

# SPADE DRILL BODIES

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## SPADE DRILL BODIES Straight Shank, Straight & Helical



**NEW  
ITEM!**



- Interchangeable with other conventional spade blades
- Complete line of straight and helical fluted holders offered with both straight and taper shank styles
- Engineered to accommodate the option of a coolant gland for use where coolant through the spindle is lacking
- **Straight fluted holders** are recommended for horizontal machining center applications to maximize chip evacuation
- **Helical fluted holders** are recommended for vertical machining center applications to break chips and enhance chip removal
- Metric shanks and Bridgeport (R8 taper) holders also available

**DRILLING TIP:**  
Through coolant via the spindle is preferable for optimal drilling with spade drills. However, if spindle cooling is unavailable, then coolant glands or inducers should be used to provide through coolant capability. Flood coolant is not recommended, but can be used for very short hole depths, less than 1X diameter. Through coolant must be used with spade drill depths greater than 1X diameter.

### Straight Shank Holders-Straight & Helical Flutes

Series	Max Drill Depth	Flute Length	OAL	Shank Dia	Shank Length	Pipe Tap	Straight Flute		Helical Flute	
							Part Number	Price	Part Number	Price
<b>Series X:</b> .375 thru .436	1.09	1.59	3.97	0.75	2.375	1/8	MET-7SXSS	\$184.30	-	-
	2.19	2.68	5.06	0.75	2.375	1/8	MET-7SXSM	\$190.90	-	-
	4.38	4.87	7.25	0.75	2.375	1/8	MET-7SXSE	\$203.90	-	-
<b>Series Z:</b> .437 thru .508	1.58	3.37	5.75	0.75	2.375	1/8	MET-7SZSS	\$171.10	MET-7HZSS	\$187.40
	2.59	4.38	6.76	0.75	2.375	1/8	MET-7SZSM	\$184.30	MET-7HZSM	\$193.80
	3.59	5.38	7.76	0.75	2.375	1/8	MET-7SZSL	\$190.90	MET-7HZSL	\$197.70
	4.46	6.25	8.63	0.75	2.375	1/8	MET-7SZSE	\$197.30	MET-7HZSE	\$213.20
<b>Series 0:</b> .509 thru .690	2.18	3.97	6.35	0.75	2.375	1/8	MET-7S0SS	\$168.70	MET-7H0SS	\$187.40
	3.44	5.33	7.71	0.75	2.375	1/8	MET-7S0SM	\$181.70	MET-7H0SM	\$193.80
	4.86	6.75	9.13	0.75	2.375	1/8	MET-7S0SL	\$188.20	MET-7H0SL	\$200.20
	7.90	9.80	12.17	0.75	2.375	1/8	MET-7S0SE	\$194.60	MET-7H0SE	\$213.20
<b>Series 0.5:</b> .609 thru .690	1.98	3.97	6.35	0.75	2.375	1/4	MET-7S0.5SS	\$174.40	MET-7H0.5SS	\$190.60
	3.34	5.33	7.71	0.75	2.375	1/4	MET-7S0.5SM	\$184.10	MET-7H0.5SM	\$200.20
	4.76	6.75	9.13	0.75	2.375	1/4	MET-7S0.5SL	\$193.80	MET-7H0.5SL	\$206.70
	7.80	9.80	12.17	0.75	2.375	1/4	MET-7S0.5SE	\$200.20	MET-7H0.5SE	\$219.70
<b>Series 1:</b> .690 thru .960	2.76	4.85	7.23	1.00	2.375	1/4	MET-7S1SS	\$181.70	MET-7H1SS	\$193.80
	4.71	6.80	9.18	1.00	2.375	1/4	MET-7S1SM	\$188.20	MET-7H1SM	\$206.70
	6.63	8.72	11.10	1.00	2.375	1/4	MET-7S1SL	\$201.20	MET-7H1SL	\$223.30
	10.66	12.75	15.12	1.00	2.375	1/4	MET-7S1SE	\$227.20	MET-7H1SE	\$258.40
<b>Series 1.5:</b> .859 thru .960	2.55	4.85	7.22	1.00	2.375	1/4	MET-7S1.5SS	\$188.20	MET-7H1.5SS	\$200.20
	4.80	6.80	9.18	1.00	2.375	1/4	MET-7S1.5SM	\$194.60	MET-7H1.5SM	\$206.70
	6.42	8.72	11.10	1.00	2.375	1/4	MET-7S1.5SL	\$201.20	MET-7H1.5SL	\$229.50
	10.45	12.75	15.12	1.00	2.375	1/4	MET-7S1.5SE	\$236.90	MET-7H1.5SE	\$264.90
<b>Series 2:</b> .961 thru 1.380	3.07	5.56	8.00	1.25	2.437	1/4	MET-7S2SS	\$194.60	MET-7H2SS	\$206.70
	5.45	7.94	10.38	1.25	2.437	1/4	MET-7S2SM	\$201.20	MET-7H2SM	\$231.60
	7.82	10.31	12.75	1.25	2.437	1/4	MET-7S2SL	\$207.70	MET-7H2SL	\$235.70
	10.89	13.38	15.82	1.25	2.437	1/4	MET-7S2SE	\$246.60	MET-7H2SE	\$284.30
<b>Series 2.5:</b> 1.187 thru 1.380	2.88	5.56	8.00	1.25	2.437	1/4	MET-7S2.5SS	\$201.20	MET-7H2.5SS	\$219.70
	5.26	5.56	8.00	1.25	2.437	1/4	MET-7S2.5SM	\$207.70	MET-7H2.5SM	\$239.80
	7.63	10.31	12.75	1.25	2.437	1/4	MET-7S2.5SL	\$214.20	MET-7H2.5SL	\$244.20
	10.70	13.38	15.82	1.25	2.437	1/4	MET-7S2.5SE	\$259.60	MET-7H2.5SE	\$290.70
<b>Series 3:</b> 1.381 thru 1.879	4.43	7.25	9.88	1.50	2.625	1/4	MET-7S3SS	\$223.00	MET-7H3SS	\$279.00
	8.43	11.25	13.88	1.50	2.625	1/4	MET-7S3SM	\$229.40	MET-7H3SM	\$294.40
	13.18	16.00	18.63	1.50	2.625	1/4	MET-7S3SL	\$273.90	MET-7H3SL	\$310.70
<b>Series 4:</b> 1.880 thru 2.570	5.90	8.75	11.38	1.50	2.625	1/4	MET-7S4SS	\$242.10	MET-7H4SS	\$291.30
	9.90	12.75	15.38	1.50	2.625	1/4	MET-7S4SM	\$280.30	MET-7H4SM	\$342.40
	16.02	18.87	21.50	1.50	2.625	1/4	MET-7S4SL	\$312.20	MET-7H4SL	\$353.10
<b>Series 5:</b> 2.500" thru 3.500" holds Series 5 & 6	6.24	9.25	12.50	2.00	3.250	1/4	MET-7S5SS	\$375.80	-	-
	11.99	15.00	18.25	2.00	3.250	1/4	MET-7S5SM	\$407.70	MET-7H5SM	\$456.20
	17.74	20.75	24.00	2.00	3.250	1/4	MET-7S5SL	\$503.30	MET-7H5SL	\$534.80
<b>Series 7:</b> 3.501 through 4.500" holds Series 7 & 8	6.88	8.63	15.25	3.00	6.625	1/4	MET-7S7SS	\$503.20	-	-
	12.25	14.63	21.25	3.00	6.625	1/4	MET-7S7SM	\$585.10	-	-
	19.45	22.86	29.50	3.00	6.625	1/4	MET-7S7SL	\$791.50	-	-

Additional holders available. See following page.

Call Us Or Visit Our Website For Our Complete Selection!

2010-11 Master Catalog

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LATHES CHUCKS  
LIVE CENTERS

VICE JAWS  
VICE ACCESSORIES

STRAIGHT SHANK  
COLLET HOLDERS

LATHES BUSHINGS  
DRILL CHUCKS

CARBIDE INSERTS  
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CUTTING TOOLS  
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PRECISION TOOLS  
DEBURRING

COOLANT/FLUIDS  
TOOL STORAGE

## SPADE DRILL BODIES

Morse Taper/R8 Shank  
Straight & Helical Flute



### Holders with Taper Shanks

Series	Max Drill Depth	Flute Length	OAL	Morse Taper	Pipe Tap	Straight Flute		Helical Flute	
						Part Number	Price	Part Number	Price
<b>Series Y:</b> .375 thru .436	1.39	3.37	6.31	2	1/8	MET-7SYTS	\$177.70	MET-7HYTS	\$180.90
	2.27	4.25	7.19	2	1/8	MET-7SYTM	\$190.90	MET-7HYTM	\$192.90
	3.15	5.13	8.07	2	1/8	MET-7SYTL	\$197.30	MET-7HYTL	\$196.50
	4.46	6.44	9.38	2	1/8	MET-7SYTE	\$203.90	MET-7HYTE	\$213.20
<b>Series Z:</b> .437 thru .508	1.58	3.56	6.50	2	1/8	MET-7SZTS	\$177.70	MET-7HZTS	\$180.90
	2.59	4.56	7.50	2	1/8	MET-7SZTM	\$190.90	MET-7HZTM	\$192.90
	3.59	5.57	8.51	2	1/8	MET-7SZTL	\$197.30	MET-7HZTL	\$196.50
	4.46	6.44	9.38	2	1/8	MET-7SZTE	\$203.90	MET-7HZTE	\$213.20
<b>Series 0:</b> .509 thru .695	2.18	4.16	7.10	2	1/8	MET-7S0TS	\$175.20	MET-7H0TS	\$180.90
	3.44	5.52	8.46	2	1/8	MET-7S0TM	\$188.20	MET-7H0TM	\$193.80
	4.86	6.94	9.88	2	1/8	MET-7S0TL	\$194.60	MET-7H0TL	\$200.20
	7.90	10.00	12.93	2	1/8	MET-7S0TE	\$201.20	MET-7H0TE	\$213.20
<b>Series 0.5:</b> .609 thru 7.80	3.34	5.52	8.46	2	1/8	-	-	MET-7H0.5TM	\$200.20
	4.76	6.94	9.88	2	1/8	MET-7S0.5TL	\$201.20	MET-7H0.5TL	\$206.70
	7.80	10.00	12.93	2	1/8	MET-7S0.5TE	\$206.70	MET-7H0.5TE	\$219.70
<b>Series 1:</b> .690 thru .960	2.76	5.04	8.73	3	1/4	MET-7S1TS	\$188.20	MET-7H1TS	\$193.80
	4.71	6.99	10.68	3	1/4	MET-7S1TM	\$194.60	MET-7H1TM	\$206.70
	6.63	8.91	12.60	3	1/4	MET-7S1TL	\$214.20	MET-7H1TL	\$223.30
	10.66	12.94	16.63	3	1/4	MET-7S1TE	\$227.20	MET-7H1TE	\$245.50
<b>Series 1.5:</b> .859 thru .960	2.55	5.04	8.73	3	1/4	MET-7S1.5TS	\$194.60	-	-
	4.80	6.99	10.68	3	1/4	MET-7S1.5TM	\$207.70	-	-
	6.42	8.91	12.60	3	1/4	-	-	MET-7H1.5TL	\$239.00
	10.45	12.94	16.63	3	1/4	-	-	MET-7H1.5TE	\$252.00
<b>Series 2:</b> .961 thru 1.380	3.07	5.75	9.44	3	1/4	MET-7S2TS	\$214.20	MET-7H2TS	\$217.00
	5.45	8.13	11.82	3	1/4	MET-7S2TM	\$220.70	MET-7H2TM	\$232.60
	7.82	10.50	14.19	3	1/4	MET-7S2TL	\$227.20	MET-7H2TL	\$238.00
	10.89	13.57	17.26	3	1/4	MET-7S2TE	\$253.10	MET-7H2TE	\$284.30
<b>Series 2.5:</b> 1.187 thru 1.380	2.88	5.75	9.44	3	1/4	MET-7S2.5TS	\$220.70	MET-7H2.5TS	\$226.20
	2.88	5.75	9.44	4	1/4	MET-7S2.5TS-4MT	\$220.70	-	-
	5.26	8.13	11.82	3	1/4	-	-	MET-7H2.5TM	\$229.50
	5.26	8.13	11.82	4	1/4	MET-7S2.5TM-4MT	\$227.20	-	-
	7.63	10.50	14.19	3	1/4	MET-7S2.5TL	\$230.50	MET-7H2.5TL	\$241.90
	7.63	10.50	14.19	4	1/4	MET-7S2.5TL-4MT	\$230.50	-	-
10.70	13.57	17.26	3	1/4	MET-7S2.5TE	\$259.60	MET-7H2.5TE	\$289.30	
<b>Series 3:</b> 1.381 thru 1.879	4.43	7.50	12.13	4	1/4	MET-7S3TS	\$223.00	MET-7H3TS	\$291.70
	8.43	11.50	16.13	4	1/4	MET-7S3TM	\$242.10	MET-7H3TM	\$304.40
	13.18	16.25	20.88	4	1/4	MET-7S3TL	\$286.70	MET-7H3TL	\$329.70
<b>Series 4:</b> 1.880 thru 2.570	5.90	9.00	13.62	4	1/4	MET-7S4TS	\$242.10	MET-7H4TS	\$309.10
	9.90	13.00	17.63	4	1/4	MET-7S4TM	\$286.70	MET-7H4TM	\$350.60
	16.02	19.12	23.75	4	1/4	MET-7S4TL	\$331.30	MET-7H4TL	\$382.00
<b>Series 5:</b> 2.500" thru 3.500" holds series 5 & 6	6.24	9.50	15.38	5	1/4	MET-7S5TS	\$382.20	-	-
	11.99	15.25	21.13	5	1/4	MET-7S5TM	\$414.00	MET-7H5TM	\$488.50
	17.74	21.00	26.88	5	1/4	MET-7S5TL	\$522.20	MET-7H5TL	\$563.70
<b>Series 7:</b> 3.501 thru 4.500" holds series 7 & 8	6.88	10.41	16.28	5	1/4	MET-7S7TS	\$515.90	-	-
	12.25	16.41	22.28	5	1/4	MET-7S7TM	\$597.60	-	-
	19.45	24.65	30.53	5	1/4	MET-7S7TL	\$803.80	-	-

### Holders for R8 (Bridgeport) Applications

Series	Max Drill Depth	Flute Length	OAL	Taper	Pipe Tap	Helical Flute	
						Part Number	Price
<b>Series 0</b>	3.29	5.19	9.19	R8 (16°50')	1/16-27	MET-7H0SR8	\$226.20
<b>Series 1</b>	3.34	5.19	9.19	R8 (16°50')	1/16-27	MET-7H1SR8	\$237.40
<b>Series 2</b>	3.32	5.19	9.19	R8 (16°50')	1/16-27	MET-7H2SR8	\$251.40

Metric Shank Holders Also Available! Please Call For More Information!

Call Us Today For All Of Your Machine Tool Needs!



**More Holes  
Per Insert!**

- Interchangeable with other conventional spade blades
- Fabricated from a pressed and HIP sintered powder metal T-15 alloy, yielding a more uniform and consistent metallurgical structure provides lower variability than competing blades.
- Highest performance in the industry
- Faster penetration rates – 35% to 100% higher "in-feed" rates than competitors' blades
- More holes per blade – 25% to 50% wear-life improvement over competitors' blades
- Improved surface finish – elimination of secondary operations
- Metric sizes also available



**Premium Coatings:**

- **TiN (Titanium Nitride)** gives longer tool life and added lubricity, while allowing more aggressive machining of steels.
- **TiCN (Titanium Carbonitride)** is a general purpose coating well suited to machining of mild steel, ductile cast iron and nonferrous materials such as aluminum and copper alloys. Superior in preventing excessive built-up edge.
- **TiAlN (Titanium Aluminum Nitride)** a multilayer, mixed phase coating designed for high-speed machining in alloy steels, high temp alloys, gray cast iron and titanium. Operate at relatively high speeds for optimum performance.

Series	Series X/Y	Series Z	Series 0	Series 1	Series 2	Series 3	Series 4	Series 5	Series 6	Series 7	Series 8
Range	.375 to .436	.437 to .508	.509 to .690	.691 to .961	.961 to 1.380	1.381 to 1.879	1.880 to 2.570	2.500 to 3.000	3.001 to 3.500	3.501 to 4.000	4.001 to 4.500

Inch	Dec.	TiN Coated Part Number	TiCN Coated Part Number	TiAlN Coated Part Number
<b>Series X</b>				
		<b>\$23.80 ea</b>	<b>\$27.00 ea</b>	<b>\$28.40 ea</b>
3/8"	.3750	MET-7FX-0375T	MET-7FX-0375N	MET-7FX-0375A
25/64"	.3906	MET-7FX-0391T	MET-7FX-0391N	MET-7FX-0391A
13/32"	.4063	MET-7FX-0406T	MET-7FX-0406N	MET-7FX-0406A
27/64"	.4219	MET-7FX-0422T	MET-7FX-0422N	MET-7FX-0422A
<b>Series Z</b>				
		<b>\$23.30 ea</b>	<b>\$27.50 ea</b>	<b>\$28.40 ea</b>
7/16"	.4375	MET-7FZ-0438T	MET-7FZ-0438N	MET-7FZ-0438A
29/64"	.4531	MET-7FZ-0453T	MET-7FZ-0453N	MET-7FZ-0453A
15/32"	.4688	MET-7FZ-0469T	MET-7FZ-0469N	MET-7FZ-0469A
31/64"	.4844	MET-7FZ-0484T	MET-7FZ-0484N	MET-7FZ-0484A
1/2"	.5000	MET-7FZ-0500T	MET-7FZ-0500N	MET-7FZ-0500A
<b>Series 0</b>				
		<b>\$25.70 ea</b>	<b>\$29.80 ea</b>	<b>\$30.40 ea</b>
33/64"	.5156	MET-7F0-0516T	MET-7F0-0516N	MET-7F0-0516A
17/32"	.5313	MET-7F0-0531T	MET-7F0-0531N	MET-7F0-0531A
35/64"	.5469	MET-7F0-0547T	MET-7F0-0547N	MET-7F0-0547A
9/16"	.5625	MET-7F0-0563T	MET-7F0-0563N	MET-7F0-0563A
37/64"	.5781	MET-7F0-0578T	MET-7F0-0578N	MET-7F0-0578A
19/32"	.5938	MET-7F0-0594T	MET-7F0-0594N	MET-7F0-0594A
39/64"	.6094	MET-7F0-0609T	MET-7F0-0609N	MET-7F0-0609A
5/8"	.6250	MET-7F0-0625T	MET-7F0-0625N	MET-7F0-0625A
41/64"	.6406	MET-7F0-0641T	MET-7F0-0641N	MET-7F0-0641A
21/32"	.6563	MET-7F0-0656T	MET-7F0-0656N	MET-7F0-0656A
43/64"	.6719	MET-7F0-0672T	MET-7F0-0672N	MET-7F0-0672A
11/16"	.6875	MET-7F0-0688T	MET-7F0-0688N	MET-7F0-0688A
<b>Series 1</b>				
		<b>\$28.60 ea</b>	<b>\$33.80 ea</b>	<b>\$34.40 ea</b>
45/64"	.7031	MET-7F1-0703T	MET-7F1-0703N	MET-7F1-0703A
23/32"	.7188	MET-7F1-0719T	MET-7F1-0719N	MET-7F1-0719A
47/64"	.7344	MET-7F1-0734T	MET-7F1-0734N	MET-7F1-0734A
3/4"	.7500	MET-7F1-0750T	MET-7F1-0750N	MET-7F1-0750A
49/64"	.7656	MET-7F1-0766T	MET-7F1-0766N	MET-7F1-0766A
25/32"	.7813	MET-7F1-0781T	MET-7F1-0781N	MET-7F1-0781A
51/64"	.7969	MET-7F1-0797T	MET-7F1-0797N	MET-7F1-0797A
13/16"	.8125	MET-7F1-0813T	MET-7F1-0813N	MET-7F1-0813A
53/64"	.8281	MET-7F1-0828T	MET-7F1-0828N	MET-7F1-0828A
27/32"	.8438	MET-7F1-0844T	MET-7F1-0844N	MET-7F1-0844A
55/64"	.8594	MET-7F1-0859T	MET-7F1-0859N	MET-7F1-0859A
7/8"	.8750	MET-7F1-0875T	MET-7F1-0875N	MET-7F1-0875A
57/64"	.8906	MET-7F1-0891T	MET-7F1-0891N	MET-7F1-0891A
29/32"	.9063	MET-7F1-0906T	MET-7F1-0906N	MET-7F1-0906A
59/64"	.9219	MET-7F1-0922T	MET-7F1-0922N	MET-7F1-0922A
15/16"	.9375	MET-7F1-0938T	MET-7F1-0938N	MET-7F1-0938A
61/64"	.9531	MET-7F1-0953T	MET-7F1-0953N	MET-7F1-0953A
<b>Series 2</b>				
		<b>\$33.80 ea</b>	<b>\$40.10 ea</b>	<b>\$40.60 ea</b>
31/32"	.9688	MET-7F2-0969T	MET-7F2-0969N	MET-7F2-0969A
1"	1.0000	MET-7F2-1000T	MET-7F2-1000N	MET-7F2-1000A
1-1/64"	1.0156	MET-7F2-1016T	MET-7F2-1016N	MET-7F2-1016A
1-1/32"	1.0313	MET-7F2-1031T	MET-7F2-1031N	MET-7F2-1031A

Inch	Dec.	TiN Coated Part Number	TiCN Coated Part Number	TiAlN Coated Part Number
<b>Series 2 (cont.)</b>				
		<b>\$33.80 ea</b>	<b>\$40.10 ea</b>	<b>\$40.60 ea</b>
1-3/64"	1.0469	MET-7F2-1047T	MET-7F2-1047N	MET-7F2-1047A
1-1/16"	1.0625	MET-7F2-1063T	MET-7F2-1063N	MET-7F2-1063A
1-5/64"	1.0781	MET-7F2-1078T	MET-7F2-1078N	MET-7F2-1078A
1-3/32"	1.0938	MET-7F2-1094T	MET-7F2-1094N	MET-7F2-1094A
1-7/64"	1.1094	MET-7F2-1109T	MET-7F2-1109N	MET-7F2-1109A
1-1/8"	1.1250	MET-7F2-1125T	MET-7F2-1125N	MET-7F2-1125A
1-9/64"	1.1406	MET-7F2-1141T	MET-7F2-1141N	MET-7F2-1141A
1-5/32"	1.1563	MET-7F2-1156T	MET-7F2-1156N	MET-7F2-1156A
1-3/16"	1.1875	MET-7F2-1188T	MET-7F2-1188N	MET-7F2-1188A
1-13/64"	1.2031	MET-7F2-1203T	MET-7F2-1203N	MET-7F2-1203A
1-7/32"	1.2188	MET-7F2-1219T	MET-7F2-1219N	MET-7F2-1219A
1-15/64"	1.2344	MET-7F2-1234T	MET-7F2-1234N	MET-7F2-1234A
1-1/4"	1.2500	MET-7F2-1250T	MET-7F2-1250N	MET-7F2-1250A
1-17/64"	1.2656	MET-7F2-1266T	MET-7F2-1266N	MET-7F2-1266A
1-9/32"	1.2813	MET-7F2-1281T	MET-7F2-1281N	MET-7F2-1281A
1-5/16"	1.3125	MET-7F2-1313T	MET-7F2-1313N	MET-7F2-1313A
1-21/64"	1.3281	MET-7F2-1328T	MET-7F2-1328N	MET-7F2-1328A
1-11/32"	1.3438	MET-7F2-1344T	MET-7F2-1344N	MET-7F2-1344A
1-23/64"	1.3594	MET-7F2-1359T	MET-7F2-1359N	MET-7F2-1359A
1-3/8"	1.3750	MET-7F2-1375T	MET-7F2-1375N	MET-7F2-1375A
<b>Series 3</b>				
		<b>\$42.70 ea</b>	<b>\$51.40 ea</b>	<b>\$52.10 ea</b>
1-25/64"	1.3906	MET-7F3-1391T	MET-7F3-1391N	MET-7F3-1391A
1-13/32"	1.4063	MET-7F3-1406T	MET-7F3-1406N	MET-7F3-1406A
1-7/16"	1.4375	MET-7F3-1438T	MET-7F3-1438N	MET-7F3-1438A
1-29/64"	1.4531	MET-7F3-1453T	MET-7F3-1453N	MET-7F3-1453A
1-15/32"	1.4688	MET-7F3-1469T	MET-7F3-1469N	MET-7F3-1469A
1-31/64"	1.4844	MET-7F3-1484T	MET-7F3-1484N	MET-7F3-1484A
1-1/2"	1.5000	MET-7F3-1500T	MET-7F3-1500N	MET-7F3-1500A
1-33/64"	1.5156	MET-7F3-1516T	MET-7F3-1516N	MET-7F3-1516A
1-17/32"	1.5313	MET-7F3-1531T	MET-7F3-1531N	MET-7F3-1531A
1-9/16"	1.5625	MET-7F3-1563T	MET-7F3-1563N	MET-7F3-1563A
1-37/64"	1.5781	MET-7F3-1578T	MET-7F3-1578N	MET-7F3-1578A
1-19/32"	1.5938	MET-7F3-1594T	MET-7F3-1594N	MET-7F3-1594A
1-5/8"	1.6250	MET-7F3-1625T	MET-7F3-1625N	MET-7F3-1625A
1-21/32"	1.6563	MET-7F3-1656T	MET-7F3-1656N	MET-7F3-1656A
1-11/16"	1.6875	MET-7F3-1688T	MET-7F3-1688N	MET-7F3-1688A
1-45/64"	1.7031	MET-7F3-1703T	MET-7F3-1703N	MET-7F3-1703A
1-23/32"	1.7188	MET-7F3-1719T	MET-7F3-1719N	MET-7F3-1719A
1-3/4"	1.7500	MET-7F3-1750T	MET-7F3-1750N	MET-7F3-1750A
1-49/64"	1.7656	MET-7F3-1766T	MET-7F3-1766N	MET-7F3-1766A
1-25/32"	1.7813	MET-7F3-1781T	MET-7F3-1781N	MET-7F3-1781A
1-13/16"	1.8125	MET-7F3-1813T	MET-7F3-1813N	MET-7F3-1813A
1-53/64"	1.8281	MET-7F3-1828T	MET-7F3-1828N	MET-7F3-1828A
1-27/32"	1.8438	MET-7F3-1844T	MET-7F3-1844N	MET-7F3-1844A
1-7/8"	1.8750	MET-7F3-1875T	MET-7F3-1875N	MET-7F3-1875A

Additional Inserts Located On Following Page

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# SPADE DRILL INSERTS-HSS

## SPADE DRILL INSERTS (continued)

High Speed Steel

- Interchangeable with other conventional spade blades
- **TiN (Titanium Nitride)** gives longer tool life and added lubricity, while allowing more aggressive machining of steels.
- **TiCN (Titanium Carbonitride)** is a general purpose coating well suited to machining of mild steel, ductile cast iron and nonferrous materials.
- **TiAlN (Titanium Aluminum Nitride)** a multilayer, mixed phase coating designed for high-speed machining in alloy steels, high temp alloys, gray cast iron and titanium. Operate at relatively high speeds for optimum performance.



Inch	Dec.	TiN Coated Part Number	TiCN Coated Part Number	TiAlN Coated Part Number
<b>Series 4</b>		<b>\$56.00 ea</b>	<b>\$67.30 ea</b>	<b>\$68.00 ea</b>
1-29/32"	1.9063	MET-7F4-1906T	MET-7F4-1906N	MET-7F4-1906A
1-15/16"	1.9375	MET-7F4-1938T	MET-7F4-1938N	MET-7F4-1938A
1-31/32"	1.9688	MET-7F4-1969T	MET-7F4-1969N	MET-7F4-1969A
2"	2.0000	MET-7F4-2000T	MET-7F4-2000N	MET-7F4-2000A
2-1/64"	2.0156	MET-7F4-2016T	MET-7F4-2016N	MET-7F4-2016A
2-1/32"	2.0313	MET-7F4-2031T	MET-7F4-2031N	MET-7F4-2031A
2-1/16"	2.0625	MET-7F4-2063T	MET-7F4-2063N	MET-7F4-2063A
2-3/32"	2.0938	MET-7F4-2094T	MET-7F4-2094N	MET-7F4-2094A
2-1/8"	2.1250	MET-7F4-2125T	MET-7F4-2125N	MET-7F4-2125A
2-5/32"	2.1563	MET-7F4-2156T	MET-7F4-2156N	MET-7F4-2156A
2-3/16"	2.1875	MET-7F4-2188T	MET-7F4-2188N	MET-7F4-2188A
2-7/32"	2.2188	MET-7F4-2219T	MET-7F4-2219N	MET-7F4-2219A
2-1/4"	2.2500	MET-7F4-2250T	MET-7F4-2250N	MET-7F4-2250A
2-9/32"	2.2813	MET-7F4-2281T	MET-7F4-2281N	MET-7F4-2281A
2-5/16"	2.3125	MET-7F4-2313T	MET-7F4-2313N	MET-7F4-2313A
2-11/32"	2.3438	MET-7F4-2344T	MET-7F4-2344N	MET-7F4-2344A
2-3/8"	2.3750	MET-7F4-2375T	MET-7F4-2375N	MET-7F4-2375A
2-25/64"	2.3906	MET-7F4-2391T	MET-7F4-2391N	MET-7F4-2391A
2-13/32"	2.4063	MET-7F4-2406T	MET-7F4-2406N	MET-7F4-2406A
2-7/16"	2.4375	MET-7F4-2438T	MET-7F4-2438N	MET-7F4-2438A
2-15/32"	2.4688	MET-7F4-2469T	MET-7F4-2469N	MET-7F4-2469A
2-1/2"	2.5000	MET-7F4-2500T	MET-7F4-2500N	MET-7F4-2500A
2-17/32"	2.5313	MET-7F4-2531T	MET-7F4-2531N	MET-7F4-2531A
2-9/16"	2.5625	MET-7F4-2563T	MET-7F4-2563N	MET-7F4-2563A
<b>Series 5</b>		<b>\$75.60 ea</b>	<b>\$89.40 ea</b>	<b>\$89.60 ea</b>
2-1/2"	2.5000	MET-7F5-2500T	MET-7F5-2500N	MET-7F5-2500A
2-17/32"	2.5313	MET-7F5-2531T	MET-7F5-2531N	MET-7F5-2531A
2-9/16"	2.5625	MET-7F5-2563T	MET-7F5-2563N	MET-7F5-2563A
2-5/8"	2.6250	MET-7F5-2625T	MET-7F5-2625N	MET-7F5-2625A
2-21/32"	2.6563	MET-7F5-2656T	MET-7F5-2656N	MET-7F5-2656A
2-11/16"	2.6875	MET-7F5-2688T	MET-7F5-2688N	MET-7F5-2688A
2-23/32"	2.7188	MET-7F5-2719T	MET-7F5-2719N	MET-7F5-2719A
2-3/4"	2.7500	MET-7F5-2750T	MET-7F5-2750N	MET-7F5-2750A
2-25/32"	2.7813	MET-7F5-2781T	MET-7F5-2781N	MET-7F5-2781A

Inch	Dec.	TiN Coated Part Number	TiCN Coated Part Number	TiAlN Coated Part Number
<b>Series 5 (cont.)</b>		<b>\$75.60 ea</b>	<b>\$89.40 ea</b>	<b>\$89.60 ea</b>
2-13/16"	2.8125	MET-7F5-2813T	MET-7F5-2813N	MET-7F5-2813A
2-27/32"	2.8438	MET-7F5-2844T	MET-7F5-2844N	MET-7F5-2844A
2-7/8"	2.8750	MET-7F5-2875T	MET-7F5-2875N	MET-7F5-2875A
2-29/32"	2.9063	MET-7F5-2906T	MET-7F5-2906N	MET-7F5-2906A
2-15/16"	2.9375	MET-7F5-2938T	MET-7F5-2938N	MET-7F5-2938A
2-31/32"	2.9688	MET-7F5-2969T	MET-7F5-2969N	MET-7F5-2969A
3"	3.0000	MET-7F5-3000T	MET-7F5-3000N	MET-7F5-3000A
<b>Series 6</b>		<b>\$85.00 ea</b>	<b>\$103.10 ea</b>	<b>\$104.00 ea</b>
3-1/16"	3.0625	MET-7F6-3063T	MET-7F6-3063N	MET-7F6-3063A
3-1/8"	3.1250	MET-7F6-3125T	MET-7F6-3125N	MET-7F6-3125A
3-3/16"	3.1875	MET-7F6-3188T	MET-7F6-3188N	MET-7F6-3188A
3-1/4"	3.2500	MET-7F6-3250T	MET-7F6-3250N	MET-7F6-3250A
3-5/16"	3.3125	MET-7F6-3313T	MET-7F6-3313N	MET-7F6-3313A
3-3/8"	3.3750	MET-7F6-3375T	MET-7F6-3375N	MET-7F6-3375A
3-7/16"	3.4375	MET-7F6-3438T	MET-7F6-3438N	MET-7F6-3438A
3-1/2"	3.5000	MET-7F6-3500T	MET-7F6-3500N	MET-7F6-3500A
<b>Series 7</b>		<b>\$99.90 ea</b>	<b>\$121.00 ea</b>	<b>\$121.30 ea</b>
3-9/16"	3.5625	MET-7F7-3563T	MET-7F7-3563N	MET-7F7-3563A
3-5/8"	3.6250	MET-7F7-3625T	MET-7F7-3625N	MET-7F7-3625A
3-11/16"	3.6875	MET-7F7-3688T	MET-7F7-3688N	MET-7F7-3688A
3-3/4"	3.7500	MET-7F7-3750T	MET-7F7-3750N	MET-7F7-3750A
3-13/16"	3.8125	MET-7F7-3813T	MET-7F7-3813N	MET-7F7-3813A
3-7/8"	3.8750	MET-7F7-3875T	MET-7F7-3875N	MET-7F7-3875A
3-15/16"	3.9375	MET-7F7-3938T	MET-7F7-3938N	MET-7F7-3938A
4"	4.0000	MET-7F7-4000T	MET-7F7-4000N	MET-7F7-4000A
<b>Series 8</b>		<b>\$114.10 ea</b>	<b>\$136.40 ea</b>	<b>\$135.20 ea</b>
4-1/16"	4.0625	MET-7F8-4063T	MET-7F8-4063N	MET-7F8-4063A
4-1/8"	4.1250	MET-7F8-4125T	MET-7F8-4125N	MET-7F8-4125A
4-3/16"	4.1875	MET-7F8-4188T	MET-7F8-4188N	MET-7F8-4188A
4-1/4"	4.2500	MET-7F8-4250T	MET-7F8-4250N	MET-7F8-4250A
4-5/16"	4.3125	MET-7F8-4313T	MET-7F8-4313N	MET-7F8-4313A
4-3/8"	4.3750	MET-7F8-4375T	MET-7F8-4375N	MET-7F8-4375A
4-7/16"	4.4375	MET-7F8-4438T	MET-7F8-4438N	MET-7F8-4438A
4-1/2"	4.5000	MET-7F8-4500T	MET-7F8-4500N	MET-7F8-4500A

## APPLICATION INFORMATION

### Technical Data

Series	Series X/Y	Series Z	Series 0	Series 1	Series 2	Series 3	Series 4	Series 5	Series 6	Series 7	Series 8
<b>Range</b>	.375 to .436	.437 to .508	.509 to .690	.691 to .961	.961 to 1.380	1.381 to 1.879	1.880 to 2.570	2.570 to 3.000	3.001 to 3.500	3.501 to 4.000	4.001 to 4.500

#### T-15 Hss Spade Blades Are Recommended:

- For replacing steel twist drills resulting in 2X to 3X higher penetration rates and up to 4X to 5X longer wearlife.
- For providing straighter and more consistent holes with superior surface finishes than can be produced using either HSS twist drills or carbide indexable drills.
- When rigidity of the machine or the fixture requires a more forging, durable and tougher tool; T-15 steel possesses a higher transverse rupture strength and is more impact-resistant than comparable carbide spade blades and/or carbide indexable drills.
- In applications requiring hole depths up through 15X to 20X diameter; pecking may be required for depths above 7X diameter for some materials.
- As a more cost effective alternative to carbide indexable drills since T-15 steel spade blades operate at comparable penetration rates to single-effective indexable drills in materials <35 Rc, and one spade blade holder accommodates multiple diameter blades.

#### Carbide Spade Blades Are Recommended:

- For high productivity applications in which wearlife must be maximized; typically limited to hole depths less than 5X diameter.
- For use in highly abrasive materials such as cast iron, cast aluminum, etc.; or in harder steel alloys, typically 30 to 45 Rc.
- To exceed performance of single-effective indexable drills by 20%-50% in materials <45 Rc.
- To get improved productivity in contrast to T-15 steel spade blades by allowing 50% to 100% higher speeds; operational parameters of carbide blades recommend hole depths < 5X diameter, rigid set-ups, and 50% to 100% higher coolant pressures.

**Spade Blade Holders** generally can accommodate a range of blade sizes up to 1.30 to 1.35 times the smallest blade size. It is therefore possible to cover the entire range of hole sizes with just a few spade drill holders. Contrast this with the inventories required for indexable drills and steel taper shank drills.

**Half-size Spade Blade Holders** may be required where the penetration rate (in-feed) exceeds the recommended values by more than 25%. They are also recommended for use in gummy materials (e.g., aluminum, copper alloys) where torque forces can exceed the yield strength of the spade blade holder, typically where the spade blade diameter exceeds the spade blade body diameter by more than 25%. Without half-size holders, the spade blade's excessive overhang can expose it to premature failure and the holder to potential catastrophic break-up. Series 0, 1 and 2 spade blade diameters have both full size and half size holders that provide proper support to the blade under most circumstances. Standard full-size holders can accommodate the full diameter range for a given spade blade series. Half-size holders should be used only for blade diameters that exceed the half-size spade blade holder body diameter by at least 0.010".

**Through coolant** via the spindle cooling is preferable for optimal drilling with spade blades. However, if spindle cooling is unavailable, then coolant glands or inducers should be used to provide through coolant capability. All METCUT spade blade holders are manufactured with both the option of through the spindle cooling or with a rotary coolant gland. Flood coolant is not recommended, but can be used for very short hole depths, less than one diameter. Through coolant must be used with spade drill depths greater than one diameter.



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## SPADE DRILL INSERTS

Carbide

- Interchangeable with other conventional spade blades
- **TIN (Titanium Nitride)** gives longer tool life and added lubricity, while allowing more aggressive machining of steels.
- **TICN (Titanium Carbonitride)** is a general purpose coating well suited to machining of mild steel, ductile cast iron and nonferrous materials such as aluminum and copper alloys. Superior in preventing excessive built-up edge.
- **TiAIN (Titanium Aluminum Nitride)** a multilayer, mixed phase coating designed for high-speed machining in alloy steels, high temp alloys, gray cast iron and titanium. Operate at relatively high speeds for optimum performance.



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COOLANT/FLUIDS  
TOOL STORAGE

Inch	Dec.	TiN Coated Part Number	TiCN Coated Part Number	TiAlN Coated Part Number
<b>Series Y</b>		<b>\$35.00 ea</b>	<b>\$37.00 ea</b>	<b>\$38.50 ea</b>
3/8	.3750	MET-9CY-0375T	MET-9CY-0375N	MET-9CY-0375A
25/64	.3906	MET-9CY-0391T	MET-9CY-0391N	MET-9CY-0391A
13/32	.4063	MET-9CY-0406T	MET-9CY-0406N	MET-9CY-0406A
27/64	.4219	MET-9CY-0422T	MET-9CY-0422N	MET-9CY-0422A
<b>Series Z</b>		<b>\$35.00 ea</b>	<b>\$37.00 ea</b>	<b>\$38.50 ea</b>
7/16	.4375	MET-9CZ-0438T	MET-9CZ-0438N	MET-9CZ-0438A
29/64	.4531	MET-9CZ-0453T	MET-9CZ-0453N	MET-9CZ-0453A
15/32	.4688	MET-9CZ-0469T	MET-9CZ-0469N	MET-9CZ-0469A
31/64	.4844	MET-9CZ-0484T	MET-9CZ-0484N	MET-9CZ-0484A
1/2	.5000	MET-9CZ-0500T	MET-9CZ-0500N	MET-9CZ-0500A
<b>Series 0</b>		<b>\$39.20 ea</b>	<b>\$40.90 ea</b>	<b>\$42.50 ea</b>
33/64	.5156	MET-9C0-0516T	MET-9C0-0516N	MET-9C0-0516A
17/32	.5313	MET-9C0-0531T	MET-9C0-0531N	MET-9C0-0531A
35/64	.5469	MET-9C0-0547T	MET-9C0-0547N	MET-9C0-0547A
9/16	.5625	MET-9C0-0563T	MET-9C0-0563N	MET-9C0-0563A
37/64	.5781	MET-9C0-0578T	MET-9C0-0578N	MET-9C0-0578A
19/32	.5938	MET-9C0-0594T	MET-9C0-0594N	MET-9C0-0594A
39/64	.6094	MET-9C0-0609T	MET-9C0-0609N	MET-9C0-0609A
5/8	.6250	MET-9C0-0625T	MET-9C0-0625N	MET-9C0-0625A
41/64	.6406	MET-9C0-0641T	MET-9C0-0641N	MET-9C0-0641A
21/32	.6563	MET-9C0-0656T	MET-9C0-0656N	MET-9C0-0656A
43/64	.6719	MET-9C0-0672T	MET-9C0-0672N	MET-9C0-0672A
11/16	.6875	MET-9C0-0688T	MET-9C0-0688N	MET-9C0-0688A
<b>Series 1</b>		<b>\$44.80 ea</b>	<b>\$47.00 ea</b>	<b>\$49.30 ea</b>
45/64	.7031	MET-9C1-0703T	MET-9C1-0703N	MET-9C1-0703A
23/32	.7188	MET-9C1-0719T	MET-9C1-0719N	MET-9C1-0719A
47/64	.7344	MET-9C1-0734T	MET-9C1-0734N	MET-9C1-0734A
3/4	.7500	MET-9C1-0750T	MET-9C1-0750N	MET-9C1-0750A

Inch	Dec.	TiN Coated Part Number	TiCN Coated Part Number	TiAlN Coated Part Number
<b>Series 1 (cont.)</b>		<b>\$44.80 ea</b>	<b>\$47.00 ea</b>	<b>\$49.30 ea</b>
49/64	.7656	MET-9C1-0766T	MET-9C1-0766N	MET-9C1-0766A
25/32	.7813	MET-9C1-0781T	MET-9C1-0781N	MET-9C1-0781A
51/64	.7969	MET-9C1-0797T	MET-9C1-0797N	MET-9C1-0797A
13/16	.8125	MET-9C1-0813T	MET-9C1-0813N	MET-9C1-0813A
27/32	.8438	MET-9C1-0844T	MET-9C1-0844N	MET-9C1-0844A
55/64	.8594	MET-9C1-0859T	MET-9C1-0859N	MET-9C1-0859A
7/8	.8750	MET-9C1-0875T	MET-9C1-0875N	MET-9C1-0875A
57/64	.8906	MET-9C1-0891T	MET-9C1-0891N	MET-9C1-0891A
29/32	.9063	MET-9C1-0906T	MET-9C1-0906N	MET-9C1-0906A
59/64	.9219	MET-9C1-0922T	MET-9C1-0922N	MET-9C1-0922A
15/16	.9375	MET-9C1-0938T	MET-9C1-0938N	MET-9C1-0938A
<b>Series 2</b>		<b>\$51.50 ea</b>	<b>\$53.70 ea</b>	<b>\$56.00 ea</b>
31/32	.9688	MET-9C2-0969T	MET-9C2-0969N	MET-9C2-0969A
1	1.0000	MET-9C2-1000T	MET-9C2-1000N	MET-9C2-1000A
1-1/64	1.0156	MET-9C2-1016T	MET-9C2-1016N	MET-9C2-1016A
1-1/32	1.0313	MET-9C2-1031T	MET-9C2-1031N	MET-9C2-1031A
1-1/16	1.0625	MET-9C2-1063T	MET-9C2-1063N	MET-9C2-1063A
1-3/32	1.0938	MET-9C2-1094T	MET-9C2-1094N	MET-9C2-1094A
1-1/8	1.1250	MET-9C2-1125T	MET-9C2-1125N	MET-9C2-1125A
1-5/32	1.1563	MET-9C2-1156T	MET-9C2-1156N	MET-9C2-1156A
1-3/16	1.1875	MET-9C2-1188T	MET-9C2-1188N	MET-9C2-1188A
1-7/32	1.2188	MET-9C2-1219T	MET-9C2-1219N	MET-9C2-1219A
1-1/4	1.2500	MET-9C2-1250T	MET-9C2-1250N	MET-9C2-1250A
1-9/32	1.2813	MET-9C2-1281T	MET-9C2-1281N	MET-9C2-1281A
1-5/16	1.3125	MET-9C2-1313T	MET-9C2-1313N	MET-9C2-1313A
1-11/32	1.3438	MET-9C2-1344T	MET-9C2-1344N	MET-9C2-1344A
1-3/8	1.3750	MET-9C2-1375T	MET-9C2-1375N	MET-9C2-1375A

## SPADE DRILL ACCESSORIES



Series	Coolant Gland		Locating Pin		Torx Screw		Torx Wrench	
	Part Number	Price	Part Number	Price	Part Number	Price	Part Number	Price
X	-	-	-	-	MET-MS-1454	\$2.30	MET-56-2025	\$4.90
Y	MET-290-1100	\$145.80	MET-SP-1	\$0.90	MET-56-1013	-	MET-56-2017	\$4.90
Z	MET-290-1100	\$145.80	MET-SP-1	\$0.90	MET-56-1015	\$1.50	MET-56-2026	\$4.90
0, 0.5	MET-290-1100	\$145.80	MET-SP-2	\$0.90	MET-56-1014	\$1.40	MET-56-2017	\$4.90
	MET-290-1075A*	\$129.70	-	-	-	-	-	-
1, 1.5	MET-290-1125	\$157.20	MET-SP-3	\$0.90	MET-56-1020	\$1.40	MET-56-2028	\$4.90
	MET-290-1100A*	\$145.80	-	-	-	-	-	-
2, 2.5	MET-290-1150	\$171.40	MET-SP-4	\$0.90	MET-56-1018	\$1.30	MET-56-2015	\$4.90
	MET-290-1100A*	\$145.80	-	-	-	-	-	-
3, 4	MET-290-1175	\$181.10	MET-SP-5	\$0.90	MET-56-1585	\$1.70	MET-56-2020	\$4.90
5	MET-290-1250	\$285.40	MET-SP-6	\$0.95	MET-56-1025	\$1.70	MET-56-2125	\$4.90
7	MET-290-1300	\$378.70	MET-P-6	\$1.00	MET-56-1025	\$1.70	MET-56-2125	\$4.90

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# SPADE DRILL INSERT SPEEDS & FEEDS

## SPADE DRILL SPEEDS & FEEDS



### Recommended Starting Speeds (SFM) & Feeds (IPR)-T-15 HSS Blades

MATERIAL	Hardness Bhn	SPEEDS (SFM) Coatings			FEED(IPR) Series/Diameters							
		TiN	TiCN	TiAlN	Y & Z	0	1	2	3	4	5	6, 7, 8
Low Carbon Steel 1010, 1020, 1025, 1522, etc.	85 – 125	175	225	NR	0.008	0.011	0.013	0.016	0.02	0.023	0.025	0.028
	125 – 175	165	210	NR	0.007	0.01	0.012	0.016	0.02	0.022	0.024	0.027
	175 – 225	155	200	NR	0.006	0.009	0.011	0.015	0.019	0.021	0.023	0.026
Free Machining Steel 1118, 1215, 12L14, etc.	225 – 275	145	185	225	0.006	0.008	0.01	0.014	0.018	0.021	0.023	0.025
	100 – 150	200	260	NR	0.008	0.011	0.014	0.017	0.021	0.025	0.026	0.028
	150 – 200	180	240	NR	0.007	0.01	0.013	0.016	0.02	0.023	0.024	0.026
Medium Carbon Steel 1030, 1040, 1050, 1527, 1140, 1144, 1151, etc.	200 – 250	160	220	250	0.006	0.01	0.013	0.016	0.02	0.023	0.024	0.026
	125 – 175	165	210	NR	0.007	0.009	0.012	0.016	0.02	0.023	0.025	0.027
	175 – 225	155	190	NR	0.006	0.008	0.011	0.015	0.019	0.022	0.023	0.025
Alloy Steel 4140, 5140, 8640, etc.	225 – 275	145	170	215	0.006	0.008	0.01	0.014	0.018	0.021	0.022	0.024
	275 – 325	135	160	200	0.005	0.007	0.009	0.012	0.016	0.019	0.021	0.023
	125 – 175	150	195	NR	0.007	0.009	0.011	0.015	0.018	0.021	0.023	0.025
High Strength Alloy 4340, 4330V, etc.	175 – 225	140	180	NR	0.007	0.009	0.01	0.014	0.017	0.019	0.021	0.023
	225 – 275	130	165	185	0.006	0.008	0.01	0.013	0.016	0.019	0.02	0.021
	275 – 325	120	150	170	0.005	0.007	0.009	0.012	0.015	0.017	0.018	0.02
Structural Steel A36, A285, A516, etc.	325 – 375	110	140	155	0.004	0.006	0.009	0.012	0.015	0.017	0.018	0.02
	225 – 300	90	105	130	0.006	0.008	0.01	0.012	0.015	0.017	0.019	0.021
	300 – 350	70	85	100	0.005	0.007	0.009	0.011	0.014	0.016	0.018	0.021
Tool Steel H-13, H-21, A-4, O-2, S-3, etc.	350 – 400	NR	NR	80	0.004	0.006	0.008	0.01	0.012	0.014	0.016	0.019
	100 – 150	150	180	NR	0.007	0.01	0.012	0.015	0.018	0.021	0.023	0.026
	150 – 250	125	160	190	0.006	0.009	0.011	0.013	0.016	0.019	0.021	0.024
Stainless Steel 416, 420, 17-4PH, etc.	250 – 350	100	135	160	0.005	0.008	0.009	0.011	0.014	0.017	0.019	0.022
	150 – 200	85	105	NR	0.007	0.008	0.009	0.011	0.013	0.015	0.016	0.018
	200 – 250	75	90	110	0.006	0.007	0.008	0.011	0.013	0.015	0.016	0.018
Cast Iron Gray, Ductile, Nodular	250 – 350	45	NR	70	0.005	0.006	0.007	0.009	0.011	0.013	0.014	0.016
	135 – 185	80	100	120	0.007	0.008	0.01	0.012	0.015	0.017	0.019	0.021
	185 – 275	NR	85	105	0.006	0.007	0.009	0.011	0.013	0.015	0.017	0.019
Aluminum - Wrought Cast	275 – 350	NR	75	90	0.005	0.006	0.007	0.009	0.011	0.013	0.015	0.017
	120 – 150	180	225	270	0.008	0.013	0.017	0.02	0.024	0.027	0.029	0.031
	150 – 200	160	200	240	0.007	0.011	0.014	0.018	0.022	0.025	0.027	0.029
Copper Alloys	200 – 220	140	175	210	0.006	0.009	0.012	0.016	0.018	0.021	0.023	0.025
	220 – 260	120	150	180	0.005	0.007	0.01	0.012	0.014	0.017	0.019	0.021
	260 – 320	100	125	150	0.004	0.006	0.007	0.009	0.012	0.014	0.016	0.018
High Temp. Alloy Hastelloy B, Inconel 600, etc.	—	NR	700	NR	0.007	0.012	0.015	0.019	0.021	0.024	0.025	0.026
	—	NR	400	NR	0.008	0.013	0.016	0.02	0.022	0.025	0.026	0.027
	—	NR	450	NR	0.007	0.012	0.015	0.019	0.021	0.024	0.025	0.026
Titanium Alloys	140 – 210	NR	35	45	0.006	0.007	0.008	0.01	0.013	0.015	0.016	0.017
	210 – 280	NR	30	40	0.005	0.006	0.007	0.008	0.01	0.012	0.013	0.014
	280 – 340	NR	25	35	0.004	0.006	0.007	0.008	0.009	0.011	0.012	0.013

NR = Not Recommended

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