

Recommended Cutting Data X^D ≤ 1/4 - Inch

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter						Drill Diameter							
						1/64	1/16	1/8	5/32	3/16	1/4	1/64	1/16	1/8	5/32	3/16	1/4		
						vc - SFM						f - IPR							
Free Machining & Low Carbon Steels 1008, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	2XDSS		3			390	380	370	360	.001-.002	.002-.003	.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XD5R		5	405	400	390	380	370	360								
			2XD5S		3			660	650	640	630								
			2XD5R		5			660	650	640	630			.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XDCL		7+			595	580	560	540								
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 9255, 2515, 3155, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8820, 8282, 9640, 52190, O1, O2, O8, S2, W1 to W310	P	28 to 38 Rc	2XDSS		3			330	320	310	300	.001-.002	.002-.003	.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XD5R		5	350	340	330	320	310	300								
			2XD5S		3			575	550	540	500								
			2XD5R		5			575	550	540	500			.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XDCL		7+			430	420	410	400								
Tool Steels & Die Steels D7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H16, H21, L3, L6, L7, P2, P20, S1, S8, S7, 52108, A128, D2, D3, D4, D6, D7	P	28 to 44 Rc	2XDSS		3			200	190	190	185	.0004-.0008	.0008-.0012	.0014-.0030	.0024-.0040	.003-.005	.0035-.0080		
			2XD5R		5	210	200	200	190	190	185								
			2XD5S		3			250	240	230	220								
			2XD5R		5			250	240	230	220			.0014-.0030	.0024-.0040	.003-.005	.0035-.0080		
			2XDCL		7+			225	220	215	205								
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	2XDSS		3			350	340	330	320	.001-.002	.002-.003	.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XD5R		5	360	355	350	340	330	320								
			2XD5S		3			550	500	475	450								
			2XD5R		5			550	500	475	450			.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XDCL		7+			450	425	400	380								
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	2XDSS		3			140	135	130	125	.001-.002	.002-.003	.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XD5R		5	150	145	140	135	130	125								
			2XD5S		3			300	290	280	270								
			2XD5R		5			300	290	280	270			.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XDCL		7+			280	270	260	250								
Stainless Steel - Difficult to Machine 302B, 304B, 306, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	2XDSS		3			140	130	120	110	.0004-.0012	.001-.002	.0020-.0033	.0024-.0035	.0030-.0043	.0031-.0050		
			2XD5R		5	160	150	140	130	120	110								
			2XD5S		3			265	250	240	230								
			2XD5R		5			265	250	240	230			.0020-.0033	.0024-.0035	.0030-.0042	.0031-.0050		
			2XDCL		7+			190	180	170	160								
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	2XDSS		3			85	80	75	70	.0004-.0012	.001-.002	.0014-.0033	.0016-.0035	.002-.004	.0023-.0043		
			2XD5R		5	100	90	85	80	75	70								
			2XD5S		3			115	100	95	90								
			2XD5R		5			115	100	95	90			.0014-.0033	.0016-.0035	.002-.004	.0023-.0043		
			2XDCL		7+			100	100	95	95								
Titanium Alloys BAI-4V, 5Al-2.5 Sn, 9Al-3 Sn-4Zr-8Mo, 3Al-6V-6Cr-4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	2XDSS		3			130	125	120	115	.0004-.0012	.001-.002	.003-.004	.004-.008	.005-.007	.0055-.0080		
			2XD5R		5	150	140	130	125	120	115								
			2XD5S		3			230	220	210	200								
			2XD5R		5			230	220	210	200			.003-.004	.004-.008	.005-.007	.0055-.0080		
			2XDCL		7+			210	190	180	170								
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J481C, GRADES G1890, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	2XDSS		3			480	470	460	430	.001-.002	.002-.003	.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XD5R		5	500	490	480	470	460	430								
			2XD5S		3			660	640	620	600								
			2XD5R		5			660	640	620	600			.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XDCL		7+			500	490	480	470								
Cast Iron Ductile & Malleable CGI 85-40-15, 85-45-12, D4016, D4512, D5506, 32510, 35106, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	2XDSS		3			280	270	260	250	.001-.002	.002-.003	.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XD5R		5	300	290	280	270	260	250								
			2XD5S		3			400	480	460	440								
			2XD5R		5			400	480	460	440			.003-.005	.004-.008	.005-.007	.0055-.0080		
			2XDCL		7+			350	340	330	320								

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

Recommended Cutting Data X^D ≥ 5/16 - Inch

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter						Drill Diameter					
						5/16	3/8	1/2	9/16	5/8	3/4	5/16	3/8	1/2	9/16	5/8	3/4
						vc - SFM						f - IPR					
Free Machining & Low Carbon Steels 1008, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	2XDSS		3	350	340	320	300	275	265	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	350	340	320	300	275	265	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSC		3	620	600	575	550	525	500	.008-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDRC		5	620	600	575	550	525	500	.008-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDCL		7+	520	500	480	460	440	430	.008-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1065, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4150, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 6820, 9262, 9840, 52100, O1, O2, O4, S2, W1 to W310	P	28 to 38 Rc	2XDSS		3	290	280	270	265	260	260	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	290	280	270	265	260	260	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSC		3	475	450	425	400	325	315	.008-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDRC		5	475	450	425	400	325	315	.008-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDCL		7+	375	350	325	315	300	280	.008-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T6, T8, T16, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L8, L7, P2, P20, S1, S5, S7, 52100, A128, D2, D3, D4, D5, D7	P	28 to 44 Rc	2XDSS		3	185	180	180	175	175	170	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	185	180	180	175	175	170	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSC		3	210	210	200	200	190	190	.008-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDRC		5	210	210	200	200	190	190	.008-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDCL		7+	200	190	190	180	180	170	.008-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 419 Annealed, 420F, 430	M	up to 28 Rc	2XDSS		3	310	300	275	250	225	200	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	310	300	275	250	225	200	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSC		3	400	390	380	370	330	320	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDRC		5	400	390	380	370	330	320	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDCL		7+	375	370	350	325	310	300	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	2XDSS		3	120	115	110	105	100	95	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSC		3	260	250	240	240	230	220	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDRC		5	260	250	240	240	230	220	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDCL		7+	240	230	220	220	200	200	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDCL		7+	240	230	220	220	200	200	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	2XDSS		3	110	105	105	100	100	95	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
			2XDSR		5	110	105	105	100	100	95	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
			2XDSC		3	220	200	190	180	170	155	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
			2XDRC		5	220	200	190	180	170	155	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
			2XDCL		7+	150	140	130	130	125	125	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	2XDSS		3	85	80	55	50	45	40	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.006-.010
			2XDSR		5	85	80	55	50	45	40	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.006-.010
			2XDSC		3	85	85	80	80	75	75	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.006-.010
			2XDRC		5	85	85	80	80	75	75	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.006-.010
			2XDCL		7+	90	90	85	85	75	75	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.006-.010
Titanium Alloys 8Al-4V, 5Al-2.5 Sn, 8Al-2 Sn-4Zr-6Mo, 3Al-5V-6Zr-4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	2XDSS		3	110	105	100	100	90	90	.006-.009	.007-.010	.008-.011	.008-.010	.010-.014	.011-.015
			2XDSR		5	110	105	100	100	90	90	.006-.009	.007-.010	.008-.011	.008-.010	.010-.014	.011-.015
			2XDSC		3	190	180	170	160	150	150	.006-.009	.007-.010	.008-.011	.008-.010	.010-.014	.011-.015
			2XDRC		5	190	180	170	160	150	150	.006-.009	.007-.010	.008-.011	.008-.010	.010-.014	.011-.015
			2XDCL		7+	160	150	140	130	120	120	.006-.009	.007-.010	.008-.011	.008-.010	.010-.014	.011-.015
Cast Iron - Gray CGI, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 25, 30, 35, 40	K	up to 240 HB	2XDSS		3	410	400	390	370	360	350	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	410	400	390	370	360	350	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSC		3	580	560	550	550	525	500	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDRC		5	580	560	550	550	525	500	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDCL		7+	460	450	440	430	410	400	.008-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5506, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	2XDSS		3	240	230	220	210	200	190	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	240	230	220	210	200	190	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSC		3	400	375	350	300	275	250	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDRC		5	400	375	350	300	275	250	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDCL		7+	300	270	250	240	220	200	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

For product information, call your local distributor.

XD
Twister X^D®

Technical Information

Recommended Cutting Data X^D ≤ 6mm - Metric

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter (mm)						Drill Diameter (mm)							
						0.05	1.5	3	4	5	6	0.05	1.5	3	4	5	6		
						vc - m/min						f - mm/Rev							
Free Machining & Low Carbon Steels 1036, 1038, 1015, 1016, 1020, 1022, 1025, 1117, 1140, 1141, 11056, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	2XDSS	●	3			119	116	113	110	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5R	●	5	123	122	119	116	113	110								
			2XD5S	●	3			201	198	195	192								
			2XD5CR	●	5			201	198	195	192			.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5CL	●	7+			181	177	171	165								
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1065, 1065, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9252, 9840, 52100, O1, O2, O8, S2, W1 to W310	P	26 to 38 Rc	2XDSS	●	3			101	98	94	91	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5R	●	5	107	104	101	98	94	91								
			2XD5CS	●	3			175	168	165	152								
			2XD5CR	●	5			175	168	165	152			.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5CL	●	7+			131	128	125	122								
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T16, A2, A3, A6, A7, H10, H11, H12, H13, H16, H21, L3, L6, L7, P2, P20, S1, S5, S7, S2100, A128, D2, D3, D4, D6, D7	P	26 to 44 Rc	2XDSS	●	3			61	58	58	56	.010-.020	.020-.030	.036-.076	.061-.102	.076-.127	.089-.152		
			2XD5R	●	5	84	81	61	58	58	56								
			2XD5CS	●	3			76	73	70	67								
			2XD5CR	●	5			76	73	70	67			.036-.076	.061-.102	.076-.127	.089-.152		
			2XD5CL	●	7+			69	67	66	62								
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	2XDSS	●	3			107	104	101	98	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5R	●	5	125	120	107	104	101	98								
			2XD5CS	●	3			168	152	145	137								
			2XD5CR	●	5			168	152	145	137			.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5CL	●	7+			137	130	122	116								
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	2XDSS	●	3			43	41	40	38	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5R	●	5	50	40	43	41	40	30								
			2XD5CS	●	3			91	88	85	82								
			2XD5CR	●	5			91	88	85	82			.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5CL	●	7+			85	82	79	76								
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	2XDSS	●	3			43	40	37	34	.010-.030	.025-.051	.051-.076	.061-.089	.089-.102	.076-.127		
			2XD5R	●	5	49	46	43	40	37	34								
			2XD5CS	●	3			81	76	73	70								
			2XD5CR	●	5			81	76	73	70			.051-.076	.061-.089	.089-.102	.076-.127		
			2XD5CL	●	7+			58	55	52	49								
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	2XDSS	●	3			26	24	23	21	.010-.030	.025-.051	.036-.089	.036-.089	.051-.102	.061-.127		
			2XD5R	●	5	30	27	26	24	23	21								
			2XD5CS	●	3			35	30	29	27								
			2XD5CR	●	5			35	30	29	27			.036-.089	.036-.089	.051-.102	.061-.127		
			2XD5CL	●	7+			30	30	29	29								
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-9V-6CrMo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	2XDSS	●	3			40	38	37	35	.010-.030	.025-.051	.076-.102	.102-.152	.127-.178	.140-.229		
			2XD5R	●	5	46	43	40	38	37	35								
			2XD5CS	●	3			70	67	64	61								
			2XD5CR	●	5			70	67	64	61			.076-.102	.102-.152	.127-.178	.140-.229		
			2XD5CL	●	7+			64	58	55	52								
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	2XDSS	●	3			146	143	140	131	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5R	●	5	152	149	146	143	140	131								
			2XD5CS	●	3			201	195	189	183								
			2XD5CR	●	5			201	195	189	183			.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5CL	●	7+			152	149	146	143								
Cast Iron - Ductile & Malleable CGI 60-40-18, 65-45-12, D4018, D4512, D5508, 32510, 35108, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	2XDSS	●	3			85	82	79	76	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5R	●	5	91	88	85	82	79	76								
			2XD5CS	●	3			122	146	140	134								
			2XD5CR	●	5			122	146	140	134			.076-.127	.102-.152	.127-.178	.127-.203		
			2XD5CL	●	7+			107	104	101	98								

Technical data provided should be considered advisory only as variations may be necessary depending on the particular application.

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter (mm)							Drill Diameter (mm)						
						8	10	12	14	16	18	20	8	10	12	14	16	18	20
						vc - m/min							f - mm/Rev						
Free Machining & Low Carbon Steels 1006, 1006, 1015, 1016, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	2XDSS	3	107	104	98	91	84	81	77	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDSR	5	107	104	98	91	84	81	77								
			2XDSC	3	189	183	175	168	160	152	145	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDRC	5	189	183	175	168	160	152	145								
			2XDCL	7+	158	152	146	140	134	131	125								
Medium Carbon & High Carbon Steels, Alloy Steels & Easy to Machine Tool Steels 1030, 1035, 1040, 1045, 1050, 1052, 1055, 1060, 1085, 1095, 1541, 1551, 2255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 6620, 6262, 6640, 52100, O1, O2, O8, S2, W1 to W310	P	28 to 38 Rc	2XDSS	3	88	85	82	81	79	79	75	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDSR	5	88	85	82	81	79	79	75								
			2XDSC	3	145	137	130	122	99	98	92	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDRC	5	145	137	130	122	99	98	92								
			2XDCL	7+	114	107	99	96	91	85	81								
Tool Steels & Die Steels O7, M1, M2, M3, M4, M7, T1, T2, T4, T5, T8, T15, A2, A3, A6, A7, H10, H11, H12, H13, H19, H21, L3, L8, L7, P2, P20, S1, S5, S7, 52100, A128, D2, D3, D4, D5, D7	P	28 to 44 Rc	2XDSS	3	56	55	55	53	53	52	49	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDSR	5	56	55	55	53	53	52	49								
			2XDSC	3	64	64	61	61	58	58	55	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDRC	5	64	64	61	61	58	58	55								
			2XDCL	7+	61	58	58	55	55	52	49								
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	2XDSS	3	94	91	84	76	69	61	55	.16-.24	.18-.27	.21-.31	.22-.35	.25-.38	.28-.38	.30-.37	
			2XDSR	5	94	91	84	76	69	61	55								
			2XDSC	3	122	119	116	113	101	98	94	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDRC	5	122	119	116	113	101	98	94								
			2XDCL	7+	114	113	107	99	94	91	87								
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	2XDSS	3	37	35	34	32	30	29	28	.16-.24	.18-.27	.21-.31	.22-.35	.25-.38	.28-.38	.30-.37	
			2XDSR	5	37	35	34	32	30	29	28								
			2XDSC	3	79	76	73	73	70	67	64	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDRC	5	79	76	73	73	70	67	64								
			2XDCL	7+	73	70	67	67	61	61	58								
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	2XDSS	3	34	32	32	30	30	29	27	.11-.15	.13-.23	.18-.25	.21-.27	.22-.31	.25-.33	.30-.37	
			2XDSR	5	34	32	32	30	30	29	27								
			2XDSC	3	67	61	58	55	52	47	45	.11-.15	.13-.23	.18-.25	.21-.27	.22-.31	.25-.33	.30-.37	
			2XDRC	5	67	61	58	55	52	47	45								
			2XDCL	7+	46	43	40	40	38	38	36								
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	2XDSS	3	20	18	17	15	14	12	11	.08-.13	.11-.15	.12-.17	.14-.19	.16-.21	.18-.25	.17-.24	
			2XDSR	5	20	18	17	15	14	12	11								
			2XDSC	3	26	26	24	24	23	23	22	.09-.13	.11-.15	.12-.17	.14-.19	.18-.21	.18-.25	.17-.24	
			2XDRC	5	26	26	24	24	23	23	22								
			2XDCL	7+	27	27	26	26	23	23	22								
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-9Cr-4Mo-4Zr, 10V-2Fe-3Al, 13V-11Cr-3Al	S	up to 42 Rc	2XDSS	3	34	32	30	30	27	27	25	.16-.24	.18-.27	.21-.31	.22-.35	.25-.36	.28-.38	.30-.37	
			2XDSR	5	34	32	30	30	27	27	25								
			2XDSC	3	55	55	52	49	46	46	44	.16-.24	.18-.27	.21-.31	.22-.35	.25-.36	.28-.38	.30-.37	
			2XDRC	5	55	55	52	49	46	46	44								
			2XDCL	7+	49	46	43	40	37	37	35								
Cast Iron - Gray CG, ASTM A48, CLASS 20, 25, 30, 35, SAE J431C, GRADES G1800, G3000, G3500, GG 10, 15, 20, 25, 30, 35, 40	K	up to 240 HB	2XDSS	3	125	122	119	113	110	107	102	.16-.24	.18-.27	.21-.31	.22-.35	.25-.38	.28-.38	.30-.37	
			2XDSR	5	125	122	119	113	110	107	102								
			2XDSC	3	177	171	168	168	160	152	145	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDRC	5	177	171	168	168	160	152	145								
			2XDCL	7+	140	137	134	131	125	122	117								
Cast Iron - Ductile & Malleable CGI 60-40-10, 65-45-12, D4016, D4612, D5506, 32510, 3510B, M3210, M4504, M5503, 250, 300, 350, 400, 450	K	over 240 HB	2XDSS	3	73	70	67	64	61	58	55	.16-.24	.18-.27	.21-.31	.22-.35	.25-.36	.28-.38	.30-.37	
			2XDSR	5	73	70	67	64	61	58	55								
			2XDSC	3	122	114	107	91	84	76	72	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37	
			2XDRC	5	122	114	107	91	84	76	72								
			2XDCL	7+	91	82	76	73	67	61	58								

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Technical Information