

**Allied Machine & Engineering Corp.**

120 Deeds Drive • Dover, OH 44622 • Phone 800-321-5537 • Fax 330-602-3400  
www.alliedmachine.com



the **HOLE**  
advantage

## **AccuPort 432™ Port Contour Cutter**

**One Operation Port Hole  
Drilling System**

• Available for the following specifications:

- SAE J-1926-1 / ISO 11926-1
- ISO 6149-1:1993 / SAE J-2244-1
- SAE AS5202  
(Formerly MilSpec MS -33641)

Patent Pending

Allied Machine & Engineering Corp. is Registered by U.L. to ISO 9001:2000

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## Features and Benefits

AMEC **AccuPort 432™ Port Contour Cutters** are produced to strict manufacturing tolerances. This provides the customer with the assurance that the forms produced are within the finish tolerances of each specification.

Drill and finish forms port in **ONE** operation

### Patent Pending Design

- For ports and stud ends with straight threads and o-ring sealing
- Eliminates the need for pre-drilling
- Allows for efficient set-up and production time
- Saves on tool cost
- Replaceable insert design eliminates regrinding and resetting

### AccuPort 432™ Port Contour Form Inserts provide:

- Absolute repeatability
- Excellent surface finish

**Available with TiAlN Coated Inserts for longer tool life and increased productivity.**

### Conforms to the following Port Standards:

- SAE J-1926/ISO11926-1, and MS16142\*
- ISO 6149-1/SAE J-2244/1 with Identification Ridge
- SAE AS5202, (Formerly MilSpec MS-33649)

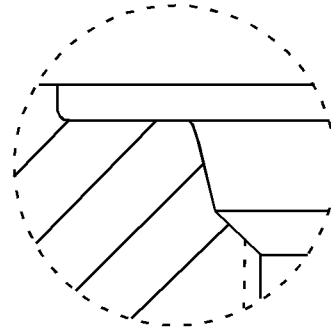
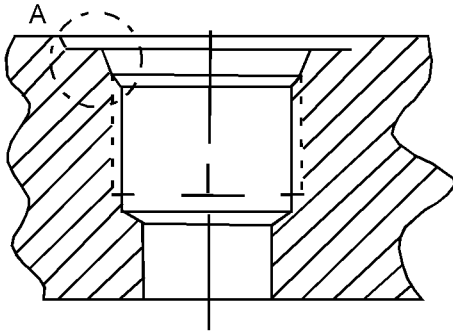
**Through-body coolant supply is standard.**

Item Number Identification Key	
Imperial Port Contour Cutter: <b>J1926-060-075F</b>	Imperial Port Form Insert: <b>J1926-02-C5A</b>
<b>J1926</b> = SAE Port Contour Imperial Series	<b>J1926</b> = SAE Port Contour Imperial Series
<b>06</b> = Dash Number - Tube Size	<b>02</b> = Insert Number
<b>0</b> = T-A® Drill Series	<b>C5</b> = Carbide Grade C5
<b>075</b> = Shank Diameter	<b>A</b> = TiAlN Coating
<b>F</b> = Flanged Shank	<b>Note: Proper cleaning of the insert pocket will insure the accuracy of this product.</b>

\*SAE J-1926 can be used in conjunction with SAE J-514 specifications.

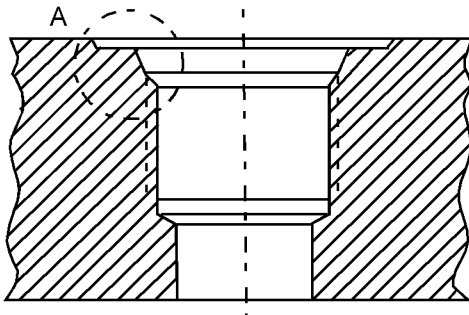
# AMEC's Accuport 432™ Port Contour Cutters are made to

SAE J-1926-1/ISO 11926-1 see pages 2 - 3.

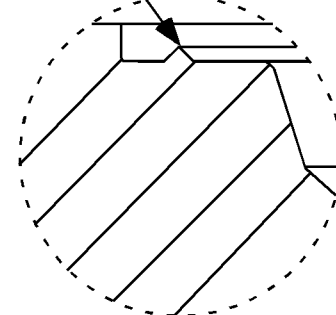


Detail A

ISO 6149 - 1:1993/SAE J-2241/1 with Identification Ridge see page 4.

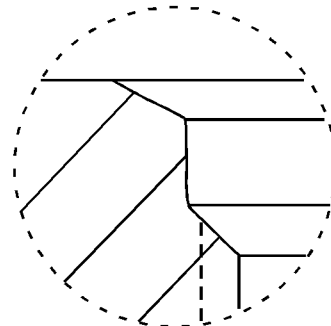
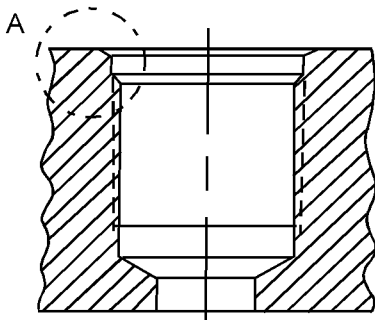


Identification Ridge



Detail A

SAE AS5202 - (Formerly MilSpec MS-33649) see page 5.



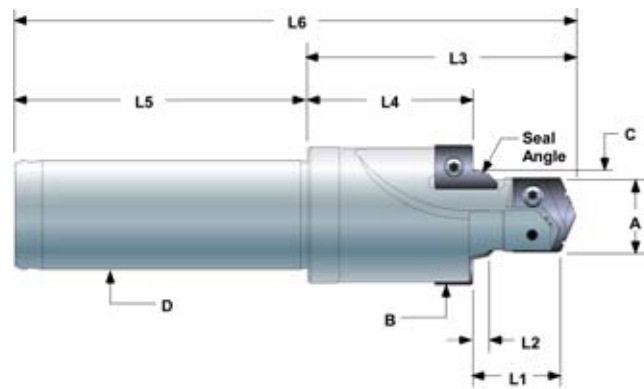
Detail A

# Port Standards: SAE J-1926-1 / ISO 11926-1, and MS-16142

## Item Numbers

Inserts sold separately.

Tube Dash Number	Port Contour Cutter Number	Port Thread Size	T-A® Drill Item Numbers				Port Form Insert Item Numbers		
			Super Cobalt (TiAIN)*	C5 Carbide (TiAIN)*	Torx Screw	Torx Driver	C5 Carbide (TiAIN)	Torx Screw	Torx Driver
- 4	J1926-04Y-063F	7/16-20 UNF-2B	15YA-.386	1C5YA-.386	724-T7	8T-7	J1926-02-C5A	72556-T8	8T-8
- 5	J1926-05Z-063F	1/2-20 UNF-2B	15ZA-11.5	1C5ZA-11.5	7247-T7	8T-7	J1926-02-C5A	72556-T8	8T-8
- 6	J1926-060-075F	9/16-18 UNF-2B	150A-13	1C50A-13	72567-T8	8T-8	J1926-02-C5A	72556-T8	8T-8
- 8	J1926-080-075F	3/4-16 UNF-2B	150A-0022	1C50A-0022	72567-T8	8T-8	J1926-07-C5A	72556-T8	8T-8
-10	J1926-101-100F	7/8-14 UNF-2B	151A-20.5	1C51A-20.5	7375-T9	8T-9	J1926-07-C5A	72556-T8	8T-8
-12	J1926-122-125F	1 1/16-12 UN-2B	152A-25	1C52A-25	7495-T15	8T-15	J1926-08-C5A	7375-T9	8T-9
-14	J1926-142-125F	1 3/16-12 UN-2B	152A-28	1C52A-28	7495-T15	8T-15	J1926-08-C5A	7375-T9	8T-9
-16	J1926-162-125F	1 5/16-12 UN-2B	152A-31	1C52A-31	7495-T15	8T-15	J1926-08-C5A	7375-T9	8T-9
-20	J1926-203-150F	1 5/8-12 UN-2B	153A-39	1C53A-39	7514-T20	8T-20	J1926-10-C5A	7375-T9	8T-9
-24	J1926-243-150F	1 7/8-12 UN-2B	153A-45.5	1C53A-45.5	7514-T20	8T-20	J1926-10-C5A	7375-T9	8T-9
-32	J1926-324-150F	2 1/2-12 UN-2B	154A-61.5	N/A	7514-T20	8T-20	J1926-12-C5A	7375-T9	8T-9



Patent Pending

Indicates metric dimension

Tube Dash Number	Port Contour Cutter Number	Port Thread Size	□	A		B	Seal Angle	C	L2	L3	L4	D	L5	L6
				Minor Dia.	Minor Dia. Length	Spotface Dia.		Seal Angle	Seal Angle Dia.	Seal Angle Length	Total Head Length	Spotface to Shoulder Length	Shank Dia.	Shank Length
- 4	J1926-04Y-063F	7/16-20 UNF-2B	●	9,8 0.386	14,0 0.551	21,4 0.841	12°	12,5 0.490	2,7 0.106	38,8 1.527	22,8 0.896	15,9 0.625	47,6 1.875	86,4 3.402
- 5	J1926-05Z-063F	1/2-20 UNF-2B	●	11,5 0.453	14,0 0.551	23,0 0.904	12°	14,1 0.553	2,7 0.106	38,8 1.527	22,4 0.881	15,9 0.625	47,6 1.875	86,4 3.402
- 6	J1926-060-075F	9/16-18 UNF-2B	●	13,0 0.512	15,5 0.610	24,6 0.969	12°	15,7 0.618	2,7 0.106	47,2 1.857	29,0 1.144	19,1 0.750	50 1.969	97,2 3.826
- 8	J1926-080-075F	3/4-16 UNF-2B	●	17,5 0.688	17,5 0.689	30,7 1.207	15°	20,7 0.813	2,7 0.106	50,3 1.982	29,2 1.150	19,1 0.750	50 1.969	100,4 3.951
-10	J1926-101-100F	7/8-14 UNF-2B	●	20,5 0.807	20,0 0.787	34,0 1.339	15°	24,0 0.945	2,7 0.106	54,4 2.140	30,1 1.185	25,4 1.000	57,9 2.281	112,3 4.421
-12	J1926-122-125F	1 1/16-12 UN-2B	●	25,0 0.984	23,0 0.906	42,1 1.657	15°	29,2 1.150	3,5 0.138	67,1 2.640	38,9 1.530	31,8 1.250	57,9 2.281	125,0 4.921
-14	J1926-142-125F	1 3/16-12 UN-2B	●	28,0 1.102	23,0 0.906	45,3 1.783	15°	32,4 1.276	3,5 0.138	67,1 2.640	38,2 1.504	31,8 1.250	57,9 2.281	125,0 4.921
-16	J1926-162-125F	1 5/16-12 UN-2B	●	31,0 1.221	23,0 0.906	48,5 1.907	15°	35,6 1.400	3,5 0.138	67,1 2.640	37,5 1.477	31,8 1.250	57,9 2.281	125,0 4.921
-20	J1926-203-150F	1 5/8-12 UN-2B	●	39,0 1.535	23,0 0.906	58,7 2.309	15°	43,6 1.715	3,5 0.138	77,8 3.062	46,6 1.835	38,1 1.500	68,3 2.688	146,0 5.750
-24	J1926-243-150F	1 7/8-12 UN-2B	●	45,5 1.791	23,0 0.906	65,0 2.559	15°	49,9 1.965	3,5 0.138	77,8 3.062	45,2 1.778	38,1 1.500	68,3 2.688	146,0 5.750
-32	J1926-324-150F	2 1/2-12 UN-2B	●	61,5 2.421	23,0 0.906	88,0 3.465	15°	65,8 2.589	3,5 0.138	96,8 3.812	60,8 2.393	38,1 1.500	68,3 2.688	165,1 6.500

\* T-A® Drill Inserts available with various coatings and geometries.

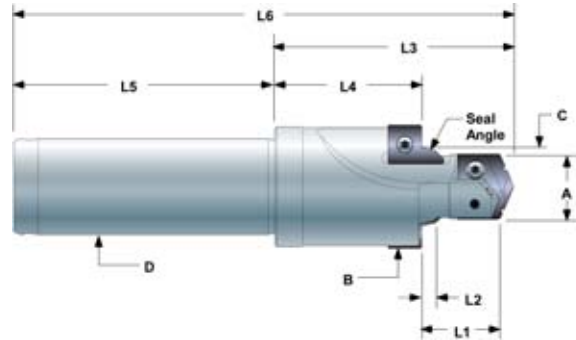
Please see T-A® Drilling System Catalog.

\*\* AccuPort 432™ Port Contour Cutters are available with extended pilot (L1). Please see page 3.

### Availability Codes

- Stocked. Subject to prior sale.
- Currently stocked in limited quantities. Advanced planning is recommended.
- ▲ Non-stocked Standard Delivery

# Port Standards: SAE J-1926-1 / ISO 11926-1, and MS-16142 with extended minor diameter lengths (L1)



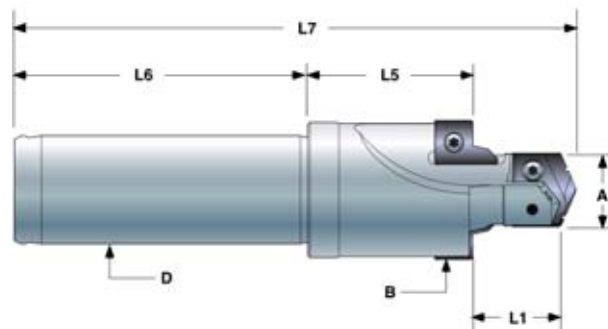
Patent Pending

Indicates metric dimension

Tube Dash Number	Port Contour Cutter Number	Port Thread Size	□	A	L1	B	Seal Angle	C	L2	L3	L4	D	L5	L6
				Minor Dia.	Minor Dia. Length	Spotface Dia.		Seal Angle Dia.	Seal Angle Length	Total Head Length	Spotface to Shoulder Length	Shank Dia.	Shank Length	OAL
- 4	X1926-04Y-063F	7/16-20 UNF-2B	▲	9,8	20,3	21,4	12°	12,5	2,7	45,1	22,8	15,9	47,6	92,8
				0.386	0.801	0.841	12°	0.490	0.106	1.777	0.896	0.625	1.875	3.652
- 5	X1926-05Z-063F	1/2-20 UNF-2B	▲	11,5	20,3	23,0	12°	14,1	2,7	45,1	22,4	15,9	47,6	92,8
				0.453	0.801	0.904	12°	0.553	0.106	1.777	0.881	0.625	1.875	3.652
- 6	X1926-060-075F	9/16-18 UNF-2B	▲	13,0	21,8	24,6	12°	15,7	2,7	53,5	29,0	19,1	50	103,5
				0.512	0.860	0.969	12°	0.618	0.106	2.107	1.144	0.750	1.969	4.067
- 8	X1926-080-075F	3/4-16 UNF-2B	▲	17,5	23,8	30,7	15°	20,7	2,7	56,7	29,2	19,1	50	106,7
				0.688	0.939	1.207	15°	0.813	0.106	2.232	1.150	0.750	1.969	4.201
-10	X1926-101-100F	7/8-14 UNF-2B	▲	20,5	26,3	34,0	15°	24,0	2,7	60,7	30,1	25,4	57,9	118,6
				0.807	1.037	1.339	15°	0.945	0.106	2.390	1.185	1.000	2.281	4.671
-12	X1926-122-125F	1 1/16-12 UN-2B	▲	25,0	29,3	42,1	15°	29,2	3,5	73,4	38,9	31,8	57,9	131,3
				0.984	1.156	1.657	15°	1.150	0.138	2.890	1.530	1.250	2.281	5.171
-14	X1926-142-125F	1 3/16-12 UN-2B	▲	28,0	29,3	45,3	15°	32,4	3,5	73,4	38,2	31,8	57,9	131,3
				1.102	1.156	1.783	15°	1.276	0.138	2.890	1.504	1.250	2.281	5.171
-16	X1926-162-125F	1 5/16-12 UN-2B	▲	31,0	29,3	48,5	15°	35,6	3,5	73,4	37,5	31,8	57,9	131,3
				1.221	1.156	1.907	15°	1.400	0.138	2.890	1.477	1.250	2.281	5.171
-20	X1926-203-150F	1 5/8-12 UN-2B	▲	39,0	29,3	58,7	15°	43,6	3,5	84,1	46,6	38,1	68,3	152,4
				1.535	1.156	2.309	15°	1.715	0.138	3.312	1.835	1.500	2.688	6.000
-24	X1926-243-150F	1 7/8-12 UN-2B	▲	45,5	29,3	65,0	15°	49,9	3,5	84,1	45,2	38,1	68,3	152,4
				1.791	1.156	2.559	15°	1.965	0.138	3.312	1.778	1.500	2.688	6.000
-32	X1926-324-150F	2 1/2-12 UN-2B	▲	61,5	29,3	88,0	15°	65,8	3,5	103,2	60,8	38,1	68,3	171,4
				2.421	1.156	3.465	15°	2.589	0.138	4.062	2.393	1.500	2.688	6.750

## Made to order tool specifications - Priced on Request

Fax or mail a copy of the table below to AMEC's Application Engineering Department (330) 364-7666 to receive pricing for a made to order AccuPort 432™ Port Contour Cutter.



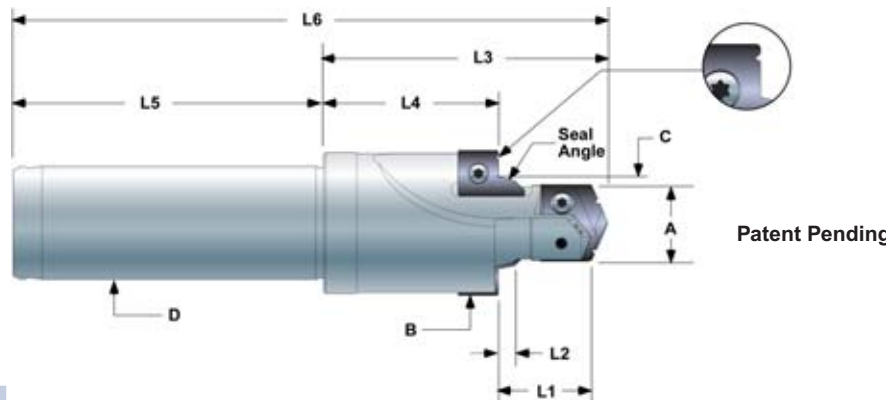
Tube Dash Number	Specification	Port Thread Size	A	L1	B	L5	D	L6	L7
			Minor Dia.	Minor Dia. Length	Spotface Dia.	Spotface to Shoulder Length	Shank Dia.	Shank Length	OAL
	<input type="checkbox"/> J1926 <input type="checkbox"/> ISO 6149 <input type="checkbox"/> AS5202 <input type="checkbox"/> ISO 6149 (without ridge)								
Company Name		Contact Name			Telephone				
Distributor Name					Fax				

# Port Standards: ISO 6149-1:1993, SAE J-2244/1

## Item Numbers

Inserts sold separately.

Tube Dash Number	Port Contour Cutter Number	Port Thread Size	T-A® Drill Item Numbers				Port Form Insert Item Numbers		
			Super Cobalt (TiAlN)*	C5 Carbide (TiAlN)*	Torx Screw	Torx Driver	C5 Carbide (TiAlN)	Torx Screw	Torx Driver
- 4	6149-04RY-16FM	M12 X 1.5	15YA-10.5	1C5YA-10.5	724-T7	8T-7	6149-03R-C5A	72556-T8	8T-8
- 5	6149-05RZ-16FM	M14 X 1.5	15ZA-12.5	1C5ZA-12.5	7247-T7	8T-7	6149-03R-C5A	72556-T8	8T-8
- 6	6149-06R0-20FM	M16 X 1.5	150A-14.5	1C50A-14.5	72567-T8	8T-8	6149-03R-C5A	72556-T8	8T-8
- 8	6149-08R0-20FM	M18 X 1.5	150A-16.5	1C50A-16.5	72567-T8	8T-8	6149-03R-C5A	72556-T8	8T-8
-10	6149-10R1-25FM	M22 X 1.5	151A-20.5	1C51A-20.5	7375-T9	8T-9	6149-03R-C5A	72556-T8	8T-8
-12	6149-12R2-32FM	M27 X 2	152A-25	1C52A-25	7495-T15	8T-15	6149-06R-C5A	72556-T8	8T-8
-14	6149-14R2-32FM	M30 X 2	152A-28	1C52A*-28	7495-T15	8T-15	6149-06R-C5A	72556-T8	8T-8
-16	6149-16R2-32FM	M33 X 2	152A-31	1C52A-31	7495-T15	8T-15	6149-09R-C5A	7375-T9	8T-9
-20	6149-20R3-40FM	M42 X 2	153A-40	1C53A-40	7514-T20	8T-20	6149-11R-C5A	7375-T9	8T-9
-24	6149-24R3-40FM	M48 X 2	153A-46	1C53A-46	7514-T20	8T-20	6149-11R-C5A	7375-T9	8T-9
-32	6149-32R4-40FM	M60 X 2	154A-58	N/A	7514-T20	8T-20	6149-09R-C5A	7375-T9	8T-9



Indicates metric dimension

Tube Dash Number	Port Contour Cutter Number	Port Thread Size	□	A		L1	B	Seal Angle	C		L2	L3	L4	D	L5	L6
				Minor Dia.	Minor Dia. Length	Spotface Dia. w/ridge	Seal Angle		Seal Angle Dia.	Seal Angle Length	Total Head Length	Spotface to Shoulder Length	Shank Dia.	Shank Length	OAL	
- 4	6149-04RY-16FM	M12 X 1.5	●	10,5	14,0	24,0	15°	13,8	2,4	38,8	22,6	16,0	1,650	3,177		
				0,413	0,551	0,945	15°	0,543	0,094	1,527	0,890	0,630	1,650	3,177		
- 5	6149-05RZ-16FM	M14 X 1.5	●	12,5	14,0	26,0	15°	15,8	2,4	38,8	22,2	16,0	41,9	80,7		
				0,492	0,551	1,024	15°	0,622	0,094	1,527	0,872	0,630	1,650	3,177		
- 6	6149-06R0-20FM	M16 X 1.5	●	14,5	15,5	28,0	15°	17,8	2,4	47,2	28,7	20,0	41,9	89,1		
				0,571	0,610	1,102	15°	0,701	0,094	1,857	1,130	0,787	1,650	3,507		
- 8	6149-08R0-20FM	M18 X 1.5	●	16,5	17,0	30,0	15°	19,8	2,4	50,3	29,9	20,0	41,9	92,2		
				0,650	0,669	1,181	15°	0,780	0,094	1,982	1,178	0,787	1,650	3,632		
-10	6149-10R1-25FM	M22 X 1.5	●	20,5	18,0	34,0	15°	23,8	2,4	54,4	32,1	25,0	53,1	107,5		
				0,807	0,709	1,339	15°	0,937	0,094	2,140	1,264	0,984	2,091	4,231		
-12	6149-12R2-32FM	M27 X 2	●	25,0	22,0	40,0	15°	29,4	3,1	67,1	39,9	32,0	57,9	125,0		
				0,984	0,866	1,575	15°	1,157	0,122	2,640	1,570	1,260	2,280	4,920		
-14	6149-14R2-32FM	M30 X 2	●	28,0	22,0	43,0	15°	32,4	3,1	67,1	39,2	32,0	57,9	125,0		
				1,102	0,866	1,693	15°	1,276	0,122	2,640	1,543	1,260	2,280	4,920		
-16	6149-16R2-32FM	M33 X 2	●	31,0	22,0	49,0	15°	35,4	3,1	67,1	38,5	32,0	57,9	125,0		
				1,220	0,866	1,929	15°	1,394	0,122	2,640	1,517	1,260	2,280	4,920		
-20	6149-20R3-40FM	M42 X 2	●	40,0	22,5	60,0	15°	44,4	3,1	77,8	46,9	40,0	70,1	147,9		
				1,575	0,886	2,362	15°	1,748	0,122	3,062	1,846	1,575	2,760	5,822		
-24	6149-24R3-40FM	M48 X 2	●	46,0	25,0	66,0	15°	50,4	3,1	77,8	43,0	40,0	70,1	147,9		
				1,811	0,984	2,598	15°	1,984	0,122	3,062	1,694	1,575	2,760	5,822		
-32	6149-32R4-40FM	M60 X 2	●	58,0	27,5	76,0	15°	62,4	3,1	96,8	57,1	40,0	70,1	166,9		
				2,283	1,083	2,992	15°	2,457	0,122	3,812	2,247	1,575	2,760	6,572		

\* T-A® Drill Inserts available with various coatings and geometries.

### □ Availability Codes

Please see T-A® Drilling System Catalog.

AccuPort 432™ Port Contour Cutters without identification ridge are available and priced on request.

For tools made to your requirements see page 3 for details.

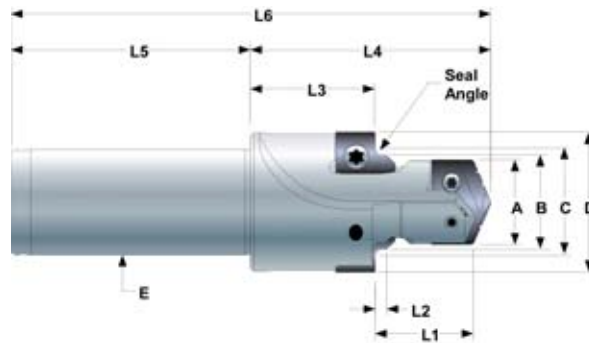
- Stocked. Subject to prior sale.
- Currently stocked in limited quantities. Advanced planning is recommended.
- ▲ Non-stocked Standard Delivery

# Port Standards: SAE AS5202 (Formerly MilSpec MS-33649)

## Item Numbers

Inserts sold separately.

Tube Dash Number	Port Contour Cutter Number	Port Thread Size	T-A® Drill Item Numbers				Port Form Insert Item Numbers		
			Super Cobalt (TiAIN)*	C5 Carbide (TiAIN)*	Torx Screw	Torx Driver	C5 Carbide (TiAIN)	Torx Screw	Torx Driver
- 4	AS5202-04Y-063F	7/16-20 UNJF-3B	15YA-.386	1C5YA-.386	724-T7	8T-7	AS5202-04-C5A	72556-T8	8T-8
- 5	AS5202-05Z-063F	1/2-20 UNJF-3B	15ZA-.451	1C5ZA-.451	7247-T7	8T-7	AS5202-05-C5A	72556-T8	8T-8
- 6	AS5202-06Z-075F	9/16-18 UNJF-3B	15ZA-.506	1C5ZA-.506	7247-T7	8T-8	AS5202-06-C5A	72556-T8	8T-8
- 8	AS5202-080-075F	3/4-16 UNJF-3B	150A-0022	1C50A-0022	72567-T8	8T-8	AS5202-08-C5A	72556-T8	8T-8
-10	AS5202-101-100F	7/8-14 UNJF-3B	151A-.801	1C51A-.801	7375-T9	8T-9	AS5202-10-C5A	7375-T9	8T-9
-12	AS5202-122-125F	1 1/16-12 UNJ-3B	152A-.976	1C52A-.976	7495-T15	8T-15	AS5202-12-C5A	7495-T15	8T-15
-14	AS5202-142-125F	1 3/16-12 UNJ-3B	152A-28	1C52A-28	7495-T15	8T-15	AS5202-14-C5A	7495-T15	8T-15
-16	AS5202-162-125F	1 5/16-12 UNJ-3B	152A-1.226	1C52A-1.226	7495-T15	8T-15	AS5202-16-C5A	7495-T15	8T-15
-20	AS5202-203-150F	1 5/8-12 UNJ-3B	153A-39	1C53A-39	7514-T20	8T-20	AS5202-20-C5A	7495-T15	8T-15
-24	AS5202-243-150F	1 7/8-12 UNJ-3B	153A-45.5	1C53A-45.5	7514-T20	8T-20	AS5202-24-C5A	7495-T15	8T-15
-32	AS5202-324-150F	2 1/2-12 UNJ-3B	154A-2.413	N/A	7514-T20	8T-20	AS5202-32-C5A	7495-T15	8T-15



Patent Pending

Indicates metric dimension

Tube Dash Number	Port Contour Cutter Number	Port Thread Size	□	A		L1		B		L2		Seal Angle	C		D		L3		L4		E		L5		L6	
				Minor Dia.	Length	Pilot Dia.	Pilot Length	Seal Dia.	Spotface Dia.	Spotface Length	Total Head Length		Shank Dia.	Shank Length	OAL											
- 4	AS5202-04Y-063F	7/16-20 UNJF-3B	●	9.80	16.79	11.53	2.11	60°	14.34	22.23	22.76	41.58	15.88	47.63	89.20											
- 5	AS5202-05Z-063F	1/2-20 UNJF-3B	●	11.45	16.79	13.13	2.11	60°	15.88	23.27	22.39	41.58	15.88	47.63	89.20											
- 6	AS5202-06Z-075F	9/16-18 UNJF-3B	●	12.85	18.14	14.73	2.11	60°	17.46	24.87	28.43	49.28	19.05	50.01	99.29											
- 8	AS5202-080-075F	3/4-16 UNJF-3B	●	17.46	21.31	19.53	2.39	60°	22.23	30.43	28.57	53.52	19.05	50.01	103.53											
-10	AS5202-101-100F	7/8-14 UNJF-3B	●	20.35	23.75	22.76	2.72	60°	25.46	34.39	30.19	58.17	25.40	57.94	116.10											
-12	AS5202-122-125F	1 1/16-12 UNJ-3B	●	24.80	27.15	27.58	3.18	60°	31.42	41.53	37.94	70.23	31.75	57.94	128.17											
-14	AS5202-142-125F	1 3/16-12 UNJ-3B	▲	28.00	27.15	30.76	3.18	60°	34.61	45.09	37.22	70.23	31.75	57.94	128.17											
-16	AS5202-162-125F	1 5/16-12 UNJ-3B	●	31.15	27.15	33.93	3.18	60°	37.77	48.77	36.51	70.23	31.75	57.94	128.17											
-20	AS5202-203-150F	1 5/8-12 UNJ-3B	●	39.00	28.47	41.86	3.18	60°	45.69	57.91	44.32	80.95	38.10	68.28	149.23											
-24	AS5202-243-150F	1 7/8-12 UNJ-3B	▲	45.50	28.75	48.21	3.18	60°	52.07	65.28	42.58	80.95	38.10	68.28	149.23											
-32	AS5202-324-150F	2 1/2-12 UNJ-3B	▲	61.30	34.87	64.11	3.18	60°	67.97	88.65	45.78	93.65	38.10	68.28	161.93											

\* T-A® Drill Inserts available with various coatings and geometries.

### Availability Codes

Please see T-A® Drilling System Catalog.

For tools made to your requirements see page 3 for details.

- Stocked. Subject to prior sale.
- Currently stocked in limited quantities. Advanced planning is recommended.
- ▲ Non-stocked Standard Delivery

# Recommended Speeds and Feeds

## HSS and Carbide - Inch

HSS						Drilling Parameters for Port Contour Cutters Feed Rates (IPR) for Drill Insert Series					
MATERIAL	Material Hardness (BHN)	Tool Steel Grade	TiN SFM	TiAlN SFM	TiCN SFM	Tube Number 4 - 5	Tube Number 6 - 8	Tube Number 10	Tube Number 12 - 16	Tube Number 20 - 24	Tube Number 32
						T-A® Series Y - Z	T-A® Series 0	T-A® Series 1	T-A® Series 2	T-A® Series 3	T-A® Series 4
Free Machining Steel 1118, 1215, 12L14, etc.	100 - 150	HSS	200	280	260	.007	.010	.013	.016	.020	.023
	150 - 200	HSS	180	260	235	.007	.010	.013	.016	.020	.023
	200 - 250	HSS	160	240	210	.006	.010	.013	.016	.020	.023
Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	HSS	170	250	220	.006	.009	.012	.015	.019	.023
	125 - 175	HSS	160	240	210	.006	.009	.012	.015	.019	.023
	175 - 225	HSS	150	225	195	.005	.008	.010	.014	.018	.021
	225 - 275	HSS	140	210	180	.005	.008	.010	.014	.018	.021
Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 175	HSS	160	240	210	.006	.009	.012	.015	.019	.023
	175 - 225	HSS	150	225	195	.005	.008	.010	.014	.018	.021
	225 - 275	HSS	140	210	180	.005	.008	.010	.014	.018	.021
	275 - 325	SC, PC	130	195	170	.004	.007	.009	.012	.016	.019
Alloy Steel 4140, 5140, 8640, etc.	125 - 175	HSS	150	210	195	.006	.008	.010	.014	.017	.019
	175 - 225	HSS	140	195	180	.005	.008	.010	.014	.017	.019
	225 - 275	HSS	130	180	170	.005	.007	.010	.014	.017	.019
	275 - 325	SC, PC	120	170	155	.004	.006	.009	.012	.015	.017
High Strength Alloy 4340, 4330V, 300M, etc.	225 - 300	SC, PC	80	110	100	.005	.007	.009	.010	.014	.017
	300 - 350	SC, PC	60	85	80	.004	.007	.009	.010	.014	.017
	350 - 400	PC	50	70	65	.003	.006	.008	.009	.012	.015
Structural Steel A36, A285, A516, etc.	100 - 150	HSS	140	200	180	.006	.010	.012	.014	.018	.021
	150 - 250	HSS	120	170	155	.005	.009	.010	.012	.016	.019
	250 - 350	SC, PC	100	140	130	.004	.008	.009	.010	.014	.017
High Temp. Alloy Hastelloy B, Inconel 600, etc.	140 - 220	SC, PC	30	40	35	.003	.007	.008	.010	.012	.015
	220 - 310	PC	25	35	30	.003	.006	.007	.008	.010	.012
Stainless Steel 303, 416, 420, 17-4 PH, etc.	135 - 185	HSS	75	105	95	.006	.008	.009	.011	.014	.016
	185 - 275	HSS	60	90	80	.005	.007	.008	.010	.012	.014
Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	150 - 200	SC	80	110	105	.004	.006	.008	.010	.012	.015
	200 - 250	SC, PC	60	90	85	.004	.006	.008	.010	.012	.015
Aluminum	30	HSS	600	850	750	.008	.013	.016	.020	.022	.025
	180	HSS	300	450	400	.008	.013	.016	.018	.022	.025
Cast Iron Gray, Ductile, Nodular	120 - 150	HSS	170	250	220	.007	.012	.016	.020	.024	.027
	150 - 200	HSS	150	225	195	.006	.011	.014	.018	.022	.025
	200 - 220	HSS	130	195	170	.006	.009	.012	.016	.018	.021
	220 - 260	SC, PC	110	165	145	.005	.007	.009	.012	.014	.017
	260 - 320	SC, PC	90	135	120	.004	.006	.007	.009	.012	.014

CARBIDE						Drilling Parameters for Port Contour Cutters Feed Rates (IPR) for Drill Insert Series					
MATERIAL	Material Hardness (BHN)	Carbide Grade	TiN SFM	TiAlN SFM		Tube Number 4 - 5	Tube Number 6 - 8	Tube Number 10	Tube Number 12 - 16	Tube Number 20 - 24	Tube Number 32
						T-A® Series Y - Z	T-A® Series 0	T-A® Series 1	T-A® Series 2	T-A® Series 3	T-A® Series 4
Free Machining Steel 1118, 1215, 12L14, etc.	100 - 150	C5/P40	320	420	420	.008	.012	.015	.018	.021	.023
	150 - 200	C5/P40	280	360	360	.007	.011	.014	.016	.019	.021
	200 - 250	C5/P40	260	340	340	.006	.010	.013	.015	.017	.019
Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	C5/P40	300	390	390	.008	.010	.013	.017	.019	.021
	125 - 175	C5/P40	260	340	340	.007	.010	.013	.016	.018	.021
	175 - 225	C5/P40	240	310	310	.006	.009	.012	.015	.017	.020
	225 - 275	C5/P40	210	270	270	.005	.009	.012	.015	.017	.020
Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 175	C5/P40	260	340	340	.007	.010	.013	.016	.018	.021
	175 - 225	C5/P40	240	310	310	.006	.009	.012	.015	.017	.020
	225 - 275	C5/P40	210	270	270	.006	.009	.012	.015	.017	.020
	275 - 325	C5/P40	180	230	230	.005	.008	.011	.014	.016	.019
Alloy Steel 4140, 5140, 8640, etc.	125 - 175	C5/P40	250	325	325	.007	.010	.013	.016	.018	.021
	175 - 225	C5/P40	230	300	300	.006	.009	.012	.015	.017	.020
	225 - 275	C5/P40	210	270	270	.006	.009	.012	.015	.017	.020
	275 - 325	C5/P40	200	250	250	.005	.008	.011	.014	.016	.019
High Strength Alloy 4340, 4330V, 300M, etc.	225 - 300	C5/P40	160	200	200	.006	.009	.010	.012	.015	.017
	300 - 350	C5/P40	140	180	180	.005	.008	.009	.011	.014	.016
	350 - 400	C5/P40	120	160	160	.004	.007	.008	.010	.012	.015
Structural Steel A36, A285, A516, etc.	100 - 150	C5/P40	240	310	310	.008	.011	.014	.016	.018	.021
	150 - 250	C5/P40	200	250	250	.006	.010	.012	.014	.016	.019
	250 - 350	C5/P40	180	230	230	.005	.009	.011	.012	.014	.017
High Temp. Alloy Hastelloy B, Inconel 600, etc.	140 - 220	C2/K20	80	105	105	.004	.007	.009	.011	.013	.015
	220 - 310	C2/K20	60	85	85	.004	.006	.008	.010	.012	.014
Stainless Steel 303, 416, 420, 17-4 PH, etc.	135 - 185	C2/K20	160	210	210	.007	.009	.012	.014	.016	.018
	185 - 275	C2/K20	120	160	160	.006	.008	.011	.012	.014	.016
Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	150 - 200	C5/K20	160	220	220	.004	.007	.009	.011	.013	.015
	200 - 250	C5/K20	120	170	170	.004	.007	.009	.011	.013	.015
Aluminum	30	C2/K20	1200	1500	1500	.010	.015	.018	.020	.022	.025
	180	C2/K20	800	1000	1000	.009	.013	.016	.018	.020	.022
Cast Iron Gray, Ductile, Nodular	120 - 150	C2/K20, C3/K10	320	460	460	.008	.012	.015	.019	.023	.027
	150 - 200	C2/K20, C3/K10	270	400	400	.007	.011	.013	.017	.021	.025
	200 - 220	C2/K20, C3/K10	240	360	360	.006	.009	.012	.015	.018	.021
	220 - 260	C2/K20, C3/K10	210	310	310	.005	.008	.011	.013	.015	.018
	260 - 320	C2/K20, C3/K10	180	270	270	.005	.007	.010	.011	.013	.015

\* Parameters shown are only starting points. Speed should be calculated using the drill diameter. Due to the short drill distance required, speed and feed rates can possibly be elevated. Coolant through the cutter is preferred. Flood, Mist or Air coolant can also be used. No spot drilling, pre-drilling, or dwell required.

# Coolant Recommendations

## HSS and Carbide - Inch

Coolant through the cutter is preferred. Flood, Mist or Air coolant can also be used.

HSS		Drilling Parameters for Port Contour Cutters					
		Coolant Pressure (PSI)					
		Coolant Volumetric Flowrate (GPM)					
MATERIAL	Material Hardness (BHN)	Tube Number 4 - 5	Tube Number 6 - 8	Tube Number 10	Tube Number 12 - 16	Tube Number 20 - 24	Tube Number 32
		T-A® Series Y - Z	T-A® Series 0	T-A® Series 1	T-A® Series 2	T-A® Series 3	T-A® Series 4
Free Machining Steel 1118, 1215, 12L14, etc.	100 - 250	175 - 185	100 - 120	105 - 140	80 - 115	75 - 100	40 - 50
		2.5 - 2.6	2.8 - 3.0	4.4 - 5.2	7 - 8	12 - 14	30 - 33
Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 275	165 - 170	75 - 90	75 - 95	60 - 80	55 - 75	30 - 40
		2.4 - 2.5	2.4 - 2.6	3.7 - 4.2	6 - 7	11 - 12	26 - 30
Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 325	160 - 165	70 - 85	70 - 90	55 - 75	50 - 70	30 - 40
		2.3 - 2.4	2.3 - 2.6	3.6 - 4.1	5 - 6	10 - 12	26 - 30
Alloy Steel 4140, 5140, 8640, etc.	125 - 375	160 - 165	65 - 75	65 - 80	50 - 70	45 - 60	30 - 35
		2.3 - 2.4	2.2 - 2.4	3.5 - 3.9	5 - 6	10 - 11	26 - 28
High Strength Alloy 4340, 4330V, 300M, etc.	225 - 400	150 - 155	55 - 60	45 - 50	25 - 30	25 - 30	20 - 25
		2.3 - 2.4	2.1 - 2.2	2.9 - 3.1	4 - 5	7 - 8	21 - 23
Structural Steel A36, A285, A516, etc.	100 - 350	160 - 165	75 - 85	65 - 80	40 - 55	40 - 50	25 - 30
		2.3 - 2.4	2.4 - 2.6	3.5 - 3.9	5 - 6	9 - 10	23 - 26
High Temp. Alloy Hastelloy B, Inconel 600, etc.	140 - 310	150 - 155	60 - 65	50 - 55	30 - 35	25 - 30	25 - 30
		2.3 - 2.4	2.2 - 2.3	3.1 - 3.2	4 - 5	7 - 8	23 - 26
Stainless Steel 303, 416, 420, 17-4 PH, etc.	135 - 275	165 - 170	70 - 85	65 - 75	40 - 55	40 - 50	25 - 30
		2.4 - 2.5	2.3 - 2.6	3.5 - 3.7	5 - 6	9 - 10	23 - 26
Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	150 - 250	150 - 155	55 - 60	45 - 50	25 - 30	25 - 30	20 - 25
		2.3 - 2.4	2.1 - 2.2	2.9 - 3.1	4 - 5	7 - 8	21 - 23
Aluminum Gray, Ductile, Nodular	30 - 180	190 - 210	140 - 180	150 - 200	115 - 160	90 - 125	40 - 50
		2.6 - 2.7	3.3 - 3.7	5.3 - 6.1	8 - 9	14 - 16	30 - 33
Cast Iron Gray, Ductile, Nodular	120 - 320	155 - 160	60 - 65	50 - 60	30 - 40	30 - 35	25 - 30
		2.3 - 2.4	2.2 - 2.3	3.1 - 3.3	4 - 5	8 - 9	23 - 26

CARBIDE		Drilling Parameters for Port Contour Cutters				
		Coolant Pressure (PSI)				
		Coolant Volumetric Flowrate (GPM)				
MATERIAL	Material Hardness (BHN)	Tube Number 4 - 5	Tube Number 6 - 8	Tube Number 10	Tube Number 12 - 16	Tube Number 20 - 24
		T-A® Series Y - Z	T-A® Series 0	T-A® Series 1	T-A® Series 2	T-A® Series 3
Free Machining Steel 1118, 1215, 12L14, etc.	100 - 250	195	140	160	140	155
		2.6	3.3	5.5	9	18
Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 275	180	105	105	110	115
		2.5	2.9	4.4	8	15
Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 325	175	100	90	100	75
		2.5	2.8	4.1	7	13
Alloy Steel 4140, 5140, 8640, etc.	125 - 375	165	85	100	75	70
		2.4	2.6	4.3	6	12
High Strength Alloy 4340, 4330V, 300M, etc.	225 - 400	160	65	55	40	35
		2.4	2.3	3.2	5	8
Structural Steel A36, A285, A516, etc.	100 - 350	175	115	105	75	70
		2.5	3	4.4	6	12
High Temp. Alloy Hastelloy B, Inconel 600, etc.	140 - 310	170	105	100	95	75
		2.5	2.9	4.3	7	13
Stainless Steel 303, 416, 420, 17-4 PH, etc.	135 - 275	215	150	145	135	90
		2.8	3.4	5.7	9	14
Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	150 - 250	155	60	55	40	35
		2.4	2.2	3.2	5	8
Aluminum Gray, Ductile, Nodular	30 - 180	320	275	300	250	330
		3.4	4.6	7.5	12	26
Cast Iron Gray, Ductile, Nodular	120 - 320	160	70	65	50	445
		2.4	2.3	3.5	5	10

Formulas:  $IPM = (RPM) (IPR)$

$SFM = \frac{(RPM) (3.14) (DIA)}{12}$

$RPM = \frac{(SFM) (12)}{(3.14) (DIA)}$

# Recommended Speeds and Feeds

## HSS and Carbide - Metric

HSS						Drilling Parameters for Port Contour Cutters					
						Feed Rates (IPR) for Drill Insert Series					
						Tube Number 4 - 5	Tube Number 6 - 8	Tube Number 10	Tube Number 12 - 16	Tube Number 20 - 24	Tube Number 32
MATERIAL	Material Hardness (BHN)	Tool Steel Grade	TiN M/min.	TiAlN M/min.	TiCN M/min.	T-A® Series Y - Z	T-A® Series 0	T-A® Series 1	T-A® Series 2	T-A® Series 3	T-A® Series 4
Free Machining Steel 1118, 1215, 12L14, etc.	100 - 150	HSS	61	86	80	0,18	0,25	0,33	0,41	0,51	0,58
	150 - 200	HSS	55	80	72	0,18	0,25	0,33	0,41	0,51	0,58
	200 - 250	HSS	49	73	64	0,15	0,25	0,33	0,41	0,51	0,58
Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	HSS	52	76	67	0,15	0,23	0,30	0,38	0,48	0,58
	125 - 175	HSS	49	73	64	0,15	0,23	0,30	0,38	0,48	0,58
	175 - 225	HSS	46	69	60	0,13	0,20	0,25	0,36	0,46	0,53
	225 - 275	HSS	43	64	55	0,13	0,20	0,25	0,36	0,46	0,53
Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 175	HSS	49	73	64	0,15	0,23	0,30	0,38	0,48	0,58
	175 - 225	HSS	46	69	60	0,13	0,20	0,25	0,36	0,46	0,53
	225 - 275	HSS	43	64	55	0,13	0,20	0,25	0,36	0,46	0,53
	275 - 325	SC, PC	40	60	52	0,10	0,18	0,23	0,30	0,41	0,48
Alloy Steel 4140, 5140, 8640, etc.	125 - 175	HSS	46	64	60	0,15	0,20	0,25	0,36	0,43	0,48
	175 - 225	HSS	43	60	55	0,13	0,20	0,25	0,36	0,43	0,48
	225 - 275	HSS	40	55	52	0,13	0,18	0,25	0,36	0,43	0,48
	275 - 325	SC, PC	37	52	47	0,10	0,15	0,23	0,30	0,38	0,43
High Strength Alloy 4340, 4330V, 300M, etc.	325 - 375	SC, PC	34	47	44	0,08	0,15	0,23	0,30	0,38	0,43
	225 - 300	SC, PC	24	34	31	0,13	0,18	0,23	0,25	0,36	0,43
Structural Steel A36, A285, A516, etc.	300 - 350	SC, PC	19	26	24	0,10	0,18	0,23	0,25	0,36	0,43
	350 - 400	PC	15	21	20	0,08	0,15	0,20	0,23	0,30	0,48
	100 - 150	HSS	43	61	55	0,15	0,25	0,30	0,36	0,46	0,53
High Temp. Alloy Hastelloy B, Inconel 600, etc.	150 - 250	HSS	37	52	47	0,13	0,23	0,25	0,30	0,41	0,48
	250 - 350	SC, PC	30	43	40	0,10	0,20	0,23	0,25	0,36	0,43
Stainless Steel 303, 416, 420, 17-4 PH, etc.	140 - 220	SC, PC	9	12	11	0,08	0,18	0,20	0,25	0,30	0,38
	220 - 310	PC	8	11	9	0,08	0,15	0,18	0,20	0,25	0,30
Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	135 - 185	HSS	23	32	29	0,15	0,20	0,23	0,28	0,36	0,41
	185 - 275	HSS	18	28	24	0,13	0,18	0,20	0,25	0,30	0,36
Aluminum	150 - 200	SC	24	34	34	0,10	0,15	0,20	0,25	0,30	0,38
	200 - 250	SC, PC	18	18	18	0,10	0,15	0,20	0,25	0,30	0,38
Cast Iron Gray, Ductile, Nodular	30	HSS	183	260	229	0,20	0,33	0,41	0,50	0,56	0,64
	180	HSS	91	138	122	0,20	0,33	0,41	0,46	0,56	0,64
Aluminum	120 - 150	HSS	52	76	67	0,18	0,30	0,41	0,51	0,61	0,69
	150 - 200	HSS	46	69	60	0,15	0,28	0,36	0,46	0,56	0,64
	200 - 220	HSS	40	60	52	0,15	0,23	0,30	0,41	0,46	0,53
	220 - 260	SC, PC	34	50	44	0,13	0,18	0,23	0,30	0,36	0,43
Cast Iron Gray, Ductile, Nodular	260 - 320	SC, PC	27	41	37	0,10	0,15	0,18	0,23	0,30	0,36

CARBIDE					Drilling Parameters for Port Contour Cutters				
					Feed Rates (IPR) for Drill Insert Series				
					Tube Number 4 - 5	Tube Number 6 - 8	Tube Number 10	Tube Number 12 - 16	Tube Number 20 - 24
MATERIAL	Material Hardness (BHN)	Carbide Grade	TiN M/min.	TiAlN M/min.	T-A® Series Y - Z	T-A® Series 0	T-A® Series 1	T-A® Series 2	T-A® Series 3
Free Machining Steel 1118, 1215, 12L14, etc.	100 - 150	C5/P40	96	128	0,20	0,30	0,38	0,45	0,53
	150 - 200	C5/P40	85	110	0,18	0,28	0,35	0,40	0,48
	200 - 250	C5/P40	79	104	0,15	0,25	0,33	0,38	0,43
Low Carbon Steel 1010, 1020, 1025, 1522, 1144, etc.	85 - 125	C5/P40	91	119	0,20	0,25	0,33	0,43	0,48
	125 - 175	C5/P40	79	104	0,18	0,25	0,33	0,40	0,45
	175 - 225	C5/P40	73	95	0,15	0,23	0,30	0,38	0,43
	225 - 275	C5/P40	64	83	0,13	0,23	0,30	0,38	0,43
Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 175	C5/P40	79	104	0,18	0,25	0,33	0,40	0,45
	175 - 225	C5/P40	73	95	0,15	0,23	0,30	0,38	0,43
	225 - 275	C5/P40	67	83	0,15	0,23	0,30	0,38	0,43
	275 - 325	C5/P40	55	70	0,13	0,20	0,28	0,35	0,40
Alloy Steel 4140, 5140, 8640, etc.	125 - 175	C5/P40	76	99	0,18	0,25	0,33	0,40	0,45
	175 - 225	C5/P40	70	92	0,15	0,23	0,30	0,38	0,43
	225 - 275	C5/P40	64	83	0,15	0,23	0,30	0,38	0,43
	275 - 325	C5/P40	61	76	0,13	0,20	0,28	0,35	0,40
High Strength Alloy 4340, 4330V, 300M, etc.	325 - 375	C5/P40	52	67	0,10	0,18	0,25	0,33	0,38
	225 - 300	C5/P40	49	61	0,15	0,23	0,25	0,30	0,38
Structural Steel A36, A285, A516, etc.	300 - 350	C5/P40	43	55	0,13	0,20	0,23	0,28	0,35
	350 - 400	C5/P40	37	49	0,10	0,18	0,20	0,25	0,30
	100 - 150	C5/P40	73	95	0,20	0,28	0,35	0,40	0,45
High Temp. Alloy Hastelloy B, Inconel 600, etc.	150 - 250	C5/P40	61	76	0,15	0,25	0,30	0,35	0,40
	250 - 350	C5/P40	55	70	0,13	0,23	0,28	0,30	0,35
Stainless Steel 303, 416, 420, 17-4 PH, etc.	140 - 220	C2/K20	24	32	0,10	0,18	0,23	0,28	0,33
	220 - 310	C2/K20	18	26	0,10	0,15	0,20	0,25	0,30
Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	135 - 185	C2/K20	49	64	0,18	0,23	0,30	0,35	0,40
	185 - 275	C2/K20	37	49	0,15	0,20	0,28	0,30	0,35
Aluminum	150 - 200	C5/K20	49	67	0,10	0,18	0,23	0,28	0,33
	200 - 250	C5/K20	37	52	0,10	0,18	0,23	0,28	0,33
Cast Iron Gray, Ductile, Nodular	30	C2/K20	366	460	0,25	0,38	0,45	0,50	0,55
	180	C2/K20	244	306	0,23	0,33	0,40	0,45	0,50
Aluminum	120 - 150	C2/K20, C3/K10	98	141	0,20	0,30	0,38	0,48	0,58
	150 - 200	C2/K20, C3/K10	82	122	0,18	0,28	0,33	0,43	0,53
	200 - 220	C2/K20, C3/K10	73	110	0,15	0,23	0,30	0,38	0,45
	220 - 260	C2/K20, C3/K10	64	95	0,13	0,20	0,28	0,33	0,38
	260 - 320	C2/K20, C3/K10	55	83	0,13	0,18	0,25	0,28	0,33

\* Parameters shown are only starting points. Speed should be calculated using the drill diameter. Due to the short drill distance required, speed and feed rates can possibly be elevated. Coolant through the cutter is preferred. Flood, Mist or Air coolant can also be used. No spot drilling, pre-drilling, or dwell required.

# Coolant Recommendations

## HSS and Carbide - Metric

Coolant through the cutter is preferred. Flood, Mist or Air coolant can also be used.

HSS		Drilling Parameters for Port Contour Cutters					
		Coolant Pressure (KPa)					
		Coolant Volumetric Flowrate (LPM)					
MATERIAL	Material Hardness (BHN)	Tube Number 4 - 5	Tube Number 6 - 8	Tube Number 10	Tube Number 12 - 16	Tube Number 20 - 24	Tube Number 32
		T-A® Series Y - Z	T-A® Series 0	T-A® Series 1	T-A® Series 2	T-A® Series 3	T-A® Series 4
<b>Free Machining Steel</b> 1118, 1215, 12L14, etc.	100 - 250	1200 - 1275	690 - 830	725 - 965	550 - 795	520 - 690	275 - 345
		9,5 - 9,8	10,6 - 11,4	16,7 - 19,7	26,5 - 30,3	45,4 - 53,0	114 - 125
<b>Low Carbon Steel</b> 1010, 1020, 1025, 1522, 1144, etc.	85 - 275	1140 - 1175	520 - 620	520 - 655	415 - 550	380 - 520	205 - 275
		9,1 - 9,5	9,1 - 9,8	14,0 - 15,9	22,7 - 26,5	41,6 - 45,4	98 - 114
<b>Medium Carbon Steel</b> 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 325	1100 - 1140	480 - 585	480 - 620	380 - 520	345 - 480	205 - 275
		8,7 - 9,1	8,7 - 9,8	13,6 - 15,5	18,9 - 22,7	37,9 - 45,4	98 - 114
<b>Alloy Steel</b> 4140, 5140, 8640, etc.	125 - 375	1100 - 1140	450 - 520	450 - 550	345 - 480	310 - 415	205 - 240
		8,7 - 9,1	8,3 - 9,1	13,2 - 14,8	18,9 - 22,7	34,1 - 37,9	87 - 98
<b>High Strength Alloy</b> 4340, 4330V, 300M, etc.	225 - 400	1035 - 1070	415 - 450	345 - 380	205 - 240	170 - 205	170 - 205
		8,7 - 9,1	7,9 - 8,3	11,0 - 11,7	15,1 - 18,9	26,5 - 30,3	79 - 87
<b>Structural Steel</b> A36, A285, A516, etc.	100 - 350	1100 - 1140	520 - 585	450 - 550	275 - 380	275 - 345	170 - 205
		8,7 - 9,1	9,1 - 9,8	13,2 - 14,8	18,9 - 22,7	34,1 - 37,9	87 - 93
<b>High Temp. Alloy</b> Hastelloy B, Inconel 600, etc.	140 - 310	1035 - 1070	415 - 450	345 - 380	205 - 240	170 - 205	170 - 205
		8,7 - 9,1	8,3 - 8,7	11,7 - 12,1	15,1 - 18,9	26,5 - 30,3	87 - 98
<b>Stainless Steel</b> 303, 416, 420, 17-4 PH, etc.	135 - 275	1140 - 1175	480 - 585	450 - 520	275 - 380	275 - 345	170 - 205
		9,1 - 9,5	8,7 - 9,8	13,2 - 14,0	18,9 - 22,7	34,1 - 37,9	87 - 98
<b>Tool Steel</b> H-13, H-21, A-4, O-2, S-3, etc.	150 - 250	1035 - 1070	380 - 415	310 - 345	170 - 205	170 - 205	140 - 170
		8,7 - 9,1	7,9 - 8,3	11,0 - 11,7	15,1 - 18,9	26,5 - 30,3	79 - 87
<b>Aluminum</b>	30 - 180	1310 - 1450	965 - 1240	1035 - 1580	795 - 1100	620 - 860	275 - 345
		9,8 - 10,2	12,5 - 14,0	20,1 - 23,1	30,3 - 34,1	53,0 - 60,6	114 - 125
<b>Cast Iron</b> Gray, Ductile, Nodular	120 - 320	1070 - 1100	415 - 450	345 - 415	205 - 275	205 - 240	170 - 205
		8,7 - 9,1	8,3 - 8,7	11,7 - 12,5	15,1 - 18,9	30,3 - 34,1	87 - 98

CARBIDE		Drilling Parameters for Port Contour Cutters				
		Coolant Pressure (KPa)				
		Coolant Volumetric Flowrate (LPM)				
MATERIAL	Material Hardness (BHN)	Tube Number 4 - 5	Tube Number 6 - 8	Tube Number 10	Tube Number 12 - 16	Tube Number 20 - 24
		T-A® Series Y - Z	T-A® Series 0	T-A® Series 1	T-A® Series 2	T-A® Series 3
<b>Free Machining Steel</b> 1118, 1215, 12L14, etc.	100 - 250	2000	1550	1650	1520	1200
		12,2	16,3	25,3	41,5	71,9
<b>Low Carbon Steel</b> 1010, 1020, 1025, 1522, 1144, etc.	85 - 275	1750	1100	1100	1180	900
		11,4	13,3	20,6	36,5	62,0
<b>Medium Carbon Steel</b> 1030, 1040, 1050, 1527, 1140, 1151, etc.	125 - 325	1720	965	1040	1040	750
		11,3	12,5	20,0	33,8	57,0
<b>Alloy Steel</b> 4140, 5140, 8640, etc.	125 - 375	1650	930	965	790	725
		11,1	12,3	19,3	30,0	55,8
<b>High Strength Alloy</b> 4340, 4330V, 300M, etc.	225 - 400	1450	520	410	310	275
		10,4	9,1	12,6	18,8	33,6
<b>Structural Steel</b> A36, A285, A516, etc.	100 - 350	1585	900	790	690	520
		10,8	12,0	17,5	27,8	47,1
<b>High Temp. Alloy</b> Hastelloy B, Inconel 600, etc.	140 - 310	1650	1140	1240	1100	900
		11,1	13,5	21,9	35,4	62,0
<b>Stainless Steel</b> 303, 416, 420, 17-4 PH, etc.	135 - 275	2275	1650	1790	1720	1310
		13,0	16,3	26,3	44,2	75,0
<b>Tool Steel</b> H-13, H-21, A-4, O-2, S-3, etc.	150 - 250	1450	520	480	345	310
		10,4	9,1	13,6	19,7	36,5
<b>Aluminum</b>	30 - 180	2410	2200	2170	1965	1380
		13,4	18,8	29,0	47,2	77,0
<b>Cast Iron</b> Gray, Ductile, Nodular	120 - 320	1550	725	620	620	550
		10,7	10,8	15,4	26,5	48,7

Formulas: mm/min = (RPM) (mm/rev)

M/min =  $\frac{\text{RPM} (3.14) (\text{DIA})}{1000}$

RPM =  $\frac{\text{M/min} (1000)}{(3.14) (\text{DIA})}$

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Literature Order Number: 2003USTAC

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Literature Order Number: ASC320-02

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