

CYCLONE™

The “Perfect Storm” for High Performance Drilling

CXD Series Advanced High Performance Drills
with ALtima® Plus Coating



Where High Performance is the Standard



**ADVANCED
PRODUCT
GROUP**

CERAedge®

 **CUSTOM
Tool Division**
Engineering & Manufacturing Excellence

 **BlueSwarf**
THE PERFECT CHIP



 **M.A. FORD**
High Performance Cutting Tools



Cyclone™

The "Perfect Storm" for High Performance Drilling

CXD ADVANCED DRILLING FEATURES AND BENEFITS

- **New lower thrust point geometry**

- Refined edge protection for better performance in titanium and stainless steel (coolant through), and carbon steels



- **Enhanced double margin design**

- Back margin location allows for quicker engagement in hole
- Improved hole finishes
- Improved location when drilling through cross holes



- **ALtima® Plus AlTiN multi-layer coating**

- Higher heat resistance means higher RPM capabilities
- Optimized coating structure lengthens drill life and reduces chipping and wear

- **Enhanced surface finish technology pre and post coating**

- Pre-treatment enhances coating adhesion
- Post-treatment enhances chip evacuation

CXD Case Studies:

Size: .758" (19.25mm)
Work material: 1018 steel plate
Machine: Haas VF-5
Competitor: X
RPM (n): 1940
vc-SFM: 385 m/min: 117
(f) IPR: .0135 mm/Rev: .34
Hole Depth: 1.5" (38mm)
M.A. Ford® Holes Produced: 3000
Competitor X Holes Produced: 2000
Total Drill Cost Savings During Test: \$3,810

Size: 11/32"
Work material: 304 stainless steel modified
Machine: Mazak CNC lathe
Competitor: Y
RPM (n): 2228
vc-SFM: 200 m/min: 61
(f) IPR: .008 mm/Rev: .20
Hole Depth: 1.8" (45mm)
M.A. Ford® Holes Produced: 382
(ran out of parts)
Customer was very pleased with the CXD drill.
The CXD drill showed no chipping along cutting edges and flutes. The Competitor Y tool showed heavy chipping on cutting edges and flutes at same point of tool life.

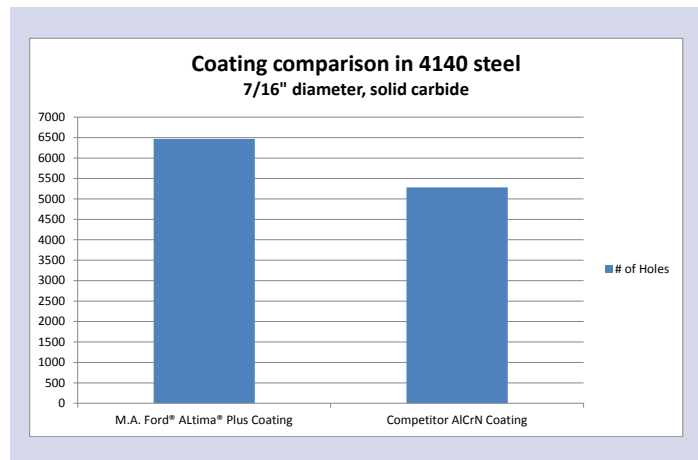
ALtima® Plus Multi-Layer AlTiN Coating

M.A. Ford® 7/16" solid carbide drill
 Workpiece Material: 4140 Steel
 Coating: **M.A. Ford® ALtima® Plus**
 Competitor Coating: AlCrN

22.5%
more

M.A. Ford®
ALtima® Plus Competitor
AlCrN

Number of Holes Produced	6468	5280
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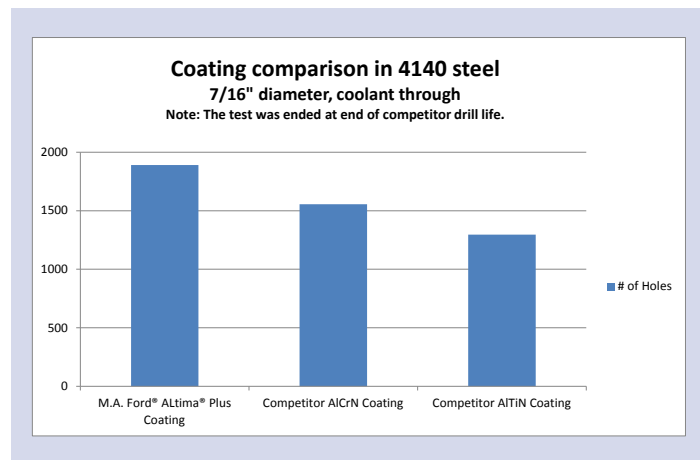


M.A. Ford® 7/16" coolant through carbide drill
 Workpiece Material: 4140 Steel
 Coating: **M.A. Ford® ALtima® Plus**
 Competitor Coating: AlCrN
 Competitor Coating: AlTiN

46%
more

M.A. Ford®
ALtima® Plus Competitor Competitor
AlCrN AlTiN

Number of Holes Produced	1890	1556	1296
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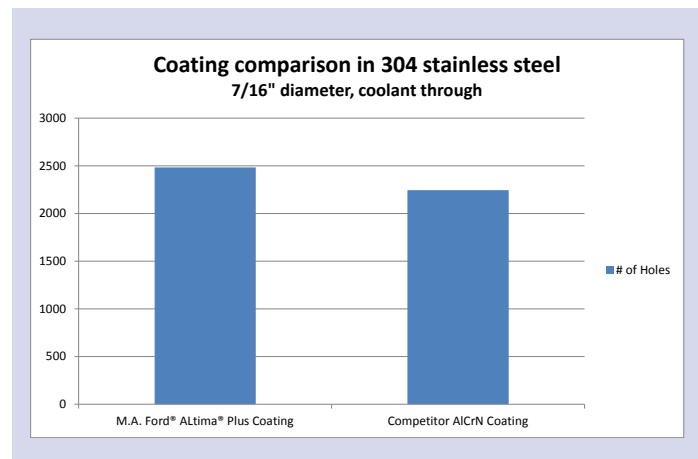


M.A. Ford® 7/16" coolant through carbide drill
 Workpiece Material: 304 Stainless Steel
 Coating: **M.A. Ford® ALtima® Plus**
 Competitor Coating: AlCrN

11%
more

M.A. Ford®
ALtima® Plus Competitor
AlCrN

Number of Holes Produced	2484	2245
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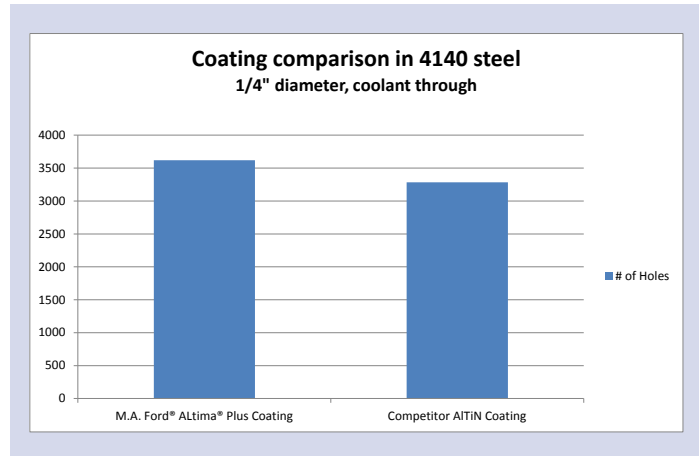


ALtima® Plus Multi-Layer AlTiN Coating

M.A. Ford® 1/4" coolant through carbide drill
 Workpiece Material: 4140 Steel
 Coating: **M.A. Ford® ALtima® Plus**
 Competitor Coating: AlTiN

10%
more

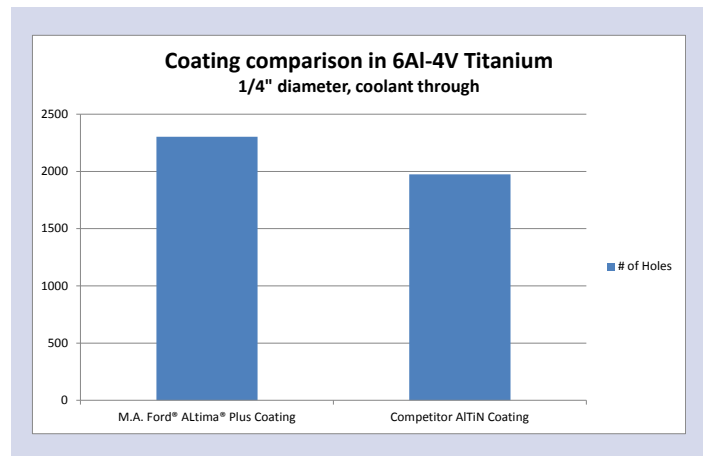
	M.A. Ford® ALtima® Plus	Competitor AlTiN
Number of Holes Produced	3619	3284



M.A. Ford® 1/4" coolant through carbide drill
 Workpiece Material: 6Al-4V Titanium
 Coating: **M.A. Ford® ALtima® Plus**
 Competitor Coating: AlTiN

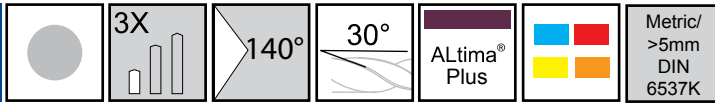
17%
more

	M.A. Ford® ALtima® Plus	Competitor AlTiN
Number of Holes Produced	2303	1974

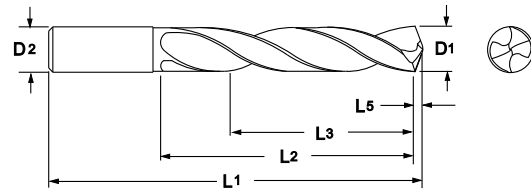


Improved Productivity • Lower Cost Per Hole

Cyclone™ Series CXDSS



Designed for high performance drilling in a broad range of materials.



ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDSS 0300AP	06615			3.0	.1181		3.0		62		20		14		0.46
CXDSS 1200AP	06616		#31		.1200	1/8		2.44		0.787		0.551		0.019	
CXDSS 0310AP	06617			3.1	.1220		4.0		62		20		14		0.48
CXDSS 1250AP	06618	1/8			.1250	1/8		2.44		0.787		0.551		0.019	
CXDSS 0320AP	06619			3.2	.1260		4.0		62		20		14		0.50
CXDSS 1285AP	06620		#30		.1285	5/32		2.44		0.787		0.551		0.020	
CXDSS 0330AP	06621			3.3	.1299		4.0		62		20		14		0.51
CXDSS 0340AP	06622			3.4	.1339		4.0		62		20		14		0.53
CXDSS 1360AP	06623		#29		.1360	5/32		2.44		0.787		0.551		0.021	
CXDSS 0350AP	06624			3.5	.1378		4.0		62		20		14		0.54
CXDSS 1406AP	06625	9/64			.1406	5/32		2.44		0.787		0.551		0.022	
CXDSS 0360AP	06626			3.6	.1417		4.0		62		20		14		0.56
CXDSS 0370AP	06627			3.7	.1457		4.0		62		20		14		0.57
CXDSS 0380AP	06628			3.8	.1496		4.0		66		24		17		0.59
CXDSS 1520AP	06629		#24		.1520	5/32		2.60		0.945		0.669		0.024	
CXDSS 0390AP	06630			3.9	.1535		4.0		66		24		17		0.60
CXDSS 1562AP	06631	5/32			.1562	5/32		2.60		0.945		0.669		0.024	
CXDSS 0400AP	06632			4.0	.1575		4.0		66		24		17		0.62
CXDSS 1590AP	06633		#21		.1590	3/16		2.60		0.945		0.669		0.025	
CXDSS 0410AP	06634			4.1	.1614		5.0		66		24		17		0.64
CXDSS 0420AP	06635			4.2	.1654		5.0		66		24		17		0.65
CXDSS 0430AP	06636			4.3	.1693		5.0		66		24		17		0.67
CXDSS 1719AP	06637	11/64			.1719	3/16		2.60		0.945		0.669		0.027	
CXDSS 0440AP	06638			4.4	.1732		5.0		66		24		17		0.68
CXDSS 0450AP	06639			4.5	.1772		5.0		66		24		17		0.70
CXDSS 0460AP	06640			4.6	.1811		5.0		66		24		17		0.71
CXDSS 0470AP	06641			4.7	.1850		5.0		66		24		17		0.73
CXDSS 1875AP	06642	3/16			.1875	3/16		2.60		1.102		0.787		0.029	
CXDSS 0480AP	06643			4.8	.1890		5.0		66		28		20		0.74
CXDSS 0490AP	06644			4.9	.1929		5.0		66		28		20		0.76

Inch	
D1	Tolerance (m7)
.0000 - .1181	+0.0008/+0.0047
.1182 - .2362	+0.0016/+0.0063
.2363 - .3937	+0.0024/+0.0083
.3938 - .7087	+0.0027/+0.0098
.7088 - .7500	+0.0031/+0.0114

Inch	
D2	Tolerance (h6)
.0000 - .1181	+0/-0.0024
.1182 - .2362	+0/-0.0031
.2363 - .3937	+0/-0.0035
.3938 - .7087	+0/-0.0043
.7088 - .7500	+0/-0.0051

Metric (mm)	
D1	Tolerance (m7)
0 - 3.0	+0.02/+0.12
3.01 - 6.0	+0.04/+0.16
6.01 - 10.0	+0.06/+0.21
10.01 - 18.0	+0.07/+0.25
18.01 - 20.0	+0.08/+0.29

Metric (mm)	
D2	Tolerance (h6)
0 - 3.0	+0/-0.06
3.01 - 6.0	+0/-0.08
6.01 - 10.0	+0/-0.09
10.01 - 18.0	+0/-0.11
18.01 - 20.0	+0/-0.13



Series CXDSS Continued

ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDSS 0500AP	06645			5.0	.1968		5.0		66		28		20		0.77
CXDSS 0510AP	06646			5.1	.2008		6.0		66		28		20		0.79
CXDSS2031AP	06647	13/64			.2031	1/4		2.60		1.102		0.787		0.031	
CXDSS 0520AP	06648			5.2	.2047		6.0		66		28		20		0.81
CXDSS 0530AP	06649			5.3	.2087		6.0		66		28		20		0.82
CXDSS 0540AP	06650			5.4	.2126		6.0		66		28		20		0.84
CXDSS 0550AP	06651			5.5	.2165		6.0		66		28		20		0.85
CXDSS2187AP	06652	7/32			.2187	1/4		2.60		1.102		0.787		0.034	
CXDSS2210AP	06653		#2		.2210	1/4		2.60		1.102		0.787		0.034	
CXDSS 0570AP	06654			5.7	.2244		6.0		66		28		20		0.88
CXDSS 0580AP	06655			5.8	.2283		6.0		66		28		20		0.90
CXDSS 0590AP	06656			5.9	.2323		6.0		66		28		20		0.91
CXDSS2344AP	06657	15/64			.2344	1/4		2.60		1.102		0.787		0.036	
CXDSS 0600AP	06658			6.0	.2362		6.0		66		28		20		0.93
CXDSS 0610AP	06659			6.1	.2402		8.0		79		34		24		0.95
CXDSS2420AP	06660		C		.2420	1/4		3.11		1.339		0.945		0.037	
CXDSS 0620AP	06661			6.2	.2441		8.0		79		34		24		0.96
CXDSS2460AP	06662		D		.2460	1/4		3.11		1.339		0.945		0.038	
CXDSS 0630AP	06663			6.3	.2480		8.0		79		34		24		0.98
CXDSS2500AP	06664	1/4			.2500	1/4		3.11		1.339		0.945		0.039	
CXDSS 0640AP	06665			6.4	.2520		8.0		79		34		24		0.99
CXDSS 0650AP	06666			6.5	.2559		8.0		79		34		24		1.01
CXDSS2570AP	06667		F		.2570	5/16		3.11		1.339		0.945		0.040	
CXDSS 0660AP	06668			6.6	.2598		8.0		79		34		24		1.03
CXDSS2610AP	06669		G		.2610	5/16		3.11		1.339		0.945		0.040	
CXDSS 0670AP	06670			6.7	.2638		8.0		79		34		24		1.04
CXDSS2656AP	06671	17/64			.2656	5/16		3.11		1.339		0.945		0.041	
CXDSS 0680AP	06672			6.8	.2677		8.0		79		34		24		1.05
CXDSS 0690AP	06673			6.9	.2717		8.0		79		34		24		1.07
CXDSS 0700AP	06674			7.0	.2756		8.0		79		34		24		1.08
CXDSS 0710AP	06675			7.1	.2795		8.0		79		41		29		1.10
CXDSS2812AP	06676	9/32			.2812	5/16		3.11		1.614		1.142		0.044	
CXDSS 0720AP	06677			7.2	.2835		8.0		79		41		29		1.12
CXDSS 0730AP	06678			7.3	.2874		8.0		79		41		29		1.13
CXDSS 0740AP	06679			7.4	.2913		8.0		79		41		29		1.15
CXDSS 0750AP	06680			7.5	.2953		8.0		79		41		29		1.16
CXDSS2969AP	06681	19/64			.2969	5/16		3.11		1.614		1.142		0.046	
CXDSS 0760AP	06682			7.6	.2992		8.0		79		41		29		1.18
CXDSS 0770AP	06683			7.7	.3031		8.0		79		41		29		1.19
CXDSS 0780AP	06684			7.8	.3071		8.0		79		41		29		1.21

CXDSS
Cyclone™ XD

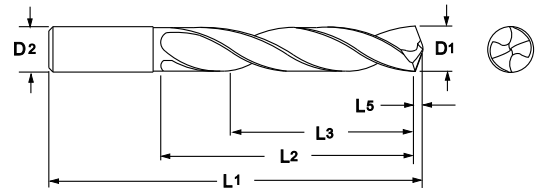
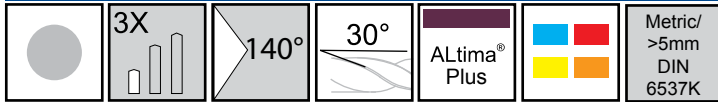


Series CXDSS Continued

ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDSS 0790AP	06685			7.9	.3110		8.0		79		41		29		1.22
CXDSS3125AP	06686	5/16			.3125	5/16		3.11		1.614		1.142		0.048	
CXDSS 0800AP	06687			8.0	.3150		8.0		79		41		29		1.24
CXDSS 0810AP	06688			8.1	.3189		10.0		89		47		35		1.26
CXDSS 0820AP	06689			8.2	.3228		10.0		89		47		35		1.27
CXDSS 0830AP	06690			8.3	.3268		10.0		89		47		35		1.29
CXDSS3281AP	06691	21/64			.3281	3/8		3.50		1.850		1.378		0.051	
CXDSS 0840AP	06692			8.4	.3307		10.0		89		47		35		1.31
CXDSS3320AP	06693		Q		.3320	3/8		3.50		1.850		1.378		0.051	
CXDSS 0850AP	06694			8.5	.3346		10.0		89		47		35		1.32
CXDSS 0860AP	06695			8.6	.3386		10.0		89		47		35		1.33
CXDSS 0870AP	06696			8.7	.3425		10.0		89		47		35		1.35
CXDSS3438AP	06697	11/32			.3438	3/8		3.50		1.850		1.378		0.053	
CXDSS 0880AP	06698			8.8	.3465		10.0		89		47		35		1.36
CXDSS 0890AP	06699			8.9	.3504		10.0		89		47		35		1.38
CXDSS 0900AP	06700			9.0	.3543		10.0		89		47		35		1.39
CXDSS 0910AP	06701			9.1	.3583		10.0		89		47		35		1.41
CXDSS3594AP	06702	23/64			.3594	3/8		3.50		1.850		1.378		0.056	
CXDSS 0920AP	06703			9.2	.3622		10.0		89		47		35		1.43
CXDSS 0925AP	06704			9.25	.3642		10.0		89		47		35		1.43
CXDSS 0930AP	06705			9.3	.3661		10.0		89		47		35		1.44
CXDSS 0940AP	06706			9.4	.3701		10.0		89		47		35		1.46
CXDSS 0950AP	06707			9.5	.3740		10.0		89		47		35		1.47
CXDSS3750AP	06708	3/8			.3750	3/8		3.50		1.850		1.378		0.058	
CXDSS 0960AP	06709			9.6	.3780		10.0		89		47		35		1.49
CXDSS 0970AP	06710			9.7	.3819		10.0		89		47		35		1.50
CXDSS 0980AP	06711			9.8	.3858		10.0		89		47		35		1.52
CXDSS 0990AP	06712			9.9	.3898		10.0		89		47		35		1.53
CXDSS3906AP	06713	25/64			.3906	7/16		3.50		1.850		1.378		0.061	
CXDSS 1000AP	06714			10.0	.3937		10.0		89		47		35		1.55
CXDSS 1010AP	06715			10.1	.3976		12.0		102		55		40		1.56
CXDSS 1020AP	06716			10.2	.4016		12.0		102		55		40		1.58
CXDSS 1030AP	06717			10.3	.4055		12.0		102		55		40		1.60
CXDSS4062AP	06718	13/32			.4062	7/16		4.02		2.165		1.575		0.063	
CXDSS 1040AP	06719			10.4	.4094		12.0		102		55		40		1.61
CXDSS 1050AP	06720			10.5	.4134		12.0		102		55		40		1.63
CXDSS 1060AP	06721			10.6	.4173		12.0		102		55		40		1.64
CXDSS 1070AP	06722			10.7	.4213		12.0		102		55		40		1.66
CXDSS4219AP	06723	27/64			.4219	7/16		4.02		2.165		1.575		0.065	
CXDSS 1080AP	06724			10.8	.4252		12.0		102		55		40		1.67
CXDSS 1090AP	06725			10.9	.4291		12.0		102		55		40		1.69
CXDSS 1100AP	06726			11.0	.4331		12.0		102		55		40		1.70
CXDSS 1110AP	06727			11.1	.4370		12.0		102		55		40		1.72



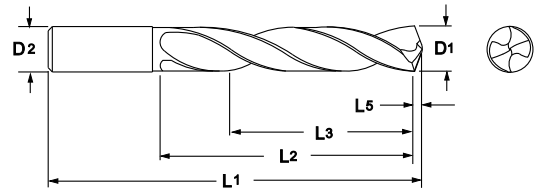
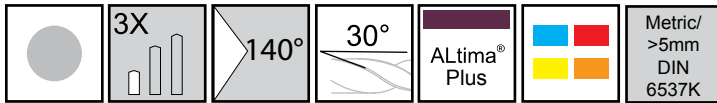
Series CXDSS Continued



ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDSS4375AP	06728	7/16			.4375	7/16		4.02		2.165		1.575		0.068	
CXDSS 1120AP	06729			11.2	.4409		12.0		102		55		40		1.74
CXDSS 1130AP	06730			11.3	.4449		12.0		102		55		40		1.75
CXDSS 1140AP	06731			11.4	.4488		12.0		102		55		40		1.77
CXDSS 1150AP	06732			11.5	.4527		12.0		102		55		40		1.78
CXDSS 1160AP	06733			11.6	.4567		12.0		102		55		40		1.80
CXDSS 1170AP	06734			11.7	.4606		12.0		102		55		40		1.81
CXDSS 1180AP	06735			11.8	.4646		12.0		102		55		40		1.83
CXDSS 1190AP	06736			11.9	.4685		12.0		102		55		40		1.84
CXDSS4688AP	06737	15/32			.4688	1/2		4.02		2.165		1.575		0.073	
CXDSS 1200AP	06738			12.0	.4724		12.0		102		55		40		1.86
CXDSS 1210AP	06739			12.1	.4764		14.0		107		60		43		1.87
CXDSS4844AP	06740	31/64			.4844	1/2		4.21		2.362		1.693		0.075	
CXDSS 1250AP	06741			12.5	.4921		14.0		107		60		43		1.94
CXDSS5000AP	06742	1/2			.5000	1/2		4.21		2.362		1.693		0.077	
CXDSS 1280AP	06743			12.8	.5039		14.0		107		60		43		1.98
CXDSS 1283AP	06744			12.83	.5051		14.0		107		60		43		1.99
CXDSS 1290AP	06745			12.9	.5079		14.0		107		60		43		2.00
CXDSS 1300AP	06746			13.0	.5118		14.0		107		60		43		2.01
CXDSS5156AP	06747	33/64			.5156	9/16		4.21		2.362		1.693		0.080	
CXDSS5312AP	06748	17/32			.5312	9/16		4.21		2.362		1.693		0.082	
CXDSS 1350AP	06750			13.5	.5315		14.0		107		60		43		2.09
CXDSS 1370AP	06751			13.7	.5394		14.0		107		60		43		2.12
CXDSS5469AP	06752	35/64			.5469	9/16		4.21		2.362		1.693		0.085	
CXDSS 1400AP	06753			14.0	.5512		14.0		107		60		43		2.17
CXDSS5625AP	06754	9/16			.5625	9/16		4.53		2.559		1.772		0.087	
CXDSS 1450AP	06755			14.5	.5709		16.0		115		65		45		2.25
CXDSS 1470AP	06756			14.7	.5787		16.0		115		65		45		2.28
CXDSS 1500AP	06757			15.0	.5905		16.0		115		65		45		2.32
CXDSS5938AP	06758	19/32			.5938	5/8		4.53		2.559		1.772		0.092	
CXDSS 1530AP	06759			15.3	.6024		16.0		115		65		45		2.37
CXDSS 1550AP	06760			15.5	.6102		16.0		115		65		45		2.40
CXDSS 1570AP	06761			15.7	.6181		16.0		115		65		45		2.43
CXDSS6250AP	06762	5/8			.6250	5/8		4.53		2.559		1.772		0.097	
CXDSS 1600AP	06763			16.0	.6299		16.0		115		65		45		2.48
CXDSS 1608AP	06764			16.08	.6331		18.0		123		73		51		2.49
CXDSS 1630AP	06765			16.3	.6417		18.0		123		73		51		2.53
CXDSS 1650AP	06766			16.5	.6496		18.0		123		73		51		2.56



Series CXDSS Continued



ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDSS6562AP	06767	21/32			.6562	11/16		4.84		2.874		2.008		0.102	
CXDSS 1700AP	06768			17.0	.6693		18.0		123		73		51		2.63
CXDSS6875AP	06769	11/16			.6875	11/16		4.84		2.874		2.008		0.107	
CXDSS 1750AP	06770			17.5	.6890		18.0		123		73		51		2.71
CXDSS 1800AP	06771			18.0	.7087		18.0		123		73		51		2.79
CXDSS 1850AP	06772			18.5	.7283		20.0		131		79		55		2.87
CXDSS7500AP	06773	3/4			.7500	3/4		5.16		3.11		2.165		0.116	
CXDSS 1916AP	06774			19.16	.7543		20.0		131		79		55		2.97
CXDSS 1925AP	06775			19.25	.7579		20.0		131		79		55		2.98
CXDSS 1930AP	06776			19.3	.7598		20.0		131		79		55		2.99
CXDSS 1950AP	06777			19.5	.7677		20.0		131		79		55		3.02
CXDSS 2000AP	06778			20.0	.7874		20.0		131		79		55		3.10

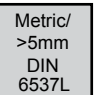
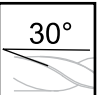
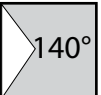
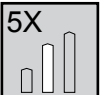
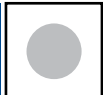


ALtima® Plus Advanced High Performance Coating

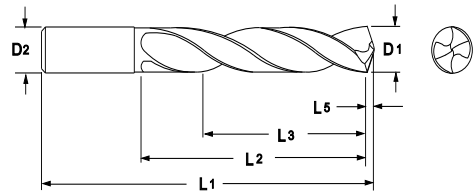
Coating Properties

MA Ford® Coating	MA Ford® Tool Number Designation	Microhardness (HV)	Maximum Service Temp.	Friction Coefficient
ALtima® Plus	AP	3200	1100° C / 2012° F	0.25

Cyclone™ Series CXDSR



Designed for high performance drilling in a broad range of materials.



CXDSR/CXDSR
Cyclone™ XD

ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDSR 0300AP	06467			3.0	.1181		3.0		66		28		23		0.46
CXDSR 1200AP	06468		#31		.1200	1/8		2.60		1.102		0.906		0.019	
CXDSR 0310AP	06469			3.1	.1220		4.0		66		28		23		0.48
CXDSR 1250AP	06470	1/8			.1250	1/8		2.60		1.102		0.906		0.019	
CXDSR 0320AP	06471			3.2	.1260		4.0		66		28		23		0.50
CXDSR 1285AP	06472		#30		.1285	5/32		2.60		1.102		0.906		0.020	
CXDSR 0330AP	06473			3.3	.1299		4.0		66		28		23		0.51
CXDSR 0340AP	06474			3.4	.1339		4.0		66		28		23		0.53
CXDSR 1360AP	06475		#29		.1360	5/32		2.60		1.102		0.906		0.021	
CXDSR 0350AP	06476			3.5	.1378		4.0		66		28		23		0.54
CXDSR 1406AP	06477	9/64			.1406	5/32		2.60		1.102		0.906		0.022	
CXDSR 0360AP	06478			3.6	.1417		4.0		66		28		23		0.56
CXDSR 0370AP	06479			3.7	.1457		4.0		66		28		23		0.57
CXDSR 0380AP	06480			3.8	.1496		4.0		74		36		29		0.59
CXDSR 1520AP	06481		#24		.1520	5/32		2.91		1.417		1.142		0.024	
CXDSR 0390AP	06482			3.9	.1535		4.0		74		36		29		0.60
CXDSR 1562AP	06483	5/32			.1562	5/32		2.91		1.417		1.142		0.024	
CXDSR 0400AP	06484			4.0	.1575		4.0		74		36		29		0.62
CXDSR 1590AP	06485		#21		.1590	3/16		2.91		1.417		1.142		0.025	
CXDSR 0410AP	06486			4.1	.1614		5.0		74		36		29		0.64
CXDSR 0420AP	06487			4.2	.1654		5.0		74		36		29		0.65
CXDSR 0430AP	06488			4.3	.1693		5.0		74		36		29		0.67
CXDSR 1719AP	06489	11/64			.1719	3/16		2.91		1.417		1.142		0.027	
CXDSR 0440AP	06490			4.4	.1732		5.0		74		36		29		0.68
CXDSR 0450AP	06491			4.5	.1772		5.0		74		36		29		0.70
CXDSR 0460AP	06492			4.6	.1811		5.0		74		36		29		0.71
CXDSR 0470AP	06493			4.7	.1850		5.0		74		36		29		0.73
CXDSR 1875AP	06494	3/16			.1875	3/16		3.23		1.732		1.378		0.029	
CXDSR 0480AP	06495			4.8	.1890		5.0		82		44		35		0.74
CXDSR 0490AP	06496			4.9	.1929		5.0		82		44		35		0.76
CXDSR 0500AP	06497			5.0	.1968		5.0		82		44		35		0.77

Inch		
D1	Tolerance (m7)	
.0000 - .1181	+0.0008/+0.00047	
.1182 - .2362	+0.0016/+0.00063	
.2363 - .3937	+0.0024/+0.00083	
.3938 - .7087	+0.0027/+0.00098	

Inch		
D2	Tolerance (h6)	
.0000 - .1181	+0/-0.00024	
.1182 - .2362	+0/-0.00031	
.2363 - .3937	+0/-0.00035	
.3938 - .7087	+0/-0.00043	

Metric (mm)		
D1	Tolerance (m7)	
0 - 3.0	+0.02/+0.012	
3.01 - 6.0	+0.04/+0.016	
6.01 - 10.0	+0.06/+0.021	
10.01 - 18.0	+0.07/+0.025	

Metric (mm)		
D2	Tolerance (h6)	
0 - 3.0	+0/-0.006	
3.01 - 6.0	+0/-0.008	
6.01 - 10.0	+0/-0.009	
10.01 - 18.0	+0/-0.011	

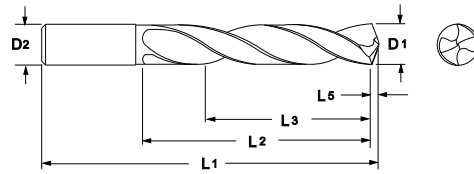
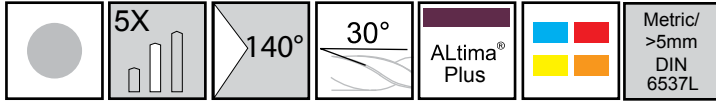


Series CXDSR Continued

ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
Tool No.	EDP	D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
		Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDSR 0510AP	06498			5.1	.2008		6.0		82		44		35		0.79
CXDSR2031AP	06499	13/64			.2031	1/4		3.23		1.732		1.378		0.031	
CXDSR 0520AP	06500			5.2	.2047		6.0		82		44		35		0.81
CXDSR 0530AP	06501			5.3	.2087		6.0		82		44		35		0.82
CXDSR 0540AP	06502			5.4	.2126		6.0		82		44		35		0.84
CXDSR 0550AP	06503			5.5	.2165		6.0		82		44		35		0.85
CXDSR2187AP	06504	7/32			.2187	1/4		3.23		1.732		1.378		0.034	
CXDSR2210AP	06505		#2		.2210	1/4		3.23		1.732		1.378		0.034	
CXDSR 0570AP	06506			5.7	.2244		6.0		82		44		35		0.88
CXDSR 0580AP	06507			5.8	.2283		6.0		82		44		35		0.90
CXDSR 0590AP	06508			5.9	.2323		6.0		82		44		35		0.91
CXDSR2344AP	06509	15/64			.2344	1/4		3.23		1.732		1.378		0.036	
CXDSR 0600AP	06510			6.0	.2362		6.0		82		44		35		0.93
CXDSR 0610AP	06511			6.1	.2402		8.0		91		53		43		0.95
CXDSR2420AP	06512		C		.2420	1/4		3.58		2.087		1.693		0.037	
CXDSR 0620AP	06513			6.2	.2441		8.0		91		53		43		0.96
CXDSR2460AP	06514		D		.2460	1/4		3.58		2.087		1.693		0.038	
CXDSR 0630AP	06515			6.3	.2480		8.0		91		53		43		0.98
CXDSR2500AP	06516	1/4			.2500	1/4		3.58		2.087		1.693		0.039	
CXDSR 0640AP	06517			6.4	.2520		8.0		91		53		43		0.99
CXDSR 0650AP	06518			6.5	.2559		8.0		91		53		43		1.01
CXDSR2570AP	06519		F		.2570	5/16		3.58		2.087		1.693		0.040	
CXDSR 0660AP	06520			6.6	.2598		8.0		91		53		43		1.03
CXDSR2610AP	06521		G		.2610	5/16		3.58		2.087		1.693		0.040	
CXDSR 0670AP	06522			6.7	.2638		8.0		91		53		43		1.04
CXDSR2656AP	06523	17/64			.2656	5/16		3.58		2.087		1.693		0.041	
CXDSR 0680AP	06524			6.8	.2677		8.0		91		53		43		1.05
CXDSR 0690AP	06525			6.9	.2717		8.0		91		53		43		1.07
CXDSR 0700AP	06526			7.0	.2756		8.0		91		53		43		1.08
CXDSR 0710AP	06527			7.1	.2795		8.0		91		53		43		1.10
CXDSR2812AP	06528	9/32			.2812	5/16		3.58		2.087		1.693		0.044	
CXDSR 0720AP	06529			7.2	.2835		8.0		91		53		43		1.12
CXDSR 0730AP	06530			7.3	.2874		8.0		91		53		43		1.13
CXDSR 0740AP	06531			7.4	.2913		8.0		91		53		43		1.15
CXDSR 0750AP	06532			7.5	.2953		8.0		91		53		43		1.16
CXDSR2969AP	06533	19/64			.2969	5/16		3.58		2.087		1.693		0.046	
CXDSR 0760AP	06534			7.6	.2992		8.0		91		53		43		1.18
CXDSR 0770AP	06535			7.7	.3031		8.0		91		53		43		1.19
CXDSR 0780AP	06536			7.8	.3071		8.0		91		53		43		1.21
CXDSR 0790AP	06537			7.9	.3110		8.0		91		53		43		1.22
CXDSR3125AP	06538	5/16			.3125	5/16		3.58		2.087		1.693		0.048	
CXDSR 0800AP	06539			8.0	.3150		8.0		91		53		43		1.24



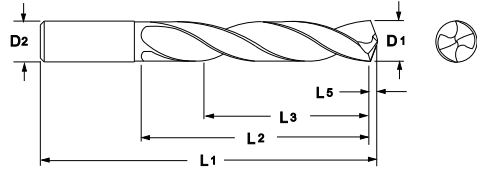
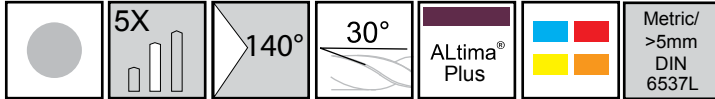
Series CXDSR Continued



ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDSR 0810AP	06540			8.1	.3189		10.0		103		61		49		1.26
CXDSR 0820AP	06541			8.2	.3228		10.0		103		61		49		1.27
CXDSR 0830AP	06542			8.3	.3268		10.0		103		61		49		1.29
CXDSR3281AP	06543	21/64			.3281	3/8		4.06		2.402		1.929		0.051	
CXDSR 0840AP	06544			8.4	.3307		10.0		103		61		49		1.31
CXDSR3320AP	06545		Q		.3320	3/8		4.06		2.402		1.929		0.051	
CXDSR 0850AP	06546			8.5	.3346		10.0		103		61		49		1.32
CXDSR 0860AP	06547			8.6	.3386		10.0		103		61		49		1.33
CXDSR 0870AP	06548			8.7	.3425		10.0		103		61		49		1.35
CXDSR3438AP	06549	11/32			.3438	3/8		4.06		2.402		1.929		0.053	
CXDSR 0880AP	06550			8.8	.3465		10.0		103		61		49		1.36
CXDSR 0890AP	06551			8.9	.3504		10.0		103		61		49		1.38
CXDSR 0900AP	06552			9.0	.3543		10.0		103		61		49		1.39
CXDSR 0910AP	06553			9.1	.3583		10.0		103		61		49		1.41
CXDSR3594AP	06554	23/64			.3594	3/8		4.06		2.402		1.929		0.056	
CXDSR 0920AP	06555			9.2	.3622		10.0		103		61		49		1.43
CXDSR 0925AP	06556			9.3	.3642		10.0		103		61		49		1.43
CXDSR 0930AP	06557			9.3	.3661		10.0		103		61		49		1.44
CXDSR 0940AP	06558			9.4	.3701		10.0		103		61		49		1.46
CXDSR 0950AP	06559			9.5	.3740		10.0		103		61		49		1.47
CXDSR3750AP	06560	3/8			.3750	3/8		4.06		2.402		1.929		0.058	
CXDSR 0960AP	06561			9.6	.3780		10.0		103		61		49		1.49
CXDSR 0970AP	06562			9.7	.3819		10.0		103		61		49		1.50
CXDSR 0980AP	06563			9.8	.3858		10.0		103		61		49		1.52
CXDSR 0990AP	06564			9.9	.3898		10.0		103		61		49		1.53
CXDSR3906AP	06565	25/64			.3906	7/16		4.06		2.402		1.929		0.061	
CXDSR 1000AP	06566			10.0	.3937		10.0		103		61		49		1.55
CXDSR 1010AP	06567			10.1	.3976		12.0		118		71		56		1.56
CXDSR 1020AP	06568			10.2	.4016		12.0		118		71		56		1.58
CXDSR 1030AP	06569			10.3	.4055		12.0		118		71		56		1.60
CXDSR4062AP	06570	13/32			.4062	7/16		4.65		2.795		2.205		0.063	
CXDSR 1040AP	06571			10.4	.4094		12.0		118		71		56		1.61
CXDSR 1050AP	06572			10.5	.4134		12.0		118		71		56		1.63
CXDSR 1060AP	06573			10.6	.4173		12.0		118		71		56		1.64
CXDSR 1070AP	06574			10.7	.4213		12.0		118		71		56		1.66
CXDSR4219AP	06575	27/64			.4219	7/16		4.65		2.795		2.205		0.065	
CXDSR 1080AP	06576			10.8	.4252		12.0		118		71		56		1.67
CXDSR 1090AP	06577			10.9	.4291		12.0		118		71		56		1.69



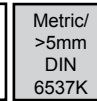
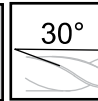
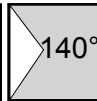
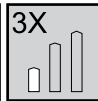
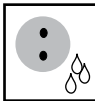
Series CXDSR Continued



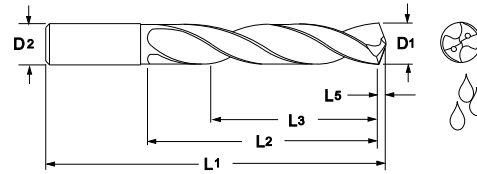
ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDSR 1100AP	06578			11.0	.4331	12.0		118		71		56		1.70	
CXDSR 1110AP	06579			11.1	.4370	12.0		118		71		56		1.72	
CXDSR4375AP	06580	7/16			.4375	7/16		4.65		2.795		2.205		0.068	
CXDSR 1120AP	06581			11.2	.4409	12.0		118		71		56		1.74	
CXDSR 1130AP	06582			11.3	.4449	12.0		118		71		56		1.75	
CXDSR 1140AP	06583			11.4	.4488	12.0		118		71		56		1.77	
CXDSR 1150AP	06584			11.5	.4527	12.0		118		71		56		1.78	
CXDSR 1160AP	06585			11.6	.4567	12.0		118		71		56		1.80	
CXDSR 1170AP	06586			11.7	.4606	12.0		118		71		56		1.81	
CXDSR 1180AP	06587			11.8	.4646	12.0		118		71		56		1.83	
CXDSR 1190AP	06588			11.9	.4685	12.0		118		71		56		1.84	
CXDSR4688AP	06589	15/32			.4688	1/2		4.65		2.795		2.205		0.073	
CXDSR 1200AP	06590			12.0	.4724	12.0		118		71		56		1.86	
CXDSR 1210AP	06591			12.1	.4764	14.0		124		77		60		1.87	
CXDSR4844AP	06592	31/64			.4844	1/2		4.88		3.031		2.362		0.075	
CXDSR 1250AP	06593			12.5	.4921	14.0		124		77		60		1.94	
CXDSR5000AP	06594	1/2			.5000	1/2		4.88		3.031		2.362		0.077	
CXDSR 1280AP	06595			12.8	.5039	14.0		124		77		60		1.98	
CXDSR 1283AP	06596			12.83	.5051	14.0		124		77		60		1.99	
CXDSR 1290AP	06597			12.9	.5079	14.0		124		77		60		2.00	
CXDSR 1300AP	06598			13.0	.5118	14.0		124		77		60		2.01	
CXDSR5156AP	06599	33/64			.5156	9/16		4.88		3.031		2.362		0.080	
CXDSR5312AP	06600	17/32			.5312	9/16		4.88		3.031		2.362		0.082	
CXDSR 1350AP	06601			13.5	.5315	14.0		124		77		60		2.09	
CXDSR 1370AP	06602			13.7	.5394	14.0		124		77		60		2.12	
CXDSR5469AP	06603	35/64			.5469	9/16		4.88		3.031		2.362		0.085	
CXDSR 1400AP	06604			14.0	.5512	14.0		124		77		60		2.17	
CXDSR5625AP	06605	9/16			.5625	9/16		5.24		3.268		2.480		0.087	
CXDSR 1450AP	06606			14.5	.5709	16.0		133		83		63		2.25	
CXDSR 1470AP	06607			14.7	.5787	16.0		133		83		63		2.28	
CXDSR 1500AP	06608			15.0	.5905	16.0		133		83		63		2.32	
CXDSR5938AP	06609	19/32			.5938	5/8		5.24		3.268		2.480		0.092	
CXDSR 1530AP	06610			15.3	.6024	16.0		133		83		63		2.37	
CXDSR 1550AP	06611			15.5	.6102	16.0		133		83		63		2.40	
CXDSR 1570AP	06612			15.7	.6181	16.0		133		83		63		2.43	
CXDSR6250AP	06613	5/8			.6250	5/8		5.24		3.268		2.480		0.097	
CXDSR 1600AP	06614			16.0	.6299	16.0		133		83		63		2.48	



Cyclone™ Series CXDCS



Designed for high performance drilling in a broad range of materials.



ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDCS 0300AP	06779			3.0	.1181		3.0		62		20		14		0.46
CXDCS 1200AP	06780		#31		.1200	1/8		2.44		0.787		0.551		0.019	
CXDCS 0310AP	06781			3.1	.1220		4.0		62		20		14		0.48
CXDCS 1250AP	06782	1/8			.1250	1/8		2.44		0.787		0.551		0.019	
CXDCS 0320AP	06783			3.2	.1260		4.0		62		20		14		0.50
CXDCS 1285AP	06784		#30		.1285	5/32		2.44		0.787		0.551		0.020	
CXDCS 0330AP	06785			3.3	.1299		4.0		62		20		14		0.51
CXDCS 0340AP	06786			3.4	.1339		4.0		62		20		14		0.53
CXDCS 1360AP	06787		#29		.1360	5/32		2.44		0.787		0.551		0.021	
CXDCS 0350AP	06788			3.5	.1378		4.0		62		20		14		0.54
CXDCS 1406AP	06789	9/64			.1406	5/32		2.44		0.787		0.551		0.022	
CXDCS 0360AP	06790			3.6	.1417		4.0		62		20		14		0.56
CXDCS 0370AP	06791			3.7	.1457		4.0		62		20		14		0.57
CXDCS 0380AP	06792			3.8	.1496		4.0		66		24		17		0.59
CXDCS 1520AP	06793		#24		.1520	5/32		2.60		0.945		0.669		0.024	
CXDCS 0390AP	06794			3.9	.1535		4.0		66		24		17		0.60
CXDCS 1562AP	06795	5/32			.1562	5/32		2.60		0.945		0.669		0.024	
CXDCS 0400AP	06796			4.0	.1575		4.0		66		24		17		0.62
CXDCS 1590AP	06797		#21		.1590	3/16		2.60		0.945		0.669		0.025	
CXDCS 0410AP	06798			4.1	.1614		5.0		66		24		17		0.64
CXDCS 0420AP	06799			4.2	.1654		5.0		66		24		17		0.65
CXDCS 0430AP	06800			4.3	.1693		5.0		66		24		17		0.67
CXDCS 1719AP	06801	11/64			.1719	3/16		2.60		0.945		0.669		0.027	
CXDCS 0440AP	06802			4.4	.1732		5.0		66		24		17		0.68
CXDCS 0450AP	06803			4.5	.1772		5.0		66		24		17		0.70
CXDCS 0460AP	06804			4.6	.1811		5.0		66		24		17		0.71
CXDCS 0470AP	06805			4.7	.1850		5.0		66		24		17		0.73
CXDCS 1875AP	06806	3/16			.1875	3/16		2.60		1.102		0.787		0.029	
CXDCS 0480AP	06807			4.8	.1890		5.0		66		28		20		0.74
CXDCS 0490AP	06808			4.9	.1929		5.0		66		28		20		0.76
CXDCS 0500AP	06809			5.0	.1968		5.0		66		28		20		0.77
CXDCS 0510AP	06810			5.1	.2008		6.0		66		28		20		0.79
CXDCS 2031AP	06811	13/64			.2031	1/4		2.60		1.102		0.787		0.031	

Inch		Inch	
D1	Tolerance (m7)	D2	Tolerance (h6)
.0000 - .1181	+0.0008/+0.0047	.0000 - .1181	+0/-0.0024
.1182 - .2362	+0.0016/+0.0063	.1182 - .2362	+0/-0.0031
.2363 - .3937	+0.0024/+0.0083	.2363 - .3937	+0/-0.0035
.3938 - .7087	+0.0027/+0.0098	.3938 - .7087	+0/-0.0043

Inch		Metric (mm)	
D1	Tolerance (m7)	D2	Tolerance (h6)
0 - 3.0	+0.02/+0.12	0 - 3.0	+0/-0.006
3.01 - 6.0	+0.04/+0.16	3.01 - 6.0	+0/-0.008
6.01 - 10.0	+0.06/+0.21	6.01 - 10.0	+0/-0.009
10.01 - 18.0	+0.07/+0.25	10.01 - 18.0	+0/-0.011

Metric (mm)		Metric (mm)	
D1	Tolerance (m7)	D2	Tolerance (h6)
0 - 3.0	+0.02/+0.12	0 - 3.0	+0/-0.006
3.01 - 6.0	+0.04/+0.16	3.01 - 6.0	+0/-0.008
6.01 - 10.0	+0.06/+0.21	6.01 - 10.0	+0/-0.009
10.01 - 18.0	+0.07/+0.25	10.01 - 18.0	+0/-0.011

Metric (mm)		Metric (mm)	
D1	Tolerance (m7)	D2	Tolerance (h6)
0 - 3.0	+0.02/+0.12	0 - 3.0	+0/-0.006
3.01 - 6.0	+0.04/+0.16	3.01 - 6.0	+0/-0.008
6.01 - 10.0	+0.06/+0.21	6.01 - 10.0	+0/-0.009
10.01 - 18.0	+0.07/+0.25	10.01 - 18.0	+0/-0.011

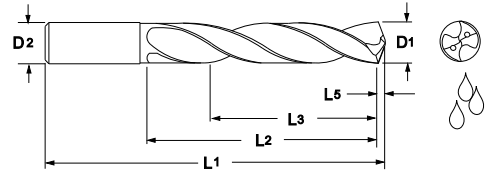
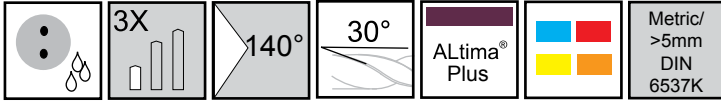


Series CXDCS Continued

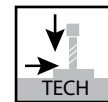
ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDCS 0520AP	06812			5.2	.2047		6.0		66		28		20		0.81
CXDCS 0530AP	06813			5.3	.2087		6.0		66		28		20		0.82
CXDCS 0540AP	06814			5.4	.2126		6.0		66		28		20		0.84
CXDCS 0550AP	06815			5.5	.2165		6.0		66		28		20		0.85
CXDCS2187AP	06816	7/32			.2187	1/4		2.60		1.102		0.787		0.034	
CXDCS2210AP	06817		#2		.2210	1/4		2.60		1.102		0.787		0.034	
CXDCS 0570AP	06818			5.7	.2244		6.0		66		28		20		0.88
CXDCS 0580AP	06819			5.8	.2283		6.0		66		28		20		0.90
CXDCS 0590AP	06820			5.9	.2323		6.0		66		28		20		0.91
CXDCS2344AP	06821	15/64			.2344	1/4		2.60		1.102		0.787		0.036	
CXDCS 0600AP	06822			6.0	.2362		6.0		66		28		20		0.93
CXDCS 0610AP	06823			6.1	.2402		8.0		79		34		24		0.95
CXDCS2420AP	06824		C		.2420	1/4		3.11		1.339		0.945		0.037	
CXDCS 0620AP	06825			6.2	.2441		8.0		79		34		24		0.96
CXDCS2460AP	06826		D		.2460	1/4		3.11		1.339		0.945		0.038	
CXDCS 0630AP	06827			6.3	.2480		8.0		79		34		24		0.98
CXDCS2500AP	06828	1/4			.2500	1/4		3.11		1.339		0.945		0.039	
CXDCS 0640AP	06829			6.4	.2520		8.0		79		34		24		0.99
CXDCS 0650AP	06830			6.5	.2559		8.0		79		34		24		1.01
CXDCS2570AP	06831		F		.2570	5/16		3.11		1.339		0.945		0.040	
CXDCS 0660AP	06832			6.6	.2598		8.0		79		34		24		1.03
CXDCS2610AP	06833		G		.2610	5/16		3.11		1.339		0.945		0.040	
CXDCS 0670AP	06834			6.7	.2638		8.0		79		34		24		1.04
CXDCS2656AP	06835	17/64			.2656	5/16		3.11		1.339		0.945		0.041	
CXDCS 0680AP	06836			6.8	.2677		8.0		79		34		24		1.05
CXDCS 0690AP	06837			6.9	.2717		8.0		79		34		24		1.07
CXDCS 0700AP	06838			7.0	.2756		8.0		79		34		24		1.08
CXDCS 0710AP	06839			7.1	.2795		8.0		79		41		29		1.10
CXDCS2812AP	06840	9/32			.2812	5/16		3.11		1.614		1.142		0.044	
CXDCS 0720AP	06841			7.2	.2835		8.0		79		41		29		1.12
CXDCS 0730AP	06842			7.3	.2874		8.0		79		41		29		1.13
CXDCS 0740AP	06843			7.4	.2913		8.0		79		41		29		1.15
CXDCS 0750AP	06844			7.5	.2953		8.0		79		41		29		1.16
CXDCS2969AP	06845	19/64			.2969	5/16		3.11		1.614		1.142		0.046	
CXDCS 0760AP	06846			7.6	.2992		8.0		79		41		29		1.18
CXDCS 0770AP	06847			7.7	.3031		8.0		79		41		29		1.19
CXDCS 0780AP	06848			7.8	.3071		8.0		79		41		29		1.21
CXDCS 0790AP	06849			7.9	.3110		8.0		79		41		29		1.22
CXDCS3125AP	06850	5/16			.3125	5/16		3.11		1.614		1.142		0.048	
CXDCS 0800AP	06851			8.0	.3150		8.0		79		41		29		1.24
CXDCS 0810AP	06852			8.1	.3189		10.0		89		47		35		1.26



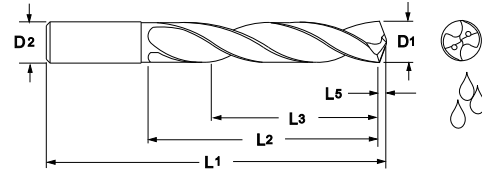
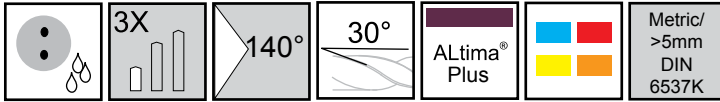
Series CXDCS Continued



ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDCS 0820AP	06853			8.2	.3228		10.0		89		47		35		1.27
CXDCS 0830AP	06854			8.3	.3268		10.0		89		47		35		1.29
CXDCS3281AP	06855	21/64			.3281	3/8		3.50		1.850		1.378		0.051	
CXDCS 0840AP	06856			8.4	.3307		10.0		89		47		35		1.31
CXDCS3320AP	06857		Q		.3320	3/8		3.50		1.850		1.378		0.051	
CXDCS 0850AP	06858			8.5	.3346		10.0		89		47		35		1.32
CXDCS 0860AP	06859			8.6	.3386		10.0		89		47		35		1.33
CXDCS 0870AP	06860			8.7	.3425		10.0		89		47		35		1.35
CXDCS3438AP	06861	11/32			.3438	3/8		3.50		1.850		1.378		0.053	
CXDCS 0880AP	06862			8.8	.3465		10.0		89		47		35		1.36
CXDCS 0890AP	06863			8.9	.3504		10.0		89		47		35		1.38
CXDCS 0900AP	06864			9.0	.3543		10.0		89		47		35		1.39
CXDCS 0910AP	06865			9.1	.3583		10.0		89		47		35		1.41
CXDCS3594AP	06866	23/64			.3594	3/8		3.50		1.850		1.378		0.056	
CXDCS 0920AP	06867			9.2	.3622		10.0		89		47		35		1.43
CXDCS 0925AP	06868			9.25	.3642		10.0		89		47		35		1.43
CXDCS 0930AP	06869			9.3	.3661		10.0		89		47		35		1.44
CXDCS 0940AP	06870			9.4	.3701		10.0		89		47		35		1.46
CXDCS 0950AP	06871			9.5	.3740		10.0		89		47		35		1.47
CXDCS3750AP	06872	3/8			.3750	3/8		3.50		1.850		1.378		0.058	
CXDCS 0960AP	06873			9.6	.3780		10.0		89		47		35		1.49
CXDCS 0970AP	06874			9.7	.3819		10.0		89		47		35		1.50
CXDCS 0980AP	06875			9.8	.3858		10.0		89		47		35		1.52
CXDCS 0990AP	06876			9.9	.3898		10.0		89		47		35		1.53
CXDCS3906AP	06877	25/64			.3906	7/16		3.50		1.850		1.378		0.061	
CXDCS 1000AP	06878			10.0	.3937		10.0		89		47		35		1.55
CXDCS 1010AP	06879			10.1	.3976		12.0		102		55		40		1.56
CXDCS 1020AP	06880			10.2	.4016		12.0		102		55		40		1.58
CXDCS 1030AP	06881			10.3	.4055		12.0		102		55		40		1.60
CXDCS4062AP	06882	13/32			.4062	7/16		4.02		2.165		1.575		0.063	
CXDCS 1040AP	06883			10.4	.4094		12.0		102		55		40		1.61
CXDCS 1050AP	06884			10.5	.4134		12.0		102		55		40		1.63
CXDCS 1060AP	06885			10.6	.4173		12.0		102		55		40		1.64
CXDCS 1070AP	06886			10.7	.4213		12.0		102		55		40		1.66
CXDCS4219AP	06887	27/64			.4219	7/16		4.02		2.165		1.575		0.065	
CXDCS 1080AP	06888			10.8	.4252		12.0		102		55		40		1.67
CXDCS 1090AP	06889			10.9	.4291		12.0		102		55		40		1.69
CXDCS 1100AP	06890			11.0	.4331		12.0		102		55		40		1.70



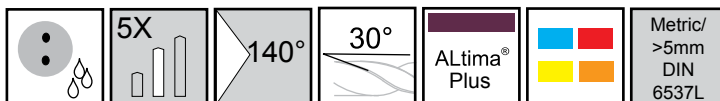
Series CXDCS Continued



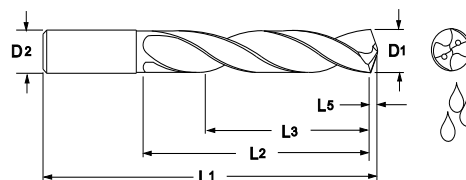
ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDCS 1110AP	06891			11.1	.4370		12.0		102		55		40		1.72
CXDCS4375AP	06892	7/16			.4375	7/16		4.02		2.165		1.575		0.068	
CXDCS 1120AP	06893			11.2	.4409		12.0		102		55		40		1.74
CXDCS 1130AP	06894			11.3	.4449		12.0		102		55		40		1.75
CXDCS 1140AP	06895			11.4	.4488		12.0		102		55		40		1.77
CXDCS 1150AP	06896			11.5	.4527		12.0		102		55		40		1.78
CXDCS 1155AP	07090			11.55	.4547		12.0		102		55		40		1.79
CXDCS 1160AP	06897			11.6	.4567		12.0		102		55		40		1.80
CXDCS 1170AP	06898			11.7	.4606		12.0		102		55		40		1.81
CXDCS 1180AP	06899			11.8	.4646		12.0		102		55		40		1.83
CXDCS 1190AP	06900			11.9	.4685		12.0		102		55		40		1.84
CXDCS4688AP	06901	15/32			.4688	1/2		4.02		2.165		1.575		0.073	
CXDCS 1200AP	06902			12.0	.4724		12.0		102		55		40		1.86
CXDCS 1210AP	06903			12.1	.4764		14.0		107		60		43		1.87
CXDCS4844AP	06904	31/64			.4844	1/2		4.21		2.362		1.693		0.075	
CXDCS 1250AP	06905			12.5	.4921		14.0		107		60		43		1.94
CXDCS5000AP	06906	1/2			.5000	1/2		4.21		2.362		1.693		0.077	
CXDCS 1280AP	06907			12.8	.5039		14.0		107		60		43		1.98
CXDCS 1283AP	06908			12.83	.5051		14.0		107		60		43		1.99
CXDCS 1290AP	06909			12.9	.5079		14.0		107		60		43		2.00
CXDCS 1300AP	06910			13.0	.5118		14.0		107		60		43		2.01
CXDCS5156AP	06911	33/64			.5156	9/16		4.21		2.362		1.693		0.080	
CXDCS5312AP	07089	17/32			.5312	9/16		4.21		2.362		1.693		0.082	
CXDCS 1350AP	06912			13.5	.5315		14.0		107		60		43		2.09
CXDCS 1370AP	06913			13.7	.5394		14.0		107		60		43		2.12
CXDCS5469AP	06914	35/64			.5469	9/16		4.21		2.362		1.693		0.085	
CXDCS 1400AP	06915			14.0	.5512		14.0		107		60		43		2.17
CXDCS5625AP	06916	9/16			.5625	9/16		4.53		2.559		1.772		0.087	
CXDCS 1450AP	06917			14.5	.5709		16.0		115		65		45		2.25
CXDCS 1470AP	06918			14.7	.5787		16.0		115		65		45		2.28
CXDCS 1500AP	06919			15.0	.5905		16.0		115		65		45		2.32
CXDCS5938AP	06920	19/32			.5938	5/8		4.53		2.559		1.772		0.092	
CXDCS 1530AP	06921			15.3	.6024		16.0		115		65		45		2.37
CXDCS 1550AP	06922			15.5	.6102		16.0		115		65		45		2.40
CXDCS 1570AP	06923			15.7	.6181		16.0		115		65		45		2.43
CXDCS6250AP	06924	5/8			.6250	5/8		4.53		2.559		1.772		0.097	
CXDCS 1600AP	06925			16.0	.6299		16.0		115		65		45		2.48



Cyclone™ Series CXDCR



Designed for high performance drilling in a broad range of materials.



ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool Number	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDCR 0300AP	06926			3.0	.1181		3.0		66		28		23		0.46
CXDCR 1200AP	06927		#31		.1200	1/8		2.60		1.102		0.906		0.019	
CXDCR 0310AP	06928			3.1	.1220		4.0		66		28		23		0.48
CXDCR 1250AP	06929	1/8			.1250	1/8		2.60		1.102		0.906		0.019	
CXDCR 0320AP	06930			3.2	.1260		4.0		66		28		23		0.50
CXDCR 1285AP	06931		#30		.1285	5/32		2.60		1.102		0.906		0.020	
CXDCR 0330AP	06932			3.3	.1299		4.0		66		28		23		0.51
CXDCR 0340AP	06933			3.4	.1339		4.0		66		28		23		0.53
CXDCR 1360AP	06934		#29		.1360	5/32		2.60		1.102		0.906		0.021	
CXDCR 0350AP	06935			3.5	.1378		4.0		66		28		23		0.54
CXDCR 1406AP	06936	9/64			.1406	5/32		2.60		1.102		0.906		0.022	
CXDCR 0360AP	06937			3.6	.1417		4.0		66		28		23		0.56
CXDCR 0370AP	06938			3.7	.1457		4.0		66		28		23		0.57
CXDCR 0380AP	06939			3.8	.1496		4.0		74		36		29		0.59
CXDCR 1520AP	06940		#24		.1520	5/32		2.91		1.417		1.142		0.024	
CXDCR 0390AP	06941			3.9	.1535		4.0		74		36		29		0.60
CXDCR 1562AP	06942	5/32			.1562	5/32		2.91		1.417		1.142		0.024	
CXDCR 0400AP	06943			4.0	.1575		4.0		74		36		29		0.62
CXDCR 1590AP	06944		#21		.1590	3/16		2.91		1.417		1.142		0.025	
CXDCR 0410AP	06945			4.1	.1614		5.0		74		36		29		0.64
CXDCR 0420AP	06946			4.2	.1654		5.0		74		36		29		0.65
CXDCR 0430AP	06947			4.3	.1693		5.0		74		36		29		0.67
CXDCR 1719AP	06948	11/64			.1719	3/16		2.91		1.417		1.142		0.027	
CXDCR 0440AP	06949			4.4	.1732		5.0		74		36		29		0.68
CXDCR 0450AP	06950			4.5	.1772		5.0		74		36		29		0.70
CXDCR 0460AP	06951			4.6	.1811		5.0		74		36		29		0.71
CXDCR 0470AP	06952			4.7	.1850		5.0		74		36		29		0.73
CXDCR 1875AP	06953	3/16			.1875	3/16		3.23		1.732		1.378		0.029	
CXDCR 0480AP	06954			4.8	.1890		5.0		82		44		35		0.74
CXDCR 0490AP	06955			4.9	.1929		5.0		82		44		35		0.76
CXDCR 0500AP	06956			5.0	.1968		5.0		82		44		35		0.77

Inch		
D1	Tolerance (m7)	
.0000 - .1181	+0.0008/+0.00047	
.1182 - .2362	+0.0016/+0.00063	
.2363 - .3937	+0.0024/+0.00083	
.3938 - .7087	+0.0027/+0.00098	
.7088 - .7500	+0.0031/+0.00114	

Inch		
D2	Tolerance (h6)	
.0000 - .1181	+0/-0.00024	
.1182 - .2362	+0/-0.00031	
.2363 - .3937	+0/-0.00035	
.3938 - .7087	+0/-0.00043	
.7088 - .7500	+0/-0.00051	

Metric (mm)		
D1	Tolerance (m7)	
0 - 3.0	+0.002/+0.012	
3.01 - 6.0	+0.004/+0.016	
6.01 - 10.0	+0.006/+0.021	
10.01 - 18.0	+0.007/+0.025	
18.01 - 20.0	+0.008/+0.029	

Metric (mm)		
D2	Tolerance (h6)	
0 - 3.0	+0/-0.006	
3.01 - 6.0	+0/-0.008	
6.01 - 10.0	+0/-0.009	
10.01 - 18.0	+0/-0.011	
18.01 - 20.0	+0/-0.013	

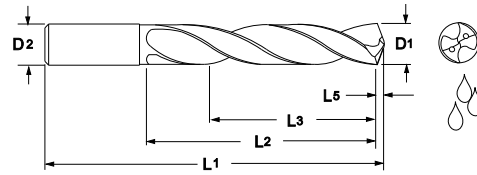
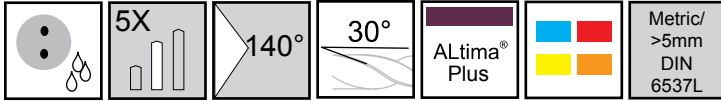


Series CXDCR Continued

ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDCR 0510AP	06957			5.1	.2008		6.0		82		44		35		0.79
CXDCR2031AP	06958	13/64			.2031	1/4		3.23		1.732		1.378		0.031	
CXDCR 0520AP	06959			5.2	.2047		6.0		82		44		35		0.81
CXDCR 0530AP	06960			5.3	.2087		6.0		82		44		35		0.82
CXDCR 0540AP	06961			5.4	.2126		6.0		82		44		35		0.84
CXDCR 0550AP	06962			5.5	.2165		6.0		82		44		35		0.85
CXDCR2187AP	06963	7/32			.2187	1/4		3.23		1.732		1.378		0.034	
CXDCR2210AP	06964		#2		.2210	1/4		3.23		1.732		1.378		0.034	
CXDCR 0570AP	06965			5.7	.2244		6.0		82		44		35		0.88
CXDCR 0580AP	06966			5.8	.2283		6.0		82		44		35		0.90
CXDCR 0590AP	06967			5.9	.2323		6.0		82		44		35		0.91
CXDCR2344AP	06968	15/64			.2344	1/4		3.23		1.732		1.378		0.036	
CXDCR 0600AP	06969			6.0	.2362		6.0		82		44		35		0.93
CXDCR 0610AP	06970			6.1	.2402		8.0		91		53		43		0.95
CXDCR2420AP	06971		C		.2420	1/4		3.58		2.087		1.693		0.037	
CXDCR 0620AP	06972			6.2	.2441		8.0		91		53		43		0.96
CXDCR2460AP	06973		D		.2460	1/4		3.58		2.087		1.693		0.038	
CXDCR 0630AP	06974			6.3	.2480		8.0		91		53		43		0.98
CXDCR2500AP	06975	1/4			.2500	1/4		3.58		2.087		1.693		0.039	
CXDCR 0640AP	06976			6.4	.2520		8.0		91		53		43		0.99
CXDCR 0650AP	06977			6.5	.2559		8.0		91		53		43		1.01
CXDCR2570AP	06978		F		.2570	5/16		3.58		2.087		1.693		0.040	
CXDCR 0660AP	06979			6.6	.2598		8.0		91		53		43		1.03
CXDCR2610AP	06980		G		.2610	5/16		3.58		2.087		1.693		0.040	
CXDCR 0670AP	06981			6.7	.2638		8.0		91		53		43		1.04
CXDCR2656AP	06982	17/64			.2656	5/16		3.58		2.087		1.693		0.041	
CXDCR 0680AP	06983			6.8	.2677		8.0		91		53		43		1.05
CXDCR 0690AP	06984			6.9	.2717		8.0		91		53		43		1.07
CXDCR 0700AP	06985			7.0	.2756		8.0		91		53		43		1.08
CXDCR 0710AP	06986			7.1	.2795		8.0		91		53		43		1.10
CXDCR2812AP	06987	9/32			.2812	5/16		3.58		2.087		1.693		0.044	
CXDCR 0720AP	06988			7.2	.2835		8.0		91		53		43		1.12
CXDCR 0730AP	06989			7.3	.2874		8.0		91		53		43		1.13
CXDCR 0740AP	06990			7.4	.2913		8.0		91		53		43		1.15
CXDCR 0750AP	06991			7.5	.2953		8.0		91		53		43		1.16
CXDCR2969AP	06992	19/64			.2969	5/16		3.58		2.087		1.693		0.046	
CXDCR 0760AP	06993			7.6	.2992		8.0		91		53		43		1.18
CXDCR 0770AP	06994			7.7	.3031		8.0		91		53		43		1.19
CXDCR 0780AP	06995			7.8	.3071		8.0		91		53		43		1.21
CXDCR 0790AP	06996			7.9	.3110		8.0		91		53		43		1.22
CXDCR3125AP	06997	5/16			.3125	5/16		3.58		2.087		1.693		0.048	
CXDCR 0800AP	06998			8.0	.3150		8.0		91		53		43		1.24
CXDCR 0810AP	06999			8.1	.3189		10.0		103		61		49		1.26



Series CXDCR Continued



ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDCR 0820AP	07000			8.2	.3228		10.0		103		61		49		1.27
CXDCR 0830AP	07001			8.3	.3268		10.0		103		61		49		1.29
CXDCR3281AP	07002	21/64			.3281	3/8		4.06		2.402		1.929		0.051	
CXDCR 0840AP	07003			8.4	.3307		10.0		103		61		49		1.31
CXDCR3320AP	07004		Q		.3320	3/8		4.06		2.402		1.929		0.051	
CXDCR 0850AP	07005			8.5	.3346		10.0		103		61		49		1.32
CXDCR 0860AP	07006			8.6	.3386		10.0		103		61		49		1.33
CXDCR 0870AP	07007			8.7	.3425		10.0		103		61		49		1.35
CXDCR3438AP	07008	11/32			.3438	3/8		4.06		2.402		1.929		0.053	
CXDCR 0880AP	07009			8.8	.3465		10.0		103		61		49		1.36
CXDCR 0890AP	07010			8.9	.3504		10.0		103		61		49		1.38
CXDCR 0900AP	07011			9.0	.3543		10.0		103		61		49		1.39
CXDCR 0910AP	07012			9.1	.3583		10.0		103		61		49		1.41
CXDCR3594AP	07013	23/64			.3594	3/8		4.06		2.402		1.929		0.056	
CXDCR 0920AP	07014			9.2	.3622		10.0		103		61		49		1.43
CXDCR 0925AP	07015			9.25	.3642		10.0		103		61		49		1.43
CXDCR 0930AP	07016			9.3	.3661		10.0		103		61		49		1.44
CXDCR 0940AP	07017			9.4	.3701		10.0		103		61		49		1.46
CXDCR 0950AP	07018			9.5	.3740		10.0		103		61		49		1.47
CXDCR3750AP	07019	3/8			.3750	3/8		4.06		2.402		1.929		0.058	
CXDCR 0960AP	07020			9.6	.3780		10.0		103		61		49		1.49
CXDCR 0970AP	07021			9.7	.3819		10.0		103		61		49		1.50
CXDCR 0980AP	07022			9.8	.3858		10.0		103		61		49		1.52
CXDCR 0990AP	07023			9.9	.3898		10.0		103		61		49		1.53
CXDCR3906AP	07024	25/64			.3906	7/16		4.06		2.402		1.929		0.061	
CXDCR 1000AP	07025			10.0	.3937		10.0		103		61		49		1.55
CXDCR 1010AP	07026			10.1	.3976		12.0		118		71		56		1.56
CXDCR 1020AP	07027			10.2	.4016		12.0		118		71		56		1.58
CXDCR 1030AP	07028			10.3	.4055		12.0		118		71		56		1.60
CXDCR4062AP	07029	13/32			.4062	7/16		4.65		2.795		2.205		0.063	
CXDCR 1040AP	07030			10.4	.4094		12.0		118		71		56		1.61
CXDCR 1050AP	07031			10.5	.4134		12.0		118		71		56		1.63
CXDCR 1060AP	07032			10.6	.4173		12.0		118		71		56		1.64
CXDCR 1070AP	07033			10.7	.4213		12.0		118		71		56		1.66
CXDCR4219AP	07034	27/64			.4219	7/16		4.65		2.795		2.205		0.065	
CXDCR 1080AP	07035			10.8	.4252		12.0		118		71		56		1.67
CXDCR 1090AP	07036			10.9	.4291		12.0		118		71		56		1.69
CXDCR 1100AP	07037			11.0	.4331		12.0		118		71		56		1.70

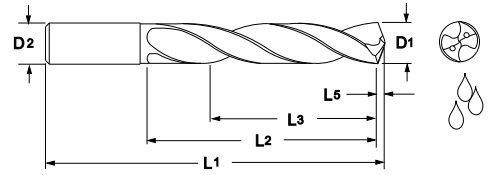
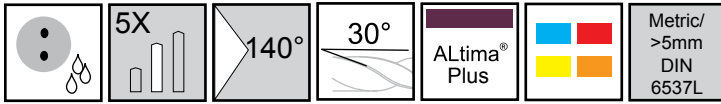


Series CXDCR Continued

ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref.		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDCR 1110AP	07038			11.1	.4370		12.0		118		71		56		1.72
CXDCR4375AP	07039	7/16			.4375	7/16		4.65		2.795		2.205		0.068	
CXDCR 1120AP	07040			11.2	.4409		12.0		118		71		56		1.74
CXDCR 1130AP	07041			11.3	.4449		12.0		118		71		56		1.75
CXDCR 1140AP	07042			11.4	.4488		12.0		118		71		56		1.77
CXDCR 1150AP	07043			11.5	.4527		12.0		118		71		56		1.78
CXDCR 1160AP	07044			11.6	.4567		12.0		118		71		56		1.80
CXDCR 1170AP	07045			11.7	.4606		12.0		118		71		56		1.81
CXDCR 1180AP	07046			11.8	.4646		12.0		118		71		56		1.83
CXDCR 1190AP	07047			11.9	.4685		12.0		118		71		56		1.84
CXDCR4688AP	07048	15/32			.4688	1/2		4.65		2.795		2.205		0.073	
CXDCR 1200AP	07049			12.0	.4724		12.0		118		71		56		1.86
CXDCR 1210AP	07050			12.1	.4764		14.0		124		77		60		1.87
CXDCR4844AP	07051	31/64			.4844	1/2		4.88		3.031		2.362		0.075	
CXDCR 1250AP	07052			12.5	.4921		14.0		124		77		60		1.94
CXDCR5000AP	07053	1/2			.5000	1/2		4.88		3.031		2.362		0.077	
CXDCR 1280AP	07054			12.8	.5039		14.0		124		77		60		1.98
CXDCR 1283AP	07055			12.83	.5051		14.0		124		77		60		1.99
CXDCR 1290AP	07056			12.9	.5079		14.0		124		77		60		2.00
CXDCR 1300AP	07057			13.0	.5118		14.0		124		77		60		2.01
CXDCR5156AP	07058	33/64			.5156	9/16		4.88		3.031		2.362		0.080	
CXDCR5312AP	07059	17/32			.5312	9/16		4.88		3.031		2.362		0.082	
CXDCR 1350AP	07060			13.5	.5315		14.0		124		77		60		2.09
CXDCR 1370AP	07061			13.7	.5394		14.0		124		77		60		2.12
CXDCR5469AP	07062	35/64			.5469	9/16		4.88		3.031		2.362		0.085	
CXDCR 1400AP	07063			14.0	.5512		14.0		124		77		60		2.17
CXDCR5625AP	07064	9/16			.5625	9/16		5.24		3.268		2.480		0.087	
CXDCR 1450AP	07065			14.5	.5709		16.0		133		83		63		2.25
CXDCR 1470AP	07066			14.7	.5787		16.0		133		83		63		2.28
CXDCR 1500AP	07067			15.0	.5905		16.0		133		83		63		2.32
CXDCR5938AP	07068	19/32			.5938	5/8		5.24		3.268		2.480		0.092	
CXDCR 1530AP	07069			15.3	.6024		16.0		133		83		63		2.37
CXDCR 1550AP	07070			15.5	.6102		16.0		133		83		63		2.40
CXDCR 1570AP	07071			15.7	.6181		16.0		133		83		63		2.43
CXDCR6250AP	07072	5/8			.6250	5/8		5.24		3.268		2.480		0.097	
CXDCR 1600AP	07073			16.0	.6299		16.0		133		83		63		2.48
CXDCR 1608AP	07074			16.08	.6331		18.0		143		93		71		2.49
CXDCR 1630AP	07075			16.3	.6417		18.0		143		93		71		2.53
CXDCR 1650AP	07076			16.5	.6496		18.0		143		93		71		2.56
CXDCR6562AP	07077	21/32			.6562	11/16		5.63		3.661		2.795		0.102	
CXDCR 1700AP	07078			17.0	.6693		18.0		143		93		71		2.63
CXDCR6875AP	07079	11/16			.6875	11/16		5.63		3.661		2.795		0.107	



Series CXDCR Continued



CXDCR™
Cyclone™ XD

ALtima® Plus		Diameter				Shank		OAL		Flute Length		Drill Length		Point Length	
		D1 (m7)				D2 (h6)		L1		L2 (Max.)		L3 Ref		L5	
Tool No.	EDP	Inch	Letter/ Wire	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
CXDCR 1750AP	07080			17.5	.6890		18.0		143		93		71		2.71
CXDCR 1800AP	07081			18.0	.7087		18.0		143		93		71		2.79
CXDCR 1850AP	07082			18.5	.7283		20.0		153		101		77		2.87
CXDCR7500AP	07083	3/4			.7500	3/4		6.024		3.976		3.031		0.116	
CXDCR 1916AP	07084			19.16	.7543		20.0		153		101		77		2.97
CXDCR 1925AP	07085			19.25	.7579		20.0		153		101		77		2.98
CXDCR 1930AP	07086			19.3	.7598		20.0		153		101		77		2.99
CXDCR 1950AP	07087			19.5	.7677		20.0		153		101		77		3.02
CXDCR 2000AP	07088			20.0	.7874		20.0		153		101		77		3.10



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ISO 9001:2008 Certified

An Employee Owned Company

Twister® Drill Icon Glossary

- Solid
- Coolant Fed
- Drill Length
- Drill Point Angle
- Helix Angle
- Coatings
- ALtima®
- DIN Specs

Workpiece Material Group

	Steels
	Stainless Steels
	Cast Iron
	Special Alloys
	Hardened Steels (35-65Rc)
	Non-Ferrous

Cutting Calculations and Definitions		Metric	U.S.
ae	= Width of cut, radial depth of cut	(mm)	(inch)
ap	= Depth of cut, axial depth of cut	(mm)	(inch)
Dc	= Cutter diameter	(mm)	(inch)
f	= Feed per revolution	(mm/rev)	(IPR)
fz	= Feed per tooth	(mm/tooth)	(IPT)
zn	= Number of teeth	Number	
n	= RPM	(rev/min)	(rev/min)
Q	= Metal removal rate	(cm ³ /min)	(in ³ /min)
vc	= Cutting speed	(m/min)	(SFM)
vf	= Feed speed	(mm/min)	(IPM)
Dw	= Working diameter	(mm)	(inch)

Formulas

Inch
 RPM (n) = SFM (vc) x 3.82/Tool Diam.
 IPM (vf) = RPM (n) x IPR (f)

Conversion Inch to Metric
 SFM (vc) to m/min (vc) = SFM (vc) x .3048
 IPM (vf) to mm/min (vf) = IPM (vf) x 25.4

Metric
 RPM (n) = m/min (vc) x 318.057/Tool Diam.
 mm/min (vf) = RPM (n) x mm/Revolution (f)

Conversion Metric to Inch
 m/min (vc) to SFM (vc) = (m/min)/.3048
 mm/min (vf) to IPM (vf) = (mm/min)/25.4

Safety Note

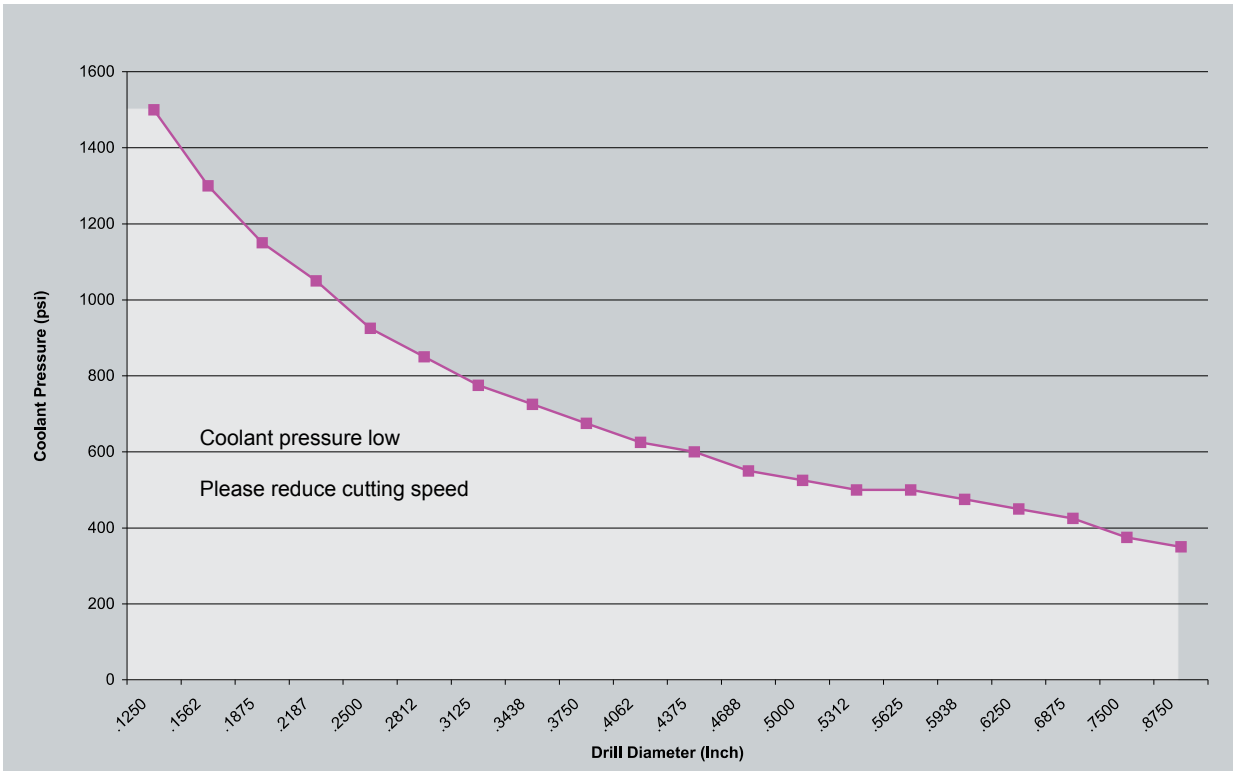
Always wear the appropriate personal protective equipment such as safety glasses and protective clothing when using solid carbide or HSS cutting tools. Machines should be fully guarded.

Drill Troubleshooting

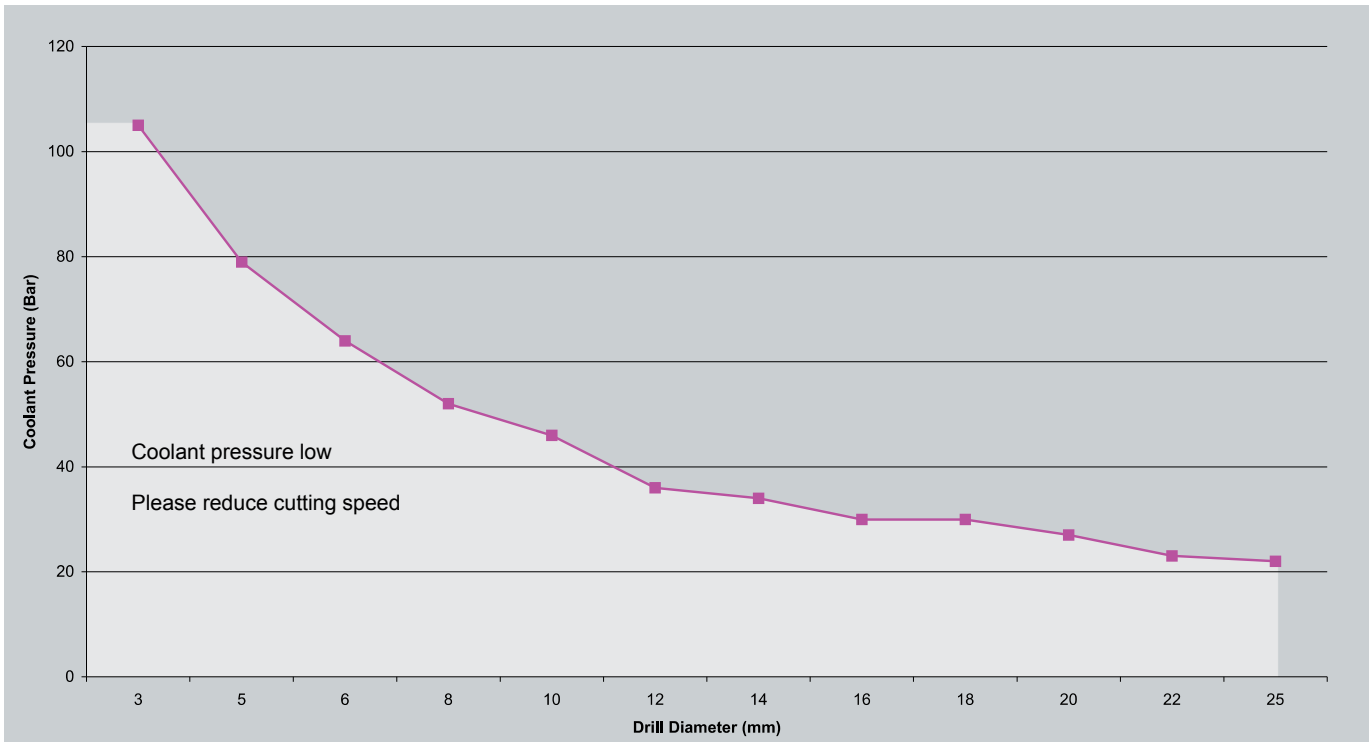
Possible Solutions	Problem																														
	Tool Deterioration										Chip Formation		Tool Life	Workpiece					Process												
	Flank wear	Margin wear	Breakage	Flaking	Creater wear	Chisel edge wear	Corner chipping	Flute chipping	Cutting edge chipping	Cutting edge wear	Point center chipping	Rake face	Scoring on tool body	Long stringy	Varied chip form	Blue/brown chips	Tool Life	Undersized hole	Oversized hole	Poor alignment	Poor surface finish	Heavy burr breakout	Retract marks	Hole location	Hole straightness	Deflection	Point Deflection	Galling	Vibration	Abnormal noise	Chip packing
Reduce feed or reduce at exit	x	x			x	x	x	x		x	x	x					x	x	x	x	x										x
Reduce feed at entrance			x															x			x			x							x
Consistent feed rate			x											x	x													x		x	
Increase feed	x				x					x				x				x	x												
Reduce speed	x	x			x		x			x							x	x										x	x	x	
Increase speed																					x										
Coolant													x				x	x			x	x								x	
Coolant increase flow	x		x			x	x		x						x	x	x				x	x								x	
Coolant filter	x		x	x					x							x	x				x	x								x	
Setup																															
Workpiece clamp rigid		x	x			x	x		x			x					x		x	x	x	x	x	x	x					x	
Collet accuracy			x						x											x								x			
Tool holder fit .0008			x						x											x											
Alignment			x						x											x											x
Peck drill			x																												
Concentricity		x	x	x					x	x			x							x	x		x	x	x		x		x		
Do not extract tool during peck									x																						

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

Coolant Pressure - Inch
Recommended Minimum Coolant Pressure



Coolant Pressure - Metric
Recommended Minimum Coolant Pressure



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

Recommended Cutting Data CXD ≤ 1/4 - Inch

Workpiece Material Group	I S O	Hardness	Tool Series	T Y P E	D E P T H	Drill Diameter				Drill Diameter			
						1/8	5/32	3/16	1/4	1/8	5/32	3/16	1/4
						vc - SFM				f - IPR			
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	CXDSS		3	390	380	370	360	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDSR		5	390	380	370	360				
			CXDCS		3	660	650	640	630	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDCR		5	660	650	640	630				
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	CXDSS		3	330	320	310	300	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDSR		5	330	320	310	300				
			CXDCS		3	575	550	540	500				
			CXDCR		5	575	550	540	500	.003-.005	.004-.006	.005-.007	.0055-.0080
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, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	CXDSS		3	200	190	190	185	.0014-.0030	.0024-.0040	.003-.005	.0035-.0060
			CXDSR		5	200	190	190	185				
			CXDCS		3	250	240	230	220	.0014-.0030	.0024-.0040	.003-.005	.0035-.0060
			CXDCR		5	250	240	230	220				
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	M	up to 28 Rc	CXDSS		3	300	275	250	200	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDSR		5	300	275	250	200				
			CXDCS		3	550	500	475	450	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDCR		5	550	500	475	450				
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	CXDSS		3	130	120	110	105	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDSR		5	130	120	110	105				
			CXDCS		3	300	290	280	270	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDCR		5	300	290	280	270				
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	CXDSS		3	140	130	120	110	.0020-.0033	.0024-.0035	.0030-.0043	.0031-.0050
			CXDSR		5	140	130	120	110				
			CXDCS		3	265	250	240	230	.0020-.0033	.0024-.0035	.0030-.0042	.0031-.0050
			CXDCR		5	265	250	240	230				
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	CXDSS		3	85	80	75	70	.0014-.0033	.0016-.0035	.002-.004	.0023-.0043
			CXDSR		5	85	80	75	70				
			CXDCS		3	115	100	95	90	.0014-.0033	.0016-.0035	.002-.004	.0023-.0043
			CXDCR		5	115	100	95	90				
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	CXDSS		3	130	125	120	115	.003-.004	.004-.006	.005-.007	.0055-.0080
			CXDSR		5	130	125	120	115				
			CXDCS		3	230	220	210	200	.003-.004	.004-.005	.005-.007	.0055-.0080
			CXDCR		5	230	220	210	200				
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	CXDSS		3	480	470	460	430	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDSR		5	480	470	460	430				
			CXDCS		3	660	640	620	600	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDCR		5	660	640	620	600				
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	CXDSS		3	280	270	260	250	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDSR		5	280	270	260	250				
			CXDCS		3	400	480	460	440	.003-.005	.004-.006	.005-.007	.0055-.0080
			CXDCR		5	400	480	460	440				

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



Recommended Cutting Data CXD ≥ 5/16 - Inch

Workpiece Material Group	I S O	Hardness	Tool Series	T Y P E	D E P T H	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 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	CXDSS	●	3	350	340	320	300	275	265	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			CXDSR		5	350	340	320	300	275							
			CXDCS	●●	3	620	600	575	550	525							
			CXDCR		5	620	600	575	550	525	500	.006-.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, 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	CXDSS	●	3	290	280	270	265	260	260	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			CXDSR		5	290	280	270	265	260							
			CXDCS	●●	3	475	450	425	400	325							
			CXDCR		5	475	450	425	400	325	315	.006-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
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, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	CXDSS	●	3	185	180	180	175	175	170	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			CXDSR		5	185	180	180	175	175							
			CXDCS	●●	3	210	210	200	200	190							
			CXDCR		5	210	210	200	200	190	190	.006-.009	.007-.010	.009-.011	.009-.014	.010-.014	.011-.015
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	M	up to 28 Rc	CXDSS	●	3	320	300	275	250	225	200	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			CXDSR		5	320	300	275	250	225							
			CXDCS	●●	3	400	390	380	370	330							
			CXDCR		5	400	390	380	370	330	320	.006-.009	.007-.010	.009-.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	CXDSS	●	3	125	120	120	105	105	100	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			CXDSR		5	125	120	120	105	105							
			CXDCS	●●	3	260	250	240	240	230							
			CXDCR		5	260	250	240	240	230	220	.006-.009	.007-.010	.009-.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	CXDSS	●	3	110	105	105	100	100	95	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
			CXDSR		5	110	105	105	100	100							
			CXDCS	●●	3	220	200	190	180	170							
			CXDCR		5	220	200	190	180	170	155	.003-.006	.005-.009	.007-.009	.008-.010	.009-.011	.009-.013
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	CXDSS	●	3	65	60	55	50	45	40	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.009-.010
			CXDSR		5	65	60	55	50	45							
			CXDCS	●●	3	85	85	80	80	75							
			CXDCR		5	85	85	80	80	75	75	.003-.005	.004-.006	.005-.007	.005-.008	.006-.008	.009-.010
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	CXDSS	●	3	110	105	100	100	90	90	.006-.009	.007-.010	.008-.011	.008-.010	.010-.014	.011-.015
			CXDSR		5	110	105	100	100	90							
			CXDCS	●●	3	190	180	170	160	150							
			CXDCR		5	190	180	170	160	150	150	.006-.009	.007-.010	.008-.011	.008-.010	.010-.014	.011-.015
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	CXDSS	●	3	410	400	390	370	360	350	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			CXDSR		5	410	400	390	370	360							
			CXDCS	●●	3	580	560	550	550	525							
			CXDCR		5	580	560	550	550	525	500	.006-.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	CXDSS	●	3	240	230	220	210	200	190	.006-.009	.007-.010	.008-.011	.009-.014	.010-.014	.011-.015
			CXDSR		5	240	230	220	210	200							
			CXDCS	●●	3	400	375	350	300	275							
			CXDCR		5	400	375	350	300	275	250	.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.

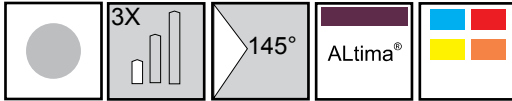
CXD
Cyclone™ XD

Recommended Cutting Data CXD ≤ 6mm - Metric

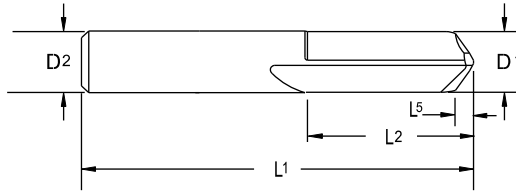
Workpiece Material Group	I S O	Hardness	Tool Series	T Y P E	D E P T H	Drill Diameter (mm)				Drill Diameter (mm)			
						3	4	5	6	3	4	5	6
						vc - m/min				f - mm/Rev			
Free Machining & Low Carbon Steels 1006, 1008, 1015, 1018, 1020, 1022, 1025, 1117, 1140, 1141, 11L08, 11L14, 1213, 12L13, 12L14, 1215, 1330	P	up to 28 Rc	CXDSS		3	119	116	113	110	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSR		5	119	116	113	110				
			CXDSCS		3	201	198	195	192	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSCR		5	201	198	195	192				
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	CXDSS		3	101	98	94	91	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSR		5	101	98	94	91				
			CXDSCS		3	175	168	165	152				
			CXDSCR		5	175	168	165	152	.076-.127	.102-.152	.127-.178	.127-.203
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, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	CXDSS		3	61	58	58	56	.036-.076	.061-.102	.076-.127	.089-.152
			CXDSR		5	61	58	58	56				
			CXDSCS		3	76	73	70	67	.036-.076	.061-.102	.076-.127	.089-.152
			CXDSCR		5	76	73	70	67				
Stainless Steel - Easy to Machine 430F, 301, 303, 410, 416 Annealed, 420F, 430, 430F	M	up to 28 Rc	CXDSS		3	91	84	76	61	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSR		5	91	84	76	61				
			CXDSCS		3	168	152	145	137	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSCR		5	168	152	145	137				
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	CXDSS		3	40	37	34	32	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSR		5	40	37	34	32				
			CXDSCS		3	91	88	85	82	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSCR		5	91	88	85	82				
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L, 321, PH13-8Mo, Nitronics	M	over 28 Rc	CXDSS		3	43	40	37	34	.051-.076	.061-.089	.089-.102	.076-.127
			CXDSR		5	43	40	37	34				
			CXDSCS		3	81	76	73	70	.051-.076	.061-.089	.089-.102	.076-.127
			CXDSCR		5	81	76	73	70				
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	CXDSS		3	26	24	23	21	.036-.089	.036-.089	.051-.102	.061-.127
			CXDSR		5	26	24	23	21				
			CXDSCS		3	35	30	29	27	.036-.089	.036-.089	.051-.102	.061-.127
			CXDSCR		5	35	30	29	27				
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	CXDSS		3	40	38	37	35	.076-.102	.102-.152	.127-.178	.140-.229
			CXDSR		5	40	38	37	35				
			CXDSCS		3	70	67	64	61	.076-.102	.102-.152	.127-.178	.140-.229
			CXDSCR		5	70	67	64	61				
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	CXDSS		3	146	143	140	131	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSR		5	146	143	140	131				
			CXDSCS		3	201	195	189	183	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSCR		5	201	195	189	183				
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	CXDSS		3	85	82	79	76	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSR		5	85	82	79	76				
			CXDSCS		3	122	146	140	134	.076-.127	.102-.152	.127-.178	.127-.203
			CXDSCR		5	122	146	140	134				

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

**Twister®
Series 200S**



Spot Drills for Cyclone™ XD



Tool No.	EDP	Diameter			Shank		OAL		Flute Length		Point Length	
		D1 (h7)			D2 (h6)		L1		L2		L5	
		Inch	mm	Decimal	Inch	mm	Inch	mm	Inch	mm	Inch	mm
200S11810A	20221		3.0	.1181		3.0		38		16		0.41
200S12500A	20230	1/8		.1250	1/8		1-1/2		5/8		0.017	
200S23620A	20431		6.0	.2362		6.0		51		19		0.83
200S25000A	20452	1/4		.2500	1/4		2		3/4		0.034	
200S31250A	20542	5/16		.3125	5/16		2-1/2		3/4		0.043	
200S31500A	20545		8.0	.3150		8.0		64		19		1.10
200S37500A	20623	3/8		.3750	3/8		2-1/2		1		0.052	
200S39370A	20647		10.0	.3937		10.0		70		25		1.38
200S47240A	20731		12.0	.4724		12.0		76		25		1.65
200S50000A	20740	1/2		.5000	1/2		3		1		0.069	
200S62500A	20782	5/8		.6250	5/8		3-1/2		1-1/4		0.086	
200S62990A	20785		16.0	.6299		16.0		89		32		2.20

Inch	
D1	Tolerance (h7)
.1182 - .2362	+0/- .00047
.2363 - .3937	+0/- .00059
.3938 - .6250	+0/- .00071

Inch	
D2	Tolerance (h6)
.1182 - .2362	+0/- .00031
.2363 - .3937	+0/- .00035
.3938 - .6250	+0/- .00043

Metric (mm)	
D1	Tolerance (h7)
3.0	+0/- .010
3.01 - 6.0	+0/- .012
6.01 - 10.0	+0/- .015
10.01 - 16.0	+0/- .018

Metric (mm)	
D2	Tolerance (h6)
3.0	+0/- .006
3.01 - 6.0	+0/- .008
6.01 - 10.0	+0/- .009
10.01 - 16.0	+0/- .011



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Twister® GP Recommended Cutting Data 200S - Inch

Workpiece Material Group	ISO	Hardness	DEPTH	vc - SFM	Drill Diameter				
					1/8	1/4	3/8	1/2	5/8
					f - IPR				
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	3	330	.0015	.0030	.0040	.0050	.0060
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	3	265	.0015	.0030	.0040	.0050	.0060
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, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	3	230	.0015	.0030	.0040	.0050	.0060
Hardened Steel	H	45 to 65 Rc	3	50	.0005	.0005	.0010	.0010	.0010
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	3	150	.0015	.0030	.0040	.0050	.0060
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L,321, PH13-8Mo, Nitronics	M	up to 28 Rc	3	100	.0010	.0020	.0025	.0030	.0040
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	3	70	.0010	.0020	.0025	.0030	.0040
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr,10V-2Fe-3Al, 13V-11Cr-3Al	S		3	180	.0010	.0020	.0025	.0030	.0040
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	3	365	.0015	.0030	.0040	.0050	.0060
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	3	265	.0015	.0030	.0040	.0050	.0060
Plastics Kevlar/Graphite	N		3	300	.0015	.0030	.0040	.0050	.0060

200S Spot Drill
Twister® GP

Recommended Cutting Data 200S - Metric

Workpiece Material Group	ISO	Hardness	DEPTH	vc - m/min	Drill Diameter (mm)					
					3	6	8	10	12	16
					f - mm/Rev					
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	3	100	.0380	.0760	.1020	.1270	.1520	.1520
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	3	80	.0380	.0760	.1020	.1270	.1520	.1520
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, A 128, D2, D3, D4, D5, D7	P	28 to 44 Rc	3	45	.0380	.0760	.1020	.1270	.1520	.1520
Hardened Steel	H	45 to 65 Rc	3	15	.0127	.0127	.0254	.0254	.0254	.0381
Stainless Steel - Moderately Difficult 301, 302, 303 High Tensile, 304, 304L, 305, 420, 15-5PH, 17-4PH, 17-7PH	M	up to 28 Rc	3	45	.0380	.0760	.1020	.1270	.1520	.1520
Stainless Steel - Difficult to Machine 302B, 304B, 309, 310, 316, 316B, 316L, 316Ti, 317, 317L,321, PH13-8Mo, Nitronics	M	up to 28 Rc	3	30	.0250	.0510	.0640	.0760	.1020	.1270
High Temp Alloys Nimonic, Inconel, Monel, Hastelloy	S	up to 42 Rc	3	20	.0250	.0510	.0640	.0760	.1020	.1270
Titanium Alloys 6Al-4V, 5Al-2.5 Sn, 6Al-2 Sn-4Zr-6Mo, 3Al-8V-6Cr4Mo-4Zr,10V-2Fe-3Al, 13V-11Cr-3Al	S		3	55	.0250	.0510	.0640	.0760	.1020	.1270
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	3	110	.0380	.0760	.1020	.1270	.1520	.1520
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	3	80	.0380	.0760	.1020	.1270	.1520	.1520
Plastics Kevlar/Graphite	N		3	90	.0380	.0760	.1020	.1270	.1520	.1520

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



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M.A. Ford® Mfg. Co., Inc.

7737 Northwest Blvd.
Davenport, IA 52806 USA
Ph: 563-391-6220 or 800-553-8024
Fax: 563-386-7660 or 800-892-9522
sales@maford.com

M.A. Ford® Asia-Pacific, Limited

Unit 2501, 25/F
148 Electric Road
North Point, Hong Kong
Ph: + 852-2167-7150
Fax: +852-2167-8150
sales@mafordap.com

M.A. Ford® Europe Ltd.

Unit 38 Royal Scot Road
Pride Park, Derby DE24 8AJ
United Kingdom
Ph: +44 (0) 1332 267960
Fax: +44 (0) 1332 267969
sales@mafordeurope.com

M.A. Ford® Asia-Pacific Ltd. (India)

412A, Arcadia
Hiranandani Estate,
Thane (W) - 400607
Maharashtra, India
Ph: +91 22 41237421
Fax: +91 22 41233387
sales@mafordin.com
www.maford.com

