



# ALLIED MACHINE & ENGINEERING

Holemaking Solutions for Today's Manufacturing



Boring



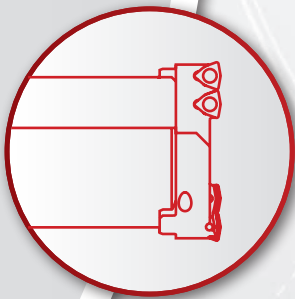
Reaming



Burnishing



Threading



Specials



## Drilling

► Opening Drill®

Large Diameter IC Insert Drilling System

## The Foundation

Since 1941, Allied Machine & Engineering has provided dependable and practical holmaking 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: holmaking.

## 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 holmaking 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 Future

Allied Machine is constantly investing in the brightest and sharpest minds, shaping a future filled with success and quality for customers around the world.



**Steve Stokey**  
Executive Vice President

**William H. Stokey**  
President and CEO

**Mike Stokey**  
Executive Vice President



# ALLIED MACHINE & ENGINEERING

Holemaking Solutions for Today's Manufacturing

**WOHLHAUPTER**



**SUPERION**

**CRITERION**

# DRILLING

## High Penetration



GEN3SYS® XT Pro



GEN3SYS® XT



ASC 320®

## General Production

(certain sizes are ideal for deep hole drilling and/or large diameter drilling)



GEN2 T-A®



Original T-A®



High Performance



Universal

## Large Diameter



Revolution Drill®



Opening Drill®

## Large Diameter / Deep Hole



APX Drill



BT-A Drill

## Deep Hole



Guided T-A® Drill  
(special)

## Porting



AccuPort 432®

## Structural Steel



GEN3SYS® XT



T-A®

# BORING



**WOHLHAUPTER®**

Bringing you the finest in precision cutting tools

**CRITERION™**



# REAMING



ALVAN®  
Reaming Systems

**S.C.A.M.I.®**

# BURNISHING



S.C.A.M.I.®  
Roller Burnishing

# THREADING



AccuThread™ 856  
Pin Style Indexable



AccuThread™ 856  
Bolt-in Style Indexable



AccuThread™ 856  
Solid Carbide



ThreadMills USA  
Solid Carbide



# SPECIALS



Insta-Quote™  
Online custom tool builder and quote generator



i-Form  
Custom indexable drill / form tool system

## Engineered Specials

If your special holmaking needs cannot be met with the Insta-Quote system, Allied Machine can specially engineer ANY product to make your application a success. Simply contact your local Field Sales Engineer or the Allied Machine Application Engineering department for assistance with creating your special tooling. Let Allied Machine resolve your challenges today.

Allied Machine & Engineering patent information can be found at [www.alliedmachine.com/patents](http://www.alliedmachine.com/patents)

# Opening Drill®

## Large Diameter Replaceable IC Insert Drilling System

► **Diameter Range:** 2.000" - 5.620" (50.8mm - 142.8mm)



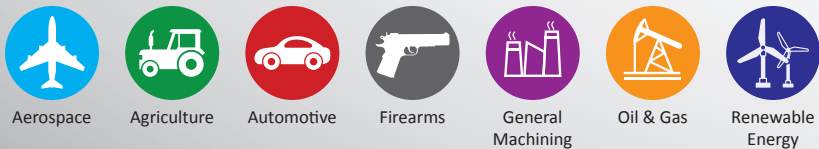
### Need larger holes? No problem.

The Opening Drill is an extremely effective tool designed to enlarge existing holes. It is available in nine different shank styles: Straight, ABS 63, CAT V40, CAT V50, HSK 63A/C, HSK 100A/C, BT 40, BT 50, and DIN50.

In a *single* operation, an existing hole can be opened and large amounts of material can be removed. The insert design reduces chip size and improves evacuation. Also, inventory and cost are reduced by the adjustable diameters.

Excellent chip control	Improves hole quality and surface finish	Provides maximum durability and stability
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### Applicable Industries



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.

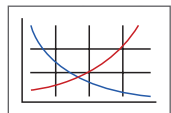
## Reference Icons

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

Series	Diameter Range	
	Imperial (inch)	Metric (mm)
OP1	2.00 - 2.50	50.8 - 63.5
OP2	2.50 - 3.00	63.5 - 76.2
OP3	3.00 - 4.12	76.2 - 104.7
OP4	4.12 - 5.62	104.7 - 142.8

## Introduction Information

Product Overview	2
Set-up Instructions	3
Product Nomenclature	4

## Drill Shank Style

Straight	5
CAT40	6
CAT50	7
BT40	8
BT50	9
HSK63	10
HSK100	11
ABS63	12
DIN50	13

## Recommended Cutting Data

Imperial (inch)	14 - 15
Metric (mm)	16 - 17



## Product Overview

### Features

- Can be used as a rotating or stationary tool
- Can be used in rough boring operations
- Available in multiple different shanks (see chart below)
- Smooth cutting action and quiet operations in lathes and mills
- Special lengths, diameters, and shanks are available upon request

### Advantages

- Opens an existing hole in a single operation
- Ignores core shifts up to 1/8" (3.175mm) providing straight and true holes without the need for boring
- Allows for large amounts of material removal
- Unique design enables larger holes to be made on low horsepower machines
- Replaceable cartridges protect your investment
- Adjustable diameters reduce inventory and cost

### Shank Options



Straight



CAT40



CAT50



BT40



BT50



HSK63



HSK100



DIN50



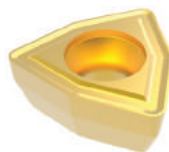
ABS63



AM300°



AM200°



TiN



2 Inserts  
(OP1 - OP3 series)



3 Inserts  
(OP4 series)

### Insert Application Recommendations

#### Carbide Grade Options

C5 (P35)	General purpose carbide grade suitable for most applications. ▶ Common application in steels and stainless steels.
C1 (K35)	Toughest carbide grade. Provides the best combination of edge strength and tool life. ▶ Recommended for less rigid applications.
C2 (K25)	Higher wear resistant carbide suitable for abrasive material applications. ▶ Recommended for grey, ductile, and nodular irons.

#### Additional Geometry Option

High Rake (HR)	Provides superior chip control and tool life in long chipping carbon and alloy steels below 200 Bhn.
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### IC Inserts

- The design allows for excellent chip control and aggressive penetration rates
- The proprietary AM200° and AM300° coatings increase tool life above competitors' premium coatings
- The same inserts are used for both Revolution Drill and Opening Drill products



## Set-up Instructions



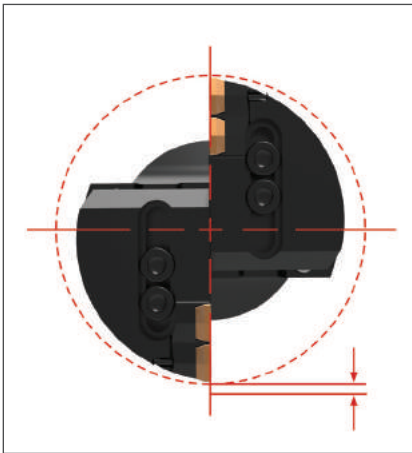
**Step 1:**  
Loosen the mounting screws on both cartridges.



**Step 2:**  
Set one cartridge to the finish diameter by tightening the adjustment screw against the adjustment pin.



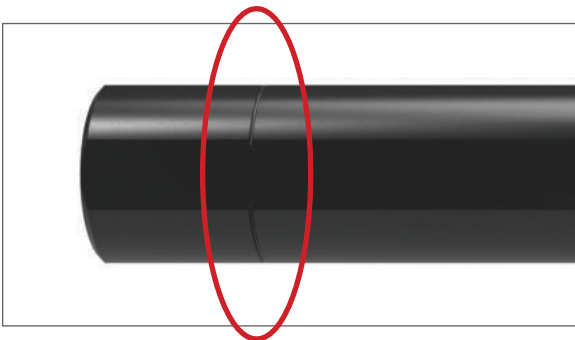
**Step 3:**  
Tighten the mounting screws on the cartridge to 11-14 ft-lbf (15-19 N-m).



**Step 4:**  
Set the opposing cartridge with 0.160" to 0.200" radial offset inward by tightening the adjustment screw against the adjustment pin (optimum situation for each insert to remove equal material).



**Step 5:**  
Tighten the mounting screws on the cartridge to 11-14 ft-lbf (15-19 N-m).



### Straight Shanks

- Designed for lathe applications
- Can be cut off for use in end-mill holders
- The score mark (circled to the left) is provided for recommended cut length
- Cut and deburr at the score mark
- This improves rigidity when the body sits against the face of an end-mill holder

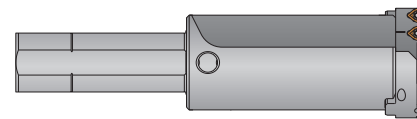




## Product Nomenclature

### Opening Drill Holders

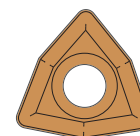
<b>OP1</b>	–	<b>1S</b>	–	<b>SS1.5</b>
1		2		3



1. Series	2. Length	3. Shank Type
<b>OP1</b> = 2.00" - 2.50" (50.8mm - 63.5mm) <b>OP2</b> = 2.50" - 3.00" (63.5mm - 76.2mm) <b>OP3</b> = 3.00" - 4.12" (76.2mm - 104.7mm) <b>OP4</b> = 4.12" - 5.62" (104.7mm - 142.8mm)	<b>1S</b> = Short <b>1L</b> = Long	<b>SS1.5</b> = 1-1/2Ø straight <b>SS2.5</b> = 2-1/2Ø straight <b>40M</b> = 40mm straight <b>50M</b> = 50mm straight <b>CV40</b> = CAT40 <b>CV50</b> = CAT50 <b>BT40</b> = BT40 <b>BT50</b> = BT50 <b>HSK63</b> = HSK 63A/C <b>HSK100</b> = HSK 100A/C <b>ABS63</b> = ABS63 <b>DV50</b> = DIN50

### Opening Drill Inserts

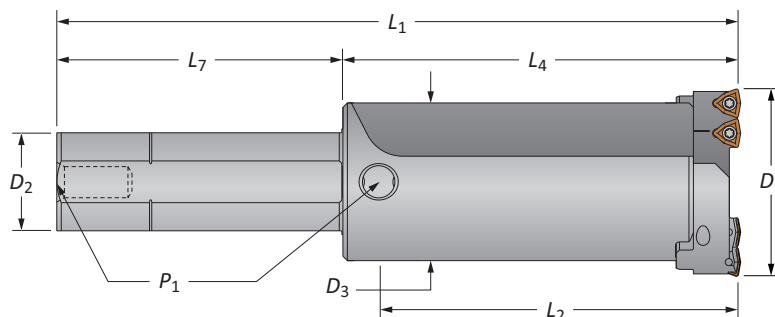
<b>OP</b>	–	<b>05</b>	<b>T3</b>	<b>08</b>	–	<b>1</b>	<b>H</b>	<b>HR</b>
1		2	3	4		5	6	7



1. Compatible with:	2. IC Type	3. Thickness	4. Radius	5. Carbide Grade
Opening Drill Revolution Drill	<b>05</b> = 5/16"	<b>T3</b> = 5/32"	<b>08</b> = 1/32"	<b>Blank</b> = C5 (P35) <b>1</b> = C1 (K35) <b>2</b> = C2 (K25)
6. Coating	7. Geometry			
<b>P</b> = AM300® <b>H</b> = AM200® <b>T</b> = TiN <b>A</b> = TiAlN <b>N</b> = TiCN <b>U</b> = Uncoated	<b>Blank</b> = General Purpose <b>HR</b> = High Rake			

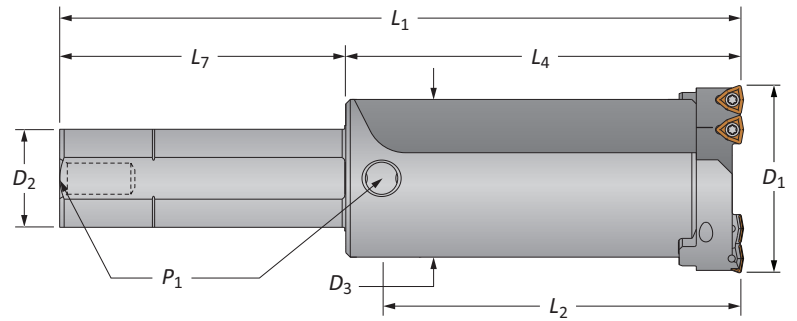
### Reference Key

Symbol	Attribute
<b>D<sub>1</sub></b>	Drill diameter range
<b>D<sub>2</sub></b>	Shank diameter
<b>D<sub>3</sub></b>	Body diameter
<b>L<sub>1</sub></b>	Overall length
<b>L<sub>2</sub></b>	Maximum drill depth
<b>L<sub>4</sub></b>	Holder length
<b>L<sub>7</sub></b>	Shank length
<b>P<sub>1</sub></b>	Rear pipe tap



## Opening Drill Holders

Straight Shank | Diameter Range: 2.00" - 5.62" (50.8mm - 142.8mm)



### Holders

			Holder				Shank				
Length		D <sub>1</sub> Range	D <sub>3</sub>	L <sub>2</sub>	L <sub>4</sub>	L <sub>1</sub>	D <sub>2</sub>	L <sub>7</sub>	P <sub>1</sub>	Part No.	Cartridges
i	Short	2.00 - 2.50	1.840	3-9/32	4-3/64	8-3/64	1-1/2	4	1/4 NPT	OP1-1S-SS1.5	OP1-WC05
	Long	2.00 - 2.50	1.840	5-17/32	6-19/64	10-19/64	1-1/2	4	1/4 NPT	OP1-1L-SS1.5	OP1-WC05
	Short	2.50 - 3.00	2.220	4-43/64	5-1/2	9-1/2	1-1/2	4	1/4 NPT	OP2-1S-SS1.5	OP2-WC05
	Long	2.50 - 3.00	2.220	7-43/64	8-1/2	12-1/2	1-1/2	4	1/4 NPT	OP2-1L-SS1.5	OP2-WC05
	Short	3.00 - 4.12	2.806	5-7/64	6	10	1-1/2	4	1/4 NPT	OP3-1S-SS1.5	OP3-WC05
	Long	3.00 - 4.12	2.806	9-7/64	10	14	1-1/2	4	1/4 NPT	OP3-1L-SS1.5	OP3-WC05
	Short	4.12 - 5.62	3.500	5-1/64	6	10-1/2	2	4-1/2	1/4 NPT	OP4-1S-SS2.0	OP4-WC05
	Long	4.12 - 5.62	3.500	10-33/64	11-1/2	16	2	4-1/2	1/4 NPT	OP4-1L-SS2.0	OP4-WC05
m	Short	50.8 - 63.5	1.840	83.5	102.9	172.9	40	70	–	OP1-1S-40M	OP1-WC05
	Long	50.8 - 63.5	1.840	140.6	160.1	230.1	40	70	–	OP1-1L-40M	OP1-WC05
	Short	63.5 - 76.2	2.220	118.5	139.8	209.8	40	70	–	OP2-1S-40M	OP2-WC05
	Long	63.5 - 76.2	2.220	194.7	216.0	286.0	40	70	–	OP2-1L-40M	OP2-WC05
	Short	76.2 - 104.7	2.806	129.9	152.5	222.5	40	70	–	OP3-1S-40M	OP3-WC05
	Long	76.2 - 104.7	2.806	231.5	254.1	324.1	40	70	–	OP3-1L-40M	OP3-WC05
	Short	104.7 - 142.8	3.500	127.4	152.5	232.5	50	80	–	OP4-1S-50M	OP4-WC05
	Long	104.7 - 142.8	3.500	254.4	292.2	372.2	50	80	–	OP4-1L-50M	OP4-WC05

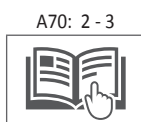
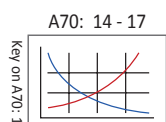
\*Holder includes cartridges; however, inserts are sold separately.

### Cartridges

Replacement Cartridges	Qty. Inserts Needed	Mounting Screw	Adjusting Screw
OP1-WC05	2	MS-13M-1	AS-10T9-1
OP2-WC05	2	MS-15M-1	AS-10T9-1
OP3-WC05	2	MS-15M-1	AS-12T9-1
OP4-WC05	3	MS-15M-1	AS-14T9-1

### IC Inserts

		Part No.			Insert Screws
Carbide Grade	Geometry	AM300®	AM200®	TiN	
C5 (P35)	Standard	OP-05T308-P	OP-05T308-H	OP-05T308-T	IS-10-1
C1 (K35)	Standard	OP-05T308-1P	OP-05T308-1H	OP-05T308-1T	IS-10-1
C2 (K25)	Standard	OP-05T308-2P	OP-05T308-2H	—	IS-10-1
C5 (P35)	High Rake	OP-05T308-PHR	OP-05T308-HHR	—	IS-10-1



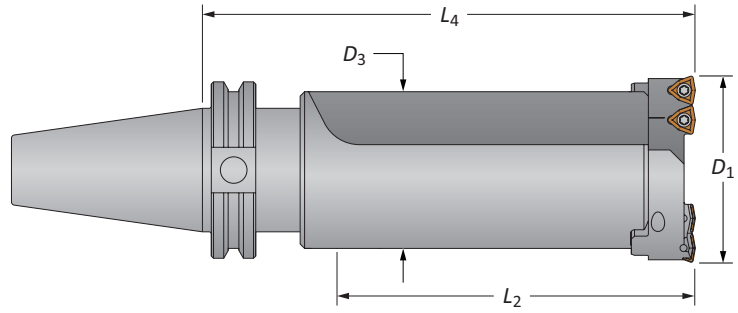
Mounting screws sold in multiples of 4 | Adjusting screws sold in multiples of 4  
IC inserts sold in multiples of 10 | Insert screws sold in multiples of 10

i = Imperial (in)  
m = Metric (mm)



## Opening Drill Holders

CAT40 Shank | Diameter Range: 2.00" - 5.62" (50.8mm - 142.8mm)



### Holder

			Holder				
Length		D <sub>1</sub> Range	D <sub>3</sub>	L <sub>2</sub>	L <sub>4</sub>	Part No.	Cartridges
i	Short	2.00 - 2.50	1.840	3-9/32	5-27/64	OP1-1S-CV40	OP1-WC05
	Long	2.00 - 2.50	1.840	5-17/32	7-43/64	OP1-1L-CV40	OP1-WC05
	Short	2.50 - 3.00	2.220	4-43/64	6-7/8	OP2-1S-CV40	OP2-WC05
	Long	2.50 - 3.00	2.220	7-43/64	9-7/8	OP2-1L-CV40	OP2-WC05
	Short	3.00 - 4.12	2.806	5-7/64	7-3/8	OP3-1S-CV40	OP3-WC05
	Long	3.00 - 4.12	2.806	9-7/64	11-3/8	OP3-1L-CV40	OP3-WC05
	Short	4.12 - 5.62	3.500	5-1/64	7-3/8	OP4-1S-CV40	OP4-WC05

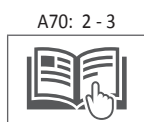
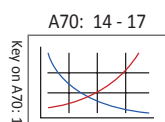
\*Holder includes cartridges; however, inserts are sold separately.

### Cartridges

Replacement Cartridges	Qty. Inserts Needed	Mounting Screw	Adjusting Screw
OP1-WC05	2	MS-13M-1	AS-10T9-1
OP2-WC05	2	MS-15M-1	AS-10T9-1
OP3-WC05	2	MS-15M-1	AS-12T9-1
OP4-WC05	3	MS-15M-1	AS-14T9-1

### IC Inserts

Carbide Grade	Geometry	Part No.			Insert Screws
		AM300®	AM200®	TiN	
C5 (P35)	Standard	OP-05T308-P	OP-05T308-H	OP-05T308-T	IS-10-1
C1 (K35)	Standard	OP-05T308-1P	OP-05T308-1H	OP-05T308-1T	IS-10-1
C2 (K25)	Standard	OP-05T308-2P	OP-05T308-2H	—	IS-10-1
C5 (P35)	High Rake	OP-05T308-PHR	OP-05T308-HHR	—	IS-10-1

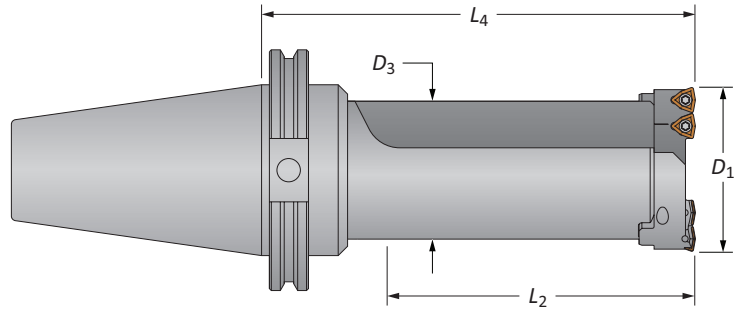


Mounting screws sold in multiples of 4 | Adjusting screws sold in multiples of 4  
IC inserts sold in multiples of 10 | Insert screws sold in multiples of 10

i = Imperial (in)  
m = Metric (mm)

## Opening Drill Holders

CAT50 Shank | Diameter Range: 2.00" - 5.62" (50.8mm - 142.8mm)



### Holder

	Length	D <sub>1</sub> Range	Holder			Part No.	Cartridges
			D <sub>3</sub>	L <sub>2</sub>	L <sub>4</sub>		
i	Short	2.00 - 2.50	1.840	3-9/32	5-27/64	OP1-1S-CV50	OP1-WC05
	Long	2.00 - 2.50	1.840	5-17/32	7-43/64	OP1-1L-CV50	OP1-WC05
	Short	2.50 - 3.00	2.220	4-43/64	6-7/8	OP2-1S-CV50	OP2-WC05
	Long	2.50 - 3.00	2.220	7-43/64	9-7/8	OP2-1L-CV50	OP2-WC05
	Short	3.00 - 4.12	2.806	5-7/64	7-3/8	OP3-1S-CV50	OP3-WC05
	Long	3.00 - 4.12	2.806	9-7/64	11-3/8	OP3-1L-CV50	OP3-WC05
	Short	4.12 - 5.62	3.500	5-1/64	7-3/8	OP4-1S-CV50	OP4-WC05
	Long	4.12 - 5.62	3.500	10-33/64	12-7/8	OP4-1L-CV50	OP4-WC05

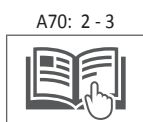
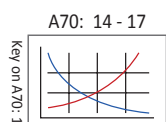
\*Holder includes cartridges; however, inserts are sold separately.

### Cartridges

Replacement Cartridges	Qty. Inserts Needed	Mounting Screw	Adjusting Screw
OP1-WC05	2	MS-13M-1	AS-10T9-1
OP2-WC05	2	MS-15M-1	AS-10T9-1
OP3-WC05	2	MS-15M-1	AS-12T9-1
OP4-WC05	3	MS-15M-1	AS-14T9-1

### IC Inserts

Carbide Grade	Geometry	Part No.			Insert Screws
		AM300®	AM200®	TiN	
C5 (P35)	Standard	OP-05T308-P	OP-05T308-H	OP-05T308-T	IS-10-1
C1 (K35)	Standard	OP-05T308-1P	OP-05T308-1H	OP-05T308-1T	IS-10-1
C2 (K25)	Standard	OP-05T308-2P	OP-05T308-2H	—	IS-10-1
C5 (P35)	High Rake	OP-05T308-PHR	OP-05T308-HHR	—	IS-10-1

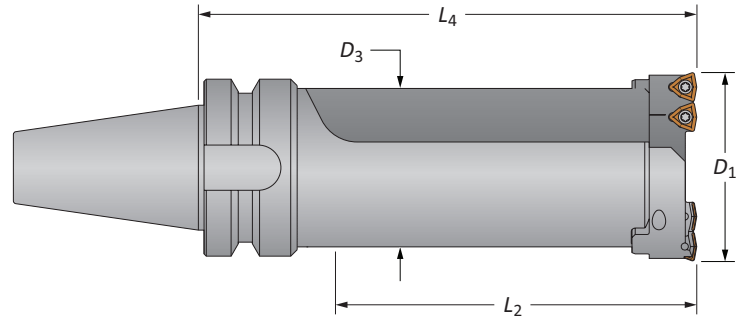


Mounting screws sold in multiples of 4 | Adjusting screws sold in multiples of 4  
IC inserts sold in multiples of 10 | Insert screws sold in multiples of 10

i = Imperial (in)  
m = Metric (mm)

## Opening Drill Holders

BT40 Shank | Diameter Range: 2.00" - 5.62" (50.8mm - 142.8mm)



### Holder

		Holder			Part No.	Cartridges
Length	D <sub>1</sub> Range	D <sub>3</sub>	L <sub>2</sub>	L <sub>4</sub>		
m	Short	50.8 - 63.5	1.840	83.5	OP1-1S-BT40	OP1-WC05
	Long	50.8 - 63.5	1.840	140.6	OP1-1L-BT40	OP1-WC05
	Short	63.5 - 76.2	2.220	118.5	OP2-1S-BT40	OP2-WC05
	Long	63.5 - 76.2	2.220	194.7	OP2-1L-BT40	OP2-WC05
	Short	76.2 - 104.7	2.806	129.9	OP3-1S-BT40	OP3-WC05
	Long	76.2 - 104.7	2.806	231.5	OP3-1L-BT40	OP3-WC05
	Short	104.7 - 142.8	3.500	127.4	OP4-1S-BT40	OP4-WC05

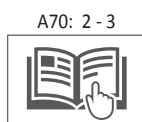
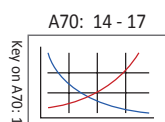
\*Holder includes cartridges; however, inserts are sold separately.

### Cartridges

Replacement Cartridges	Qty. Inserts Needed	Mounting Screw	Adjusting Screw
OP1-WC05	2	MS-13M-1	AS-10T9-1
OP2-WC05	2	MS-15M-1	AS-10T9-1
OP3-WC05	2	MS-15M-1	AS-12T9-1
OP4-WC05	3	MS-15M-1	AS-14T9-1

### IC Inserts

		Part No.			Insert Screws
Carbide Grade	Geometry	AM300®	AM200®	TiN	
C5 (P35)	Standard	OP-05T308-P	OP-05T308-H	OP-05T308-T	IS-10-1
C1 (K35)	Standard	OP-05T308-1P	OP-05T308-1H	OP-05T308-1T	IS-10-1
C2 (K25)	Standard	OP-05T308-2P	OP-05T308-2H	—	IS-10-1
C5 (P35)	High Rake	OP-05T308-PHR	OP-05T308-HHR	—	IS-10-1



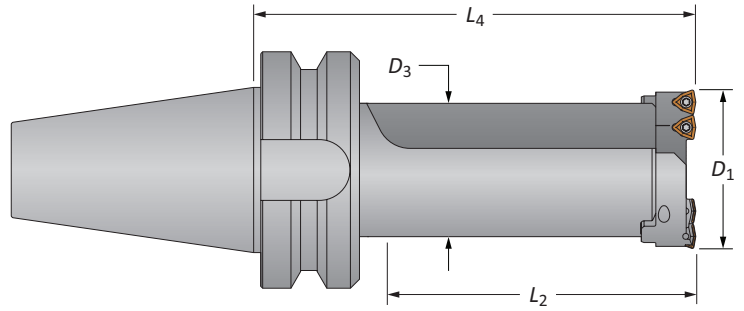
Mounting screws sold in multiples of 4 | Adjusting screws sold in multiples of 4  
IC inserts sold in multiples of 10 | Insert screws sold in multiples of 10

i = Imperial (in)  
m = Metric (mm)



## Opening Drill Holders

BT50 Shank | Diameter Range: 2.00" - 5.62" (50.8mm - 142.8mm)



### Holder

	Length	D <sub>1</sub> Range	Holder			Part No.	Cartridges
			D <sub>3</sub>	L <sub>2</sub>	L <sub>4</sub>		
m	Short	50.8 - 63.5	1.840	83.5	147.4	OP1-1S-BT50	OP1-WC05
	Long	50.8 - 63.5	1.840	140.6	204.5	OP1-1L-BT50	OP1-WC05
	Short	63.5 - 76.2	2.220	118.5	174.7	OP2-1S-BT50	OP2-WC05
	Long	63.5 - 76.2	2.220	194.7	260.4	OP2-1L-BT50	OP2-WC05
	Short	76.2 - 104.7	2.806	129.9	196.9	OP3-1S-BT50	OP3-WC05
	Long	76.2 - 104.7	2.806	231.5	298.5	OP3-1L-BT50	OP3-WC05
	Short	104.7 - 142.8	3.500	127.4	196.9	OP4-1S-BT50	OP4-WC05
	Long	104.7 - 142.8	3.500	254.4	336.5	OP4-1L-BT50	OP4-WC05

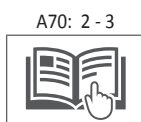
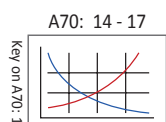
\*Holder includes cartridges; however, inserts are sold separately.

### Cartridges

Replacement Cartridges	Qty. Inserts Needed	Mounting Screw	Adjusting Screw
OP1-WC05	2	MS-13M-1	AS-10T9-1
OP2-WC05	2	MS-15M-1	AS-10T9-1
OP3-WC05	2	MS-15M-1	AS-12T9-1
OP4-WC05	3	MS-15M-1	AS-14T9-1

### IC Inserts

Carbide Grade	Geometry	Part No.			Insert Screws
		AM300®	AM200®	TiN	
C5 (P35)	Standard	OP-05T308-P	OP-05T308-H	OP-05T308-T	IS-10-1
C1 (K35)	Standard	OP-05T308-1P	OP-05T308-1H	OP-05T308-1T	IS-10-1
C2 (K25)	Standard	OP-05T308-2P	OP-05T308-2H	—	IS-10-1
C5 (P35)	High Rake	OP-05T308-PHR	OP-05T308-HHR	—	IS-10-1

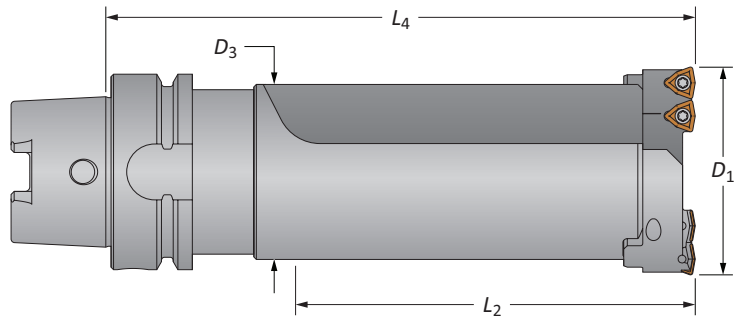


Mounting screws sold in multiples of 4 | Adjusting screws sold in multiples of 4  
IC inserts sold in multiples of 10 | Insert screws sold in multiples of 10

ⓘ = Imperial (in)  
Ⓜ = Metric (mm)

## Opening Drill Holders

HSK63 Shank | Diameter Range: 2.00" - 5.62" (50.8mm - 142.8mm)



### Holder

			Holder				
Length		D <sub>1</sub> Range	D <sub>3</sub>	L <sub>2</sub>	L <sub>4</sub>	Part No.	Cartridges
i	Short	2.00 - 2.50	1.840	3-9/32	5-59/64	OP1-1S-HSK63	OP1-WC05
	Long	2.00 - 2.50	1.840	5-17/32	8-11/64	OP1-1L-HSK63	OP1-WC05
	Short	2.50 - 3.00	2.220	4-43/64	7-3/8	OP2-1S-HSK63	OP2-WC05
	Long	2.50 - 3.00	2.220	7-43/64	10-3/8	OP2-1L-HSK63	OP2-WC05
	Short	3.00 - 4.12	2.806	5-7/64	7-7/8	OP3-1S-HSK63	OP3-WC05
	Long	3.00 - 4.12	2.806	9-7/64	11-7/8	OP3-1L-HSK63	OP3-WC05
	Short	4.12 - 5.62	3.500	5-1/64	7-7/8	OP4-1S-HSK63	OP4-WC05

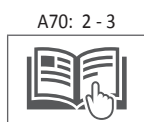
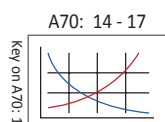
\*Holder includes cartridges; however, inserts are sold separately.

### Cartridges

Replacement Cartridges	Qty. Inserts Needed	Mounting Screw	Adjusting Screw
OP1-WC05	2	MS-13M-1	AS-10T9-1
OP2-WC05	2	MS-15M-1	AS-10T9-1
OP3-WC05	2	MS-15M-1	AS-12T9-1
OP4-WC05	3	MS-15M-1	AS-14T9-1

### IC Inserts

Carbide Grade	Geometry	Part No.			Insert Screws
		AM300®	AM200®	TiN	
C5 (P35)	Standard	OP-05T308-P	OP-05T308-H	OP-05T308-T	IS-10-1
C1 (K35)	Standard	OP-05T308-1P	OP-05T308-1H	OP-05T308-1T	IS-10-1
C2 (K25)	Standard	OP-05T308-2P	OP-05T308-2H	—	IS-10-1
C5 (P35)	High Rake	OP-05T308-PHR	OP-05T308-HHR	—	IS-10-1



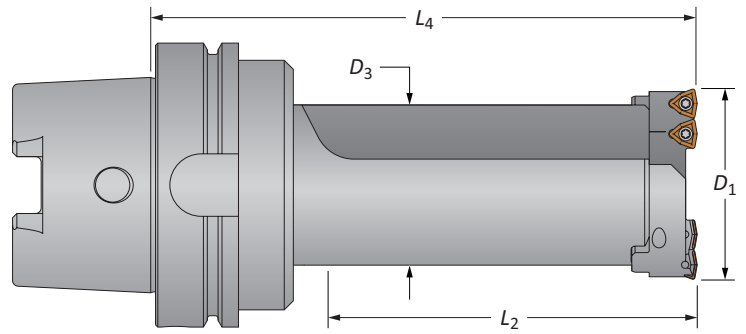
Mounting screws sold in multiples of 4 | Adjusting screws sold in multiples of 4  
IC inserts sold in multiples of 10 | Insert screws sold in multiples of 10

i = Imperial (in)  
m = Metric (mm)



## Opening Drill Holders

HSK100 Shank | Diameter Range: 2.00" - 5.62" (50.8mm - 142.8mm)



### Holdings

	Length	D <sub>1</sub> Range	Holder			Part No.	Cartridges
			D <sub>3</sub>	L <sub>2</sub>	L <sub>4</sub>		
i	Short	2.00 - 2.50	1.840	3-9/32	6-1/64	OP1-1S-HSK100	OP1-WC05
	Long	2.00 - 2.50	1.840	5-17/32	8-17/64	OP1-1L-HSK100	OP1-WC05
	Short	2.50 - 3.00	2.220	4-43/64	7-15/32	OP2-1S-HSK100	OP2-WC05
	Long	2.50 - 3.00	2.220	7-43/64	10-15/32	OP2-1L-HSK100	OP2-WC05
	Short	3.00 - 4.12	2.806	5-7/64	7-31/32	OP3-1S-HSK100	OP3-WC05
	Long	3.00 - 4.12	2.806	9-7/64	11-31/32	OP3-1L-HSK100	OP3-WC05
	Short	4.12 - 5.62	3.500	5-1/64	7-31/32	OP4-1S-HSK100	OP4-WC05
	Long	4.12 - 5.62	3.500	10-33/64	13-15/32	OP4-1L-HSK100	OP4-WC05

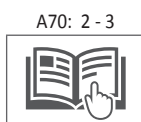
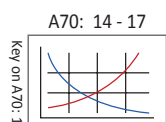
\*Holder includes cartridges; however, inserts are sold separately.

### Cartridges

Replacement Cartridges	Qty. Inserts Needed	Mounting Screw	Adjusting Screw
OP1-WC05	2	MS-13M-1	AS-10T9-1
OP2-WC05	2	MS-15M-1	AS-10T9-1
OP3-WC05	2	MS-15M-1	AS-12T9-1
OP4-WC05	3	MS-15M-1	AS-14T9-1

### IC Inserts

Carbide Grade	Geometry	Part No.			Insert Screws
		AM300®	AM200®	TiN	
C5 (P35)	Standard	OP-05T308-P	OP-05T308-H	OP-05T308-T	IS-10-1
C1 (K35)	Standard	OP-05T308-1P	OP-05T308-1H	OP-05T308-1T	IS-10-1
C2 (K25)	Standard	OP-05T308-2P	OP-05T308-2H	-	IS-10-1
C5 (P35)	High Rake	OP-05T308-PHR	OP-05T308-HHR	-	IS-10-1



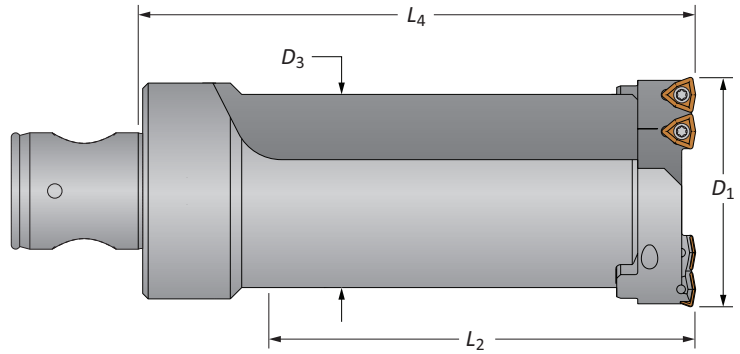
Mounting screws sold in multiples of 4 | Adjusting screws sold in multiples of 4  
IC inserts sold in multiples of 10 | Insert screws sold in multiples of 10

i = Imperial (in)  
m = Metric (mm)



## Opening Drill Holders

ABS63 Shank | Diameter Range: 2.00" - 5.62" (50.8mm - 142.8mm)



### Holder

			Holder				
Length		D <sub>1</sub> Range	D <sub>3</sub>	L <sub>2</sub>	L <sub>4</sub>	Part No.	Cartridges
i	Short	2.00 - 2.50	1.840	3-9/32	5-1/2	OP1-1S-ABS63	OP1-WC05
	Long	2.00 - 2.50	1.840	5-17/32	7-3/4	OP1-1L-ABS63	OP1-WC05
	Short	2.50 - 3.00	2.220	4-43/64	6-1/4	OP2-1S-ABS63	OP2-WC05
	Long	2.50 - 3.00	2.220	7-43/64	9-1/4	OP2-1L-ABS63	OP2-WC05
	Short	3.00 - 4.12	2.806	5-7/64	6-3/4	OP3-1S-ABS63	OP3-WC05
	Long	3.00 - 4.12	2.806	9-7/64	10-3/4	OP3-1L-ABS63	OP3-WC05
	Short	4.12 - 5.62	3.500	5-1/64	6-3/4	OP4-1S-ABS63	OP4-WC05

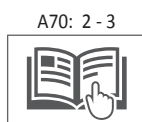
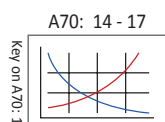
\*Holder includes cartridges; however, inserts are sold separately.

### Cartridges

Replacement Cartridges	Qty. Inserts Needed	Mounting Screw	Adjusting Screw
OP1-WC05	2	MS-13M-1	AS-10T9-1
OP2-WC05	2	MS-15M-1	AS-10T9-1
OP3-WC05	2	MS-15M-1	AS-12T9-1
OP4-WC05	3	MS-15M-1	AS-14T9-1

### IC Inserts

Carbide Grade	Geometry	Part No.			Insert Screws
		AM300®	AM200®	TiN	
C5 (P35)	Standard	OP-05T308-P	OP-05T308-H	OP-05T308-T	IS-10-1
C1 (K35)	Standard	OP-05T308-1P	OP-05T308-1H	OP-05T308-1T	IS-10-1
C2 (K25)	Standard	OP-05T308-2P	OP-05T308-2H	—	IS-10-1
C5 (P35)	High Rake	OP-05T308-PHR	OP-05T308-HHR	—	IS-10-1

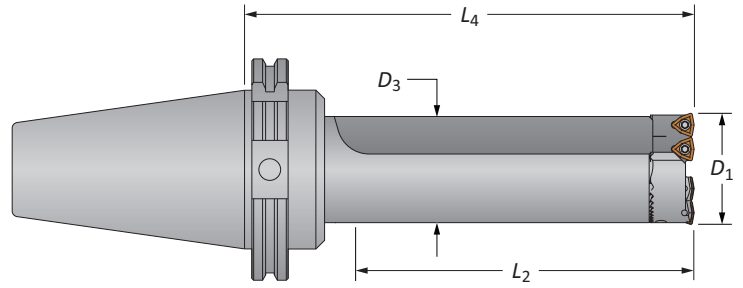


Mounting screws sold in multiples of 4 | Adjusting screws sold in multiples of 4  
IC inserts sold in multiples of 10 | Insert screws sold in multiples of 10

i = Imperial (in)  
m = Metric (mm)

## Opening Drill Holders

DIN50 Shank | Diameter Range: 2.00" - 5.62" (50.8mm - 142.8mm)



### Holder

	Length	D <sub>1</sub> Range	Holder			Part No.	Cartridges
			D <sub>3</sub>	L <sub>2</sub>	L <sub>4</sub>		
m	Short	50.8 - 63.5	1.840	83.5	137.9	OP1-1S-DV50	OP1-WC05
	Long	50.8 - 63.5	1.840	140.6	195.1	OP1-1L-DV50	OP1-WC05
	Short	63.5 - 76.2	2.220	118.5	174.8	OP2-1S-DV50	OP2-WC05
	Long	63.5 - 76.2	2.220	194.7	251.0	OP2-1L-DV50	OP2-WC05
	Short	76.2 - 104.7	2.806	129.9	187.5	OP3-1S-DV50	OP3-WC05
	Long	76.2 - 104.7	2.806	231.5	289.1	OP3-1L-DV50	OP3-WC05
	Short	104.7 - 142.8	3.500	127.4	187.5	OP4-1S-DV50	OP4-WC05
	Long	104.7 - 142.8	3.500	254.4	327.2	OP4-1L-DV50	OP4-WC05

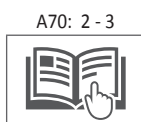
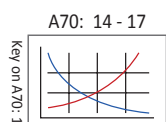
\*Holder includes cartridges; however, inserts are sold separately.

### Cartridges

Replacement Cartridges	Qty. Inserts Needed	Mounting Screw	Adjusting Screw
OP1-WC05	2	MS-13M-1	AS-10T9-1
OP2-WC05	2	MS-15M-1	AS-10T9-1
OP3-WC05	2	MS-15M-1	AS-12T9-1
OP4-WC05	3	MS-15M-1	AS-14T9-1

### IC Inserts




Carbide Grade	Geometry	Part No.			Insert Screws
		AM300®	AM200®	TiN	
C5 (P35)	Standard	OP-05T308-P	OP-05T308-H	OP-05T308-T	IS-10-1
C1 (K35)	Standard	OP-05T308-1P	OP-05T308-1H	OP-05T308-1T	IS-10-1
C2 (K25)	Standard	OP-05T308-2P	OP-05T308-2H	-	IS-10-1
C5 (P35)	High Rake	OP-05T308-PHR	OP-05T308-HHR	-	IS-10-1



Mounting screws sold in multiples of 4 | Adjusting screws sold in multiples of 4  
IC inserts sold in multiples of 10 | Insert screws sold in multiples of 10

ⓘ = Imperial (in)  
m = Metric (mm)

## Recommended Cutting Data | Imperial (inch)

ISO	Material	Hardness (BHN)	Speed (SFM)			Feed Rate (IPR)
			 AM300®	 AM200®	 TiN	
P	Free Machining Steel 1118, 1215, 12L14, etc.	100 - 250	900 - 1300	850 - 1200	700 - 900	.0035 - .007
	Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 275	850 - 1250	800 - 1150	650 - 850	.003 - .0065
	Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 325	800 - 1050	750 - 950	600 - 850	.0035 - .0065
	Alloy Steel 4140, 5140, 8640, etc.	125 - 375	750 - 1000	700 - 900	600 - 850	.0035 - .0065
	High Strength Alloy 4340, 4330V, 300M, etc.	225 - 400	600 - 850	550 - 750	400 - 650	.003 - .005
	Structural Steel A36, A285, A516, etc.	100 - 350	850 - 1050	800 - 950	650 - 850	.003 - .0065
	Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	150 - 250	400 - 800	350 - 700	250 - 650	.0025 - .005
S	High Temp Alloy Hastelloy B, Inconel 600, etc.	140 - 310	250 - 450	250 - 350	150 - 300	.0025 - .005
M	Stainless Steel 400 Series 416, 420, etc.	185 - 350	600 - 850	550 - 750	400 - 650	.003 - .006
	Stainless Steel 300 Series 304, 316, 17-4PH, etc.	135 - 275	600 - 850	550 - 750	400 - 650	.003 - .006
	Super Duplex Stainless Steel	135 - 275	500 - 750	450 - 650	300 - 550	.002 - .005
K	Nodular, Grey, Ductile Cast Iron	120 - 320	700 - 900	650 - 800	500 - 700	.004 - .008
N	Cast Aluminum	30 - 180	1250 - 1650	1200 - 1550	950 - 1100	.006 - .012
	Wrought Aluminum	30 - 180	1250 - 1650	1200 - 1550	950 - 1100	.006 - .012
	Brass	30 - 100	950 - 1350	900 - 1250	750 - 1100	.005 - .009

### Minimum Pilot Hole Diameter = Finish Diameter – C

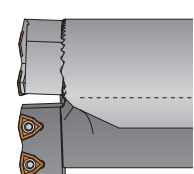
Ex: To open an existing diameter hole to 2.75" diameter, an OP2 tool would be used. The minimum pilot hole diameter would be: **2.750 - 1.880 = 0.870"**

Opening Drill Series	Drill Diameter Range	C
OP1	2.00 - 2.50	1.880
OP2	2.50 - 3.00	1.880
OP3	3.00 - 4.12	1.880
OP4	4.12 - 5.62	2.680

Pre-drilled  
part or core



OP Drill



**IMPORTANT:** The speeds and feeds listed above are considered a general starting point for all applications. Factory technical assistance is available for your specific applications through our Application Engineering department.



## Formulas and Constants | Imperial (inch)

### Material Constants




Type of Material	Hardness (BHN)	K <sub>m</sub> (lbs/in <sup>2</sup> )
Free Machining Steel	100 - 250	0.75
Low Carbon Steel	85 - 275	0.85
Medium Carbon Steel	125 - 325	0.90
Alloy Steel	125 - 375	1.00
High Strength Steel	225 - 400	1.15
Structural Steel	100 - 350	1.00
Tool Steel	150 - 250	0.90
High Temperature Alloy	140 - 310	1.44
Titanium Alloy	140 - 310	0.72
Aerospace Alloy	185 - 350	0.70
Stainless Steel 400 Series	185 - 350	1.08
Stainless Steel 300 Series	135 - 275	0.94
Super Duplex Stainless Steel	135 - 275	0.94
Wear Plate	400 - 600	1.60
Hardened Steel	300 - 500	1.40
Nodular, Ductile Cast Iron	120 - 320	0.65
Grey Cast Iron	120 - 320	0.75
Cast Aluminum	30 - 180	0.40
Wrought Aluminum	30 - 180	0.40
Aluminum Bronze	100 - 250	0.50
Brass	100	0.35
Copper	60	0.30

### Formulas

1.	<b>RPM</b>	<b>= (3.82 • SFM) / DIA<sub>F</sub></b>
	where:	
	RPM	= revolutions per minute (rev/min)
	SFM	= speed (ft/min)
	DIA <sub>F</sub>	= finish diameter of drill (inch)
2.	<b>HP</b>	<b>= (0.5891 • (DIA<sub>F</sub><sup>2</sup> – DIA<sub>P</sub><sup>2</sup>) • IPR • RPM • K<sub>m</sub>) / 0.80</b>
	where:	
	Tool Power	= tool power (HP)
	DIA <sub>F</sub>	= finish diameter of drill (inch)
	DIA <sub>P</sub>	= pre-drill diameter (inch)
	IPR	= feed rate (in/rev)
	RPM	= revolutions per minute (rev/min)
	K <sub>m</sub>	= specific cutting energy (lbs/in <sup>2</sup> ) machine efficiency (using 0.80 as constant)
3.	<b>Thrust</b>	<b>= 148,500 • IPR • (DIA<sub>F</sub> – DIA<sub>P</sub>) • K<sub>m</sub></b>
	where:	
	Thrust	= axial thrust (lbs)
	IPR	= feed rate (in/rev)
	DIA <sub>F</sub>	= finish diameter of drill (inch)
	DIA <sub>P</sub>	= pre-drill diameter (inch)
	K <sub>m</sub>	= specific cutting energy (lbs/in <sup>2</sup> )
5.	<b>Torque</b>	<b>= (HP • 5252) / RPM</b>
	where:	
	Torque	= torque (ft/lbs)
	HP	= tool power (HP)
	RPM	= revolutions per minute (rev/min)

The table and equations on this page are found in the *Machinery's Handbook*. Permission to simplify and print the equations is granted by the Editor of the *Machinery's Handbook*.

## Recommended Cutting Data | Metric (mm)

ISO	Material	Hardness (BHN)	Speed (M/min)			Feed Rate (mm/rev)
			 AM300®	 AM200®	 TiN	
P	<b>Free Machining Steel</b> 1118, 1215, 12L14, etc.	100 - 250	274 - 396	259 - 366	213 - 274	0.09 - 0.18
	<b>Low Carbon Steel</b> 1010, 1020, 1025, 1522, 1144, etc.	85 - 275	259 - 381	244 - 351	198 - 259	0.08 - 0.17
	<b>Medium Carbon Steel</b> 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 325	244 - 320	229 - 290	183 - 259	0.09 - 0.17
	<b>Alloy Steel</b> 4140, 5140, 8640, etc.	125 - 375	229 - 305	213 - 274	183 - 259	0.09 - 0.17
	<b>High Strength Alloy</b> 4340, 4330V, 300M, etc.	225 - 400	183 - 259	168 - 229	122 - 198	0.08 - 0.13
	<b>Structural Steel</b> A36, A285, A516, etc.	100 - 350	259 - 320	244 - 290	198 - 259	0.08 - 0.17
	<b>Tool Steel</b> H-13, H-21, A-4, O-2, S-3, etc.	150 - 250	122 - 244	107 - 213	76 - 198	0.06 - 0.13
S	<b>High Temp Alloy</b> Hastelloy B, Inconel 600, etc.	140 - 310	76 - 137	76 - 107	46 - 91	0.06 - 0.11
M	<b>Stainless Steel 400 Series</b> 416, 420, etc.	185 - 350	183 - 259	168 - 229	122 - 198	0.08 - 0.15
	<b>Stainless Steel 300 Series</b> 304, 316, 17-4PH, etc.	135 - 275	183 - 259	168 - 229	122 - 198	0.08 - 0.15
	<b>Super Duplex Stainless Steel</b>	135 - 275	152 - 228	137 - 198	91 - 152	0.05 - 0.12
K	<b>Nodular, Grey, Ductile Cast Iron</b>	120 - 320	213 - 274	198 - 244	152 - 213	0.10 - 0.20
N	<b>Cast Aluminum</b>	30 - 180	381 - 503	381 - 472	290 - 335	0.15 - 0.30
	<b>Wrought Aluminum</b>	30 - 180	381 - 503	381 - 472	290 - 335	0.15 - 0.30
	<b>Brass</b>	30 - 100	290 - 411	274 - 381	229 - 335	0.13 - 0.23

### Minimum Pilot Hole Diameter = Finish Diameter – C

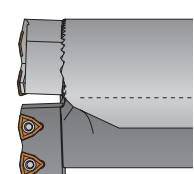
Ex: To open an existing diameter hole to 69.85mm diameter, an OP2 tool would be used. The minimum pilot hole diameter would be: **69.85 - 47.75 = 22.10**

Opening Drill Series	Drill Diameter Range	C
OP1	50.8 - 63.5	47.75
OP2	63.5 - 76.2	47.75
OP3	76.2 - 104.6	47.75
OP4	104.6 - 142.7	68.07

Pre-drilled  
part or core



OP Drill



**IMPORTANT:** The speeds and feeds listed above are considered a general starting point for all applications. Factory technical assistance is available for your specific applications through our Application Engineering department.

## Formulas and Constants | Metric (mm)

### Material Constants

Type of Material	Hardness (BHN)	K <sub>m</sub> (lbs/in <sup>2</sup> )
Free Machining Steel	100 - 250	5.17
Low Carbon Steel	85 - 275	5.86
Medium Carbon Steel	125 - 325	6.21
Alloy Steel	125 - 375	6.90
High Strength Steel	225 - 400	7.93
Structural Steel	100 - 350	6.90
Tool Steel	150 - 250	6.21
High Temperature Alloy	140 - 310	9.93
Titanium Alloy	140 - 310	4.97
Aerospace Alloy	185 - 350	4.48
Stainless Steel 400 Series	185 - 350	7.45
Stainless Steel 300 Series	135 - 275	6.48
Super Duplex Stainless Steel	135 - 275	6.48
Wear Plate	400 - 600	11.04
Hardened Steel	300 - 500	9.66
Nodular, Ductile Cast Iron	120 - 320	4.48
Grey Cast Iron	120 - 320	5.17
Cast Aluminum	30 - 180	2.76
Wrought Aluminum	30 - 180	2.76
Aluminum Bronze	100 - 250	3.45
Brass	100	2.41
Copper	60	2.07

### Formulas

1.	<b>RPM</b>	<b>= (318.31 • M/min) / DIA<sub>F</sub></b>
	where:	
	RPM	= revolutions per minute (rev/min)
	M/min	= speed (M/min)
	DIA <sub>F</sub>	= finish diameter of drill (mm)
2.	<b>kW</b>	<b>= ((DIA<sub>F</sub><sup>2</sup> - DIA<sub>P</sub><sup>2</sup>) • mm/rev • RPM • K<sub>m</sub>) / 205,154</b>
	where:	
	kW	= tool power (kW)
	DIA <sub>F</sub>	= finish diameter of drill (mm)
	DIA <sub>P</sub>	= pre-drill diameter (mm)
	mm/rev	= feed rate (mm/rev)
	RPM	= revolutions per minute (rev/min)
	K <sub>m</sub>	= specific cutting energy (kPa) machine efficiency (using 205,154 as constant)
3.	<b>Thrust</b>	<b>= 148.78 • mm/rev • (DIA<sub>F</sub> - DIA<sub>P</sub>) • K<sub>m</sub></b>
	where:	
	Thrust	= axial thrust (N)
	IPR	= feed rate (mm/rev)
	DIA <sub>F</sub>	= finish diameter of drill (mm)
	DIA <sub>P</sub>	= pre-drill diameter (mm)
	K <sub>m</sub>	= specific cutting energy (kPa)
4.	<b>Torque</b>	<b>= (kW • 9549.3) / RPM</b>
	where:	
	Torque	= torque (Nm)
	kW	= tool power (kW)
	RPM	= revolutions per minute (rev/min)

The table and equations on this page are found in the *Machinery's Handbook*. Permission to simplify and print the equations is granted by the Editor of the *Machinery's Handbook*.

# 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: _____ <input type="checkbox"/> Excellent <input type="checkbox"/> Good <input type="checkbox"/> Poor	Orientation: _____ <input type="checkbox"/> Vertical <input type="checkbox"/> Horizontal	Tool Rotating: _____ <input type="checkbox"/> Yes <input type="checkbox"/> No  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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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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Available Online Only: A70-OPN  
Publish Date: May 2017