

Material group	Hardness		SFM	Feed Rate - IPR									
	HRC	BHN		1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	-	≤ 150	460		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160		
	≤ 32	≤ 301	395		0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125		
Free-cutting steels	≤ 25	≤ 255	550		0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200		
	≤ 32	≤ 301	480		0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200		
Unalloyed heat-treatable steels	≤ 20	≤ 220	415		0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200		
	≤ 25	≤ 255	400		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160		
	≤ 32	≤ 301	395		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160		
Alloyed heat-treatable steels	≤ 32	≤ 301	395		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160		
	≤ 43	≤ 402	335		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160		
Unalloyed case hardened steels	≤ 25	≤ 255	465		0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200		
Alloyed case hardened steels	≤ 32	≤ 301	395		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160		
	≤ 43	≤ 402	270		0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100		
Nitriding steels	≤ 32	≤ 301	340		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160		
	≤ 43	≤ 402	325		0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125		
Tool steels	≤ 25	≤ 255	230		0.0040	0.0065	0.0080	0.0100	0.0100	0.0110	0.0125		
	≤ 43	≤ 402	175		0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100		
High speed steels	≤ 43	≤ 402	195		0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080		
Spring steels	≤ 38	≤ 354	195		0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065		
Hardened steels	≤ 48	≤ 460	175		0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065		
	≤ 66	-	110		0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065		
Stainless steels, sulphured	≤ 28	≤ 273	195		0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100		
austenitic	≤ 36	≤ 337	175		0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100		
martensitic	≤ 46	≤ 435	155		0.0030	0.0050	0.0065	0.0080	0.0080	0.0090	0.0100		
Cast iron	≤ 23	≤ 242	640		0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245		
	≤ 38	≤ 354	525		0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245		
Spheroidal graphite iron and malleable cast iron	≤ 23	≤ 242	435		0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245		
	≤ 38	≤ 354	415		0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200		
Chilled cast iron	≤ 38	≤ 354	130		0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065		
New cast materials GGV	≤ 20	≤ 220											
	≤ 32	≤ 301											
New cast materials ADI	≤ 32	≤ 301											
	≤ 43	≤ 402											
Special alloys	≤ 54	≤ 549	110		0.0025	0.0040	0.0050	0.0065	0.0065	0.0070	0.0080		
Ti and Ti-alloys	≤ 25	≤ 255	140		0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065		
	≤ 43	≤ 402	130		0.0020	0.0030	0.0040	0.0050	0.0050	0.0055	0.0065		
Aluminium and Al-alloys	-	≤ 120	1000		0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245		
Al wrought alloys	-	≤ 200	1000		0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245		
Al cast alloys ≤ 10 % Si	-	≤ 180	845		0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245		
≤ 24 % Si	-	≤ 180	710		0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245		
Magnesium alloys	-	≤ 120	900		0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200		
Copper, low-alloyed	-	≤ 150	400		0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200		
Brass, short-chipping	-	≤ 180	1050		0.0080	0.0125	0.0160	0.0200	0.0200	0.0220	0.0245		
long-chipping	-	≤ 180	710		0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200		
Bronze, short-chipping	-	≤ 180	410		0.0065	0.0100	0.0125	0.0160	0.0160	0.0180	0.0200		
	≤ 25	≤ 255	345		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160		
Bronze, long-chipping	≤ 25	≤ 255	285		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160		
	≤ 32	≤ 301	250		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140	0.0160		
Duroplastics													
Thermoplastics													
Reinforced plastics - Kevlar													
Reinforced plastics - GFK / CFK													

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	HRC	BHN		1/16 in. 1.590 mm	1/8 in. 3.170 mm	1/4 in. 6.350 mm	3/8 in. 9.520 mm	1/2 in. 12.700 mm	5/8 in. 15.870 mm	3/4 in. 19.050 mm	1 in. 25.400 mm	1 1/4 in. 31.750 mm	1 1/2 in. 38.100 mm
Common structural steels	-	≤ 150											
	≤ 32	≤ 301											
Free-cutting steels	≤ 25	≤ 255											
	≤ 32	≤ 301											
Unalloyed heat-treatable steels	≤ 20	≤ 220											
	≤ 25	≤ 255											
	≤ 32	≤ 301											
Alloyed heat-treatable steels	≤ 32	≤ 301											
	≤ 43	≤ 402											
Unalloyed case hardened steels	≤ 25	≤ 255											
Alloyed case hardened steels	≤ 32	≤ 301											
	≤ 43	≤ 402											
Nitriding steels	≤ 32	≤ 301											
	≤ 43	≤ 402											
Tool steels	≤ 25	≤ 255											
	≤ 43	≤ 402											
High speed steels	≤ 43	≤ 402											
Spring steels	≤ 38	≤ 354											
Cast iron	≤ 23	≤ 242	395		0.0040	0.0065	0.0080	0.0100	0.0100	0.0110			
	≤ 38	≤ 354	330		0.0040	0.0065	0.0080	0.0100	0.0100	0.0110			
Spheroidal graphite iron and malleable cast iron	≤ 23	≤ 242	295		0.0040	0.0065	0.0080	0.0100	0.0100	0.0110			
	≤ 38	≤ 354	260		0.0040	0.0065	0.0080	0.0100	0.0100	0.0110			
Chilled cast iron	≤ 38	≤ 354	130		0.0020	0.0030	0.0040	0.0050	0.0055	0.0065			
New cast materials GGV	≤ 20	≤ 220											
	≤ 32	≤ 301											
New cast materials ADI	≤ 32	≤ 301											
	≤ 43	≤ 402											
Special alloys	≤ 54	≤ 549											
Ti and Ti-alloys	≤ 25	≤ 255											
	≤ 43	≤ 402											
Aluminium and Al-alloys	-	≤ 120	1345		0.0065	0.0100	0.0125	0.0160	0.0180	0.0200			
Al wrought alloys	-	≤ 200	1345		0.0065	0.0100	0.0125	0.0160	0.0180	0.0200			
Al cast alloys ≤ 10 % Si	-	≤ 180	1245		0.0065	0.0100	0.0125	0.0160	0.0180	0.0200			
≤ 24 % Si	-	≤ 180	1080		0.0065	0.0100	0.0125	0.0160	0.0180	0.0200			
Magnesium alloys	-	≤ 120											
Copper, low-alloyed	-	≤ 150											
Brass, short-chipping	-	≤ 180	920		0.0050	0.0080	0.0100	0.0125	0.0125	0.0140			
long-chipping	-	≤ 180											
Bronze, short-chipping	-	≤ 180	360		0.0040	0.0065	0.0080	0.0100	0.0100	0.0110			
	≤ 25	≤ 255	260		0.0030	0.0050	0.0065	0.0080	0.0080	0.0090			
Bronze, long-chipping	≤ 25	≤ 255											
	≤ 32	≤ 301											
Duroplastics													
Thermoplastics													
Reinforced plastics - Kevlar													
Reinforced plastics - GFK / CFK													

Note: Pilot holes (depth >1xD) are recommended when drilling depths greater than 7xD. The pilot hole can be produced with a short, rigid drill. The diameter should be 0.01 - 0.02 mm larger than the diameter of the finish drill. Ratio drills can produce their own pilot hole by reducing speed and feed rates by 30-40%.