

HSS Drilling & Reaming Speeds

Material	Brinell Hardness	Material Condition*	SFPM		
			Drilling	Reaming	
Resulphurized Carbon Steels					
1212, 1213, 1214	100-150	HR, A	120	80	
	150-200	CD	125	80	
1108,1109, 1115, 1117, 1118, 1120, 1126, 1211	100-150	HR, A	110	75	
	150-200	CD	120	80	
1132, 1137, 1139, 1140, 1144, 1146, 1151	175-225	HR, A, N, CD	100	65	
	275-325	Q & T	70	45	
	325-375	Q & T	45	30	
	375-425	Q & T	35	20	
Leaded Carbon Steels					
11L17, 11L18, 12L13, 12L14	100-150	HR, A, N, CD	130	85	
	150-200	HR, A, N, CD	120	80	
	200-250	N, CD	90	60	
Carbon Steels					
1006, 1008, 1009, 1010,1012,1015, 1016, 1017, 1018, 1019, 1020, 1021, 1022, 1023, 1024, 1025, 1026, 1513, 1514	100-125	HR, A, N, CD	100	65	
	125-175	HR, A, N, CD	90	60	
	175-225	HR, N, CD	70	45	
	225-275	CD	60	40	
1027, 1030, 1033, 1035, 1036, 1037, 1028, 1039, 1040, 1041, 1042, 1043, 1045, 1046, 1048, 1049, 1050, 1052, 1524, 1526, 1527, 1541	125-175	HR, A, N, CD	90	60	
	175-225	HR, A, N, CD	75	50	
	225-275	N, CD, Q & T	60	40	
	275-325	Q & T	50	30	
	325-375	Q & T	35	20	
1055, 1060, 1064, 1065, 1070, 1074, 1078, 1080, 1084, 1086, 1090, 1095, 1548, 1551, 1552, 1561, 1566	375-425	Q & T	25	15	
	125-175	HR, A, N, CD	85	55	
	175-225	HR, A, N, CD	70	45	
	225-275	N, CD, Q & T	50	30	
	275-325	Q & T	40	25	
4140, 4150	325-375	Q & T	30	20	
	375-425	Q & T	15	10	
	Resulphurized Alloy Steels				
	4140, 4150	175-200	HR, A, N, CD	90	60
		200-250	HR, N, CD	80	50
250-300		Q & T	55	30	
300-375		Q & T	40	25	
375-425		Q & T	30	15	
Leaded Alloy Steels					
41L30, 41L40, 41L47, 41L50, 43L47, 51L32, 52L100, 86L20, 86L40	150-200	HR, A, N, CD	100	65	
	200-250	HR, N, CD	90	60	
	250-300	Q & T	65	40	
	300-375	Q & T	45	30	
	375-425	Q & T	30	15	

HSS Drilling & Reaming Speeds

Material	Brinell Hardness	Material Condition*	SFPM	
			Drilling	Reaming
Alloy Steels				
4012, 4023, 4024 4028, 4118, 4120, 4419, 4422, 4427, 4615, 4620, 4621, 4626, 4718, 4720, 4815, 4817, 4820, 5015, 5017, 5020, 6118, 8115, 8615, 8617, 8620, 8622, 8625, 8627, 8820, 8822, 94B17	125-175	HR, A, N, CD	85	55
	175-225	HR, N, CD	70	45
	225-275	CD, N, Q & T	55	35
	275-325	Q & T	50	30
	325-375	Q & T	35	25
	375-425	Q & T	25	15
1330, 1335, 1340, 1345, 4032, 4037, 4042, 4047, 4130, 4135, 4137, 4140, 4142, 4145, 4147, 4150, 4160, 4337, 4340, 50B44, 50B46, 50B50, 50B60, 5130, 5132, 5140, 5145, 5147, 5150, 5160, 51B60, 6150, 81B45, 8630, 8635, 8637, 8640, 8642, 8645, 8650, 8655, 8660, 8740, 9254, 9255, 9260, 9262, 94B30, E51100, E52100	175-225	HR, A, N, CD	75	50
	225-275	N, CD, Q & T	60	40
	275-325	N, Q & T	45	30
	325-375	N, Q & T	30	15
	375-425	Q & T	20	15
Tool Steels				
A2, A3, A8, A9, A10	200-250	A	50	35
A4, A6	200-250	A	45	30
A7	225-275	A	30	20
D2, D3, D4, D5, D7	200-250	A	30	20
S1, S2, S5, S6, S7	175-225	A	50	35
O1, O2, O6, O7	175-225	A	45	30
W1, W2, W5	15-200	A	85	55
Free Machining Stainless Steels				
430F, 430F SE	135-185	A	90	60
203EZ, 303, 303 Se, 303 MA, 303Pb, 303 Cu	135-185	A	85	55
	225-275	CD	70	45
416, 416Se, 420F, 420F Se, 440F, 440F Se	135-185	A	90	60
	185-240	CD	70	45
	275-325	Q & T	40	25
	375-425	Q & T	20	110
Stainless Steels				
405, 409, 429, 430, 434, 436, 442, 446, 502	135-185	A	65	45
201, 202, 301, 302, 304, 304L, 305, 308, 321, 347, 348	135-185	A	55	35
	225-275	CD	50	30
302B, 309, 309S, 310, 310S, 314, 316, 316L, 317, 330	135-185	A	50	30
403, 410, 420, 501	135-175	A	75	50
	175-225	A	65	45
	275-325	Q & T	40	25
	375-425	Q & T	25	15
414, 431, 440A, 440B, 440C	225-275	A	45	30
	275-325	Q & T	40	25
	375-425	Q & T	20	10
15-5PH, 17-4PH, 17-7PH, AF-71, 17-14CuMo, AFC-77, AM-350, AM-355, AM-362, Custom 455, HNM, PH13-8, PH14-8Mo, PH15-7Mo, Stainless W	150-200	A	50	30
	275-325	H	45	25
	325-375	H	35	20
	375-450	H	20	10

HSS Drilling & Reaming Speeds

Material	Brinell Hardness	Material Condition*	SFPM	
			Drilling	Reaming
Gray Cast Iron				
ASTM Class 20	120-150	A	100	65
ASTM Class 25	160-200	AC	90	60
ASTM Class 30, 35, & 40	190-220	AC	80	55
ASTM Class 45, & 50	220-260	AC	60	40
ASTM Class 55, & 60	250-320	AC, HT	30	20
ASTM Type 1, 1b, 5	100-215	AC	50	30
ASTM Type 2, 3, 6	120-175	AC	40	25
ASTM Type 2b, 4	150-250	AC	30	20
Malleable Iron				
32510, 35018	110-160	MHT	110	75
40010, 43010, 45006, 45008, 48005, 50005	160-200	MHT	80	55
	200-240	MHT	70	45
53004, 60003, 60004	200-255	MHT	55	35
70002, 70003	220-260	MHT	50	30
80002	240-280	MHT	45	30
90001	250-320	MHT	25	15
Ductile Iron				
60-40-18, 65-45-12	140-190	A	100	65
80-55-06	190-225	AC	70	45
	225-260	AC	50	30
100-70-03	240-300	HT	40	25
120-90-02	270-330	HT	25	15
	330-400	HT	10	5
Copper Alloys				
C38500, C35600, C37700, C54400, C36000, C37000, C33200, C34200, C35300, C31400, C48500, C34000	N/A	A	160	160
	N/A	CD	175	175
C68700, C26000, C65500, C44300, C44500, C22600, C36500, C36800, C79600, C24000, C33500, C65100, C67500, C28000, C77000, C23000, C26800	N/A	A	120	110
	N/A	CD	140	120
C61400, C17000, C17200, C17500, C22000, C70600, C71500, C11000, C21000, C74500, C75700, C75400, C75200, C10200, C50200, C52400, C51000, C52100, C12200	N/A	A	60	50
	N/A	CD	65	60
Aluminum				
Wrought	N/A	CD	400	400
	N/A	ST & A	350	350
Sand & permanent mold casting alloys	N/A	AC	500	500
	N/A	ST & A	350	350

*Abbreviations: A, annealed; AC, as cast; CD, cold drawn; H, precipitation hardened; HR, hot rolled; HT, heat treated; MHT, malleablizing heat treatment; N, normalized; Q & T, quenched & tempered; ST & A, solution treated & aged