Twister XD® Xtreme Drilling

Recommended Cutting Data XD ≤ 1/4 - Inch

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter vc - SFM 1/64	1/16	1/8	5/32	3/16	1/4	Drill Diameter f - IPR 1/64	1/16	1/8	5/32	3/16	1/4
Free Machining & Low Carbon Steels 1006, 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-.006	.005-.007	.0055-.0080
			2XDSR		5	405	400	390	380	370	360						
			2XDCS		3			660	650	640	630			.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDCR		5			660	650	640	630						
			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, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	2XDSS		3			330	320	310	300	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDSR		5	350	340	330	320	310	300						
			2XDCS		3			575	550	540	500			.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDCR		5			575	550	540	500						
			2XDCL		7+			430	420	410	400						
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, L6, L7, P2, P20, S1, S5, S7, 52100, A128, D2, D3, D4, D5, D7	P	28 to 44 Rc	2XDSS		3			200	190	190	185	.0004-.0008	.0008-.0012	.0014-.0030	.0024-.0040	.003-.005	.0035-.0060
			2XDSR		5	210	200	200	190	190	185						
			2XDCS		3			250	240	230	220			.0014-.0030	.0024-.0040	.003-.005	.0035-.0060
			2XDCR		5			250	240	230	220						
			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-.006	.005-.007	.0055-.0080
			2XDSR		5	360	355	350	340	330	320						
			2XDCS		3			550	500	475	450			.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDCR		5			550	500	475	450						
			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-.006	.005-.007	.0055-.0080
			2XDSR		5	150	145	140	135	130	125						
			2XDCS		3			300	290	280	270			.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDCR		5			300	290	280	270						
			2XDCL		7+			280	270	260	250						
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			140	130	120	110	.0004-.0012	.001-.002	.0020-.0033	.0024-.0035	.0030-.0043	.0031-.0050
			2XDSR		5	160	150	140	130	120	110						
			2XDCS		3			265	250	240	230			.0020-.0033	.0024-.0035	.0030-.0042	.0031-.0050
			2XDCR		5			265	250	240	230						
			2XDCL		7+			190	180	170	160						
High Temp Alloys Nimonics, 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
			2XDSR		5	100	90	85	80	75	70						
			2XDCS		3			115	100	95	90			.0014-.0033	.0016-.0035	.002-.004	.0023-.0043
			2XDCR		5			115	100	95	90						
			2XDCL		7+			100	100	95	95						
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-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-.006	.005-.007	.0055-.0080
			2XDSR		5	150	140	130	125	120	115						
			2XDCS		3			230	220	210	200			.003-.004	.004-.005	.005-.007	.0055-.0080
			2XDCR		5			230	220	210	200						
			2XDCL		7+			210	190	180	170						
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			480	470	460	430	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDSR		5	500	490	480	470	460	430						
			2XDCS		3			660	640	620	600			.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDCR		5			660	640	620	600						
			2XDCL		7+			500	490	480	470						
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			280	270	260	250	.001-.002	.002-.003	.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDSR		5	300	290	280	270	260	250						
			2XDCS		3			400	480	460	440			.003-.005	.004-.006	.005-.007	.0055-.0080
			2XDCR		5			400	480	460	440						
			2XDCL		7+			350	340	330	320						

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

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Recommended Cutting Data XD ≥ 5/16 - Inch

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter vc - SFM 5/16	3/8	1/2	9/16	5/8	3/4	Drill Diameter f - IPR 5/16	3/8	1/2	9/16	5/8	3/4
Free Machining & Low Carbon Steels 1006, 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	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	350	340	320	300	275	265						
			2XDCS		3	620	600	575	550	525	500	.006-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDCR		5	620	600	575	550	525	500						
			2XDCL		7+	520	500	480	460	440	430						
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, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	2XDSS		3	290	280	270	265	260	260	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	290	280	270	265	260	260						
			2XDCS		3	475	450	425	400	325	315	.006-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDCR		5	475	450	425	400	325	315						
			2XDCL		7+	375	350	325	315	300	280						
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, L6, 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	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	185	180	180	175	175	170						
			2XDCS		3	210	210	200	200	190	190	.006-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
			2XDCR		5	210	210	200	200	190	190						
			2XDCL		7+	200	190	190	180	180	170						
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430	M	up to 28 Rc	2XDSS		3	310	300	275	250	225	200	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	310	300	275	250	225	200						
			2XDCS		3	400	390	380	370	330	320	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDCR		5	400	390	380	370	330	320						
			2XDCL		7+	375	370	350	325	310	300						
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	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	120	115	110	105	100	95						
			2XDCS		3	260	250	240	240	230	220	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDCR		5	260	250	240	240	230	220						
			2XDCL		7+	240	230	220	220	200	200						
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						
			2XDCS		3	220	200	190	180	170	155	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
			2XDCR		5	220	200	190	180	170	155						
			2XDCL		7+	150	140	130	130	125	125						
High Temp Alloys Nimonics, Inconel, Monel, Hastelloy	S	up to 42 Rc	2XDSS		3	65	60	55	50	45	40	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.009-.010
			2XDSR		5	65	60	55	50	45	40						
			2XDCS		3	85	85	80	80	75	75	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.009-.010
			2XDCR		5	85	85	80	80	75	75						
			2XDCL		7+	90	90	85	85	75	75						
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-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						
			2XDCS		3	190	180	170	160	150	150	.006-.009	.007-.010	.008-.011	.008-.-.010	.010-.014	.011-.015
			2XDCR		5	190	180	170	160	150	150						
			2XDCL		7+	160	150	140	130	120	120						
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	410	400	390	370	360	350	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDSR		5	410	400	390	370	360	350						
			2XDCS		3	580	560	550	550	525	500	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDCR		5	580	560	550	550	525	500						
			2XDCL		7+	460	450	440	430	410	400						
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						
			2XDCS		3	400	375	350	300	275	250	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			2XDCR		5	400	375	350	300	275	250						
			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.

Twister XD® Xtreme Drilling

Recommended Cutting Data XD ≤ 6mm - Metric

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter (mm) vc - m/min						Drill Diameter (mm) f - mm/Rev					
						0.05	1.5	3	4	5	6	0.05	1.5	3	4	5	6
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 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
			2XDSR		5	123	122	119	116	113	110						
			2XDCS		3			201	198	195	192			.076-.127	.102-.152	.127-.178	.127-.203
			2XDCR		5			201	198	195	192						
			2XDCL		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, 1085, 1095, 1541, 1551, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, S2, W1 to W310	P	28 to 38 Rc	2XDSS		3			101	98	94	91	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203
			2XDSR		5	107	104	101	98	94	91						
			2XDCS		3			175	168	165	152			.076-.127	.102-.152	.127-.178	.127-.203
			2XDCR		5			175	168	165	152						
			2XDCL		7+			131	128	125	122						
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, L6, L7, P2, P20, S1, S5, S7, 52100, A128, D2, D3, D4, D5, D7	P	28 to 44 Rc	2XDSS		3			61	58	58	56	.010-.020	.020-.030	.036-.076	.061-.102	.076-.127	.089-.152
			2XDSR		5	64	61	61	58	58	56						
			2XDCS		3			76	73	70	67			.036-.076	.061-.102	.076-.127	.089-.152
			2XDCR		5			76	73	70	67						
			2XDCL		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
			2XDSR		5	125	120	107	104	101	98						
			2XDCS		3			168	152	145	137			.076-.127	.102-.152	.127-.178	.127-.203
			2XDCR		5			168	152	145	137						
			2XDCL		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
			2XDSR		5	50	48	43	41	40	38						
			2XDCS		3			91	88	85	82			.076-.127	.102-.152	.127-.178	.127-.203
			2XDCR		5			91	88	85	82						
			2XDCL		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
			2XDSR		5	49	46	43	40	37	34						
			2XDCS		3			81	76	73	70			.051-.076	.061-.089	.089-.102	.076-.127
			2XDCR		5			81	76	73	70						
			2XDCL		7+			58	55	52	49						
High Temp Alloys Nimonics, 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
			2XDSR		5	30	27	26	24	23	21						
			2XDCS		3			35	30	29	27			.036-.089	.036-.089	.051-.102	.061-.127
			2XDCR		5			35	30	29	27						
			2XDCL		7+			30	30	29	29						
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-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
			2XDSR		5	46	43	40	38	37	35						
			2XDCS		3			70	67	64	61			.076-.102	.102-.152	.127-.178	.140-.229
			2XDCR		5			70	67	64	61						
			2XDCL		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
			2XDSR		5	152	149	146	143	140	131						
			2XDCS		3			201	195	189	183			.076-.127	.102-.152	.127-.178	.127-.203
			2XDCR		5			201	195	189	183						
			2XDCL		7+			152	149	146	143						
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			85	82	79	76	.025-.051	.051-.076	.076-.127	.102-.152	.127-.178	.127-.203
			2XDSR		5	91	88	85	82	79	76						
			2XDCS		3			122	146	140	134			.076-.127	.102-.152	.127-.178	.127-.203
			2XDCR		5			122	146	140	134						
			2XDCL		7+			107	104	101	98						

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

Recommended Cutting Data XD ≥ 8mm - Metric

Workpiece Material Group	ISO	Hardness	Tool Series	TYPE	DEPTH	Drill Diameter (mm) vc - m/min							Drill Diameter (mm) f - mm/Rev						
						8	10	12	14	16	18	20	8	10	12	14	16	18	20
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 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							
			2XDCS		3	189	183	175	168	160	152	145	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37
			2XDCR		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, 9255, 2515, 3135, 3415, 4130, 4137, 4140, 4150, 4320, 4340, 4520, 5015, 5115, 5120, 5132, 5140, 5155, 6150, 8620, 9262, 9840, 52100, O1, O2, O6, 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							
			2XDCS		3	145	137	130	122	99	96	92	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37
			2XDCR		5	145	137	130	122	99	96	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, L6, 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							
			2XDCS		3	64	64	61	61	58	58	55	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37
			2XDCR		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-.36	.28-.38	.30-.37
			2XDSR		5	94	91	84	76	69	61	55							
			2XDCS		3	122	119	116	113	101	98	94	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37
			2XDCR		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-.36	.28-.38	.30-.37
			2XDSR		5	37	35	34	32	30	29	28							
			2XDCS		3	79	76	73	73	70	67	64	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37
			2XDCR		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							
			2XDCS		3	67	61	58	55	52	47	45	.11-.15	.13-.23	.18-.25	.21-.27	.22-.31	.25-.33	.30-.37
			2XDCR		5	67	61	58	55	52	47	45							
			2XDCL		7+	46	43	40	40	38	38	36							
High Temp Alloys Nimonics, 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							
			2XDCS		3	26	26	24	24	23	23	22	.09-.13	.11-.15	.12-.17	.14-.19	.16-.21	.18-.25	.17-.24
			2XDCR		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-6Cr4Mo-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							
			2XDCS		3	55	55	52	49	46	46	44	.16-.24	.18-.27	.21-.31	.22-.35	.25-.36	.28-.38	.30-.37
			2XDCR		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-.36	.28-.38	.30-.37
			2XDSR		5	125	122	119	113	110	107	102							
			2XDCS		3	177	171	168	168	160	152	145	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37
			2XDCR		5	177	171	168	168	160	152	145							
			2XDCL		7+	140	137	134	131	125	122	117							
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	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							
			2XDCS		3	122	114	107	91	84	76	72	.16-.24	.18-.27	.21-.31	.22-.35	.25-.35	.28-.38	.30-.37
			2XDCR		5	122	114	107	91	84	76	72							
			2XDCL		7+	91	82	76	73	67	61	58							

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.