



FEEDS & SPEEDS — DRILLING OR REAMING

GENERAL PURPOSE OR COOLANT FED



CHIP CLASS	MATERIAL BEING MACHINED	MATERIAL EXAMPLES	BRINELL HARDNESS	CHIP DESCRIPTION	TOOL APPLIC.	CUTTING SPEED (SFM) STARTING RANGE*		FEED RATE (INCHES PER REVOLUTION)																		
						GENERAL PURPOSE	COOLANT FED	HOLE DIAMETER IN INCHES																		
								1/8	1/4	3/8	1/2	5/8	3/4	1	1 1/4	1 1/2										
20	ALUMINUM ALLOY 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	DRILL REAM	250-350 150-250	375-550 200-300	.003 .004	– –	.005 .006	.004 .008	.007 .008	.005 .010	.008 .011	.006 .013	.010 .012	.006 .015	.011 .013	.007 .017	.014 .016	.009 .021	.017 .019	– .022	.019 .020	– .024	
	COPPER ALLOY 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	DRILL REAM	125-190 50-90	225-300 70-105	.002 .005	– –	.005 .006	.004 .008	.007 .008	.005 .010	.008 .010	.006 .013	.009 .011	.007 .014	.010 .017	.008 .016	.012 .018	.010 .018	.014 .016	– .019	.016 .017	– .020	
	LEAD ALLOY	Alloys 7, 8, 13, 15 15b, 45b, 65b, 85b, 95b	10-20 (500 kg)	DISCONTINUOUS TIGHTLY CURLED	DRILL REAM	350-450 150-250	400-500 200-300	.003 .002	– –	.005 .006	.004 .008	.006 .006	.006 .010	.007 .012	.007 .016	.008 .014	.008 .017	.009 .015	.009 .018	.013 .018	.013 .022	.015 .021	– .024	.017 .022	– .026	
	PLASTIC	ABS, Acrylic, Allyl, Bakelite, Epoxy, Furan, Nylon, Polyethylene, Polystyrene, PVC	–	CONTINUOUS	DRILL REAM	175-450 90-250	– 125-300	.002 .004	– –	.004 .005	– .006	– .007	– .008	– .008	– .009	– .009	– .010	– .010	– .012	– .014	– .014	– .016	– .016	– .018	– .018	– .020
	ZINC ALLOY	AC41A, AG40A, AMS4803, ILZRO 12, ZDC NO. 7, GRADES 903, 925	80-100	LONG TIGHTLY CURLED	DRILL REAM	300-400 140-210	400-500 170-240	.003 .005	– –	.005 .007	.004 .009	.007 .008	.005 .011	.009 .010	.006 .013	.011 .011	.008 .014	.012 .016	.009 .016	.014 .015	.010 .020	.016 .018	– .022	.018 .020	– .025	
40	ALUMINUM BRONZE	614, 952-958	40-175	SHORT LOOSELY CURLED	DRILL REAM	125-190 50-90	200-300 70-105	.002 .004	– –	.005 .006	.004 .008	.007 .010	.005 .013	.008 .012	.006 .015	.009 .014	.007 .016	.010 .016	.008 .018	.012 .018	.010 .021	.014 .020	– .024	.016 .022	– .028	
	COPPER ALLOY/BRASS/BRONZE FREE MACHINING	268, 270, 314, 332, 335, 340, 342, 353, 356, 360, 370, 464-467, 485, 838, 945	10-100 Rb	FLAT SMALL	DRILL REAM	225-400 100-250	300-450 125-300	.003 .005	– –	.005 .008	.004 .010	.007 .011	.005 .014	.008 .015	.006 .020	.009 .017	.007 .022	.010 .018	.008 .024	.012 .020	.010 .026	.014 .022	– .028	.016 .025	– .032	
	MAGNESIUM ALLOY	AM60A, AZ21A, AZ91B-C, HM31A, K1A, ZE41A, ZK40A	50-90 (500 kg)	FLAT SMALL	DRILL REAM	300-400 130-190	450-550 150-250	.003 .005	– –	.005 .010	.005 .012	.006 .012	.006 .015	.007 .015	.007 .018	.008 .016	.008 .019	.009 .017	.009 .020	.013 .020	.013 .024	.015 .022	– .026	.016 .025	– .028	
	NICKEL SILVER	745, 752, 754, 757, 700, 973-978	10-100 Rb	LOOSELY CURLED	DRILL REAM	125-190 50-90	225-300 70-190	.002 .004	– –	.005 .006	.004 .007	.007 .008	.005 .010	.008 .010	.006 .012	.009 .011	.007 .013	.010 .012	.008 .014	.012 .014	.010 .017	.014 .017	– .018	.016 .016	– .018	
60	CAST IRON-DUCTILE 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	DRILL REAM	– 45-70	– 65-100	– .004	– –	– .006	– .008	– .007	– .009	– .008	– .011	– .010	– .014	– .013	– .016	– .015	– .018	– .018	– .020	– .020	– .025	
	CAST IRON-DUCTILE FERRITIC & FERRITIC-PEARLITIC	GRADES 60-40-18, 65-45-12, 80-55-06, D4018, D4512, D5506	140-270	DISCONTINUOUS TIGHTLY CURLED	DRILL REAM	150-225 50-90	200-250 70-105	.002 .004	– –	.004 .005	.004 .007	.006 .008	.005 .010	.008 .010	.006 .012	.010 .012	.007 .015	.012 .017	.008 .017	.014 .022	.010 .020	.016 .024	– .024	.018 .023	– .027	
	CAST IRON-DUCTILE MARTENSITIC & PEARLITIC-MARTENSITIC	GRADES 100-70-03, 120-90-02, D7003, DQ&T	270-400	DISCONTINUOUS TIGHTLY CURLED	DRILL REAM	– 35-60	200-250 50-85	– .004	– –	– .006	– .008	– .007	– .009	– .008	– .010	– .009	– .011	– .010	– .013	– .012	– .014	– .014	– .017	– .016	– .019	
	CAST IRON-GRAY FERRITIC & FERRITIC-PEARLITIC	CLASSES 20, 25, 30, 35, 40 GRADES G1800, G2500, G3000	120-220	DISCONTINUOUS	DRILL REAM	175-300 65-135	250-400 95-190	.002 .005	– –	.005 .008	.004 .010	.007 .010	.006 .013	.009 .011	.008 .014	.011 .013	.010 .017	.014 .016	.012 .020	.017 .020	.015 .024	.018 .022	– .028	.019 .025	– .030	
	CAST IRON-GRAY PEARLITIC	CLASSES 45, 50, 55, 60 GRADES G3500, G4000	220-320	DISCONTINUOUS	DRILL REAM	130-225 45-70	225-325 55-100	.002 .004	– –	.004 .006	.004 .008	.006 .008	.006 .010	.007 .009	.008 .012	.009 .010	.010 .014	.010 .012	.012 .015	.013 .014	.015 .018	.016 .018	– .020	.018 .020	– .026	
	CAST IRON-MALLEABLE FERRITIC & PEARLITIC	CLASSES 32510, 35018, 40010, 45008 GRADES M3210, M4504, M5003	110-240	DISCONTINUOUS	DRILL REAM	125-190 60-120	200-250 70-105	.002 .004	– –	.005 .006	.004 .007	.008 .010	.006 .012	.009 .011	.008 .014	.010 .012	.008 .014	.011 .014	.008 .014	.012 .017	.010 .017	.014 .016	– .020	.016 .018	– .022	
	CAST IRON-MALLEABLE TEMPERED MARTENSITE	GRADES 60004, 70003, 80002 GRADES M5003, M8501	200-320	DISCONTINUOUS	DRILL REAM	100-150 45-70	200-250 65-100	.002 .004	– –	.004 .006	.004 .008	.006 .008	.005 .010	.007 .010	.006 .012	.008 .012	.007 .014	.010 .013	.008 .015	.012 .015	.010 .020	.014 .018	– .023	.016 .025	– .030	
80	STEEL-LOW & MEDIUM STRENGTH FREE MACHINING	1108-1119, 1132-1151, 10L17, 10L18, 10L50, 11L44, 12L13, 12L14, 12L15	100-250	DISCONTINUOUS LOOSELY CURLED	DRILL REAM	125-175 70-100	150-250 100-150	.003 .005	– –	.004 .008	.005 .012	.008 .010	.006 .014	.010 .012	.008 .016	.012 .014	.009 .018	.014 .015	.010 .020	.017 .025	.012 .025	.018 .025	– .030	.019 .030	– .035	
	STEEL-LOW & MEDIUM STRENGTH WROUGHT	1005-1029, 1030-1050, 1513, 1518, 1524, 1552	100-375	CONTINUOUS STRINGY	DRILL REAM	– 30-85	– 40-110	– .004	– –	– .008	– .009	– .009	– .011	– .011	– .013	– .013	– .015	– .015	– .017	– .018	– .022	– .020	– .024	– .022	– .026	
100	ALLOY STEEL-LOW & MEDIUM STRENGTH FREE MACHINING	41L30, 41L40, 41L50, 86L20, 4142Se, 4145Te	100-275	DISCONTINUOUS TIGHTLY CURLED	DRILL REAM	– 65-100	100-220 90-135	– .005	– –	– .008	– .010	– .012	– .015	– .018	– .017	– .020	– .018	– .022	– .022	– .025	– .025	– .027	– .027	– .030		
	ALLOY STEEL-LOW & MEDIUM STRENGTH	1330, 1345, 1515, 4012, 4130, 4140, 4150, 4320, 4340, 4620, 5130, 8620, 8630, 8645, 9310	85-375	LOOSELY CURLED	DRILL REAM	– 40-85	100-150 65-100	– .005	– –	– .010	– .012	– .015	– .018	– .018	– .022	– .020	– .024	– .025	– .028	– .027	– .030	– .030	– .033			
	STAINLESS STEEL 400 SERIES	409, 410, 414, 420, 430, 436, 442, 446	135-325	DISCONTINUOUS TIGHTLY CURLED	DRILL REAM	– 40-90	110-150 50-100	– .003	– –	– .005	– .007	– .006	– .007	– .008	– .008	– .009	– .008	– .009	– .008	– .009	– .010	– .012	– .011	– .014	– .012	
	STAINLESS STEEL FREE MACHINING	203 EZ, 303, 303MA, 303Pb, 303 PLUS X, 303Se, 416, 416Se, 420F, 430F, 440F	135-275	SHORT TIGHTLY CURLED	DRILL REAM	100-150 65-100	125-190 90-135	.002 .004	– –	.004 .006	.004 .008	.005 .007	.005 .009	.006 .008	.006 .010	.007 .009	.007 .011	.008 .009	.007 .012	.008 .010	.007 .013	.010 .011	.008 .013	– .013	.014 .012	– .014
120	ALLOY STEEL-HIGH STRENGTH, MARAGING STEEL, NITRIDING STEEL, TOOL STEEL	50100, 51100, 52100, GRADES 200-350, Nitr alloy, SERIES A2, D2, H13, M50, P20, S7, WI	175-400	CONTINUOUS WIRY	DRILL REAM	– 35-70	100-150 50-100	– .004	– –	– .006	– .007	– .006	– .008	– .008	– .009	– .009	– .011	– .010	– .012	– .011	– .014	– .012	– .015	– .013	– .016	
140	HIGH TEMP ALLOY NICKEL & IRON	A-286; Hastelloy C; Inconel 600, 625, 718, 825; Monel 400; Nimonic 75, 80; Rene 41; Waspaloy	140-300	CONTINUOUS WIRY	DRILL REAM	– 15-85	– 20-115	– .003	– –	– .005	– .006	– .005	– .007	– .005	– .007	– .006	– .008	– .007	– .008	– .008	– .010	– .010	– .012	– .012	– .015	
	STAINLESS STEEL 300 SERIES	301, 302, 304, 309, 314, 316, 321, 330, 347, 385, Nitronic 32, 33, 40, 50, 60	135-375	WIRY LOOSELY CURLED	DRILL REAM	– 40-75	– 60-90	– .003	– –	– .004	– .006	– .005	– .007	– .006	– .008	– .006	– .008	– .007	– .009	– .008	– .010	– .009	– .011	– .010	– .012	
	STAINLESS STEEL PH SERIES	13-8 Mo, 15-5PH, 16-6PH, 17-4PH, 17-7PH, AM-350, AM-355	150-440	WIRY LOOSELY CURLED	DRILL REAM	– 35-70	– 50-90	– .003	– –	– .004	– .006	– .004	– .006	– .005	– .007	– .006	– .008	– .007	– .009	– .008	– .010	– .009	– .012	– .010	– .014	
	TITANIUM ALLOY	98.9, 99.0, 99.2, 99.5, Ti-6Al-4V, Ti-6Al-6V2Sn, Ti-8Mn, Ti-10v-2Fe-3Al	110-380	CONTINUOUS WIRY	DRILL 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.