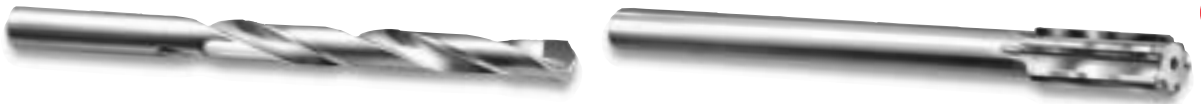


# FEEDS & SPEEDS – DRILLING OR REAMING GENERAL PURPOSE OR COOLANT FED



TECHNICAL

CHIP CLASS	MATERIAL BEING MACHINED	MATERIAL EXAMPLES	BRINELL HARDNESS	CHIP DESCRIPTION
20	<b>ALUMINUM ALLOY</b> CAST AND WROUGHT	308.0, 356.0, 360.0, 380.0, 383.0, 390.0, 2024, 3003, 4032, 5052, 6061, 7075	30-150 (500 kg)	DISCONTINUOUS FLAKY OR LONG STRINGY
	<b>COPPER ALLOY</b> TOUGH	101, 110, 115, 120, 130, 142, 155, 170, 172, 175, 195, 425, 610, 630, 655, 725, 805, 826, 910	40-200 (500 kg)	LONG CONTINUOUS
	<b>LEAD ALLOY</b>	Alloys 7, 8, 13, 15 1Sb, 4Sb, 6Sb, 8Sb, 9Sb	10-20 (500 kg)	DISCONTINUOUS TIGHTLY CURLED
	<b>PLASTIC</b>	ABS, Acrylic, Allyl, Bakelite, Epoxy, Furan, Nylon, Polyethylene, Polystyrene, PVC	–	CONTINUOUS
	<b>ZINC ALLOY</b>	AC41A, AG40A, AMS4803, ILZRO 12, ZDC NO. 7, GRADES 903, 925	80-100	LONG TIGHTLY CURLED
40	<b>ALUMINUM BRONZE</b>	614, 952-958	40-175	SHORT LOOSELY CURLED
	<b>COPPER ALLOY/BRASS/BRONZE</b> FREE MACHINING	268, 270, 314, 332, 335, 340, 342, 353, 356, 360, 370, 464-467, 485, 838, 945	10-100 Rb	FLAT SMALL
	<b>MAGNESIUM ALLOY</b>	AM60A, AZ21A, AZ91B-C, HM31A, K1A, ZE41A, ZK40A	50-90 (500 kg)	FLAT SMALL
	<b>NICKEL SILVER</b>	745, 752, 754, 757, 770, 973-978	10-100 Rb	LOOSELY CURLED
60	<b>CAST IRON-DUCTILE</b> AUSTENITIC (NI-RESIST)	TYPES D-2, D-2B, D-2C, D-2M, D-3, D-3A, D-4, D-5, D-5B	120-275	DISCONTINUOUS TIGHTLY CURLED
	<b>CAST IRON-DUCTILE</b> FERRITIC & FERRITIC-PEARLITIC	GRADES 60-40-18, 65-45-12, 80-55-06, D4018, D4512, D5506	140-270	DISCONTINUOUS TIGHTLY CURLED
	<b>CAST IRON-DUCTILE</b> MARTENSITIC & PEARLITIC-MARTENSITIC	GRADES 100-70-03, 120-90-02, D7003, DQ&T	270-400	DISCONTINUOUS TIGHTLY CURLED
	<b>CAST IRON-GRAY</b> FERRITIC & FERRITIC-PEARLITIC	CLASSES 20, 25, 30, 35, 40 GRADES G1800, G2500, G3000	120-220	DISCONTINUOUS
	<b>CAST IRON-GRAY</b> PEARLITIC	CLASSES 45, 50, 55, 60 GRADES G3500, G4000	220-320	DISCONTINUOUS
	<b>CAST IRON-MALLEABLE</b> FERRITIC & PEARLITIC	GRADES 32510, 35018, 40010, 45008 GRADES M3210, M4504, M5003	110-240	DISCONTINUOUS
	<b>CAST IRON-MALLEABLE</b> TEMPERED MARTENSITIC	GRADES 60004, 70003, 80002 GRADES M5003, M8501	200-320	DISCONTINUOUS
80	<b>STEEL-LOW &amp; MEDIUM STRENGTH</b> FREE MACHINING	1108-1119, 1132-1151, 10L17, 10L18, 10L50, 11L44, 12L13, 12L14, 12L15	100-250	DISCONTINUOUS LOOSELY CURLED
	<b>STEEL-LOW &amp; MEDIUM STRENGTH</b> WROUGHT	1005-1029, 1030-1050, 1513, 1518, 1524, 1552	100-375	CONTINUOUS STRINGY
100	<b>ALLOY STEEL-LOW &amp; MEDIUM STRENGTH</b> FREE MACHINING	41L30, 41L40, 41L50, 86L20, 4142Se, 4145Te	100-275	DISCONTINUOUS TIGHTLY CURLED
	<b>ALLOY STEEL-LOW &amp; MEDIUM STRENGTH</b>	1330, 1345, 1515, 4012, 4130, 4140, 4150, 4320, 4340, 4620, 5130, 8620, 8630, 8645, 9310	85-375	LOOSELY CURLED
	<b>STAINLESS STEEL 400 SERIES</b>	409, 410, 414, 420, 430, 436, 442, 446	135-325	DISCONTINUOUS TIGHTLY CURLED
	<b>STAINLESS STEEL</b> FREE MACHINING	203 EZ, 303, 303MA, 303Pb, 303 PLUS X, 303Se, 416, 416Se, 420F, 430F, 440F	135-275	SHORT TIGHTLY CURLED
120	<b>ALLOY STEEL - HIGH STRENGTH, MARAGING STEEL, NITRIDING STEEL, TOOL STEEL</b>	50100, 51100, 52100, GRADES 200-350, Nitalloy, SERIES A2, D2, H13, M50, P20, S7, W1	175-400	CONTINUOUS WIRY
140	<b>HIGH TEMP ALLOY</b> NICKEL & IRON	A-286; Hastelloy C; Inconel 600, 625, 718, 825; Monel 400; Nimonic 75, 80; Rene 41; Waspaloy	140-300	CONTINUOUS WIRY
	<b>STAINLESS STEEL 300 SERIES</b>	301, 302, 304, 309, 314, 316, 321, 330, 347, 385, Nitronic 32, 33, 40, 50, 60	135-375	WIRY LOOSELY CURLED
	<b>STAINLESS STEEL PH SERIES</b>	13-8 Mo, 15-5PH, 16-6PH, 17-4PH, 17-7PH, AM-350, AM-355	150-440	WIRY LOOSELY CURLED
	<b>TITANIUM ALLOY</b>	98.9, 99.0, 99.2, 99.5, Ti-6Al-4V, Ti-6Al-6V2Sn, Ti-8Mn, Ti-10v-2Fe-3Al	110-380	CONTINUOUS WIRY



TOOL APPLIC.		FEED RATE (INCHES PER REVOLUTION)																			
		HOLE DIAMETER IN INCHES																			
		CUTTING SPEED (SFM)		1/8		1/4		3/8		1/2		5/8		3/4		1		1 1/4		1 1/2	
		GENERAL PURPOSE	COOLANT FED	GEN PUR-POSE	COOL-ANT FED	GEN PUR-POSE	COOL-ANT FED	GEN PUR-POSE	COOL-ANT FED	GEN PUR-POSE	COOL-ANT FED	GEN PUR-POSE	COOL-ANT FED	GEN PUR-POSE	COOL-ANT FED	GEN PUR-POSE	COOL-ANT FED	GEN PUR-POSE	COOL-ANT FED	GEN PUR-POSE	COOL-ANT FED
DRILL	250-350	375-550	.003	-	.005	.004	.007	.005	.008	.006	.010	.006	.011	.007	.014	.009	.017	-	.019	-	
REAM	150-250	200-300	.004	-	.006	.008	.008	.010	.011	.013	.012	.015	.013	.017	.016	.021	.019	.022	.020	.024	
DRILL	125-190	225-300	.002	-	.005	.004	.007	.005	.008	.006	.009	.007	.010	.008	.012	.010	.014	-	.016	-	
REAM	50-90	70-105	.005	-	.006	.008	.008	.010	.010	.013	.011	.014	.012	.016	.014	.018	.016	.019	.017	.020	
DRILL	350-450	400-500	.003	-	.005	.004	.006	.006	.007	.007	.008	.008	.009	.009	.013	.013	.015	-	.017	-	
REAM	150-250	200-300	.002	-	.006	.008	.008	.010	.012	.016	.014	.017	.015	.018	.018	.022	.021	.024	.022	.026	
DRILL	175-450	-	.002	-	.004	-	.005	-	.005	-	.006	-	.008	-	.009	-	.010	-	.012	-	
REAM	90-250	125-300	.004	-	.005	.006	.007	.008	.008	.009	.009	.010	.012	.014	.014	.016	.016	.018	.018	.020	
DRILL	300-400	400-500	.003	-	.005	.004	.007	.005	.009	.006	.011	.008	.012	.009	.014	.010	.016	-	.018	-	
REAM	140-210	170-240	.005	-	.007	.009	.008	.011	.010	.013	.011	.014	.012	.016	.015	.020	.018	.022	.020	.025	
DRILL	125-190	200-300	.002	-	.005	.004	.007	.005	.008	.006	.009	.007	.010	.008	.012	.010	.014	-	.016	-	
REAM	50-90	70-105	.004	-	.006	.008	.010	.013	.012	.015	.014	.016	.016	.018	.018	.021	.020	.024	.022	.028	
DRILL	225-400	300-450	.003	-	.005	.004	.007	.005	.008	.006	.009	.007	.010	.008	.012	.010	.014	-	.016	-	
REAM	100-250	125-300	.005	-	.008	.010	.011	.014	.015	.020	.017	.022	.018	.024	.020	.026	.022	.028	.025	.032	
DRILL	300-400	450-550	.003	-	.005	.005	.006	.006	.007	.007	.008	.008	.009	.009	.013	.013	.015	-	.016	-	
REAM	130-190	150-250	.005	-	.010	.012	.012	.015	.015	.018	.016	.019	.017	.020	.020	.024	.022	.026	.025	.028	
DRILL	125-190	225-300	.002	-	.005	.004	.007	.005	.008	.006	.009	.007	.010	.008	.012	.010	.014	-	.016	-	
REAM	50-90	70-190	.004	-	.006	.007	.008	.010	.010	.012	.011	.013	.012	.014	.014	.017	.015	.018	.016	.018	
DRILL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
REAM	45-70	65-100	.004	-	.006	.008	.007	.009	.008	.011	.010	.014	.013	.016	.015	.018	.018	.020	.020	.025	
DRILL	150-225	200-250	.002	-	.004	.004	.006	.005	.008	.006	.010	.007	.012	.008	.014	.010	.016	-	.018	-	
REAM	50-90	70-105	.004	-	.005	.007	.008	.010	.010	.012	.012	.015	.014	.017	.017	.022	.020	.024	.023	.027	
DRILL	-	200-250	-	-	-	.004	-	.005	-	.006	-	.007	-	.008	-	.010	-	.011	-	-	
REAM	35-60	50-85	.004	-	.006	.008	.007	.009	.008	.010	.009	.011	.010	.013	.012	.014	.014	.017	.016	.019	
DRILL	175-300	250-400	.002	-	.005	.004	.007	.006	.009	.008	.011	.010	.014	.012	.017	.015	.018	-	.019	-	
REAM	65-135	95-190	.005	-	.008	.010	.010	.013	.011	.014	.013	.017	.016	.020	.020	.024	.022	.028	.025	.030	
DRILL	130-225	225-325	.002	-	.004	.004	.006	.006	.007	.008	.009	.010	.010	.012	.013	.015	.016	-	.018	-	
REAM	45-70	55-100	.004	-	.006	.008	.008	.010	.009	.012	.010	.014	.012	.015	.014	.018	.018	.020	.020	.026	
DRILL	125-190	200-250	.002	-	.005	.004	.008	.006	.009	.008	.010	.008	.011	.008	.012	.010	.014	-	.016	-	
REAM	60-120	70-105	.004	-	.006	.007	.010	.012	.011	.014	.012	.014	.013	.014	.014	.017	.016	.020	.018	.022	
DRILL	100-150	200-250	.002	-	.004	.004	.006	.005	.007	.006	.008	.007	.010	.008	.012	.010	.014	-	.016	-	
REAM	45-70	65-100	.004	-	.006	.008	.008	.010	.010	.012	.012	.014	.013	.015	.015	.020	.018	.023	.025	.030	
DRILL	125-175	150-250	.003	-	.004	.005	.008	.006	.010	.008	.012	.009	.014	.010	.017	.012	.018	-	.019	-	
REAM	70-100	100-150	.005	-	.008	.012	.010	.014	.012	.016	.014	.018	.015	.020	.020	.025	.025	.030	.030	.035	
DRILL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
REAM	30-85	40-110	.004	-	.008	.009	.009	.011	.011	.013	.013	.015	.015	.017	.018	.022	.020	.024	.022	.026	
DRILL	-	100-220	-	-	-	.005	-	.006	-	.007	-	.008	-	.010	-	.012	-	-	-	-	
REAM	65-100	90-135	.005	-	.008	.010	.010	.012	.015	.018	.017	.020	.018	.022	.022	.025	.025	.027	.027	.030	
DRILL	-	100-150	-	-	-	.005	-	.006	-	.007	-	.008	-	.010	-	.012	-	-	-	-	
REAM	40-85	65-100	.005	-	.010	.012	.012	.015	.015	.018	.018	.022	.020	.024	.025	.028	.027	.030	.030	.033	
DRILL	-	110-150	-	-	-	.004	-	.005	-	.006	-	.007	-	.008	-	.010	-	-	-	-	
REAM	40-90	50-100	.003	-	.005	.007	.006	.007	.007	.008	.008	.009	.008	.009	.010	.012	.011	.014	.012	.015	
DRILL	100-150	125-190	.002	-	.004	.004	.005	.005	.006	.006	.007	.007	.008	.007	.010	.008	.012	-	.014	-	
REAM	65-100	90-135	.004	-	.006	.008	.007	.009	.008	.010	.009	.011	.009	.012	.010	.013	.011	.013	.012	.014	
DRILL	-	100-150	-	-	-	.004	-	.006	-	.007	-	.008	-	.010	-	.012	-	-	-	-	
REAM	35-70	50-100	.004	-	.006	.007	.007	.008	.008	.009	.009	.011	.010	.012	.011	.014	.012	.015	.013	.016	
DRILL	-	60-115	-	-	-	.002	-	.003	-	.004	-	.005	-	.006	-	.007	-	-	-	-	
REAM	15-85	20-115	.003	-	.005	.006	.005	.007	.005	.007	.006	.008	.007	.008	.008	.010	.010	.012	.012	.015	
DRILL	-	70-105	-	-	-	.003	-	.004	-	.005	-	.006	-	.007	-	.008	-	-	-	-	
REAM	40-75	60-90	.003	-	.004	.006	.005	.007	.006	.008	.006	.008	.007	.009	.008	.010	.009	.011	.010	.012	
DRILL	-	65-100	-	-	-	.002	-	.003	-	.004	-	.005	-	.006	-	.007	-	-	-	-	
REAM	35-70	50-90	.003	-	.004	.006	.004	.006	.005	.007	.006	.008	.007	.009	.008	.010	.009	.012	.010	.014	
DRILL	-	65-100	-	-	-	.002	-	.003	-	.004	-	.005	-	.006	-	.007	-	-	-	-	
REAM	30-45	40-60	.004	-	.006	.008	.008	.010	.010	.013	.011	.014	.011	.014	.012	.016	.013	.016	.014	.018	

\*Use low end of speed range for high end of hardness range.