Screw Machine / Stub Length Drills

	Type	Style	Page	Set	Tool Material: HSS	Cobalt	Carbide	TCT	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Point: 118°	118° Split	118° 4-facet	118° K-Notch	135° Split	Surface Treatment: Bright	Black Oxide	Straw	TiN	TiCN	TiAlN
	General Purpose	2120	22	yes	•				•		•	•			•					•					
	Wide Land Parabolic	2175	24			•			•	•	•	•							•			•	•	•	•
	NAS907-C Heavy Duty	2330	27	yes	•				•	•	•	•							•	•					
	NAS907-K Heavy Duty	2133	30			•			•	•	•	•	•						•			•		•	
	Spade Drill	1765	34				•		•	•	•			•	•					•					
	Stub Length	1767	35				•		•	•	•	•		•			•			•	•				

Jobber Drills

	Type	Style	Page	Set	Tool Material: HSS	Cobalt	Carbide	TCT	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Point: 118°	118° Split	118° 4-facet	118° K-Notch	135° Split	Surface Treatment: Bright	Black Oxide	Straw	TiN	TiCN	TiAlN
	General Purpose	*2001G, 2002G	37	yes	•				•	•	•	•			•					•	•			•	
	General Purpose	2001, 2002	43	yes	•				•		•	•			•					•	•				
	Low Helix	2020	45		•				•			•			•					•					
	High Helix	2012	47		•				•			•			•					•					
	Parabolic	2065	49		•				•	•		•						•		•			•		
	Wide Land Parabolic	2075	51	yes		•			•	•	•	•							•			•	•	•	•
	Left Hand	2006	55		•				•		•	•			•					•					
	NAS907-A General Purpose	2228	56		•				•	•		•				•				•					
	NAS907-B Heavy Duty	2222	58	yes	•				•	•	•	•							•	•					
	NAS907-J Heavy Duty	2213	61	yes		•			•	•		•	•						•			•			
	Cotter Pin Heavy Duty	2011	66		•				•	•	•								•		•				
	Q-AMD Short Flute	3780	67	yes		•			•	•	•		•						•		•			•	
	Carbide Tipped	2727	70					•	•	•	•	•			•					•					
	Straight Flute	1766	71				•		•	•	•	•		•	140° 4-facet					•					
	Heavy Duty	1727	73				•		•	•	•	•					•			•					

*Tool Material is Premium HSS

Common Shank Drills

	Type	Style	Page	Set	Tool Material: HSS	Cobalt	Carbide	TCT	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Point: 118°	118° Split	118° 4-facet	118° K-Notch	135° Split	Surface Treatment: Bright	Black Oxide	Straw	TiN	TiCN	TiAlN
	External Coolant Single Margin	6100	76				•																		
	Internal Coolant Single Margin	6200	77				•																		
	Internal Coolant Double Margin	6300	78				•																		
	Internal Coolant Double Margin	6400	79				•																		

Taper Length Drills

	Type	Style	Page	Set	Tool Material: HSS	Cobalt	Carbide	TCT	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Point: 118°	118° Split	118° 4-facet	118° K-Notch	135° Split	Surface Treatment: Bright	Black Oxide	Straw	TiN	TiCN	TiAlN
	Carbide Tipped Heavy Duty, Tanged	2745	80					•	•		•	•			•					•					
	General Purpose	2510	81	yes	•				•		•				•						•				
	High Helix	2550	85		•				•			•			•					•					
	Heavy Duty, Tanged	2513	87			•			•	•	•							•				•			
	Auto. Tanged Shank Heavy Duty	2540	88		•				•	•	•							•				•			
	Parabolic, Tanged	2565	89		•				•	•		•						•		•			•		
	Wide Land Parabolic	2575	91			•			•	•	•	•							•			•	•		•

Aircraft Extension Drills

	Type	Style	Page	Set	Tool Material: HSS	Cobalt	Carbide	TCT	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Point: 118°	118° Split	118° 4-facet	118° K-Notch	135° Split	Surface Treatment: Bright	Black Oxide	Straw	TiN	TiCN	TiAlN
	NAS907-B 6" and 12"	3957	94		•				•	•	•	•							•	•					
	NAS907-J 6" and 12"	3722	96			•			•	•	•	•	•						•			•			

Extra Length Drills

	Type	Style	Page	Set	Tool Material: HSS	Cobalt	Carbide	TCT	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Point: 118°	118° Split	118° 4-facet	118° K-Notch	135° Split	Surface Treatment: Bright	Black Oxide	Straw	TiN	TiCN	TiAlN
	Extra Length	950E	98		•				•		•							•			•				

Taper Shank Drills

	Type	Style	Page	Set	Tool Material: HSS	Cobalt	Carbide	TCT	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Point: 118°	118° Split	118° 4-facet	118° K-Notch	135° Split	Surface Treatment: Bright	Black Oxide	Straw	TiN	TiCN	TiAlN
	Standard	2410	100		•				•		•				•						•				
	Undersized	2411	100		•				•		•				•						•				
	Oversized	2412	100		•				•		•				•						•				
	Cobalt Heavy Duty	2440	102			•			•	•	•				135º Mod. Point							•			
	Extra Length	940E	103		•				•		•							•			•				

Misc. Drills

	Type	Style	Page	Set	Tool Material: HSS	Cobalt	Carbide	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Point: 118°	Various degrees - see product page	Surface Treatment: Bright	Black Oxide	Straw	TiN	TiCN	TiAlN
	Combined Drill Countersink	1798	104				•	•	•	•	•				60°	•					
	Bell Type Drill & Countersink	996	105		•			•		•	•			•	60°, 120°	•					
	Plain Drill & Countersink	998	105	yes	•			•		•	•			•	60°	•					
	Countersink & Deburring	3001	106	yes		•		•	•		•				60°, 82°, 90°, 100°	•					
	Spotting & Centering - Short	995	107		•			•		•	•			•		•					
NEW 	Spotting & Centering	1799	107				•	•	•	•	•	•			90°, 120°, 142°							•
	NC Spotting & Centering - Short	2636	108	yes		•		•	•	•	•	•			90°, 120°			•				
	Spotting & Centering - Long	2646	108	yes		•		•	•	•	•	•			90°, 120°			•				
	NC Spotting Drill - Short	2635	109	yes	•			•	•	•	•				90°, 120°	•						
	NC Spotting Drill - Long	2645	109	yes	•			•	•	•	•				90°, 120°	•						
NEW 	Single Flute Countersink	110C1	110				•	•		•					60°, 82°, 90°, 100°, 120°		•					
NEW 	3 Flute Countersink	110C3	110				•	•		•					60°, 82°, 90°, 100°, 120°		•					
NEW 	6 Flute Countersink	110C6	110				•	•		•					60°, 82°, 90°, 100°, 120°		•					
	Single Flute Countersink	10001	111	yes	•			•		•					60°, 82°, 90°, 100°, 120°		•					
	3 Flute Countersink	10003	111	yes	•			•		•					60°, 82°, 90°, 100°, 120°		•					
	4 Flute Countersink	610	112	yes	•			•		•					60°, 82°, 90°, 100°		•					
	Drift Drill	105	112		•											•					

Reamers

	Type	Style	Page	Set	Tool Material: HSS	Tool Material: Cobalt	Tool Material: Carbide	Application: Steel	Application: Stainless	Application: Cast Iron	Application: Non-Ferrous	Application: High-Temp Alloy	Application: Hardened Steel	Hole: Blind Hole	Hole: Thru Hole	Surface Treatment: Bright	Surface Treatment: Black Oxide	Surface Treatment: Straw	Surface Treatment: TiN	Surface Treatment: TiCN	Surface Treatment: TiAlN
	Straight Shank, Straight Flute	1730	113				•	•	•	•	•				•	•						
	Straight Shank, Straight Flute	4001	114	yes	•			•	•	•	•				•	•						
	Straight Shank, Spiral Flute	4030	118		•			•	•	•	•			•		•						
	Taper Shank, Straight Flute	4005	111		•			•	•	•	•				•	•						
	Straight Shank, Straight Flute	4703	120		•			•	•	•	•				•	•						
	Taper Shank, Bridge Reamer	616	121		•			•		•							•					
	Taper Shank, Car Reamer	618	121		•			•		•							•					
	Taper Pipe Reamer	642	122		•			•			•					•						
	High Spiral Spirex Taper Pin	650	122		•			•			•					•						
	Taper Pin Straight Shank, Straight Flute	657	123		•			•		•	•					•						
	Taper Pin Straight Shank, Helical Flute	659	123		•			•		•	•					•						

Counterbores

	Type	Style	Page	Set	Tool Material: HSS	Tool Material: Cobalt	Tool Material: Carbide	Application: Steel	Application: Stainless	Application: Cast Iron	Application: Non-Ferrous	Application: High-Temp Alloy	Application: Hardened Steel	Helix: Blind Hole	Helix: Thru Hole	Surface Treatment: Bright	Surface Treatment: Black Oxide	Surface Treatment: Straw	Surface Treatment: TiN	Surface Treatment: TiCN	Surface Treatment: TiAlN
	Straight Shank C'bore & Spot Facer	879	124		•			•		•	•					•						
	Short Aircraft Type	884	125		•			•		•	•					•						
	Interchangeable Pilot for Style 879 & 884	879P	126		•			•		•	•					•						
	Clearance or Taper Router	655	127		•			•		•	•					•						
	3 Flute Continuous Pilot	183	183	yes	•			•		•						•						

Straight Flute

	Type	Style	Page	Set	Tool Material: HSS	Tool Material: HSS-E	Blank: 302A	Blank: 311	Blank: DIN / ANSI	Champer: Taper	Champer: Plug	Champer: Bottoming	Champer: Mod Bottoming	Application: Steel	Application: Stainless	Application: Cast Iron	Application: Non-Ferrous	Application: High-Temp Alloy	Application: Hardened Steel	Hole: Blind	Hole: Thru	Surface Treatment: Bright	Surface Treatment: Black Oxide	Surface Treatment: TiN	Surface Treatment: TiCN	Surface Treatment: TiAlN	Surface Treatment: AlCrN	Surface Treatment: Oxide over Nitride	Surface Treatment: Hardlube
	General Purpose	**1001**	162	yes	•		•			•				•	•	•	•				•	•		•						
	General Purpose	**1002**	165	yes	•		•				•			•	•	•	•				•	•	•	•	•					
	General Purpose	**1003**	165	yes	•		•					•		•	•	•	•			•		•		•					
	Set *(Styles: 1001, 1002, 1003)*	**1004**	165	yes	•		•			•	•	•		•	•	•	•					•							
	General Purpose - Left Hand	**1002L**	166		•		•				•			•		•	•				•	•							
	Cast Iron	**CI-1000**	167			•	•						•	•		•			•	•				•			•		

Spiral Point

	Type	Style	Page	Set	Tool Material: HSS	Tool Material: HSS-E	Blank: 302A	Blank: 311	Blank: DIN / ANSI	Champer: Taper	Champer: Plug	Champer: Bottoming	Champer: Mod Bottoming	Application: Steel	Application: Stainless	Application: Cast Iron	Application: Non-Ferrous	Application: High-Temp Alloy	Application: Hardened Steel	Hole: Blind	Hole: Thru	Surface Treatment: Bright	Surface Treatment: Black Oxide	Surface Treatment: TiN	Surface Treatment: TiCN	Surface Treatment: TiAlN	Surface Treatment: AlCrN	Surface Treatment: Oxide over Nitride	Surface Treatment: Hardlube
	General Purpose	**1011**	168		•		•				•			•	•	•	•				•	•	•	•	•					
	Low Shear	**1053**	171		•		•				•			•		•					•	•							
	Bottoming	**1012**	172		•		•					•		•		•	•			•		•							
	6" Extended Length	**1011E**	172		•		303-A				•			•		•					•	•							
	Stainless Steel & Steel	**T-101**	173			•	•				•			•	•	•					•		•						
	Universal	**PRO-961SP**	174			•			•		•			•	•	•					•		•						
	Universal	**PRO-861SP**				•			•		•			•	•	•					•				•				
	Stainless Steel	**PER-862SP**	176			•			•		•			•	•	•					•		•						
	Stainless Steel	**PER-960SP**				•			•		•			•	•	•					•								•

Spiral Flute

	Type	Style	Page	Set	Tool Material: HSS	Tool Material: HSS-E	Blank: 302A	Blank: 311	Blank: DIN / ANSI	Champer: Taper	Champer: Plug	Champer: Bottoming	Champer: Mod Bottoming	Application: Steel	Application: Stainless	Application: Cast Iron	Application: Non-Ferrous	Application: High-Temp Alloy	Application: Hardened Steel	Hole: Blind	Hole: Thru	Surface Treatment: Bright	Surface Treatment: Black Oxide	Surface Treatment: TiN	Surface Treatment: TiCN	Surface Treatment: TiAlN	Surface Treatment: AlCrN	Surface Treatment: Oxide over Nitride	Surface Treatment: Hardlube
	General Purpose	**1093**	178		•		•				•			•	•		•			•		•		•	•				
	General Purpose	**1094**	178		•		•					•		•	•		•			•		•		•	•				
	Heavy Duty	**1095**	179		•		•				•			•		•				•		•							
	Heavy Duty	**1096**	179		•		•					•		•		•				•		•							
	Stainless Steel & Steel	**B-101**	180			•	•						•	•	•	•				•		•							
	Universal	**PRO-981SF**	181			•			•				•	•	•	•				•		•							
	Universal	**PRO-892SF**				•			•				•	•	•	•				•					•				
	Stainless Steel	**PER-893SF**	183			•			•				•	•	•	•				•		•							
	Stainless Steel	**PER-980SF**				•			•				•	•	•	•				•									•

Form

	Type	Style	Page	Set	Tool Material: HSS	Tool Material: HSS-E	Blank: 302A	Blank: 311	Blank: DIN / ANSI	Champer: Taper	Champer: Plug	Champer: Bottoming	Champer: Mod Bottoming	Application: Steel	Application: Stainless	Application: Cast Iron	Application: Non-Ferrous	Application: High-Temp Alloy	Application: Hardened Steel	Hole: Blind	Hole: Thru	Surface Treatment: Bright	Surface Treatment: Black Oxide	Surface Treatment: TiN	Surface Treatment: TiCN	Surface Treatment: TiAlN	Surface Treatment: AlCrN	Surface Treatment: Oxide over Nitride	Surface Treatment: Hardlube
	General Purpose	**1091**	185		•		•				•			•	•		•			•		•							
	General Purpose	**1092**	185		•		•					•		•	•		•			•		•							

Pipe

	Type	Style	Page	Set	Tool Material: HSS	Tool Material: HSS-E	Blank: 302A	Blank: 311	Blank: DIN / ANSI	Champer: Taper	Champer: Plug	Champer: Bottoming	Champer: Mod Bottoming	Application: Steel	Application: Stainless	Application: Cast Iron	Application: Non-Ferrous	Application: High-Temp Alloy	Application: Hardened Steel	Hole: Blind	Hole: Thru	Surface Treatment: Bright	Surface Treatment: Black Oxide	Surface Treatment: TiN	Surface Treatment: TiCN	Surface Treatment: TiAlN	Surface Treatment: AlCrN	Surface Treatment: Oxide over Nitride	Surface Treatment: Hardlube
	NPT Medium Hook	**965**	186		•			•		•				•		•	•					•		•					
	NPTF Medium Hook	**975**	186		•			•		•				•		•	•					•		•					
	NPT Interrupted Thread	**964B**	187		•			•		•				•		•						•							
	NPTF Interrupted Thread	**966B**	187		•			•		•				•		•						•							
	NPS	**963B**	188		•			•					•	•		•						•							
	NPSF	**967B**	188		•			•					•	•		•						•							

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Thread Mills

	Type	Style	Page	Set	Tool Material: HSS	Tool Material: Cobalt	Tool Material: Carbide	Thread: UNC	Thread: UNF	Thread: NPT	Thread: NPTF	Thread: Metric Coarse	Thread: Metric Fine	Thread: BSPP	Thread: BSPT	Thread: DIN	Application: Steel	Application: Stainless	Application: Cast Iron	Application: Non-Ferrous	Application: Special Alloy	Application: Hardened Steel	Coolant: Non	Coolant: Thru	Surface Treatment: TiAlN	Surface Treatment: AlCrN	Surface Treatment: Hardlube
	Mini	**CMTM2, CMTMM2**	189				•	•	•			•	•				•	•	•	•	•	•	•			•	
	Mini	**CMTM3, CMTMM3**	190				•	•	•			•	•				•	•	•	•	•	•	•			•	
	General Purpose - Inch	**CTM, CTMC**	191				•	•	•								•	•	•		•	•	•	•	•		
	General Purpose - Metric	**CTMM, CTMMC**	192				•									•	•	•	•		•	•	•	•			
	National Pipe Tapered	**CTMNP, CTMNPC**	192				•			•	•						•	•	•		•	•	•	•	•		
	British Pipe Tapered	**CTMBPP, CTMBPPC**	193				•							•			•	•	•		•	•	•	•	•		
	British Pipe Parallel	**CTMBPT, CTMBPTC**	193				•								•		•	•	•		•	•	•	•	•		

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Dies

	Type	Style	Page	Set	Tool Material: HSS	Tool Material: Carbon Steel	Tool Material: Steel	Surface Treatment: Bright	Surface Treatment: Black Oxide	Surface Treatment: TiN	Surface Treatment: TiCN	Surface Treatment: TiAlN	Surface Treatment: AlCrN	Surface Treatment: Oxide over Nitride	Surface Treatment: Hardlube
	Hexagon Rethreading	**0650, 0650M, 492**	194-195	yes	•	•		•							
	Taper Pipe	**0660**			•	•		•							
	Round Adjustable	**0610, 0710**	196-198		•	•		•							
	Round Adjustable	**0710M**			•			•							
	Round Adjustable - Pipe	**0620**				•		•							
	Die Stock, Adjustable	**222**	198												
	Die Stock, Built-in Workpiece Guide	**224**	198												
	Die Set: Die Halves	**0550**	199-200				•	•							
	Die Set: Cap	**0551**					•	•							
	Die Set: Guide	**0552**					•	•							
	Die Set: Collet (cap and guide)	**0553**					•	•							
	Die Set Assembly (0550,0553,0551,0552)	**0554**					•	•							
	Quick Set Die Stock	**223**	200			•			•						
	Quick Set Jr. Die Stock	**225**	200			•			•						
	Quick Set Spanner Wrench	**226**	200												

Wrenches

	Type	Style	Page
	Straight Wrench	**240**	201
	Plain T-Handle Wrench	**242**	201
	Slip T-Handle Wrench	**243**	201

	Type	Style	Page
	Combo Ratchet & Slip Handle Wrench	**244**	201
	Long Shank T-Handle Wrench	**245**	201

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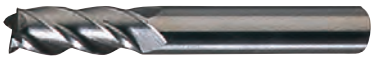
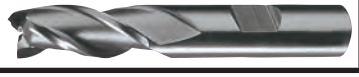
High Speed Steel

	Type	Style	Page	No. of Flutes	End Work: Square	End Work: Ball	End Work: Chamfer	End Work: Radius/Rounding	Application: Steel	Application: Stainless	Application: Cast Iron	Application: Non-Ferrous	Application: High-Temp Alloy	Application: Hardened Steel	Machining: Slot	Machining: Profile	Machining: Plunging	Machining: Ramping	Machining: Drilling	Machining: Chamfer	Machining: Slot w/ Radius	Surface Treatment: Bright	Surface Treatment: TiN	Surface Treatment: TiCN	Surface Treatment: TiAlN
	Miniature	**HMD-2**	230	2	•				•		•	•			•	•	•	•				•		•	
	Miniature	**HMD-2B**	231	2		•			•		•	•			•	•	•	•			•	•			
	Miniature	**HMD-4**	232	4	•				•		•	•				•		•				•			
	Miniature	**HMG-2**	233	2	•				•		•				•	•	•	•				•			
	Miniature	**HMG-2B**	234	2		•			•						•	•	•	•			•	•			
	Miniature	**HMG-4**	235	4	•				•		•					•		•				•			
	Finisher	**HD-2**	236	2	•				•		•	•			•	•	•	•				•	•	•	
	Finisher	**HD-2B**	238	2		•			•		•	•			•	•	•	•			•	•	•	•	
	Finisher	**HD-3**	239	3	•				•		•	•			•	•		•	•			•	•	•	
	Finisher	**HD-4C**	240	4	•				•		•	•				•		•				•	•	•	
	Finisher	**HG-2**	241	2	•				•		•	•			•	•	•	•				•	•	•	
	Finisher	**HG-2M**	244	2	•				•		•	•			•	•	•	•				•			
	Finisher	**HG-2B**	245	2		•			•		•				•	•	•	•				•	•	•	
	Keyway	**HG-2K**	246	2	•				•		•	•			•	•	•	•				•	•	•	
	Keyway Cutter	**HG-2KS**	247	2	•				•		•	•			•							•			
	Finisher - Extended Neck	**HGN-2**	248	2	•				•		•	•			•	•	•	•				•			
	Finisher - Extended Neck	**HGN-2B**	249	2		•			•		•	•			•	•	•	•				•			
	Finisher - High Helix	**HGA-2**	250	2	•							•			•	•	•	•				•	•	•	
	Finisher - Drill Mill	**HPDM-2**	251	2	*Pointed end*				•		•	•			•		•		•			•	•	•	
	General Purpose	**HG-3**	252	3	•				•		•	•			•	•		•				•	•	•	

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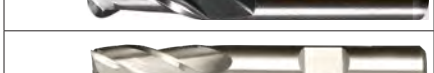
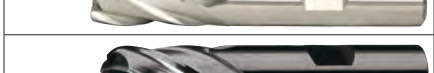
High Speed Steel (continued)

	Type	Style	Page	No. of Flutes	End Work: Square	Ball	Chamfer	Radius/Rounding	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Machining: Slot	Profile	Plunging	Ramping	Drilling	Chamfer	Slot w/ Radius	Surface Treatment: Bright	TiN	TiCN	TiAlN
	General Purpose	**HG-4C**	252	M	•				•		•	•				•		•				•	•	•	
	General Purpose	**HG-4MC**	256	4	•				•		•					•		•				•			
	General Purpose	**HG-4B**	257	4		•			•		•					•		•				•	•	•	
	Left Hand Helix / Cut	**HG-4LL**	258	4	•				•		•	•				•		•				•	•	•	
	Corner Radius	**CRE**	259	4				•	•		•					•						•			

M = Multi Flute

Cobalt

	Type	Style	Page	No. of Flutes	End Work: Square	Ball	Chamfer	Radius	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Machining: Slot	Profile	Plunging	Ramping	Drilling	Chamfer	Slot w/ Radius	Surface Treatment: Bright	TiN	TiCN	TiAlN
	Miniature End Mill	**HMDC-2**	260	2	•				•	•			•		•	•	•	•				•		•	
	Miniature End Mill	**HMDC-4**	261	4	•				•	•			•			•		•				•		•	
	Finisher	**HDC-2**	262	2	•				•	•			•		•	•	•	•				•	•	•	
	Finisher	**HDC-4C**	263	4	•				•	•			•			•		•				•	•	•	
	Finisher	**HGC-2**	264	2	•				•	•			•		•	•	•	•				•	•	•	
	Finisher	**HGC-2B**	266	2		•			•	•			•		•	•	•	•				•	•	•	
	Finisher	**HGC-4C**	267	M	•				•	•			•			•		•				•	•	•	
	Finisher	**HGC-4B**	269	M		•			•	•			•			•		•				•	•	•	
	Rougher Fine Pitch	**RG6**	270	M	•				•	•			•			•		•				•		•	•
	Rougher Coarse Pitch	**RG8**	271	M			•		•	•						•		•	•			•		•	•
	Rougher - Extra Coarse Pitch	**RG9**	273	3			•					•				•		•	•			•		•	

M = Multi Flute

Index

Powdered Metal

	Type	Style	Page	No. of Flutes	End Work: Square	Ball	Chamfer	Radius	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Machining: Slot	Profile	Plunging	Ramping	Drilling	Chamfer	Slot w/ Radius	Surface Treatment: Bright	TiN	TiCN	TiAlN
	Finisher	**PM-4DE**	274	4	•				•	•	•		•	•		•		•				•		•	
	Finisher	**PM-2**	275	2	•				•	•		•	•		•	•	•	•				•	•	•	
	Finisher	**PM-3**	276	3	•				•	•		•	•		•	•		•				•		•	
	Finisher	**PM-4**	277	M	•				•	•	•		•	•		•		•				•	•	•	
	Finisher	**PM-4B**	279	4		•			•	•	•		•	•		•		•				•		•	
	Finisher High Helix	**PM-539R**	280	3	•			•				•			•	•		•			•	•		•	
	Finisher - Left - High Helix/Cut	**PM-539L**	281	3	•							•			•	•		•				•		•	
	Rougher Coarse Profile	**PMRC-C**	282	M	•				•	•		•	•			•		•				•	•	•	
	Rougher Fine Profile	**PMRF-C**	283	M	•				•	•			•			•		•	•			•		•	•
	Rougher Coarse Profile	**PM-538R**	284	3	•			•				•			•	•		•			•	•		•	
	Rougher - Left Low Helix/Cut	**PM-538L**	285	3	•			•				•			•	•		•			•	•			

M = Multi Flute

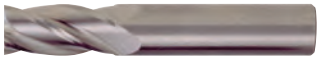
Carbide

Tolerances for Solid Carbide End Mills
Cutting Diameter: 1/32" through 1": +0.000 – 0.002
Shank Diameter: h6

	Type	Style	Page	No. of Flutes	End Work: Square	Ball	Chamfer	Radius	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Machining: Slot	Profile	Plunging	Ramping	Drilling	Chamfer	Slot w/ Radius	Surface Treatment: Bright	TiCN	TiAlN	AlCrN	ZrN
	Variable Index Ferrous Material	**CEM-V-4R**	286	4	•			•	•	•			•	•	•	•	•	•			•	•		•		
	Variable Index Ferrous Material	**CEM-V-4B**	289	4		•			•	•			•	•	•	•	•	•			•	•		•		
	Variable Index Ferrous Material	**CEM-V2-5R**	290	5	•			•	•	•			•	•	•	•	•	•			•	•		•		
	Steel Material	**CEM-V3-7R CEM-V3-7RCB**	292	7	•			•	•	•			•	•	•	•	•	•			•				•	
	Steel Material	**CEM-HPDE-5**	295	5	•				•	•				•		•		•				•		•		
	Steel Material	**CEM-EMS-3**	296	3	•			•	•	•				•	•	•	•	•	•		•	•		•		
	Steel Material	**CEM-EMS-5**	297	5	•				•	•				•	•	•						•		•		

Index

Carbide (continued)

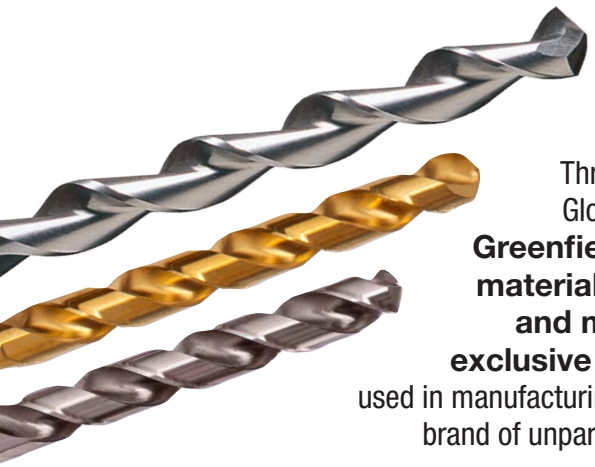
	Type	Style	Page	No. of Flutes	End Work: Square	Ball	Chamfer	Radius	Application: Steel	Stainless	Cast Iron	Non-Ferrous	High-Temp Alloy	Hardened Steel	Machining: Slot	Profile	Plunging	Ramping	Drilling	Chamfer	Slot w/ Radius	Surface Treatment: Bright	TiCN	TiAlN	AlCrN	ZrN
	Aluminum Material	**CEM-AM2**	298	2	•							•			•		•	•	•			•				•
	Aluminum Material	**CEM-AM3**	299	3	•							•			•	•	•	•				•				•
	Rougher	**CEM-RS**	301	4	•				•	•				•		•		•				•		•		
	Rougher	**CEM-RA**	302	3	•					•		•			•		•	•				•	•			
	General Purpose	**CEM-DE2**	303	2	•				•	•	•				•		•	•				•		•		
	General Purpose	**CEM-DE2B**	304	2		•			•	•	•				•	•	•	•			•	•		•		
	General Purpose	**CEM-DE4**	305	4	•				•	•	•			•		•		•				•		•		
	General Purpose	**CEM-DE4B**	306	4		•			•	•	•				•			•			•	•		•		
	Miniature	**CMCE-2 CMCE-2AL**	307	2	•				•	•	•	•	•	•	•	•	•	•				•			•	
	General Purpose	**CEM-SE2**	309	2	•			•	•	•	•	•			•		•	•	•		•	•		•		
	General Purpose	**CEM-SE2B**	311	2		•			•	•	•	•			•	•	•	•			•	•		•		
	General Purpose	**CEM-SE3**	313	3	•			•	•	•	•	•			•	•	•	•			•	•		•		
	Miniature	**CMCE-4 CMCE-4AL**	314	4	•				•	•	•	•	•	•		•		•				•			•	
	General Purpose	**CEM-SE4**	316	4	•			•	•	•	•	•				•		•				•		•		
	General Purpose	**CEM-SE4B**	319	4		•			•	•	•	•			•	•		•			•	•		•		
	Straight Flute	**CEM-SEST2**	321	2					•	•	•	•		•	•		•		•			•		•		
	Engraving Tool	**CEM-EG2**	321	2		•			•		•	•			•						•		•			
	Chamfer Tool	**CEM-CH2**	322	2			•		•			•								•		•				
	Chamfer Tool	**CEM-CH2D**	322	2			•		•			•								•		•				
	Chamfer Tool	**CEM-CH4**	323	4			•		•			•		•						•		•				
	Chamfer Tool	**CEM-CH4D**	323	4			•		•			•		•						•		•				

M = Multi Flute

Index

We have the product for your industry.

Cleveland offers an extensive array of holemaking tools. The Cleveland brand is known for performance tools that run faster, longer, and with more precision than competitive tools. This Holemaking section includes: screw machine length, stub length, jobber length, taper length, AC extension, extra length, taper shank, as well as miscellaneous drills, reamers, and counterbores. We have a large selection of surface treatments, and industry specific application products.



GREENTech Global Recycling

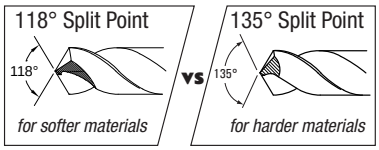
Through GreenTech Global Recycling all **Greenfield Industries materials are refined and made into the exclusive raw material** used in manufacturing the Cleveland brand of unparalleled products.

Tech Tip

Split Point versus Traditional Point

The right drill bit can help you work smarter & faster, and even save you money — if you know which features to look for.

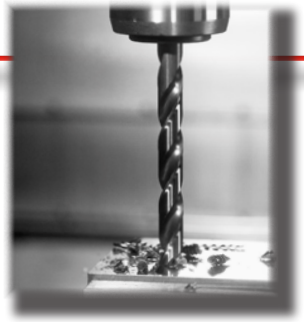
If you're drilling by hand, choose a drill with a split point: it drills on contact.



You'll get a faster start and there's no walking. And you're less likely to need a center punch to get started, thanks to the split point's four cutting edges. Those extra edges cause the split point to drill rounder holes faster, while generating less heat with less force. That means you're working faster and getting more holes per charge with your cordless drill. The split point tool is versatile: it also performs well in presses, CNC machines, and more.

The heavy duty construction of split point drill bits make them a great choice when you work with hard materials like cast iron, stainless steel and alloy steels. Split point bits are available from Greenfield Industries in cobalt and High Speed steel.

You can expect a longer life from Greenfield Industries' heavy duty split point drill, with fewer broken bits.



Holemaking Product Index 8-11

Cost Saving Sets

Technical Information

Tech Tips

Surface Treatment

Additional treatments available upon request.

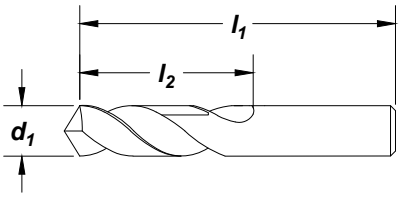
CLEVELAND

General Purpose

Style: 2120

Note
** 1-1/16" through 1-1/4" drills have 1" diameter reduced shank.*
Operating parameters: See Technical section

ASME B94.11M | HSS | 118° | Helix Regular 21° to 34° | Straight Shank | Reduced Shank * | Surface Treatment: Bright



Feature:
Short length design for improved accuracy and rigidity.

drill diameter d1 fraction wire/let	decimal equiv.	overall length l1 (in)	flute length l2 (in)	order no. 2120
60	.0400	1.375	.500	C04356
59	.0410	1.375	.500	C04357
58	.0420	1.375	.500	C04359
57	.0430	1.375	.500	C04360
56	.0465	1.375	.500	C04363
3/64	.0469	1.375	.500	C04364
55	.0520	1.625	.625	C04368
54	.0550	1.625	.625	C04370
53	.0595	1.625	.625	C04374
1/16	.0625	1.625	.625	C04376
52	.0635	1.688	.688	C04378
51	.0670	1.688	.688	C04381
50	.0700	1.688	.688	C04383
49	.0730	1.688	.688	C04386
48	.0760	1.688	.688	C04388
5/64	.0781	1.688	.688	C04390
47	.0785	1.750	.750	C04391
46	.0810	1.750	.750	C04394
45	.0820	1.750	.750	C04395
44	.0860	1.750	.750	C04398
43	.0890	1.750	.750	C04401
42	.0935	1.750	.750	C04404
3/32	.0938	1.750	.750	C04405
41	.0960	1.813	.813	C04407
40	.0980	1.813	.813	C04409
39	.0995	1.813	.813	C04411
38	.1015	1.813	.813	C04412
37	.1040	1.813	.813	C04414
36	.1065	1.813	.813	C04416
7/64	.1094	1.813	.813	C04418
35	.1100	1.875	.875	C04419
34	.1110	1.875	.875	C04421
33	.1130	1.875	.875	C04422
32	.1160	1.875	.875	C04424
31	.1200	1.875	.875	C04426
1/8	.1250	1.875	.875	C04428
30	.1285	1.938	.938	C04431
29	.1360	1.938	.938	C04434
28	.1405	1.938	.938	C04436
9/64	.1406	1.938	.938	C04437
27	.1440	2.063	1.000	C04439
26	.1470	2.063	1.000	C04441
25	.1495	2.063	1.000	C04443
24	.1520	2.063	1.000	C04445
23	.1540	2.063	1.000	C04447
5/32	.1562	2.063	1.000	C04448
22	.1570	2.125	1.063	C04449
21	.1590	2.125	1.063	C04451
20	.1610	2.125	1.063	C04452
19	.1660	2.125	1.063	C04455
18	.1695	2.125	1.063	C04458
11/64	.1719	2.125	1.063	C04459
17	.1730	2.188	1.125	C04460
16	.1770	2.188	1.125	C04462
15	.1800	2.188	1.125	C04464
14	.1820	2.188	1.125	C04466
13	.1850	2.188	1.125	C04467
3/16	.1875	2.188	1.125	C04470
12	.1890	2.250	1.188	C04471
11	.1910	2.250	1.188	C04473
10	.1935	2.250	1.188	C04475
9	.1960	2.250	1.188	C04476
8	.1990	2.250	1.188	C04478
7	.2010	2.250	1.188	C04480
13/64	.2031	2.250	1.188	C04481
6	.2040	2.375	1.250	C04482
5	.2055	2.375	1.250	C04484
4	.2090	2.375	1.250	C04487
3	.2130	2.375	1.250	C04489
7/32	.2188	2.375	1.250	C04491
2	.2210	2.438	1.313	C04493
1	.2280	2.438	1.313	C04496
A	.2340	2.438	1.313	C04499
15/64	.2344	2.438	1.313	C04500
B	.2380	2.500	1.375	C04502
C	.2420	2.500	1.375	C04504
D	.2460	2.500	1.375	C04506
1/4 E	.2500	2.500	1.375	C04509
F	.2570	2.625	1.438	C04513
G	.2610	2.625	1.438	C04515

continued on next page

drill diameter d_1 fraction	wire/let	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order no. 2120
17/64		.2656	2.625	1.438	C04517
	H	.2660	2.688	1.500	C04519
	I	.2720	2.688	1.500	C04522
	J	.2770	2.688	1.500	C04524
	K	.2810	2.688	1.500	C04526
9/32		.2812	2.688	1.500	C04531
	L	.2900	2.750	1.563	C04530
	M	.2950	2.750	1.563	C04533
19/64		.2969	2.750	1.563	C04535
	N	.3020	2.813	1.625	C04537
5/16		.3125	2.813	1.625	C04542
	O	.3160	2.938	1.688	C04544
	P	.3230	2.938	1.688	C04547
21/64		.3281	2.938	1.688	C04550
	Q	.3320	3.000	1.688	C04552
	R	.3390	3.000	1.688	C04555
11/32		.3438	3.000	1.688	C04557
	S	.3480	3.063	1.750	C04560
	T	.3580	3.063	1.750	C04563
23/64		.3594	3.063	1.750	C04565
	U	.3680	3.125	1.813	C04569
3/8		.3750	3.125	1.813	C04572
	V	.3770	3.250	1.875	C04573
	W	.3860	3.250	1.875	C04578
25/64		.3906	3.250	1.875	C04580
	X	.3970	3.313	1.938	C04582
	Y	.4040	3.313	1.938	C04584
13/32		.4062	3.313	1.938	C04585
	Z	.4130	3.375	2.000	C04586
27/64		.4219	3.375	2.000	C04588
7/16		.4375	3.438	2.063	C04591
29/64		.4531	3.563	2.125	C04594
15/32		.4688	3.625	2.125	C04596
31/64		.4844	3.688	2.188	C04599
1/2		.5000	3.750	2.250	C04601
33/64		.5156	3.875	2.375	C04604

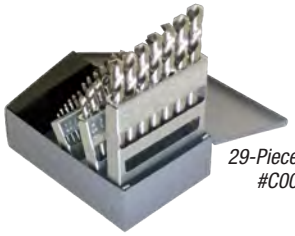
drill diameter d_1 fraction	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order no. 2120
17/32	.5312	3.875	2.375	C04606
35/64	.5469	4.000	2.500	C04609
9/16	.5625	4.000	2.500	C04612
37/64	.5781	4.125	2.625	C04614
19/32	.5938	4.125	2.625	C04617
39/64	.6094	4.250	2.750	C04619
5/8	.6250	4.250	2.750	C04622
41/64	.6406	4.500	2.875	C04625
21/32	.6562	4.500	2.875	C04627
43/64	.6719	4.625	2.875	C04630
11/16	.6875	4.625	2.875	C04632
45/64	.7031	4.750	3.000	C04634
23/32	.7188	4.750	3.000	C04636
47/64	.7344	5.000	3.125	C04638
3/4	.7500	5.000	3.125	C04640
49/64	.7656	5.125	3.250	C04641
25/32	.7812	5.125	3.250	C04643
51/64	.7969	5.250	3.375	C04645
13/16	.8125	5.250	3.375	C04647
53/64	.8281	5.375	3.500	C04649
27/32	.8438	5.375	3.500	C04650
55/64	.8594	5.500	3.500	C04652
7/8	.8750	5.500	3.500	C04654
57/64	.8906	5.625	3.625	C04656
29/32	.9062	5.625	3.625	C04658
59/64	.9219	5.750	3.750	C04659
15/16	.9375	5.750	3.750	C04661
61/64	.9531	5.875	3.875	C04663
31/32	.9688	5.875	3.875	C04665
63/64	.9844	6.000	4.000	C04667
1	1.0000	6.000	4.000	C04668
1-1/16*	1.0625	6.250	4.000	C04675
1-1/8*	1.1250	6.375	4.000	C04683
1-3/16*	1.1875	6.625	4.250	C04690
1-1/4*	1.2500	6.750	4.375	C04697

** 1-1/16" through 1-1/4" drills have 1" shank.*

SET

Style: 2120

General Purpose



29-Piece Set #C00980

no. of pieces	surface treatment	size range	order number 2120
29	Bright	1/16" through 1/2" x 1/64"	C00980
26	Bright	letter A through Z	C01332

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		✦					✦		☆			

☆ = Best Performance ✦ = Acceptable

Wide Land Parabolic
Q-Cobalt™

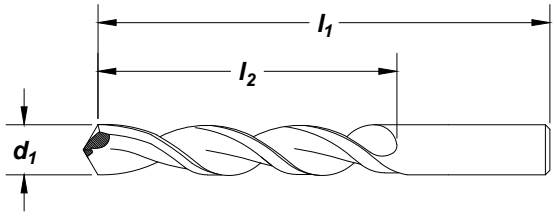
Styles: 2175, 2175-TN, 2175-TC, 2175-TA

CLEVELAND

Note
Operating parameters: See Technical section

ASME B94.11M | M42 Cobalt | 135° Split | Helix High 35° to 45° | Straight Shank

Surface Treatment: Straw Oxide | TiN | TiCN | TiAlN



Feature:
Effective deep hole drilling in a wide array of materials. Available coating for extended tool life and productivity. Shorter design for accuracy and rigidity.

drill diameter d_1 fraction	drill diameter d_1 wire/letter	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2175 straw oxide	2175-TN TiN	2175-TC TiCN	2175-TA TiAlN
1/16		.0625	1.625	.625	C14200	C14321	C15250	C15050
	52	.0635	1.688	.688	C14318	C14439	–	–
	51	.0670	1.688	.688	C14317	C14438	–	–
	50	.0700	1.688	.688	C14316	C14437	–	–
	49	.0730	1.688	.688	C14315	C14436	–	–
	48	.0760	1.688	.688	C14314	C14435	–	–
5/64		.0781	1.688	.688	C14201	C14322	C15251	C15051
	47	.0785	1.750	.750	C14313	C14434	–	–
	46	.0810	1.750	.750	C14312	C14433	–	–
	45	.0820	1.750	.750	C14311	C14432	–	–
	44	.0860	1.750	.750	C14310	C14431	–	–
	43	.0890	1.750	.750	C14309	C14430	–	–
	42	.0935	1.750	.750	C14308	C14429	–	–
3/32		.0938	1.750	.750	C14202	C14323	C15252	C15052
	41	.0960	1.813	.813	C14307	C14428	–	–
	40	.0980	1.813	.813	C14280	C14402	C15330	C15130
	39	.0995	1.813	.813	C14279	C14401	C15329	C15129
	38	.1015	1.813	.813	C14278	C14400	C15328	C15128
	37	.1040	1.813	.813	C14277	C14399	C15327	C15127
	36	.1065	1.813	.813	C14276	C14398	C15326	C15126
7/64		.1094	1.813	.813	C14203	C14324	C15253	C15053
	35	.1100	1.875	.875	C14275	C14397	C15325	C15125
	34	.1110	1.875	.875	C14274	C14396	C15324	C15124
	33	.1130	1.875	.875	C14273	C14395	C15323	C15123
	32	.1160	1.875	.875	C14272	C14393	C15322	C15122
	31	.1200	1.875	.875	C14271	C14392	C15321	C15121
1/8		.1250	1.875	.875	C14204	C14325	C15254	C15054
	30	.1285	1.938	.938	C14270	C14391	C15320	C15120
	29	.1360	1.938	.938	C14269	C14390	C15319	C15119
	28	.1405	1.938	.938	C14268	C14389	C15318	C15118
9/64		.1406	1.938	.938	C14205	C14326	C15255	C15055
	27	.1440	2.063	1.000	C14267	C14388	C15317	C15117
	26	.1470	2.063	1.000	C14266	C14387	C15316	C15116
	25	.1495	2.063	1.000	C14265	C14386	C15315	C15115
	24	.1520	2.063	1.000	C14264	C14385	C15314	C15114
	23	.1540	2.063	1.000	C14263	C14384	C15313	C15113
5/32		.1562	2.063	1.000	C14206	C14327	C15256	C15056
	22	.1570	2.125	1.063	C14262	C14383	C15312	C15112
	21	.1590	2.125	1.063	C14261	C14382	C15311	C15111
	20	.1610	2.125	1.063	C14260	C14381	C15310	C15110
	19	.1660	2.125	1.063	C14259	C14380	C15309	C15109
	18	.1695	2.125	1.063	C14258	C14379	C15308	C15108
11/64		.1719	2.125	1.063	C14207	C14328	C15257	C15057

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drill diameter d_1 fraction	wire/letter	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2175 straw oxide	2175-TN TiN	2175-TC TiCN	2175-TA TiAlN
	17	.1730	2.188	1.125	C14257	C14378	C15307	C15107
	16	.1770	2.188	1.125	C14256	C14377	C15306	C15106
	15	.1800	2.188	1.125	C14255	C14376	C15305	C15105
	14	.1820	2.188	1.125	C14254	C14375	C15304	C15104
	13	.1850	2.188	1.125	C14253	C14374	C15303	C15103
3/16		.1875	2.188	1.125	C14208	C14329	C15258	C15058
	12	.1890	2.250	1.188	C14252	C14373	C15302	C15102
	11	.1910	2.250	1.188	C14251	C14372	C15301	C15101
	10	.1935	2.250	1.188	C14250	C14371	C15300	C15100
	9	.1960	2.250	1.188	C14249	C14370	C15299	C15099
	8	.1990	2.250	1.188	C14248	C14369	C15298	C15098
	7	.2010	2.250	1.188	C14247	C14368	C15297	C15097
13/64		.2031	2.250	1.188	C14209	C14330	C15259	C15059
	6	.2040	2.375	1.250	C14246	C14367	C15296	C15096
	5	.2055	2.375	1.250	C14245	C14366	C15295	C15095
	4	.2090	2.375	1.250	C14244	C14365	C15294	C15094
	3	.2130	2.375	1.250	C14243	C14364	C15293	C15093
7/32		.2188	2.375	1.250	C14210	C14331	C15260	C15060
	2	.2210	2.438	1.313	C14242	C14363	C15292	C15092
	1	.2280	2.438	1.313	C14241	C14362	C15291	C15091
	A	.2340	2.438	1.313	C14281	C14403	C15331	C15131
15/64		.2344	2.438	1.313	C14211	C14332	C15261	C15061
	B	.2380	2.500	1.375	C14282	C14404	C15332	C15132
	C	.2420	2.500	1.375	C14283	C14405	C15333	C15133
	D	.2460	2.500	1.375	C14284	C14406	C15334	C15134
1/4	E	.2500	2.500	1.375	C14212	C14333	C15262	C15062
	F	.2570	2.625	1.438	C14286	C14407	C15335	C15135
	G	.2610	2.625	1.438	C14287	C14408	C15336	C15136
17/64		.2656	2.625	1.438	C14213	C14334	C15263	C15063
	H	.2660	2.688	1.500	C14288	C14409	C15337	C15137
	I	.2720	2.688	1.500	C14289	C14410	C15338	C15138
	J	.2770	2.688	1.500	C14290	C14411	C15339	C15139
	K	.2810	2.688	1.500	C14291	C14412	C15340	C15140
9/32		.2812	2.688	1.500	C14214	C14335	C15264	C15064
	L	.2900	2.750	1.563	C14292	C14413	C15341	C15141
	M	.2950	2.750	1.563	C14293	C14414	C15342	C15142
19/64		.2969	2.750	1.563	C14215	C14336	C15265	C15065
	N	.3020	2.813	1.625	C14294	C14415	C15343	C15143
5/16		.3125	2.813	1.625	C14216	C14337	C15266	C15066
	O	.3160	2.938	1.688	C14295	C14416	C15344	C15144
	P	.3230	2.938	1.688	C14296	C14417	C15345	C15145
21/64		.3281	2.938	1.688	C14217	C14338	C15267	C15067
	Q	.3320	3.000	1.688	C14297	C14418	C15346	C15146
	R	.3390	3.000	1.688	C14298	C14419	C15347	C15147
11/32		.3438	3.000	1.688	C14218	C14339	C15268	C15068

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
TiN	✦		✦										
TiCN	☆		☆		✦	✦		✦	✦	☆			
TiAlN					☆	☆		☆	☆				

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	wire/letter	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2175 straw oxide	2175-TN TiN	2175-TC TiCN	2175-TA TiAlN
	S	.3480	3.063	1.750	C14299	C14420	C15348	C15148
	T	.3580	3.063	1.750	C14300	C14421	C15349	C15149
23/64		.3594	3.063	1.750	C14219	C14340	C15269	C15069
	U	.3680	3.125	1.813	C14301	C14422	C15350	C15150
3/8		.3750	3.125	1.813	C14220	C14341	C15270	C15070
	V	.3770	3.250	1.875	C14302	C14423	C15351	C15151
	W	.3860	3.250	1.875	C14303	C14424	C15352	C15152
25/64		.3906	3.250	1.875	C14221	C14342	C15271	C15071
	X	.3970	3.313	1.938	C14304	C14425	C15353	C15153
	Y	.4040	3.313	1.938	C14305	C14426	C15354	C15154
13/32		.4062	3.313	1.938	C14222	C14343	C15272	C15072
	Z	.4130	3.375	2.000	C14306	C14427	C15355	C15155
27/64		.4219	3.375	2.000	C14223	C14344	C15273	C15073
7/16		.4375	3.438	2.063	C14224	C14345	C15274	C15074
29/64		.4531	3.563	2.125	C14225	C14346	C15275	C15075
15/32		.4688	3.625	2.125	C14226	C14347	C15276	C15076
31/64		.4844	3.688	2.188	C14227	C14348	C15277	C15077
1/2		.5000	3.750	2.250	C14228	C14349	C15278	C15078
33/64		.5156	3.875	2.375	C14229	C14350	C15279	C15079
17/32		.5312	3.875	2.375	C14230	C14351	C15280	C15080
35/64		.5469	4.000	2.500	C14231	C14352	C15281	C15081
9/16		.5625	4.000	2.500	C14232	C14353	C15282	C15082
37/64		.5781	4.125	2.625	C14233	C14354	C15283	C15083
19/32		.5938	4.125	2.625	C14234	C14355	C15284	C15084
39/64		.6094	4.250	2.750	C14235	C14356	C15285	C15085
5/8		.6250	4.250	2.750	C14236	C14357	C15286	C15086
41/64		.6406	4.500	2.875	C14237	C14358	C15287	C15087
21/32		.6562	4.500	2.875	C14238	C14359	C15288	C15088
43/64		.6719	4.625	2.875	C14239	C14360	C15289	C15089
11/16		.6875	4.625	2.875	C14240	C14361	C15290	C15090

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
TiN	✦		✦										
TiCN	☆		☆		✦	✦		✦	✦	☆			
TiAlN					☆	☆		☆	☆				

☆ = Best Performance ✦ = Acceptable

CLEVELAND

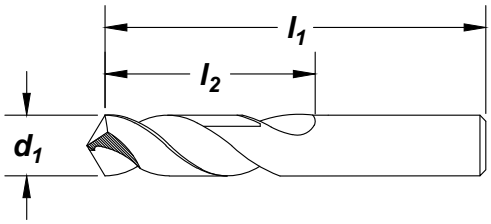
Style: 2330

Aircraft NAS 907, Type C
Heavy Duty

Note
Operating parameters: See Technical section

NAS 907 TYPE C | HSS | 135° Split | Helix Regular 21° to 34° | Straight Shank

Surface Treatment: Bright



Feature:
Heavy duty design for tougher materials.

drill diameter d_1 fraction	wire	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2330
*3/64		.0469	1.375	.500	C70250
1/16		.0625	1.625	.625	C70251
	52	.0635	1.688	.688	C70356
	51	.0670	1.688	.688	C70355
	50	.0700	1.688	.688	C70354
	49	.0730	1.688	.688	C70353
	48	.0760	1.688	.688	C70352
5/64		.0781	1.688	.688	C70252
	47	.0785	1.750	.750	C70351
	46	.0810	1.750	.750	C70350
	45	.0820	1.750	.750	C70349
	44	.0860	1.750	.750	C70348
	43	.0890	1.750	.750	C70347
	42	.0935	1.750	.750	C70346
3/32		.0938	1.750	.750	C70253
	41	.0960	1.813	.813	C70345
	40	.0980	1.813	.813	C70344
	39	.0995	1.813	.813	C70343
	38	.1015	1.813	.813	C70342
	37	.1040	1.813	.813	C70341
	36	.1065	1.813	.813	C70340
7/64		.1094	1.813	.813	C70254
	35	.1100	1.875	.875	C70339
	34	.1110	1.875	.875	C70338
	33	.1130	1.875	.875	C70337
	32	.1160	1.875	.875	C70336
	31	.1200	1.875	.875	C70335
1/8		.1250	1.875	.875	C70255
	30	.1285	1.938	.938	C70334
	29	.1360	1.938	.938	C70333
	28	.1405	1.938	.938	C70332
9/64		.1406	1.938	.938	C70256

*Not split point.

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		✦			☆	☆	✦			

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	wire	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2330
	27	.1440	2.063	1.000	C70331
	26	.1470	2.063	1.000	C70330
	25	.1495	2.063	1.000	C70329
	24	.1520	2.063	1.000	C70328
	23	.1540	2.063	1.000	C70327
5/32		.1562	2.063	1.000	C70257
	22	.1570	2.125	1.063	C70326
	21	.1590	2.125	1.063	C70325
	20	.1610	2.125	1.063	C70324
	19	.1660	2.125	1.063	C70323
	18	.1695	2.125	1.063	C70322
11/64		.1719	2.125	1.063	C70258
	17	.1730	2.188	1.125	C70321
	16	.1770	2.188	1.125	C70320
	15	.1800	2.188	1.125	C70319
	14	.1820	2.188	1.125	C70318
	13	.1850	2.188	1.125	C70317
3/16		.1875	2.188	1.125	C70259
	12	.1890	2.250	1.188	C70316
	11	.1910	2.250	1.188	C70315
	10	.1935	2.250	1.188	C70314
	9	.1960	2.250	1.188	C70313
	8	.1990	2.250	1.188	C70312
	7	.2010	2.250	1.188	C70311
13/64		.2031	2.250	1.188	C70260
	6	.2040	2.375	1.250	C70310
	5	.2055	2.375	1.250	C70309
	4	.2090	2.375	1.250	C70308
	3	.2130	2.375	1.250	C70307
7/32		.2188	2.375	1.250	C70261
	2	.2210	2.438	1.313	C70306
	1	.2280	2.438	1.313	C70305
	A	.2340	2.438	1.313	C70280
15/64		.2344	2.438	1.313	C70262
	B	.2380	2.500	1.375	C70281
	C	.2420	2.500	1.375	C70282
	D	.2460	2.500	1.375	C70283
1/4	E	.2500	2.500	1.375	C70263
	F	.2570	2.625	1.438	C70284
	G	.2610	2.625	1.438	C70285
17/64		.2656	2.625	1.438	C70264
	H	.2660	2.688	1.500	C70286
	I	.2720	2.688	1.500	C70287
	J	.2770	2.688	1.500	C70288
9/32		.2812	2.688	1.500	C70265
	K	.2812	2.688	1.500	C70289
	L	.2900	2.750	1.563	C70290
	M	.2950	2.750	1.563	C70291
19/64		.2969	2.750	1.563	C70266
	N	.3020	2.813	1.625	C70292
5/16		.3125	2.813	1.625	C70267
	O	.3160	2.813	1.688	C70293
	P	.3230	2.813	1.688	C70294
21/64		.3281	2.813	1.688	C70268
	Q	.3320	3.000	1.688	C70295
	R	.3390	3.000	1.688	C70296
11/32		.3438	3.000	1.688	C70269
	S	.3480	3.063	1.750	C70297

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Style: 2330 (continued)

drill diameter d_1 fraction	wire	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2330
	T	.3580	3.063	1.750	C70298
23/64		.3594	3.063	1.750	C70270
	U	.3680	3.125	1.813	C70299
3/8		.3750	3.125	1.813	C70271
	V	.3770	3.250	1.875	C70300
	W	.3860	3.250	1.875	C70301
25/64		.3906	3.250	1.875	C70272
	X	.3970	3.313	1.938	C70302
	Y	.4040	3.313	1.938	C70303
13/32		.4062	3.313	1.938	C70273
	Z	.4130	3.375	2.000	C70304
27/64		.4219	3.375	2.000	C70274
7/16		.4375	3.438	2.063	C70275
29/64		.4531	3.563	2.125	C70276
15/32		.4688	2.625	2.125	C70277
31/64		.4844	3.688	2.188	C70278
1/2		.5000	3.750	2.250	C70279

SET — Style: 2330

Aircraft NAS 907, Type C
Heavy Duty

29-Piece Set #C70368

no. of pieces	surface treatment	size range	order number 2330
15	Bright	1/16" through 1/2" x 1/32"	C70370
21	Bright	1/16" through 3/8" x 1/64"	C70369
29	Bright	1/16" through 1/2" x 1/64"	C70368

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		✦			☆	☆	✦			

☆ = Best Performance ✦ = Acceptable

Aircraft NAS 907, Type K

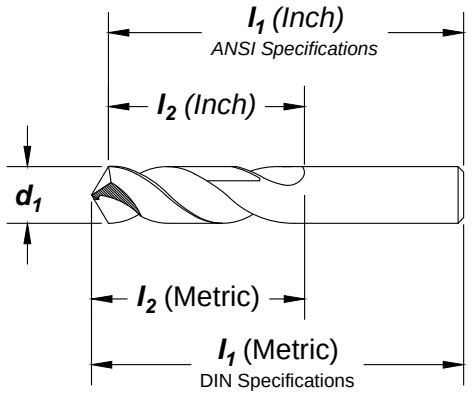
Heavy Duty

Styles: 2133, 2133-TC

CLEVELAND

Note
Operating parameters: See Technical section

ASME B94.11M | DIN 1897 | M42 Cobalt | 135° Split | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Straw Oxide, TiCN



Feature:
Highly heat resistant substrate for tough to machine materials.

drill diameter				overall length		flute length		order number	
	d_1		decimal	l_1		l_2		2133	2133-TC
fraction	wire/letter	mm	equivalent	in	mm	in	mm	straw oxide	TiCN
	*60		.0400	1.375		.500		C14501	–
	*59		.0410	1.375		.500		C14502	–
	*58		.0420	1.375		.500		C14504	–
	*57		.0430	1.375		.500		C14505	–
	*56		.0465	1.375		.500		C14508	–
*3/64			.0469	1.375		.500		C14509	–
		*1.2	.0472		30.00		8.00	C14835	–
	*55		.0520	1.625		.625		C14513	–
	*54		.0550	1.625		.625		C14515	–
		*1.5	.0591		32.00		9.00	C14838	–
	*53		.0595	1.625		.625		C14519	–
1/16			.0625	1.625		.625		C14521	C14846
		1.6	.0630		34.00		10.00	C14748	–
	52		.0635	1.688		.688		C14523	–
	51		.0670	1.688		.688		C14526	–
	50		.0700	1.688		.688		C14528	–
	49		.0730	1.688		.688		C14531	–
	48		.0760	1.688		.688		C14533	–
5/64			.0781	1.688		.688		C14535	–
	47		.0785	1.750		.750		C14536	–
		2.0	.0787		38.00		12.00	C14800	C14749
	46		.0810	1.750		.750		C14539	–
	45		.0820	1.750		.750		C14540	–
	44		.0860	1.750		.750		C14543	–
	43		.0890	1.750		.750		C14546	–
	42		.0935	1.750		.750		C14549	–
3/32			.0938	1.750		.750		C14550	C14848
		2.4	.0945		43.00		14.00	C14790	–
	41		.0960	1.813		.813		C14552	–
	40		.0980	1.813		.813		C14554	–
		2.5	.0984	1.693	43.00	.551	14.00	C14820	C14750

**Not split point.*

continued on next page

Tech Tip

Benefits of 2133 Cobalt Screw Machine Drill

- Cobalt provides high heat resistance for tough applications.
- Short flutes provide enhanced rigidity and drill more accurate holes.

Styles: 2133, 2133-TC (continued)

drill diameter d_1 fraction	wire/letter	mm	decimal equivalent	overall length l_1 in	mm	flute length l_2 in	mm	order number 2133 straw oxide	2133-TC TiCN
	39		.0995	1.813		.813		C14556	–
	38		.1015	1.813		.813		C14557	–
		2.6	.1024	1.693	43.00	.551	14.00	C14840	C14730
	37		.1040	1.813		.813		C14559	–
	36		.1065	1.813		.813		C14561	–
7/64			.1094	1.813		.813		C14562	–
	35		.1100	1.875		.875		C14563	–
		2.8	.1102		46.00		16.00	C14841	–
	34		.1110	1.875		.875		C14565	–
	33		.1130	1.875		.875		C14566	–
	32		.1160	1.875		.875		C14568	–
		3.0	.1181		46.00		16.00	C14821	C14751
	31		.1200	1.875		.875		C14570	–
		3.1	.1220		49.00		18.00	C14822	C14752
1/8			.1250	1.875		.875		C14572	C14850
		3.2	.1260		49.00		18.00	C14801	C14753
	30		.1285	1.938		.938		C14574	–
		3.3	.1299		49.00		18.00	C14802	C14754
	29		.1360	1.938		.938		C14577	–
		3.5	.1378		52.00		20.00	C14803	C14755
	28		.1405	1.938		.938		C14579	–
9/64			.1406	1.938		.938		C14580	–
	27		.1440	2.063		1.000		C14582	–
		3.7	.1457		52.00		20.00	C14823	–
	26		.1470	2.063		1.000		C14584	–
	25		.1495	2.063		1.000		C14585	–
	24		.1520	2.063		1.000		C14587	–
	23		.1540	2.063		1.000		C14589	–
5/32			.1562	2.063		1.000		C14590	C14852
	22		.1570	2.125		1.063		C14591	–
		4.0	.1575		55.00		22.00	C14824	C14756
	21		.1590	2.125		1.063		C14593	–
	20		.1610	2.125		1.063		C14594	–
		4.1	.1614		55.00		22.00	C14825	C14757
		4.2	.1654		55.00		22.00	C14804	C14758
	19		.1660	2.125		1.063		C14597	–
	18		.1695	2.125		1.063		C14599	–
11/64			.1719	2.125		1.063		C14600	–
	17		.1730	2.188		1.125		C14601	–
	16		.1770	2.188		1.125		C14603	–
		4.5	.1772		58.00		24.00	C14805	C14759
	15		.1800	2.188		1.125		C14605	–
		4.6	.1811		58.00		24.00	C14842	C14728
	14		.1820	2.188		1.125		C14607	–
	13		.1850	2.188		1.125		C14608	–
3/16			.1875	2.188		1.125		C14610	C14854
		4.8	.1890		62.00		26.00	C14806	C14760
	12		.1890	2.250		1.188		C14611	–
	11		.1910	2.250		1.188		C14613	–

continued on next page

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw	✦		✦		✦	✦		✦	✦				
TiCN	☆		☆		☆	☆		☆	☆	☆	✦	✦	

☆ = Best Performance ✦ = Acceptable

drill diameter				overall length		flute length		order number	
	d_1		decimal	l_1		l_2		2133	2133-TC
fraction	wire/letter	mm	equivalent	in	mm	in	mm	straw oxide	TiCN
		4.9	.1929		62.00		26.00	C14826	–
	10		.1935	2.250		1.188		C14615	–
	9		.1960	2.250		1.188		C14616	–
		5.0	.1969		62.00		26.00	C14827	C14761
	8		.1990	2.250		1.188		C14618	–
		5.1	.2008		62.00		26.00	C14807	C14762
	7		.2010	2.250		1.188		C14620	–
13/64			.2031	2.250		1.188		C14621	–
	6		.2040	2.375		1.250		C14622	–
	5		.2055	2.375		1.250		C14624	–
	4		.2090	2.375		1.250		C14626	–
	3		.2130	2.375		1.250		C14628	–
		5.5	.2165		66.00		28.00	C14828	C14786
7/32			.2188	2.375		1.250		C14630	C14856
		5.6	.2205		66.00		28.00	C14843	–
	2		.2210	2.438		1.313		C14632	–
		5.7	.2244		66.00		28.00	C14844	–
	1		.2280	2.438		1.313		C14634	–
	A		.2340	2.438		1.313		C14637	–
15/64			.2344	2.438		1.313		C14638	–
		6.0	.2362		66.00		28.00	C14829	C14763
	B		.2380	2.500		1.375		C14640	–
		6.1	.2402		70.00		31.00	C14869	–
	C		.2420	2.500		1.375		C14642	–
	D		.2460	2.500		1.375		C14644	–
1/4, E	E		.2500	2.500		1.375		C14646	C14858
		6.5	.2559		70.00		31.00	C14808	C14764
	F		.2570	2.625		1.438		C14649	–
		6.6	.2598		70.00		31.00	C14809	–
	G		.2610	2.625		1.438		C14651	–
17/64			.2656	2.625		1.438		C14653	–
	H		.2660	2.688		1.500		C14654	–
		6.8	.2677		74.00		34.00	C14810	C14765
	I		.2720	2.688		1.500		C14657	–
		7.0	.2756		74.00		34.00	C14830	C14766
	J		.2770	2.688		1.500		C14659	–
	K		.2810	2.688		1.500		C14661	–
9/32			.2812	2.688		1.500		C14664	C14860
	L		.2900	2.750		1.563		C14665	–
		7.4	.2913		74.00		34.00	C14811	–
	M		.2950	2.750		1.563		C14667	–
		7.5	.2953		74.00		34.00	C14831	C14787
19/64			.2969	2.750		1.563		C14669	–
	N		.3020	2.813		1.625		C14671	–
5/16			.3125	2.813		1.625		C14675	C14861
		8.0	.3150		79.00		37.00	C14812	C14767
	O		.3160	2.938		1.688		C14677	–
		8.1	.3189		79.00		37.00	C14670	–
	P		.3230	2.938		1.688		C14680	–
21/64			.3281	2.938		1.688		C14682	–
	Q		.3320	3.000		1.688		C14684	–
		8.5	.3346		79.00		37.00	C14813	C14768
	R		.3390	3.000		1.688		C14687	–
11/32			.3438	3.000		1.688		C14689	C14862
	S		.3480	3.063		1.750		C14691	–
		9.0	.3543		84.00		40.00	C14814	C14769

continued on next page

Styles: 2133, 2133-TC (continued)

drill diameter				overall length		flute length		order number	
	d_1		decimal	l_1		l_2		2133	2133-TC
fraction	wire/letter	mm	equivalent	in	mm	in	mm	straw oxide	TiCN
	T		.3580	3.063		1.750		C14694	–
23/64			.3594	3.063		1.750		C14696	–
	U		.3680	3.125		1.813		C14699	–
		9.5	.3740		84.00		40.00	–	C14770
3/8			.3750	3.125		1.813		C14702	C14863
	V		.3770	3.250		1.875		C14703	–
	W		.3860	3.250		1.875		C14707	–
25/64			.3906	3.250		1.875		C14709	–
		10.0	.3937		89.00		43.00	C14815	C14771
	X		.3970	3.313		1.938		C14711	–
	Y		.4040	3.313		1.938		C14713	–
13/32			.4062	3.313		1.938		C14715	C14864
	Z		.4130	3.375		2.000		C14716	–
		10.5	.4134		89.00		43.00	C14816	C14788
27/64			.4219	3.375		2.000		C14718	–
		11.0	.4331		95.00		47.00	C14817	C14772
7/16			.4375	3.438		2.063		C14721	C14865
		11.5	.4528		95.00		47.00	C14832	C14773
29/64			.4531	3.563		2.125		C14724	–
15/32			.4688	3.625		2.125		C14726	C14867
		12.0	.4724		102.00		51.00	C14818	C14774
31/64			.4844	3.688		2.188		C14729	–
		12.5	.4921		102.00		51.00	C14819	C14775
1/2			.5000	3.750		2.250		C14731	C14866

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw	✦		✦		✦	✦		✦	✦				
TiCN	☆		☆		☆	☆		☆	☆	☆	✦	✦	

☆ = Best Performance ✦ = Acceptable

CLEVELAND

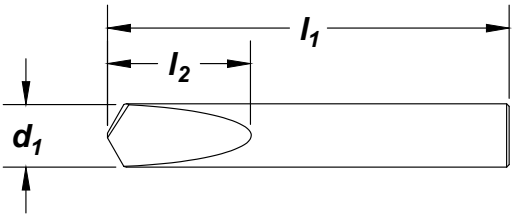
Spade Drill

Style: 1765

Carbide | 118° | Surface Treatment: Bright

Stub Length

Carbide



cutting diameter d_1 fraction	decimal equivalent	overall length l_1	flute length l_2	order number 1765
1/32	.0313	1-1/2	3/16	C89705
1/16	.0625	1-1/2	5/16	C89706
3/32	.0938	1-1/2	3/8	C89707
1/8	.1250	1-1/2	7/16	C89708
5/32	.1562	2	15/32	C89709
3/16	.1875	2	9/16	C89710
7/32	.2188	2	19/32	C89711
1/4	.2500	2	11/16	C89712
9/32	.2812	2-1/2	3/4	C89714
5/16	.3125	2-1/2	7/8	C89715
11/32	.3438	2-1/2	15/16	C89716
3/8	.3750	2-1/2	1-1/16	C89713

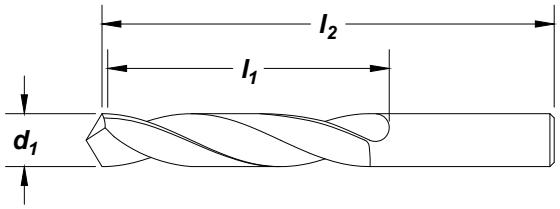
Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆	✦	☆	✦	✦			☆	✦				✦

☆ = Best Performance ✦ = Acceptable

Style: 1767

ASME B94.11M | Carbide | 118° 4-Facet | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Bright



cutting diameter d_1 fraction	wire/let	decimal equivalent	overall length l_1	flute length l_2	order number 1767
	60	.0400	1-1/2	3/8	C89675
	59	.0410	1-1/2	3/8	C89674
	58	.0420	1-1/2	3/8	C89673
	57	.0430	1-1/2	3/8	C89672
	56	.0465	1-1/2	3/8	C89671
	55	.0520	1-1/2	3/8	C89670
	54	.0550	1-1/2	3/8	C89669
	53	.0595	1-1/2	3/8	C89668
1/16		.0625	2	5/8	C89676
	52	.0635	2	5/8	C89667
	51	.0670	2	5/8	C89666
	50	.0700	2	5/8	C89665
	49	.0730	2	5/8	C89664
	48	.0760	2	5/8	C89663
5/64		.0781	2	5/8	C89677
	47	.0785	2	5/8	C89662
	46	.0810	2	5/8	C89661
	45	.0820	2	5/8	C89660
	44	.0860	2	5/8	C89659
	43	.0890	2	5/8	C89658
	42	.0935	2	5/8	C89657
3/32		.0938	2	5/8	C89678
	41	.0960	2	5/8	C89656
	40	.0980	2	5/8	C89655
	39	.0995	2	5/8	C89654
	38	.1015	2	5/8	C89653
	37	.1040	2	5/8	C89652
	36	.1065	2	5/8	C89651
7/64		.1094	2	5/8	C89679
	35	.1100	2	5/8	C89650
	34	.1110	2	5/8	C89649
	33	.1130	2	5/8	C89648
	32	.1160	2	5/8	C89647
	31	.1200	2	5/8	C89646
1/8		.1250	2	5/8	C89680
	30	.1285	2	5/8	C89645

continued on next page

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆	✦	☆	✦	✦			☆	☆	✦			✦

☆ = Best Performance ✦ = Acceptable

cutting diameter d_1 fraction	cutting diameter d_1 wire/let	decimal equivalent	overall length l_1	flute length l_2	order number 1767
	29	.1360	2	5/8	C89644
9/64		.1406	2	5/8	C89681
	28	.1405	2	5/8	C89643
	27	.1440	2	5/8	C89642
	26	.1470	2	5/8	C89641
	25	.1495	2-1/2	3/4	C89640
	24	.1520	2-1/2	3/4	C89639
	23	.1540	2-1/2	3/4	C89638
5/32		.1562	2-1/2	3/4	C89682
	22	.1570	2-1/2	3/4	C89637
	21	.1590	2-1/2	3/4	C89636
	20	.1610	2-1/2	3/4	C89635
	19	.1660	2-1/2	3/4	C89634
	18	.1695	2-1/2	3/4	C89633
11/64		.1719	2-1/2	3/4	C89683
	17	.1730	2-1/2	3/4	C89632
	16	.1770	2-1/2	3/4	C89631
	15	.1800	2-1/2	3/4	C89630
	14	.1820	2-1/2	3/4	C89629
	13	.1850	2-1/2	3/4	C89628
3/16		.1875	2-1/2	3/4	C89684
	12	.1890	2-1/2	3/4	C89627
	11	.1910	2-1/2	3/4	C89626
	10	.1935	2-1/2	3/4	C89625
	9	.1960	2-1/2	3/4	C89624
	8	.1990	2-1/2	3/4	C89623
	7	.2010	2-1/2	3/4	C89622
13/64		.2031	2-1/2	3/4	C89685
	6	.2040	2-1/2	3/4	C89621
	5	.2055	2-1/2	3/4	C89620
	4	.2090	2-1/2	3/4	C89619
	3	.2130	2-1/2	1	C89618
7/32		.2188	2-1/2	1	C89686
	2	.2210	2-1/2	1	C89617
	1	.2280	2-1/2	1	C89616
15/64		.2344	2-1/2	1	C89687
1/4		.2500	2-1/2	1	C89688
17/64		.2656	2-1/2	1	C89689
9/32		.2812	2-1/2	1	C89690
19/64		.2969	2-3/4	1-1/4	C89691
5/16		.3125	2-3/4	1-1/4	C89692
21/64		.3281	2-3/4	1-1/4	C89693
11/32		.3438	3	1-1/4	C89694
23/64		.3594	3	1-1/4	C89695
3/8		.3750	3	1-1/4	C89696
25/64		.3906	3	1-1/4	C89697
13/32		.4062	3	1-1/4	C89698
27/64		.4219	3	1-1/4	C89699
7/16		.4375	3	1-1/4	C89700
29/64		.4531	3	1-1/4	C89701
15/32		.4688	3	1-1/4	C89702
31/64		.4844	3	1-1/4	C89703
1/2		.5000	3	1-1/4	C89704

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆	✦	☆	✦	✦			☆	☆	✦			✦

☆ = Best Performance ✦ = Acceptable

CLEVELAND

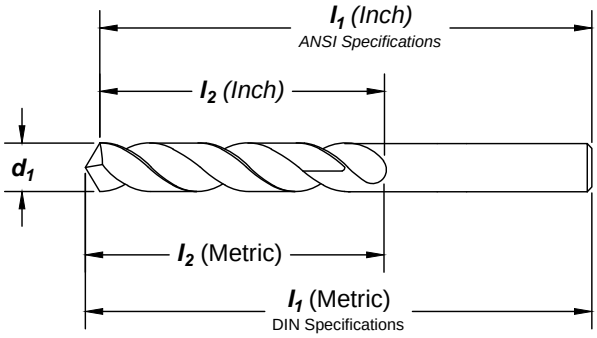
Styles: 2002G, 2001G, 2002G-TC

General Purpose

Note
Operating parameters: See Technical section

ASME B94.11M | DIN 338 | HSS-E | 118° | Helix Regular 21° to 34° | Straight Shank

Surface Treatment: Bright | Black Oxide | TiCN



Feature:
General purpose jobber drill with improved geometry. Premium steel substrate.

drill diameter				overall length		flute length		order number		
	d_1		decimal	l_1		l_2		2002G	2001G	2002G-TC
fraction	wire/letter	mm	equivalent	in	mm	in	mm	bright	black oxide	TiCN
		1.00	.0394		34.00		12.00	C72200	C71200	C73200
	60		.0400	1.625		.688		C72160	C71160	–
	59		.0410	1.625		.688		C72159	C71159	–
		1.05	.0413		34.00		12.00	–	C71201	–
	58		.0420	1.625		.688		C72158	C71158	–
	57		.0430	1.750		.750		C72157	C71157	–
		1.10	.0433		36.00		14.00	C72202	C71202	–
		1.15	.0453		36.00		14.00	–	C71203	–
	56		.0465	1.750		.750		C72156	C71156	–
3/64			.0469	1.750		.750		C72003	C71003	C73003
		1.20	.0472		38.00		16.00	C72204	C71204	–
		1.25	.0492		38.00		16.00	–	C71205	–
		1.30	.0512		38.00		16.00	C72206	C71206	–
	55		.0520	1.875		.875		C72155	C71155	–
		1.35	.0531		40.00		18.00	–	C71207	–
	54		.0550	1.875		.875		C72154	C71154	–
		1.40	.0551		40.00		18.00	C72208	C71208	–
		1.45	.0571		40.00		18.00	–	C71209	–
		1.50	.0591		40.00		18.00	C72210	C71210	C73210
	53		.0595	1.875		.875		C72153	C71153	–
		1.55	.0610		43.00		20.00	–	C71211	–
1/16			.0625	1.875		.875		C72004	C71004	C73004
		1.60	.0630		43.00		20.00	C72212	C71212	C73212
	52		.0635	1.875		.875		C72152	C71152	C73152
		1.65	.0650		43.00		20.00	–	C71213	–
		1.70	.0669		43.00		20.00	C72214	C71214	–
	51		.0670	2.000		1.000		C72151	C71151	C73151
		1.75	.0689		46.00		22.00	–	C71215	–

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Material Reference	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright										✦			
Black Oxide	✦				✦			✦					
TiCN	☆		☆		☆			☆		☆			

☆ = Best Performance ✦ = Acceptable

CLEVELAND

General Purpose

Styles: 2002G, 2001G, 2002G-TC (continued)

Jobber Length

High Speed Steel

drill diameter d_1 fraction	drill diameter d_1 wire/letter	drill diameter d_1 mm	decimal equivalent	overall length l_1 in	overall length l_1 mm	flute length l_2 in	flute length l_2 mm	order number 2002G bright	order number 2001G black oxide	order number 2002G-TC TiCN
	50		.0700	2.000		1.000		C72150	C71150	C73150
		1.80	.0709		46.00		22.00	C72216	C71216	–
		1.85	.0728		46.00		22.00	–	C71217	–
	49		.0730	2.000		1.000		C72149	C71149	C73149
		1.90	.0748		46.00		22.00	C72218	C71218	–
	48		.0760	2.000		1.000		C72148	C71148	C73148
		1.95	.0767	1.929	49.00	.945	24.00	–	C71219	–
5/64			.0781	2.000	50.80	1.000	25.40	C72005	C71005	C73005
	47		.0785	2.000	50.80	1.000	25.40	C72147	C71147	C73147
		2.00	.0787	1.929	49.00	.945	24.00	C72220	C71220	C73220
		2.05	.0807	1.929	49.00	.945	24.00	–	C71221	–
	46		.0810	2.125		1.125		C72146	C71146	C73146
	45		.0820	2.125		1.125		C72145	C71145	C73145
		2.10	.0827		49.00		24.00	C72222	C71222	–
		2.15	.0846		53.00		27.00	–	C71223	–
	44		.0860	2.125		1.125		C72144	C71144	C73144
		2.20	.0866		53.00		27.00	C72224	C71224	–
		2.25	.0886		53.00		27.00	–	C71225	–
	43		.0890	2.250		1.250		C72143	C71143	C73143
		2.30	.0906		53.00		27.00	C72226	C71226	–
		2.35	.0925		53.00		27.00	–	C71227	–
	42		.0935	2.250		1.250		C72142	C71142	C73142
3/32			.0938	2.250		1.250		C72006	C71006	C73006
		2.40	.0945		57.00		30.00	C72228	C71228	C73228
	41		.0960	2.375		1.375		C72141	C71141	C73141
		2.45	.0964		57.00		30.00	–	C71229	–
	40		.0980	2.375		1.375		C72140	C71140	C73140
		2.50	.0984		57.00		30.00	C72230	C71230	C73230
	39		.0995	2.375		1.375		C72139	C71139	C73139
	38		.1015	2.500		1.438		C72138	C71138	C73138
		2.60	.1024		57.00		30.00	C72231	C71231	–
	37		.1040	2.500		1.438		C72137	C71137	C73137
		2.70	.1062		61.00		33.00	C72232	C71232	–
	36		.1065	2.500		1.438		C72136	C71136	C73136
7/64			.1094	2.625		1.500		C72007	C71007	C73007
	35		.1100	2.625		1.500		C72135	C71135	C73135
		2.80	.1102		61.00		33.00	C72233	C71233	–
	34		.1110	2.625		1.500		C72134	C71134	C73134
	33		.1130	2.625		1.500		C72133	C71133	C73133
		2.90	.1142		61.00		33.00	C72234	C71234	–
	32		.1160	2.750		1.625		C72132	C71132	C73132
		3.00	.1181		61.00		33.00	C72235	C71235	C73235
	31		.1200	2.750		1.625		C72131	C71131	C73131
		3.10	.1220		65.00		36.00	C72236	C71236	–
1/8			.1250	2.750		1.625		C72008	C71008	C73008
		3.20	.1260		66.00		37.00	C72237	C71237	C73237
	30		.1285	2.750		1.625		C72130	C71130	C73130
		3.30	.1299		67.00		38.00	C72238	C71238	C73238
		3.40	.1339		70.00		39.00	C72239	C71239	–
	29		.1360	2.875		1.750		C72129	C71129	C73129
		3.50	.1378		70.00		39.00	C72240	C71240	C73240
	28		.1405	2.875		1.750		C72128	C71128	C73128
9/64			.1406	2.875		1.750		C72009	C71009	C73009
		3.60	.1417		70.00		39.00	C72241	C71241	C73241
	27		.1440	3.000		1.875		C72127	C71127	C73127
		3.70	.1457		70.00		39.00	C72242	C71242	–
	26		.1470	3.000		1.875		C72126	C71126	C73126

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drill diameter				overall length		flute length		order number		
	d_1		decimal	l_1		l_2		2002G	2001G	2002G-TC
fraction	wire/letter	mm	equivalent	in	mm	in	mm	bright	black oxide	TiCN
	25		.1495	3.000		1.875		C72125	C71125	C73125
		3.80	.1496		75.00		43.00	C72243	C71243	–
	24		.1520	3.125		2.000		C72124	C71124	C73124
		3.90	.1535		75.00		43.00	C72244	C71244	–
	23		.1540	3.125		2.000		C72123	C71123	C73123
5/32			.1562	3.125		2.000		C72010	C71010	C73010
	22		.1570	3.125		2.000		C72122	C71122	C73122
		4.00	.1575		75.00		43.00	C72245	C71245	C73245
	21		.1590	3.250		2.125		C72121	C71121	C73121
	20		.1610	3.250		2.125		C72120	C71120	C73120
		4.10	.1614		75.00		43.00	C72246	C71246	C73246
		4.20	.1654		75.00		43.00	C72247	C71247	C73247
	19		.1660	3.250		2.125		C72119	C71119	C73119
		4.30	.1692		80.00		47.00	C72248	C71248	C73248
	18		.1695	3.250		2.125		C72118	C71118	C73118
11/64			.1719	3.250		2.125		C72011	C71011	C73011
	17		.1730	3.375		2.188		C72117	C71117	C73117
		4.40	.1732		80.00		47.00	C72249	C71249	–
	16		.1770	3.375		2.188		C72116	C71116	C73116
		4.50	.1772		80.00		47.00	C72250	C71250	C73250
	15		.1800	3.375		2.188		C72115	C71115	C73115
		4.60	.1811			1.850	47.00	C72251	C71251	–
	14		.1820	3.375		2.188		C72114	C71114	C73114
	13		.1850	3.500		2.313		C72113	C71113	C73113
		4.70	.1850		80.00		47.00	C72252	C71252	–
3/16			.1875	3.500		2.313		C72012	C71012	C73012
	12		.1890	3.500		2.313		C72112	C71112	C73112
		4.80	.1890		86.00		52.00	C72253	C71253	C73253
	11		.1910	3.500		2.313		C72111	C71111	C73111
		4.90	.1929		86.00		52.00	C72254	C71254	C73254
	10		.1935	3.625		2.438		C72110	C71110	C73110
	9		.1960	3.625		2.438		C72109	C71109	C73109
		5.00	.1969		86.00		52.00	C72255	C71255	C73255
	8		.1990	3.625		2.438		C72108	C71108	C73108
		5.10	.2008		86.00		52.00	C72256	C71256	C73256
	7		.2010	3.625		2.438		C72107	C71107	C73107
13/64			.2031	3.625		2.438		C72013	C71013	C73013
	6		.2040	3.750		2.500		C72106	C71106	C73106
		5.20	.2047		86.00		52.00	C72257	C71257	C73257
	5		.2055	3.750		2.500		C72105	C71105	C73105
	4		.2090	3.750		2.500		C72104	C71104	C73104
		5.40	.2125		93.00		57.00	C72259	C71259	–
	3		.2130	3.750		2.500		C72103	C71103	C73103
		5.50	.2165		93.00		57.00	C72260	C71260	C73260
7/32			.2188	3.750		2.500		C72014	C71014	C73014
		5.60	.2205		93.00		57.00	C72261	C71261	–
	2		.2210	3.875		2.625		C72102	C71102	C73102
		5.70	.2244		93.00		57.00	C72262	C71262	–
	1		.2280	3.875		2.625		C72101	C71101	C73101

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright										✦			
Black Oxide	✦				✦			✦					
TiCN	☆		☆		☆			☆		☆			

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	wire/letter	mm	decimal equivalent	overall length l_1 in	mm	flute length l_2 in	mm	order number 2002G bright	2001G black oxide	2002G-TC TiCN
		5.90	.2322		93.00		57.00	C72264	C71264	–
	A		.2340	3.875		2.625		C72071	C71071	C73071
15/64			.2344	3.875		2.625		C72015	C71015	C73015
		6.00	.2362		93.00		57.00	C72265	C71265	C73265
	B		.2380	4.000		2.750		C72072	C71072	C73072
		6.10	.2401		101.00		63.00	C72266	C71266	–
	C		.2420	4.000		2.750		C72073	C71073	C73073
		6.20	.2440		101.00		63.00	C72267	C71267	–
	D		.2460	4.000		2.750		C72074	C71074	C73074
		6.30	.2480		101.00		63.00	C72268	C71268	–
1/4	E		.2500	4.000		2.750		C72016	C71016	C73016
		6.40	.2520		101.00		63.00	C72269	C71269	–
		6.50	.2559		101.00		63.00	C72270	C71270	C73270
	F		.2570	4.125		2.875		C72076	C71076	C73075
		6.60	.2598		101.00		63.00	C72271	C71271	–
	G		.2610	4.125		2.875		C72077	C71077	C73076
		6.70	.2638					C72272	C71272	–
17/64			.2656	4.125		2.875		C72017	C71017	C73017
	H		.2660	4.125		2.875		C72078	C71078	C73077
		6.80	.2677		109.00		69.00	C72273	C71273	C73273
		6.90	.2717		109.00		69.00	C72274	C71274	–
	I		.2720	4.125		2.875		C72079	C71079	C73078
		7.00	.2756		109.00		69.00	C72275	C71275	C73275
	J		.2770	4.125		2.875		C72080	C71080	C73079
		7.10	.2795		109.00		69.00	C72276	C71276	–
9/32			.2812	4.250		2.938		C72018	C71018	C73018
	K		.2812	4.250		2.938		C72081	C71081	C73080
		7.20	.2835		109.00		69.00	C72277	C71277	–
		7.30	.2874		109.00		69.00	C72278	C71278	–
	L		.2900	4.250		2.938		C72082	C71082	C73081
		7.40	.2913		109.00		69.00	C72279	C71279	–
	M		.2950	4.375		3.063		C72083	C71083	C73082
		7.50	.2953		109.00		69.00	C72280	C71280	C73280
19/64			.2969	4.375		3.063		C72019	C71019	C73019
	N		.3020	4.375		3.063		C72084	C71084	C73083
		7.70	.3031		117.00		75.00	C72282	C71282	–
		7.80	.3070		117.00		75.00	C72283	C71283	–
		7.90	.3110		117.00		75.00	C72284	C71284	–
5/16			.3125	4.500		3.188		C72020	C71020	C73020
		8.00	.3150		117.00		75.00	C72285	C71285	C73285
	O		.3160	4.500		3.188		C72085	C71085	C73084
		8.10	.3189		117.00		75.00	C72286	C71286	–
		8.20	.3228		117.00		75.00	C72287	C71287	–
	P		.3230	4.625		3.313		C72086	C71086	C73085
21/64			.3281	4.625		3.313		C72021	C71021	C73021
		8.40	.3307		117.00		75.00	C72289	C71289	–
	Q		.3320	4.750		3.438		C72087	C71087	C73086
		8.50	.3346		117.00		75.00	C72290	C71290	C73290
	R		.3390	4.750		3.438		C72088	C71088	C73087
		8.70	.3425		125.00		81.00	C72292	C71292	–
11/32			.3438	4.750		3.438		C72022	C71022	C73022
		8.80	.3464		125.00	3.189		C72293	C71293	–
	S		.3480	4.875		3.500		C72089	C71089	C73088
		9.00	.3543		125.00		81.00	C72295	C71295	C73295
	T		.3580	4.875		3.500		C72090	C71090	C73089
23/64			.3594	4.875		3.500		C72023	C71023	C73023
		9.20	.3622		125.00		81.00	C72297	C71297	–
		9.30	.3661		125.00		81.00	C72298	C71298	–
	U		.3680	5.000		3.625		C72091	C71091	C73090

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drill diameter				overall length		flute length		order number		
	d_1		decimal	l_1		l_2		2002G	2001G	2002G-TC
fraction	wire/letter	mm	equivalent	in	mm	in	mm	bright	black oxide	TiCN
		9.40	.3700		125.00		81.00	C72299	C71299	–
		9.50	.3740		125.00		81.00	C72300	C71300	C73300
3/8			.3750	5.000		3.625		C72024	C71024	C73024
	V		.3770	5.000		3.625		C72092	C71092	C73091
		9.60	.3779		133.00		87.00	C72301	C71301	–
		9.70	.3817		133.00		87.00	C72302	C71302	–
		9.80	.3858		133.00		87.00	C72303	C71303	–
	W		.3860	5.125		3.750		C72093	C71093	C73092
25/64			.3906	5.125		3.750		C72025	C71025	C73025
		10.00	.3937		133.00		87.00	C72305	C71305	C73305
	X		.3970		130.18		95.25	C72094	C71094	C73093
		10.20	.4016		133.00		87.00	C72306	C71306	C73306
	Y		.4040	5.250		3.875		C72095	C71095	C73094
13/32			.4062	5.250		3.875		C72026	C71026	C73026
	Z		.4130	5.250		3.875		C72096	C71096	C73095
		10.50	.4134		133.00		87.00	C72308	C71308	C73308
27/64			.4219	5.375		3.938		C72027	C71027	C73027
		10.80	.4252		142.00		94.00	C72309	C71309	–
		11.00	.4331		142.00		94.00	C72310	C71310	C73310
7/16			.4375	5.500		4.063		C72028	C71028	C73028
		11.20	.4409		142.00		94.00	C72311	C71311	–
		11.50	.4527		142.00		94.00	C72312	C71312	C73312
29/64			.4531	5.625		4.188		C72029	C71029	C73029
15/32			.4688	5.750		4.313		C72030	C71030	C73030
		12.00	.4724		151.00		101.00	C72314	C71314	C73314
		12.20	.4803		151.00		101.00	C72315	C71315	–
31/64			.4844	5.875		4.375		C72031	C71031	C73031
		12.50	.4921		151.00		101.00	C72316	C71316	C73316
1/2			.5000	6.000		4.500		C72032	C71032	C73032
		13.00	.5118		151.00		101.00	C72319	C71319	C73319
33/64			.5156	6.625		4.813		–	C71033	–
17/32			.5312	6.625		4.813		–	C71034	–
		13.50	.5315		160.00		108.00	C72321	C71321	–
35/64			.5469	6.625		4.813		–	C71035	–
		14.00	.5512		160.00		108.00	C72323	C71323	C73323
9/16			.5625	6.625		4.813		–	C71036	–
		14.50	.5709		169.00		114.00	C72325	C71325	–
37/64			.5781	6.625		4.813		–	C71037	–
		15.00	.5906		169.00		114.00	C72327	C71327	C73327
19/32			.5938	7.125		5.188		–	C71038	–
39/64			.6094	7.125		5.188		–	C71039	–
		15.50	.6102		178.00		120.00	C72329	C71329	–
5/8			.6250	7.125		5.188		–	C71040	–
		16.00	.6299		178.00		120.00	C72331	C71331	C73331
41/64			.6406	7.125		5.188		–	C71041	–
		16.50	.6496		184.00		120.00	C72333	C71333	–
21/32			.6562	7.125		5.188		–	C71042	–
		17.00	.6693		184.00		120.00	C72335	C71335	C73335
43/64			.6719	7.625		5.625		–	C71043	–
11/16			.6875	7.625		5.625		–	C71044	–
		17.50	.6890		191.00		130.00	C72337	C71337	–

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Material Reference

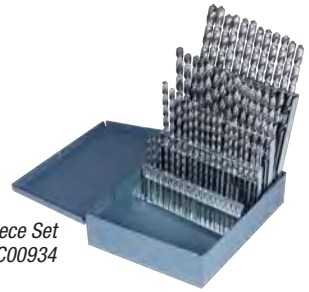
	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright										✦			
Black Oxide	✦				✦			✦					
TiCN	☆		☆		☆			☆		☆			

☆ = Best Performance ✦ = Acceptable

no. of pieces	size range	order number 2002G bright	2002G black oxide
15	1/16" through 1/2" x 1/3 2"	C72199	
29	1/16" through 1/2" x 1/64"	C72198	C72197
26	letter A through Z	C00939	
60	wire gauge #1 through #60	C00934	
115	1/16" through 1/2", letter A through Z, and wire gage #1 through #60	C01330	
25	1 mm through 13 mm x 0.5 mm	C72000	C71000
50	1 mm through 5.9 mm x 0.1 mm		C00960

115-Piece Set #C01330

50-Piece Set #C00690



60-Piece Set #C00934

25-Piece Set #C71000

Material Reference

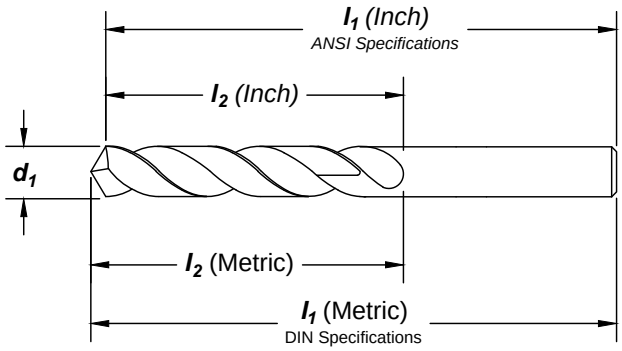
	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright										✦			
Black Oxide	✦				✦			✦					
TiCN	☆		☆		☆			☆		☆			

☆ = Best Performance ✦ = Acceptable

Note
Operating parameters: See Technical section
All sizes feature uncleared diameter.

ASME B94.11M | DIN 338 | HSS | 118° | Helix Regular 21° to 34° | Straight Shank

Surface Treatment: Bright | Black Oxide



Feature:
General purpose jobber drill for effective drilling in medium and softer materials.

drill diameter				overall length		flute length		order number	
	d_1			l_1		l_2		2002	2001
fraction	wire	mm	decimal equivalent	in	mm	in	mm	Bright	black oxide
	80		.0135	.750		.125		C01799	C01012
		0.35	.0138		19.00		3.00	–	C01013
	79		.0145	.750		.188		C01801	C01014
		0.38	.0150		19.00		4.00	–	C01015
1/64			.0156	.750		.188		C01803	C01016
		0.40	.0157		20.00		5.00	–	C01017
	78		.0160	.875		.188		C01805	C01018
		0.42	.0165		20.00		5.00	–	C01019
		0.45	.0177		20.00		5.00	–	C01020
	77		.0180	.875		.188		C01808	C01021
		0.48	.0189		20.00		5.00	–	C01022
		0.50	.0197		22.00		6.00	–	C01023
	76		.0200	.875		.188		C01811	C01024
	75		.0210	1.000		.250		C01812	C01025
		0.55	.0217		24.00		7.00	–	C01026
	74		.0225	1.000		.250		C01814	C01027
		0.60	.0236		24.00		7.00	–	C01028
	73		.0240	1.125		.313		C01816	C01029
	72		.0250	1.125		.313		C01817	C01030
		0.65	.0256		26.00		8.00	–	C01031
	71		.0260	1.250		.375		C01819	C01032
		0.70	.0276		28.00		9.00	–	C01033
	70		.0280	1.250		.375		C01821	C01034
	69		.0292	1.375		.500		C01822	C01035
		0.75	.0295		28.00		9.00	–	C01036
	68		.0310	1.375		.500		C01824	C01037

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		✦					✦		☆			
Black Oxide	☆		☆					☆					

☆ = Best Performance ✦ = Acceptable

CLEVELAND

General Purpose

Styles: 2002, 2001 (continued)

Jobber Length

High Speed Steel

drill diameter				overall length		flute length		order number	
	d_1		decimal	l_1		l_2		2002	2001
fraction	wire	mm	equivalent	in	mm	in	mm	Bright	black oxide
1/32			.0312	1.375		.500		C01825	C01038
		0.80	.0315		30.00		10.00	–	C01039
	67		.0320	1.375		.500		C01827	C01040
	66		.0330	1.375		.500		C01828	C01041
		0.85	.0335		30.00		10.00	–	C01042
	65		.03 50	1.500		.625		C01830	C01043
		0.90	.0354		32.00		11.00	–	C01044
	64		.0360	1.500		.625		C01832	C01045
	63		.0370	1.500		.625		C01833	C01046
		0.95	.0374		32.00		11.00	–	C01047
	62		.0380	1.500		.625		C01835	C01048
	61		.0390	1.500		.688		C01836	C01049
		5.30	.2087		95.00		64.00	–	C01181
		5.80	.2283		98.00		67.00	–	C01192

General Purpose

SET **Style: 2002**

no. of pieces	surface treatment	size range	order number 2002
20	Bright	#61-#80	C00937

Tech Tips

Bright versus Surface Treated Tools

- Bright (untreated) series are used in non-ferrous materials.
- Black oxide drills provide better wear life in ferrous materials.

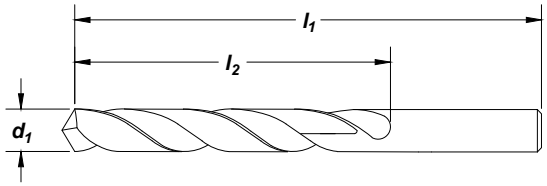
Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		✦					✦		☆			
Black Oxide	☆		☆					☆					

☆ = Best Performance ✦ = Acceptable

Note
Operating parameters: See Technical section

ASME B94.11M | HSS | 118° | Helix Low 10° to 20° | Straight Shank | Surface Treatment: Bright



Feature:
Slower helix aids chip removal in horizontal application.

drill diameter d_1 fraction	wire	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order no. 2020
	60	.0400	1.625	.688	C03457
	59	.0410	1.625	.688	C03458
	58	.0420	1.625	.688	C03460
	57	.0430	1.750	.750	C03461
	56	.0465	1.750	.750	C03464
	55	.0520	1.875	.875	C03469
	54	.0550	1.875	.875	C03471
	53	.0595	1.875	.875	C03475
1/16		.0625	1.875	.875	C03477
	52	.0635	1.875	.875	C03479
	51	.0670	2.000	1.000	C03482
	50	.0700	2.000	1.000	C03484
	49	.0730	2.000	1.000	C03487
	48	.0760	2.000	1.000	C03489
5/64		.0781	2.000	1.000	C03491
	47	.0785	2.000	1.000	C03492
	46	.0810	2.125	1.125	C03495
	45	.0820	2.125	1.125	C03496
	44	.0860	2.125	1.125	C03499
	43	.0890	2.250	1.250	C03502
	42	.0935	2.250	1.250	C03505
3/32		.0938	2.250	1.250	C03506
	41	.0960	2.375	1.375	C03508
	40	.0980	2.375	1.375	C03510
	39	.0995	2.375	1.375	C03512
	38	.1015	2.500	1.438	C03513
	37	.1040	2.500	1.438	C03515
	36	.1065	2.500	1.438	C03517
7/64		.1094	2.625	1.500	C03519
	35	.1100	2.625	1.500	C03520
	34	.1110	2.625	1.500	C03522
	33	.1130	2.625	1.500	C03523
	32	.1160	2.750	1.625	C03525

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆									☆			

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	wire	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order no. 2020
	31	.1200	2.750	1.625	C03527
1/8		.1250	2.750	1.625	C03529
	30	.1285	2.750	1.625	C03532
	29	.1360	2.875	1.750	C03535
	28	.1405	2.875	1.750	C03537
9/64		.1406	2.875	1.750	C03538
	27	.1440	3.000	1.875	C03540
	26	.1470	3.000	1.875	C03542
	25	.1495	3.000	1.875	C03544
	24	.1520	3.125	2.000	C03546
	23	.1540	3.125	2.000	C03548
5/32		.1562	3.125	2.000	C03549
	22	.1570	3.125	2.000	C03550
	21	.1590	3.250	2.125	C03552
	20	.1610	3.250	2.125	C03553
	19	.1660	3.250	2.125	C03556
	18	.1695	3.250	2.125	C03559
11/64		.1719	3.250	2.125	C03560
	17	.1730	3.375	2.188	C03561
	16	.1770	3.375	2.188	C03563
	15	.1800	3.375	2.188	C03565
	14	.1820	3.375	2.188	C03567
	13	.1850	3.500	2.313	C03568
3/16		.1875	3.500	2.313	C03571
	12	.1890	3.500	2.313	C03572
	11	.1910	3.500	2.313	C03574
	10	.1935	3.625	2.438	C03576
	9	.1960	3.625	2.438	C03577
	8	.1990	3.625	2.438	C03579
	7	.2010	3.625	2.438	C03581
13/64		.2031	3.625	2.438	C03582
	6	.2040	3.750	2.500	C03583
	5	.2055	3.750	2.500	C03585
	4	.2090	3.750	2.500	C03588
	3	.2130	3.750	2.500	C03590
7/32		.2188	3.750	2.500	C03592
	2	.2210	3.875	2.625	C03594
	1	.2280	3.875	2.625	C03597
15/64		.2344	3.875	2.625	C03601
1/4		.2500	4.000	2.750	C03610
17/64		.2656	4.125	2.875	C03618
9/32		.2812	4.250	2.938	C03632
19/64		.2969	4.375	3.063	C03636
5/16		.3125	4.500	3.188	C03643
21/64		.3281	4.625	3.313	C03651
11/32		.3438	4.750	3.438	C03658
3/8		.3750	5.000	3.625	C03673
25/64		.3906	5.125	3.750	C03681
13/32		.4062	5.250	3.875	C03686
27/64		.4219	5.375	3.938	C03689
7/16		.4375	5.500	4.063	C03692
29/64		.4531	5.625	4.188	C03695
15/32		.4688	5.750	4.313	C03697
1/2		.5000	6.000	4.500	C03702

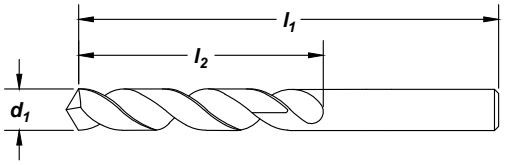
Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆									☆			

☆ = Best Performance ✦ = Acceptable

Note
Operating parameters: See Technical section

ASME B94.11M | HSS | 118° | Helix High 35° to 45° | Straight Shank | Surface Treatment: Bright



Feature:
Higher helix for improved chip lifting in softer materials.

drill diameter d_1 fraction	wire	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order no. 2012
	80	.0135	.750	.188	C02881
	79	.0145	.750	.188	C02883
	78	.0160	.875	.188	C02887
	77	.0180	.875	.188	C02890
	76	.0200	.875	.188	C02893
	75	.0210	1.000	.250	C02894
	74	.0225	1.000	.250	C02896
	73	.0240	1.125	.313	C02898
	72	.0250	1.125	.313	C02899
	71	.0260	1.250	.375	C02901
	70	.0280	1.250	.375	C02903
	69	.0292	1.375	.500	C02904
	68	.0310	1.375	.500	C02906
1/32		.0312	1.375	.500	C02907
	67	.0320	1.375	.500	C02909
	66	.0330	1.375	.500	C02910
	65	.0350	1.500	.625	C02912
	64	.0360	1.500	.625	C02914
	63	.0370	1.500	.625	C02915
	62	.0380	1.500	.625	C02917
	61	.0390	1.625	.688	C02918
	60	.0400	1.625	.688	C02920
	59	.0410	1.625	.688	C02921
	58	.0420	1.625	.688	C02923
	57	.0430	1.750	.750	C02924
	56	.0465	1.750	.750	C02927
3/64		.0469	1.750	.750	C02928

drill diameter d_1 fraction	wire	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order no. 2012
	55	.0520	1.875	.875	C02932
	54	.0550	1.875	.875	C02934
	53	.0595	1.875	.875	C02938
1/16		.0625	1.875	.875	C02940
	52	.0635	1.875	.875	C02942
	51	.0670	2.000	1.000	C02945
	50	.0700	2.000	1.000	C02947
	49	.0730	2.000	1.000	C02950
	48	.0760	2.000	1.000	C02952
5/64		.0781	2.000	1.000	C02954
	47	.0785	2.000	1.000	C02955
	46	.0810	2.125	1.125	C02958
	45	.0820	2.125	1.125	C02959
	44	.0860	2.125	1.125	C02962
	43	.0890	2.250	1.250	C02965
	42	.0935	2.250	1.250	C02968
3/32		.0938	2.250	1.250	C02969
	41	.0960	2.375	1.375	C02971
	40	.0980	2.375	1.375	C02973
	39	.0995	2.375	1.375	C02975
	38	.1015	2.500	1.438	C02976
	37	.1040	2.500	1.438	C02978
	36	.1065	2.500	1.438	C02980
7/64		.1094	2.625	1.500	C02982
	35	.1100	2.625	1.500	C02983
	34	.1110	2.625	1.500	C02985
	33	.1130	2.625	1.500	C02986

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆									☆			

☆ = Best Performance ✦ = Acceptable

CLEVELAND

High Helix

Style: 2012 (continued)

Jobber Length

High Speed Steel

drill diameter d_1 fraction	wire	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order no. 2012
	32	.1160	2.750	1.625	C02988
	31	.1200	2.750	1.625	C02990
1/8		.1250	2.750	1.625	C02992
	30	.1285	2.750	1.625	C02995
	29	.1360	2.875	1.750	C02998
	28	.1405	2.875	1.750	C03000
9/64		.1406	2.875	1.750	C03001
	27	.1440	3.000	1.875	C03003
	26	.1470	3.000	1.875	C03005
	25	.1495	3.000	1.875	C03007
	24	.1520	3.125	2.000	C03009
	23	.1540	3.125	2.000	C03011
5/32		.1562	3.125	2.000	C03012
	22	.1570	3.125	2.000	C03013
	21	.1590	3.250	2.125	C03015
	20	.1610	3.250	2.125	C03016
	19	.1660	3.250	2.125	C03019
	18	.1695	3.250	2.125	C03022
11/64		.1719	3.250	2.125	C03023
	17	.1730	3.375	2.188	C03024
	16	.1770	3.375	2.188	C03026
	15	.1800	3.375	2.188	C03028
	14	.1820	3.375	2.188	C03030
	13	.1850	3.500	2.313	C03031
3/16		.1875	3.500	2.313	C03034
	12	.1890	3.500	2.313	C03035
	11	.1910	3.500	2.313	C03037
	10	.1935	3.625	2.438	C03039
	9	.1960	3.625	2.438	C03040
	8	.1990	3.625	2.438	C03042
	7	.2010	3.625	2.438	C03044
13/64		.2031	3.625	2.438	C03045
	6	.2040	3.750	2.500	C03046
	5	.2055	3.750	2.500	C03048
	4	.2090	3.750	2.500	C03051
	3	.2130	3.750	2.500	C03053
7/32		.2188	3.750	2.500	C03055
	2	.2210	3.875	2.625	C03057
	1	.2280	3.875	2.625	C03060
	A	.2340	3.875	2.625	C03063
15/64		.2344	3.875	2.625	C03064
	B	.2380	4.000	2.750	C03066
	C	.2420	4.000	2.750	C03068
	D	.2460	4.000	2.750	C03070
1/4	E	.2500	4.000	2.750	C03073
	F	.2570	4.125	2.875	C03077
	G	.2610	4.125	2.875	C03079
17/64		.2656	4.125	2.875	C03081
	H	.2660	4.125	2.875	C03083
	I	.2720	4.125	2.875	C03086
	J	.2770	4.125	2.875	C03088
	L	.2900	4.250	2.938	C03094
9/32		.2812	4.250	2.938	C03095
	M	.2950	4.375	3.063	C03097
19/64		.2969	4.375	3.063	C03099
	N	.3020	4.375	3.063	C03101
5/16		.3125	4.500	3.188	C03106
	O	.3160	5.750	3.188	C03108
	P	.3230	4.625	3.313	C03111
21/64		.3281	4.625	3.313	C03114
	Q	.3320	4.750	3.438	C03116
	R	.3390	4.750	3.438	C03119
11/32		.3438	4.750	3.438	C03121
	S	.3480	4.875	3.500	C03124
	T	.3580	4.875	3.500	C03127
23/64		.3594	4.875	3.500	C03129
	U	.3680	5.000	3.625	C03133
3/8		.3750	5.000	3.625	C03136
	V	.3770	5.000	3.625	C03137
	W	.3860	5.125	3.750	C03142
25/64		.3906	5.125	3.750	C03144
	X	.3970	5.125	3.750	C03146
	Y	.4040	5.250	3.875	C03148
13/32		.4062	5.250	3.875	C03149
	Z	.4130	5.250	3.875	C03150
27/64		.4219	5.375	3.938	C03152
7/16		.4375	5.500	4.063	C03155
29/64		.4531	5.625	4.188	C03158
15/32		.4688	5.750	4.313	C03160
31/64		.4844	5.875	4.375	C03163
1/2		.5000	6.000	4.500	C03165

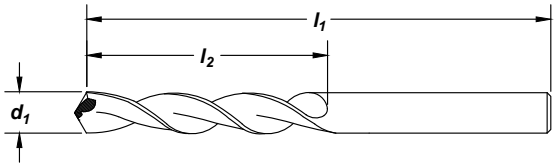
Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆									☆			

☆ = Best Performance ✦ = Acceptable

Note
Operating parameters: See Technical section
Adjust the parameters as follows: double the given feed rate.

ASME B94.11M | HSS | 118° K-Notch | Helix High 35° to 45° | Straight Shank | Surface Treatment: Bright, TiN



Feature:
Excels in deep hole drilling without pecking in softer, free machining materials. Drill up to 10x diameter without pecking.

drill diameter d_1 fraction	wire	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2065 Bright	2065-TN TiN
1/16		.0625	1.875	.875	C16029	C03705
	52	.0635	1.875	.875	C16219	–
	51	.0670	2.000	1.000	C16218	–
	50	.0700	2.000	1.000	–	C03708
	49	.0730	2.000	1.000	C16216	–
5/64		.0781	2.000	1.000	C16030	C03711
	47	.0785	2.000	1.000	C16214	–
	45	.0820	2.125	1.125	C16212	–
	43	.0890	2.250	1.250	C16210	–
	42	.0935	2.250	1.250	C16209	–
3/32		.0938	2.250	1.250	C16031	C03718
	41	.0960	2.375	1.375	C16208	–
	40	.0980	2.375	1.375	C16207	C03720
	39	.0995	2.375	1.375	C16206	–
	38	.1015	2.500	1.438	C16205	C03722
	36	.1065	2.500	1.438	C16203	C03724
7/64		.1094	2.625	1.500	C16032	C03725
	33	.1130	2.625	1.500	C16200	C03728
	32	.1160	2.750	1.625	C16199	–
	31	.1200	2.750	1.625	C16198	C03730
1/8		.1250	2.750	1.625	C16033	C03731
	30	.1285	2.750	1.625	C16197	C03732
	29	.1360	2.875	1.750	C16196	C03733
	28	.1405	2.875	1.750	C16195	–
9/64		.1406	2.875	1.750	C16034	–
	27	.1440	3.000	1.875	C16194	–
	26	.1470	3.000	1.875	C16193	–

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		✦		✦					☆			
TiN	☆		☆		☆								

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	wire	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2065 Bright	order number 2065-TN TiN
	25	.1495	3.000	1.875	C16192	C03738
5/32		.1562	3.125	2.000	C16035	C03741
	22	.1570	3.125	2.000	C16189	C03742
	21	.1590	3.500	2.313	C16188	C03743
	20	.1610	3.250	2.125	C16187	–
	19	.1695	3.250	2.125	C16186	C03745
11/64		.1719	3.250	2.125	C16036	C03747
	17	.1730	3.375	2.188	C16184	–
	16	.1770	3.375	2.188	C16183	–
	15	.1800	3.375	2.188	–	C03750
	14	.1820	3.375	2.188	C16181	C03751
	13	.1850	3.500	2.313	C16180	C03752
3/16		.1875	3.500	2.313	C16037	C03753
	12	.1890	3.500	2.313	C16179	–
	11	.1910	3.500	2.313	C16178	–
	10	.1935	3.625	2.438	C16177	C03756
	9	.1960	3.625	2.438	C16176	–
	8	.1990	3.625	2.438	C16175	C03758
	7	.2010	3.625	2.438	C16174	–
13/64		.2031	3.625	2.438	C16038	C03760
	6	.2040	3.750	2.500	C16173	C03761
	5	.2055	3.750	2.500	C16172	C03762
	4	.2090	3.750	2.500	C16171	–
	3	.2130	3.750	2.500	C16170	C03764
7/32		.2188	3.750	2.500	C16039	C03765
	2	.2210	3.875	2.625	C16169	–
	1	.2280	3.875	2.625	C16168	–
15/64		.2344	3.875	2.625	C16040	–
1/4	E	.2500	4.000	2.750	C16041	C03773
17/64		.2656	4.125	2.875	C16042	C03776
9/32		.2812	4.250	2.938	C16043	C03781
19/64		.2969	4.375	3.063	C16044	C03784
5/16		.3125	4.500	3.188	C16045	C03786
21/64		.3281	4.625	3.313	C16046	–
11/32		.3438	4.750	3.438	C16047	–
23/64		.3594	4.875	3.500	C16048	–
3/8		.3750	5.000	3.625	C16049	–
25/64		.3906	5.125	3.750	C16050	–
13/32		.4062	5.250	3.875	C16051	C03801
27/64		.4219	5.375	3.938	C16052	–
7/16		.4375	5.500	4.063	C16053	C03804
29/64		.4531	5.625	4.188	C16054	–
15/32		.4688	5.750	4.313	C16055	C03806
31/64		.4844	5.875	4.375	C16056	C03807
1/2		.5000	6.000	4.500	C16057	–

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		✦		✦					☆			
TiN	☆		☆		☆								

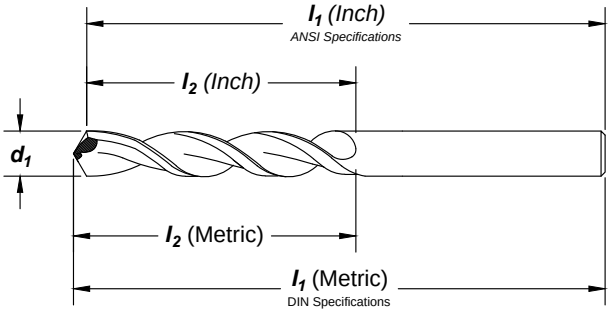
☆ = Best Performance ✦ = Acceptable

Styles: 2075, 2075-TN, 2075-TC, 2075-TA

Note
Operating parameters: See Technical section

ASME B94.11M | DIN 338 | M42 Cobalt | 135° Split | Helix High 35° to 45° | Straight Shank

Surface Treatment: Straw Oxide | TiN | TiCN | TiAlN



Feature:
Effective deep hole drilling in a wide array of materials. Available coating for extended tool life and productivity. Up to 7x diameter drilling without pecking.

drill diameter d_1 fraction	wire/let	mm	decimal equivalent	overall length l_1 in	mm	flute length l_2 in	mm	order number 2075 straw oxide	2075-TN TiN	2075-TC TiCN	2075-TA TiAlN
		*1.50	.0591		40.00		18.00	C16584	C16696	–	C11360
		*1.55	.0610		43.00		20.00	C15540	–	–	–
1/16			.0625	1.875		0.875		C16555	C16667	C16942	C16972
		1.60	.0630		43.00		20.00	C15541	–	–	C11361
	52		.0635	1.875		0.875		C16554	C16666	–	C11452
		1.65	.0650		43.00		20.00	C15542	–	–	–
	51		.0670	2.000		1.000		C16553	C16665	–	C11451
		1.75	.0689		46.00		22.00	C15543	–	–	–
	50		.0700	2.000		1.000		C16552	C16664	–	C11450
		1.80	.0709		46.00		22.00	C15544	–	–	–
	49		.0730	2.000		1.000		C16551	C16663	–	C11449
		1.90	.0748		46.00		22.00	C15545	–	–	–
	48		.0760	2.000		1.000		C16550	C16661	–	C11448
5/64			.0781	2.000		1.000		C16556	C16668	C16943	C16973
	47		.0785	2.000		1.000		C16549	C16660	–	C11447
		2.00	.0787		49.00		24.00	C16585	C16697	–	C11362
		2.05	.0807		49.00		24.00	C15546	–	–	–
	46		.0810	2.125		1.125		C16548	C16659	–	C11446
	45		.0820	2.125		1.125		C16547	C16658	–	C11445
		2.10	.0827		49.00		24.00	C15547	–	–	–
		2.15	.0846		53.00		27.00	C15548	–	–	–
	44		.0860	2.125		1.125		C16546	C16657	–	C11444
		2.20	.0866		53.00		27.00	C15549	–	–	–
		2.25	.0886		53.00		27.00	C15550	–	–	–
	43		.0890	2.250		1.250		C16545	C16656	C16944	C16974
		2.30	.0906		53.00		27.00	C15551	C16455	–	–
		2.35	.0925		53.00		27.00	C15552	–	–	–
	42		.0935	2.250		1.250		C16544	C16655	–	C11442
3/32			.0938	2.250	57.15	1.250	31.75	C16557	C16669	C16945	C16975
		2.40	.0945		57.00		30.00	C15553	–	–	–

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
TiN	✦		✦										
TiCN	☆		☆		✦	✦		✦	✦	☆			
TiAlN					☆	☆		☆	☆				

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	drill diameter d_1 wire/let	drill diameter d_1 mm	drill diameter d_1 decimal equivalent	overall length l_1 in	overall length l_1 mm	flute length l_2 in	flute length l_2 mm	order number 2075 straw oxide	order number 2075-TN TiN	order number 2075-TC TiCN	order number 2075-TA TiAlN
	41		.0960	2.375		1.375		C16543	C16654	C16946	C16976
	40		.0980	2.375		1.375		C16542	C16652	C16947	C16977
		2.50	.0984		57.00		30.00	C16586	C16698	–	C11363
	39		.0995	2.375		1.375		C16541	C16651	C16948	C16978
	38		.1015	2.500		1.438		C16540	C16650	–	C11438
		2.60	.1024		57.00		30.00	C15554	–	–	–
	37		.1040	2.500		1.438		C16539	C16649	–	C11437
	36		.1065	2.500		1.438		C16538	C16648	C16949	C16979
7/64			.1094	2.625		1.500		C16558	C16670	C16950	C16980
	35		.1100	2.625		1.500		C16537	C16647	–	C11435
		2.80	.1102		61.00		33.00	C15555	–	–	C11364
	34		.1110	2.625		1.500		C16536	C16646	–	C11434
	33		.1130	2.625		1.500		C16535	C16645	–	C11433
		2.90	.1142		61.00		33.00	C15556	–	–	C11365
	32		.1160	2.750		1.625		C16534	C16644	–	C11432
		3.00	.1181		61.00		33.00	C16587	C16699	–	C11366
	31		.1200	2.750		1.625		C16533	C16643	–	C11431
		3.10	.1220		65.00		36.00	C15557	C16456	–	–
1/8			.1250	2.750		1.625		C16559	C16671	C16951	C16981
		3.20	.1260		65.00		36.00	C15558	C16457	–	–
	30		.1285	2.750		1.625		C16532	C16642	C16952	C16982
		3.30	.1299		65.00		36.00	C15559	–	–	C11367
		3.40	.1339		70.00		39.00	C15560	–	–	–
	29		.1360	2.875		1.750		C16531	C16641	C16953	C16983
		3.50	.1378		70.00		39.00	C16588	C16700	–	C11368
	28		.1405	2.875		1.750		C16530	C16640	–	C11428
9/64			.1406	2.875		1.750		C16560	C16672	–	C11400
	27		.1440	3.000		1.875		C16529	C16639	–	C11427
		3.70	.1457		70.00		39.00	C15561	–	–	C11369
	26		.1470	3.000		1.875		C16528	C16638	–	C11426
	25		.1495	3.000		1.875		C16527	C16637	–	C11425
	24		.1520	3.125		2.000		C16526	C16636	–	C11424
	23		.1540	3.125		2.000		C16525	C16635	–	C11423
5/32			.1562	3.125		2.000		C16561	C16673	C16954	C16984
	22		.1570	3.125		2.000		C16524	C16634	–	C11422
		4.00	.1575		75.00		43.00	C16589	C16701	–	C11370
	21		.1590	3.500		2.313		C16523	C16633	C16955	C16985
	20		.1610	3.250		2.125		C16522	C16632	–	C11420
		4.10	.1614		75.00		43.00	C15562	–	–	–
		4.20	.1654		75.00		43.00	C15563	–	–	C11371
	19		.1660	3.250		2.125		C16521	C16631	–	C11419
		4.30	.1693		80.00		47.00	C15580	–	–	–
	18		.1695	3.250		2.125		C16520	C16630	–	C11418
11/64			.1719	3.250		2.125		C16562	C16674	–	C11404
	17		.1730	3.375		2.188		C16519	C16629	–	C11417
		4.40	.1732		80.00		47.00	C15581	–	–	C11372
	16		.1770	3.375		2.188		C16518	C16628	–	C11416
		4.50	.1772		80.00		47.00	C16590	C16702	–	C11373
	15		.1800	3.375		2.188		C16517	C16626	–	C11415
	14		.1820	3.375		2.188		C16516	C16625	–	C11414
	13		.1850	3.500		2.313		C16515	C16624	–	C11413
3/16			.1875	3.500		2.313		C16563	C16675	C16956	C16986
		4.80	.1890		86.00		52.00	C15564	–	–	–
	12		.1890	3.500		2.313		C16514	C16623	–	C11412
	11		.1910	3.500		2.313		C16513	C16622	–	C11411
	10		.1935	3.625		2.438		C16512	C16621	–	C11410
	9		.1960	3.625		2.438		C16511	C16620	–	C11409
		5.00	.1969		86.00		52.00	C16591	C16703	–	C11374
	8		.1990	3.625		2.438		C16510	C16619	–	C11408
		5.10	.2008		86.00		52.00	C15565	–	–	–

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drill diameter d_1 fraction	wire/let	mm	decimal equivalent	overall length l_1 in	mm	flute length l_2 in	mm	order number 2075 straw oxide	2075-TN TiN	2075-TC TiCN	2075-TA TiAlN
	7		.2010	3.625		2.438		C16509	C16618	C16957	C16987
13/64			.2031	3.625		2.438		C16564	C16676	C16958	C16988
	6		.2040	3.750		2.500		C16508	C16617	C16959	C16989
		5.20	.2047		86.00		52.00	C16592	C16704	–	–
	5		.2055	3.750		2.500		C16507	C16616	–	C11405
	4		.2090	3.750		2.500		C16506	C16615	C16960	C16990
	3		.2130	3.750		2.500		C16505	C16614	–	C11403
		5.50	.2165		93.00		57.00	C16593	C16705	–	C11375
7/32			.2188	3.750		2.500		C16565	C16677	C16961	C16991
		5.60	.2205		93.00		57.00	C16594	C16706	–	–
	2		.2210	3.875		2.625		C16504	C16613	–	C11402
		5.70	.2244		93.00		57.00	C15566	–	–	–
	1		.2280	3.875		2.625		C16503	C16612	–	C11401
		5.80	.2283		93.00		57.00	C15582	–	–	C11376
	A		.2340	3.875		2.625		C15650	–	C16430	–
15/64			.2344	3.875		2.625		C16566	C16678	C16962	C16992
		6.00	.2362		93.00		57.00	C16595	C16707	–	C11377
	B		.2380	4.000		2.750		C15651	–	C16431	–
	C		.2420	4.000		2.750		C15652	–	C16432	–
	D		.2460	4.000		2.750		C15653	–	C16433	–
1/4	E		.2500	4.000		2.750		C16567	C16679	C16963	C16993
		6.40	.2520		101.00		63.00	C15567	–	–	–
		6.50	.2559		101.00		63.00	C16596	C16708	–	C11378
	F		.2570	4.125		2.875		C15654	–	C16434	–
		6.60	.2598		101.00		63.00	C15568	–	–	–
	G		.2610	4.125		2.875		C15655	–	C16435	–
		6.70	.2638		101.00		63.00	C15569	–	–	–
17/64			.2656	4.125		2.875		C16568	C16680	C16964	C16994
	H		.2660	4.125		2.875		C15656	–	C16436	–
		6.80	.2677		109.00		69.00	C16597	C16709	–	C11379
	I		.2720	4.125		2.875		C15657	–	C16437	–
		7.00	.2756		109.00		69.00	C16598	C16710	C16965	C16995
	J		.2770	4.125		2.875		C15658	–	C16438	–
	K		.2810	4.250		2.938		C15659	–	C16439	–
9/32			.2812	4.250		2.938		C16569	C16681	C16966	C16996
		7.20	.2835		109.00		69.00	C15570	–	–	–
	L		.2900	4.250		2.938		C15660	–	C16440	–
		7.40	.2913		109.00		69.00	C15571	–	–	–
	M		.2950	4.375	111.13	3.063	77.79	C15661	–	C16441	–
		7.50	.2953		109.00		69.00	C16599	C16711	–	C11380
19/64			.2969	4.375		3.063		C16570	C16682	–	–
	N		.3020	4.375		3.063		C15662	–	C16442	–
5/16			.3125	4.500		3.188		C16571	C16683	C16967	C16997
		8.00	.3150		117.00		75.00	C16600	C16712	–	C11381
	O		.3160	4.500		3.188		C15663	–	C16443	–
		8.10	.3189		117.00		75.00	C15572	–	–	–
		8.20	.3228		117.00		75.00	C16601	C16713	–	–
	P		.3230	4.625		3.313		C15664	–	C16444	–
21/64			.3281	4.625		3.313		C16572	C16684	–	–
	Q		.3320	4.750		3.438		C15665	–	C16445	–
		8.50	.3346		117.00		75.00	C16602	C16714	–	C11382
		8.60	.3386		125.00		81.00	C16603	C16715	–	–

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
TiN	✦		✦										
TiCN	☆		☆		✦	✦		✦	✦	☆			
TiAlN					☆	☆		☆	☆				

☆ = Best Performance ✦ = Acceptable

Wide Land Parabolic
Q-Cobalt™

Styles: 2075, 2075-TN, 2075-TC, 2075-TA (cont'd)

CLEVELAND

Jobber Length

Cobalt

drill diameter d_1 fraction	wire/let	mm	decimal equivalent	overall length l_1 in	mm	flute length l_2 in	mm	order number 2075 straw oxide	2075-TN TiN	2075-TC TiCN	2075-TA TiAlN
	R		.3390	4.750		3.438		C15666	–	C16446	–
		8.70	.3425		125.00		81.00	C15573	–	–	–
11/32			.3438	4.750		3.438		C16573	C16685	C16968	C16998
	S		.3480	4.875		3.500		C15667	–	C16447	–
		9.00	.3543		125.00		81.00	C16604	C16716	–	C11383
	T		.3580	4.875		3.500		C15668	–	C16448	–
23/64			.3594	4.875		3.500		C16574	C16686	–	–
	U		.3680	5.000		3.625		C15669	–	C16449	–
		9.50	.3740		125.00		81.00	C16605	C16717	–	–
3/8			.3750	5.000		3.625		C16575	C16687	C16969	C16999
	V		.3770	5.000		3.625		C15670	–	C16450	–
	W		.3860	5.125		3.750		C15671	–	C16451	–
25/64			.3906	5.125		3.750		C16576	C16688	–	–
		10.00	.3937		133.00		87.00	C16606	C16718	–	C11384
	X		.3970	5.125		3.750		C15672	–	C16452	–
		10.20	.4016		133.00		87.00	C15574	–	–	–
	Y		.4040	5.250		3.875		C15673	–	C16453	–
13/32			.4062	5.250		3.875		C16577	C16689	–	–
	Z		.4130	5.250		3.875		C15674	–	C16454	–
		10.50	.4134		133.00		87.00	C16607	C16719	–	–
27/64			.4219	5.375		3.938		C16578	C16690	–	–
		10.80	.4252		142.00		94.00	C15575	–	–	–
		11.00	.4331		142.00		94.00	C16608	C16720	–	C11385
7/16			.4375	5.500		4.063		C16579	C16691	C16970	C17000
		11.20	.4409		142.00		94.00	C15576	–	–	–
		11.50	.4528		142.00		94.00	C16609	C16721	–	–
29/64			.4531	5.625		4.188		C16580	C16692	–	–
15/32			.4688	5.750		4.313		C16581	C16693	–	–
		12.00	.4724		151.00		101.00	C16610	C16722	–	C11386
		12.25	.4823		151.00		101.00	C15577	–	–	–
31/64			.4844	5.875		4.375		C16582	C16694	–	–
		12.50	.4921		151.00		101.00	C16611	C16723	–	–
1/2			.5000	6.000		4.500		C16583	C16695	C16971	C17001
		13.00	.5118		151.00		101.00	C15583	–	–	C11387

Wide Land Parabolic
Q-Cobalt™

SET — Style: 2075

no. of pieces	surface treatment	size range	order number 2075
15	straw oxide	1/16" through 1/2" x 1/32"	C00901
29	straw oxide	1/16" through 1/2" x 1/64"	C00902

15-Piece Set #C00901

29-Piece Set #C00902

Material Reference

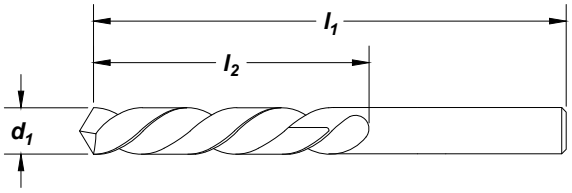
	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
TiN	✦		✦										
TiCN	☆		☆		✦	✦		✦	✦	☆			
TiAlN					☆	☆		☆	☆				

☆ = Best Performance ✦ = Acceptable

GREENFIELD INDUSTRIES CUSTOMER SERVICE: telephone 800.348.2885 • fax 800.892.4290

Note
Operating parameters: See Technical section

ASME B94.11M | HSS | 118° | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Bright



Feature:
Left Hand for reverse spindle application.

drill diameter d_1 fraction	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order no. 2006
1/16	.0625	1.875	.875	C01401
5/64	.0781	2.000	1.000	C01415
3/32	.0938	2.250	1.250	C01430
7/64	.1094	2.625	1.500	C01443
1/8	.1250	2.750	1.625	C01453
9/64	.1406	2.875	1.750	C01462
5/32	.1562	3.125	2.000	C01473
11/64	.1719	3.250	2.125	C01484
3/16	.1875	3.500	2.313	C01495
13/64	.2031	3.875	2.438	C01506
7/32	.2188	3.750	2.500	C01516
1/4	.2500	4.000	2.750	C01532
17/64	.2656	4.125	2.875	C01538
9/32	.2812	4.250	2.938	C01551
5/16	.3125	4.500	3.188	C01561
3/8	.3750	5.000	3.625	C01588
13/32	.4062	5.250	3.875	C01600

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆		☆			

☆ = Best Performance ✦ = Acceptable

Aircraft NAS 907, Type A

General Purpose

Style: 2228

CLEVELAND

Jobber Length

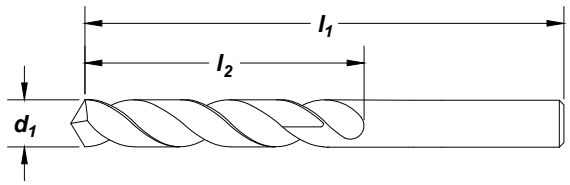
High Speed Steel

Note

Split point for reduced thrust and easy penetration.

Operating parameters: See Technical section

HSS | NAS 907 TYPE A | 118° Split | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Bright



drill diameter d_1 fraction	wire	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2228 bright
1/16		.0625	1.875	.875	C73400
	52	.0635	1.875	.875	C73480
	51	.0670	2.000	1.000	C73479
	50	.0700	2.000	1.000	C73478
	49	.0730	2.000	1.000	C73477
	48	.0760	2.000	1.000	C73476
5/64		.0781	2.000	1.000	C73401
	47	.0785	2.000	1.000	C73475
	46	.0810	2.125	1.125	C73474
	45	.0820	2.125	1.125	C73473
	44	.0860	2.125	1.125	C73472
	43	.0890	2.250	1.250	C73471
	42	.0935	2.250	1.250	C73470
3/32		.0938	2.250	1.250	C73402
	41	.0960	2.375	1.375	C73469
	40	.0980	2.375	1.375	C73468
	39	.0995	2.375	1.375	C73467
	38	.1015	2.500	1.438	C73466
	37	.1040	2.500	1.438	C73465
	36	.1065	2.500	1.438	C73464
7/64		.1094	2.625	1.500	C73403
	35	.1100	2.625	1.500	C73463
	34	.1110	2.625	1.500	C73462
	33	.1130	2.625	1.500	C73461
	32	.1160	2.750	1.625	C73460
	31	.1200	2.750	1.625	C73459
1/8		.1250	2.750	1.625	C73404
	30	.1285	2.750	1.625	C73458
	29	.1360	2.875	1.750	C73457
	28	.1405	2.875	1.750	C73456
9/64		.1406	2.875	1.750	C73405
	27	.1440	3.000	1.875	C73455
	26	.1470	3.000	1.875	C73454
	25	.1495	3.000	1.875	C73453
	24	.1520	3.125	2.000	C73452
	23	.1540	3.125	2.000	C73451
5/32		.1562	3.125	2.000	C73406
	22	.1570	3.125	2.000	C73450
	21	.1590	3.250	2.125	C73449
	20	.1610	3.250	2.125	C73448
	19	.1660	3.250	2.125	C73447
	18	.1695	3.250	2.125	C73446

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drill diameter d_1 fraction	wire	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2228 bright
11/64		.1719	3.250	2.125	C73407
	17	.1730	3.375	2.188	C73445
	16	.1770	3.375	2.188	C73444
	15	.1800	3.375	2.188	C73443
	14	.1820	3.375	2.188	C73442
	13	.1850	3.500	2.313	C73441
3/16		.1875	3.500	2.313	C73408
	12	.1890	3.500	2.313	C73440
	11	.1910	3.500	2.313	C73439
	10	.1935	3.625	2.438	C73438
	9	.1960	3.625	2.438	C73437
	8	.1990	3.625	2.438	C73436
	7	.2010	3.625	2.438	C73435
13/64		.2031	3.625	2.438	C73409
	6	.2040	3.750	2.500	C73434
	5	.2055	3.750	2.500	C73433
	4	.2090	3.750	2.500	C73432
	3	.2130	3.750	2.500	C73431
7/32		.2188	3.750	2.500	C73410
	2	.2210	3.875	2.625	C73430
	1	.2280	3.875	2.625	C73429
15/64		.2344	3.875	2.625	C73411
1/4		.2500	4.000	2.750	C73412
17/64		.2656	4.125	2.875	C73413
9/32		.2812	4.250	2.938	C73414
19/64		.2969	4.375	3.063	C73415
5/16		.3125	4.500	3.188	C73416
21/64		.3281	4.625	3.313	C73417
11/32		.3438	4.750	3.438	C73418
23/64		.3594	4.875	3.500	C73419
3/8		.3750	5.000	3.625	C73420
25/64		.3906	5.125	3.750	C73421
13/32		.4062	5.250	3.875	C73422
27/64		.4219	5.375	3.938	C73423
7/16		.4375	5.500	4.063	C73424
29/64		.4531	5.625	4.188	C73425
15/32		.4688	5.750	4.313	C73426
31/64		.4844	5.875	4.375	C73427
1/2		.5000	6.000	4.500	C73428

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		✦					☆			

☆ = Best Performance ✦ = Acceptable

Aircraft NAS 907, Type B

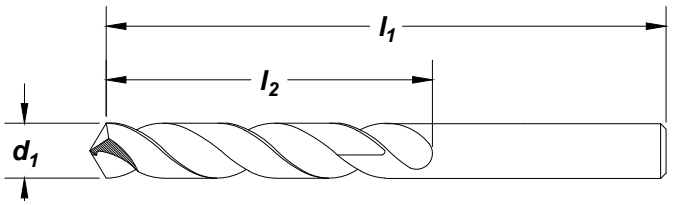
Heavy Duty

Style: 2222

CLEVELAND

Note
Operating parameters: See Technical section

HSS | NAS 907 TYPE B | 135° Split | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Bright



Feature:
Heavy Duty design for tougher materials.

drill diameter d_1 fraction	drill diameter d_1 wire/letter	drill diameter d_1 mm	decimal equivalent	overall length l_1 in	overall length l_1 mm	flute length l_2 in	flute length l_2 mm	order number 2222 bright
		* 1.00	0.0394		34.00		12.00	C11800
* 3/64			0.0469	1.750		0.750		C11600
		1.50	0.0591		40.00		18.00	C11805
1/16			0.0625	1.875		0.875		C11601
	#52		0.0635	1.875		0.875		C11706
	#51		0.0670	2.000		1.000		C11705
	#50		0.0700	2.000		1.000		C11704
	#49		0.0730	2.000		1.000		C11703
	#48		0.0760	2.000		1.000		C11702
5/64			0.0781	2.000		1.000		C11602
	#47		0.0785	2.000		1.000		C11701
		2.00	0.0787		49.00		24.00	C11810
	#46		0.0810	2.125		1.125		C11700
	#45		0.0820	2.125		1.125		C11699
	#44		0.0860	2.125		1.125		C11698
	#43		0.0890	2.250		1.250		C11697
	#42		0.0935	2.250		1.250		C11696
3/32			0.0938	2.250		1.250		C11603
	#41		0.0960	2.375		1.375		C11695
	#40		0.0980	2.375		1.375		C11694
		2.50	0.0984		57.00		30.00	C11815
	#39		0.0995	2.375		1.375		C11693
	#38		0.1015	2.500		1.438		C11692
	#37		0.1040	2.500		1.438		C11691
	#36		0.1065	2.500		1.438		C11690
7/64			0.1094	2.625		1.500		C11604
	#35		0.1100	2.625		1.500		C11689
	#34		0.1110	2.625		1.500		C11688
	#33		0.1130	2.625		1.500		C11687
	#32		0.1160	2.750		1.625		C11686
		3.00	0.1181		61.00		33.00	C11820
	#31		0.1200	2.750		1.625		C11685
1/8			0.1250	2.750		1.625		C11605
		3.20	0.1260		65.00		36.00	C11822
	#30		0.1285	2.750		1.625		C11684
	#29		0.1360	2.875		1.750		C11683
		3.50	0.1378		70.00		39.00	C11825
	#28		0.1405	2.875		1.750		C11682
9/64			0.1406	2.875		1.750		C11606
	#27		0.1440	3.000		1.875		C11681
	#26		0.1470	3.000		1.875		C11680
	#25		0.1495	3.000		1.875		C11679
	#24		0.1520	3.125		2.000		C11678
	#23		0.1540	3.125		2.000		C11677
5/32			0.1562	3.125		2.000		C11607

**Not split point.*

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drill diameter d_1 fraction	wire/letter	mm	decimal equivalent	overall length l_1 in	mm	flute length l_2 in	mm	order number 2222 bright
	#22		0.1570	3.125		2.000		C11676
		4.00	0.1575		75.00		43.00	C11830
	#21		0.1590	3.250		2.125		C11675
	#20		0.1610	3.250		2.125		C11674
		4.10	0.1614		75.00		43.00	C11831
	#19		0.1660	3.250		2.125		C11673
	#18		0.1695	3.250		2.125		C11672
11/64			0.1719	3.250		2.125		C11608
	#17		0.1730	3.375		2.188		C11671
	#16		0.1770	3.375		2.188		C11670
		4.50	0.1772		80.00		47.00	C11835
	#15		0.1800	3.375		2.188		C11669
	#14		0.1820	3.375		2.188		C11668
	#13		0.1850	3.500		2.313		C11667
3/16			0.1875	3.500		2.313		C11609
	#12		0.1890	3.500		2.313		C11666
	#11		0.1910	3.500		2.313		C11665
		4.90	0.1929		86.00		52.00	C11839
	#10		0.1935	3.625		2.438		C11664
	#9		0.1960	3.625		2.438		C11663
		5.00	0.1969		86.00		52.00	C11840
	#8		0.1990	3.625		2.438		C11662
	#7		0.2010	3.625		2.438		C11661
13/64			0.2031	3.625		2.438		C11610
	#6		0.2040	3.750		2.500		C11660
	#5		0.2055	3.750		2.500		C11659
	#4		0.2090	3.750		2.500		C11658
	#3		0.2130	3.750		2.500		C11657
		5.50	0.2165		93.00		57.00	C11845
7/32			0.2188	3.750		2.500		C11611
	#2		0.2210	3.875		2.625		C11656
	#1		0.2280	3.875		2.625		C11655
	A		0.2340	3.875		2.625		C11630
15/64			0.2344	3.875		2.625		C11612
		6.00	0.2362		93.00		57.00	C11850
	B		0.2380	4.000		2.750		C11631
	C		0.2420	4.000		2.750		C11632
	D		0.2460	4.000		2.750		C11633
1/4	E		0.2500	4.000		2.750		C11613
		6.50	0.2559		101.00		63.00	C11855
	F		0.2570	4.125		2.875		C11634
	G		0.2610	4.125		2.875		C11635
17/64			0.2656	4.125		2.875		C11614
	H		0.2660	4.125		2.875		C11636
	I		0.2720	4.125		2.875		C11637
		7.00	0.2756		109.00		69.00	C11860
	J		0.2770	4.125		2.875		C11638
	K		0.2810	4.250		2.938		C11639
9/32			0.2812	4.250		2.938		C11615
	L		0.2900	4.250		2.938		C11640
	M		0.2950	4.375		3.063		C11641

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		✦			✦	✦	☆			

☆ = Best Performance ✦ = Acceptable

Aircraft NAS 907, Type B
Heavy Duty

Style: 2222 (continued)

CLEVELAND

Jobber Length

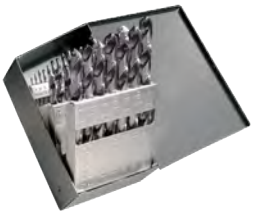
High Speed Steel

drill diameter				overall length		flute length		order number
	d_1		decimal	l_1		l_2		2222
fraction	wire/letter	mm	equivalent	in	mm	in	mm	bright
		7.50	0.2953		109.00		69.00	C11865
19/64			0.2969	4.375		3.063		C11616
	N		0.3020	4.375		3.063		C11642
5/16			0.3125	4.500		3.188		C11617
		8.00	0.3150		117.00		75.00	C11870
	O		0.3160	4.500		3.188		C11643
	P		0.3230	4.625		3.313		C11644
21/64			0.3281	4.625		3.313		C11618
	Q		0.3320	4.750		3.438		C11645
		8.50	0.3346		117.00		75.00	C11875
	R		0.3390	4.750		3.438		C11646
11/32			0.3438	4.750		3.438		C11619
	S		0.3480	4.875		3.500		C11647
		9.00	0.3543		125.00		81.00	C11880
	T		0.3580	4.875		3.500		C11648
23/64			0.3594	4.875		3.500		C11620
	U		0.3680	5.000		3.625		C11649
		9.50	0.3740		125.00		81.00	C11885
3/8			0.3750	5.000		3.625		C11621
	V		0.3770	5.000		3.625		C11650
	W		0.3860	5.125		3.750		C11651
25/64			0.3906	5.125		3.750		C11622
		10.00	0.3937		133.00		87.00	C11890
	X		0.3970	5.125		3.750		C11652
	Y		0.4040	5.250		3.875		C11653
13/32			0.4062	5.250		3.875		C11623
	Z		0.4130	5.250		3.875		C11654
		10.50	0.4134		133.00		87.00	C11895
27/64			0.4219	5.375		3.938		C11624
		11.00	0.4331		142.00		94.00	C11900
7/16			0.4375	5.500		4.063		C11625
		11.50	0.4528		142.00		94.00	C11905
29/64			0.4531	5.625		4.188		C11626
15/32			0.4688	5.750		4.313		C11627
		12.00	0.4724		151.00		101.00	C11910
31/64			0.4844	5.875		4.375		C11628
		12.50	0.4921		151.00		101.00	C11915
1/2			0.5000	6.000		4.500		C11629
		13.00	0.5118		151.00		101.00	C11920

Aircraft NAS 907, Type B
Heavy Duty

SET **Style: 2222**

no. of pieces	drill style	surface treatment	size range	order number 2222
29	2222	bright	1/16" through 1/2" x 1/64"	C70371



Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		✦			✦	✦	☆			

☆ = Best Performance ✦ = Acceptable

CLEVELAND

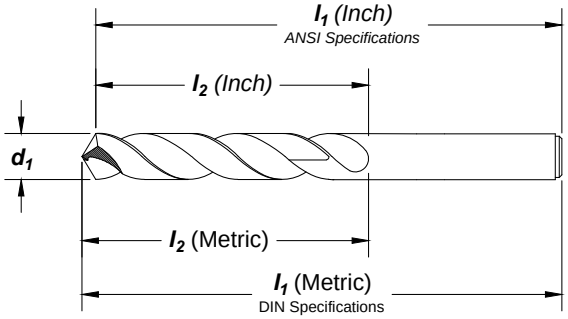
Style: Style: 2213

Aircraft NAS 907, Type J
Cobalt Heavy Duty

Note
Operating parameters:
See Technical section

M42 Cobalt | NAS 907 TYPE J | 135° Split | Helix Regular 21° to 34° | Straight Shank

Surface Treatment
Straw Oxide



Feature:
Highly heat resistant cobalt substrate for tough to machine materials.

drill diameter				overall length		flute length		
	d_1		decimal	l_1		l_2		order number
fraction	wire/letter	mm	equivalent	in	mm	in	mm	2213
	*80		.0135	.750		.125		C70213
	*79		.0145	.750		.125		C70212
*1/64			.0156	.750		.188		C70000
	*78		.0160	.875		.188		C70211
	*77		.0180	.875		.188		C70210
	*76		.0200	.875		.188		C70209
	*75		.0210	1.000		.250		C70208
	*74		.0225	1.000		.250		C70207
	*73		.0240	1.125		.313		C70206
	*72		.0250	1.125		.313		C70205
	*71		.0260	1.250		.375		C70204
	*70		.0280	1.250		.375		C70203
	*69		.0292	1.375		.500		C70202
	*68		.0310	1.375		.500		C70201
*1/32			.0312	1.375		.500		C70001
	*67		.0320	1.375		.500		C70200
	*66		.0330	1.375		.500		C70199
	*65		.0350	1.500		.625		C70198
	*64		.0360	1.500		.625		C70197
	*63		.0370	1.500		.625		C70196
	*62		.0380	1.500		.625		C70195
	*61		.0390	1.625		.688		C70194
		*1.0	.0394		34.00		12.00	C70057
	*60		.0400	1.625		.688		C70193
	*59		.0410	1.625		.688		C70192
	*58		.0420	1.625		.688		C70191
	*57		.0430	1.750		.750		C70190
		*1.1	.0433		36.00		14.00	C70058
	*56		.0465	1.750		.750		C70189
*3/64			.0469	1.750		.750		C70002

**Not split point.*

continued on next page

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw	☆		☆		☆	☆	✦	✦	✦	☆	✦	✦	

☆ = Best Performance ✦ = Acceptable

Aircraft NAS 907, Type J

Cobalt Heavy Duty

Style: 2213 (continued)

CLEVELAND

Jobber Length

Cobalt

drill diameter d_1 fraction	drill diameter d_1 wire/letter	drill diameter d_1 mm	decimal equivalent	overall length l_1 in	overall length l_1 mm	flute length l_2 in	flute length l_2 mm	order number 2213
		*1.2	.0472		38.00		16.00	C70059
		*1.3	.0512		38.00		16.00	C70060
	*55		.0520	1.875		.875		C70188
	*54		.0550	1.875		.875		C70187
		*1.4	.0551		40.00		18.00	C70061
		*1.5	.0591		40.00		18.00	C70062
	*53		.0595	1.875		.875		C70186
1/16			.0625	1.875		.875		C70003
		1.6	.0630		43.00		20.00	C70063
	52		.0635	1.875		.875		C70185
		1.7	.0669		43.00		20.00	C70064
	51		.0670	2.000		1.000		C70184
	50		.0700	2.000		1.000		C70183
		1.8	.0709		46.00		22.00	C70065
	49		.0730	2.000		1.000		C70182
		1.9	.0748		46.00		22.00	C70220
	48		.0760	2.000		1.000		C70181
5/64			.0781	2.000		1.000		C70004
	47		.0785	2.000		1.000		C70180
		2.0	.0787		49.00		24.00	C70067
	46		.0810	2.125		1.125		C70179
	45		.0820	2.125		1.125		C70178
		2.1	.0827		49.00		24.00	C70068
	44		.0860	2.125		1.125		C70177
		2.2	.0866		53.00		27.00	C70221
	43		.0890	2.250		1.250		C70176
		2.3	.0906		53.00		27.00	C70070
	42		.0935	2.250		1.250		C70175
3/32			.0938	2.250		1.250		C70005
		2.4	.0945		57.00		30.00	C70071
	41		.0960	2.375		1.375		C70174
	40		.0980	2.375		1.375		C70173
		2.5	.0984		57.00		30.00	C70072
	39		.0995	2.375		1.375		C70172
	38		.1015	2.500		1.438		C70171
		2.6	.1024		57.00		30.00	C70073
	37		.1040	2.500		1.438		C70170
		2.7	.1063		61.00		33.00	C70074
	36		.1065	2.500		1.438		C70169
7/64			.1094	2.625		1.500		C70006
	35		.1100	2.625		1.500		C70168
		2.8	.1102		61.00		33.00	C70222
	34		.1110	2.625		1.500		C70167
	33		.1130	2.625		1.500		C70166
		2.9	.1142		61.00		33.00	C70076
	32		.1160	2.750		1.625		C70165
		3.0	.1181		61.00		33.00	C70077
	31		.1200	2.750		1.625		C70164
		3.1	.1220		65.00		36.00	C70078
1/8	1/8		.1250	2.750		1.625		C70007
		3.2	.1260		65.00		36.00	C70079
	30		.1285	2.750		1.625		C70163
		3.3	.1299		65.00		36.00	C70080
		3.4	.1339		70.00		39.00	C70081
	29		.1360	2.875		1.750		C70162
		3.5	.1378		70.00		39.00	C70082

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drill diameter d_1 fraction	drill diameter d_1 wire/letter	drill diameter d_1 mm	decimal equivalent	overall length l_1 in	overall length l_1 mm	flute length l_2 in	flute length l_2 mm	order number 2213
	28		.1405	2.875		1.750		C70161
9/64			.1406	2.875		1.750		C70008
		3.6	.1417		70.00		39.00	C70083
	27		.1440	3.000		1.875		C70160
		3.7	.1457		70.00		39.00	C70223
	26		.1470	3.000		1.875		C70159
	25		.1495	3.000		1.875		C70158
		3.8	.1496		75.00		43.00	C70085
	24		.1520	3.125		2.000		C70157
		3.9	.1535		75.00		43.00	C70086
	23		.1540	3.125		2.000		C70156
5/32			.1562	3.125		2.000		C70009
	22		.1570	3.125		2.000		C70155
		4.0	.1575		75.00		43.00	C70087
	21		.1590	3.250		2.125		C70154
	20		.1610	3.250		2.125		C70153
		4.1	.1614		75.00		43.00	C70088
		4.2	.1654		75.00		43.00	C70089
	19		.1660	3.250		2.125		C70152
		4.3	.1693		80.00		47.00	C70090
	18		.1695	3.250		2.125		C70151
11/64			.1719		82.55		53.98	C70010
	17		.1730	3.375		2.188		C70150
		4.4	.1732		80.00		47.00	C70091
	16		.1770	3.375		2.188		C70149
		4.5	.1772		80.00		47.00	C70092
	15		.1800	3.375		2.188		C70148
		4.6	.1811		80.00		47.00	C70224
	14		.1820	3.375		2.188		C70147
	13		.1850	3.500		2.313		C70146
		4.7	.1850		80.00		47.00	C70094
3/16			.1875	3.500		2.313		C70011
	12		.1890	3.500		2.313		C70145
		4.8	.1890		86.00		52.00	C70095
	11		.1910	3.500		2.313		C70144
		4.9	.1929		86.00		52.00	C70096
	10		.1935	3.625		2.438		C70143
	9		.1960	3.625		2.438		C70142
		5.0	.1968		86.00		52.00	C70097
	8		.1990	3.625		2.438		C70141
		5.1	.2008		86.00		52.00	C70098
	7		.2010	3.625		2.438		C70140
13/64			.2031	3.625		2.438		C70012
	6		.2040	3.750		2.500		C70139
		5.2	.2047		86.00		52.00	C70099
	5		.2055	3.750		2.500		C70138
		5.3	.2087		86.00		52.00	C70100
	4		.2090	3.750		2.500		C70137

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw	☆		☆		☆	☆	✦	✦	✦	☆	✦	✦	

☆ = Best Performance ✦ = Acceptable

Aircraft NAS 907, Type J

Cobalt Heavy Duty

Style: 2213 (continued)

CLEVELAND

Jobber Length

Cobalt

drill diameter d_1 fraction	drill diameter d_1 wire/letter	drill diameter d_1 mm	decimal equivalent	overall length l_1 in	overall length l_1 mm	flute length l_2 in	flute length l_2 mm	order number 2213
		5.4	.2126		93.00		57.00	C70101
	3		.2130	3.750		2.500		C70136
		5.5	.2165		93.00		57.00	C70102
7/32			.2188	3.750		2.500		C70013
		5.6	.2205		93.00		57.00	C70225
	2		.2210	3.875		2.625		C70135
		5.7	.2244		93.00		57.00	C70104
	1		.2280	3.875		2.625		C70134
		5.8	.2283		93.00		57.00	C70226
	A		.2340	3.875		2.625		C70032
15/64			.2344	3.875		2.625		C70014
		6.0	.2362		93.00		57.00	C70106
	B		.2380	4.000		2.750		C70033
		6.1	.2402		101.00		63.00	C70107
	C		.2420	4.000		2.750		C70034
		6.2	.2441		101.00		63.00	C70108
	D		.2460	4.000		2.750		C70035
		6.3	.2480		101.00		63.00	C70109
1/4	E		.2500	4.000		2.750		C70015
			.2500	4.000		2.750		C70015
		6.4	.2520		101.00		63.00	C70110
		6.5	.2559		101.00		63.00	C70111
	F		.2570	4.125		2.875		C70036
		6.6	.2598		101.00		63.00	C70112
	G		.2610	4.125		2.875		C70037
		6.7	.2638		101.00		63.00	C70113
17/64			.2656	4.125		2.875		C70016
	H		.2660	4.125		2.875		C70038
		6.8	.2677		109.00		69.00	C70114
	I		.2720	4.125		2.875		C70039
		7.0	.2756		109.00		69.00	C70115
	J		.2770	4.125		2.875		C70040
9/32			.2812	4.250		2.938		C70017
	K		.2812	4.250		2.938		C70041
		7.2	.2835		109.00		69.00	C70116
	L		.2900	4.250		2.938		C70042
	M		.2950	4.375		3.063		C70043
		7.5	.2953		109.00		69.00	C70117
19/64			.2969	4.375		3.063		C70018
	N		.3020	4.375		3.063		C70044
		7.8	.3071		117.00		75.00	C70118
5/16			.3125	4.500		3.188		C70019
		8.0	.3150		117.00		75.00	C70119
	O		.3160	4.500		3.188		C70045
		8.1	.3189		117.00		75.00	C70120
	P		.3230	4.625		3.313		C70046
21/64			.3281	4.625		3.313		C70020
	Q		.3320	4.750		3.438		C70047
		8.5	.3346		117.00		75.00	C70122
	R		.3390	4.750		3.438		C70048
11/32			.3438	4.750		3.438		C70021
	S		.3480	4.875		3.500		C70049
		9.0	.3543		125.00		81.00	C70124
	T		.3580	4.875		3.500		C70050
23/64			.3594	4.875		3.500		C70022
	U		.3680	5.000		3.625		C70051

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drill diameter d_1 fraction	wire/letter	mm	decimal equivalent	overall length l_1 in	mm	flute length l_2 in	mm	order number 2213
		9.5	.3740		125.00		81.00	C70125
3/8			.3750	5.000		3.625		C70023
	V		.3770	5.000		3.625		C70052
	W		.3860	5.125		3.750		C70053
25/64			.3906	5.125		3.750		C70024
		10.0	.3937		133.00		87.00	C70126
	X		.3970	5.125		3.720		C70054
		10.2	.4016		133.00		87.00	C70127
	Y		.4040	5.250		3.875		C70055
13/32			.4062	5.250		3.875		C70025
	Z		.4130	5.250		3.875		C70056
		10.5	.4134		133.00		87.00	C70128
27/64			.4219	5.375		3.938		C70026
		11.0	.4331		142.00		94.00	C70129
7/16			.4375	5.500		4.063		C70027
		11.5	.4528		142.00		94.00	C70130
29/64			.4531	5.625		4.188		C70028
15/32			.4688	5.750		4.313		C70029
		12.0	.4724		151.00		101.00	C70131
31/64			.4844	5.875		4.375		C70030
		12.5	.4921		151.00		101.00	C70132
1/2			.5000	6.000		4.500		C70031
		13.0	.5118		151.00		101.00	C70133

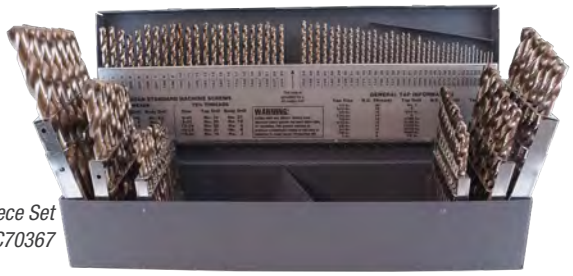
SET

Style: 2213

Aircraft NAS 907, Type J
Cobalt Heavy Duty

26-Piece Set
#C00986

no. of pieces	surface treatment	size range	order number 2213
29	straw oxide	1/16" through 1/2" x 1/64"	C70365
26	straw oxide	A through Z letter	C00986
60	straw oxide	#1 through #60 wire gauge	C70366
115	straw oxide	1/16" through 1/2" x 1/64", A through Z and #1 through #60	C70367



115-Piece Set
#C70367

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw	☆		☆		☆	☆	✦	✦	✦	☆	✦	✦	

☆ = Best Performance ✦ = Acceptable

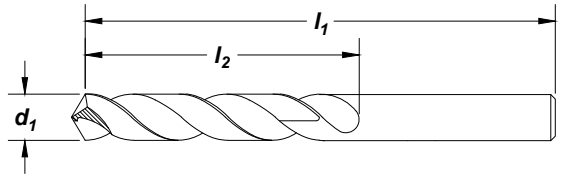
Cotter Pin
Heavy Duty

Style: 2011

CLEVELAND

Note
Operating parameters:
See Technical section

ASME B94.11M | HSS | 135° Split | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Black Oxide



Feature:
Fast penetrating split point design. Constant parallel web for easy regrinds.

drill diameter d_1 fraction	wire/letter	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2011
	*80	.0135	.750	.125	C02593
	*54	.0550	1.875	.875	C02646
1/16		.0625	1.875	.875	C02652
	52	.0635	1.875	1.000	C02654
	50	.0700	2.000	1.000	C02659
5/64		.0781	2.000	1.000	C02666
	47	.0785	2.000	1.000	C02667
	45	.0820	2.125	1.125	C02671
3/32		.0938	2.250	1.250	C02681
	40	.0980	2.375	1.375	C02685
	37	.1040	2.500	1.438	C02690
7/64		.1094	2.625	1.500	C02694
	32	.1160	2.750	1.625	C02700
	31	.1200	2.750	1.625	C02702
1/8		.1250	2.750	1.625	C02704
	30	.1285	2.750	1.625	C02707
	29	.1360	2.875	1.750	C02710
9/64		.1406	2.875	1.750	C02713
	25	.1495	3.000	1.875	C02719
5/32		.1562	3.125	2.000	C02724
11/64		.1719	3.125	2.000	C02735
3/16		.1875	3.500	2.313	C02746
7/32		.2188	3.750	2.500	C02767
15/64		.2344	3.875	2.625	C02776
1/4	E	.2500	4.000	2.750	C02785
9/32		.2812	4.250	2.938	C02807
19/64		.2969	4.375	3.063	C02811
5/16		.3125	4.500	3.188	C02818
11/32		.3438	4.750	3.188	C02833
3/8		.3750	5.000	3.625	C02848
13/32		.4062	5.250	3.875	C02861
7/16		.4375	5.500	4.063	C02867
15/32		.4688	5.750	4.313	C02872
1/2		.5000	6.000	4.500	C02877

**Not split point.*

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Black Oxide	✦		☆		✦			☆	✦				

☆ = Best Performance ✦ = Acceptable

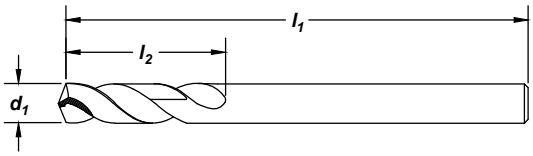
CLEVELAND

Styles: 3780, 3780-TC

Note
High helix for efficient chip removal.
Operating parameters: See Technical section

ASME B94.11M | M42 Cobalt | 135° Split | High Helix 35° to 45° | Straight Shank

Surface Treatment: Black Oxide | TiCN



Feature:
Preferred point for work hardening materials, with extra heavy web for superior rigidity.

drill diameter d_1 fraction	wire/letter	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 3780 black oxide	3780-TC TiCN
	*60	.0400	1.625	.500	C15880	C19880
	*59	.0410	1.625	.500	C15881	–
	*58	.0420	1.625	.500	C15882	C19882
	*57	.0430	1.750	.500	C15883	–
	*56	.0465	1.750	.500	C15884	–
*3/64		.0469	1.750	.500	C15885	C19885
	*55	.0520	1.750	.625	C15886	–
	*54	.0550	1.875	.625	C15887	–
	*53	.0595	1.875	.625	C15888	–
1/16		.0625	1.875	.625	C15889	C19889
	52	.0635	1.875	.688	C15890	C19890
	51	.0670	2.000	.688	C15891	–
	50	.0700	2.000	.688	C15892	C19892
	49	.0730	2.000	.688	C15893	–
	48	.0760	2.000	.688	C15894	–
5/64		.0781	2.000	.688	C15895	C19895
	47	.0785	2.000	.688	C15896	C19896
	46	.0810	2.125	.750	C15897	–
	45	.0820	2.125	.750	C15898	–
	44	.0860	2.125	.750	C15899	–
	43	.0890	2.250	.750	C15900	C19900
	42	.0935	2.250	.750	C15901	C19901
3/32		.0938	2.250	.750	C15902	C19902
	41	.0960	2.375	.813	C15903	C19903
	40	.0980	2.375	.813	C15904	C19904
	39	.0995	2.375	.813	C15905	–
	38	.1015	2.500	.813	C15906	–
	37	.1040	2.500	.813	C15907	–
	36	.1065	2.500	.813	C15908	–
7/64		.1094	2.625	.813	C15909	C19909
	35	.1100	2.625	.875	C15910	–
	34	.1110	2.625	.875	C15911	–
	33	.1130	2.625	.875	C15912	–
	32	.1160	2.750	.875	C15913	–
	31	.1200	2.750	.875	C15914	–

*Not split point.

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Black Oxide	✦		✦		✦	✦		✦	✦		✦		
TiCN	☆		☆		☆	☆					☆		

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	wire/letter	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 3780 black oxide	3780-TC TiCN
1/8		.1250	2.750	.875	C15915	C19915
	30	.1285	2.750	.938	C15916	C19916
	29	.1360	2.875	.938	C15917	C19917
	28	.1405	2.875	.938	C15918	–
9/64		.1406	2.875	.938	C15919	C19919
	27	.1440	3.000	1.000	C15920	C19920
	26	.1470	3.000	1.000	C15921	C19921
	25	.1495	3.000	1.000	C15922	C19922
	24	.1520	3.125	1.000	C15923	–
	23	.1540	3.125	1.000	C15924	–
5/32		.1562	3.125	1.000	C15925	C19925
	22	.1570	3.125	1.063	C15926	–
	21	.1590	3.250	1.063	C15927	C19927
	20	.1610	3.250	1.063	C15928	C19928
	19	.1660	3.250	1.063	C15929	C19929
	18	.1695	3.250	1.063	C15930	C19930
11/64		.1719	3.250	1.063	C15931	C19931
	17	.1730	3.375	1.125	C15932	–
	16	.1770	3.375	1.125	C15933	C19933
	15	.1800	3.375	1.125	C15934	–
	14	.1820	3.375	1.125	C15935	–
	13	.1850	3.500	1.125	C15936	–
3/16		.1875	3.500	1.125	C15937	C19937
	12	.1890	3.500	1.188	C15938	–
	11	.1910	3.500	1.188	C15939	C19939
	10	.1935	3.625	1.188	C15940	C19940
	9	.1960	3.625	1.188	C15941	–
	8	.1990	3.625	1.188	C15942	C19942
	7	.2010	3.625	1.188	C15943	–
13/64		.2031	3.625	1.188	C15944	C19944
	6	.2040	3.750	1.250	C15945	–
	5	.2055	3.750	1.250	C15946	–
	4	.2090	3.750	1.250	C15947	–
	3	.2130	3.750	1.250	C15948	–
7/32		.2188	3.750	1.250	C15949	C19949
	2	.2210	3.875	1.313	C15950	–
	1	.2280	3.875	1.313	C15951	C19951
	A	.2340	3.875	1.313	C15952	–
15/64		.2344	3.875	1.313	C15953	C19953
	B	.2380	4.000	1.375	C15954	–
	C	.2420	4.000	1.375	C15955	C19955
	D	.2460	4.000	1.375	C15956	C19956
1/4	E	.2500	4.000	1.375	C15957	C19957
	F	.2570	4.125	1.438	C15958	C19958
	G	.2610	4.125	1.438	C15959	C19959
17/64		.2656	4.125	1.438	C15960	C19960
	H	.2660	4.125	1.500	C15961	–
	I	.2720	4.125	1.500	C15962	C19962
	J	.2770	4.125	1.500	C15963	–
	K	.2810	4.250	1.500	C15964	–
9/32		.2812	4.250	1.500	C15965	C19965
	L	.2900	4.250	1.563	C15966	–
	M	.2950	4.375	1.563	C15967	–
19/64		.2969	4.375	1.563	C15968	C19968
	N	.3020	4.375	1.625	C15969	C19969
5/16		.3125	4.500	1.625	C15970	C19970
	O	.3160	4.500	1.688	C15971	C19971

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Styles: 3780, 3780-TC (continued)

drill diameter d_1 fraction	wire/letter	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 3780 black oxide	3780-TC TiCN
	P	.3230	4.625	1.688	C15972	–
21/64		.3281	4.625	1.688	C15973	–
	Q	.3320	4.750	1.688	C15974	C19974
	R	.3390	4.750	1.688	C15975	–
11/32		.3438	4.750	1.688	C15976	C19976
	S	.3480	4.875	1.750	C15977	–
	T	.3580	4.875	1.750	C15978	–
23/64		.3594	4.875	1.750	C15979	–
	U	.3680	5.000	1.813	C15980	–
3/8		.3750	5.000	1.813	C15981	C19981
	V	.3770	5.000	1.875	C15982	–
	W	.3860	5.125	1.875	C15983	–
25/64		.3906	5.125	1.875	C15984	–
	X	.3970	5.125	1.938	C15985	–
	Y	.4040	5.250	1.938	C15986	–
13/32		.4062	5.250	1.938	C15987	C19987
	Z	.4130	5.250	2.000	C15988	–
27/64		.4219	5.375	2.000	C15989	–
7/16		.4375	5.500	2.063	C15990	–
29/64		.4531	5.625	2.125	C15991	–
15/32		.4688	5.750	2.125	C15992	–
31/64		.4844	5.875	2.188	C15993	–
1/2		.5000	6.000	2.250	C15994	C19994

SET — Style: 3780

Q-AMD™ Short Flute
Aircraft Maintenance

no. of pieces	surface treatment	size range	order number 3780
29	black oxide	1/16" through 1/2" x 1/64"	C14499

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Black Oxide	✦		✦		✦	✦		✦	✦		✦		
TiCN	☆		☆		☆	☆					☆		

☆ = Best Performance ✦ = Acceptable

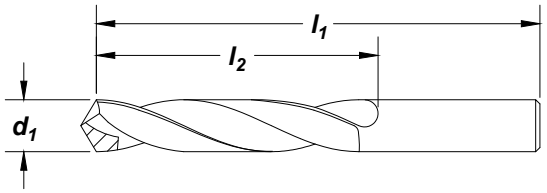
CLEVELAND

Carbide Tipped

Style: 2727

Note
Operating parameters:
See Technical section

HSS Carbide Tipped | 118° | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Bright



Feature:
Run at carbide speeds with the flexibility of a HSS body and shank.

drill diameter d_1 fraction	wire/letter	decimal equivalent	overall length l_1 (in)	flute length l_2 (in)	order number 2727
1/8		.1250	2.750	1.625	C48655
5/32		.1562	3.125	2.000	C48675
3/16		.1875	3.500	2.313	C48697
	7	.2010	3.625	2.438	C48707
7/32		.2188	3.750	2.500	C48718
1/4	E	.2500	4.000	2.750	C48736
9/32		.2812	4.250	2.938	C48758
5/16		.3125	4.500	3.188	C48769
11/32		.3438	4.750	3.438	C48784
3/8		.3750	5.000	3.625	C48799
13/32		.4062	5.250	3.875	C48812
7/16		.4375	5.500	4.063	C48818
15/32		.4688	5.750	4.313	C48823
1/2		.5000	6.000	4.500	C48828

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		✦		✦			☆		☆			

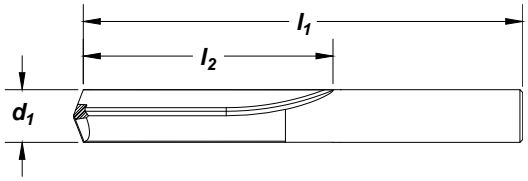
☆ = Best Performance ✦ = Acceptable

Note

Tolerances for Series DM Drills:
Cutting Diameter: +.000, – .0005
Shank Diameter: +.0000, – .0005

ASME B94.11M | Carbide | 140° 4-Facet | Helix High 35° to 45° | Straight Shank

Surface Treatment: Bright



cutting diameter d_1 fraction	wire	decimal equivalent	overall length l_1	flute length l_2	order number 1766
1/32		.0313	1-1/2	1/2	C89410
	60	.0400	1-1/2	1/2	C89411
	59	.0410	1-1/2	1/2	C89412
	58	.0420	1-1/2	1/2	C89413
	57	.0430	1-1/2	1/2	C89414
	56	.0465	1-1/2	1/2	C89415
3/64		.0469	1-1/2	1/2	C89416
	55	.0520	1-1/2	1/2	C89417
	54	.0550	1-1/2	1/2	C89418
	53	.0595	1-1/2	1/2	C89419
1/16		.0625	1-5/8	5/8	C89420
	52	.0635	1-11/16	11/16	C89421
	51	.0670	1-11/16	11/16	C89422
	50	.0700	1-11/16	11/16	C89423
	49	.0730	1-11/16	11/16	C89424
	48	.0760	1-11/16	11/16	C89425
5/64		.0781	1-11/16	11/16	C89426
	47	.0785	1-3/4	3/4	C89427
	46	.0810	1-3/4	3/4	C89428
	45	.0820	1-3/4	3/4	C89429
	44	.0860	1-3/4	3/4	C89430
	43	.0890	1-3/4	3/4	C89431
	42	.0935	1-3/4	3/4	C89432
3/32		.0938	1-3/4	3/4	C89433
	41	.0960	1-13/16	13/16	C89434
	40	.0980	1-13/16	13/16	C89435
	39	.0995	1-13/16	13/16	C89436
	38	.1015	1-13/16	13/16	C89437
	37	.1040	1-13/16	13/16	C89438
	36	.1065	1-13/16	13/16	C89439
7/64		.1094	1-13/16	13/16	C89440
	35	.1100	1-7/8	7/8	C89441
	34	.1110	1-7/8	7/8	C89442
	33	.1130	1-7/8	7/8	C89443
	32	.1160	1-7/8	7/8	C89444
	31	.1200	1-7/8	7/8	C89445
1/8		.1250	1-7/8	7/8	C89446
	30	.1285	1-15/16	15/16	C89447
	29	.1360	1-15/16	15/16	C89448
	28	.1405	1-15/16	15/16	C89449

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Material Reference

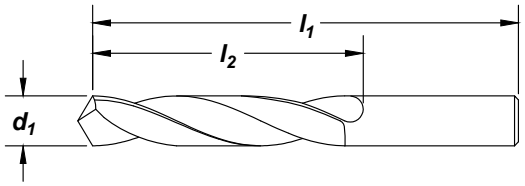
	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆	✦	☆	✦	✦			☆	☆	✦			✦

☆ = Best Performance ✦ = Acceptable

cutting diameter d_1 fraction	wire	decimal equivalent	overall length l_1	flute length l_2	order number 1766
9/64		.1406	1-15/16	15/16	C89450
	27	.1440	2-1/16	1	C89451
	26	.1470	2-1/16	1	C89452
	25	.1495	2-1/16	1	C89453
	24	.1520	2-1/16	1	C89454
	23	.1540	2-1/16	1	C89455
5/32		.1562	2-1/16	1	C89456
	22	.1570	2-1/8	1-1/16	C89457
	21	.1590	2-1/8	1-1/16	C89458
	20	.1610	2-1/8	1-1/16	C89459
	19	.1660	2-1/8	1-1/16	C89460
	18	.1695	2-1/8	1-1/16	C89461
11/64		.1719	2-1/8	1-1/16	C89462
	17	.1730	2-3/16	1-1/8	C89463
	16	.1770	2-3/16	1-1/8	C89464
	15	.1800	2-3/16	1-1/8	C89465
	14	.1820	2-3/16	1-1/8	C89466
	13	.1850	2-3/16	1-1/8	C89467
3/16		.1875	2-3/16	1-1/8	C89468
	12	.1890	2-1/4	1-3/16	C89469
	11	.1910	2-1/4	1-3/16	C89470
	10	.1935	2-1/4	1-3/16	C89471
	9	.1960	2-1/4	1-3/16	C89472
	8	.1990	2-1/4	1-3/16	C89473
	7	.2010	2-1/4	1-3/16	C89474
13/64		.2031	2-1/4	1-3/16	C89475
	6	.2040	2-3/8	1-1/4	C89476
	5	.2055	2-3/8	1-1/4	C89477
	4	.2090	2-3/8	1-1/4	C89478
	3	.2130	2-3/8	1-1/4	C89479
7/32		.2188	2-3/8	1-1/4	C89480
	2	.2210	2-7/16	1-5/16	C89481
	1	.2280	2-7/16	1-5/16	C89482
15/64		.2344	2-7/16	1-5/16	C89483
1/4		.2500	2-1/2	1-3/8	C89484
17/64		.2656	2-5/8	1-7/16	C89485
9/32		.2812	2-11/16	1-1/2	C89486
19/64		.2969	2-3/4	1-9/16	C89487
5/16		.3125	2-13/16	1-5/8	C89488
21/64		.3281	2-15/16	1-11/16	C89489
11/32		.3438	3	1-11/16	C89490
23/64		.3594	3-1/16	1-3/4	C89491
3/8		.3750	3-1/8	1-13/16	C89492
25/64		.3906	3-1/4	1-7/8	C89493
13/32		.4062	3-5/16	1-15/16	C89494
27/64		.4219	3-3/8	2	C89495
7/16		.4375	3-7/16	2-1/16	C89496
29/64		.4531	3-9/16	2-1/8	C89497
15/32		.4688	3-5/8	2-1/8	C89498
31/64		.4844	3-11/16	2-3/16	C89499
1/2		.5000	3-3/4	2-1/4	C89500

Note
Operating parameters:
See Technical section

Carbide | 118° 4-Facet | Helix Low 10° to 20° | Straight Shank | Surface Treatment: Bright



Feature:
Run at 2-3 times SFM over HSS drills.

drill diameter d_1 fraction	wire	mm	decimal equivalent	overall length l_1 in	mm	flute length l_2 in	mm	order number 1727
1/32			0.0312	1.250		0.313		C89501
	60		0.0400	1.500		0.750		C89502
	59		0.0410	1.500		0.750		C89503
	58		0.0420	1.500		0.750		C89504
	57		0.0430	1.500		0.750		C89505
	56		0.0465	1.500		0.750		C89506
3/64			0.0469	1.500		0.750		C89507
	55		0.0520	1.500		0.750		C89508
	54		0.0550	1.500		0.750		C89509
	53		0.0595	1.500		0.750		C47517
1/16			0.0625	1.500		0.750		C47519
	52		0.0635	1.500		0.750		C89512
	51		0.0670	1.500		0.750		C89513
	50		0.0700	1.750		0.875		C47526
	49		0.0730	1.750		0.875		C89515
	48		0.0760	1.750		0.875		C89516
5/64			0.0781	1.750		0.875		C89517
	47		0.0785	1.750		0.875		C89518
	46		0.0810	1.750		0.875		C89519
	45		0.0820	1.750		0.875		C89520
	44		0.0860	2.000		1.000		C89521
	43		0.0890	2.000		1.000		C89522
	42		0.0935	2.000		1.000		C89523
3/32			0.0938	2.000		1.000		C47548
	41		0.0960	2.000		1.000		C89525
	40		0.0980	2.000		1.000		C47552
	39		0.0995	2.250		1.250		C89527
	38		0.1015	2.250		1.250		C89528
	37		0.1040	2.250		1.250		C89529
	36		0.1065	2.250		1.250		C89530
7/64			0.1094	2.250		1.250		C47561
	35		0.1100	2.250		1.250		C89532
	34		0.1110	2.250		1.250		C89533
	33		0.1130	2.250		1.250		C89534

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		✦		✦			☆		☆			

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	wire	mm	decimal equivalent	overall length l_1 in	mm	flute length l_2 in	mm	order number 1727
	32		0.1160	2.250		1.250		C89535
		3.0	0.1182		61		33	C47239
	31		0.1200	2.250		1.250		C89536
		3.1	0.1221		65		36	C47240
1/8			0.1250	2.250		1.250		C47571
		3.2	0.1260		65		36	C47241
	30		0.1285	2.500		1.375		C47574
		3.3	0.1300		65		36	C47242
		3.4	0.1339		70		39	C47243
	29		0.1360	2.500		1.375		C89539
		3.5	0.1378		70		39	C47244
	28		0.1405	2.500		1.375		C89540
9/64			0.1406	2.500		1.375		C47580
	27		0.1440	2.500		1.375		C47582
	26		0.1470	2.500		1.375		C89543
	25		0.1495	2.500		1.375		C89544
	24		0.1520	2.500		1.375		C89545
	23		0.1540	2.500		1.375		C89546
5/32			0.1562	2.500		1.375		C47591
	22		0.1570	2.500		1.375		C89548
		4.0	0.1575		75		43	C47245
	21		0.1590	2.500		1.375		C89549
	20		0.1610	2.500		1.375		C89550
		4.5	0.1615		80		47	C47246
	19		0.1660	2.750		1.625		C89551
	18		0.1695	2.750		1.625		C89552
11/64			0.1719	2.750		1.625		C47602
	17		0.1730	2.750		1.625		C89554
	16		0.1770	2.750		1.625		C89555
	15		0.1800	2.750		1.625		C89556
	14		0.1820	2.750		1.625		C89557
	13		0.1850	2.750		1.625		C89558
3/16			0.1875	2.750		1.625		C47613
	12		0.1890	2.750		1.625		C89560
	11		0.1910	2.750		1.625		C89561
	10		0.1935	2.750		1.625		C47618
	9		0.1960	3.000		1.750		C89563
		5.0	0.1969		86		52	C47247
	8		0.1990	3.000		1.750		C89564
	7		0.2010	3.000		1.750		C47623
13/64			0.2031	3.000		1.750		C89566
	6		0.2040	3.000		1.750		C47625
	5		0.2055	3.000		1.750		C89568
	4		0.2090	3.000		1.750		C89569
	3		0.2130	3.000		1.750		C89570
		5.5	0.2166		93		57	C47248
7/32			0.2188	3.000		1.750		C47634
	2		0.2210	3.000		1.750		C89572
	1		0.2280	3.000		1.750		C89573
	A		0.2340	3.250		2.000		C89574
15/64			0.2344	3.250		2.000		C89575
		6.0	0.2363		93		57	C47249
	B		0.2380	3.250		2.000		C89576
	C		0.2420	3.250		2.000		C89577
	D		0.2460	3.250		2.000		C89578
1/4	E		0.2500	3.250		2.000		C47648

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drill diameter d_1 fraction	wire	mm	decimal equivalent	overall length l_1 in	mm	flute length l_2 in	mm	order number 1727
		6.5	0.2560		101		63	C47250
	F		0.2570	3.250		2.000		C89580
	G		0.2610	3.500		2.125		C89581
17/64			0.2656	3.500		2.125		C89582
	H		0.2660	3.500		2.125		C89583
	I		0.2720	3.500		2.125		C89584
		7.0	0.2756		109		69	C47251
	J		0.2770	3.500		2.125		C89585
	K		0.2810	3.500		2.125		C89586
9/32			0.2812	3.500		2.125		C89587
	L		0.2900	3.500		2.125		C89588
	M		0.2950	4.000		2.375		C89589
		7.5	0.2953		109		69	C47252
19/64			0.2969	4.000		2.375		C89590
	N		0.3020	4.000		2.375		C89591
5/16			0.3125	4.000		2.375		C47671
		8.0	0.3150		117		75	C47253
	O		0.3160	4.000		2.375		C89593
	P		0.3230	4.000		2.375		C89594
21/64			0.3281	4.000		2.500		C89595
	Q		0.3320	4.000		2.500		C89596
		8.5	0.3347		117		75	C47254
11/32			0.3438	4.000		2.500		C89597
	S		0.3480	4.000		2.500		C89598
		9.0	0.3544		125		81	C47255
	T		0.3580	4.000		2.500		C89599
23/64			0.3594	4.250		2.750		C89600
	U		0.3680	4.250		2.750		C89601
		9.5	0.3741		125		81	C47256
3/8			0.3750	4.250		2.750		C47694
	V		0.3770	4.250		2.750		C89603
	W		0.3860	4.500		2.875		C89604
25/64			0.3906	4.500		2.875		C89605
		10.0	0.3938		133		87	C47257
	X		0.3970	4.500		2.875		C89606
	Y		0.4040	4.500		2.875		C89607
13/32			0.4062	4.500		2.875		C89608
	Z		0.4130	4.500		2.875		C89609
		10.5	0.4134		133		87	C47258
27/64			0.4219	4.500		2.875		C89610
		11.0	0.4331		142		94	C47259
7/16			0.4375	4.500		2.875		C47708
		11.5	0.4528		142		94	C47260
29/64			0.4531	4.750		3.000		C89612
15/32			0.4688	4.750		3.000		C89613
		12.0	0.4725		151		101	C47261
31/64			0.4844	4.750		3.000		C89614
1/2			0.5000	4.750		3.000		C47718

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		✦		✦			☆		☆			

☆ = Best Performance ✦ = Acceptable

NEW

Carbide
Common Shank 3xD

Style: 6100

CLEVELAND

Common Shank

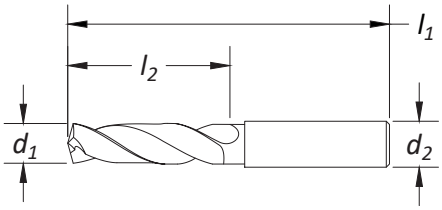
Carbide

External Coolant - Single Margin

Surface Treatment AlTiN

Note

- *Made From Ultra Fine Grain Carbide*
- *Polished Flutes*
- *Defined Edge Geometry (Pre-Coat)*
- *140° Self Starting Point*
- *Coating - Advanced AlTiN*
- *0.02mm (0.0008") Maximum Concentricity*
- *Shank to Din 6535 HA (h6 tolerance)*
- *Drill diameter tolerance = h7*
- *See Technical section for Drilling Method & Speeds & Feeds*



drill diameter d_1 in	drill diameter d_1 metric	decimal equiv.	shank diameter d_2 dia Ø	shank diameter d_2 dec. equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 6100
	3.00	0.1181	6.00	0.2362	2.441	0.787	C92500
1/8	3.18	0.1250	6.00	0.2362	2.441	0.787	C92501
	3.30	0.1299	6.00	0.2362	2.441	0.787	C92502
	3.80	0.1496	6.00	0.2362	2.598	0.945	C92503
5/32	3.97	0.1563	6.00	0.2362	2.598	0.945	C92504
	4.20	0.1654	6.00	0.2362	2.598	0.945	C92505
3/16	4.76	0.1875	6.00	0.2362	2.598	0.945	C92506
	5.00	0.1969	6.00	0.2362	2.598	1.102	C92507
	5.10	0.2008	6.00	0.2362	2.598	1.102	C92508
7/32	5.56	0.2188	6.00	0.2362	2.598	1.102	C92509
	5.50	0.2165	6.00	0.2362	2.598	1.102	C92510
	5.80	0.2283	6.00	0.2362	2.598	1.102	C92511
	6.00	0.2362	6.00	0.2362	2.598	1.102	C92512
1/4	6.35	0.2500	8.00	0.3150	3.110	1.457	C92513
	6.50	0.2559	8.00	0.3150	3.110	1.339	C92514
	6.70	0.2638	8.00	0.3150	3.110	1.339	C92515
	6.80	0.2677	8.00	0.3150	3.110	1.339	C92516
	7.00	0.2756	8.00	0.3150	3.110	1.339	C92517
9/32	7.15	0.2812	8.00	0.3150	3.110	1.339	C92518
	7.50	0.2953	8.00	0.3150	3.110	1.339	C92642
5/16	7.94	0.3125	8.00	0.3150	3.110	1.339	C92519
	8.00	0.3150	8.00	0.3150	3.110	1.339	C92520
	8.50	0.3346	10.00	0.3937	3.504	1.850	C92521
11/32	8.73	0.3438	10.00	0.3937	3.504	1.850	C92522
	9.00	0.3543	10.00	0.3937	3.504	1.850	C92523
3/8	9.53	0.3750	10.00	0.3937	3.504	1.850	C92524
	10.00	0.3937	10.00	0.3937	3.504	1.850	C92525
	10.20	0.4016	12.00	0.4724	4.016	2.165	C92526
13/32	10.32	0.4063	12.00	0.4724	4.016	2.165	C92527
	10.50	0.4134	12.00	0.4724	4.016	2.165	C92528
	11.00	0.4331	12.00	0.4724	4.016	2.165	C92529
7/16	11.11	0.4375	12.00	0.4724	4.016	2.165	C92530
	12.00	0.4724	12.00	0.4724	4.016	2.165	C92531
	12.50	0.4921	14.00	0.5512	4.213	2.362	C92532
1/2	12.70	0.5000	14.00	0.5512	4.213	2.362	C92533
	13.00	0.5118	14.00	0.5512	4.213	2.362	C92534
	13.50	0.5315	14.00	0.5512	4.213	2.362	C92535
	14.00	0.5512	14.00	0.5512	4.213	2.362	C92536

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
AlTiN													

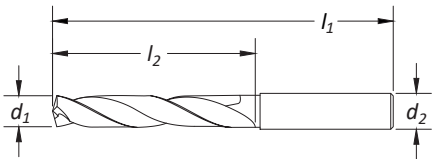
☆ = Best Performance ✦ = Acceptable

Internal Coolant - Single Margin

Note

- Made From Ultra Fine Grain Carbide
- Polished Flutes
- Defined Edge Geometry (Pre-Coat)
- 140° Self Starting Point
- Coating - Advanced AlTiN
- 0.02mm (0.0008") Maximum Concentricity
- Shank to Din 6535 HA (h6 tolerance)
- Drill diameter tolerance = h7
- See Technical section for Drilling Method & Speeds & Feeds

Surface Treatment: AlTiN



drill diameter d_1 in	drill diameter d_1 metric	decimal equiv.	shank diameter d_2 dia Ø	shank diameter d_2 dec. equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 6200
	3.00	0.1181	6.00	0.2362	2.598	1.102	C92537
1/8	3.18	0.1250	6.00	0.2362	2.598	1.102	C92538
	3.30	0.1299	6.00	0.2362	2.598	1.102	C92539
	4.00	0.1575	6.00	0.2362	2.913	1.417	C92540
	4.20	0.1654	6.00	0.2362	2.913	1.417	C92541
	4.50	0.1772	6.00	0.2362	2.913	1.417	C92542
3/16	4.76	0.1875	6.00	0.2362	3.228	1.732	C92543
	5.00	0.1969	6.00	0.2362	3.228	1.732	C92544
	5.10	0.2008	6.00	0.2362	3.228	1.732	C92545
	5.50	0.2165	6.00	0.2362	3.228	1.732	C92546
	6.00	0.2362	6.00	0.2362	3.228	1.732	C92547
1/4	6.35	0.2500	8.00	0.3150	3.583	2.087	C92548
	6.50	0.2559	8.00	0.3150	3.583	2.087	C92549
	6.80	0.2677	8.00	0.3150	3.583	2.087	C92550
	7.00	0.2756	8.00	0.3150	3.583	2.087	C92551
9/32	7.15	0.2812	8.00	0.3150	3.583	2.087	C92552
	7.50	0.2953	8.00	0.3150	3.583	2.087	C92643
5/16	7.94	0.3125	8.00	0.3150	3.583	2.087	C92553
	8.00	0.3150	8.00	0.3150	3.583	2.087	C92554
21/64	8.33	0.3281	10.00	0.3937	3.583	2.087	C92555
	8.50	0.3346	10.00	0.3937	4.055	2.402	C92556
	9.00	0.3543	10.00	0.3937	4.055	2.402	C92557
	9.40	0.3701	10.00	0.3937	4.055	2.402	C92558
3/8	9.53	0.3750	10.00	0.3937	4.055	2.402	C92559
	9.90	0.3898	10.00	0.3937	4.055	2.402	C92560
	10.00	0.3937	10.00	0.3937	4.055	2.402	C92561
	10.20	0.4016	12.00	0.4724	4.646	2.795	C92562
13/32	10.32	0.4063	12.00	0.4724	4.646	2.795	C92563
	10.50	0.4134	12.00	0.4724	4.646	2.795	C92564
	10.70	0.4213	12.00	0.4724	4.646	2.795	C92565
	11.00	0.4331	12.00	0.4724	4.646	2.795	C92566
7/16	11.11	0.4375	12.00	0.4724	4.646	2.795	C92567
	11.60	0.4567	12.00	0.4724	4.646	2.795	C92568
	12.00	0.4724	12.00	0.4724	4.646	2.795	C92569
31/64	12.30	0.4844	14.00	0.5512	4.882	3.031	C92570
	12.50	0.4921	14.00	0.5512	4.882	3.031	C92571
1/2	12.70	0.5000	14.00	0.5512	4.882	3.031	C92572
	13.00	0.5118	14.00	0.5512	4.882	3.031	C92573
	13.50	0.5315	14.00	0.5512	4.882	3.031	C92574
	14.00	0.5512	14.00	0.5512	4.882	3.031	C92575
	14.50	0.5709	16.00	0.6299	5.236	3.268	C92576
	14.70	0.5787	16.00	0.6299	5.236	3.268	C92577
	15.00	0.5906	16.00	0.6299	5.236	3.268	C92578
	15.50	0.6102	16.00	0.6299	5.236	3.268	C92579
	15.80	0.6220	16.00	0.6299	5.236	3.268	C92580
5/8	15.88	0.6250	16.00	0.6299	5.236	3.268	C92581

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
AlTiN													

☆ = Best Performance ✦ = Acceptable

NEW

Carbide
Common Shank 8xD

Style: 6300

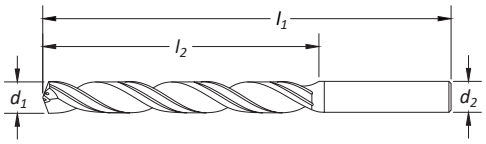
CLEVELAND

Internal Coolant - Double Margin

Surface Treatment AlTiN

Note

- *Made From Ultra Fine Grain Carbide*
- *Polished Flutes*
- *Defined Edge Geometry (Pre-Coat)*
- *140° Self Starting Point*
- *Coating - Advanced AlTiN*
- *0.02mm (0.0008") Maximum Concentricity*
- *Shank to Din 6535 HA (h6 tolerance)*
- *Drill diameter tolerance = h7*
- *See Technical section for Drilling Method & Speeds & Feeds*



drill diameter d_1 in	drill diameter d_1 metric	decimal equiv.	shank diameter d_2 dia Ø	shank diameter d_2 dec. equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 6300
	4.00	0.1575	6.00	0.2362	3.150	1.654	C92582
	4.50	0.1772	6.00	0.2362	3.150	1.654	C92583
3/16	4.76	0.1875	6.00	0.2362	3.622	2.126	C92584
	5.00	0.1969	6.00	0.2362	3.622	2.126	C92585
	5.50	0.2165	6.00	0.2362	3.622	2.126	C92586
	6.00	0.2362	6.00	0.2362	3.622	2.126	C92587
1/4	6.35	0.2500	8.00	0.3150	3.937	2.441	C92588
	6.50	0.2559	8.00	0.3150	3.937	2.441	C92589
	6.80	0.2677	8.00	0.3150	3.937	2.441	C92590
	7.00	0.2756	8.00	0.3150	4.252	2.756	C92591
9/32	7.15	0.2812	8.00	0.3150	4.252	2.756	C92592
	7.50	0.2953	8.00	0.3150	4.252	2.756	C92593
5/16	7.94	0.3125	8.00	0.3150	4.252	2.756	C92594
	8.00	0.3150	8.00	0.3150	4.252	2.756	C92595
	8.50	0.3346	10.00	0.3937	4.803	3.150	C92596
	9.00	0.3543	10.00	0.3937	4.803	3.150	C92597
	9.50	0.3740	11.00	0.4331	5.118	3.465	C92598
3/8	9.53	0.3750	10.00	0.3937	5.118	3.465	C92599
	10.00	0.3937	10.00	0.3937	5.118	3.465	C92600
	10.20	0.4016	12.00	0.4724	5.984	4.134	C92601
	10.50	0.4134	12.00	0.4724	5.984	4.134	C92602
	11.00	0.4331	12.00	0.4724	5.984	4.134	C92603
7/16	11.11	0.4375	12.00	0.4724	5.984	4.134	C92604
	11.80	0.4646	12.00	0.4724	5.984	4.134	C92605
	12.00	0.4724	12.00	0.4724	5.984	4.134	C92606
	12.50	0.4921	14.00	0.5512	6.693	4.843	C92607
1/2	12.70	0.5000	14.00	0.5512	6.693	4.843	C92608
	13.00	0.5118	14.00	0.5512	6.693	4.843	C92609
	13.50	0.5315	14.00	0.5512	6.693	4.843	C92610
	14.00	0.5512	14.00	0.5512	6.693	4.843	C92611

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
AlTiN													

☆ = Best Performance ✦ = Acceptable

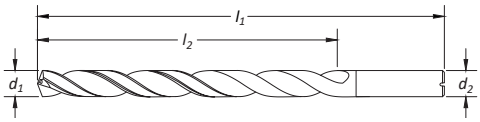
Style: 6400

Internal Coolant - Double Margin

Note

- *Made From Ultra Fine Grain Carbide*
- *Polished Flutes*
- *Defined Edge Geometry (Pre-Coat)*
- *140° Self Starting Point*
- *Coating - Advanced AlTiN*
- *0.02mm (0.0008") Maximum Concentricity*
- *Shank to Din 6535 HA (h6 tolerance)*
- *Drill diameter tolerance = h7*
- *See Technical section for Drilling Method & Speeds & Feeds*

Surface Treatment



A starter drill must be used.
See style: 6100 (3xD) as a starter for this item.

drill diameter d_1 in	drill diameter d_1 metric	decimal equiv.	shank diameter dia Ø	shank diameter dec. equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 6400
	4.00	0.1575	6.00	0.2362	4.016	2.520	C92612
	4.50	0.1772	6.00	0.2362	4.016	2.520	C92613
3/16	4.76	0.1875	6.00	0.2362	4.567	3.071	C92614
	5.00	0.1969	6.00	0.2362	4.567	3.071	C92615
	5.50	0.2165	6.00	0.2362	4.567	3.071	C92616
	6.00	0.2362	6.00	0.2362	4.567	3.071	C92617
1/4	6.35	0.2500	8.00	0.3150	5.748	4.252	C92618
	6.50	0.2559	8.00	0.3150	5.748	4.252	C92619
	6.80	0.2677	8.00	0.3150	5.748	4.252	C92620
	7.00	0.2756	8.00	0.3150	5.748	4.252	C92621
9/32	7.14	0.2812	8.00	0.3150	5.748	4.252	C92622
	7.50	0.2953	8.00	0.3150	5.748	4.252	C92623
5/16	7.94	0.3125	8.00	0.3150	5.748	4.252	C92624
	8.00	0.3150	8.00	0.3150	5.748	4.252	C92625
	8.50	0.3346	10.00	0.3937	6.378	4.724	C92626
	9.00	0.3543	10.00	0.3937	6.378	4.724	C92627
	9.50	0.3740	11.00	0.4331	6.378	4.724	C92628
3/8	9.53	0.3750	10.00	0.3937	6.378	4.724	C92629
	10.00	0.3937	10.00	0.3937	6.378	4.724	C92630
	10.20	0.4016	12.00	0.4724	8.031	6.142	C92631
	10.50	0.4134	12.00	0.4724	8.031	6.142	C92632
	11.00	0.4331	12.00	0.4724	8.031	6.142	C92633
7/16	11.11	0.4375	12.00	0.4724	8.031	6.142	C92634
	11.80	0.4646	12.00	0.4724	8.031	6.142	C92635
	12.00	0.4724	12.00	0.4724	8.031	6.142	C92636
	12.50	0.4921	14.00	0.5512	9.055	7.165	C92637
1/2	12.70	0.5000	14.00	0.5512	9.055	7.165	C92638
	13.00	0.5118	14.00	0.5512	9.055	7.165	C92639
	13.50	0.5315	14.00	0.5512	9.055	7.165	C92640
	14.00	0.5512	14.00	0.5512	9.055	7.165	C92641

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
AlTiN													

☆ = Best Performance ✦ = Acceptable

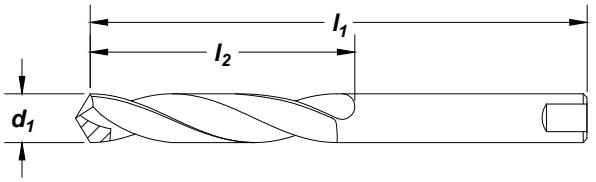
Carbide-Tipped
Heavy Duty, Tanged

Style: 2745

CLEVELAND

Note
Operating parameters: See Technical section

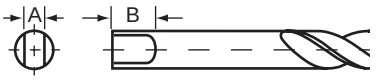
HSS Carbide Tipped | 118° | Helix Regular 21° to 34° | Straight Shank Tang | Surface Treatment: Bright



Feature:
Run at carbide speeds with the flexibility of a HSS body and shank.

drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 2745
1/8	.1250	5.125	2.750	C49017
5/32	.1562	5.375	3.000	C49029
3/16	.1875	5.750	3.375	C49041
7/32	.2188	6.000	3.625	C49052
1/4	.2500	6.125	3.750	C49064
9/32	.2812	6.250	3.875	C49078
5/16	.3125	6.375	4.000	C49087
11/32	.3438	6.500	4.125	C49098
3/8	.3750	6.750	4.250	C49110
13/32	.4062	7.000	4.375	C49119
27/64	.4219	7.250	4.625	C49121
7/16	.4375	7.250	4.625	C49124
15/32	.4688	7.500	4.750	C49129
1/2	.5000	7.750	4.750	C49134
17/32	.5312	8.000	4.750	C49139
9/16	.5625	8.250	4.875	C49145
5/8	.6250	8.750	4.875	C49155

Tang Specifications



shank diameter (inches) from	to	tang dimensions (inches) width **A**	width **B**
1/8	3/16	.092	.281
over 3/16	1/4	.120	.312
over 1/4	5/16	.160	.344
over 5/16	3/8	.201	.375
over 3/8	15/32	.241	.438
over 15/32	9/16	.300	.500
over 9/16	21/32	.370	.563
over 21/32	3/4	.440	.625
over 3/4	7/8	.511	.688
over 7/8	1	.605	.750
over 1	1-3/16	.696	.813
over 1-3/16	1-3/8	.813	.875

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	✦	☆			

☆ = Best Performance ✦ = Acceptable

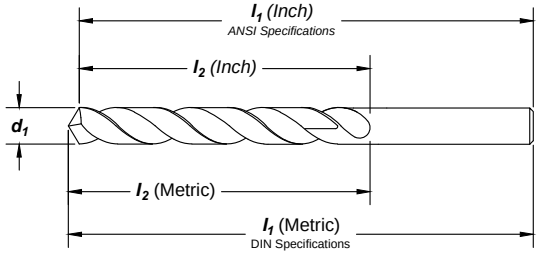
CLEVELAND

Style: 2510

General Purpose

Note
Operating parameters: See Technical section

ASME B94.11M | DIN 340 | HSS | 118° | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Black Oxide



Feature:
General purpose with longer length for added reach.

drill diameter				overall length		flute length		order number
	d_1		decimal	l_1		l_2		2510
fraction	wire	mm	equiv.	in	mm	in	mm	black oxide
		1.0	.0394		56.00		33.00	C08592
	60		.0400	2.250		1.125		C08593
	59		.0410	2.250		1.125		C08594
	58		.0420	2.250		1.125		C08596
	57		.0430	2.250		1.125		C08597
	56		.0465	2.250		1.125		C08600
3/64			.0469	2.250		1.125		C08601
		1.25	.0492		65.00		41.00	C08603
	55		.0520	3.000		1.750		C08605
	54		.0550	3.000		1.750		C08607
	53		.0595	3.000		1.750		C08611
		1.55	.0610		70.00		45.00	C08612
1/16			.0625	3.000		1.750		C08613
	52		.0635	3.750		2.000		C08615
	51		.0670	3.750		2.000		C08618
	50		.0700	3.750		2.000		C08620
	49		.0730	3.750		2.000		C08623
	48		.0760	3.750		2.000		C08625
5/64			.0781	3.750		2.000		C08627
	47		.0785	4.250		2.250		C08628
		2.0	.0787		85.00		56.00	C08629
	46		.0810	4.250		2.250		C08631
	45		.0820	4.250		2.250		C08632
	44		.0860	4.250		2.250		C08635
	43		.0890	4.250		2.250		C08638
		2.35	.0925		90.00		59.00	C08640
	42		.0935	4.250		2.250		C08641
3/32			.0938	4.250		2.250		C08642
		2.4	.0945		95.00		62.00	C08643
	41		.0960	4.625		2.500		C08644
	40		.0980	4.625		2.500		C08646
	39		.0995	4.625		2.500		C08648
	38		.1015	4.625		2.500		C08649

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆				

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	wire	mm	decimal equiv.	overall length l_1 in	mm	flute length l_2 in	mm	order number 2510 black oxide
	37		.1040	4.625		2.500		C08651
	36		.1065	4.625		2.500		C08653
7/64			.1094	4.625		2.500		C08655
	35		.1100	5.125		2.750		C08656
		2.8	.1102		100.00		66.00	C08578
	34		.1110	5.125		2.750		C08658
	33		.1130	5.125		2.750		C08659
	32		.1160	5.125		2.750		C08661
		3.0	.1181		100.00		66.00	C08662
	31		.1200	5.125		2.750		C08663
1/8			.1250	5.125		2.750		C08665
		3.2	.1260		106.00		69.00	C08666
	30		.1285	5.375		3.000		C08668
		3.3	.1299		106.00		69.00	C08669
	29		.1360	5.375		3.000		C08671
		3.5	.1378		112.00		73.00	C08582
	28		.1405	5.375		3.000		C08673
9/64			.1406	5.375		3.000		C08674
	27		.1440	5.375		3.000		C08676
	26		.1470	5.375		3.000		C08678
	25		.1495	5.375		3.000		C08680
	24		.1520	5.375		3.000		C08682
	23		.1540	5.375		3.000		C08684
5/32			.1562	5.375		3.000		C08685
	22		.1570	5.750		3.375		C08686
		4.0	.1575		119.00		78.00	C08687
	21		.1590	5.750		3.375		C08688
	20		.1610	5.750		3.375		C08689
		4.2	.1654		119.00		78.00	C08587
	19		.1660	5.750		3.375		C08692
	18		.1695	5.750		3.375		C08695
11/64			.1719	5.750		3.375		C08696
	17		.1730	5.750		3.375		C08697
	16		.1770	5.750		3.375		C08699
	15		.1800	5.750		3.375		C08701
	14		.1820	5.750		3.375		C08703
	13		.1850	5.750		3.375		C08704
3/16			.1875	5.750		3.375		C08707
	12		.1890	6.000		3.625		C08708
	11		.1910	6.000		3.625		C08710
	10		.1935	6.000		3.625		C08712
	9		.1960	6.000		3.625		C08713
		5.0	.1969		132.00		87.00	C08714
	8		.1990	6.000		3.625		C08715
	7		.2010	6.000		3.625		C08717
13/64			.2031	6.000		3.625		C08718
	6		.2040	6.000		3.625		C08719
	5		.2055	6.000		3.625		C08721
	4		.2090	6.000		3.625		C08724
	3		.2130	6.000		3.625		C08726
7/32			.2188	6.000		3.625		C08728
	2		.2210	6.125		3.750		C08730
	1		.2280	6.125		3.750		C08733
		5.8	.2283		139.00		91.00	C08608
		5.9	.2323		139.00		91.00	C08735
15/64			.2344	6.125		3.750		C08737

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drill diameter d_1 fraction	wire	mm	decimal equiv.	overall length l_1 in	mm	flute leng th l_2 in	mm	order number 2510 black oxide
		6.0	.2362		139.00		91.00	C08738
	D		.2460	6.125		3.750		C08743
		6.3	.2480		148.00		97.00	C08745
1/4	E		.2500	6.125		3.750		C08746
		6.5	.2559		148.00		97.00	C08749
	F		.2570	6.250		3.875		C08750
17/64			.2656	6.250		3.875		C08752
		6.8	.2677		156.00		102.00	C08755
	I		.2720	6.250		3.875		C08757
		7.0	.2756		156.00		102.00	C08758
	J		.2770	6.250		3.875		C08759
9/32			.2812	6.250		3.875		C08766
		7.5	.2953		156.00		102.00	C08609
19/64			.2969	6.375		4.000		C08770
	N		.3020	6.375		4.000		C08772
5/16			.3125	6.375		4.000		C08777
		8.0	.3150		165.00		109.00	C08778
	O		.3160	6.500		4.125		C08779
	P		.3230	6.500		4.125		C08782
21/64			.3281	6.500		4.125		C08785
	Q		.3320	6.500		4.125		C08787
		8.5	.3346		165.00		109.00	C08788
	R		.3390	6.500		4.125		C08790
11/32			.3438	6.500		4.125		C08792
		9.0	.3543		175.00		115.00	C08797
23/64			.3594	6.750		4.250		C08800
3/8			.3750	6.750		4.250		C08807
	V		.3770	7.000		4.375		C08808
25/64			.3906	7.000		4.375		C08815
		10.0	.3937		184.00		121.00	C08816
		10.2	.4016		184.00		121.00	C08818
13/32			.4062	7.000		4.375		C08821
		10.5	.4134		184.00		121.00	C08823
27/64			.4219	7.250		4.625		C08824
		11.0	.4331		195.00		128.00	C08826
7/16			.4375	7.250		4.625		C08827
		11.2	.4409		195.00		128.00	C08828
29/64			.4531	7.500		4.750		C08830
15/32			.4688	7.500	190.50	4.750	120.65	C08832
		12.0	.4724		205.00		134.00	C08833
31/64			.4844	7.750		4.750		C08835
		12.5	.4921		205.00		134.00	C08610
1/2			.5000	7.750		4.750		C08837
		13.0	.5118		205.00		134.00	C08839
33/64			.5156	8.000		4.750		C08840
17/32			.5312	8.000		4.750		C08842
35/64			.5469	8.250		4.875		C08845

continued on next page

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆				

☆ = Best Performance ✦ = Acceptable

CLEVELAND

General Purpose

Style: 2510 (continued)

Taper Length

High Speed Steel

drill diameter d_1 fraction	wire	mm	decimal equiv.	overall length l_1 in	mm	flute length l_2 in	mm	order number 2510 black oxide
		14.0	.5512		214.00		140.00	C08846
9/16			.5625	8.250		4.875		C08848
37/64			.5781	8.750		4.875		C08850
		15.0	.5906		220.00		144.00	C08852
19/32			.5938	8.750		4.875		C08853
39/64			.6094	8.750		4.875		C08855
5/8			.6250	8.750		4.875		C08858
		16.0	.6299		227.00		149.00	C08859
41/64			.6406	9.000		5.125		C08861
21/32			.6562	9.000		5.125		C08863
		17.0	.6693		235.00		149.00	C08865
43/64			.6719	9.250		5.375		C08866
11/16			.6875	9.250		5.375		C08868
45/64			.7031	9.500		5.625		C08870
		18.0	.7087		241.00		143.00	C08871
23/32			.7188	9.500		5.625		C08872
47/64			.7344	9.750		5.875		C08874
3/4			.7500	9.750		5.875		C08876
49/64			.7656	9.875		6.000		C08877
25/32			.7812	9.875		6.000		C08879
		20.0	.7874		254.00		156.00	C08880
51/64			.7969	10.000		6.125		C08881
13/16			.8125	10.000		6.125		C08883
53/64			.8281	10.000		6.125		C08885
27/32			.8438	10.000		6.125		C08886
55/64			.8594	10.000		6.125		C08888
7/8			.8750	10.000		6.125		C08890
57/64			.8906	10.000		6.125		C08892
29/32			.9062	10.000		6.125		C08894
59/64			.9219	10.750		6.125		C08895
15/16			.9375	10.750		6.125		C08897
61/64			.9531	11.000		6.375		C08899
31/32			.9688	11.000		6.375		C08901
63/64			.9844	11.000		6.375		C08903
1			1.0000	11.000		6.375		C08904

General Purpose

SET

Style: 2510

no. of pieces	surface treatment	size range	order number 2510
29	black oxide	1/16" through 1/2" x 1/64"	C00962

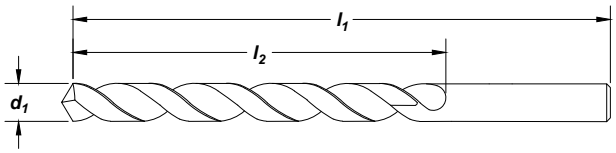
Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆				

☆ = Best Performance ✦ = Acceptable

Note
Operating parameters: See Technical section

ASME B94.11M | HSS | 118° | Helix High 35° to 45° | Straight Shank | Surface Treatment: Bright



Feature:
Fast spiral aids chip removal in softer materials.

drill diameter d_1 fraction	wire	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 2550
1/32		.0312	1.625	.750	C09060
	60	.0400	2.250	1.125	C09062
	57	.0430	2.250	1.125	C09066
	56	.0465	2.250	1.125	C09069
3/64		.0469	2.250	1.125	C09070
	55	.0520	3.000	1.750	C09074
	54	.0550	3.000	1.750	C09076
	53	.0595	3.000	1.750	C09080
1/16		.0625	3.000	1.750	C09082
	51	.0670	3.750	2.000	C09087
	50	.0700	3.750	2.000	C09089
	49	.0730	3.750	2.000	C09092
	48	.0760	3.750	2.000	C09094
5/64		.0781	3.750	2.000	C09096
	47	.0785	4.250	2.250	C09097
	46	.0810	4.250	2.250	C09100
	45	.0820	4.250	2.250	C09101
	44	.0860	4.250	2.250	C09104
	43	.0890	4.250	2.250	C09107
	42	.0935	4.250	2.250	C09110
3/32		.0938	4.250	2.250	C09111
	41	.0960	4.625	2.500	C09113
	40	.0980	4.625	2.500	C09115
	39	.0995	4.625	2.500	C09117
	38	.1015	4.625	2.500	C09118
	37	.1040	4.625	2.500	C09120
	36	.1065	4.625	2.500	C09122
7/64		.1094	4.625	2.500	C09124
	35	.1100	5.125	2.750	C09125
	33	.1130	5.125	2.750	C09128
	32	.1160	5.125	2.750	C09130
	31	.1200	5.125	2.750	C09132
1/8		.1250	5.125	2.750	C09134
	30	.1285	5.375	3.000	C09137

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		☆							☆			

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	wire	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 2550
	29	.1360	5.375	3.000	C09140
9/64		.1406	5.375	3.000	C09143
	27	.1440	5.375	3.000	C09145
	26	.1470	5.375	3.000	C09147
5/32		.1562	5.375	3.000	C09154
	21	.1590	5.750	3.375	C09157
	20	.1610	5.750	3.375	C09158
11/64		.1719	5.750	3.375	C09165
	16	.1770	5.750	3.375	C09168
	15	.1800	5.750	3.375	C09170
3/16		.1875	5.750	3.375	C09176
	11	.1910	6.000	3.625	C09179
	10	.1935	6.000	3.625	C09181
	8	.1990	6.000	3.625	C09184
	7	.2010	6.000	3.625	C09186
13/64		.2031	6.000	3.625	C09187
	3	.2130	6.000	3.625	C09195
7/32		.2188	6.000	3.625	C09197
	1	.2280	6.125	3.750	C09202
15/64		.2344	6.125	3.750	C09205
1/4		.2500	6.125	3.750	C09211
5/16		.3125	6.375	4.000	C09234
3/8		.3750	6.750	4.250	C09257
7/16		.4375	7.250	4.625	C09271
1/2		.5000	7.750	4.750	C09281

Material Reference

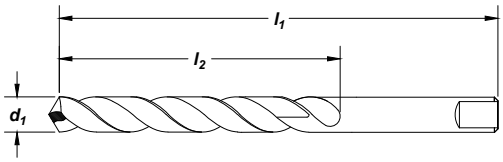
	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		☆							☆			

☆ = Best Performance ✦ = Acceptable

Style: 2513

Note
Operating parameters: See Technical section

ASME B94.11M | M42 Cobalt | 118° K-Notch | Helix Regular 21° to 34° | Straight Shank Tang | Surface Treatment: Straw Oxide



Feature:
Highly heat resistant substrate for tough to machine materials.

drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 2513
1/8	.1250	5.125	3.375	C14873
9/64	.1406	5.375	3.625	C14882
5/32	.1562	5.375	3.750	C14893
3/16	.1875	5.750	4.125	C14915
7/32	.2188	6.000	4.375	C14935
1/4	.2500	6.125	4.813	C14954
9/32	.2812	6.250	5.000	C14973
5/16	.3125	6.375	5.125	C14984
11/32	.3438	6.500	5.250	C14999
23/64	.3594	6.750	5.375	C15007
3/8	.3750	6.750	5.375	C15014
13/32	.4062	7.000	5.625	C15028
27/64	.4219	7.250	5.688	C15031
7/16	.4375	7.250	5.688	C15034
29/64	.4531	7.500	5.750	C15037
15/32	.4688	7.500	5.750	C15039
31/64	.4844	7.750	5.750	C15042
1/2	.5000	7.750	5.750	C15044

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw	✦		☆		✦	☆		✦	☆				

☆ = Best Performance ✦ = Acceptable

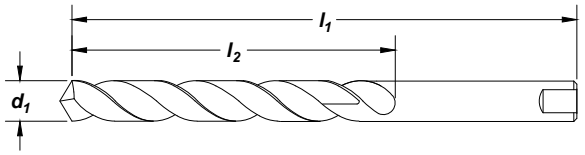
Automotive, Tanged Shank
Heavy Duty

Style: 2540

CLEVELAND

Note
Operating parameters: See Technical section

ASME B94.11M | HSS | 118° K-Notch | Helix Regular 21° to 34° | Straight Shank Tang | Surface Treatment: Black Oxide



Feature:
Heavy duty design with long length for extended reach application.

drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 2540
1/8	.1250	5.125	3.375	C09443
5/32	.1562	5.375	3.750	C09455
3/16	.1875	5.750	4.125	C09467
7/32	.2188	6.000	4.375	C09478
1/4	.2500	6.125	4.813	C09490
9/32	.2812	6.250	5.000	C09504
5/16	.3125	6.375	5.125	C09513
11/32	.3438	6.500	5.250	C09524
3/8	.3750	6.750	5.375	C09536
13/32	.4062	7.000	5.625	C09545
7/16	.4375	7.250	5.688	C09550
29/64	.4531	7.500	5.750	C09553
15/32	.4688	7.500	5.750	C09555
1/2	.5000	7.750	5.750	C09560
33/64	.5156	8.000	6.000	C09563
17/32	.5312	8.000	6.000	C09565
9/16	.5625	8.250	6.250	C09571
19/32	.5938	8.750	6.500	C09576
5/8	.6250	8.750	6.500	C09581

Tech Tips

Heavy Duty Automotive Tang Taper Length Drills

- These drills feature a 20% longer flute length than regular taper length drills for increased regrinds and reach.

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Black Oxide	✦		☆		☆			✦	☆				

☆ = Best Performance ✦ = Acceptable

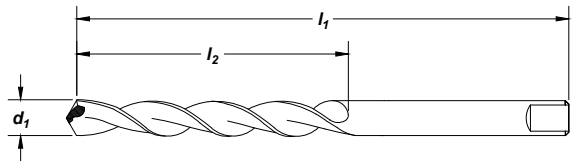
CLEVELAND

Styles: 2565, 2565-TN

Note
Operating parameters: See Technical section
Adjust the parameters as follows: double the given feed rate.

ASME B94.11M | HSS | 118° K-Notch | Helix High 35° to 45° | Straight Shank Tang

Surface Treatment: Bright | TiN



Feature:
Excels in deep hole drilling without pecking in softer, free machining materials. Drill up to 10x diameter without pecking. Taper length for extended reach. Standard with automotive tang.

drill diameter d_1 fraction	wire/let	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 2565 bright	2565-TN TiN
1/16		.0625	3.000	1.750	C16058	C05105
	50	.0700	3.750	2.000	C16269	–
5/64		.0781	3.750	2.000	C16059	–
	47	.0785	4.250	2.250	C16266	–
	43	.0890	4.250	2.250	C16262	–
	42	.0935	4.250	2.250	C16261	–
3/32		.0938	4.250	2.250	C16060	C05118
	40	.0980	4.625	2.500	–	C05120
	37	.1040	4.625	2.500	C16256	C05123
	36	.1065	4.625	2.500	C16255	–
7/64		.1094	4.625	2.500	C16061	–
	33	.1130	5.125	2.750	C16252	–
1/8		.1250	5.125	2.750	C16062	C05131
	30	.1285	5.375	3.000	C16249	–
	29	.1360	5.375	3.000	C16248	–
9/64		.1406	5.375	3.000	C16063	–
	26	.1470	5.375	3.000	C16245	–
	25	.1495	5.375	3.000	C16244	–
5/32		.1562	5.375	3.000	C16064	C05141
	21	.1590	5.750	3.375	C16240	–
	20	.1610	5.750	3.375	C16239	–
11/64		.1719	5.750	3.375	C16065	–
	16	.1730	5.750	3.375	C16235	–
	15	.1770	5.750	3.375	C16234	–
	13	.1820	5.750	3.375	–	C05152
3/16		.1875	5.750	3.375	C16066	C05153
	12	.1890	6.000	3.625	–	C05154
	10	.1935	6.000	3.625	C16229	–
	9	.1960	6.000	3.625	C16228	–
	7	.2010	6.000	3.625	C16226	–

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		✦		✦					☆			
TiN	☆		☆		☆								

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	wire/let	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 2565 bright	2565-TN TiN
13/64		.2031	6.000	3.625	C16067	C05160
	3	.2130	6.000	3.625	C16222	–
7/32		.2188	6.000	3.625	C16068	C05165
15/64		.2344	6.125	3.750	C16069	–
1/4	E	.2500	6.125	3.750	C16070	C05173
17/64		.2656	6.250	3.875	C16071	C05176
9/32		.2812	6.250	3.875	C16072	C05181
19/64		.2969	6.375	4.000	C16073	C05184
5/16		.3125	6.375	4.000	C16074	–
21/64		.3281	6.500	4.125	C16075	C05187
11/32		.3438	6.500	4.125	C16076	C05190
23/64		.3594	6.750	4.250	C16077	C05193
3/8		.3750	6.750	4.250	C16078	C05195
25/64		.3906	7.000	4.375	C16079	C05198
13/32		.4062	7.000	4.375	C16080	C05201
27/64		.4219	7.250	4.625	C16081	C05203
7/16		.4375	7.250	4.625	C16082	C05204
29/64		.4531	7.500	4.750	C16083	C05205
15/32		.4688	7.500	4.750	C16084	C05206
31/64		.4844	7.750	4.750	C16085	C05207
1/2		.5000	7.750	4.750	C16086	–

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		✦		✦					☆			
TiN	☆		☆		☆								

☆ = Best Performance ✦ = Acceptable

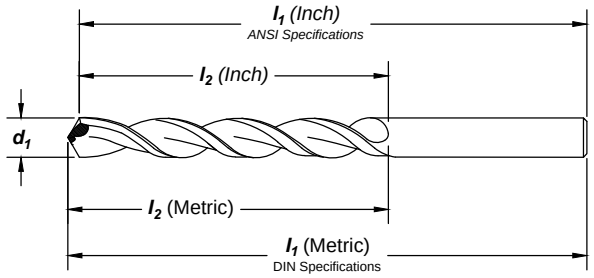
CLEVELAND

Styles: 2575, 2575-TN, 2575-TA

Note
Operating parameters: See Technical section

ASME B94.11M | DIN 340 | M42 Cobalt | 135° Split | Helix High 35° to 45° | Straight Shank

Surface Treatment: Straw Oxide | TiN | TiAlN



Feature:

Effective deep hole drilling in a wide array of materials. Available coating for extended tool life and productivity. Longer design for deeper holes and extended reach.

drill diameter d1 fraction	wire/let	mm	decimal equiv.	overall length l1 in	mm	flute length l2 in	mm	order number 2575 straw oxide	2575-TN TiN	2575-TA TiAlN
		*1.50	.0591		76.00		44.00	C16805	C16914	C18805
1/16			.0625	3.000		1.750		C16776	C16885	–
	52		.0635	3.750		2.000		C16775	C16884	–
		1.70	.0669		76.00		50.00	–	–	C18807
	51		.0670	3.750		2.000		C16774	C16883	–
	50		.0700	3.750		2.000		C16773	C16882	–
	49		.0730	3.750		2.000		C16772	C16881	–
	48		.0760	3.750		2.000		C16771	C16880	–
5/64			.0781	3.750		2.000		C16777	C16886	–
	47		.0785	4.250		2.250		C16770	C16879	–
		2.00	.0787		108.00		57.00	C16806	C16915	C18810
	46		.0810	4.250		2.250		C16769	C16878	–
	45		.0820	4.250		2.250		C16768	C16877	–
	44		.0860	4.250		2.250		C16767	C16876	–
		2.20	.0866		90.00		59.00	–	–	C18812
	43		.0890	4.250		2.250		C16766	C16875	–
	42		.0935	4.250		2.250		C16765	C16874	–
3/32			.0938	4.250		2.250		C16778	C16887	–
	41		.0960	4.625		2.500		C16764	C16873	–
	40		.0980	4.625		2.500		C16763	C16872	–
		2.50	.0984		117.00		64.00	C16807	C16916	C18815
	39		.0995	4.625		2.500		C16762	C16871	–
	38		.1015	4.625		2.500		C16761	C16870	–
	37		.1040	4.625		2.500		C16760	C16869	–
	36		.1065	4.625		2.500		C16759	C16868	–
7/64			.1094	4.625		2.500		C16779	C16888	–
	35		.1100	5.125		2.750		C16758	C16867	–
	34		.1110	5.125		2.750		C16757	C16866	–
	33		.1130	5.125		2.750		C16756	C16865	–

*Not split point.

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Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw										☆			
TiN	✦		✦		✦	✦		✦	✦				
TiAlN	☆		☆		☆	☆		☆	☆				

☆ = Best Performance ✦ = Acceptable

drill diameter d_1 fraction	drill diameter d_1 wire/let	drill diameter d_1 mm	decimal equiv.	overall length l_1 in	overall length l_1 mm	flute length l_2 in	flute length l_2 mm	order number 2575 straw oxide	order number 2575-TN TiN	order number 2575-TA TiAlN
	32		.1160	5.125		2.750		C16755	C16864	–
		3.00	.1181		130.00		70.00	C16808	C16917	–
	31		.1200	5.125		2.750		C16754	C16863	–
1/8			.1250	5.125		2.750		C16780	C16889	–
	30		.1285	5.375		3.000		C16753	C16862	–
	29		.1360	5.375		3.000		C16752	C16861	–
		3.50	.1378		137.00		76.00	C16809	C16918	–
	28		.1405	5.375		3.000		C16751	C16860	–
9/64			.1406	5.375		3.000		C16781	C16890	–
	27		.1440	5.375		3.000		C16750	C16859	–
	26		.1470	5.375		3.000		C16749	C16858	–
	25		.1495	5.375		3.000		C16748	C16857	–
	24		.1520	5.375		3.000		C16747	C16856	–
	23		.1540	5.375		3.000		C16746	C16855	–
5/32			.1562	5.375		3.000		C16782	C16891	–
	22		.1570	5.750		3.375		C16745	C16854	–
		4.00	.1575		146.00		86.00	C16810	C16919	–
	21		.1590	5.750		3.375		C16744	C16853	–
	20		.1610	5.750		3.375		C16743	C16852	–
	19		.1660	5.750		3.375		C16742	C16851	–
	18		.1695	5.750		3.375		C16741	C16850	–
11/64			.1719	5.750		3.375		C16783	C16892	–
	17		.1730	5.750		3.375		C16740	C16849	–
	16		.1770	5.750		3.375		C16739	C16848	–
		4.50	.1772		126.00		82.00	C16811	C16920	–
	15		.1800	5.750		3.375		C16738	C16847	–
	14		.1820	5.750		3.375		C16737	C16846	–
	13		.1850	5.750		3.375		C16736	C16845	–
3/16			.1875	5.750		3.375		C16784	C16893	–
	12		.1890	6.000		3.625		C16735	C16844	–
	11		.1910	6.000		3.625		C16734	C16843	–
	10		.1935	6.000		3.625		C16733	C16842	–
	9		.1960	6.000		3.625		C16732	C16841	–
		5.00	.1969		152.00		92.00	C16812	C16921	–
	8		.1990	6.000		3.625		C16731	C16840	–
	7		.2010	6.000		3.625		C16730	C16839	–
13/64			.2031	6.000		3.625		C16785	C16894	–
	6		.2040	6.000		3.625		C16729	C16838	–
		5.20	.2047		152.00		92.00	C16813	C16922	–
	5		.2055	6.000		3.625		C16728	C16837	–
	4		.2090	6.000		3.625		C16727	C16836	–
	3		.2130	6.000		3.625		C16726	C16835	–
		5.50	.2165		152.00		92.00	C16814	C16923	–
7/32			.2188	6.000		3.625		C16786	C16895	–
		5.60	.2205		156.00		95.00	C16815	C16924	–
	2		.2210	6.125		3.750		C16725	C16834	–
	1		.2280	6.125		3.750		C16724	C16833	–
15/64			.2344	6.125		3.750		C16787	C16896	–
		6.00	.2362		156.00		95.00	C16816	C16925	–
1/4			.2500	6.125		3.750		C16788	C16897	–
		6.50	.2559		159.00		98.00	C16817	C16926	–
17/64			.2656	6.250		3.875		C16789	C16898	–
		6.80	.2677		159.00		98.00	C16818	C16927	–
		7.00	.2756		159.00		98.00	C16819	C16928	–
9/32			.2812	6.250		3.875		C16790	C16899	–

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drill diameter				overall length		flute length		order number		
	d_1		decimal	l_1		l_2		2575	2575-TN	2575-TA
fraction	wire/let	mm	equiv.	in	mm	in	mm	straw oxide	TiN	TiAlN
		7.50	.2953		162.00		102.00	C16820	C16929	–
19/64			.2969	6.375		4.000		C16791	C16900	–
5/16			.3125	6.375		4.000		C16792	C16901	–
		8.00	.3150		165.00		105.00	C16821	C16930	–
		8.20	.3228		165.00		105.00	C16822	C16931	–
21/64			.3281	6.500		4.125		C16793	C16902	–
		8.50	.3346		165.00		105.00	C16823	C16932	–
		8.60	.3386		165.00		105.00	C16824	C16933	–
11/32			.3438	6.500		4.125		C16794	C16903	–
		9.00	.3543		171.00		108.00	C16825	C16934	–
23/64			.3594	6.750		4.250		C16795	C16904	–
		9.50	.3740		171.00		108.00	C16826	C16935	–
3/8			.3750	6.750		4.250		C16796	C16905	–
25/64			.3906	7.000		4.375		C16797	C16906	–
		10.00	.3937		178.00		111.00	C16827	C16936	–
13/32			.4062	7.000		4.375		C16798	C16907	–
		10.50	.4134		184.00		117.00	C16828	C16937	–
27/64			.4219	7.250		4.625		C16799	C16908	–
		11.00	.4331		184.00		117.00	C16829	C16938	–
7/16			.4375	7.250		4.625		C16800	C16909	–
		11.50	.4528		190.00		121.00	C16830	C16939	–
29/64			.4531	7.500		4.750		C16801	C16910	–
15/32			.4688	7.500		4.750		C16802	C16911	–
		12.00	.4724		190.00		121.00	C16831	C16940	–
31/64			.4844	7.750		4.750		C16803	C16912	–
		12.50	.4921		190.00		121.00	C16832	C16941	–
1/2			.5000	7.750		4.750		C16804	C16913	–

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw										☆			
TiN	✦		✦		✦	✦		✦	✦				
TiAlN	☆		☆		☆	☆		☆	☆				

☆ = Best Performance ✦ = Acceptable

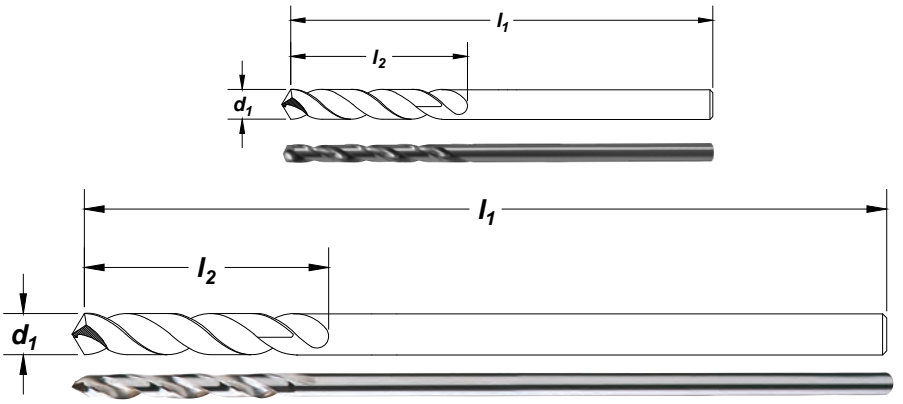
Aircraft NAS 907, Type B
6" & 12" Extension

Styles: 3957-6, 3957-12

CLEVELAND

Note
Operating parameters: See Technical section

HSS | NAS 907 TYPE B | 135° Split | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Bright



Feature:
Ideal for long reach drilling applications.

drill diameter d_1 fraction	drill diameter d_1 wire/letter	decimal equiv.	order number 3957-6 overall length l_1 (6.0 in)	order number 3957-12 overall length l_1 (12.0 in)	flute length l_2 (in)
*3/64		.0469	C13100	–	.750
1/16		.0625	C13101	C13176	.875
	52	.0635	C13174	–	.875
	51	.0670	C13173	–	1.000
	50	.0700	C13172	–	1.000
	49	.0730	C13171	–	1.000
	48	.0760	C13170	–	1.000
5/64		.0781	C13102	C13177	1.000
	47	.0785	C13169	–	1.125
	46	.0810	C13168	–	1.125
	45	.0820	C13167	–	1.125
	44	.0860	C13166	–	1.250
	43	.0890	C13165	–	1.250
	42	.0935	C13164	–	1.250
3/32		.0938	C13103	C13178	1.250
	41	.0960	C13163	–	1.375
	40	.0980	C13162	C13244	1.375
	39	.0995	C13161	C13243	1.375
	38	.1015	C13160	–	1.438
	37	.1040	C13159	–	1.438
	36	.1065	C13158	–	1.438
7/64		.1094	C13104	C13179	1.500
	35	.1100	C13157	–	1.500
	34	.1110	C13156	–	1.500
	33	.1130	C13155	–	1.500
	32	.1160	C13154	–	1.625
	31	.1200	C13153	C13242	1.625
1/8		.1250	C13105	C13180	1.625
	30	.1285	C13152	C13241	1.625
	29	.1360	C13151	C13240	1.750
	28	.1405	C13150	C13239	1.750
9/64		.1406	C13106	C13181	1.750
	27	.1440	C13149	C13238	1.875
	26	.1470	C13148	C13237	1.875
	25	.1495	C13147	C13236	1.875
	24	.1520	C13146	C13235	2.000
	23	.1540	C13145	–	2.000
5/32		.1562	C13107	C13182	2.000
	22	.1570	C13144	–	2.000
	21	.1590	C13143	C13234	2.125

**Not split point.*

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Styles: 3957-6, 3957-12 (continued)

drill diameter d_1 fraction	wire/letter	decimal equiv.	order number 3957-6 overall length l_1 (6.0 in)	3957-12 overall length l_1 (12.0 in)	flute length l_2 (in)
	20	.1610	C13142	C13233	2.125
	19	.1660	C13141	C13232	2.125
	18	.1695	C13140	–	2.125
11/64		.1719	C13108	C13183	2.125
	17	.1730	C13139	–	2.188
	16	.1770	C13138	C13231	2.188
	15	.1800	C13137	C13230	2.188
	14	.1820	C13136	–	2.188
	13	.1850	C13135	C13229	2.313
3/16		.1875	C13109	C13184	2.313
	12	.1890	C13134	C13228	2.313
	11	.1910	C13133	C13227	2.313
	10	.1935	C13132	C13226	2.438
	9	.1960	C13131	C13225	2.438
	8	.1990	C13130	C13224	2.438
	7	.2010	C13129	C13223	2.438
13/64		.2031	C13110	C13185	2.438
	6	.2040	C13128	C13222	2.500
	5	.2055	C13127	C13221	2.500
	4	.2090	C13126	–	2.500
	3	.2130	C13125	C13220	2.500
7/32		.2188	C13111	C13186	2.500
	2	.2210	C13124	C13219	2.625
	1	.2280	C13123	C13218	2.625
15/64		.2344	C13112	C13187	2.625
1/4	E	.2500	C13113	C13188	2.750
	F	.2570	C13122	–	2.875
17/64		.2656	–	C13189	2.625
17/64		.2656	C13245	–	2.875
9/32		.2812	C13114	C13190	3.063
19/64		.2969	–	C13191	3.063
5/16		.3125	C13115	C13192	3.188
	O	.3160	–	C13211	3.438
21/64		.3281	–	C13193	3.438
11/32		.3438	C13116	C13194	3.438
23/64		.3594	–	C13195	3.500
3/8		.3750	C13117	C13196	3.625
25/64		.3906	–	C13197	3.750
13/32		.4062	C13118	C13198	3.750
27/64		.4219	–	C13199	3.938
7/16		.4375	C13119	C13200	4.063
29/64		.4531	–	C13201	4.188
15/32		.4688	C13120	C13202	4.313
31/64		.4844	–	C13203	4.375
1/2		.5000	C13121	C13204	4.500

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		✦			✦		☆			

☆ = Best Performance ✦ = Acceptable

Aircraft NAS 907, Type J

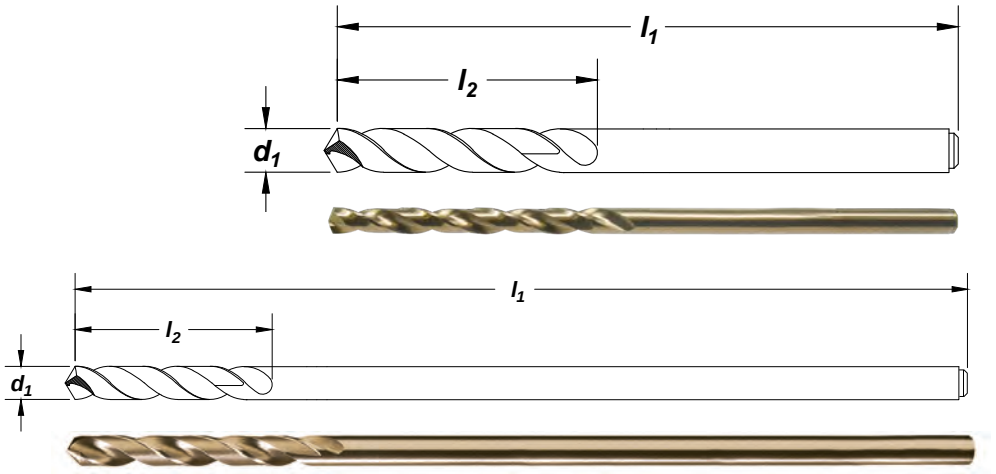
Heavy Duty

Style: 3722-6, 3722-12

CLEVELAND

Note
Operating parameters: See Technical section

M42 Cobalt | NAS 907 TYPE J | 135° Split | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Straw Oxide



Feature:
Highly heat resistant substrate for tough to machine materials. Extended length for long reach applications.

drill diameter d_1 fraction	drill diameter d_1 wire/letter	decimal equiv.	order number 3722-6 overall length l_1 (6.0 in)	order number 3722-12 overall length l_1 (12.0 in)	flute length l_2 (in)
	42	0.0935	C08100	—	1.250
3/32		0.0938	C08101	C08188	1.250
	41	0.0960	C08102	—	1.375
	40	0.0980	C08144	C08167	1.375
	39	0.0995	C08103	—	1.375
	38	0.1015	C08104	—	1.438
	37	0.1040	C08105	—	1.438
	36	0.1065	C08106	—	1.438
7/64		0.1094	C08107	C08168	1.500
	35	0.1100	C08108	—	1.500
	34	0.1110	C08109	—	1.500
	32	0.1160	C08110	—	1.625
	31	0.1200	C08111	—	1.625
1/8		0.1250	C08115	C08169	1.625
	30	0.1285	C08142	C08170	1.625
	29	0.1360	C08112	C08171	1.750
	28	0.1405	C08113	—	1.750
9/64		0.1406	C08114	C08172	1.750
	27	0.1440	C08140	C08173	1.875
	26	0.1470	C08145	—	1.875
	25	0.1495	C08146	—	1.875
	24	0.1520	C08147	—	2.000
	23	0.1540	C08148	—	2.000
5/32		0.1562	C08117	C08174	2.000
	22	0.1570	C08149	—	2.000
	21	0.1590	C08138	C08175	2.125
	20	0.1610	C08137	C08176	2.125
	19	0.1660	C08150	C08177	2.125
	18	0.1695	C08151	—	2.125
11/64		0.1719	C08152	C08178	2.125
	17	0.1730	C08153	—	2.188

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drill diameter d_1 fraction	wire/letter	decimal equiv.	order number 3722-6 l_1 (6.0 in)	3722-12 overall length l_1 (12.0 in)	flute length l_2 (in)
	16	0.1770	C08135	C08179	2.188
	15	0.1800	C08154	—	2.188
	14	0.1820	C08155	—	2.188
	13	0.1850	C08134	—	2.313
3/16		0.1875	C08119	C08180	2.313
	12	0.1890	C08156	—	2.313
	11	0.1910	C08133	C08181	2.313
	10	0.1935	C08132	C08182	2.438
	9	0.1960	C08157	—	2.438
	8	0.1990	C08130	—	2.438
	7	0.2010	C08158	—	2.438
13/64		0.2031	C08159	C08183	2.438
	6	0.2040	C08160	—	2.500
	5	0.2055	C08161	—	2.500
	4	0.2090	C08162	—	2.500
	3	0.2130	C08163	—	2.500
7/32		0.2188	C08121	C08184	2.500
	2	0.2210	C08164	C08185	2.625
	1	0.2280	C08165	—	2.625
15/64		0.2344	C08166	C08186	2.625
1/4		0.2500	C08123	C08187	2.750

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw	☆		☆		☆	☆	✦	✦	✦	☆	✦	✦	

☆ = Best Performance ✦ = Acceptable

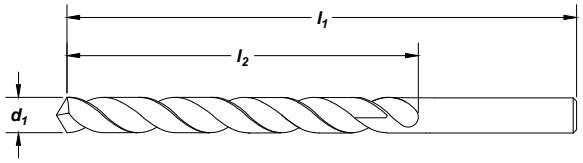
Extra Length
General Purpose

Style: 950E

CLEVELAND

Note
Operating parameters: See Technical section

ASME B94.11M | HSS | 118° K-Notch | Helix Regular 21° to 34° | Straight Shank | Surface Treatment: Black Oxide



Feature:
Extra length for long reach and deeper drilling depth.

drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 950E
3/32	.0938	8.000	5.500	C09655
7/64	.1094	8.000	5.500	C09656
1/8	.1250	8.000	5.500	C09657
1/8	.1250	10.000	7.500	C09707
1/8	.1250	12.000	9.000	C09736
9/64	.1406	8.000	5.500	C09658
5/32	.1562	8.000	5.500	C09659
5/32	.1562	10.000	7.500	C09709
5/32	.1562	12.000	9.000	C09738
11/64	.1719	8.000	5.500	C09660
3/16	.1875	8.000	5.500	C09661
3/16	.1875	10.000	7.500	C09711
3/16	.1875	12.000	9.000	C09740
13/64	.2031	8.000	5.500	C09662
7/32	.2188	8.000	5.500	C09663
7/32	.2188	10.000	7.500	C09713
7/32	.2188	12.000	9.000	C09742
15/64	.2344	8.000	5.500	C09664
15/64	.2344	10.000	7.500	C09714
1/4	.2500	8.000	5.500	C09665
1/4	.2500	10.000	7.500	C09715
1/4	.2500	12.000	9.000	C09744
17/64	.2656	8.000	5.500	C09666
9/32	.2812	8.000	5.500	C09667
9/32	.2812	10.000	7.500	C09717
9/32	.2812	12.000	9.000	C09746
19/64	.2969	8.000	5.500	C09668
5/16	.3125	8.000	5.500	C09669
5/16	.3125	10.000	7.500	C09719
5/16	.3125	12.000	9.000	C09748
21/64	.3281	8.000	5.500	C09670
11/32	.3438	8.000	5.500	C09671
11/32	.3438	10.000	7.500	C09721
11/32	.3438	12.000	9.000	C09750
23/64	.3594	8.000	5.500	C09672
3/8	.3750	8.000	5.500	C09673
3/8	.3750	10.000	7.500	C09723
3/8	.3750	12.000	9.000	C09752
25/64	.3906	8.000	5.500	C09674
13/32	.4062	8.000	5.500	C09675
13/32	.4062	10.000	7.500	C09725
13/32	.4062	12.000	9.000	C09754

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drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 950E
27/64	.4219	8.000	5.500	C09676
7/16	.4375	8.000	5.500	C09677
7/16	.4375	10.000	7.500	C09727
7/16	.4375	12.000	9.000	C09756
29/64	.4531	8.000	5.500	C09678
15/32	.4688	8.000	5.500	C09679
15/32	.4688	10.000	7.500	C09729
15/32	.4688	12.000	9.000	C09758
31/64	.4844	8.000	5.500	C09680
1/2	.5000	8.000	5.500	C09681
1/2	.5000	10.000	7.500	C09731
1/2	.5000	12.000	9.000	C09760
17/32	.5312	10.000	7.500	C09733
17/32	.5312	12.000	9.000	C09762
9/16	.5625	10.000	7.500	C09735
9/16	.5625	12.000	9.000	C09764
19/32	.5938	12.000	9.000	C09766
5/8	.6250	12.000	9.000	C09768
21/32	.6562	12.000	9.000	C09770
11/16	.6875	12.000	9.000	C09772
23/32	.7188	12.000	9.000	C09774
3/4	.7500	12.000	9.000	C09776

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Black Oxide	☆		☆					☆	✦				

☆ = Best Performance ✦ = Acceptable

Taper Shank

Standard, Undersized, & Oversized

Styles: 2410, 2411, 2412

CLEVELAND

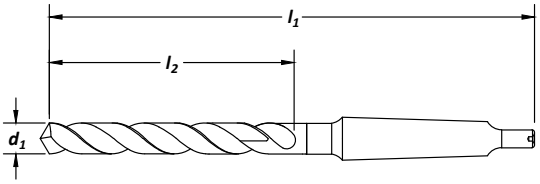
Note

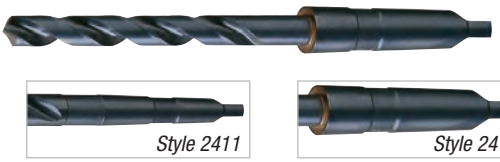
Undersized and oversized shank drills available from stock in popular sizes.

Operating parameters: See Technical section

Morse Taper Shank specs: See Technical section

ASME B94.11M | HSS | 118° | Helix Regular 21° to 34° | Taper Shank | Surface Treatment: Black Oxide





Style 2411 | Style 2412

Feature:

General purpose use in steel and iron.

drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	morse taper	order number 2410 standard	2411 undersized	2412 oversized
1/8	.1250	5.125	1.875	1	C12040	—	—
5/32	.1562	5.375	2.125	1	C12052	—	—
3/16	.1875	5.750	2.500	1	C12064	—	—
13/64	.2031	6.000	2.750	1	C12069	—	—
7/32	.2188	6.000	2.750	1	C12075	—	—
15/64	.2344	6.125	2.875	1	C12082	—	—
1/4-E	.2500	6.125	2.875	1	C12091	—	—
17/64	.2656	6.250	3.000	1	C12099	—	—
9/32	.2812	6.250	3.000	1	C12113	—	—
19/64	.2969	6.375	3.125	1	C12117	—	—
5/16	.3125	6.375	3.125	1	C12124	—	—
21/64	.3281	6.500	3.250	1	C12132	—	—
11/32	.3438	6.500	3.250	1	C12139	—	—
23/64	.3594	6.750	3.500	1	C12147	—	—
3/8	.3750	6.750	3.500	1	C12154	—	—
25/64	.3906	7.000	3.625	1	C12162	—	—
13/32	.4062	7.000	3.625	1	C12167	—	—
27/64	.4219	7.250	3.875	1	C12170	—	—
7/16	.4375	7.250	3.875	1	C12173	—	—
29/64	.4531	7.500	4.125	1	C12176	—	—
15/32	.4688	7.500	4.125	1	C12178	—	—
31/64	.4844	8.250	4.375	2	C12181	—	—
1/2	.5000	8.250	4.375	2	C12183	—	
1/2	.5000	7.750	4.375	1	—	C12483	—
33/64	.5156	8.500	4.625	2	C12186	—	—
17/32	.5312	8.500	4.625	2	C12188	—	—
35/64	.5469	8.750	4.875	2	C12191	—	—
9/16	.5625	8.750	4.875	2	C12194	—	—
37/64	.5781	8.750	4.875	2	C12196	—	—
19/32	.5938	8.750	4.875	2	C12199	—	—
39/64	.6094	8.750	4.875	2	C12201	—	—
5/8	.6250	8.750	4.875	2	C12204	—	—
41/64	.6406	9.000	5.125	2	C12207	—	—
21/32	.6562	9.000	5.125	2	C12209	—	—
43/64	.6719	9.250	5.375	2	C12212	—	—
11/16	.6875	9.250	5.375	2	C12214	—	—
11/16	.6875	10.000	5.375	3	—	—	C12670
45/64	.7031	9.500	5.625	2	C12216	—	—
23/32	.7188	9.500	5.625	2	C12218	—	—
47/64	.7344	9.750	5.875	2	C12220	—	—
3/4	.7500	9.750	5.875	2	C12222	—	—

continued on next page

drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	morse taper	order number 2410 standard	2411 undersized	2412 oversized
3/4	.7500	10.500	5.875	3	—	—	C12678
49/64	.7656	9.875	6.000	2	C12223	—	—
25/32	.7812	9.875	6.000	2	C12225	—	—
51/64	.7969	10.750	6.125	3	C12227	—	—
13/16	.8125	10.750	6.125	3	C12229	—	—
53/64	.8281	10.750	6.125	3	C12231	—	—
27/32	.8438	10.750	6.125	3	C12232	—	—
55/64	.8594	10.750	6.125	3	C12234	—	—
7/8	.8750	10.750	6.125	3	C12236	—	—
7/8	.8750	10.000	6.125	2	—	C12505	—
57/64	.8906	10.750	6.125	3	C12238	—	—
29/32	.9062	10.750	6.125	3	C12240	—	—
59/64	.9219	10.750	6.125	3	C12241	—	—
15/16	.9375	10.750	6.125	3	C12243	—	—
31/32	.9688	11.000	6.375	3	C12247	—	—
63/64	.9844	11.000	6.375	3	C12249	—	—
1	1.0000	11.000	6.375	3	C12250	—	—
1	1.0000	12.000	6.375	4	—	—	C12684
1-1/64	1.0156	11.125	6.500	3	C12252	—	—
1-1/32	1.0312	11.125	6.500	3	C12254	—	—
1-1/16	1.0625	11.250	6.625	3	C12257	—	—
1-1/16	1.0625	12.250	6.625	4	—	—	C12691
1-1/8	1.1250	12.750	7.125	4	C12265	—	—
1-1/8	1.1250	11.750	7.125	3	—	C12518	—
1-3/16	1.1875	13.000	7.375	4	C12272	—	—
1-1/4	1.2500	13.500	7.875	4	C12279	—	—
1-1/4	1.2500	12.500	7.875	3	—	C12532	—
1-5/16	1.3125	14.250	8.625	4	C12286	—	—
1-11/32	1.3438	14.375	8.750	4	C12290	—	—
1-3/8	1.3750	14.500	8.875	4	C12293	—	—
1-7/16	1.4375	14.750	9.125	4	C12301	—	—
1-15/32	1.4688	14.875	9.250	4	C12304	—	—
1-1/2	1.5000	15.000	9.375	4	C12308	—	—
1-17/32	1.5312	15.000	9.375	4	—	C12541	—
1-9/16	1.5625	16.625	9.625	5	C12315	—	—
1-5/8	1.6250	17.000	10.000	5	C12322	—	—
1-3/4	1.7500	17.125	10.125	5	C12336	—	—
1-3/4	1.7500	16.250	10.375	4	—	C12566	—
1-7/8	1.8750	17.375	10.375	5	C12351	—	—
2	2.0000	17.375	10.375	5	C12365	—	—

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Black Oxide	☆		☆					☆	✦				

☆ = Best Performance ✦ = Acceptable

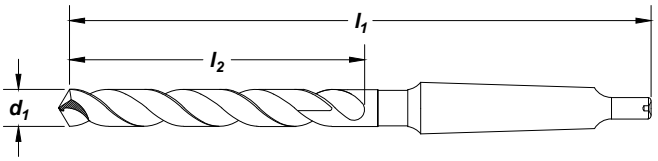
Cobalt
Heavy-Duty

Style: 2440

CLEVELAND

Note
Operating parameters: See Technical section
Morse Taper Shank specs: See Technical section

ASME B94.11M | M42 Cobalt | 135° MOD | Helix Regular 21° to 34° | Taper Shank | Surface Treatment: Straw Oxide

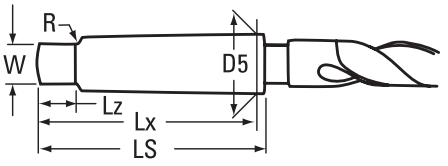


Feature:
Highly heat resistant substrate for tough to machine materials.

drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	morse taper	order number 2440
1/4	.2500	6.125	2.875	1	C12705
5/16	.3125	6.375	3.125	1	C12728
3/8	.3750	7.375	3.500	2	C12751
7/16	.4375	7.750	3.875	2	C12765
1/2	.5000	8.250	4.375	2	C12775
9/16	.5625	8.750	4.875	2	C12786
5/8	.6250	8.750	4.875	2	C12796
11/16	.6875	10.000	5.375	3	C12806
3/4	.7500	10.500	5.875	3	C12814
7/8	.8750	10.750	6.125	3	C12828
15/16	.9375	10.750	6.125	3	C12835
1	1.0000	11.000	6.375	3	C12842

Tech Tips

Morse Taper Shank Specifications



morse taper shank no.	taper per foot	taper per inch	**D5** max shank dia.	**LS** length of shank	**Lx** length of shank to gauge line	**Lz** length of tang	**W** thickness of tang	**R** radius
1	.5985	.0498	.475	2.56	2.44	.37	.20	.19
2	.5994	.0499	.700	3.12	2.94	.44	.25	.25
3	.6023102	.0501	.938	3.87	3.69	.56	.31	.28
4	.6232	.0519	1.231	4.87	4.62	.62	.47	.31
5	.6315	.0526	1.749	6.12	5.87	.75	.62	.37
6	.6256	.0521	2.494	8.56	8.25	1.12	.75	.50

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw	☆		☆		☆	☆	✦	☆	☆				

☆ = Best Performance ✦ = Acceptable

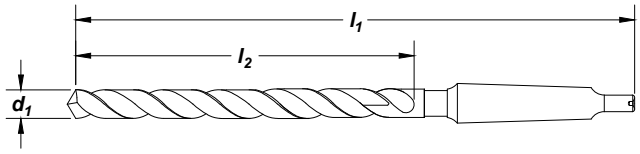
CLEVELAND

Style: 940E

Note
Operating parameters: See Technical section
Morse Taper Shank specs: See Technical section

ASME B94.11M | HSS | 118° K-Notch | Helix High 35° to 45° | Taper Shank

Surface Treatment — Black Oxide



Feature:
Extra length for long reach and deeper drilling depth.

drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	morse taper	order number 940E
31/64	.4844	11.875	8.000	2	C13830
1/2	.5000	11.875	8.000	2	C13831
33/64	.5156	11.875	8.000	2	C13832
17/32	.5312	11.875	8.000	2	C13833
35/64	.5469	11.875	8.000	2	C13834
9/16	.5625	11.875	8.000	2	C13835
37/64	.5781	11.875	8.000	2	C13836
19/32	.5938	11.875	8.000	2	C13837
5/8	.6250	11.875	8.000	2	C13839
41/64	.6406	11.875	8.000	2	C13840
21/32	.6562	11.875	8.000	2	C13841
43/64	.6719	11.875	8.000	2	C13842
11/16	.6875	11.875	8.000	2	C13843
45/64	.7031	11.875	8.000	2	C13844
23/32	.7188	11.875	8.000	2	C13845
3/4	.7500	11.875	8.000	2	C13847
49/64	.7656	11.875	8.000	2	C13848
25/32	.7812	11.875	8.000	2	C13849

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Black Oxide	☆		☆					☆	✦				

☆ = Best Performance ✦ = Acceptable

GREENFIELD INDUSTRIES *CUSTOMER SERVICE: telephone 800.348.2885 • fax 800.892.4290*

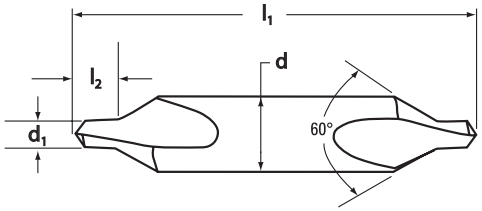
Combined Drill & Countersink

Style: 1798

CLEVELAND

Note
Operating parameters: See Technical section

ASME B94.11M | Carbide | **Surface Treatment** Bright



size number	drill diameter d_1 in	drill diameter d_1 decimal	body diameter d in	overall length l_1 in	drill length l_2 in	order number 1798
#1	3/64	.0469	.125	1.500	.0469	C52772
#2	5/64	.0781	.188	2.000	.0781	C52773
#3	7/64	.1094	.250	2.000	.1094	C52774
#4	1/8	.1250	.313	2.125	.1250	C52775
#5	3/16	.1875	.438	2.750	.1875	C52776
#6	7/32	.2188	.500	3.000	.2188	C52777

Material Reference

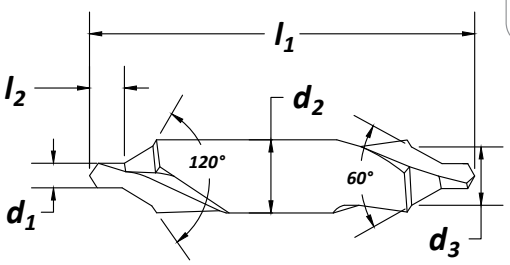
	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆	✦	☆	✦	✦	✦		☆	☆	☆			

☆ = Best Performance ✦ = Acceptable

Style: 996

Bell Type Drill & Countersink

Note
Bell-type tool forms protected centers.

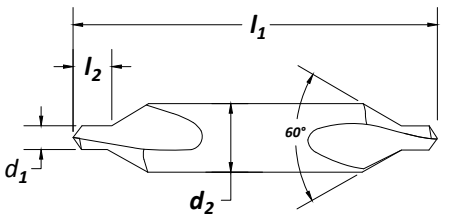


ASME B94.11M | HSS | 118° | Surface Treatment: Bright

size number	body diameter d_2 in	drill diameter d_1 in	drill diameter d_1 decimal	bell diameter d_3 in	overall length l_1 in	drill length l_2 in	order number 996
#11	.125	3/64	.0469	.100	1.250	.047	C46272
#12	.188	1/16	.0625	.150	1.875	.063	C46273
#13	.250	3/32	.0938	.200	2.000	.094	C46274
#14	.313	7/64	.1094	.250	2.125	.109	C46275
#15	.438	5/32	.1562	.350	2.750	.156	C46276
#16	.500	3/16	.1875	.400	3.000	.188	C46277
#17	.625	7/32	.2188	.500	3.250	.219	C46278
#18	.750	1/4	.2500	.600	3.500	.250	C46279

Style: 998

Plain Drill & Countersink



ASME B94.11M | HSS | 118° | Surface Treatment: Bright

size number	body diameter d_2 in	drill diameter d_1 in	drill diameter d_1 decimal	overall length l_1 in	drill length l_2 in	order number 998
#00	.125	.025	.0250	1.250	.030	C46261
#0	.125	1/32	.0312	1.250	.038	C46262
#1	.125	3/64	.0469	1.250	.047	C46263
#2	.188	5/64	.0781	1.875	.078	C46264
#3	.250	7/64	.1094	2.000	.109	C46265
#4	.313	1/8	.1250	2.125	.125	C46266
#5	.438	3/16	.1875	2.750	.188	C46267
#6	.500	7/32	.2188	3.000	.219	C46268
#7	.625	1/4	.2500	3.250	.250	C46269
#8	.750	5/16	.3125	3.500	.313	C46270

SET Style: 998

Plain Drill & Countersink

no. of pieces	size range	order number 998
5	#1 through #5	C00944

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆	☆			

☆ = Best Performance ✦ = Acceptable

Countersink & Deburring

Style: 3001

CLEVELAND

Countersink

Cobalt

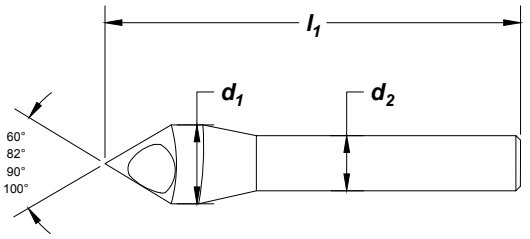
Note

All dimensions in inches.

Many tools are available with additional surface treatments. Please call for a quote.

Countersink and deburring tools are simple, all-purpose tools made of Cobalt that provide flawless countersinking and deburring. The chatter-free cutting action requires minimal power. The micro-smooth CNC precision ground construction produces clean, smooth cutting without smearing on a variety of materials. The tool especially excels in countersinking or deburring holes in aluminum, plastics and other nonmetallic.

M42 Cobalt | Straight Shank | Surface Treatment: Bright



Additional View

60° Countersink Angle

head diameter d_1	diameter of cut min	diameter of cut max	overall length l_1 (in)	shank diameter d_2 (in)	order no. 3001 bright
5/16	7/64	9/32	1-7/8	1/4	C94560
3/8	5/32	11/32	1-7/8	1/4	C94561
1/2	11/64	29/64	2	5/16	C94562
5/8	3/16	37/64	2-1/2	3/8	C94563
3/4	1/4	45/64	2-3/4	3/8	C94564
1	19/64	27/32	3	3/8	C94565
1-1/4	27/64	1-1/32	3-1/2	1/2	C94566

82° Countersink Angle

head diameter d_1	diameter of cut min	diameter of cut max	overall length l_1 (in)	shank diameter d_2 (in)	order no. 3001 bright
5/16	3/32	9/32	1-5/8	1/4	C94567
3/8	9/64	11/32	1-3/4	1/4	C94568
1/2	5/32	29/64	1-3/4	5/16	C94569
5/8	11/64	37/64	2-1/8	3/8	C94570
3/4	13/64	45/64	2-3/8	3/8	C94571
1	19/64	59/64	2-5/8	3/8	C94572
1-1/4	23/64	1-1/32	3-1/8	1/2	C94573

90° Countersink Angle

head diameter d_1	diameter of cut min	diameter of cut max	overall length l_1 (in)	shank diameter l_2 (in)	order no. 3001 bright
5/16	3/32	9/32	1-5/8	1/4	C94574
3/8	9/64	11/32	1-3/4	1/4	C94575
1/2	5/32	29/64	1-3/4	5/16	C94576
5/8	11/64	37/64	2-1/8	3/8	C94577
3/4	13/64	45/64	2-3/8	3/8	C94578
1	19/64	59/64	2-5/8	3/8	C94579
1-1/4	23/64	1-1/32	3-1/8	1/2	C94580

100° Countersink Angle

head diameter d_1	diameter of cut min	diameter of cut max	overall length l_1 (in)	shank diameter l_2 (in)	order no. 3001 bright
5/16	3/32	9/32	1-5/8	1/4	C94581
3/8	9/64	11/32	1-3/4	1/4	C94582
1/2	5/32	29/64	1-3/4	5/16	C94583
5/8	11/64	37/64	2-1/8	3/8	C94584
3/4	13/64	45/64	2-3/8	3/8	C94585
1	19/64	59/64	2-5/8	3/8	C94586
1-1/4	23/64	1-1/32	3-1/8	1/2	C94587

SET — Style: 3001 *4 Pieces*

angle	sizes	order number 3001
60°	5/16, 3/8, 1/2, 5/8	C94588
	C94560, C94561, C94562, C94563	
82°	5/16, 3/8, 1/2, 5/8	C94589
	C94567, C94568, C94569, C94570	
90°	5/16, 3/8, 1/2, 5/8	C94590
	C94574, C94575, C94576, C94577	
100°	5/16, 3/8, 1/2, 5/8	C94591
	C94581, C94582, C94583, C94584	

SET — Style: 3001 *5 Pieces*

angle	sizes	order number 3001
60°	5/16, 3/8, 1/2, 3/4, 1	C94592
	C94560, C94561, C94562, C94564, C94565	
82°	5/16, 3/8, 1/2, 3/4, 1	C94593
	C94567, C94568, C94569, C94571, C94572	
90°	5/16, 3/8, 1/2, 3/4, 1	C94594
	C94574, C94575, C94576, C94578, C94579	
100°	5/16, 3/8, 1/2, 3/4, 1	C94595
	C94581, C94582, C94583, C94585, C94586	

Material Reference

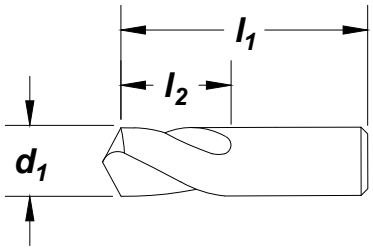
	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		✦					☆			

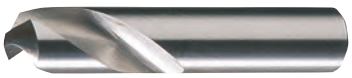
☆ = Best Performance ✦ = Acceptable

Style: 995

Note
Operating parameters: See Technical section

ASME B94.11M | HSS | 118° | Straight Shank | Surface Treatment: Bright





drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number 995
3/8	.3750	2.000	1.000	C11739
1/2	.5000	2.000	1.000	C11757
5/8	.6250	2.250	1.125	C11771
3/4	.7500	2.250	1.125	C11782
1	1.0000	2.500	1.250	C11796

Tech Tip

Using Spotting and Centering Drills

- Use these drills to get true and accurate centers.
- There is no body clearance on these drills to allow chucking close to the point. This features helps to maintain drill accuracy for centering.

Tech Tip

Point Angle: 90° versus 120°

- Use the 90° point spotting drill for a 118° point following drill.
- Use the 120° point spotting drill for a 135° following drill.

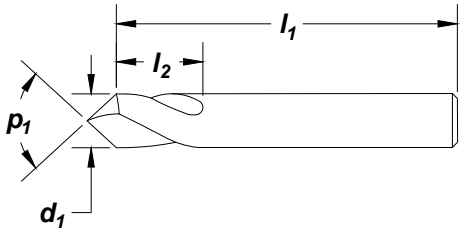
NEW

Spotting & Centering
Long

Style: 1799

Note
Operating parameters: See Technical section

ASME B94.11M | Carbide | Straight Shank | Surface Treatment: AlTiN



drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number p_1 -point angle 90°	120°	142°
1/8	0.1250	2	3/8	C46400	C46401	C46402
3/16	0.1875	3	3/4	C46403	C46404	C46405
1/4	0.2500	3	3/4	C46406	C46407	C46408
5/16	0.3125	2 1/2	1	C46409	C46410	C46411
3/8	0.3750	3	1	C46412	C46413	C46414
1/2	0.5000	4	1	C46415	C46416	C46417

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
AlTiN	☆		☆					☆	☆	✦			

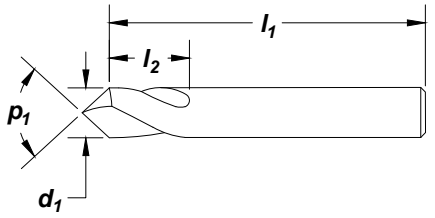
☆ = Best Performance ✦ = Acceptable

NC Spotting & Centering
Short

Style: 2636

Note
Operating parameters: See Technical section

ASME B94.11M | M42 Cobalt | 90° | 120° | Straight Shank | Surface Treatment: Straw Oxide

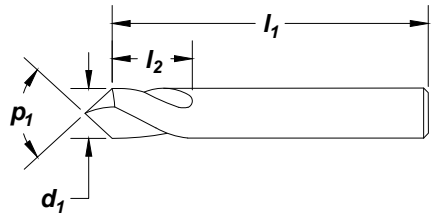


drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number p_1 - point angle 90°	120°
1/4	.2500	2.500	1.000	C26167	C26174
3/8	.3750	3.125	1.125	C26168	C26175
1/2	.5000	3.750	1.500	C26169	C26176
5/8	.6250	4.250	1.625	C26170	C26177
3/4	.7500	5.000	1.750	C26171	C26178
1	1.0000	6.000	1.750	C26172	C26179

NC Spotting & Centering
Long

Style: 2646

ASME B94.11M | M42 Cobalt | 90° | 120° | Straight Shank | Surface Treatment: Straw Oxide



drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number p_1 - point angle 90°	120°
1/4	.2500	4.000	1.000	C26181	C26188
3/8	.3750	5.000	1.125	C26182	C26189
1/2	.5000	6.000	1.500	C26183	C26190
5/8	.6250	7.125	1.625	C26184	C26191
3/4	.7500	8.000	1.750	C26185	C26192
1	1.0000	8.000	1.750	C26186	C26193

NC Spotting & Centering
Short and Long

SET **Style: 2636, 2646**

no. of pieces	point angle	size range	order number 2636	2646
6	90°	1/4" through 1"	C26173	C26187
6	120°	1/4" through 1"	C26180	C26194

6-Piece Set #C26173

Material Reference	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Straw	☆		☆		☆			☆	☆	☆	✦		

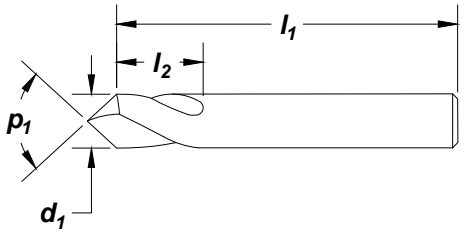
☆ = Best Performance ✦ = Acceptable

NC Spotting & Centering
Short

Style: 2635

Note
Operating parameters: See Technical section

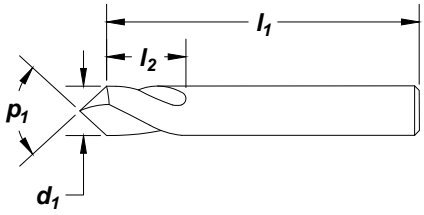
HSS | 90° | 120° | Straight Shank | Surface Treatment: Bright



drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number p_1 -point angle 90°	120°
1/4	.2500	2.500	1.000	C24167	C24174
3/8	.3750	3.125	1.125	C24168	C24175
1/2	.5000	3.750	1.500	C24169	C24176
5/8	.6250	4.250	1.625	C24170	C24177
3/4	.7500	5.000	1.750	C24171	C24178
1	1.0000	6.000	1.750	C24172	C24179

NC Spotting & Centering
Long

Style: 2645



drill diameter d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	order number p_1 - point angle 90°	120°
1/4	.2500	4.000	1.000	C24181	C24188
3/8	.3750	5.000	1.125	C24182	C24189
1/2	.5000	6.000	1.500	C24183	C24190
5/8	.6250	7.125	1.625	C24184	C24191
3/4	.7500	8.000	1.750	C24185	C24192
1	1.0000	8.000	1.750	C24186	C24193

NC Spotting & Centering
Short and Long

SET

Style: 2635, 2645

no. of pieces	point angle	size range	order number 2635	2645
6	90°	1/4" through 1"	C24173	C24187
6	120°	1/4" through 1"	C24180	C24194

6-Piece Set #C24187

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		✦			☆	☆	☆			

☆ = Best Performance ✦ = Acceptable

CLEVELAND

Countersink

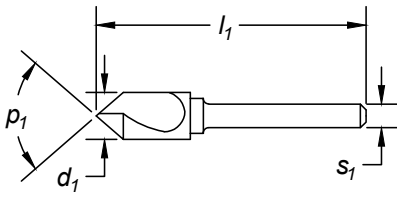
Carbide

Single Flute
Carbide Countersink

NEW

Style: 110C1

Carbide | Surface Treatment: Bright



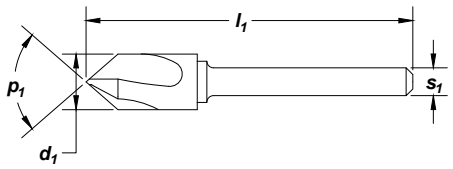
tool diameter d_1 (in) fraction	decimal	shank diameter s_1 (in)	overall length l_1 (in)	p_1 order number - 110C1 60° angle	82° angle	90° angle
1/8	.1250	1/8	1-1/2	C46320	C46328	C46336
3/16	.1875	3/16	2	C46321	C46329	C46337
1/4	.2500	1/4	2	C46322	C46330	C46338
3/8	.3750	1/4	2-5/8	C46323	C46331	C46339
1/2	.5000	1/4	2-7/8	C46324	C46332	C46340
5/8	.6250	3/8	3	C46325	C46333	C46341
3/4	.7500	1/2	3	C46326	C46334	C46342
1	1.000	1/2	2-3/4	C46327	C46335	C46343

3 Flute
Carbide Countersink

NEW

Style: 110C3

Carbide | Surface Treatment: Bright



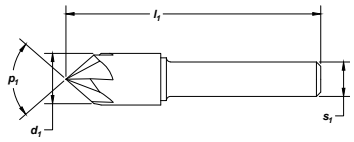
tool diameter d_1 (in) fraction	decimal	shank diameter s_1 (in)	overall length l_1 (in)	p_1 order number - 110C3 60° angle	82° angle	90° angle
1/8	.1250	1/8	1-1/2	C46344	C46352	C46360
3/16	.1875	3/16	2	C46345	C46353	C46361
1/4	.2500	1/4	2	C46346	C46354	C46362
3/8	.3750	1/4	2-5/8	C46347	C46355	C46363
1/2	.5000	1/4	2-7/8	C46348	C46356	C46364
5/8	.6250	3/8	3	C46349	C46357	C46365
3/4	.7500	1/2	3	C46350	C46358	C46366
1	1.000	1/2	2-3/4	C46351	C46359	C46367

6 Flute
Carbide Countersink

NEW

Style: 110C6

Carbide | Surface Treatment: Bright



tool diameter d_1 (in) fraction	decimal	shank diameter s_1 (in)	overall length l_1 (in)	p_1 order number - 110C6 60° angle	82° angle	90° angle
1/8	.1250	1/8	1-1/2	C46368	C46376	C46384
3/16	.1875	3/16	2	C46369	C46377	C46385
1/4	.2500	1/4	2	C46370	C46378	C46386
3/8	.3750	1/4	2-5/8	C46371	C46379	C46387
1/2	.5000	1/4	2-7/8	C46372	C46380	C46388
5/8	.6250	3/8	3	C46373	C46381	C46389
3/4	.7500	1/2	3	C46374	C46382	C46390
1	1.000	1/2	2-3/4	C46375	C46383	C46391

Material Reference

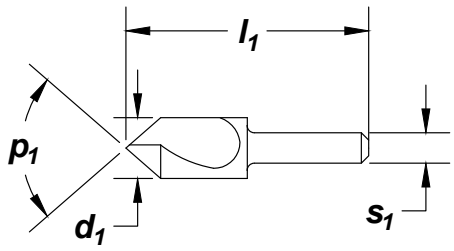
	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	✦		☆					☆	☆				

☆ = Best Performance ✦ = Acceptable

Style: 10001

Single Flute Countersink

Note
Operating parameters:
See Technical section

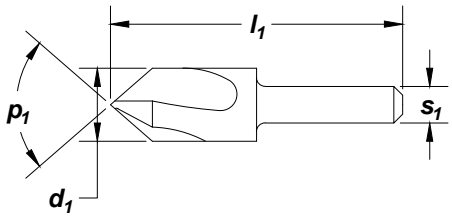


HSS | Reduced Shank | Surface Treatment: Black Oxide

tool diameter d_1 (in) fraction	decimal	shank diameter s_1 (in)	overall length l_1 (in)	p_1 order number - 10001 60° angle	82° angle	90° angle	100° angle	120° angle
1/4	.2500	.188	1.500	C46101	C46102	C46103	C46104	C46106
3/8	.3750	.250	1.750	C46107	C46108	C46109	C46110	C46112
1/2	.5000	.250	2.000	C46113	C46114	C46115	C46116	C46118
5/8	.6250	.375	2.250	C46119	C46120	C46121	C46122	C46123
3/4	.7500	.500	2.625	C46124	C46125	C46126	C46127	C46129
1	1.0000	.500	2.750	C46130	C46131	C46132	C46133	C46135
1-1/4	1.2500	.500	2.750	C46136	C46137	C46138	–	–
1-1/2	1.5000	.750	2.875	C46141	C46139	C46140	–	–
2	2.0000	.750	3.250	C46142	–	C46143	–	–

Style: 10003

3 Flute Countersink



HSS | Surface Treatment: Black Oxide

tool diameter d_1 fraction	decimal	shank diameter s_1 (in)	overall length l_1 (in)	p_1 order number - 10003 60° angle	82° angle	90° angle	100° angle	120° angle
1/4	.2500	.188	1.500	C46150	C46151	C46152	C46153	C46155
3/8	.3750	.250	1.750	C46156	C46157	C46158	C46159	C46161
1/2	.5000	.250	2.000	C46162	C46163	C46164	C46165	C46167
5/8	.6250	.375	2.250	C46168	C46169	C46170	C46171	C46173
3/4	.7500	.500	2.625	C46174	C46175	C46176	C46177	C46179
1	1.0000	.500	2.750	C46180	C46181	C46182	C46183	C46185
1-1/4	1.2500	.500	2.750	C46186	C46187	C46188	–	–
1-1/2	1.5000	.750	2.875	C46189	C46190	C46191	–	–
2	2.0000	.750	3.250	–	–	C46192	–	–

SET

Style: 10001, 10003

Countersink Sets

Single flute and 3 flute

no. of pieces	angle	size range	order number 10001	10003
5	60°	1/4" through 3/4" x 1/8"	C00970	C00972
5	82°	1/4" through 3/4" x 1/8"	C00971	C00973

Material Reference	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Black Oxide	☆		✦					☆	☆				

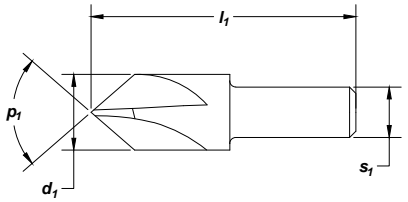
☆ = Best Performance ✦ = Acceptable

4 Flute Center Reamer / Countersink

Style: 610

CLEVELAND

Surface Treatment: Black Oxide



tool diameter d_1 (in) fraction	decimal	shank diameter s_1 (in)	overall length l_1 (in)	p_1 order number - 610 60° angle	82° angle	90° angle	100° angle
1/4	.2500	.188	1.500	C46198	C46199	C46200	C46201
3/8	.3750	.250	1.750	C46204	C46205	C46206	C46207
1/2	.5000	.375	2.000	C46210	C46211	C46212	C46213
5/8	.6250	.375	2.250	C46216	C46217	C46218	C46219
3/4	.7500	.500	2.625	C46222	C46223	C46224	C46225

4 Flute Center Reamer / Countersink

SET

Style: 610

no. of pieces	angle	size range	order number 610
5	82°	1/4"-3/4" x 1/8"	C00969

Drift Drill

Style: 105

fits morse taper socket or sleeve	order number 105
#1	C53665
#2	C53666
#3	C53667
#4	C53668

Surface Treatment: Bright

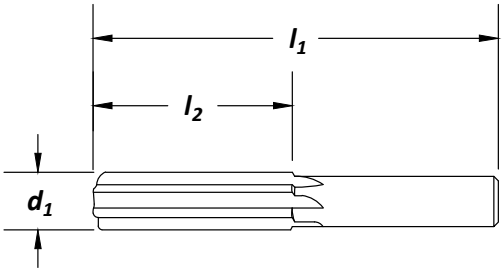
Tech Tips

Using Drill Drifts

- Used to remove taper shank drills and tapered sockets from the spindle or from holders.

Note
Operating parameters: See Technical section

ANSI SIZES | Carbide | Thru Holes | Straight Flute | Straight Shank | Surface Treatment: Bright



Feature:
High red hardness for extended wear life in high heat conditions.

reamer dia. d_1	decimal equiv.	shank dia.	overall length l_1 (in)	flute length l_2 (in)	number of flutes	order number 1730
1/16	.0625	.058	1.500	.375	4	C50103
3/32	.0938	.088	2.000	.500	4	C50121
1/8	.1250	.120	2.250	.625	4	C50133
5/32	.1562	.151	2.500	.750	4	C50145
3/16	.1875	.182	2.750	.875	4	C50157
7/32	.2188	.213	3.000	1.000	4	C50168
1/4	.2500	.244	3.000	1.000	4	C50180
9/32	.2812	.270	3.250	1.125	6	C50194
5/16	.3125	.301	3.250	1.125	6	C50203
11/32	.3438	.332	3.500	1.250	6	C50214
3/8	.3750	.363	3.500	1.250	6	C50226

Tech Tips

How to Select the Correct Reamer Style

- Straight flute reamers, styles 4001, 4005, 1730, and 4703, are for use in through hole applications.
- Spiral flute reamers, style 4030, are for use in blind holes. They produce a smoother finish than straight flute reamers.
- Use reamer style 616, bridge reamer and style 618, car reamer, for aligning misaligned holes.
- Style 642 taper pipe reamers are used to ream a tapered hole before tapping only in soft, stringy materials.
- High spiral Taper Pin Reamers, style 650 are used to produce taper pin holes; the high spiral prevents chip packing.
- Taper pin reamers styles 657 and 659 are used to produce taper pin holes primarily by hand reaming; drill the starting hole a few thousands of an inch smaller than the desired small diameter of the finished hole.

Material Reference

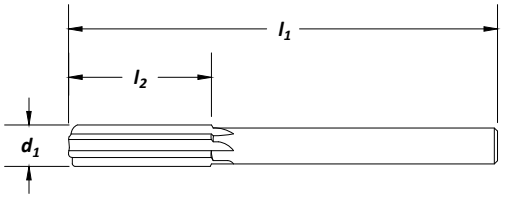
	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆	✦	☆	✦	☆	☆		☆	☆	☆			

☆ = Best Performance ✦ = Acceptable

Note
Custom reamer dimensions shown in Technical Section.
Operating parameters: See Technical section

ASME B94.2 | DIN 338 | HSS | Thru Holes | Straight Flute | Straight Shank

Surface Treatment: Bright



reamer dia. d_1 in	wire	metric	decimal equiv.	overall length l_1 in	mm	flute length l_2 in	mm	number of flutes	order number 4001
	60		.0400	2.500		.500		4	C25003
	59		.0410	2.500		.500		4	C25005
	58		.0420	2.500		.500		4	C25008
	57		.0430	2.500		.500		4	C25010
	56		.0465	2.500		.500		4	C25019
3/64			.0469	2.500		.500		4	C25020
	55		.0520	2.500		.500		4	C25034
	54		.0550	2.500		.500		4	C25041
		1.5	.0591		63.50		12.70	4	C25059
	53		.0595	2.500		.500		4	C25053
1/16			.0625	2.500		.500		4	C25060
	52		.0635	2.500		.500		4	C25063
	51		.0670	3.000		.750		4	C25072
	50		.0700	3.000		.750		4	C25079
	49		.0730	3.000		.750		4	C25087
	48		.0760	3.000		.750		4	C25094
5/64			.0781	3.000		.750		4	C25100
	47		.0785	3.000		.750		4	C25101
		2.0	.0787		76.20		19.05	4	C25095
	46		.0810	3.000		.750		4	C25108
	45		.0820	3.000		.750		4	C25110
	44		.0860	3.000		.750		4	C25120
	43		.0890	3.000		.750		4	C25128
	42		.0935	3.000		.750		4	C25139
3/32			.0938	3.000		.750		4	C25140
	41		.0960	3.500		.875		4	C25146
	40		.0980	3.500		.875		4	C25151
	39		.0995	3.500		.875		4	C25155
	38		.1015	3.500		.875		4	C25159
	37		.1040	3.500		.875		4	C25165
	36		.1065	3.500		.875		4	C25171
7/64			.1094	3.500		.875		4	C25178
	35		.1100	3.500		.875		4	C25180
	34		.1110	3.500		.875		4	C25183
	33		.1130	3.500		.875		4	C25187
	32		.1160	3.500		.875		4	C25194
		3.0	.1181		88.90		22.23	4	C25185
	31		.1200	3.500		.875		6	C25203
1230*			.1230	3.500		.875		6	*C25210
.1240			.1240	3.500		.875		6	C25212
.1247*			.1247	3.500		.875		6	*C25215
1/8			.1250	3.500		.875		6	C25216
.1260			.1260	3.500		.875		6	C25220
	30		.1285	3.500		.875		6	C25226
	29		.1360	4.000		1.000		6	C25243

**dowel pin reamer tolerance +.0000/–.0002*

continued on next page

reamer dia. d_1 in	wire	metric	decimal equiv.	overall length l_1 in	mm	flute length l_2 in	mm	number of flutes	order number 4001
	28		.1405	4.000		1.000		6	C25253
9/64			.1406	4.000		1.000		6	C25254
	27		.1440	4.000		1.000		6	C25262
	26		.1470	4.000		1.000		6	C25269
	25		.1495	4.000		1.000		6	C25275
	24		.1520	4.000		1.000		6	C25281
	23		.1540	4.000		1.000		6	C25285
5/32			.1562	4.000		1.000		6	C25290
	22		.1570	4.000		1.000		6	C25292
		4.0	.1575		101.60		25.40	6	C25291
	21		.1590	4.500		1.125		6	C25297
	20		.1610	4.500		1.125		6	C25301
	19		.1660	4.500		1.125		6	C25313
	18		.1695	4.500		1.125		6	C25322
11/64			.1719	4.500		1.125		6	C25327
	17		.1730	4.500		1.125		6	C25330
	16		.1770	4.500		1.125		6	C25339
	15		.1800	4.500		1.125		6	C25346
	14		.1820	4.500		1.125		6	C25351
	13		.1850	4.500		1.125		6	C25357
1855*			.1855	4.500		1.125		6	*C25360
.1865			.1865	4.500		1.125		6	C25362
.1870*			.1870	4.500		1.125		6	*C25365
3/16			.1875	4.500		1.125		6	C25366
.1885			.1885	4.500		1.125		6	C25368
	12		.1890	4.500		1.125		6	C25369
	11		.1910	5.000		1.250		6	C25374
	10		.1935	5.000		1.250		6	C25380
	9		.1960	5.000		1.250		6	C25385
		5.0	.1969		127.00		31.75	6	C25314
	8		.1990	5.000		1.250		6	C25392
	7		.2010	5.000		1.250		6	C25397
13/64			.2031	5.000		1.250		6	C25402
	6		.2040	5.000		1.250		6	C25404
	5		.2055	5.000		1.250		6	C25408
	4		.2090	5.000		1.250		6	C25417
	3		.2130	5.000		1.250		6	C25426
7/32			.2188	5.000		1.250		6	C25438
	2		.2210	6.000		1.500		6	C25443
	1		.2280	6.000		1.500		6	C25459
	A		.2340	6.000		1.500		6	C25473
15/64			.2344	6.000		1.500		6	C25474
		6.0	.2362		152.40		38.10	6	C25475
	B		.2380	6.000		1.500		6	C25483
	C		.2420	6.000		1.500		6	C25492
	D		.2460	6.000		1.500		6	C25501
2480*			.2480	6.000		1.500		6	*C25508
.2490			.2490	6.000		1.500		6	C25510
.2495*			.2495	6.000		1.500		6	*C25512

*dowel pin reamer tolerance +.0000/–.0002

continued on next page

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		☆			☆	✦	☆			

☆ = Best Performance ✦ = Acceptable

reamer dia. d_1 in	wire	metric	decimal equiv.	overall length l_1 in	mm	flute length l_2 in	mm	number of flutes	order number 4001
1/4	E		.2500	6.000		1.500		6	C25513
.2510			.2510	6.000		1.500		6	C25516
	F		.2570	6.000		1.500		6	C25530
	G		.2610	6.000		1.500		6	C25539
17/64			.2656	6.000		1.500		6	C25550
	H		.2660	6.000		1.500		6	C25552
	I		.2720	6.000		1.500		6	C25566
		7.0	.2756		152.40		38.10	6	C25567
	J		.2770	6.000		1.500		6	C25577
	K		.2810	6.000		1.500		6	C25585
9/32			.2812	6.000		1.500		6	C25608
	L		.2900	6.000		1.500		6	C25605
	M		.2950	6.000		1.500		6	C25617
19/64			.2969	6.000		1.500		6	C25622
	N		.3020	6.000		1.500		6	C25634
.3105*			.3105	6.000		1.500		6	*C25655
.3115			.3115	6.000		1.500		6	C25658
.3120*			.3120	6.000		1.500		6	*C25660
5/16			.3125	6.000		1.500		6	C25661
.3135			.3135	6.000		1.500		6	C25663
		8.0	.3150		152.40		38.10	6	C25668
	O		.3160	6.000		1.500		6	C25669
	P		.3230	6.000		1.500		6	C25685
21/64			.3281	6.000		1.500		6	C25698
	Q		.3320	6.000		1.500		6	C25707
	R		.3390	6.000		1.500		6	C25723
11/32			.3438	6.000		1.500		6	C25733
	S		.3480	7.000		1.750		6	C25742
		9.0	.3543		177.80		44.45	6	C25743
	T		.3580	7.000		1.750		6	C25764
23/64			.3594	7.000		1.750		6	C25768
	U		.3680	7.000		1.750		6	C25789
.3730*			.3730	7.000		1.750		6	*C25801
.3740			.3740	7.000		1.750		6	C25804
.3745*			.3745	7.000		1.750		6	*C25806
3/8			.3750	7.000		1.750		6	C25807
.3760			.3760	7.000		1.750		6	C25809
	V		.3770	7.000		1.750		6	C25811
	W		.3860	7.000		1.750		6	C25833
25/64			.3906	7.000		1.750		6	C25844
		10.0	.3937		177.80		44.45	6	C25845
	X		.3970	7.000		1.750		6	C25858
	Y		.4040	7.000		1.750		6	C25873
13/32			.4062	7.000		1.750		6	C25878
	Z		.4130	7.000		1.750		6	C25892
27/64			.4219	7.000		1.750		6	C25911
		11.0	.4331		177.80		44.45	6	C25912
.4355*			.4355	7.000		1.750		6	*C25942
.4365			.4365	7.000		1.750		6	C25944
.4370*			.4370	7.000		1.750		6	*C25946
7/16			.4375	7.000		1.750		6	C25947
.4385			.4385	7.000		1.750		6	C25949
29/64			.4531	7.000		1.750		6	C25981
15/32			.4688	7.000		1.750		6	C26014
		12.0	.4724		203.20		50.80	6	C26015
31/64			.4844	8.000		2.000		6	C26048
.4990*			.4990	8.000		2.000		6	*C26080

**dowel pin reamer tolerance +.0000/–.0002*

continued on next page

Styles: 4001 (continued)

reamer dia. d_1 in	reamer dia. d_1 wire	reamer dia. d_1 metric	decimal equiv.	overall length l_1 in	overall length l_1 mm	flute length l_2 in	flute length l_2 mm	number of flutes	order number 4001
1/2			.5000	8.000		2.000		6	C26083
.5010*			.5010	8.000		2.000		8	*C26085
		13.0	.5118		203.20		50.80	8	C26086
17/32			.5312	8.000		2.000		8	C26150
		14.0	.5512		203.20		50.80	8	C26151
9/16			.5625	8.000		2.000		8	C26217
		15.0	.5906		203.20		50.80	8	C26218
19/32			.5938	8.000		2.000		8	C26284
5/8			.6250	9.000		2.250		8	C26351
		16.0	.6299		228.60		57.15	8	C26352
21/32			.6562	9.000		2.250		8	C26418
11/16			.6875	9.000		2.250		8	C26485
23/32			.7188	9.000		2.250		8	C26550
3/4			.7500	9.500		2.500		8	C26615
25/32			.7812	9.500		2.500		8	C26680
13/16			.8125	9.500		2.500		8	C26746
27/32			.8438	9.500		2.500		8	C26811
7/8			.8750	10.000		2.625		8	C26876
29/32			.9062	10.000		2.625		8	C26941
15/16			.9375	10.000		2.625		8	C27006
31/32			.9688	10.000		2.625		8	C27072
1			1.0000	10.500		2.750		8	C27137
1-1/16			1.0625	10.500		2.750		10	C27144
1-1/8			1.1250	11.000		2.875		10	C27152
1-3/16			1.1875	11.000		2.875		10	C27159
1-1/4			1.2500	11.500		3.000		10	C27166
1-3/8			1.3750	12.000		3.250		10	C27180
1-1/2			1.5000	12.500		3.500		12	C27195

**dowel pin reamer tolerance +.0000/–.0002*

SET — Style: 4001

Straight Shank and Flute
Chucking

no. of pieces	surface treatment	size range	order number 4001
29	bright	1/16" through 1/2" x 1/64"	C00964

Material Reference	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		☆			☆	✦	☆			

☆ = Best Performance ✦ = Acceptable

Straight Shank, Spiral Flute
Chucking

Styles: 4030

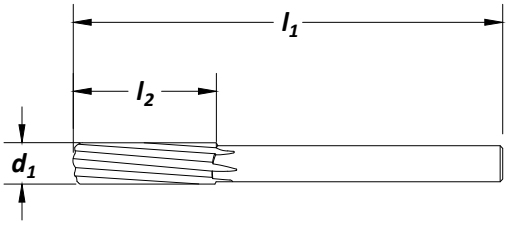
CLEVELAND

Note
Custom reamer dimensions shown in Technical Section.

Operating parameters: See Technical section

ASME B94.2 | HSS | Blind Holes | Thru Holes | RH Spiral Flute | Straight Shank

Surface Treatment — Bright



reamer dia. d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	number of flutes	order number 4030
1/16	.0625	2.500	.500	4	C29273
5/64	.0781	3.000	.750	4	C29311
3/32	.0938	3.000	.750	4	C29350
7/64	.1094	3.500	.875	4	C29386
1/8	.1250	3.500	.875	6	C29421
9/64	.1406	4.000	1.000	6	C29457
5/32	.1562	4.000	1.000	6	C29493
3/16	.1875	4.500	1.125	6	C29565
13/64	.2031	5.000	1.250	6	C29601
7/32	.2188	5.000	1.250	6	C29637
1/4	.2500	6.000	1.500	6	C29709
17/64	.2656	6.000	1.500	6	C29745
9/32	.2812	6.000	1.500	6	C29803
5/16	.3125	6.000	1.500	6	C29853
21/64	.3281	6.000	1.500	6	C29890
11/32	.3438	6.000	1.500	6	C29925
23/64	.3594	7.000	1.750	6	C29960
3/8	.3750	7.000	1.750	6	C29997
25/64	.3906	7.000	1.750	6	C30033
13/32	.4062	7.000	1.750	6	C30067
7/16	.4375	7.000	1.750	6	C30134
29/64	.4531	7.000	1.750	6	C30168
15/32	.4688	7.000	1.750	6	C30201
31/64	.4844	8.000	2.000	6	C30235
1/2	.5000	8.000	2.000	6	C30268
17/32	.5312	8.000	2.000	8	C30335
9/16	.5625	8.000	2.000	8	C30402
19/32	.5938	8.000	2.000	8	C30469
5/8	.6250	9.000	2.250	8	C30536
21/32	.6562	9.000	2.250	8	C30603
11/16	.6875	9.000	2.250	8	C30670
23/32	.7188	9.000	2.250	8	C30735
3/4	.7500	9.500	2.500	8	C30800
25/32	.7812	9.500	2.500	8	C30865
13/16	.8125	9.500	2.500	8	C30931
7/8	.8750	10.000	2.625	8	C31061
15/16	.9375	10.000	2.625	8	C31191
1	1.0000	10.500	2.750	8	C31322
1-1/8	1.1250	11.000	2.875	10	C31337
1-1/4	1.2500	11.500	3.000	10	C31351
1-3/8	1.3750	12.000	3.250	10	C31365
1-1/2	1.5000	12.500	3.500	12	C31380

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		☆			☆	✦	☆			

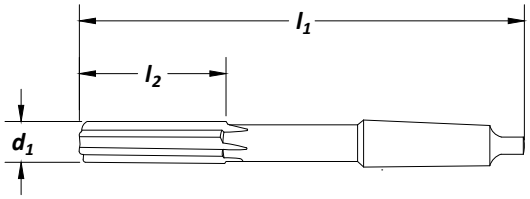
☆ = Best Performance ✦ = Acceptable

Styles: 4005

Note
Custom reamer dimensions shown in Technical Section.

Operating parameters: See Technical section

ANSI SIZES | HSS | Thru Holes | Straight Flute | Taper Shank | Surface Treatment: Bright



reamer dia. d_1	decimal equiv.	overall length l_1 (in)	flute length l_2 (in)	morse taper	number of flutes	order number 4005
1/4	.2500	6.000	1.500	1	6	C33842
5/16	.3125	6.000	1.500	1	6	C33986
3/8	.3750	7.000	1.750	1	6	C34129
7/16	.4375	7.000	1.750	1	6	C34266
1/2	.5000	8.000	2.000	1	6	C34400
17/32	.5312	8.000	2.000	1	6	C34467
9/16	.5625	8.000	2.000	1	8	C34534
19/32	.5938	8.000	2.000	1	8	C34601
5/8	.6250	9.000	2.250	2	8	C34668
21/32	.6562	9.000	2.250	2	8	C34735
11/16	.6875	9.000	2.250	2	8	C34802
23/32	.7188	9.000	2.250	2	8	C34867
3/4	.7500	9.500	2.500	2	8	C34932
25/32	.7812	9.500	2.500	2	8	C34997
13/16	.8125	9.500	2.500	2	8	C35063
27/32	.8438	9.500	2.500	2	8	C35128
7/8	.8750	10.000	2.625	2	8	C35193
29/32	.9062	10.000	2.625	2	8	C35258
15/16	.9375	10.000	2.625	3	8	C35323
31/32	.9688	10.000	2.625	3	8	C35389
1"	1.0000	10.500	2.750	3	8	C35454
1-1/16	1.0625	10.500	2.750	3	10	C35461
1-1/8	1.1250	11.000	2.875	3	10	C35469
1-3/16	1.1875	11.000	2.875	3	10	C35476
1-1/4	1.2500	11.500	3.000	4	10	C35483
1-5/16	1.3125	11.500	3.000	4	10	C35490
1-3/8	1.3750	12.000	3.250	4	10	C35497
1-7/16	1.4375	12.000	3.250	4	10	C35505
1-1/2	1.5000	12.500	3.500	4	12	C35512

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆		☆			☆	✦	☆			

☆ = Best Performance ✦ = Acceptable

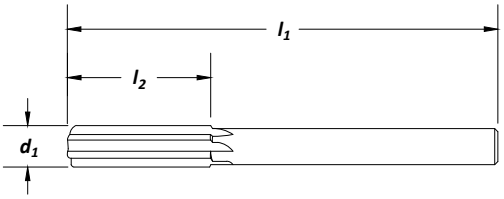
Straight Shank and Flute
Chucking - Carbide-Tipped

Styles: 4703

CLEVELAND

Note
Run at carbide speeds.
HSS shank and body for extra strength.
Operating parameters: See Technical section

ANSI SIZES | HSS | Thru Holes | Straight Flute | Straight Shank | Surface Treatment: Bright



reamer dia. d_1	decimal equiv.	shank dia.	overall length l_1 (in)	flute length l_2 (in)	number of flutes	order number 4703
1/4	.2500	.2405	6.000	1.500	4	C50368
9/32	.2812	.2485	6.000	1.500	4	C50382
5/16	.3125	.2792	6.000	1.500	4	C50391
11/32	.3438	.2792	6.000	1.500	4	C50402
3/8	.3750	.3105	7.000	1.750	4	C50414
13/32	.4062	.3105	7.000	1.750	4	C50423
7/16	.4375	.3730	7.000	1.750	6	C50428
15/32	.4688	.3730	7.000	1.750	6	C50433
1/2	.5000	.4355	8.000	2.000	6	C50438
17/32	.5312	.4355	8.000	2.000	6	C50443
9/16	.5625	.4355	8.000	2.000	6	C50449
5/8	.6250	.5620	9.000	2.250	6	C50459

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆	✦	☆	✦	☆	✦	✦	☆	✦	☆			

☆ = Best Performance ✦ = Acceptable

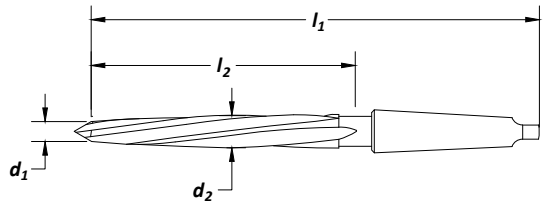
CLEVELAND

Style: 616

Taper Shank
Bridge Reamer

Note
Operating parameters:
See Technical section

ANSI SIZES | HSS | LHS / RHC | Taper Shank | Surface Treatment: Black Oxide



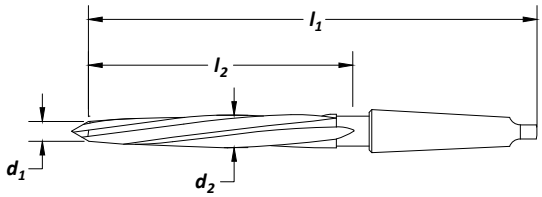
reamer dia. d_2	decimal equiv.	small end dia. d_1 (in)	overall length l_1 (in)	flute length l_2 (in)	morse taper	number of flutes	order number 616
7/16	.4375	.266	8.250	4.375	2	4	C23812
1/2	.5000	.313	9.000	5.125	2	4	C23813
9/16	.5625	.375	9.000	5.125	2	4	C23814
5/8	.6250	.391	10.000	6.125	2	4	C23815
11/16	.6875	.406	11.750	7.125	3	4	C23816
3/4	.7500	.469	12.000	7.375	3	4	C23817
13/16	.8125	.547	12.000	7.375	3	4	C23818
7/8	.8750	.609	12.000	7.375	3	4	C23819
15/16	.9375	.672	12.000	7.375	3	4	C23820
1	1.0000	.734	12.000	7.375	3	4	C23821
1-1/16	1.0625	.813	12.000	7.375	3	4	C23822
1-1/8	1.1250	.859	12.000	7.375	3	4	C23823
1-3/16	1.1875	.922	12.000	7.375	3	4	C23824

Style: 618

Taper Shank
Car Reamer

Note
Operating parameters:
See Technical section

ANSI SIZES | HSS | LHS / RHC | Taper Shank | Surface Treatment: Black Oxide



reamer dia. d_2	decimal equiv.	small end dia. d_1 (in)	overall length l_1 (in)	flute length l_2 (in)	morse taper	number of flutes	order number 618
9/16	.5625	0.313	7.563	3.938	2	5	C23957
5/8	.6250	0.328	8.063	4.438	2	5	C23958
11/16	.6875	0.359	8.813	4.438	3	5	C23959
3/4	.7500	0.422	9.500	5.000	3	5	C23960
13/16	.8125	0.469	9.500	5.000	3	5	C23961
15/16	.9375	0.563	9.500	5.000	3	5	C23962

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆				

☆ = Best Performance ✦ = Acceptable

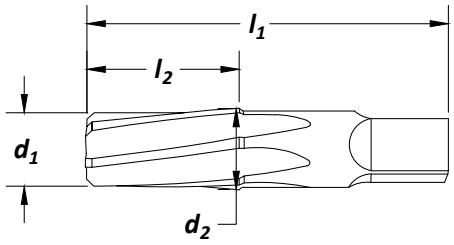
CLEVELAND

Taper Pipe

Style: 642

Note
Operating parameters: See Technical section

ANSI SIZES | HSS | LHS / RHC | Square Shank | Surface Treatment: Bright



nominal pipe diameter	small end dia. d_1 (in)	large end dia. d_2 (in)	overall length l_1 (in)	flute length l_2 (in)	no. of flutes	order number 642
1/8	.316	.362	2.125	.750	6	C24982
1/4	.406	.472	2.438	1.063	6	C24983
3/8	.540	.606	2.563	1.063	6	C24984
1/2	.665	.751	3.125	1.375	6	C24985
3/4	.876	.962	3.750	1.375	8	C24986
1	1.103	1.212	3.750	1.750	8	C24987
1-1/4	1.444	1.553	4.000	1.750	10	C24988
1-1/2	1.684	1.793	4.250	1.750	10	C24989

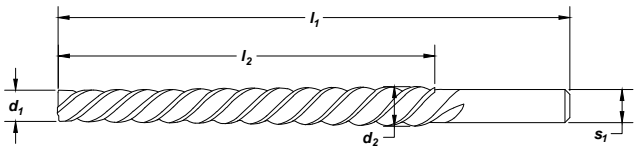
High Spiral Spirex

Taper Pin

Style: 650

Note
Operating parameters: See Technical section

ANSI SIZES | HSS | 1/4" / 12" | LH Spiral Flute | Surface Treatment: Bright



pin size	small end dia. d_1 (in)	large end dia. d_2 (in)	overall length l_1 (in)	flute length l_2 (in)	shank dia. s_1 (in)	order number 650
#7/0	.0497	.0666	1.813	.813	.0781	C24229
#6/0	.0611	.0806	1.938	.938	.0938	C24230
#5/0	.0719	.0966	2.188	1.188	.1094	C24231
#4/0	.0869	.1142	2.313	1.313	.1250	C24232
#3/0	.1029	.1302	2.313	1.313	.1406	C24233
#2/0	.1137	.1462	2.563	1.563	.1562	C24234
#0	.1287	.1638	2.938	1.688	.1719	C24235
#1	.1447	.1798	2.938	1.688	.1875	C24236
#2	.1605	.2008	3.188	1.938	.2031	C24237
#3	.1813	.2294	3.688	2.313	.2344	C24238
#4	.2071	.2604	4.063	2.563	.2656	C24239
#5	.2409	.2994	4.313	2.813	.3125	C24240
#6	.2773	.3540	5.438	3.688	.3594	C24241
#7	.3297	.4220	6.313	4.438	.4062	C24242
#8	.3971	.5050	7.188	5.188	.4375	C24243
#9	.4805	.6066	8.313	6.063	.5625	C24244
#10	.5799	.7216	9.313	6.813	.6250	C24245

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆							☆			

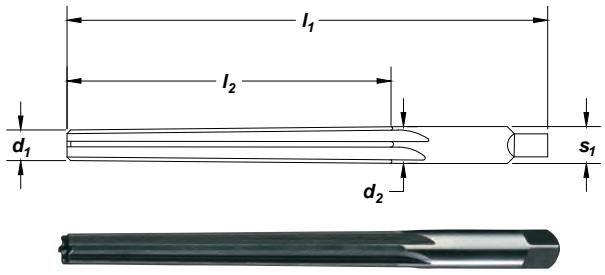
☆ = Best Performance ✦ = Acceptable

CLEVELAND

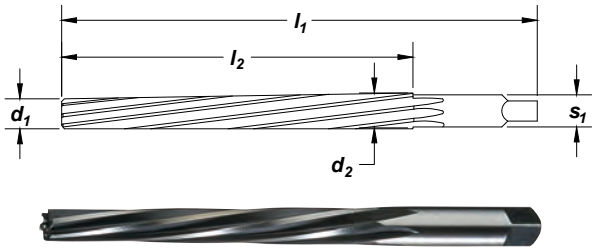
Styles: 657, 659

Note
Operating parameters:
See Technical section

ANSI SIZES | HSS | 1/4" / 12" | LHS / RHC | Straight Flute | Square Shank | Surface Treatment: Bright



Style 657 - Straight Flute



Style 659 - LHH/RHC

pin size	small end dia. d_1 (in)	large end dia. d_2 (in)	overall length l_1 (in)	flute length l_2 (in)	shank dia. s_1 (in)	no. of flutes	order number 657 straight flute	order number 659 helical flute
#6/0	.0611	.0806	1.938	.938	.0938	4	C24250	C24271
#5/0	.0719	.0966	2.188	1.188	.1094	4	C24251	C24272
#4/0	.0869	.1142	2.313	1.313	.1250	4	C24252	C24273
#3/0	.1029	.1302	2.313	1.313	.1406	4	C24253	C24274
#2/0	.1137	.1462	2.563	1.563	.1562	4	C24254	C24275
#0	.1287	.1638	2.938	1.688	.1719	4	C24255	C24276
#1	.1447	.1798	2.938	1.688	.1875	6	C24256	C24277
#2	.1605	.2008	3.188	1.938	.2031	6	C24257	C24278
#3	.1813	.2294	3.688	2.313	.2344	6	C24258	C24279
#4	.2071	.2604	4.063	2.563	.2656	6	C24259	C24280
#5	.2409	.2994	4.313	2.813	.3125	6	C24260	C24281
#6	.2773	.3540	5.438	3.688	.3594	6	C24261	C24282
#7	.3297	.4220	6.313	4.438	.4062	6	C24262	C24283
#8	.3971	.5050	7.188	5.188	.4375	6	C24263	C24284
#9	.4805	.6066	8.313	6.063	.5625	6	C24264	C24285
#10	.5799	.7216	9.313	6.813	.6250	6	C24265	C24286

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆	☆			

☆ = Best Performance ✦ = Acceptable

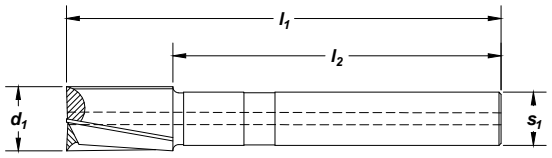
Straight Shank, C'bore & Spot Facer, *Interchangeable Pilot*

Style: 879

CLEVELAND

Note
Pilots listed on page 114.

ANSI SIZES | HSS | RH Spiral Flute | Straight Shank | **Surface Treatment** Bright



counterbore diameter d_1 fraction	d_1 in	pilot shank sizes fraction	pilot shank sizes in	shank length l_2 (in)	overall length l_1 (in)	shank diameter s_1 (in)	pilot size range	no. of flutes	order no. 879
3/16	.1875	3/32	.0938	2.125	3.000	.234	1/8 - 3/16	3	C46421
7/32	.2188	3/32	.0938	2.125	3.000	.234	1/8 - 7/32	3	C46422
1/4	.2500	3/32	.0938	3.063	3.813	.234	1/8 - 3/16	3	C46423
9/32	.2812	3/32	.0938	3.063	3.813	.266	1/8 - 7/32	3	C46424
5/16	.3125	3/32	.0938	3.063	3.813	.297	1/8 - 1/4	3	C46425
11/32	.3438	3/32	.0938	3.063	3.813	.313	1/8 - 9/32	3	C46426
3/8	.3750	5/32	.1562	3.063	4.063	.313	3/16 - 5/16	3	C46427
13/32	.4062	5/32	.1562	3.063	4.063	.375	3/16 - 11/32	3	C46428
7/16	.4375	5/32	.1562	3.063	4.063	.375	3/16 - 3/8	3	C46429
15/32	.4688	3/16	.1875	3.063	4.313	.438	1/4 - 13/32	3	C46430
1/2	.5000	3/16	.1875	3.063	4.313	.438	1/4 - 7/16	3	C46431
17/32	.5312	3/16	.1875	3.063	4.313	.500	1/4 - 15/32	3	C46432
9/16	.5625	3/16	.1875	3.063	4.313	.500	1/4 - 1/2	3	C46433
19/32	.5938	3/16	.1875	3.875	5.125	.500	1/4 - 17/32	3	C46434
5/8	.6250	3/16	.1875	3.875	5.125	.500	1/4 - 9/16	3	C46435
21/32	.6562	3/16	.1875	3.875	5.125	.500	1/4 - 19/32	3	C46436
11/16	.6875	3/16	.1875	3.875	5.125	.500	1/4 - 5/8	3	C46437
23/32	.7188	1/4	.2500	3.875	5.375	.500	5/16 - 21/32	3	C46438
3/4	.7500	1/4	.2500	3.875	5.375	.500	5/16 - 11/16	3	C46439
25/32	.7812	1/4	.2500	3.875	5.375	.625	5/16 - 23/32	3	C46440
13/16	.8125	1/4	.2500	3.875	5.375	.625	5/16 - 3/4	3	C46441
7/8	.8750	1/4	.2500	3.875	5.375	.750	5/16 - 13/16	3	C46443
15/16	.9375	1/4	.2500	4.625	6.125	.750	5/16 - 7/8	3	C46445
1	1.0000	5/16	.3125	4.625	6.375	.750	3/8 - 15/16	3	C46447
1-1/16	1.0625	5/16	.3125	4.625	6.375	.750	3/8 - 1	3	C46448
1-1/8	1.1250	5/16	.3125	4.625	6.375	1.000	3/8 - 1-1/16	3	C46449

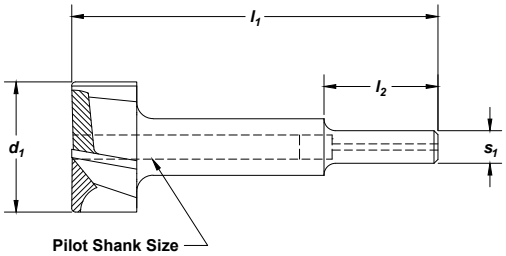
Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆	☆			

☆ = Best Performance ✦ = Acceptable

Note
Pilots listed on page 125.

ANSI SIZES | HSS | Straight Shank | Surface Treatment: Bright



counterbore diameter d_1 fraction	in	pilot shank sizes fraction	in	shank length l_2 (in)	overall length l_1 (in)	shank diameter s_1 (in)	pilot size range	no. of flutes	order no. 884
1/4	.2500	3/32	.0938	1.125	2.375	.250	1/8 - 3/16	4	C46886
5/16	.3125	3/32	.0938	.875	2.375	.250	1/8 - 1/4	4	C46888
3/8	.3750	3/32	.0938	.875	2.375	.250	3/16 - 5/16	4	C46890
13/32	.4062	1/8	.1250	.875	2.813	.250	3/16 - 11/32	4	C46891
7/16	.4375	1/8	.1250	.875	2.813	.250	3/16 - 3/8	4	C46892
15/32	.4688	1/8	.1250	.875	2.813	.250	1/4 - 13/32	4	C46893
1/2	.5000	1/8	.1250	.875	2.813	.250	1/4 - 7/16	4	C46894
9/16	.5625	1/8	.1250	.875	2.813	.250	1/4 - 1/2	4	C46896
5/8	.6250	1/8	.1250	.875	2.813	.250	1/4 - 9/16	4	C46898
11/16	.6875	3/16	.1875	.875	2.813	.250	1/4 - 5/8	4	C46900
3/4	.7500	3/16	.1875	.875	2.813	.250	5/16 - 11/16	4	C46902
13/16	.8125	3/16	.1875	.875	2.813	.250	5/16 - 3/4	4	C46904
7/8	.8750	3/16	.1875	.875	2.813	.250	5/16 - 13/16	4	C46906
15/16	.9375	3/16	.1875	.875	2.813	.250	5/16 - 7/8	4	C46908
1	1.0000	3/16	.1875	.875	2.813	.250	3/8 - 15/16	4	C46910

Tech Tips

Aircraft Type Counterbores

- Designed for aircraft fabricating use with portable pneumatic and electric drills.
- Smaller pilot holes than standard counterbores.
- Corner radius of 1/32" is standard.

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆	☆			

☆ = Best Performance ✦ = Acceptable

Interchangeable Pilot
for Counterbore & Spot Facer

Style: 879P

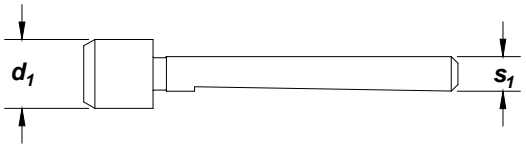
CLEVELAND

Counterbore

High Speed Steel

Note
For pilot diameter, match pilot shank size, from style #884 or #879, to pilot shank size s_1 in these columns.

ANSI SIZES | HSS | Surface Treatment: Bright



pilot diameter d_1	decimal equiv.	s_1 order number 879P							
		3/32"	1/8"	5/32"	3/16"	1/4"	5/16"	3/8"	7/16"
3/32	.0938	C46520	–	–	–	–	–	–	–
.127	.1250	C46525	–	–	–	–	–	–	–
1/8	.1250	C46523	C46522	–	–	–	–	–	–
5/32	.1562	C46528	C46527	C46529	–	–	–	–	–
.157	.1570	C46531	–	–	–	–	–	–	–
.159	.1590	C46533	–	–	–	–	–	–	–
3/16	.1875	C46538	C46537	C46539	C46540	–	–	–	–
.191	.1910	C46545	C46544	–	C46546	–	–	–	–
13/64	.2031	–	C46547	–	–	–	–	–	–
7/32	.2188	C46549	C46548	C46550	C46551	–	–	–	–
1/4	.2500	C46554	C46553	C46555	C46556	C46557	–	–	–
.255	.2550	–	C46558	–	C46560	–	–	–	–
9/32	.2812	–	–	C46565	C46566	–	–	–	–
5/16	.3125	C46570	C46569	C46571	C46572	C46573	–	–	–
11/32	.3438	–	C46576	C46578	C46579	C46580	–	–	–
3/8	.3750	C46314	C46583	C46584	C46585	C46586	C46587	–	–
13/32	.4062	–	–	–	C46592	C46593	C46594	–	–
7/16	.4375	–	–	C46597	C46598	C46599	C46600	–	–
15/32	.4688	–	–	–	C46605	–	–	–	–
1/2	.5000	–	–	–	C46612	C46613	C46614	–	–
17/32	.5312	–	–	–	C46620	C46621	C46622	–	–
9/16	.5625	–	–	–	–	C46629	C46630	–	–
19/32	.5938	–	–	–	–	–	–	C46639	–
5/8	.6250	–	–	–	–	C46645	–	C46647	–
11/16	.6875	–	–	–	–	C46657	C46658	C46659	–
3/4	.7500	–	–	–	C46316	–	–	C46669	–
25/32	.7812	–	–	–	–	–	C46673	C46674	–
13/16	.8125	–	–	–	–	–	C46678	C46679	–
7/8	.8750	–	–	–	–	C46687	–	–	–
1	1.0000	–	–	–	–	–	–	–	–
1-1/16	1.0625	–	–	–	–	–	–	–	C46716
1-1/8	1.1250	–	–	–	–	–	–	C46723	–

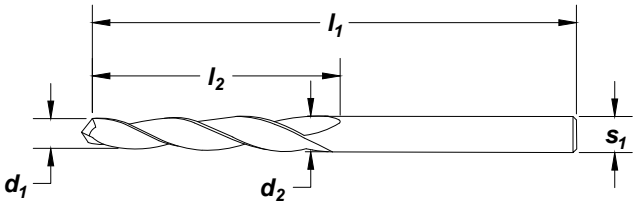
Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆	☆			

☆ = Best Performance ✦ = Acceptable

Style: 655

ANSI SIZES | HSS | Straight Shank | Surface Treatment: Bright



size number	shank diameter s_1 (in)	small end diameter d_1 (in)	large end diameter d_2 (in)	flute length l_2 (in)	overall length l_1 (in)	order no. 655
#1	.098	.081	.0980	.813	2.000	C24292
#2	.128	.110	.1280	.875	2.250	C24293
#3	.188	.165	.1875	1.063	2.500	C24294
#4	.250	.224	.2500	1.250	2.750	C24295

Tech Tips

Clearance or Taper Router

- Use for cutting, trimming, routing, and elongating existing holes.

Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆	☆			

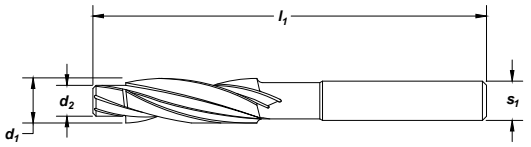
☆ = Best Performance ✦ = Acceptable

3 Flute
Continuous Pilot

Style: 183

CLEVELAND

ANSI SIZES | DIN 1897 | HSS | Straight Shank | Surface Treatment: Bright



counterbore number	cutter diameter d_1 (in)	pilot diameter d_2 (in)	shank diameter s_1 (in)	overall length l_1 (in)	cap screw size	order no. 183
183-CSS-6	.230	.135	.219	3.000	No. 6	C91695
183-CSS-7	.242	.150	.219	3.000	No. 6	C91696
183-CSS-8	.274	.161	.250	3.000	No. 8	C91697
183-CSS-9	.286	.178	.250	3.000	No. 8	C91698
183-CSS-10	.316	.187	.313	3.500	No. 10	C91699
183-CSS-11	.328	.204	.313	3.500	No. 10	C91700
183-CSS-12	.348	.213	.344	3.500	No. 12	C91701
183-CSS-16	.375	.250	.375	3.500	No. 12	C91703
183-CSS-17	.391	.266	.375	5.750	1/4	C92704
183-CSS-18	.406	.281	.375	5.750	1/4	C92705
183-CSM-6	.433	.268	.438	6.000	6mm	C91830
183-CSS-20	.438	.313	.438	6.000	5/16	C92706
183-CSS-21	.453	.328	.438	6.000	5/16	C92708
183-CSS-20-60	.469	.313	.438	6.000	5/16	C92707
183-CSS-22	.469	.344	.438	6.000	5/16	C91710
183-CSS-21-60	.484	.328	.438	6.000	5/16	C91709
183-CSS-22-60	.500	.344	.438	6.000	5/16	C91711
183-CSS-24	.563	.375	.500	6.500	3/8	C91712
183-CSS-25	.578	.391	.500	6.500	3/8	C91713
183-CSS-26	.594	.406	.500	6.500	3/8	C91714
183-CSS-28	.625	.438	.500	7.000	7/16	C91715
183-CSS-29	.641	.453	.500	7.000	7/16	C91717
183-CSS-30	.656	.469	.500	7.000	7/16	C91719
183-CSS-30-60	.688	.469	.500	7.000	7/16	C91720
183-CSM-10	.709	.433	.500	7.000	10mm	C91832
183-CSS-32	.750	.500	.500	7.250	1/2	C91721
183-CSS-33	.766	.516	.500	7.250	1/2	C91722
183-CSS-34	.781	.531	.500	7.250	1/2	C91723
183-CSM-12	.787	.531	.500	7.000	12mm	C91833
183-CSS-36	.813	.563	.750	7.500	9/16	C91724
183-CSS-40	.875	.625	.750	8.250	5/8	C91726
183-CSS-42	.906	.656	.750	8.250	5/8	C91728
183-CSS-42-60	.969	.656	.750	8.250	5/8	C91729
183-CSM-16	1.024	.689	.750	8.250	16mm	C91834
183-CSS-50	1.031	.781	1.000	8.813	3/4	C91734
183-CSS-50-60	1.156	.781	1.000	8.813	3/4	C91735
183-CSS-52-60	1.188	.813	1.000	8.813	3/4	C91737
183-CSM-20	1.299	.866	1.000	8.813	20mm	C91835
183-CSS-68-60	1.563	1.063	1.000	8.813	1	C91749
183-CSM-24	1.575	1.024	1.000	8.813	24mm	C92836

set number	no. of pieces	size range	order number 183
183-CSS-1	9	CSS-6, -8, -10, -12, -16, -20, -24, -28, -32	C91750
183-CSS-3	8	CSS-18, -20-60, -21-60, -22-60, -22, -26, -30, -34	C91770

#C91770

#C91750

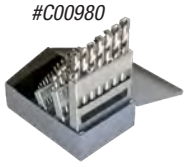
Material Reference

	Steel (HRc)				Stainless Steel			Cast Iron (HRc)		Aluminum and Non-Ferrous	Hi-Temp Alloy		Hardened Steel (HRc)
	Low Carbon		Alloy		Austenitic	Martensitic	PH	Gray	Nodular		Ni, Co, Fe Based Super Alloy	Titanium	
Hardness	13-38	>38	16-38	> 38	300 Series	400 series		18-22	22-32				>45
Bright	☆		☆					☆	☆				

☆ = Best Performance ✦ = Acceptable

Screw Machine / Stub Length Drills

	Type	Style	Order No.	Number of pieces	Surface Treatment: Bright	Black Oxide	Straw Oxide	TiN	Material: HSS	Cobalt	Size Range	Case Type: Metal	Plastic
	General Purpose	2120	C00980	29	•				•		1/16" through 1/2" x 1/64"	•	
			C01332	26	•				•		letter A through Z	•	
	NAS907-C Heavy Duty	2330	C70370	15	•				•		1/16" through 1/2" x 1/32"	•	
			C70369	21	•				•		1/16" through 3/8" x 1/64"	•	
			C70368	29	•				•		1/16" through 1/2" x 1/64"	•	

#C00980 

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#C70369 

#C70368 

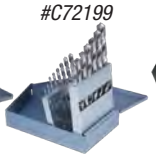
Jobber Drills

	Type	Style	Order No.	Number of pieces	Surface Treatment: Bright	Black Oxide	Straw Oxide	TiN	Material: HSS	Cobalt	Size Range	Case Type: Metal	Plastic
	General Purpose	2001G	C72197	29		•			•		1/16" through 1/2" x 1/64"	•	
			C71000	25		•			•		1 mm through 13 mm x 0.5 mm	•	
			C00960	50		•			•		1 mm through 5.9 mm x 0.1 mm	•	
	General Purpose	2002G	C72199	15	•				•		1/16" through 1/2" x 1/32"	•	
			C72198	29	•				•		1/16" through 1/2" x 1/64"	•	
			C00939	26	•				•		letter A through Z	•	
			C00934	60	•				•		wire gauge #1 through #60	•	
			C01330	115	•				•		1/16" through 1/2" x 1/16", A through Z and #1 through #60	•	
			C72000	25	•				•		1 mm through 13 mm x 0.5 mm	•	
	General Purpose	2002	C00937	20	•				•		#61-#80	•	
	Q-Cobalt Wide Land Parabolic	2075	C00901	15			•			•	1/16" through 1/2" x 1/32"	•	
			C00902	29			•			•	1/16" through 1/2" x 1/64"	•	
	NAS907-B Heavy Duty	2222	C70371	20	•				•		1/16" through 1/2" x 1/64"	•	
	NAS907-J Heavy Duty	2213	C70365	29			•			•	1/16" through 1/2" x 1/64"	•	
			C00986	26			•			•	A through Z letter	•	
			C70366	60			•			•	#1 through #60 wire gauge	•	
			C70367	115			•			•	1/16" through 1/2" x 1/64", A through Z and #1 through #60	•	
	Q-AMD Short Flute	3780	C14499	29		•				•	1/16" through 1/2" x 1/64"	•	

#C72197 

#C71000 

#C00960 

#C72199 

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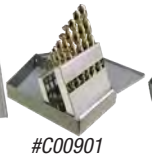
#C00901 

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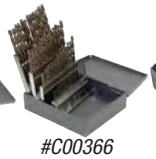
#C00366 

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#C14499 

Taper Length Drills

	Type	Style	Order No.	Number of pieces	Surface Treatment: Bright	Black Oxide	Straw Oxide	TiN	Material: HSS	Cobalt	Size Range	Case Type: Metal	Plastic
	General Purpose	**2510**	C00962	29		•			•		1/16" through 1/2" x 1/64"	•	

Misc. Drills

	Type	Style	Order No.	Number of pieces	Surface Treatment: Bright	Black Oxide	Straw Oxide	TiN	Material: HSS	Cobalt	Size Range	Case Type: Metal	Plastic
	Spotting / Centering	**2636**	C26173	6			•			•	90° - 1/4" through 1" (short)		•
			C26180	6			•			•	120° - 1/4" through 1" (short)		•
		**2646**	C26187	6			•			•	90° - 1/4" through 1" (long)		•
			C26194	6			•			•	120° - 1/4" through 1" (long)		•
		**2635**	C24173	6	•				•		90° - 1/4" through 1" (short)		•
			C24180	6	•				•		120° - 1/4" through 1" (short)		•
		**2645**	C24187	6	•				•		90° - 1/4" through 1" (long)		•
			C24194	6	•				•		120° - 1/4" through 1" (long)		•
	Countersink / Deburring	**3001**	C94588	4	•					•	60° - 5/16, 3/8, 1/2, 5/8		•
			C94589	4	•					•	82° - 5/16, 3/8, 1/2, 5/8		•
			C94590	4	•					•	90° - 5/16, 3/8, 1/2, 5/8		•
			C94591	4	•					•	100° - 5/16, 3/8, 1/2, 5/8		•
			C94592	5	•					•	60° - 5/16, 3/8, 1/2, 3/4, 1		•
			C94593	5	•					•	82° - 5/16, 3/8, 1/2, 3/4, 1		•
			C94594	5	•					•	90° - 5/16, 3/8, 1/2, 3/4, 1		•
			C94595	5	•					•	100° - 5/16, 3/8, 1/2, 3/4, 1		•
	Countersink / Drill Plain	**998**	C00944	5	•				•		#1 through #5		•
	Single Flute Countersink	**10001**	C00970	5		•			•		60° - 1/4" through 3/4" x 1/8"		•
			C00971	5		•			•		82° - 1/4" through 3/4" x 1/8"		•
	3 Flute Countersink	**10003**	C00972	5		•			•		60° - 1/4" through 3/4" x 1/8"		•
			C00973	5		•			•		82° - 1/4" through 3/4" x 1/8"		•
	4 Flute Reamer / Countersink	**610**	C00969	5		•			•		82° - 1/4" through 3/4" x 1/8"		•

#C26173


#C24173


#C24180


#C24187


#C24194


#C00944


Reamers

	Type	Style	Order No.	Number of pieces	Surface Treatment: Bright	Black Oxide	Straw Oxide	TiN	Material: HSS	Cobalt	Size Range	Case Type: Metal	Plastic
	Straight Shank, Straight Flute	**4001**	C00964	29	•				•		1/16" through 1/2" x 1/64"	•	

Counterbores

	Type	Style	Order No.	Number of pieces	Surface Treatment: Bright	Black Oxide	Straw Oxide	TiN	Material: HSS	Cobalt	Size Range	Case Type: Metal	Plastic
	3 Flute Continuous Pilot	**183** *(Set #183-CSS-1)*	C91750	9	•				•		CSS-6, -8, -10, -12, -16, -20, -24, -28, -32		•
		183 *(Set #183-CSS-3)*	C91770	8	•				•		CSS-18, -20-60, -21-60, -22-60, -22, -26, -30, -34		•

#C91750


#C91770


Technical Information

Drill Nomenclature

Axis
The imaginary straight line which forms the longitudinal center line of the drill.

Back Taper
A slight decrease in diameter, from front to back in the body of the drill.

Body
The portion of the drill extending from the shank or neck to the outer corners of the cutting lips.

Body Diameter Clearance
That portion of the land that has been cut away so it will not rub against the walls of the hole.

Chisel Edge
The edge at the end of the web that connects the cutting lips.

Drill Diameter
The diameter over the margins of the drill measured at the point.

Flutes
Helical or straight grooves cut or formed in the body of the drill to provide cutting lips, to permit removal of chips, and to allow cutting fluid to reach the cutting lips.

Flute Length
The length from the outer corners of the cutting lips to the extreme back end of the flutes. However, metric drills are measured from the extreme end of the shank to the end of the flute at the point.

Land
The peripheral portion of the body between adjacent flutes.

Land Width
The distance between the leading edge and the heel of the land measured at a right angle to the leading edge.

Lip Relief
The axial relief on the drill point.

Margin
The cylindrical portion of the land which is not cut away to provide clearance.

Neck
The section of reduced diameter between the body and the shank of a drill.

Overall Length
The length from the extreme end of the shank to the outer corners of the cutting lips. However, metric drills are measured from the extreme end of the shank to the end of the flute at the point.

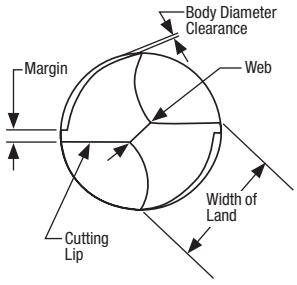
Point
The cutting end of a drill, made up of the ends of the lands and the web. In form it resembles a cone, but departs from a true cone to furnish clearance behind the cutting lips.

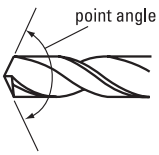
Point Angle
The angle included between the cutting lips projected upon a plane parallel to the drill axis and parallel to the two cutting lips.

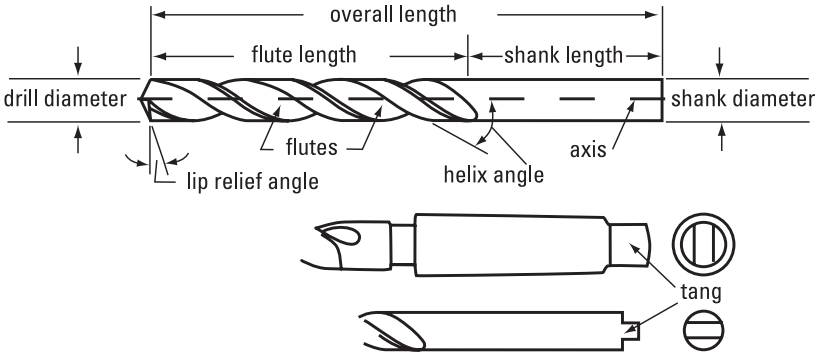
Shank
The part of the drill by which it is held and driven.

Tang
The flattened end of a taper shank, intended to fit into a driving slot in a socket.

Web
The central portion of the body that joins the lands. The extreme end of the web forms the chisel edge on a two flute drill.







Recommended Surface Feet per Minute (SFM) and Coolant by Material Application

Ferrous Materials

Materials	Brinell Hardness	geometry	SFM	coolant
Low Carbon Steel	85-125	general-purpose	80-95	soluble oil
Medium Carbon Steel	125-175	general-purpose	70-85	soluble oil
High Carbon Steel	175-225	heavy-duty	45-65	soluble oil
Steels Alloyed	under 200	general-purpose	60-90	soluble oil
	200-300	heavy-duty	40-70	soluble oil
	over 300	cobalt	20-30	soluble oil
Steel Drop Forgings Heat Treated	330-370		30-40	cutting oil
	370-420		20-30	cutting oil
	over 420		10-20	cutting oil
Grey Cast Iron Soft	125	general-purpose	140-150	dry
Grey Cast Iron Medium	120-200	heavy-duty	50-80	soluble oil
Crey Cast Iron Hard	up to 350	heavy-duty	25-40	soluble oil
Titanium Alloys (Ti)-75A	300-440	cobalt	50-60	cutting oil
Ti-150A, RS-120	300-440	cobalt	40-50	cutting oil
Ti-140A, RC 130B	300-440	cobalt	30-40	cutting oil
Ti-6AL -4V	300-440	cobalt	20-30	cutting oil
300 Series Stainless	120-200	cobalt	20-40	cutting oil
400 Series Stainless	200-300	cobalt	40-70	cutting oil
Martensitic 416, 420, F416 Plus K, 400F,4165SE, 440F	135-185	cobalt	40-50	cutting oil
Precipitation Hardening	325-375	cobalt	30	cutting oil
Stainless Steel, Cast	400-450	cobalt	20	cutting oil
Heat Resisting Steels	175-225	cobalt	10-25	cutting oil
Nimonic Alloys	200-300	cobalt	10-20	cutting oil
Manganese 12-14% min	125-220	heavy-duty	10-12	cutting oil
Spring Steels	402	cobalt	15-30	soluble oil
Armor Plate	200-250	cobalt	40	soluble oil
	250-300	cobalt	35	soluble oil
	300-350	cobalt	30	cutting oil

Non-Ferrous Materials

Materials	Brinell Hardness	geometry	SFM	coolant
Aluminum Pure	140-350	fast spiral*	130-200	soluble oil
Aluminum Alloys	140-330	fast spiral*	150-300	soluble oil
Aluminum Leaded	40-100	fast spiral*	200-325	soluble oil
Aluminum Silicon Alloy Die Cast	40-100	fast spiral*	25-50	soluble oil
Brass	190-210	slow spiral*	200-250	cutting or soluble oil
Bronze	150-200	slow spiral*	200-250	soluble oil
Copper - Nickel & Copper Tin Alloy	65-100	general-purpose*	140-200	cutting or soluble oil
Copper - Aluminum Alloys	30-100	general-purpose*	120-200	cutting or soluble oil
Magnesium Alloys - Wrought	50-90	general-purpose*	140-330	cutting or soluble oil
Magnesium Alloys - Cast	50-90	general-purpose*	140-365	cutting or soluble oil
Nickel Alloys - Wrought and Cast	80-170	cobalt	15-20	cutting or soluble oil
Nickel Alloys - Monel	115-240	cobalt	15-20	cutting or soluble oil
Nickel Alloys - Beryllium Nickel	200-250	cobalt	10-12	cutting or soluble oil
Zinc Alloy	112-126	general-purpose	200-250	soluble oil

**bright only*

Determining Feed and Speed

This Cleveland catalog offers starting feed and speed parameters for each style of tool. The recommended operating parameters are found in front of each tool style for high-performance tools and in the beginning of the general application section for those tools. Drill cutting speed tables for individual sizes of drills can be found in this section, titled "Drill Cutting Speeds".

To determine your own starting speeds and feeds, follow this procedure.

Look up the material to be drilled in the Recommended SFM (surface feet per minute) by material class table in this section, titled "Material Class" and determine the geometry class.

Determine the drill style from the Drill Style by Geometry and Length/Construction table on page 3 based on recommended drill type and drill length desired.

Review each drill style to understand the geometry differences. Select the appropriate geometry and check to ensure the desired size is available.

Starting speed and feed recommendations for the drill can be determined from the formulas below.

Recommended operating parameters for high-performance drills are generally 20% faster than for conventional geometries and are shown with the individual drill styles. Feed rates for high performance drills are heavier than for conventional geometries by 50% or more.

Drill Diameter Tolerances

Diameter Range (inches)	Plus (+) (inches)	Minus (–) (inches)
through 1/8	.0000	.0005
over 1/8 through 1/4	.0000	.0007
over 1/4 through 1/2	.0000	.0010
over 1/2 through 1	.0000	.0012
over 1 through 2	.0000	.0015
over 2 through 3-1/2	.0000	.0020

Drill Lip Height Tolerances

Diameter Range (inches)	Total Indicator Variation (inches)
1/16 through 1/8	.0020
over 1/8 through 1/4	.0030
over 1/4 through 1/2	.0040
over 1/2 through 1	.0050
over 1 through 3-1/2	.0060

Drill Overall Length and Flute Length Tolerances

Diameter Range (inches)	Plus (+) (inches)	Minus (–) (inches)
#80 through 1/8	.1250	.0625
over 1/8 through 1/2	.1250	.1250
over 1/2 through 1	.2500	.1250
over 1 through 2	.2500	.2500
over 2 through 3-1/2	.3750	.3750

Drill Definitions

RPM = revolutions per minute
SFM = surface feet per minute
FR = feed rate in inches per minute
IPR = inches per revolution

Drill Formula

RPM = 3.8 x SFM/drill diameter
SFM = 0.26 x RPM x drill diameter
FR = RPM x IPR

Drill Point Angle Tolerances

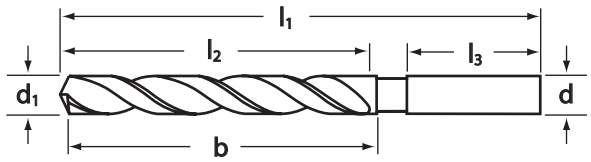
Diameter Range (inches)	Included Angle (degrees)	Tolerance (degrees)
1/16 through 1/2	118° or 135°	± 5°
over 1/2 through 1-1/2	118°	± 3°
over 1-1/2 through 3-1/2	118°	± 2°

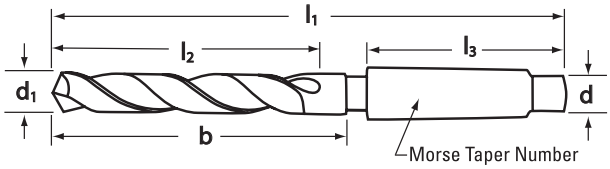
Drill Feeds

Diameter Range (inches)	IPR (inches per revolution)	
	Normal Feeds	Heavy Feed
1/16 through 1/8	.001 - .002	.002 - .004
over 1/8 through 1/4	.002 - .004	.004 - .008
over 1/4 through 1/2	.004 - .008	.008 - .016
over 1/2 through 1	.008 - .016	.016 - .024
over 1	.016 - .024	.024 - .032

Surface Treatment	Recommended Applications	Precautions
TiN (Titanium Nitride)	For ferrous and non-metallic materials: free-machining steels and irons, high tensile steels, tough machining steels, plastics, hard rubber, and fiber. The hard, smooth treatment increases tool life, improves finish, and allows higher speeds.	Avoid titanium and titanium alloys due to tendency to gall.
TiCN (Titanium Carbonitride)	For ferrous and non-ferrous materials: cast iron, aluminum, stainless steel, brass, abrasive materials, high-silicon automotive aluminum, glass-filled plastics, and composites. The hard, smooth treatment increases tool life and improves finish.	Use with caution in titanium, titanium alloys, and aluminum die casting due to tendency to gall.
TiAlN (Titanium Aluminum Nitride)	For ferrous materials, high-temperature alloys, and titanium: stainless steels, gray cast irons or nodular irons, and steels containing high-nickel, cobalt, chromium, and tungsten. Most effective where higher speeds are available.	Avoid in most non-ferrous materials.
CrN (Chromium Nitride)	For non-ferrous materials: brass, bronze, zinc alloys, and magnesium alloys. CrN is medium-hard and has a lower wear resistance than TiN, TiCN, and TiAlN. However, unlike these treatments, CrN does not gall in non-ferrous materials.	Ineffective in ferrous materials.

Special Drills





If you know the specs for your special tool, please send a blueprint and/or provide this information:

- Material/hardness to be drilled.
- **d** = **shank diameter or size.**
  - — If standard taper shank is ordered, specify as No. 2 American National Standard Taper, No. 3 American National Standard Taper, etc.
  - — If taper shank is special, give diameter at small end, length of shank, diameter at large end, taper per foot, and furnish a sample of gauge if possible.
  - — If tang is special, give thickness and length.
- **b** = **body length.**
- **d^1** = **diameter of fluted section.** For multiple diameter drills, indicate the diameter of the large fluted section
- **l^1** = **overall length.**
  - — When ordering extra-length drills, specify: type of material being drilled, depth of hole, whether drilling in a vertical or horizontal position, and whether feed is intermittent or with only occasional withdrawals.
- **l^2** = **flute length.**
- **l^3** = **shank length.**

For multiple-diameter drills, provide:

- the diameter of the small, fluted section
- the included angle of cutting shoulder. Note: this is measured as an angle between the two cutting edges (included angle) and not as an angle with the center line.
- the length of small diameter. Note: this is measured from the outer corner of the point to the bottom or inner corner of the cutting shoulder.

For special accuracy requirements, give tolerances on the important dimensions.

For assistance in designing your special tool, provide

- Workpiece material hardness
- Depth of hole
- Shank type
- Step length if necessary
- Hole diameter
- Thru hole or blind hole
- Coolant or non-coolant
- Step angle

Make sure that suitable allowance has been made for re-sharpening and for clearance for the spindle above the drill bushings. If a particular style of flute-construction is desired, it should be specified by reference to the regular drill of the required flute-style.

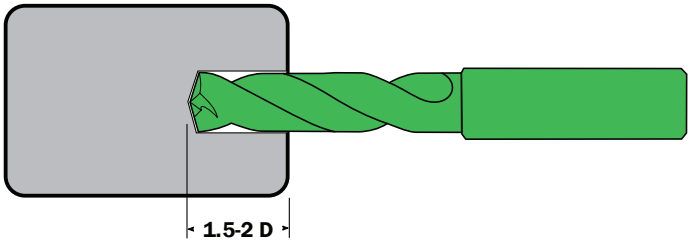
Speed & Feeds

ISO	Material Group	Tensile Strength (N/mm^2) Rockwell Hardness (HRc)	Average Cutting Speed Vc (SFM) 5xD Vc	5xD Feed Ltr	8xD Vc	8xD Feed Ltr	12xD Vc	12xD Feed Ltr
P	Structural Steel	≤ 25 HRC (≤ 850 N/mm^2)	459	E	344	E	312	D
	Heat Treatable, Case Hardening, Free Cutting Steels	≤ 42 HRC (≤ 1300 N/mm^2)	443	E	312	E	295	E
M	Stainless Steels	≤ 23 HRC (500 - 800 N/mm^2)	180	B	148	B	131	B
	Heat Resisting Steels	≤ 23 HRC	180	C	148	C	131	C
K	Cast Material	≤ 22 HRC	541	F	476	F	361	F
	Cast Material	≤ 30 HRC	476	F	361	F	312	F
S	Titanium Materials	≤ 23 HRC (800 N/mm^2)	148	C	131	C	98	C
	Titanium Alloys	≤ 38 HRC (1200 N/mm^2)	131	C	115	C	82	C
H	Hardened Steels	≤ 60 HRC	115	A	115	A	82	A

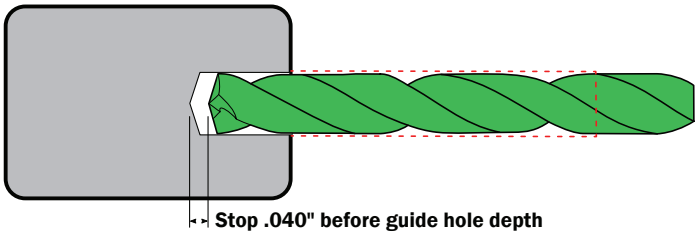
Feed Ltr	Nominal Diameter mm - Inch per rev 2.5mm (0.098")	4mm (0.1575")	6.3mm (0.2362")	10mm (0.3932")	16mm (0.6300")	25mm (0.9842")
A	0.001	0.002	0.002	0.004	0.005	0.008
B	0.002	0.002	0.003	0.005	0.006	0.010
C	0.002	0.003	0.004	0.006	0.008	0.012
D	0.002	0.004	0.005	0.008	0.010	0.016
E	0.003	0.005	0.006	0.010	0.012	0.020
F	0.004	0.006	0.008	0.012	0.016	0.025

Drilling method for Cleveland® 12x diameter common shank drill

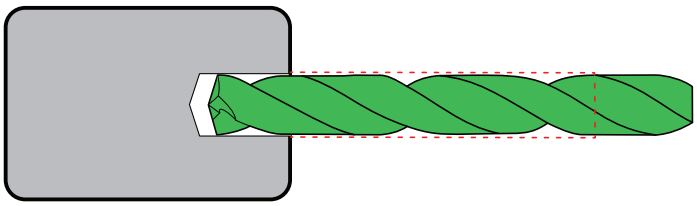
1. Create guide hole using Cleveland® carbide common shank 3x diameter drill.



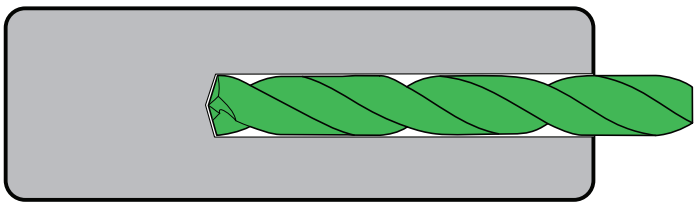
2. Insert the 12x diameter drill at low RPM and feed (500 RPM / 40-80 IPM).



3. Increase rotation to full speed and begin normal drilling cycle.



4. After drilling is complete, reduce RPM and feed during retract (500 RPM / 40-80 IPM).



Important Note:

If the hole to be drilled is on a curved surface, or otherwise not perpendicular to the drilling axis, a flat must be cut for accurate drilling.

Coolant Options:

Through spindle coolant or minimum quantity lube (MQL) through spindle coolant.

		Speeds (SFM) Drill Surface Treatment				Feed Rate (IPR) increase by 25% for TiCN			
Ferrous Material									
Material	Hardness	Bright, Black Oxide & Straw	TiN	TiCN	TiAlN	1/8" 3.17mm	1/4" 6.35mm	3/8" 9.52mm	1/2" 12.70mm
low carbon steel	85-125 Bhn	90	125	135	–	.0040	.0065	.0080	.0100
medium carbon steel	125-175 Bhn	90	125	135	–	.0040	.0065	.0080	.0100
high carbon steel	175-225 Bhn	90	125	135	–	.0030	.0050	.0065	.0080
alloyed steel	200-300 Bhn	60	80	90	–	.0025	.0040	.0050	.0065
heat-treatable steel and forgings	370-420 Bhn	40	50	60	70	.0025	.0040	.0050	.0065
tool steels	< 24 HRc	60	80	90	110	.0030	.0050	.0065	.0080
	> 24-30 HRc	30	40	45	55	.0025	.0040	.0050	.0065
high-speed steels	14-30 HRc	35	50	55	60	.0025	.0040	.0050	.0065
gray cast iron	240 Bhn	115	160	175	–	.0050	.0080	.0100	.0125
	<300 Bhn	90	125	135	–	.0050	.0080	.0100	.0125
mallable cast iron	<300 Bhn	70	95	105	–	.0050	.0080	.0100	.0125
chilled cast iron	<350 Bhn	25	35	40	–	.0025	.0040	.0050	.0065
stainless steel									
300 series (Austenetic)	120-200 Bhn	60	80	90	100	.0025	.0040	.0050	.0065
400 series (Martensitic)	200-300 Bhn	40	50	60	80	.0025	.0040	.0050	.0065
sulphurized	> 25 HRc	45	65	70	80	.0025	.0040	.0050	.0065
spring steel	400 Bhn	25	35	40	45	.0020	.0030	.0040	.0050
Non-Ferrous Material									
Material	Hardness	Bright, Black Oxide & Straw	TiN	TiCN	TiAlN	1/8" 3.17mm	1/4" 6.35mm	3/8" 9.52mm	1/2" 12.70mm
aluminum and aluminum alloys	40-100 Bhn	180	–	–	–	.0050	.0080	.0100	.0125
cast aluminum									
< 10% Si	200 Bhn	200	275	–	–	.0050	.0080	.0100	.0125
> 10% Si	200 Bhn	180	225	–	250	.0040	.0065	.0080	.0100
brass, long chipping	190-210 Bhn	150	–	–	–	.0040	.0065	.0080	.0100
bronze, long chipping	150-200 Bhn	90	115	–	130	.0030	.0050	.0065	.0080
copper, low alloy	65-100 Bhn	120	145	–	–	.0040	.0065	.0080	.0100
plastics, duraplastics	N/A	55	75	80	–	.0030	.0050	.0065	.0080

The speeds and feeds listed here are conservative recommendations for initial setup. In actual use, depending on the machine environment and workpiece material, significantly higher speeds and feeds may be achievable.

Use these speeds and feeds as a starting point. Cutting conditions can be gradually adjusted until the optimum settings for the application are found.
Questions? Contact Technical Support at 800.892.4281.

Tech Tips

Q-Cobalt Advantages

- Deliver close hole tolerance for high-precision work.
- Use higher speeds and feeds for increased productivity.
- Ideal for deep-hole drilling in a wide range of materials.

Material	Hardness	Speeds (SFM) Bright		Feed Rate (IPR) for drill diameter .0625"	.1250"	.2500"	.5000"	.7500"	1.0000"
low carbon steel, annealed	85-125 Bhn	85-150	low	.0005	.0010	.0020	.0040	.0050	.0060
			high	.0015	.0030	.0050	.0090	.0100	.0120
medium carbon steel	275-425 Bhn	65-120	low	.0005	.0010	.0020	.0030	.0040	.0040
			high	.0010	.0020	.0040	.0080	.0900	.0100
hardened steel	48-52 Rc C	30-90	low	.0005	.0010	.0020	.0030	.0040	.0040
			high	.0010	.0030	.0030	.0050	.0060	.0070
stainless steel (soft)	135-275 Bhn	50-150	low	.0005	.0005	.0020	.0040	.0050	.0060
			high	.0010	.0030	.0060	.0060	.0080	.0100
stainless steel (hard)	275-425 Bhn	30-90	low	.0005	.0005	.0010	.0015	.0020	.0025
			high	.0010	.0020	.0030	.0040	.0060	.0070
cast iron (soft)	120-220 Bhn	100-300	low	.0010	.0020	.0040	.0050	.0070	.0090
			high	.0020	.0040	.0080	.0100	.0120	.0140
cast iron (hard)	220-320 Bhn	60-200	low	.0015	.0010	.0020	.0030	.0040	.0050
			high	.0020	.0030	.0040	.0070	.0080	.0100
ductile iron		70-250	low	.0010	.0020	.0030	.0050	.0060	.0070
			high	.0020	.0040	.0060	.0080	.0090	.0150
malleable iron		80-250	low	.0010	.0020	.0030	.0050	.0060	.0070
			high	.0020	.0050	.0060	.0120	.0140	.0150
high-temp alloys, nickel-based		15-20	low	.0005	.0005	.0010	.0015	.0020	.0025
			high	.0010	.0030	.0040	.0050	.0600	.0070
monel, high nickel steels		15-20	low	.0005	.0005	.0010	.0015	.0020	.0025
			high	.0010	.0020	.0030	.0040	.0050	.0060
titanium (soft)		60-200	low	.0005	.0020	.0040	.0050	.0060	.0070
			high	.0010	.0030	.0060	.0060	.0080	.0100
titanium (hard)		45-200	low	.0005	.0010	.0020	.0040	.0040	.0050
			high	.0020	.0040	.0070	.0090	.0100	.0120
refractory alloys		50-200	low	.0005	.0005	.0020	.0040	.0050	.0050
			high	.0010	.0030	.0060	.0100	.0120	.0120
aluminum, aluminum alloys		150-400	low	.0010	.0020	.0030	.0050	–	–
			high	.0020	.0040	.0070	.0130	–	–
brass, bronze		100-300	low	.0005	.0010	.0020	.0040	–	–
			high	.0015	.0030	.0040	.0100	–	–
copper, copper alloys		150-400	low	.0010	.0030	.0050	.0060	–	–
			high	.0030	.0050	.0120	.0140	–	–
magnesium, magnesium alloys		200-650	low	.0015	.0030	.0050	.0080	–	–
			high	.0030	.0070	.0120	.0150	–	–
plastics, glass filled		150-300	low	.0010	.0020	.0030	.0050	–	–
			high	.0020	.0040	.0060	.0120	–	–
plastics		250-600	low	.0015	.0030	.0040	.0060	–	–
			high	.0030	.0050	.0120	.0160	–	–

Higher feed and speed values should be favored for softer materials; lower feed and speed values should be used for harder materials. The above recommendations are for hole depths up to 2 drill diameters.

When hole depths run 3 to 6 times diameters, speeds should be reduced 10% to 35% respectively, and feeds should be reduced 10% to 20% respectively.

Fractional

Drill Size		Feet per Minute														
Frac / Dec		10’	20’	30’	40’	50’	60’	70’	80’	90’	100’	110’	120’	130’	140’	150’
		Revolutions per Minute														
1/16	.0625	611	1222	1833	2445	3056	3667	4278	4889	5550	6111	6722	7334	7945	8556	9167
1/8	.1250	306	611	917	1222	1528	1833	2139	2445	2750	3056	3361	3667	3973	4278	4584
3/16	.1875	204	407	611	815	1019	1222	1426	1630	1833	2037	2241	2445	2648	2852	3056
1/4	.2500	153	306	458	611	764	917	1070	1222	1375	1528	1681	1833	1986	2139	2292
5/16	.3125	122	244	367	489	611	733	856	978	1100	1222	1345	1467	1589	1711	1833
3/8	.3750	102	204	306	407	509	611	713	815	917	1019	1120	1222	1324	1426	1528
7/16	.4375	87	175	262	349	437	524	611	698	786	873	960	1048	1135	1222	1310
1/2	.5000	76	153	229	306	382	458	535	611	688	764	840	917	993	1070	1146
5/8	.6250	61	122	183	244	306	367	428	489	550	611	672	733	794	856	917
3/4	.7500	51	102	153	203	255	306	357	407	458	509	560	611	662	713	764
7/8	.8750	44	87	131	175	218	262	306	349	393	436	480	524	568	611	655
1	1.0000	38	76	115	153	191	229	267	306	344	382	420	458	497	535	573
1-1/8	1.1250	34	68	102	136	170	204	238	272	306	340	373	407	441	475	509
1-1/4	1.2500	31	61	92	122	153	183	214	244	275	306	336	367	397	428	458
1-3/8	1.3750	28	56	83	111	139	167	194	222	250	278	306	333	361	389	417
1-1/2	1.5000	26	51	76	102	127	153	178	204	229	255	280	306	331	357	382
1-5/8	1.6250	24	47	70	94	117	141	165	188	212	235	259	282	306	329	353
1-3/4	1.7500	22	44	65	87	109	131	153	175	196	218	240	262	284	306	327
1-7/8	1.8750	20	41	61	81	102	122	143	163	183	204	224	244	265	285	306
2	2.0000	19	38	57	76	95	115	134	153	172	191	210	229	248	267	287
2-1/4	2.2500	17	34	51	68	85	102	119	136	153	170	187	204	221	238	255
2-1/2	2.5000	15	31	46	61	76	92	107	122	137	153	168	183	199	214	229
2-3/4	2.7500	14	28	42	56	69	83	97	111	125	139	153	167	181	194	208
3	3.0000	13	25	38	51	64	76	89	102	115	127	140	153	166	178	191

Letter

Drill Size		Feet per Minute														
Letter / Dec		10’	20’	30’	40’	50’	60’	70’	80’	90’	100’	110’	120’	130’	140’	150’
		Revolutions per Minute														
A	.2340	163	326	491	654	818	982	1145	1309	1472	1636	1796	1959	2122	2285	2448
B	.2380	161	321	482	642	803	963	1124	1284	1445	1605	1765	1926	2086	2247	2407
C	.2420	158	316	473	631	789	947	1105	1262	1420	1578	1736	1894	2052	2210	2368
D	.2460	155	311	467	622	778	934	1089	1245	1400	1556	1708	1863	2018	2174	2329
E	.2500	153	306	458	611	764	917	1070	1222	1375	1528	1681	1834	1968	2139	2292
F	.2570	149	297	446	594	743	892	1040	1189	1337	1486	1635	1784	1932	2081	2229
G	.2610	146	293	440	585	732	878	1024	1170	1317	1463	1610	1756	1903	2049	2195
H	.2660	144	287	430	574	718	862	1005	1149	1292	1436	1580	1723	1867	2010	2154
I	.2720	140	281	421	562	702	842	983	1123	1264	1404	1545	1685	1826	1966	2106
J	.2770	138	276	414	552	690	827	965	1103	1241	1379	1517	1655	1793	1930	2068
K	.2810	136	272	408	544	680	815	951	1087	1223	1359	1495	1631	1767	1903	2039
L	.2900	132	263	395	527	659	790	922	1054	1185	1317	1449	1581	1712	1844	1976
M	.2950	129	259	389	518	648	777	907	1036	1166	1295	1424	1554	1683	1813	1942
N	.3020	126	253	380	506	633	759	886	1012	1139	1265	1391	1518	1644	1771	1897
O	.3160	121	242	363	484	605	725	846	967	1088	1209	1330	1450	1571	1692	1813
P	.3230	118	237	355	473	592	710	828	946	1065	1183	1301	1419	1537	1657	1774
Q	.3320	115	230	345	460	575	690	805	920	1035	1150	1266	1384	1496	1611	1726
R	.3390	113	225	338	451	564	676	789	902	1014	1127	1239	1355	1465	1577	1690
S	.3480	110	220	329	439	549	659	769	878	988	1098	1207	1317	1427	1537	1646
T	.3580	107	213	320	426	533	640	746	853	959	1066	1173	1280	1387	1494	1600
U	.3680	104	208	311	415	519	623	727	830	934	1038	1142	1246	1349	1453	1557
V	.3770	101	203	304	405	507	608	709	810	912	1013	1114	1219	1317	1418	1520
W	.3860	99	198	297	396	495	594	693	792	891	989	1088	1188	1286	1385	1484
X	.3970	96	192	289	385	481	576	672	769	865	962	1058	1155	1251	1347	1443
Y	.4040	95	189	284	378	473	567	662	756	851	945	1040	1135	1229	1324	1418
Z	.4130	92	185	277	370	462	555	647	740	832	925	1017	1110	1202	1295	1387

Diameter Range (inches)	Normal Feeds (IPR)	Heavy Feed (IPR)
from 1/16 thru 1/8	.001-.002	.002-.004
over 1/8 thru 1/4	.002-.004	.004-.008
over 1/4 thru 1/2	.004-.008	.008-.016
over 1/2 thru 1	.008-.016	.016-.024
over 1	.016-.024	.024-.032

Wire Gage

Drill Size		Feet per Minute														
Wire / Dec		10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
		Revolutions per Minute														
1	.2280	168	335	503	670	838	1005	1173	1340	1508	1675	1843	2010	2179	2346	2513
2	.2210	173	345	518	691	864	1037	1210	1382	1555	1728	1901	2074	2247	2420	2593
3	.213	179	359	538	717	897	1076	1255	1434	1614	1793	1974	2152	2331	2511	2690
4	.2090	183	365	548	731	914	1097	1280	1462	1645	1828	2010	2193	2376	2560	2741
5	.2055	186	372	558	744	930	1115	1301	1487	1673	1859	2045	2230	2416	2602	2788
6	.2040	187	374	562	749	936	1123	1310	1498	1685	1872	2060	2247	2434	2621	2809
7	.2010	190	380	570	760	950	1140	1330	1520	1710	1900	2090	2281	2470	2660	2850
8	.1990	192	384	576	768	960	1151	1343	1535	1727	1919	2111	2303	2495	2687	2879
9	.1960	195	390	585	780	975	1169	1364	1559	1754	1949	2144	2339	2534	2728	2923
10	.1935	197	395	592	790	987	1184	1382	1579	1777	1974	2171	2369	2566	2764	2961
11	.1910	200	400	600	800	1000	1200	1400	1600	1800	2000	2200	2400	2600	2800	3001
12	.1890	202	404	606	808	1010	1213	1415	1617	1819	2021	2223	2425	2627	2829	3032
13	.1850	206	413	620	826	1032	1239	1450	1652	1859	2065	2271	2479	2684	2891	3097
14	.1820	210	420	630	840	1050	1259	1469	1679	1889	2099	2309	2518	2728	2938	3148
15	.1800	213	425	638	851	1064	1276	1489	1702	1914	2127	2334	2546	2759	2971	3183
16	.1770	216	432	647	863	1079	1295	1511	1726	1942	2158	2374	2590	2806	3021	3237
17	.1730	221	442	662	883	1104	1325	1546	1766	1987	2208	2429	2650	2870	3091	3313
18	.1695	226	452	678	904	1130	1356	1582	1808	2034	2260	2479	2704	2930	3155	3380
19	.1660	230	460	690	920	1151	1381	1611	1841	2071	2301	2531	2761	2991	3222	3453
20	.1610	237	475	712	949	1186	1423	1660	1898	2135	2372	2610	2847	3084	3322	3559
21	.1590	240	480	721	961	1201	1441	1681	1922	2162	2402	2644	2883	3123	3363	3604
22	.1570	243	487	730	973	1217	1460	1703	1946	2190	2433	2676	2920	3164	3406	3649
23	.1540	248	496	744	992	1240	1488	1736	1984	2232	2480	2728	2976	3224	3472	3720
24	.1520	251	503	754	1005	1257	1508	1759	2010	2262	2513	2764	3016	3267	3518	3769
25	.1495	256	511	767	1022	1276	1533	1789	2044	2300	2555	2810	3066	3322	3577	3832
26	.1470	260	520	779	1039	1299	1559	1819	2078	2338	2598	2858	3118	3378	3638	3898
27	.1440	265	531	796	1061	1327	1592	1857	2122	2388	2653	2919	3183	3448	3714	3979
28	.1405	272	544	816	1088	1360	1631	1903	2175	2447	2719	2990	3262	3534	3806	4078
29	.1360	281	562	843	1124	1405	1685	1966	2247	2528	2809	3090	33701	3651	3932	4213
30	.1285	297	595	892	1189	1487	1784	2081	2378	2676	2973	3270	3567	3864	4162	4459
31	.1200	318	637	955	1273	1592	1910	2228	2546	2865	3183	3501	3821	4138	4456	4775
32	.1160	329	659	988	1317	1647	1976	2305	2634	2964	3293	3622	3951	4281	4610	4939
33	.1130	338	676	1014	1352	1690	2028	2366	2704	3042	3380	3718	4056	4394	4732	5070
34	.1110	344	688	1032	1376	1721	2065	2409	2753	3097	3442	3785	4129	4474	4818	5162
35	.1100	347	694	1042	1389	1736	2083	2430	2778	3125	3472	3821	4167	4514	4861	5209
36	.1065	359	717	1076	1435	1794	2152	2511	2870	3228	3587	3945	4304	4663	5021	5380
37	.1040	367	735	1102	1469	1837	2204	2571	2938	3306	3673	4040	4407	4775	5142	5509
38	.1015	376	753	1129	1505	1882	2258	2634	3010	3387	3763	4140	4516	4892	5269	5645

continued on next page

Wire Gage (continued)

Drill Size		Feet per Minute														
Wire / Dec		10’	20’	30’	40’	50’	60’	70’	80’	90’	100’	110’	120’	130’	140’	150’
		Revolutions per Minute														
39	.0995	384	768	1152	1536	1920	2303	2687	3071	3455	3839	4222	4607	4991	5374	5758
40	.0980	390	780	1169	1559	1949	2339	2729	3118	3508	3898	4287	4677	5067	5457	5846
41	.0960	398	796	1194	1592	1990	2387	2785	3183	3581	3979	4377	4775	5172	5570	5968
42	.0935	408	817	1226	1634	2043	2451	2860	3268	3677	4085	4494	4902	5311	5719	6128
43	.0890	429	858	1288	1717	2146	2575	3004	3434	3863	4292	4721	5150	5579	6008	6438
44	.0860	444	888	1333	1777	2221	2665	3109	3554	3999	4442	4886	5330	5774	6218	6662
45	.0820	466	932	1397	1863	2329	2795	3261	3726	4192	4658	5124	5590	6056	6522	6987
46	.0810	472	943	1415	1886	2358	2830	3301	3773	4244	4716	5187	5659	6130	6602	7074
47	.0785	487	973	1460	1946	2433	2920	3406	3893	4379	4866	5352	5839	6326	6812	7299
48	.0760	503	1005	1508	2010	2513	3016	3518	4021	4523	5026	5528	6031	6534	7036	7539
49	.0730	523	1047	1570	2093	2617	3140	3663	4186	4710	5233	5756	6279	6808	7326	7849
50	.0700	546	1091	1637	2183	2729	3274	3820	4366	4911	5457	6002	6548	7094	7640	8185
51	.0670	570	1140	1710	2280	2851	3421	3991	4561	5131	5701	6271	6841	7413	798	8552
52	.0635	602	1203	1805	2406	3008	3609	4211	4812	5414	6015	6619	7218	7820	8421	9023
53	.0595	641	1283	1924	2566	3207	3848	4490	5131	5773	6414	7062	7704	8346	8988	9630
54	.0550	694	1389	2084	2778	3473	4167	4862	5556	6251	6945	7639	8334	9028	9723	10417
55	.0520	735	1469	2204	2938	3673	4408	5142	5877	6611	7346	8080	8815	9549	10284	11028
56	.0465	821	1643	2465	3286	4108	4929	5751	6572	7394	8215	9036	9857	10678	11500	12322
57	.0430	888	1777	2671	3561	4452	5342	6232	7122	8013	8903	9771	10660	11548	12436	13325
58	.0420	910	1819	2729	3637	4547	5456	6367	7275	8186	9095	10004	10913	11823	12732	13642
59	.0410	932	1863	2795	3726	4658	5590	6521	7453	8388	9316	10248	11180	12111	13043	13975
60	.0400	955	1910	2865	3820	4775	5729	6684	7639	8594	9549	10504	11459	12414	13369	14324
61	.0390	979	1959	2938	3918	4897	5876	6856	7835	8815	9794	10774	11753	12732	13712	14691
62	.0380	1005	2010	3015	4020	5025	6030	7035	8040	9045	10050	11057	12060	13068	14073	15078
63	.0370	1032	2064	3096	4128	5160	6192	7224	8256	9288	10320	11366	12398	13421	14453	15485
64	.0360	1061	2122	3183	4244	5305	6366	7427	8488	9549	10610	11671	12732	13793	14854	15915
65	.0350	1091	2182	3273	4364	5455	6546	7637	8728	9819	10910	12005	13096	14187	15279	16370
66	.0330	1158	2316	3474	4632	5790	6948	8106	9264	10422	11580	12732	13890	15047	16205	17362
67	.0320	1194	2388	3582	4776	5970	7164	8358	9552	10746	11940	13130	14324	15517	16712	17905
68	.0310	1232	2465	3696	4928	6160	7392	8624	9856	11088	12320	13554	14786	16018	17250	18482
69	.0292	1308	2616	3918	5224	6530	7836	9142	1048	11754	13060	14389	15697	17006	18314	19622
70	.0280	1364	2729	4091	5456	6820	8184	9548	10912	12276	13640	15006	16370	17734	19099	20463
71	.0260	1469	2938	4419	5892	7365	8838	10311	11784	13257	14730	16160	17629	19099	20568	22037
72	.0250	1528	3056	4584	6112	7640	9168	10696	12224	13752	15280	16807	18335	19863	21390	22918
73	.0240	1592	3183	4776	6368	7960	9552	11144	12736	14328	15920	17507	19099	20690	22282	23873
74	.0225	1698	3396	5106	6808	8510	10212	11914	13616	15318	17020	18674	20372	22069	23767	25465
75	.0210	1819	3638	5457	7276	9095	10914	12733	14552	16371	18190	20008	21827	23646	25465	27284
76	.0200	1910	3820	5730	7640	9550	11460	13370	15280	17190	19100	21008	22918	24828	26738	28648
77	.0180	2122	4244	6366	8488	10610	12732	14854	16976	19098	21220	23343	25465	27587	29709	31831
78	.0160	2388	4775	7161	9548	11935	14322	16709	19096	21483	23870	26260	28648	31035	33422	35810
79	.0145	2634	5269	7902	10536	13170	15804	18438	21072	23706	26340	28988	31611	34246	36880	39514
80	.0135	2830	5659	8490	11320	14150	16980	19810	22640	25470	28300	31123	33953	36782	39612	42441

Inch Drill Sizes

Conversion formulas:
Inch = mm x .03937
Metric = inch x 25.4

Drill Sizes	Decimal Equiv.	Screw Machine Length				Jobbers Length				Taper Length			
		flute length		overall length		flute length		overall length		flute length		overall length	
		fraction	decimal	fraction	decimal	fraction	decimal	fraction	decimal	fraction	decimal	fraction	decimal
1/64	.0156	—	—	—	—	3/16	.1875	3/4	.7500	5/16	.3125	1-1/2	1.5000
80	.0135	—	—	—	—	1/8	.1250	3/4	.7500	5/16	.3125	1-1/2	1.5000
79	.0145	—	—	—	—	1/8	.1250	3/4	.7500	5/16	.3125	1-1/2	1.5000
78	.0160	—	—	—	—	3/16	.1875	7/8	.8750	5/16	.3125	1-1/2	1.5000
77	.0180	—	—	—	—	3/16	.1875	7/8	.8750	5/16	.3125	1-1/2	1.5000
76	.0200	—	—	—	—	3/16	.1875	7/8	.8750	5/16	.3125	1-1/2	1.5000
75	.0210	—	—	—	—	1/4	.2500	1	1.0000	5/16	.3125	1-1/2	1.5000
74	.0225	—	—	—	—	1/4	.2500	1	1.0000	5/16	.3125	1-1/2	1.5000
73	.0240	—	—	—	—	5/16	.3125	1-1/8	1.1250	5/16	.3125	1-1/2	1.5000
72	.0250	—	—	—	—	5/16	.3125	1-1/8	1.1250	5/16	.3125	1-1/2	1.5000
71	.0260	—	—	—	—	3/8	.3750	1-1/4	1.2500	3/4	.7500	2	2.0000
70	.0280	—	—	—	—	3/8	.3750	1-1/4	1.2500	3/4	.7500	2	2.0000
69	.0292	—	—	—	—	1/2	.5000	1-3/8	1.3750	3/4	.7500	2	2.0000
68	.0310	—	—	—	—	1/2	.5000	1-3/8	1.3750	3/4	.7500	2	2.0000
1/32	.0312	1/2	.5000	1-3/8	1.3750	1/2	.5000	1-3/8	1.3750	3/4	.7500	2	2.0000
67	.0320	—	—	—	—	1/2	.5000	1-3/8	1.3750	3/4	.7500	2	2.0000
66	.0330	—	—	—	—	1/2	.5000	1-3/8	1.3750	3/4	.7500	2	2.0000
65	.0350	—	—	—	—	5/8	.6250	1-1/2	1.5000	3/4	.7500	2	2.0000
64	.0360	—	—	—	—	5/8	.6250	1-1/2	1.5000	3/4	.7500	2	2.0000
63	.0370	—	—	—	—	5/8	.6250	1-1/2	1.5000	3/4	.7500	2	2.0000
62	.0380	—	—	—	—	5/8	.6250	1-1/2	1.5000	3/4	.7500	2	2.0000
61	.0390	—	—	—	—	11/16	.6875	1-5/8	1.6250	1-1/8	1.1250	2-1/4	2.2500
60	.0400	1/2	.5000	1-3/8	1.3750	11/16	.6875	1-5/8	1.6250	1-1/8	1.1250	2-1/4	2.2500
59	.0410	1/2	.5000	1-3/8	1.3750	11/16	.6875	1-5/8	1.6250	1-1/8	1.1250	2-1/4	2.2500
58	.0420	1/2	.5000	1-3/8	1.3750	11/16	.6875	1-5/8	1.6250	1-1/8	1.1250	2-1/4	2.2500
57	.0430	1/2	.5000	1-3/8	1.3750	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/4	2.2500
56	.0465	1/2	.5000	1-3/8	1.3750	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/4	2.2500
3/64	.0469	1/2	.5000	1-3/8	1.3750	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/4	2.2500
55	.0520	5/8	.6250	1-5/8	1.6250	7/8	.8750	1-7/8	1.8750	1-3/4	1.7500	3	3.0000
54	.0550	5/8	.6250	1-5/8	1.6250	7/8	.8750	1-7/8	1.8750	1-3/4	1.7500	3	3.0000
53	.0595	5/8	.6250	1-5/8	1.6250	7/8	.8750	1-7/8	1.8750	1-3/4	1.7500	3	3.0000
1/16	.0625	5/8	.6250	1-5/8	1.6250	7/8	.8750	1-7/8	1.8750	1-3/4	1.7500	3	3.0000
52	.0635	11/16	.6875	1-11/16	1.6875	7/8	.8750	1-7/8	1.8750	2	2.0000	3-3/4	3.7500
51	.0670	11/16	.6875	1-11/16	1.6875	1	1.0000	2	2.0000	2	2.0000	3-3/4	3.7500
50	.0700	11/16	.6875	1-11/16	1.6875	1	1.0000	2	2.0000	2	2.0000	3-3/4	3.7500
49	.0730	11/16	.6875	1-11/16	1.6875	1	1.0000	2	2.0000	2	2.0000	3-3/4	3.7500
48	.0760	11/16	.6875	1-11/16	1.6875	1	1.0000	2	2.0000	2	2.0000	3-3/4	3.7500
5/64	.0781	11/16	.6875	1-11/16	1.6875	1	1.0000	2	2.0000	2	2.0000	3-3/4	3.7500
47	.0785	3/4	.7500	1-3/4	1.7500	1	1.0000	2	2.0000	2-1/4	2.2500	4-1/4	4.2500
46	.0810	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/8	2.1250	2-1/4	2.2500	4-1/4	4.2500
45	.0820	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/8	2.1250	2-1/4	2.2500	4-1/4	4.2500
44	.0860	3/4	.7500	1-3/4	1.7500	1-1/8	1.1250	2-1/8	2.1250	2-1/4	2.2500	4-1/4	4.2500
43	.0890	3/4	.7500	1-3/4	1.7500	1-1/4	1.2500	2-1/4	2.2500	2-1/4	2.2500	4-1/4	4.2500
42	.0935	3/4	.7500	1-3/4	1.7500	1-1/4	1.2500	2-1/4	2.2500	2-1/4	2.2500	4-1/4	4.2500
3/32	.0938	3/4	.7500	1-3/4	1.7500	1-1/4	1.2500	2-1/4	2.2500	2-1/4	2.2500	4-1/4	4.2500
41	.0960	13/16	.8125	1-13/16	1.8125	1-3/8	1.3750	2-3/8	2.3750	2-1/2	2.5000	4-5/8	4.6250
40	.0980	13/16	.8125	1-13/16	1.8125	1-3/8	1.3750	2-3/8	2.3750	2-1/2	2.5000	4-5/8	4.6250
39	.0995	13/16	.8125	1-13/16	1.8125	1-3/8	1.3750	2-3/8	2.3750	2-1/2	2.5000	4-5/8	4.6250
38	.1015	13/16	.8125	1-13/16	1.8125	1-7/16	1.4375	2-1/2	2.5000	2-1/2	2.5000	4-5/8	4.6250
37	.1040	13/16	.8125	1-13/16	1.8125	1-7/16	1.4375	2-1/2	2.5000	2-1/2	2.5000	4-5/8	4.6250
36	.1065	13/16	.8125	1-13/16	1.8125	1-7/16	1.4375	2-1/2	2.5000	2-1/2	2.5000	4-5/8	4.6250
7/64	.1094	13/16	.8125	1-13/16	1.8125	1-1/2	1.5000	2-5/8	2.6250	2-1/2	2.5000	4-5/8	4.6250
35	.1100	7/8	.8750	1-7/8	1.8750	1-1/2	1.5000	2-5/8	2.6250	2-3/4	2.7500	5-1/8	5.1250
34	.1110	7/8	.8750	1-7/8	1.8750	1-1/2	1.5000	2-5/8	2.6250	2-3/4	2.7500	5-1/8	5.1250
33	.1130	7/8	.08750	1-7/8	1.8750	1-1/2	1.5000	2-5/8	2.6250	2-3/4	2.7500	5-1/8	5.1250
32	.1160	7/8	.8750	1-7/8	1.8750	1-5/8	1.6250	2-3/4	2.7500	2-3/4	2.7500	5-1/8	5.1250

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Inch Drill Sizes (continued)

Conversion formulas:
Inch = mm x .03937
Metric = inch x 25.4

Drill Sizes	Decimal Equiv.	Screw Machine Length				Jobbers Length				Taper Length			
		flute length		overall length		flute length		overall length		flute length		overall length	
		fraction	decimal	fraction	decimal	fraction	decimal	fraction	decimal	fraction	decimal	fraction	decimal
1/8	.1250	7/8	.8750	1-7/8	1.8750	1-5/8	1.6250	2-3/4	2.7500	2-3/4	2.7500	5-1/8	5.1250
30	.1285	15/16	.9375	1-15/16	1.9375	1-5/8	1.6250	2-3/4	2.7500	3	3.0000	5-3/8	5.3750
29	.1360	15/16	.9375	1-15/16	1.9375	1-3/4	1.7500	2-7/8	2.8750	3	3.0000	5-3/8	5.3750
28	.1405	15/16	.9375	1-15/16	1.9375	1-3/4	1.7500	2-7/8	2.8750	3	3.0000	5-3/8	5.3750
9/64	.1406	15/16	.9375	1-15/16	1.9375	1-3/4	1.7500	2-7/8	2.8750	3	3.0000	5-3/8	5.3750
27	.1440	1	1.0000	2-1/16	2.0625	1-7/8	1.8750	3	3.0000	3	3.0000	5-3/8	5.3750
26	.1470	1	1.0000	2-1/16	2.0625	1-7/8	1.8750	3	3.0000	3	3.0000	5-3/8	5.3750
25	.1495	1	1.0000	2-1/16	2.0625	1-7/8	1.8750	3	3.0000	3	3.0000	5-3/8	5.3750
24	.1520	1	1.0000	2-1/16	2.0625	2	2.0000	3-1/8	3.1250	3	3.0000	5-3/8	5.3750
23	.1540	1	1.0000	2-1/16	2.0625	2	2.0000	3-1/8	3.1250	3	3.0000	5-3/8	5.3750
5/32	.1562	1	1.0000	2-1/16	2.0625	2	2.0000	3-1/8	3.1250	3	3.0000	5-3/8	5.3750
22	.1570	1-1/16	1.0625	2-1/8	2.1250	2	2.0000	3-1/8	3.1250	3-3/8	3.3750	5-3/4	5.7500
21	.1590	1-1/16	1.0625	2-1/8	2.1250	2-1/8	2.1250	3-1/4	3.2500	3-3/8	3.3750	5-3/4	5.7500
20	.1610	1-1/16	1.0625	2-1/8	2.1250	2-1/8	2.1250	3-1/4	3.2500	3-3/8	3.3750	5-3/4	5.7500
19	.1660	1-1/16	1.0625	2-1/8	2.1250	2-1/8	2.1250	3-1/4	3.2500	3-3/8	3.3750	5-3/4	5.7500
18	.1695	1-1/16	1.0625	2-1/8	2.1250	2-1/8	2.1250	3-1/4	3.2500	3-3/8	3.3750	5-3/4	5.7500
11/64	.1719	1-1/16	1.0625	2-1/8	2.1250	2-1/8	2.1250	3-1/4	3.2500	3-3/8	3.3750	5-3/4	5.7500
17	.1730	1-1/8	1.2500	2-3/16	2.1875	2-3/16	2.1875	3-3/8	3.3750	3-3/8	3.3750	5-3/4	5.7500
16	.1770	1-1/8	1.2500	2-3/16	2.1875	2-3/16	2.1875	3-3/8	3.3750	3-3/8	3.3750	5-3/4	5.7500
15	.1800	1-1/8	1.2500	2-3/16	2.1875	2-3/16	2.1875	3-3/8	3.3750	3-3/8	3.3750	5-3/4	5.7500
14	.1820	1-1/8	1.2500	2-3/16	2.1875	2-3/16	2.1875	3-3/8	3.3750	3-3/8	3.3750	5-3/4	5.7500
13	.1850	1-1/8	1.2500	2-3/16	2.1875	2-5/16	2.3125	3-1/2	3.5000	3-3/8	3.3750	5-3/4	5.7500
3/16	.1875	1-1/8	1.2500	2-3/16	2.1875	2-5/16	2.3125	3-1/2	3.5000	3-3/8	3.3750	5-3/4	5.7500
12	.1890	1-3/16	1.1875	2-1/4	2.2500	2-5/16	2.3125	3-1/2	3.5000	3-5/8	3.6250	6	6.0000
11	.1910	1-3/16	1.1875	2-1/4	2.2500	2-5/16	2.3125	3-1/2	3.5000	3-5/8	3.6250	6	6.0000
10	.1935	1-3/16	1.1875	2-1/4	2.2500	2-7/16	2.4375	3-5/8	3.6250	3-5/8	3.6250	6	6.0000
9	.1960	1-3/16	1.1875	2-1/4	2.2500	2-7/16	2.4375	3-5/8	3.6250	3-5/8	3.6250	6	6.0000
8	.1990	1-3/16	1.1875	2-1/4	2.2500	2-7/16	2.4375	3-5/8	3.6250	3-5/8	3.6250	6	6.0000
7	.2010	1-3/16	1.1875	2-1/4	2.2500	2-7/16	2.4375	3-5/8	3.6250	3-5/8	3.6250	6	6.0000
13/64	.2031	1-3/16	1.1875	2-1/4	2.2500	2-7/16	2.4375	3-5/8	3.6250	3-5/8	3.6250	6	6.0000
6	.2040	1-1/4	1.2500	2-3/8	2.3750	2-1/2	2.5000	3-3/4	3.7500	3-5/8	3.6250	6	6.0000
5	.2055	1-1/4	1.2500	2-3/8	2.3750	2-1/2	2.5000	3-3/4	3.7500	3-5/8	3.6250	6	6.0000
4	.2090	1-1/4	1.2500	2-3/8	2.3750	2-1/2	2.5000	3-3/4	3.7500	3-5/8	3.6250	6	6.0000
3	.2130	1-1/4	1.2500	2-3/8	2.3750	2-1/2	2.5000	3-3/4	3.7500	3-5/8	3.6250	6	6.0000
7/32	.2188	1-1/4	1.2500	2-3/8	2.3750	2-1/2	2.5000	3-3/4	3.7500	3-5/8	3.6250	6	6.0000
2	.2210	1-5/16	1.3125	2-7/16	2.4375	2-5/8	2.6250	3-7/8	3.8750	3-3/4	3.7500	6-1/8	6.1250
1	.2280	1-5/16	1.3125	2-7/16	2.4375	2-5/8	2.6250	3-7/8	3.8750	3-3/4	3.7500	6-1/8	6.1250
A	.2340	1-5/16	1.3125	2-7/16	2.4375	2-5/8	2.6250	3-7/8	3.8750	3-3/4	3.7500	6-1/8	6.1250
15/64	.2344	1-5/16	1.3125	2-7/16	2.4375	2-5/8	2.6250	3-7/8	3.8750	3-3/4	3.7500	6-1/8	6.1250
B	.2380	1-3/8	1.3750	2-1/2	2.5000	2-3/4	2.7500	4	4.0000	3-3/4	3.7500	6-1/8	6.1250
C	.2420	1-3/8	1.3750	2-1/2	2.5000	2-3/4	2.7500	4	4.0000	3-3/4	3.7500	6-1/8	6.1250
D	.2460	1-3/8	1.3750	2-1/2	2.5000	2-3/4	2.7500	4	4.0000	3-3/4	3.7500	6-1/8	6.1250
1/4-E	.2500	1-3/8	1.3750	2-1/2	2.5000	2-3/4	2.7500	4	4.0000	3-3/4	3.7500	6-1/8	6.1250
F	.2570	1-7/16	1.4375	2-5/8	2.6250	2-7/8	2.8750	4-1/8	4.1250	3-3/4	3.7500	6-1/8	6.1250
G	.2610	1-7/16	1.4375	2-5/8	2.6250	2-7/8	2.8750	4-1/8	4.1250	3-3/4	3.7500	6-1/8	6.1250
17/64	.2656	1-7/16	1.4375	2-5/8	2.6250	2-7/8	2.8750	4-1/8	4.1250	3-7/8	3.8750	6-1/4	6.2500
H	.2660	1-1/2	1.5000	2-11/16	2.6875	2-7/8	2.8750	4-1/8	4.1250	3-7/8	3.8750	6-1/4	6.2500
I	.2720	1-1/2	1.5000	2-11/16	2.6875	2-7/8	2.8750	4-1/8	4.1250	3-7/8	3.8750	6-1/4	6.2500
J	.2770	1-1/2	1.5000	2-11/16	2.6875	2-7/8	2.8750	4-1/8	4.1250	3-7/8	3.8750	6-1/4	6.2500
9/32	.2812	1-1/2	1.5000	2-11/16	2.6875	2-15/16	2.9375	4-1/4	4.2500	3-7/8	3.8750	6-1/4	6.2500
K	.2812	1-1/2	1.5000	2-11/16	2.6875	2-15/16	2.9375	4-1/4	4.2500	3-7/8	3.8750	6-1/4	6.2500
L	.2900	1-9/16	1.5625	2-3/4	2.7500	2-15/16	2.9375	4-1/4	4.2500	3-7/8	3.8750	6-1/4	6.2500
M	.2950	1-9/16	1.5625	2-3/4	2.7500	3-1/16	3.0625	4-3/8	4.3750	4	4.0000	6-3/8	6.3750
19/64	.2969	1-9/16	1.5625	2-3/4	2.7500	3-1/16	3.0625	4-3/8	4.3750	4	4.0000	6-3/8	6.3750
N	.3020	1-5/8	1.6250	2-13/16	2.8125	3-1/16	3.0625	4-3/8	4.3750	4	4.0000	6-3/8	6.3750
5/16	.3125	1-5/8	1.6250	2-13/16	2.8125	3-3/16	3.1875	4-1/2	4.5000	4	4.0000	6-3/8	6.3750

continued on next page

Conversion formulas:
Inch = mm x .03937
Metric = inch x 25.4

Inch Drill Sizes (continued)

Drill Sizes	Decimal Equiv.	Screw Machine Length				Jobbers Length				Taper Length			
		flute length		overall length		flute length		overall length		flute length		overall length	
		fraction	decimal	fraction	decimal	fraction	decimal	fraction	decimal	fraction	decimal	fraction	decimal
O	.3160	1-11/16	1.6875	2-15/16	2.9375	3-3/16	3.1875	4-1/2	4.5000	4	4.0000	6-3/8	6.3750
P	.3230	1-11/16	1.6875	2-15/16	2.9375	3-5/16	3.1875	4-5/8	4.6250	4	4.0000	6-3/8	6.3750
21/64	.3281	1-11/16	1.6875	2-15/16	2.9375	3-5/16	3.1875	4-5/8	4.6250	4-1/8	4.1250	6-1/2	6.5000
Q	.3320	1-11/16	1.6875	3	3.0000	3-7/16	3.4375	4-3/4	4.7500	4-1/8	4.1250	6-1/2	6.5000
R	.3390	1-11/16	1.6875	3	3.0000	3-7/16	3.4375	4-3/4	4.7500	4-1/8	4.1250	6-1/2	6.5000
11/32	.3438	1-11/16	1.6875	3	3.0000	3-7/16	3.4375	4-3/4	4.7500	4-1/8	4.1250	6-1/2	6.5000
S	.3480	1-3/4	1.7500	3-1/16	3.0625	3-1/2	3.5000	4-7/8	4.8750	4-1/4	4.2500	6-3/4	6.7500
T	.3580	1-3/4	1.7500	3-1/16	3.0625	3-1/2	3.5000	4-7/8	4.8750	4-1/4	4.2500	6-3/4	6.7500
23/64	.3594	1-3/4	1.7500	3-1/16	3.0625	3-1/2	3.5000	4-7/8	4.8750	4-1/4	4.2500	6-3/4	6.7500
U	.3680	1-13/16	1.8125	3-1/8	3.1250	3-5/8	3.6250	5	5.0000	4-1/4	4.2500	6-3/4	6.7500
3/8	.3750	1-13/16	1.8125	3-1/8	3.1250	3-5/8	3.6250	5	5.0000	4-1/4	4.2500	6-3/4	6.7500
V	.3770	1-7/8	1.8750	3-1/4	3.2500	3-5/8	3.6250	5	5.0000	4-1/4	4.2500	6-3/4	6.7500
W	.3860	1-7/8	1.8750	3-1/4	3.2500	3-3/4	3.7500	5-1/8	5.1250	4-1/4	4.2500	6-3/4	6.7500
25/64	.3906	1-7/8	1.8750	3-1/4	3.2500	3-3/4	3.7500	5-1/8	5.1250	4-3/8	4.3750	7	7.0000
X	.3970	1-15/16	1.9375	3-5/16	3.3125	3-3/4	3.7500	5-1/8	5.1250	4-3/8	4.3750	7	7.0000
Y	.4040	1-15/16	1.9375	3-5/16	3.3125	3-7/8	3.8750	5-1/4	5.2500	4-3/8	4.3750	7	7.0000
13/32	.4062	1-15/16	1.9375	3-5/16	3.3125	3-7/8	3.8750	5-1/4	5.2500	4-3/8	4.3750	7	7.0000
Z	.4130	2	2.0000	3-3/8	3.3750	3-7/8	3.8750	5-1/4	5.2500	4-5/8	4.6250	7-1/4	7.2500
27/64	.4219	2	2.0000	3-3/8	3.3750	3-15/16	3.9375	5-3/8	5.3750	4-5/8	4.6250	7-1/4	7.2500
7/16	.4375	2-1/16	2.0625	3-7/16	3.4375	4-1/16	4.0625	5-1/2	5.5000	4-5/8	4.6250	7-1/4	7.2500
29/64	.4531	2-1/8	2.1250	3-9/16	3.5625	4-3/16	4.1875	5-5/8	5.6250	4-3/4	4.7500	7-1/2	7.5000
15/32	.4688	2-1/8	2.1250	3-5/8	3.6250	4-5/16	4.3125	5-3/4	5.7500	4-3/4	4.7500	7-1/2	7.5000
31/64	.4844	2-3/16	2.1875	3-11/16	3.6875	4-3/8	4.3750	5-7/8	5.8750	4-3/4	4.7500	7-3/4	7.7500
1/2	.5000	2-1/4	2.2500	3-3/4	3.7500	4-1/2	4.5000	6	6.0000	4-3/4	4.7500	7-3/4	7.7500
33/64	.5156	2-3/8	2.3750	3-7/8	3.8750	4-13/16	4.8125	6-5/8	6.6250	4-3/4	4.7500	8	8.0000
17/32	.5312	2-3/8	2.3750	3-7/8	3.8750	4-13/16	4.8125	6-5/8	6.6250	4-3/4	4.7500	8	8.0000
35/64	.5469	2-1/2	2.5000	4	4.0000	4-13/16	4.8125	6-5/8	6.6250	4-7/8	4.8750	8-1/4	8.2500
9/16	.5625	2-1/2	2.5000	4	4.0000	4-13/16	4.8125	6-5/8	6.6250	4-7/8	4.8750	8-1/4	8.2500
37/64	.5781	2-5/8	2.6250	4-1/8	4.1250	4-13/16	4.8125	6-5/8	6.6250	4-7/8	4.8750	8-3/4	8.7500
19/32	.5938	2-5/8	2.6250	4-1/8	4.1250	5-3/16	5.1875	7-1/8	7.1250	4-7/8	4.8750	8-3/4	8.7500
39/64	.6094	2-3/4	2.7500	4-1/4	4.2500	5-3/16	5.1875	7-1/8	7.1250	4-7/8	4.8750	8-3/4	8.7500
5/8	.6250	2-3/4	2.7500	4-1/4	4.2500	5-3/16	5.1875	7-1/8	7.1250	4-7/8	4.8750	8-3/4	8.7500
41/64	.6406	2-7/8	2.8750	4-1/2	4.5000	5-3/16	5.1875	7-1/8	7.1250	5-1/8	5.1250	9	9.0000
21/32	.6562	2-7/8	2.8750	4-1/2	4.5000	5-3/16	5.1875	7-1/8	7.1250	5-1/8	5.1250	9	9.0000
43/64	.6719	2-7/8	2.8750	4-5/8	4.6250	5-5/8	5.6250	7-5/8	7.6250	5-3/8	5.3750	9-1/4	9.2500
11/16	.6875	2-7/8	2.8750	4-5/8	4.6250	5-5/8	5.6250	7-5/8	7.6250	5-3/8	5.3750	9-1/4	9.2500
45/64	.7031	3	3.0000	4-3/4	4.7500	—	—	—	—	5-5/8	5.6250	9-1/2	9.5000
23/32	.7188	3	3.0000	4-3/4	4.7500	—	—	—	—	5-5/8	5.6250	9-1/2	9.5000
47/64	.7344	3-1/8	3.1250	5	5.0000	—	—	—	—	5-7/8	5.8750	9-3/4	9.7500
3/4	.7500	3-1/8	3.1250	5	5.0000	—	—	—	—	5-7/8	5.8750	9-3/4	9.7500
49/64	.7656	3-1/4	3.2500	5-1/8	5.1250	—	—	—	—	6	6.0000	9-7/8	9.8750
25/32	.7812	3-1/4	3.2500	5-1/8	5.1250	—	—	—	—	6	6.0000	9-7/8	9.8750
51/64	.7969	3-3/8	3.3750	5-1/4	5.2500	—	—	—	—	6-1/8	6.1250	10	10.0000
13/16	.8125	3-3/8	3.3750	5-1/4	5.2500	—	—	—	—	6-1/8	6.1250	10	10.0000
53/64	.8281	3-1/2	3.5000	5-3/8	5.3750	—	—	—	—	6-1/8	6.1250	10	10.0000
27/32	.8438	3-1/2	3.5000	5-3/8	5.3750	—	—	—	—	6-1/8	6.1250	10	10.0000
55/64	.8594	3-1/2	3.5000	5-1/2	5.5000	—	—	—	—	6-1/8	6.1250	10	10.0000
7/8	.8750	3-1/2	3.5000	5-1/2	5.5000	—	—	—	—	6-1/8	6.1250	10	10.0000
57/64	.8906	3-5/8	3.6250	5-5/8	5.6250	—	—	—	—	6-1/8	6.1250	10	10.0000
29/32	.9062	3-5/8	3.6250	5-5/8	5.6250	—	—	—	—	6-1/8	6.1250	10	10.0000
59/64	.9219	3-3/4	3.7500	5-3/4	5.7500	—	—	—	—	6-1/8	6.1250	10-3/4	10.7500
15/16	.9375	3-3/4	3.7500	5-3/4	5.7500	—	—	—	—	6-1/8	6.1250	10-3/4	10.7500
61/64	.9531	3-7/8	3.8750	5-7/8	5.8750	—	—	—	—	6-3/8	6.3750	11	11.0000
31/32	.9688	3-7/8	3.8750	5-7/8	5.8750	—	—	—	—	6-3/8	6.3750	11	11.0000
63/64	.9844	4	4.0000	6	6.0000	—	—	—	—	6-3/8	6.3750	11	11.0000
1	1.0000	4	4.0000	6	6.0000	—	—	—	—	6-3/8	6.3750	11	11.0000

Metric Drill Sizes

Conversion formulas:
Inch = mm x .03937
Metric = inch x 25.4

Drill Size (mm)	Decimal Equivalent (in)	Screw Machine Length DIN 1897		Jobbers Length DIN 338		Taper Length DIN 340	
		flute length mm	overall length mm	flute length mm	overall length mm	flute length mm	overall length mm
0.2	.0079	1.5	19	2.5	19	—	—
0.22	.0087	1.5	19	2.5	19	—	—
0.25	.0098	1.5	19	3	19	—	—
0.28	.0110	1.5	19	3	19	—	—
0.3	.0118	1.5	19	3	19	—	—
0.32	.0126	2	19	4	19	—	—
0.35	.0138	2	19	4	19	—	—
0.38	.0150	2	19	4	19	—	—
0.4	.0157	2.5	19	5	20	—	—
0.42	.0165	2.5	19	5	20	—	—
0.45	.0177	2.5	19	5	20	—	—
0.48	.0189	2.5	19	5	20	—	—
0.5	.0197	3	20	6	22	—	—
0.52	.0205	3	20	6	22	—	—
0.55	.0217	3.5	21	7	24	—	—
0.58	.0228	3.5	21	7	24	—	—
0.6	.0236	3.5	21	7	24	—	—
0.62	.0244	4	22	8	26	—	—
0.65	.0256	4	22	8	26	—	—
0.68	.0268	4.5	23	9	28	—	—
0.7	.0276	4.5	23	9	28	—	—
0.72	.0283	4.5	23	9	28	—	—
0.75	.0295	4.5	23	9	28	—	—
0.78	.0307	5	24	10	30	—	—
0.8	.0315	5	24	10	30	—	—
0.82	.0322	5	24	10	30	—	—
0.85	.0335	5	24	10	30	—	—
0.88	.0346	5.5	25	11	32	—	—
0.9	.0354	5.5	25	11	32	—	—
0.92	.0362	5.5	25	11	32	—	—
0.95	.0374	5.5	25	11	32	—	—
0.98	.0385	6	26	12	34	—	—
1.0	.0394	6	26	12	34	33	56
1.05	.0413	6	26	12	34	—	—
1.1	.0433	7	28	14	36	37	60
1.15	.0453	7	28	14	36	—	—
1.2	.0472	8	30	16	38	41	65
1.25	.0492	8	30	16	38	—	—
1.3	.0512	8	30	16	38	41	65
1.35	.0531	9	32	18	40	—	—
1.4	.0551	9	32	18	40	45	70
1.45	.0571	9	32	18	40	—	—
1.5	.0591	9	32	18	40	45	70
1.55	.0610	10	34	20	43	—	—
1.6	.0630	10	34	20	43	50	76
1.65	.0650	10	34	20	43	—	—
1.7	.0669	10	34	20	43	50	76
1.75	.0689	11	36	22	46	—	—
1.8	.0709	11	36	22	46	53	80
1.85	.0728	11	36	22	46	—	—
1.9	.0748	11	36	22	46	53	80
1.95	.0767	12	38	24	49	—	—
2.0	.0787	12	38	24	49	56	85
2.05	.0807	12	38	24	49	—	—
2.1	.0827	12	38	24	49	56	85
2.15	.0846	13	40	27	53	—	—

continued on next page

Conversion formulas:
Inch = mm x .03937
Metric = inch x 25.4

Metric Drill Sizes (continued)

Drill Size (mm)	Decimal Equivalent (in)	Screw Machine Length DIN 1897		Jobbers Length DIN 338		Taper Length DIN 340	
		flute length mm	overall length mm	flute length mm	overall length mm	flute length mm	overall length mm
2.2	.0866	13	40	27	53	59	90
2.25	.0886	13	40	27	53	—	—
2.3	.0906	13	40	27	53	59	90
2.35	.0925	13	40	27	53	—	—
2.4	.0945	14	43	30	57	62	95
2.45	.0964	14	43	30	57	—	—
2.5	.0984	14	43	30	57	62	95
2.55	.1003	14	43	30	57	—	—
2.6	.1024	14	43	30	57	62	95
2.65	.1043	14	43	30	57	—	—
2.7	.1062	16	46	33	61	66	100
2.75	.1082	16	46	33	61	—	—
2.8	.1102	16	46	33	61	66	100
2.85	.1122	16	46	33	61	—	—
2.9	.1142	16	46	33	61	66	100
2.95	.1161	16	46	33	61	—	—
3.0	.1181	16	46	33	61	66	100
3.1	.1220	18	49	36	65	69	106
3.2	.1260	18	49	36	65	69	106
3.3	.1299	18	49	36	65	69	106
3.4	.1339	20	52	39	70	73	112
3.5	.1378	20	52	39	70	73	112
3.6	.1417	20	52	39	70	73	112
3.7	.1457	20	52	39	70	73	112
3.8	.1496	22	55	43	75	78	119
3.9	.1535	22	55	43	75	78	119
4.0	.1575	22	55	43	75	78	119
4.1	.1614	22	55	43	75	78	119
4.2	.1654	22	55	43	75	78	119
4.3	.1692	24	58	47	80	82	126
4.4	.1732	24	58	47	80	82	126
4.5	.1772	24	58	47	80	82	126
4.6	.1811	24	58	47	80	82	126
4.7	.1850	24	58	47	80	82	126
4.8	.1890	26	62	52	86	87	132
5.0	.1969	26	62	52	86	87	132
5.1	.2008	26	62	52	86	87	132
5.2	.2047	26	62	52	86	87	132
5.3	.2086	26	62	52	86	87	132
5.4	.2125	28	66	57	93	91	139
5.5	.2165	28	66	57	93	91	139
5.6	.2205	28	66	57	93	91	139
5.7	.2244	28	66	57	93	91	139
5.8	.2283	28	66	57	93	91	139
5.9	.2322	28	66	57	93	91	139
6.0	.2362	28	66	57	93	91	139
6.1	.2401	31	70	63	101	97	148
6.2	.2440	31	70	63	101	97	148
6.3	.2480	31	70	63	101	97	148
6.4	.2520	31	70	63	101	97	148
6.5	.2559	31	70	63	101	97	148
6.6	.2598	31	70	63	101	97	148
6.7	.2638	31	70	63	101	97	148
6.8	.2677	34	74	69	109	102	156
6.9	.2717	34	74	69	109	102	156
7.0	.2756	34	74	69	109	102	156

continued on next page

Metric Drill Sizes (continued)

Conversion formulas:
Inch = mm x .03937
Metric = inch x 25.4

Drill Size (mm)	Decimal Equivalent (in)	Screw Machine Length DIN 1897		Jobbers Length DIN 338		Taper Length DIN 340	
		flute length mm	overall length mm	flute length mm	overall length mm	flute length mm	overall length mm
7.1	.2795	34	74	69	109	102	156
7.2	.2835	34	74	69	109	102	156
7.3	.2874	34	74	69	109	102	156
7.4	.2913	34	74	69	109	102	156
7.5	.2953	34	74	69	109	102	156
7.6	.2992	37	79	75	117	109	165
7.7	.3031	37	79	75	117	109	165
7.8	.3070	37	79	75	117	109	165
7.9	.3110	37	79	75	117	109	165
8.0	.3150	37	79	75	117	109	165
8.1	.3189	37	79	75	117	109	165
8.2	.3228	37	79	75	117	109	165
8.3	.3267	37	79	75	117	109	165
8.4	.3307	37	79	75	117	109	165
8.5	.3346	37	79	75	117	109	165
8.6	.3386	40	84	81	125	115	175
8.7	.3425	40	84	81	125	115	175
8.8	.3464	40	84	81	125	115	175
8.9	.3503	40	84	81	125	115	175
9.0	.3543	40	84	81	125	115	175
9.1	.3582	40	84	81	125	115	175
9.2	.3622	40	84	81	125	115	175
9.3	.3661	40	84	81	125	115	175
9.4	.3700	40	84	81	125	115	175
9.5	.3740	40	84	81	125	115	175
9.6	.3779	43	89	87	133	121	184
9.7	.3817	43	89	87	133	121	184
9.8	.3858	43	89	87	133	121	184
9.9	.3897	43	89	87	133	121	184
10.0	.3937	43	89	87	133	121	184
10.1	.3976	43	89	87	133	121	184
10.2	.4016	43	89	87	133	121	184
10.3	.4055	43	89	87	133	121	184
10.4	.4094	43	89	87	133	121	184
10.5	.4134	43	89	87	133	121	184
10.6	.4173	43	89	87	133	121	184
10.7	.4212	47	95	94	142	128	195
10.8	.4252	47	95	94	142	128	195
10.9	.4291	47	95	94	142	128	195
11.0	.4331	47	95	94	142	128	195
11.1	.4370	47	95	94	142	128	195
11.2	.4409	47	95	94	142	128	195
11.3	.4448	47	95	94	142	128	195
11.4	.4488	47	95	94	142	128	195
11.5	.4527	47	95	94	142	128	195
11.6	.4566	47	95	94	142	128	195
11.7	.4606	47	95	94	142	128	195
11.8	.4645	47	95	94	142	128	195
11.9	.4685	51	102	101	151	134	205
12.0	.4724	51	102	101	151	134	205
12.1	.4763	51	102	101	151	134	205
12.2	.4823	51	102	101	151	134	205
12.3	.4842	51	102	101	151	134	205
12.4	.4881	51	102	101	151	134	205
12.5	.4921	51	102	101	151	134	205
12.6	.4960	51	102	101	151	134	205

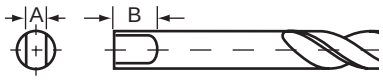
continued on next page

Conversion formulas:
Inch = mm x .03937
Metric = inch x 25.4

Metric Drill Sizes (continued)

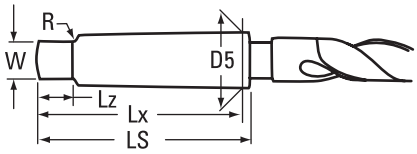
Drill Size (mm)	Decimal Equivalent (in)	Screw Machine Length DIN 1897		Jobbers Length DIN 338		Taper Length DIN 340	
		flute length	overall length	flute length	overall length	flute length	overall length
		mm	mm	mm	mm	mm	mm
12.7	.5000	51	102	101	151	134	205
12.8	.5039	51	102	101	151	134	205
12.9	.5078	51	102	101	151	134	205
13.0	.5118	51	102	101	151	134	205
13.1	.5157	51	102	101	151	134	205
13.2	.5197	51	102	101	151	134	205
13.3	.5236	54	107	108	160	140	214
13.4	.5118	54	107	108	160	140	214
13.5	.5315	54	107	108	160	140	214
13.6	.5354	54	107	108	160	140	214
13.7	.5394	54	107	108	160	140	214
13.8	.5433	54	107	108	160	140	214
13.9	.5472	54	107	108	160	140	214
14.0	.5512	54	107	108	160	140	214
14.25	.5610	56	111	114	169	144	220
14.5	.5709	56	111	114	169	144	220
14.75	.5807	56	111	114	169	144	220
15.0	.5906	56	111	114	169	144	220
15.25	.6004	58	115	120	178	149	227
15.5	.6102	58	115	120	178	149	227
15.75	.6201	58	115	120	178	149	227
16.0	.6299	58	115	120	178	149	227

Shank / Tang



Shank Diameter (inches)		Tang Dimensions (inches)	
from	to	A width	B length
1/8	3/16	.092	9/32
over 3/16	1/4	.120	5/16
over 1/4	5/16	.160	11/32
over 5/16	3/8	.201	3/8
over 3/8	15/32	.241	7/16
over 15/32	9/16	.300	1/2
over 9/16	21/32	.370	9/16
over 21/32	3/4	.440	5/8
over 3/4	7/8	.511	11/16
over 7/8	1	.605	3/4
over 1-3/16	1-3/8	.813	7/8

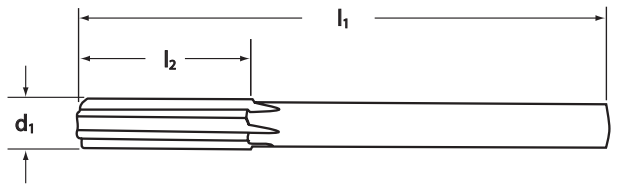
Morse Taper Shank



morse taper shank number	taper per foot	taper per inch	**D5** maximum shank dia.	**LS** length of shank	**Lx** length of shank to gage line	**Lz** length of tang	**W** thickness of tang	**R** radius
1	.5985	.0498	.475	2.56	2.44	.37	.20	.19
2	.5994	.0499	.700	3.12	2.94	.44	.25	.25
3	.6023	.0501	.938	3.87	3.69	.56	.31	.28
4	.6232	.0519	1.231	4.87	4.62	.62	.47	.31
5	.6315	.0526	1.749	6.12	5.87	.75	.62	.37
6	.6256	.0521	2.494	8.56	8.25	1.12	.75	.50

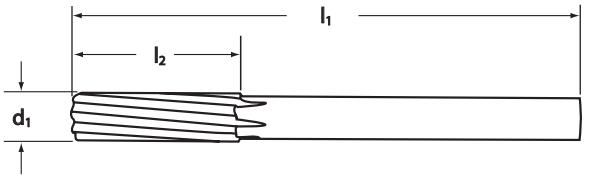
Straight Shank Chucking Reamer Dimensions

Straight Flute



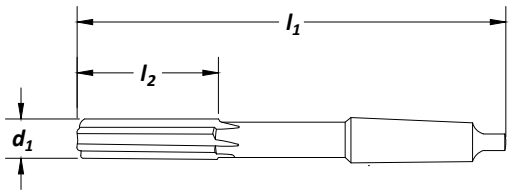
decimal size range min	decimal size range max	reamer dia d_1 (in) max	reamer dia d_1 (in) min	overall length l_1 (in)	flute length l_2 (in)	no. of flutes
.0394	.0460	.0390	.0380	2.500	.500	4
.0461	.0515	.0455	.0445	2.500	.500	4
.0516	.0590	.0510	.0500	2.500	.500	4
.0591	.0635	.0585	.0575	2.500	.500	4
.0636	.0665	.0585	.0575	3.000	.750	4
.0666	.0755	.0660	.0650	3.000	.750	4
.0756	.0805	.0720	.0710	3.000	.750	4
.0806	.0855	.0771	.0761	3.000	.750	4
.0856	.0930	.0810	.0800	3.000	.750	4
.0931	.0938	.0880	.0870	3.000	.750	4
.0939	.0955	.0880	.0870	3.500	.875	4
.0956	.1005	.0928	.0918	3.500	.875	4
.1006	.1060	.0950	.0940	3.500	.875	4
.1061	.1105	.1030	.1020	3.500	.875	4
.1106	.1155	.1055	.1045	3.500	.875	4
.1156	.1160	.1120	.1110	3.500	.875	4
.1161	.1225	.1120	.1110	3.500	.875	6
.1226	.1285	.1190	.1180	3.500	.875	6
.1286	.1355	.1190	.1180	4.000	1.000	6
.1356	.1400	.1275	.1265	4.000	1.000	6
.1401	.1465	.1350	.1340	4.000	1.000	6
.1466	.1515	.1430	.1420	4.000	1.000	6
.1516	.1560	.1460	.1450	4.000	1.000	6
.1561	.1570	.1510	.1500	4.000	1.000	6
.1571	.1585	.1510	.1500	4.500	1.125	6
.1586	.1655	.1530	.1520	4.500	1.125	6
.1656	.1715	.1595	.1585	4.500	1.125	6
.1716	.1765	.1645	.1635	4.500	1.125	6
.1766	.1795	.1704	.1694	4.500	1.125	6
.1796	.1845	.1755	.1745	4.500	1.125	6

Spiral Flute



decimal size range min	decimal size range max	reamer dia d_1 (in) max	reamer dia d_1 (in) min	overall length l_1 (in)	flute length l_2 (in)	no. of flutes
.1846	.1890	.1805	.1795	4.500	1.125	6
.1891	.1905	.1805	.1795	5.000	1.250	6
.1906	.1955	.1860	.1850	5.000	1.250	6
.1956	.2005	.1895	.1885	5.000	1.250	6
.2006	.2050	.1945	.1935	5.000	1.250	6
.2051	.2125	.2016	.2006	5.000	1.250	6
.2126	.2188	.2075	.2065	5.000	1.250	6
.2189	.2205	.2075	.2065	6.000	1.500	6
.2206	.2335	.2173	.2163	6.000	1.500	6
.2336	.2375	.2265	.2255	6.000	1.500	6
.2376	.2475	.2329	.2319	6.000	1.500	6
.2476	.2530	.2405	.2395	6.000	1.500	6
.2531	.2840	.2485	.2475	6.000	1.500	6
.2841	.3438	.2792	.2782	6.000	1.500	6
.3439	.4062	.3105	.3095	7.000	1.750	6
.4063	.4688	.3730	.3720	7.000	1.750	6
.4689	.5010	.4355	.4345	8.000	2.000	6
.5011	.6000	.4355	.4345	8.000	2.000	8
.6001	.7230	.5620	.5605	9.000	2.250	8
.7231	.8490	.6245	.6230	9.500	2.500	8
.8491	.9740	.7495	.7480	10.000	2.625	8
.9741	1.0000	.8745	.8730	10.500	2.750	8
1.0001	1.0625	.8745	.8730	10.500	2.750	10
1.0626	1.1250	.8745	.8730	11.000	2.875	10
1.1251	1.1875	.9995	.9980	11.000	2.875	10
1.1876	1.3125	.9995	.9980	11.500	3.000	10
1.3126	1.3750	.9995	.9980	12.000	3.250	10
1.3751	1.4375	1.2495	1.2480	12.000	3.250	10
1.4376	1.5000	1.2495	1.2480	12.500	3.500	12

Taper Shank Chucking Reamers - Straight Flute



diameter size range d_1 (in) min	max	overall length l_1 (in)	flute length l_2 (in)	morse taper shank number	no. of flutes
.1750	.1890	4.500	1.125	1	6
.1891	.2041	5.000	1.250	1	6
.2042	.2188	5.000	1.250	1	6
.2189	.2630	6.000	1.500	1	6
.2531	.2840	6.000	1.500	1	6
.2841	.3135	6.000	1.500	1	6
.3136	.3438	6.000	1.500	1	6
.3439	.3770	7.000	1.750	1	6
.3771	.4062	7.000	1.750	1	6
.4063	.4385	7.000	1.750	1	6
.4386	.4688	7.000	1.750	1	6
.4689	.5010	8.000	2.000	1	6
.5011	.5330	8.000	2.000	1	8
.5331	.5635	8.000	2.000	1	8
.5636	.5938	8.000	2.000	1	8
.5939	.6260	9.000	2.250	2	8
.6261	.6719	9.000	2.250	2	8
.6720	.7230	9.000	2.250	2	8
.7231	.7656	9.500	2.500	2	8
.7657	.8125	9.500	2.500	2	8
.8126	.8490	9.500	2.500	2	8
.8491	.9062	1.000	2.625	2	8
.9063	.9740	1.000	2.625	3	8
.9741	1.0000	1.500	2.750	3	8
1.0001	1.0625	1.500	2.750	3	10
1.0626	1.1250	11.000	2.875	3	10
1.1251	1.1875	11.000	2.875	3	10
1.1876	1.2500	11.500	3.000	4	10
1.2501	1.3125	11.500	3.000	4	10
1.3126	1.3750	12.000	3.250	4	10
1.3751	1.4375	12.000	3.250	4	10
1.4376	1.5000	12.500	3.500	4	12

Reaming Speeds

Speeds for machine reaming may vary considerably depending in part on the material to be reamed, type of machine, and required finish and accuracy. In general most machine reaming is done at about 2/3 the speed used for drilling the same material. Speeds for reaming are shown on pages 128-129.

Reaming Feeds

Feeds for reaming are usually much higher than those used for drilling, often running 200% to 300% of drill feeds. Too low a feed may result in excessive reamer wear. At all times it is necessary that the feed be high enough to permit the reamer to cut rather than to rub or burnish. Too high a feed may tend to reduce the accuracy of the hole and may also lower the quality of the finish. The basic idea is to use as high a feed as possible and still produce the required finish and accuracy.

Stock to be Removed

For the same reason, insufficient stock for reaming may result in a burnishing rather than a cutting action. It is difficult to generalize on this phase as it is tied in closely with type of material, feed, finish required, depth of hole, and chip capacity of the reamer. For machine reaming, 0.010" on a 1/4" hole, 0.015" on a 1/2" hole, up to 0.025" on a 1-1/2" hole, seems a good starting point. For hand reaming, stock allowances are much smaller, partly because of the difficulty in forcing the reamer through greater stock. A common allowance is 0.001" to 0.003".

Alignment

In the ideal reaming job, the spindle, reamer, bushing, and hole to be machined are all in perfect alignment. Any variation from this tends to increase reamer wear and detracts from the accuracy of the hole. Tapered, oversize, or bell-mouthed holes should call for a check of alignment. Sometimes the bad effects of misalignment can be reduced through the use of floating or adjustable holders. Quite often if the user will grind a slight back taper on the reamer it will also be of help in overcoming the effects of misalignment.

Chatter

The presence of chatter while reaming has a very bad effect on reamer life and on the finish in the hole. Chatter may be the result of one of several causes, some of which are listed:

- Excessive speed.
- Too much clearance on reamer.
- Lack of rigidity in jig or machine.
- Insecure holding of work.
- Excessive overhang of reamer or spindle.
- Excessive looseness in floating holder.
- Too light a feed.

Correcting the cause can materially increase both reamer life and the quality of the reamed holes.

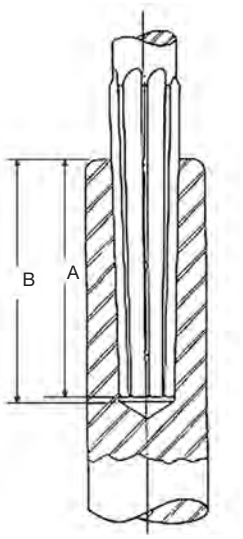
Coolant

In reaming, the emphasis is usually on finish, and a coolant is normally chosen for this purpose rather than for cooling. Quite often this means a change from that recommended for drilling as shown on page 2, but in general this list will be found satisfactory.

American National Standard Reamer Taper (Morse Taper) Dimensions

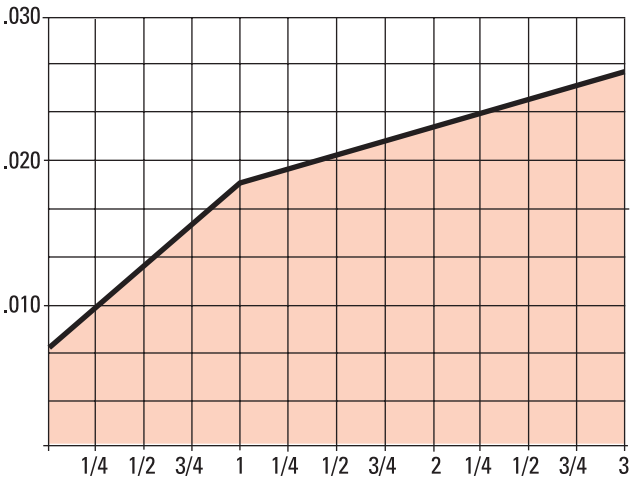
Taper No.	Depth of Hole A *Drilled*	Depth of Hole B *Reamed*
0*	2-1/16	2-1/32
1	2-3/16	2-5/32
2	3-1/8	2-15/16
3	3-7/8	3-11/16
4	4-7/8	4-5/8
4-1/2	5-1/8	4-5/8
5	6-1/8	5-7/8
6	8-9/16	8-1/4
7	11-5/8	11-1/4

**Size 0 taper shank not listed in American National Standards.*



Reamer Stock Removal

Stock removal is dependent on material, feed, and finish required. The stock removal chart below illustrates starting points for various diameters when using machine and chucking reamers.



Reamer Diameter Tolerances

Reamer Diameter inches	+ inches	+ inches
through 1/2	.0001	.0004
over 1/2 through 1	.0001	.0005
over 1	.0002	.0006
dowel pin sizes	+ .0000	– (.0002)

Reamer Overall Length and Flute Length Tolerances

Reamer Diameter inches	+ inches	– inches
3/64 through 1	.0625	.0625
over 1 through 2	.0938	.0938
over 2 through 3	.1250	.1250

Reamer Lip Height Tolerances

Reamer Diameter inches	Total Indicator Variation inches
through 1/8	.0010
1/8 through 1/4	.0012
over 1/4 through 1/2	.0015
over 1/2 through 1	.0020
over 1 through 3-1/2	.0025

Reamer Straight Shank Diameter Tolerances

Reamer Diameter	+ inches	– inches
Tool Style 4001, 4030		
.0390 to .4335	.0000	.0010
.4396 to 1.2495	.0000	.0015
Tool Style 657, 659		
.0781 to .6250	.0010	.0050
Tool Style 650		
.0781 to .6250	.0005	.0020

Reamer Regrinding

In obtaining maximum economy from reamers the same principles apply as in the case of most other cutting tools. One of these principles is not to allow a tool to become too dull. It is best to regrind the chamfer on a reamer long before it exhibits excessive wear or refuses to cut. This sharpening is usually restricted to the entering taper or chamfer. It can be done on almost any tool and cutter grinder. Care must be taken so that each flute is ground exactly even or the tool is apt to cut oversize.

Sharpening the chamfer on a reamer by hand is not recommended as it is practically impossible to keep the cutting edges even.

The following figures show three common types of grinds used on reamers:

In grinding down a reamer to special size it is usually necessary to relieve or clear the lands. No hard or fast rule may be given as to the amount of this clearance but the following table may be of help:

Size of Reamer	Circular Land Width	Primary Clearance
1/4"	.007	14°
1/2"	.009	11°
1"	.013	9°
1-1/2"	.016	7°
2"	.023	7°

Figure A

Ordinary reamer grind for most jobs.

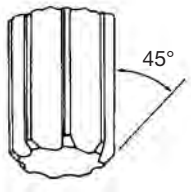


Figure B

Hand reamer grind also used on some machine reamer applications to obtain required finish or tolerance.

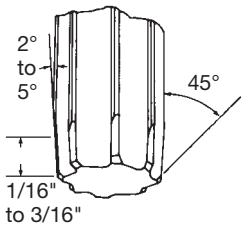


Figure C

Semi-finish reamer grind to straighten out bent or mis-aligned holes. Corners must be kept sharp.

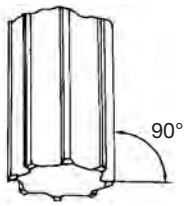
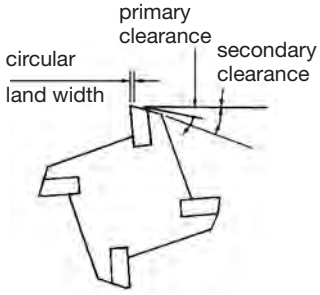


Figure D

A secondary clearance is often ground on reamers as shown in Fig. D. This clearance is only to insure the back of the land being well away from the wall of the reamed hole in order to prevent rubbing.



Fractional Sizes

Drill Size		Feet per Minute														
Fraction / Dec		10’	20’	30’	40’	50’	60’	70’	80’	90’	100’	110’	120’	130’	140’	150’
		Revolutions Per Minute														
1/16	.0625	403	807	1210	1614	2017	2420	2823	3227	3663	4033	4437	4840	5244	5647	6050
1/8	.1250	202	403	605	807	1008	1210	1412	1614	1815	2017	2218	2420	2622	2823	3025
3/16	.1875	135	269	403	538	673	807	941	1076	1210	1344	1479	1614	1748	1882	2017
1/4	.2500	101	202	302	403	504	605	706	807	908	1008	1109	1210	1311	1412	1513
5/16	.3125	81	161	242	323	403	484	565	645	726	807	888	968	1049	1129	1210
3/8	.3750	67	135	202	269	336	403	471	538	605	673	739	807	874	941	1008
7/16	.4375	57	116	173	230	288	346	403	461	519	576	634	692	749	807	865
1/2	.5000	50	101	151	202	252	302	353	403	454	504	554	605	655	706	756
5/8	.6250	40	81	121	161	202	242	282	323	363	403	444	484	524	565	605
3/4	.7500	34	67	101	134	168	202	236	269	302	336	370	403	437	471	504
7/8	.8750	29	57	86	116	144	173	202	230	259	288	317	346	375	403	432
1	1.0000	25	50	76	101	126	151	176	202	227	252	277	302	328	353	378
1-1/8	1.1250	22	45	67	90	112	135	157	180	202	224	246	269	291	314	336
1-1/4	1.2500	20	40	61	81	101	121	141	161	182	202	222	242	262	282	302
1-3/8	1.3750	18	37	55	73	92	110	128	147	165	183	202	220	238	257	275
1-1/2	1.5000	17	34	50	67	84	101	117	135	151	168	185	202	218	236	252
1-5/8	1.6250	16	31	46	62	77	93	109	124	140	155	171	186	202	217	233
1-3/4	1.7500	15	29	43	57	72	86	101	116	129	144	158	173	187	202	216
1-7/8	1.8750	13	27	40	53	67	81	94	108	121	135	148	161	175	188	202
2	2.0000	13	25	38	50	63	76	88	101	114	126	139	151	164	176	189
2-1/4	2.2500	11	22	34	45	56	67	79	90	101	112	123	135	146	157	168
2-1/2	2.5000	10	20	30	40	50	61	71	81	90	101	111	121	131	141	151
2-3/4	2.7500	9	18	28	37	46	55	64	73	83	92	101	110	119	128	137
3	3.0000	9	17	25	34	42	50	59	67	76	84	92	101	110	117	126

Letter Sizes

Drill Size		Feet per Minute														
Letter / Dec		10’	20’	30’	40’	50’	60’	70’	80’	90’	100’	110’	120’	130’	140’	150’
		Revolutions Per Minute														
A	.2340	108	215	324	432	540	648	756	864	972	1080	1185	1293	1401	1508	1616
B	.2380	106	212	318	424	530	636	742	847	954	1059	1165	1271	1377	1483	1589
C	.2420	104	209	312	416	521	625	729	833	937	1041	1146	1250	1354	1459	1563
D	.2460	102	205	308	411	513	616	719	822	924	1027	1127	1230	1332	1435	1537
E	.2500	101	202	302	403	504	605	706	807	908	1008	1109	1210	1299	1412	1513
F	.2570	98	196	294	392	490	589	686	785	882	981	1079	1177	1275	1373	1471
G	.2610	96	193	290	386	483	579	676	772	869	966	1063	1159	1256	1352	1449
H	.2660	95	189	284	379	474	569	663	758	853	948	1043	1137	1232	1327	1422
I	.2720	92	185	278	371	463	556	649	741	834	927	1020	1112	1205	1298	1390
J	.2770	91	182	273	364	455	546	637	728	819	910	1001	1092	1183	1274	1365
K	.2810	90	180	269	359	449	538	628	717	807	897	987	1076	1166	1256	1346
L	.2900	87	174	261	348	435	521	609	696	782	869	956	1043	1130	1217	1304
M	.2950	85	171	257	342	428	513	599	684	770	855	940	1026	1111	1197	1282
N	.3020	83	167	251	334	418	501	585	668	752	835	918	1002	1085	1169	1252
O	.3160	80	160	240	319	399	479	558	638	718	798	878	957	1037	1117	1197
P	.3230	78	156	234	312	391	469	546	624	703	781	859	937	1014	1094	1171
Q	.3320	76	152	228	304	380	455	531	607	683	759	836	913	987	1063	1139
R	.3390	75	149	223	298	372	446	521	595	669	744	818	894	967	1041	1115
S	.3480	73	145	217	290	362	435	508	579	652	725	797	869	942	1014	1086
T	.3580	71	141	211	281	352	422	492	563	633	704	774	845	915	986	1056
U	.3680	69	137	205	274	343	411	480	548	616	685	754	822	890	959	1028
V	.3770	67	134	201	267	335	401	468	535	602	669	735	805	869	936	1003
W	.3860	65	131	196	261	327	392	457	523	588	653	718	784	849	914	979
X	.3970	63	127	191	254	317	380	444	508	571	635	698	762	826	889	952
Y	.4040	63	125	187	249	312	374	437	499	562	624	686	749	811	874	936
Z	.4130	61	122	183	244	305	366	427	488	549	611	671	733	793	855	915

Wire Gauge Sizes

Drill Size Wire / Dec		Feet per Minute 10'	20'	30'	40'	50'	60'	70'	80'	90'	100'	110'	120'	130'	140'	150'
		Revolutions Per Minute														
1	.2280	111	221	332	442	553	663	774	884	995	1106	1216	1327	1438	1548	1659
2	.2210	114	228	342	456	570	684	799	912	1026	1140	1255	1369	1483	1597	1711
3	.2130	118	237	355	473	592	710	828	946	1065	1183	1303	1420	1538	1657	1775
4	.2090	121	241	362	482	603	724	845	965	1086	1206	1327	1447	1568	1690	1809
5	.2055	123	246	368	491	614	736	859	981	1104	1227	1350	1472	1595	1717	1840
6	.2040	123	247	371	494	618	741	865	989	1112	1236	1360	1483	1606	1730	1854
7	.2010	125	251	376	502	627	752	878	1003	1129	1254	1379	1505	1630	1756	1881
8	.1990	127	253	380	507	634	760	886	1013	1140	1267	1393	1520	1647	1773	1900
9	.1960	129	257	386	515	644	772	900	1029	1158	1286	1415	1544	1672	1800	1929
10	.1935	130	261	391	521	651	781	912	1042	1173	1303	1433	1564	1694	1824	1954
11	.1910	132	264	396	528	660	792	924	1056	1188	1320	1452	1584	1716	1848	1981
12	.1890	133	267	400	533	667	801	934	1067	1201	1334	1467	1601	1734	1867	2001
13	.1850	136	273	409	545	681	818	957	1090	1227	1363	1499	1636	1771	1908	2044
14	.1820	139	277	416	554	693	831	970	1108	1247	1385	1524	1662	1800	1939	2078
15	.1800	141	281	421	562	702	842	983	1123	1263	1404	1540	1680	1821	1961	2101
16	.1770	143	285	427	570	712	855	997	1139	1282	1424	1567	1709	1852	1994	2136
17	.1730	146	292	437	583	729	875	1020	1166	1311	1457	1603	1749	1894	2040	2187
18	.1695	149	298	447	597	746	895	1044	1193	1342	1492	1636	1785	1934	2082	2231
19	.1660	152	304	455	607	760	911	1063	1215	1367	1519	1670	1822	1974	2127	2279
20	.1610	156	314	470	626	783	939	1096	1253	1409	1566	1723	1879	2035	2193	2349
21	.1590	158	317	476	634	793	951	1109	1269	1427	1585	1745	1903	2061	2220	2379
22	.1570	160	321	482	642	803	964	1124	1284	1445	1606	1766	1927	2088	2248	2408
23	.1540	164	327	491	655	818	982	1146	1309	1473	1637	1800	1964	2128	2292	2455
24	.1520	166	332	498	663	830	995	1161	1327	1493	1659	1824	1991	2156	2322	2488
25	.1495	169	337	506	675	842	1012	1181	1349	1518	1686	1855	2024	2193	2361	2529
26	.1470	172	343	514	686	857	1029	1201	1371	1543	1715	1886	2058	2229	2401	2573
27	.1440	175	350	525	700	876	1051	1226	1401	1576	1751	1927	2101	2276	2451	2626
28	.1405	180	359	539	718	898	1076	1256	1436	1615	1795	1973	2153	2332	2512	2691
29	.1360	185	371	556	742	927	1112	1298	1483	1668	1854	2039	22243	2410	2595	2781
30	.1285	196	393	589	785	981	1177	1373	1569	1766	1962	2158	2354	2550	2747	2943
31	.1200	210	420	630	840	1051	1261	1470	1680	1891	2101	2311	2522	2731	2941	3152
32	.1160	217	435	652	869	1087	1304	1521	1738	1956	2173	2391	2608	2825	3043	3260
33	.1130	223	446	669	892	1115	1338	1562	1785	2008	2231	2454	2677	2900	3123	3346
34	.1110	227	454	681	908	1136	1363	1590	1817	2044	2272	2498	2725	2953	3180	3407
35	.1100	229	458	688	917	1146	1375	1604	1833	2063	2292	2522	2750	2979	3208	3438
36	.1065	237	473	710	947	1184	1420	1657	1894	2130	2367	2604	2841	3078	3314	3551
37	.1040	242	485	727	970	1212	1455	1697	1939	2182	2424	2666	2909	3152	3394	3636
38	.1015	248	497	745	993	1242	1490	1738	1987	2235	2484	2732	2981	3229	3478	3726
39	.0995	253	507	760	1014	1267	1520	1773	2027	2280	2534	2787	3041	3294	3547	3800
40	.0980	257	515	772	1029	1286	1544	1801	2058	2315	2573	2829	3087	3344	3602	3858
41	.0960	263	525	788	1051	1313	1575	1838	2101	2363	2626	2889	3152	3414	3676	3939
42	.0935	269	539	809	1078	1348	1618	1888	2157	2427	2696	2966	3235	3505	3775	4044
43	.0890	283	566	850	1133	1416	1700	1983	2266	2550	2833	3116	3399	3682	3965	4249
44	.0860	293	586	880	1173	1466	1759	2052	2346	2639	2932	3225	3518	3811	4104	4397
45	.0820	308	615	922	1230	1537	1845	2152	2459	2767	3074	3382	3689	3997	4305	4611
46	.0810	312	622	934	1245	1556	1868	2179	2490	2801	3113	3423	3735	4046	4357	4669
47	.0785	321	642	964	1284	1606	1927	2248	2569	2890	3212	3532	3854	4175	4496	4817
48	.0760	332	663	995	1327	1659	1991	2322	2654	2985	3317	3648	3980	4312	4644	4976
49	.0730	345	691	1036	1381	1727	2072	2418	2763	3109	3454	3799	4144	4493	4835	5180
50	.0700	360	720	1080	1441	1801	2161	2521	2882	3241	3602	3961	4322	4682	5042	5402
51	.0670	376	752	1129	1505	1882	2258	2634	3010	3386	3763	4139	4515	4893	527	5644
52	.0635	397	794	1191	1588	1985	2382	2779	3176	3573	3970	4369	4764	5161	5558	5955
53	.0595	423	847	1270	1694	2117	2540	2963	3386	3810	4233	4661	5085	5508	5932	6356
54	.0550	458	917	1375	1833	2292	2750	3209	3667	4126	4584	5042	5500	5958	6417	6875
55	.0520	485	970	1455	1939	2424	2909	3394	3879	4363	4848	5333	5818	6302	6787	7278
56	.0465	542	1084	1627	2169	2711	3253	3796	4338	4880	5422	5964	6506	7047	7590	8133
57	.0430	586	1173	1763	2350	2938	3526	4113	4701	5289	5876	6449	7036	7622	8208	8795
58	.0420	601	1201	1801	2400	3001	3601	4202	4802	5403	6003	6603	7203	7803	8403	9004
59	.0410	615	1230	1845	2459	3074	3689	4304	4919	5536	6149	6764	7379	7993	8608	9224
60	.0400	630	1261	1891	2521	3152	3781	4411	5042	5672	6302	6933	7563	8193	8824	9454