60	4.56	115.4	40	10	360M09470A21M
-	0.3740	9.50	-	2.362	60	4.56	115.4	40	10	360M09500A21M
3/8	0.3750	9.53	-	2.362	60	4.56	115.4	40	10	360E03750A21M
-	0.3780	9.60	-	2.362	60	4.56	115.4	40	10	360M09600A21M
-	0.3820	9.70	-	2.362	60	4.56	115.4	40	10	360M09700A21M
25/64	0.3906	9.92	7/16-20	2.362	60	4.56	115.4	40	10	360E03906A21M
-	0.3937	10.00	-	2.362	60	4.56	115.4	40	10	360M10000A21M

\*Tap drill diameters allow approximately 75% of full thread to be produced

A10: 12 - 14

A10: 2

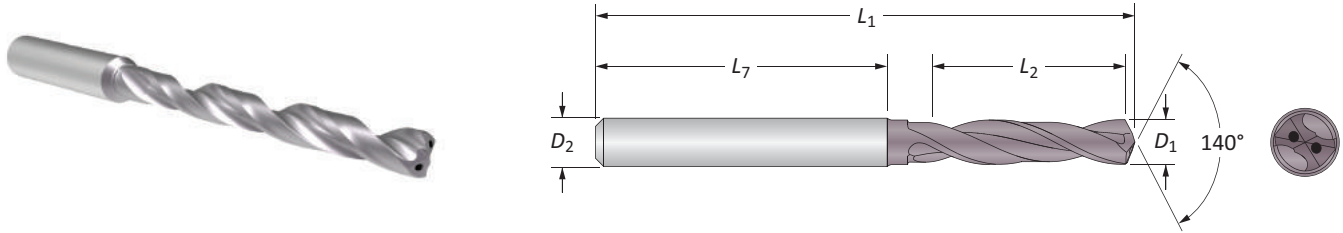


Sizes not shown are available as non-stocked standards. When ordering, please follow the examples shown below:

<b>Inch</b>	Diameter needed = 0.3450"	Part No. = 335E03450A21M
<b>Metric</b>	Diameter needed = 7.250mm	Part No. = 335M07250A21M

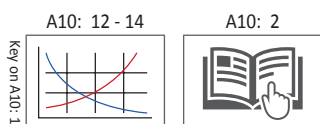
## Solid Carbide Drills

6xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



Fractional Equivalent	D <sub>1</sub>		Tap Size*	Body				Shank		Part No.
	inch	mm		L <sub>2</sub> inch	L <sub>2</sub> mm	L <sub>1</sub> inch	L <sub>1</sub> mm	L <sub>7</sub> mm	D <sub>2</sub> mm	
-	0.4016	10.20	M12x1.75	2.835	72	5.36	136.2	45	12	360M10200A21M
Y	0.4040	10.31	-	2.835	72	5.36	136.2	45	12	360E04040A21M
13/32	0.4062	10.32	-	2.835	72	5.36	136.2	45	12	360E04062A21M
-	0.4134	10.50	-	2.835	72	5.36	136.2	45	12	360M10500A21M
27/64	0.4219	10.72	1/2-13	2.835	72	5.36	136.2	45	12	360E04219A21M
-	0.4252	10.80	M12x4.25	2.835	72	5.36	136.2	45	12	360M10800A21M
-	0.4290	10.90	-	2.835	72	5.36	136.2	45	12	360M10900A21M
-	0.4331	11.00	-	2.835	72	5.36	136.2	45	12	360M11000A21M
7/16	0.4375	11.11	-	2.835	72	5.36	136.2	45	12	360E04375A21M
-	0.4409	11.20	-	2.835	72	5.36	136.2	45	12	360M11200A21M
-	0.4528	11.50	-	2.835	72	5.36	136.2	45	12	360M11500A21M
29/64	0.4531	11.51	1/2-20	2.835	72	5.36	136.2	45	12	360E04531A21M
-	0.4646	11.80	-	2.835	72	5.36	136.2	45	12	360M11800A21M
15/32	0.4688	11.91	-	2.835	72	5.36	136.2	45	12	360E04688A21M
-	0.4724	12.00	M14x2	2.835	72	5.36	136.2	45	12	360M12000A21M
31/64	0.4844	12.30	9/16-12	3.307	84	5.93	150.5	45	14	360E04844A21M
-	0.4921	12.50	M14x1.5	3.307	84	5.93	150.5	45	14	360M12500A21M
1/2	0.5000	12.70	-	3.307	84	5.93	150.5	45	14	360E05000A21M
-	0.5100	12.95	-	3.307	84	5.93	150.5	45	14	360M12950A21M
-	0.5118	13.00	-	3.307	84	5.93	150.5	45	14	360M13000A21M
33/64	0.5156	13.10	9/16-18	3.307	84	5.93	150.5	45	14	360E05156A21M
-	0.5197	13.20	-	3.307	84	5.93	150.5	45	14	360M13200A21M
17/32	0.5312	13.49	5/8-11	3.307	84	5.93	150.5	45	14	360E05312A21M
-	0.5315	13.50	-	3.307	84	5.93	150.5	45	14	360M13500A21M
-	0.5433	13.80	-	3.307	84	5.93	150.5	45	14	360M13800A21M
35/64	0.5469	13.89	5/8-12	3.307	84	5.93	150.5	45	14	360E05469A21M
-	0.5512	14.00	M16x2	3.307	84	5.93	150.5	45	14	360M14000A21M
9/16	0.5625	14.29	-	3.780	96	6.65	168.9	48	16	360E05625A21M
-	0.5709	14.50	M16x1.5	3.780	96	6.65	168.9	48	16	360M14500A21M
37/64	0.5781	14.68	5/8-18	3.780	96	6.65	168.9	48	16	360E05781A21M
-	0.5906	15.00	-	3.780	96	6.65	168.9	48	16	360M15000A21M
19/32	0.5938	15.08	-	3.780	96	6.65	168.9	48	16	360E05938A21M
39/64	0.6094	15.48	11/16-12	3.780	96	6.65	168.9	48	16	360E06094A21M
-	0.6102	15.50	M18x2.5	3.780	96	6.65	168.9	48	16	360M15500A21M
5/8	0.6250	15.88	-	3.780	96	6.65	168.9	48	16	360E06250A21M
-	0.6299	16.00	-	3.780	96	6.65	168.9	48	16	360M16000A21M

\*Tap drill diameters allow approximately 75% of full thread to be produced



Sizes not shown are available as non-stocked standards.

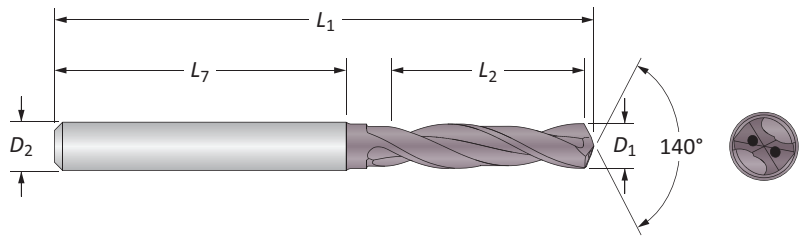
When ordering, please follow the examples shown below:

<b>Inch</b>	Diameter needed = 0.3450"	Part No. = 335E03450A21M
<b>Metric</b>	Diameter needed = 7.250mm	Part No. = 335M07250A21M



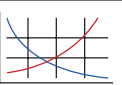
Solid Carbide Drills


6xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



Fractional Equivalent	D <sub>1</sub>		Tap Size*	Body				Shank		Part No.
	inch	mm		L <sub>2</sub> inch	L <sub>2</sub> mm	L <sub>1</sub> inch	L <sub>1</sub> mm	L <sub>7</sub> mm	D <sub>2</sub> mm	
-	0.6307	16.02	-	4.252	108	7.22	183.3	48	18	360M16020A21M
-	0.6331	16.08	-	4.252	108	7.22	183.3	48	18	360M16080A21M
-	0.6378	16.20	-	4.252	108	7.22	183.3	48	18	360M16200A21M
41/64	0.6406	16.27	-	4.252	108	7.22	183.3	48	18	360E06406A21M
-	0.6496	16.50	M18x1.5	4.252	108	7.22	183.3	48	18	360M16500A21M
21/32	0.6563	16.67	3/4-10	4.252	108	7.22	183.3	48	18	360E06563A21M
-	0.6693	17.00	-	4.252	108	7.22	183.3	48	18	360M17000A21M
43/64	0.6719	17.07	3/4-12	4.252	108	7.22	183.3	48	18	360E06719A21M
11/16	0.6875	17.46	3/4-16	4.252	108	7.22	183.3	48	18	360E06875A21M
-	0.6890	17.50	M20x2.5	4.252	108	7.22	183.3	48	18	360M17500A21M
45/64	0.7031	17.86	-	4.252	108	7.22	183.3	48	18	360E07031A21M
-	0.7087	18.00	-	4.252	108	7.22	183.3	48	18	360M18000A21M
-	0.7098	18.03	-	4.724	120	7.86	199.6	50	20	360M18030A21M
23/32	0.7188	18.26	-	4.724	120	7.86	199.6	50	20	360E07188A21M
-	0.7283	18.50	M20x1.5	4.724	120	7.86	199.6	50	20	360M18500A21M
47/64	0.7344	18.65	-	4.724	120	7.86	199.6	50	20	360E07344A21M
-	0.7480	19.00	-	4.724	120	7.86	199.6	50	20	360M19000A21M
3/4	0.7500	19.05	-	4.724	120	7.86	199.6	50	20	360E07500A21M
-	0.7520	19.10	-	4.724	120	7.86	199.6	50	20	360M19100A21M
-	0.7535	19.14	-	4.724	120	7.86	199.6	50	20	360M19140A21M
-	0.7543	19.16	-	4.724	120	7.86	199.6	50	20	360M19160A21M
-	0.7559	19.20	-	4.724	120	7.86	199.6	50	20	360M19200A21M
-	0.7580	19.25	-	4.724	120	7.86	199.6	50	20	360E07580A21M
-	0.7598	19.30	-	4.724	120	7.86	199.6	50	20	360M19300A21M
49/64	0.7656	19.45	7/8-9	4.724	120	7.86	199.6	50	20	360E07656A21M
-	0.7677	19.50	M22x2.5	4.724	120	7.86	199.6	50	20	360M19500A21M
25/32	0.7813	19.84	-	4.724	120	7.86	199.6	50	20	360E07813A21M
-	0.7874	20.00	-	4.724	120	7.86	199.6	50	20	360M20000A21M

\*Tap drill diameters allow approximately 75% of full thread to be produced

A10: 12 - 14  Key on A10: 1

A10: 2 

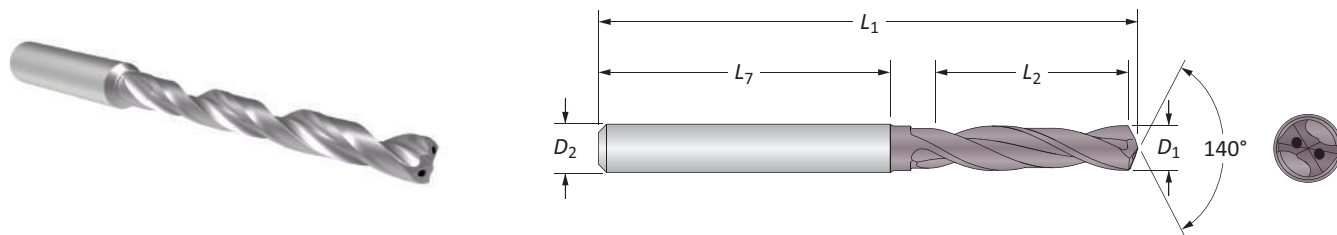
Sizes not shown are available as non-stocked standards. When ordering, please follow the examples shown below:

Inch	Diameter needed = 0.3450"	Part No. = 335E03450A21M
Metric	Diameter needed = 7.250mm	Part No. = 335M07250A21M

A DRILLING  
B BORING  
C REAMING  
D BURNISHING  
E THREADING  
X SPECIALS

## Solid Carbide Drills

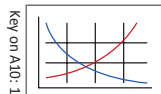
9xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



Fractional Equivalent	D <sub>1</sub>		Tap Size*	Body				Shank		Part No.
	inch	mm		L <sub>2</sub> inch	L <sub>2</sub> mm	L <sub>1</sub> inch	L <sub>1</sub> mm	L <sub>7</sub> mm	D <sub>2</sub> mm	
-	0.1969	5.00	M6x1	2.126	54	3.98	101.1	36	6	390M05000A21M
-	0.2362	6.00	M7x1	2.126	54	3.98	101.1	36	6	390M06000A21M
D	0.2461	6.25	-	2.835	72	4.86	123.4	36	8	390E02461A21M
1/4	0.2500	6.35	-	2.835	72	4.86	123.4	36	8	390E02500A21M
-	0.2559	6.50	-	2.835	72	4.86	123.4	36	8	390M06500A21M
17/64	0.2656	6.75	M8x1.25	2.835	72	4.86	123.4	36	8	390E02656A21M
I	0.2720	6.91	5/16-24	2.835	72	4.86	123.4	36	8	390E02720A21M
-	0.2756	7.00	M8x1	2.835	72	4.86	123.4	36	8	390M07000A21M
-	0.2953	7.50	-	2.835	72	4.86	123.4	36	8	390M07500A21M
19/64	0.2969	7.54	-	2.835	72	4.86	123.4	36	8	390E02969A21M
5/16	0.3125	7.94	3/8-16	2.835	72	4.86	123.4	36	8	390E03125A21M
-	0.3150	8.00	-	2.835	72	4.86	123.4	36	8	390M08000A21M
21/64	0.3281	8.33	-	3.543	90	5.74	145.8	40	10	390E03281A21M
Q	0.3319	8.43	3/8-24	3.543	90	5.74	145.8	40	10	390M08430A21M
-	0.3346	8.50	M10x1.5	3.543	90	5.74	145.8	40	10	390M08500A21M
-	0.3386	8.60	-	3.543	90	5.74	145.8	40	10	390M08600A21M
11/32	0.3438	8.73	-	3.543	90	5.74	145.8	40	10	390E03438A21M
-	0.3465	8.80	-	3.543	90	5.74	145.8	40	10	390M08800A21M
-	0.3543	9.00	-	3.543	90	5.74	145.8	40	10	390M09000A21M
23/64	0.3594	9.13	-	3.543	90	5.74	145.8	40	10	390E03594A21M
U	0.3680	9.35	7/16-14	3.543	90	5.74	145.8	40	10	390E03680A21M
-	0.3740	9.50	-	3.543	90	5.74	145.8	40	10	390M09500A21M
3/8	0.3750	9.53	-	3.543	90	5.74	145.8	40	10	390E03750A21M
-	0.3780	9.60	-	3.543	90	5.74	145.8	40	10	390M09600A21M
25/64	0.3906	9.92	7/16-20	3.543	90	5.74	145.8	40	10	390E03906A21M
-	0.3937	10.00	-	3.543	90	5.74	145.8	40	10	390M10000A21M
-	0.4016	10.20	M12x1.75	4.252	108	6.78	172.2	45	12	390M10200A21M
-	0.4040	10.26	-	4.252	108	6.78	172.2	45	12	390E04040A21M
13/32	0.4062	10.32	-	4.252	108	6.78	172.2	45	12	390E04062A21M
-	0.4134	10.50	-	4.252	108	6.78	172.2	45	12	390M10500A21M
27/64	0.4219	10.72	1/2-13	4.252	108	6.78	172.2	45	12	390E04219A21M
-	0.4331	11.00	-	4.252	108	6.78	172.2	45	12	390M11000A21M
7/16	0.4375	11.11	-	4.252	108	6.78	172.2	45	12	390E04375A21M
-	0.4528	11.50	-	4.252	108	6.78	172.2	45	12	390M11500A21M
29/64	0.4531	11.51	1/2-20	4.252	108	6.78	172.2	45	12	390E04531A21M
15/32	0.4688	11.91	-	4.252	108	6.78	172.2	45	12	390E04688A21M
-	0.4724	12.00	M14x2	4.252	108	6.78	172.2	45	12	390M12000A21M

\*Tap drill diameters allow approximately 75% of full thread to be produced

A10: 12 - 14



A10: 2



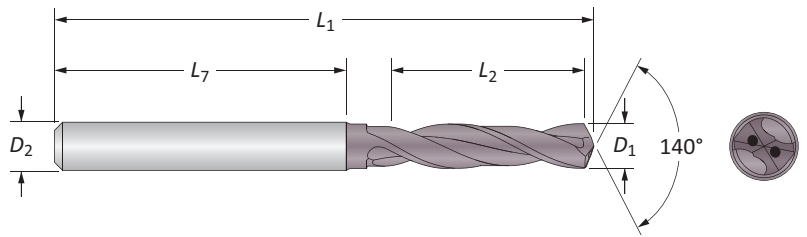
Sizes not shown are available as non-stocked standards.

When ordering, please follow the examples shown below:

<b>Inch</b>	Diameter needed = 0.3450"	Part No. = 335E03450A21M
<b>Metric</b>	Diameter needed = 7.250mm	Part No. = 335M07250A21M

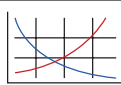

**Solid Carbide Drills**

9xD | Diameter Range: 0.1181" - 0.7874" (3.00mm - 20.00mm)



Fractional Equivalent	D <sub>1</sub>		Tap Size*	Body				Shank		Part No.
	inch	mm		L <sub>2</sub> inch	L <sub>2</sub> mm	L <sub>1</sub> inch	L <sub>1</sub> mm	L <sub>7</sub> mm	D <sub>2</sub> mm	
31/64	0.4844	12.30	9/16-12	4.961	126	7.58	192.5	45	14	390E04844A21M
-	0.4921	12.50	M14x1.5	4.961	126	7.58	192.5	45	14	390M12500A21M
1/2	0.5000	12.70	-	4.961	126	7.58	192.5	45	14	390E05000A21M
-	0.5118	13.00	-	4.961	126	7.58	192.5	45	14	390M13000A21M
33/64	0.5156	13.10	9/16-18	4.961	126	7.58	192.5	45	14	390E05156A21M
17/32	0.5312	13.49	5/8-11	4.961	126	7.58	192.5	45	14	390E05312A21M
-	0.5315	13.50	-	4.961	126	7.58	192.5	45	14	390M13500A21M
35/64	0.5469	13.89	5/8-12	4.961	126	7.58	192.5	45	14	390E05469A21M
-	0.5512	14.00	M16x2	4.961	126	7.58	192.5	45	14	390M14000A21M
9/16	0.5625	14.29	-	5.669	144	8.54	216.9	48	16	390E05625A21M
-	0.5709	14.50	M16x1.5	5.669	144	8.54	216.9	48	16	390M14500A21M
37/64	0.5781	14.68	5/8-18	5.669	144	8.54	216.9	48	16	390E05781A21M
-	0.5906	15.00	-	5.669	144	8.54	216.9	48	16	390M15000A21M
19/32	0.5938	15.08	-	5.669	144	8.54	216.9	48	16	390E05938A21M
39/64	0.6094	15.48	11/16-12	5.669	144	8.54	216.9	48	16	390E06094A21M
-	0.6102	15.50	M18x2.5	5.669	144	8.54	216.9	48	16	390M15500A21M
5/8	0.6250	15.88	-	5.669	144	8.54	216.9	48	16	390E06250A21M
-	0.6299	16.00	-	5.669	144	8.54	216.9	48	16	390M16000A21M
41/64	0.6406	16.27	-	6.378	162	9.34	237.3	48	18	390E06406A21M
-	0.6496	16.50	M18x1.5	6.378	162	9.34	237.3	48	18	390M16500A21M
21/32	0.6563	16.67	3/4-10	6.378	162	9.34	237.3	48	18	390E06563A21M
-	0.6693	17.00	-	6.378	162	9.34	237.3	48	18	390M17000A21M
43/64	0.6719	17.07	3/4-12	6.378	162	9.34	237.3	48	18	390E06719A21M
11/16	0.6875	17.46	3/4-16	6.378	162	9.34	237.3	48	18	390E06875A21M
-	0.6890	17.50	M20x2.5	6.378	162	9.34	237.3	48	18	390M17500A21M
45/64	0.7031	17.86	-	6.378	162	9.34	237.3	48	18	390E07031A21M
-	0.7087	18.00	-	6.378	162	9.34	237.3	48	18	390M18000A21M
23/32	0.7188	18.26	-	7.087	180	10.22	259.6	50	20	390E07188A21M
-	0.7283	18.50	M20x1.5	7.087	180	10.22	259.6	50	20	390M18500A21M
47/64	0.7344	18.65	-	7.087	180	10.22	259.6	50	20	390E07344A21M
-	0.7480	19.00	-	7.087	180	10.22	259.6	50	20	390M19000A21M
3/4	0.7500	19.05	-	7.087	180	10.22	259.6	50	20	390E07500A21M
49/64	0.7656	19.45	7/8-09	7.087	180	10.22	259.6	50	20	390E07656A21M
-	0.7677	19.50	M22x2.5	7.087	180	10.22	259.6	50	20	390M19500A21M
25/32	0.7813	19.84	-	7.087	180	10.22	259.6	50	20	390E07813A21M
-	0.7874	20.00	-	7.087	180	10.22	259.6	50	20	390M20000A21M

\*Tap drill diameters allow approximately 75% of full thread to be produced

A10: 12 - 14  A10: 2 

Sizes not shown are available as non-stocked standards. When ordering, please follow the examples shown below:

<b>Inch</b>	Diameter needed = 0.3450"	Part No. = 335E03450A21M
<b>Metric</b>	Diameter needed = 7.250mm	Part No. = 335M07250A21M

A DRILLING  
B BORING  
C REAMING  
D BURNISHING  
E THREADING  
X SPECIALS



## Recommended Drilling Data | Imperial (inch)

ISO	Material	Hardness (BHN)	Speed (SFM)	Feed Rate (IPR) by Diameter								
				0.118 - 0.157	0.161 - 0.236	0.240 - 0.315	0.319 - 0.394	0.398 - 0.472	0.476 - 0.551	0.555 - 0.630	0.634 - 0.709	0.713 - 0.787
P	Free Machining Steel 1118, 1215, 12L14, etc.	100 - 150	450	0.007	0.009	0.011	0.013	0.014	0.016	0.018	0.020	0.022
		150 - 200	400	0.005	0.008	0.009	0.011	0.012	0.014	0.016	0.018	0.020
		200 - 250	375	0.004	0.006	0.007	0.009	0.010	0.012	0.014	0.016	0.018
	Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	425	0.007	0.009	0.011	0.013	0.015	0.017	0.019	0.019	0.021
		125 - 175	390	0.006	0.008	0.010	0.012	0.014	0.016	0.018	0.018	0.020
		175 - 225	360	0.005	0.008	0.010	0.011	0.013	0.015	0.017	0.017	0.019
	Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	225 - 275	330	0.004	0.007	0.009	0.010	0.012	0.014	0.016	0.016	0.018
		125 - 175	390	0.006	0.008	0.010	0.012	0.013	0.014	0.016	0.018	0.020
		175 - 225	360	0.005	0.007	0.010	0.012	0.012	0.013	0.015	0.017	0.019
	Alloy Steel 4140, 5140, 8640, etc.	225 - 275	320	0.004	0.006	0.009	0.011	0.011	0.012	0.014	0.016	0.018
		275 - 325	285	0.003	0.006	0.008	0.010	0.010	0.011	0.013	0.015	0.017
		175 - 225	375	0.006	0.008	0.010	0.012	0.013	0.014	0.016	0.018	0.020
	High Strength Alloy 4340, 4330V, 300M, etc.	225 - 275	340	0.005	0.007	0.009	0.011	0.012	0.013	0.015	0.017	0.019
		275 - 325	300	0.004	0.006	0.008	0.010	0.011	0.012	0.013	0.016	0.018
		325 - 375	275	0.003	0.005	0.007	0.009	0.010	0.010	0.012	0.014	0.016
	Structural Steel A36, A285, A516, etc.	225 - 300	260	0.005	0.007	0.008	0.011	0.011	0.012	0.013	0.014	0.016
		300 - 350	210	0.004	0.006	0.007	0.009	0.010	0.011	0.012	0.013	0.015
		350 - 400	160	0.003	0.005	0.006	0.008	0.009	0.010	0.011	0.012	0.013
Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	100 - 150	360	0.005	0.008	0.009	0.011	0.012	0.013	0.014	0.016	0.018	
	150 - 250	320	0.004	0.007	0.008	0.010	0.011	0.012	0.013	0.015	0.017	
	250 - 350	270	0.003	0.005	0.007	0.008	0.009	0.010	0.011	0.013	0.015	
S	High Temp Alloy Hastelloy B, Inconel 600, etc.	150 - 200	260	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011
		200 - 250	220	0.002	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010
M	Stainless Steel 300 Series 304, 316, 17-4PH, etc.	140 - 220	120	0.003	0.004	0.005	0.006	0.007	0.008	0.009	0.010	0.011
		220 - 310	90	0.002	0.003	0.003	0.004	0.005	0.006	0.007	0.008	0.009
K	Nodular, Grey, Ductile Cast Iron	135 - 185	200	0.004	0.005	0.006	0.007	0.008	0.009	0.011	0.012	0.013
		185 - 275	140	0.003	0.004	0.004	0.005	0.006	0.007	0.009	0.010	0.011
		120 - 150	550	0.008	0.010	0.012	0.014	0.016	0.018	0.020	0.022	0.024
		150 - 200	500	0.008	0.010	0.012	0.014	0.016	0.018	0.020	0.022	0.024
		200 - 220	475	0.007	0.009	0.011	0.013	0.015	0.017	0.019	0.021	0.023
N	Cast Aluminum	220 - 260	430	0.007	0.009	0.011	0.013	0.015	0.017	0.019	0.021	0.023
		260 - 320	400	0.006	0.008	0.010	0.012	0.014	0.016	0.018	0.020	0.022
		30	1500	0.008	0.010	0.013	0.015	0.017	0.020	0.022	0.024	0.026
Wrought Aluminum	180	1000	0.006	0.008	0.011	0.013	0.015	0.018	0.020	0.022	0.024	
	30	1500	0.008	0.010	0.013	0.015	0.017	0.020	0.022	0.024	0.026	
		180	1000	0.006	0.008	0.011	0.013	0.015	0.018	0.020	0.022	0.024

### Speed and Feed Adjustment

3.5xD	6xD	9xD
See above chart	0.90	0.75

### Recommended Speed and Feed Example

If the recommended speed and feed is 300 SFM and 0.010 IPR, then reduce to 225 SFM and 0.0075 IPR when using a 9xD tool	
$300 \cdot 0.75 = 225 \text{ SFM}$	$0.010 \cdot 0.75 = 0.0075 \text{ IPR}$

### Calculations

Value	Formula
IPM	$\text{RPM} \cdot \text{IPR}$
SFM	$\text{RPM} \cdot 0.262 \cdot \text{DIA}$
RPM	$(\text{SFM} \cdot 3.82) / \text{DIA}$

**IMPORTANT:** The speeds and feeds listed above are a general starting point for all applications. Refer to the Coolant Recommendation charts for coolant requirements to run at the recommended speeds and feeds. Factory technical assistance is available through our Application Engineering department.

**Recommended Drilling Data | Metric (mm)**

ISO	Material	Hardness (BHN)	Speed (M/min)	Feed Rate (mm/rev) by Diameter								
				3.00 - 4.00	4.01 - 6.00	6.01 - 8.00	8.01 - 10.00	10.01 - 12.00	12.01 - 14.00	14.01 - 16.00	16.01 - 18.00	18.01 - 20.00
P	Free Machining Steel 1118, 1215, 12L14, etc.	100 - 150	137	0.18	0.23	0.28	0.33	0.36	0.41	0.46	0.51	0.56
		150 - 200	122	0.13	0.20	0.23	0.28	0.30	0.36	0.41	0.46	0.51
		200 - 250	114	0.10	0.15	0.18	0.23	0.25	0.30	0.36	0.41	0.46
	Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	130	0.18	0.23	0.28	0.33	0.38	0.43	0.48	0.48	0.53
		125 - 175	119	0.15	0.20	0.25	0.30	0.36	0.41	0.46	0.46	0.51
		175 - 225	110	0.13	0.20	0.25	0.28	0.33	0.38	0.43	0.43	0.48
	Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	225 - 275	101	0.10	0.18	0.23	0.25	0.30	0.36	0.41	0.41	0.46
		125 - 175	119	0.15	0.20	0.25	0.30	0.33	0.36	0.41	0.46	0.51
		175 - 225	110	0.13	0.18	0.25	0.30	0.30	0.33	0.38	0.43	0.48
	Alloy Steel 4140, 5140, 8640, etc.	225 - 275	98	0.10	0.15	0.23	0.28	0.28	0.30	0.36	0.41	0.48
		275 - 325	87	0.08	0.15	0.20	0.25	0.25	0.28	0.33	0.38	0.43
		275 - 325	91	0.10	0.15	0.20	0.25	0.28	0.30	0.33	0.41	0.46
	High Strength Alloy 4340, 4330V, 300M, etc.	325 - 375	84	0.08	0.13	0.18	0.23	0.25	0.25	0.30	0.36	0.41
		225 - 300	79	0.13	0.18	0.20	0.28	0.28	0.30	0.33	0.36	0.41
		300 - 350	64	0.10	0.15	0.18	0.23	0.25	0.28	0.30	0.33	0.38
	Structural Steel A36, A285, A516, etc.	350 - 400	49	0.08	0.13	0.15	0.20	0.23	0.25	0.28	0.30	0.33
		100 - 150	110	0.13	0.20	0.23	0.28	0.30	0.33	0.36	0.41	0.46
		150 - 250	98	0.10	0.18	0.20	0.25	0.28	0.30	0.33	0.38	0.43
Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	250 - 350	82	0.08	0.13	0.18	0.20	0.23	0.25	0.28	0.33	0.38	
	150 - 200	79	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.28	
S	High Temp Alloy Hastelloy B, Inconel 600, etc.	200 - 250	67	0.05	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25
		140 - 220	37	0.08	0.10	0.13	0.15	0.18	0.20	0.23	0.25	0.28
M	Stainless Steel 300 Series 304, 316, 17-4PH, etc.	220 - 310	27	0.05	0.08	0.08	0.10	0.13	0.15	0.18	0.20	0.23
		135 - 185	61	0.10	0.13	0.15	0.18	0.20	0.23	0.28	0.30	0.33
K	Nodular, Grey, Ductile Cast Iron	185 - 275	43	0.08	0.10	0.10	0.13	0.15	0.18	0.23	0.25	0.28
		120 - 150	168	0.20	0.25	0.30	0.36	0.41	0.46	0.51	0.56	0.61
		150 - 200	152	0.20	0.25	0.30	0.36	0.41	0.46	0.51	0.56	0.61
		200 - 220	145	0.18	0.23	0.28	0.33	0.38	0.43	0.48	0.53	0.58
		220 - 260	131	0.18	0.23	0.28	0.33	0.38	0.43	0.48	0.53	0.58
N	Cast Aluminum	260 - 320	122	0.15	0.20	0.25	0.30	0.36	0.41	0.46	0.51	0.56
		30	457	0.20	0.25	0.33	0.38	0.43	0.51	0.56	0.61	0.66
	Wrought Aluminum	180	305	0.15	0.20	0.28	0.33	0.38	0.46	0.51	0.56	0.61
		30	457	0.20	0.25	0.33	0.38	0.43	0.51	0.56	0.61	0.66
		180	305	0.15	0.20	0.28	0.33	0.38	0.46	0.51	0.56	0.61

**Speed and Feed Adjustment**

3.5xD	6xD	9xD
See above chart	0.90	0.75

**Recommended Speed and Feed Example**

If the recommended speed and feed is 91 M/min and 0.25 mm/rev, then reduce to 68 M/min and 0.19 mm/rev when using a 9xD tool	
$91 \cdot 0.75 = 68 \text{ M/min}$	$0.25 \cdot 0.75 = 0.19 \text{ mm/rev}$

**Calculations**

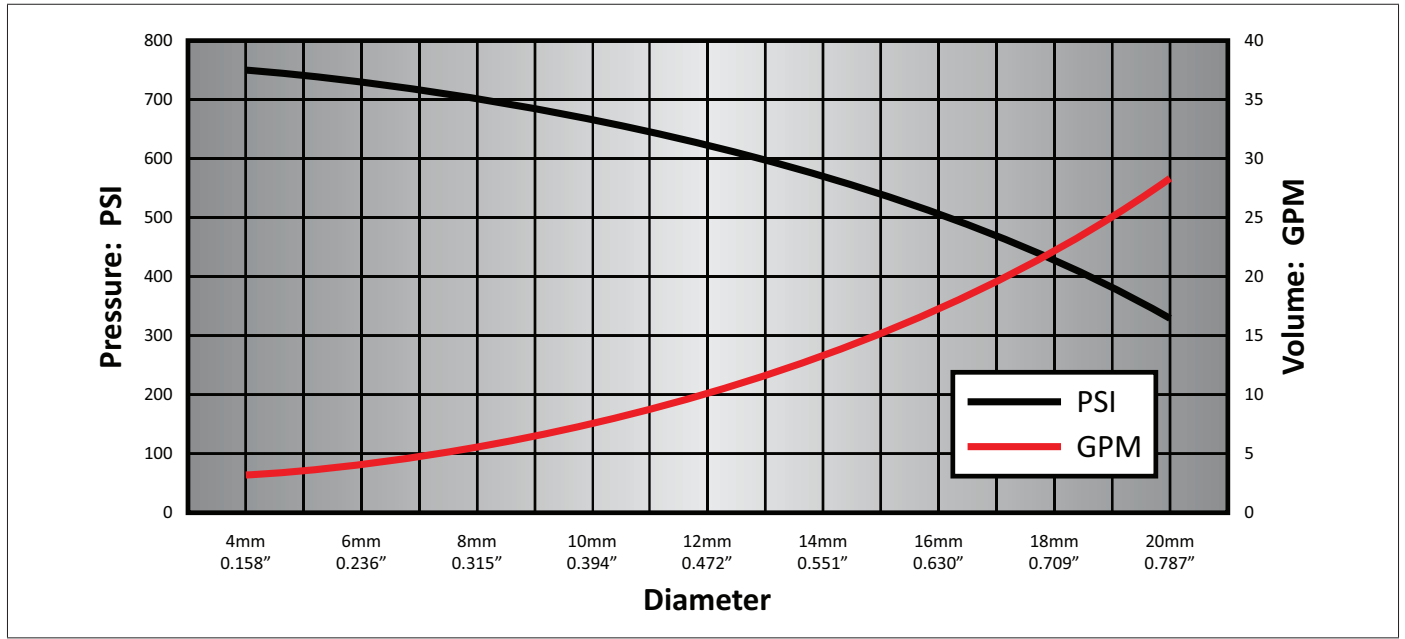
Value	Formula
mm/min	$\text{RPM} \cdot \text{mm/rev}$
M/min	$\text{RPM} \cdot 0.003 \cdot \text{DIA}$
RPM	$(\text{M/min} \cdot 318.47) / \text{DIA}$

**IMPORTANT:** The speeds and feeds listed above are a general starting point for all applications. Refer to the Coolant Recommendation charts for coolant requirements to run at the recommended speeds and feeds. Factory technical assistance is available through our Application Engineering department.

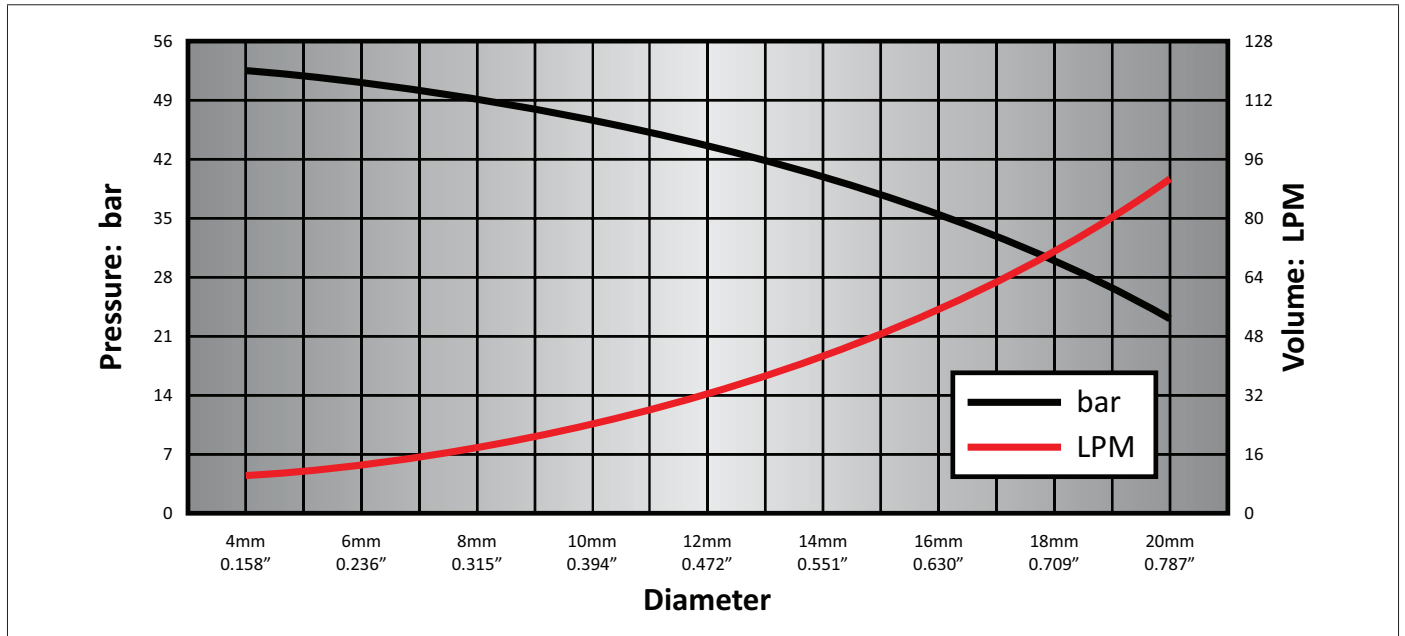
A  
DRILLING  
B  
BORING  
C  
REAMING  
D  
BURNISHING  
E  
THREADING  
X  
SPECIALS

## Coolant Recommendations

### Imperial (PSI)



### Metric (bar)



### Coolant Adjustment

Drill Length	Pressure and Flow
3.5xD	See above chart
6xD	1.5
9xD	2.0

### Coolant Recommendation Example

If the recommended coolant pressure and flow is 600 PSI and 12 GPM for a 3xD tool, the adjusted pressure and flow for a 9xD tool would be:

$600 \cdot 2 = 1200$ PSI	$12 \cdot 2 = 24$ GPM
--------------------------	-----------------------

**IMPORTANT:** The coolant pressure and flow rate recommendations above represent a good approximation to obtain optimum tool life and chip evacuation at Allied recommended speeds and feeds. If lower coolant capabilities exist in a drilling application, the ASC 320 drilling system will still function at reduced penetration rates. Contact our Application Engineering Department for a more specific recommendation of coolant requirements and/or speeds and feeds.





# Guaranteed Test / Demo Application Form

Distributor PO # \_\_\_\_\_

The following must be filled out completely before your test will be considered

## Distributor Information

Company Name: \_\_\_\_\_  
 Contact: \_\_\_\_\_  
 Account Number: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Email: \_\_\_\_\_

## End User Information

Company Name: \_\_\_\_\_  
 Contact: \_\_\_\_\_  
 Industry: \_\_\_\_\_  
 Phone: \_\_\_\_\_  
 Email: \_\_\_\_\_

**Current Process** List all tooling, coatings, substrates, speeds and feeds, tool life, and any problems you are experiencing

\_\_\_\_\_

\_\_\_\_\_

**Test Objective** List what would make this a successful test (i.e. penetration rate, finish, tool life, hole size, etc.)

\_\_\_\_\_

\_\_\_\_\_

## Application Information

Hole Diameter: _____ in/mm	Tolerance: _____	Material: _____ (4150 / A36 / Cast Iron / etc.)
Pre-existing Diameter: _____ in/mm	Depth of Cut: _____ in/mm	Hardness: _____ (BHN / Rc)
Required Finish: _____ RMS	State: _____ (Casting / Hot rolled / Forging)	

## Machine Information

Machine Type: _____ (Lathe / Screw machine / Machine center / etc.)	Builder: _____ (Haas, Mori Seiki, etc.)	Model #: _____
Shank Required: _____ (CAT50 / Morse taper, etc.)		Power: _____ HP/KW
Rigidity: _____	Orientation: _____	Tool Rotating: _____
<input type="checkbox"/> Excellent	<input type="checkbox"/> Vertical	<input type="checkbox"/> Yes
<input type="checkbox"/> Good	<input type="checkbox"/> Horizontal	<input type="checkbox"/> No
<input type="checkbox"/> Poor		Thrust: _____ lbs/N

## Coolant Information

Coolant Delivery: _____ (Through tool / Flood)	Coolant Pressure: _____ PSI / bar
Coolant Type: _____ (Air mist, oil, synthetic, water soluble, etc.)	Coolant Volume: _____ GPM / LPM

## Requested Tooling

QTY	Item Number	QTY	Item Number



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Allied Machine & Engineering warrants to original equipment manufacturers, distributors, industrial and commercial users of its products that each new product manufactured or supplied by Allied Machine shall be free from defects in material and workmanship.

Allied Machine's obligation under this warranty is limited to furnishing without additional charge a replacement or, at its option repairing or issuing credit for any product which shall within one year from the date of sale be returned freight prepaid to the plant designated by an Allied Machine representative and which upon inspection is determined by Allied Machine to be defective in materials or workmanship.

Complete information as to operating conditions, machine, set-up, and application of cutting fluid should accompany any product returned for inspection. The provisions of this warranty shall not apply to any Allied Machine products which have been subjected to misuse, improper operating conditions, machine set-up or application of cutting fluid or which have been repaired or altered if such repair or alteration in the judgment of Allied Machine would adversely affect performance of the product.

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Literature Order Number: A10-ASC  
Publish Date: June 2018