



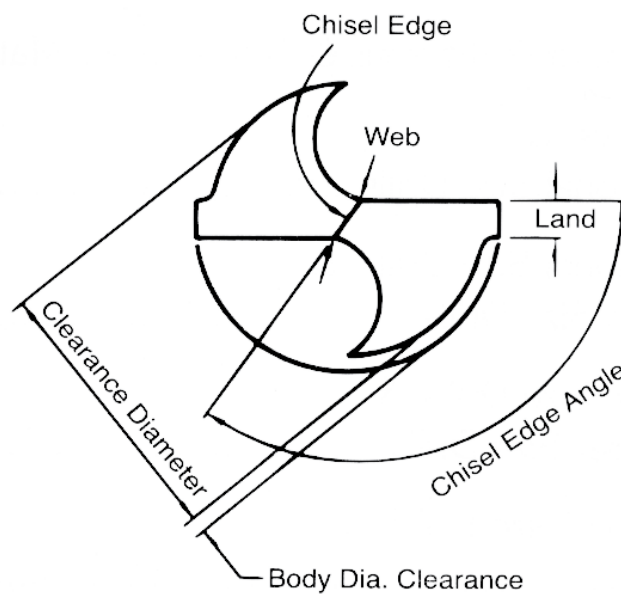
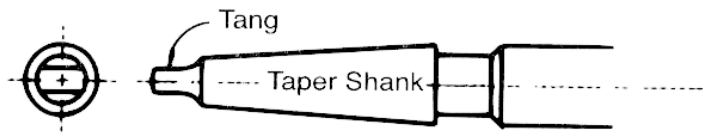
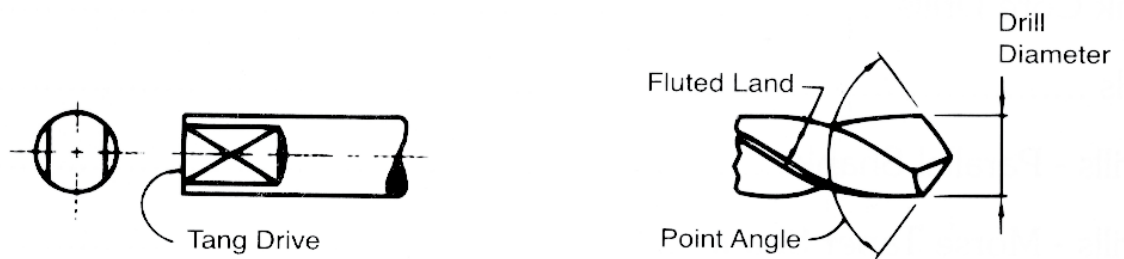
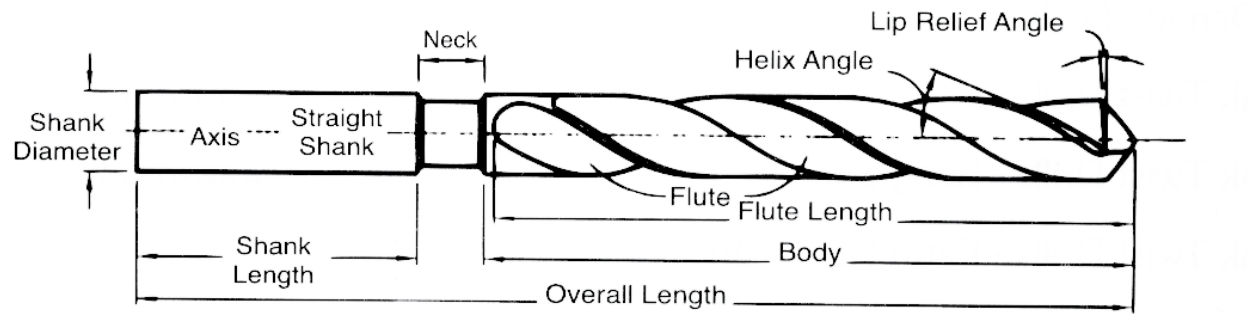
TWIST DRILLS

CONTENTS

Drill - Nomenclature	6
Parallel Shank Twist Drills - Jobber Series	7
Parallel Shank Twist Drills - Stub Series	12
Parallel Shank Twist Drills - Long Series	15
Parallel Shank Twist Drills - Extra Long Series	19
Silver and Deming Drills	20
Taper Shank Twist Drills	22
Taper Shank Twist Drills - Long Series	34
Taper Shank Twist Drills - Extra Long Series	38
Taper Shank Core Drills	39
Centre Drills	41
Subland Drills - Parallel Shank	45
Subland Drills - Morse Taper Shank	47
Technical Information	50
High Speed Steels used for Cutting Tools &	
Technical Calculations - Drilling	51
Helix Angles for Twist Drills &	
Recommended 'Tool Types' and Point Angles for various materials	52
Peripheral Speeds for HSS Twist Drills	
(Ferrous & Non Ferrous Materials)	53
Drilling Speeds for Thermoplastics &	54
Table of Cutting Speeds - Fractional Size Drills	55
Table of Cutting Speeds - Metric Size Drills	59
Feeds for HSS Twist Drills	57
Types of Drill Points and Cutting Fluids	58
Decimal Equivalents	59
Decimal and Metric Equivalents for Gauge and Letter Size Drills	64
Standard Tolerances and Deviations	65



DRILL - NOMENCLATURE





High Speed Steel PARALLEL SHANK TWIST DRILLS Jobber Series

Specifications Conform to
IS 5101 - 1991
ISO 235 - 1980
DIN 338 - 1978
BS 328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8			Flute Length	Overall Length
mm	Inch	Number Series		
0.30			3	19
0.40	1/64		5	20
0.50			6	22
0.60			7	24
0.70			9	28
0.80	1/32	68,67,66	10	30
0.90		65,64,63	11	32
1.00		62,61,60,59	12	34
1.10		58,57	14	36
1.20	3/64	56	16	38
1.30		55	16	38
1.40		54	18	40
1.50			18	40
1.60	1/16	53,52	20	43
1.70			20	43
1.80		51,50	22	46
1.90		49	22	46
2.00	5/64	48,47	24	49
2.10		46,45	24	49
2.20		44	27	53
2.30		43	27	53
2.40	3/32	42,41	30	57
2.50		40,39	30	57
2.60		38,37	30	57
2.70		36	33	61

Diameters h8			Flute Length	Overall Length
mm	Inch	Number Series		
2.80	7/64	35,34	33	61
2.90		33,32	33	61
3.00			33	61
3.10		31	36	65
3.20	1/8		36	65
3.30		30	36	65
3.40			39	70
3.50		29	39	70
3.60	9/64	28	39	70
3.70		27,26	39	70
3.80		25	43	75
3.90		24,23	43	75
4.00	5/32	22,21	43	75
4.10		20	43	75
4.20		19	43	75
4.30		18	47	80
4.40	11/64	17	47	80
4.50		16	47	80
4.60		15,14	47	80
4.70		13	47	80
4.80	3/16	12	52	86
4.90		11,10	52	86
5.00		9	52	86
5.10		9	52	86
5.20	13/64	6,5	52	86

A drill having two flutes and a parallel shank of approximately the same diameter as the cutting end.

Type 'N' Drills shall be supplied unless otherwise specified.



High Speed Steel PARALLEL SHANK TWIST DRILLS Jobber Series

Specifications Conform to
IS 5101 - 1991
ISO 235 - 1980
DIN 338 - 1978
BS328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8			Flute Length	Overall Length
mm	Inch	Number & Letter series		
5.30			52	86
5.40		4,3	57	93
5.50			57	93
5.60	7/32	2	57	93
5.70			57	93
5.80		1	57	93
5.90		A	57	93
6.00	15/64		57	93
6.10		B,C	63	101
6.20		D	63	101
6.30			63	101
6.40	1/4	E	63	101
6.50		F	63	101
6.60		G	63	101
6.70			63	101
6.80	17/64	H	69	109
6.90		I	69	109
7.00		J	69	109
7.10	9/32	K	69	109
7.20			69	109
7.30			69	109
7.40		L	69	109
7.50		M	69	109
7.60	19/64		75	117
7.70		N	75	117
7.80			75	117
7.90	5/16		75	117
8.00		O	75	117
8.10			75	117
8.20		P	75	117
8.30	21/64		75	117
8.40		Q	75	117
8.50			75	117

Diameters h8			Flute Length	Overall Length
mm	Inch	Number & Letter series		
8.60		R	81	125
8.70	11/32		81	125
8.80		S	81	125
8.90			81	125
9.00			81	125
9.10	23/64	T	81	125
9.20			81	125
9.30		U	81	125
9.40			81	125
9.50			81	125
9.60	3/8	V	87	133
9.70			87	133
9.80		W	87	133
9.90	25/64		87	133
10.00			87	133
10.10		X	87	133
10.20			87	133
10.30	13/32	Y	87	133
10.40			87	133
10.50		Z	87	133
10.60		-	87	133
10.70	27/64	-	94	142
10.80		-	94	142
10.90		-	94	142
11.00		-	94	142
11.10	7/16	-	94	142
11.20		-	94	142
11.30		-	94	142
11.40		-	94	142
11.50	29/64	-	94	142
11.60		-	94	142
11.70		-	94	142
11.80		-	94	142



High Speed Steel PARALLEL SHANK TWIST DRILLS Jobber Series

Specifications Conform to
IS 5101 - 1991
ISO 235 - 1980
DIN 338 - 1978
BS328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length
mm	Inch		
11.90	15/32	101	151
12.00		101	151
12.10		101	151
12.20		101	151
12.30	31/64	101	151
12.40		101	151
12.50		101	151
12.60		101	151
12.70	1/2	101	151
12.80		101	151
12.90		101	151
13.00		101	151
13.10	33/64	101	151
13.20		101	151
13.30		108	160
13.40		108	160
13.50	17/32	108	160

Diameters h8		Flute Length	Overall Length
mm	Inch		
13.60		108	160
13.70		108	160
13.80		108	160
13.90	35/64	108	160
14.00		108	160
14.25	9/16	114	169
14.50		114	169
14.75	37/64	114	169
15.00		114	169
15.25	19/32	120	178
15.50	39/64	120	178
15.75		120	178
16.00	5/8	120	178
17.00		125	184
18.00	11/16	130	191
19.00		135	198
20.00	3/4	140	205



High Speed Steel PARALLEL SHANK TWIST DRILLS Jobber Series

Specifications Conform to
ASME B94. 11M-1993
Dimensions in mm / Inch



Diameter			Flute Length	Overall Length
Fraction	Number & Letter Series	mm		
-	-	0.30	2.4	19
1/64	-	0.40	5.0	19
-	-	0.50	5.0	22
-	-	0.60	8.0	29
-	-	0.70	10.0	32
1/32	68,67,66	0.80	13.0	35
-	65,64,63,62	0.90	16.0	38
-	61,60,59,58	1.00	17.0	41
3/64	57,56	1.10	19.0	44
-	-	1.20	22.0	48
-	55	1.30	22.0	48
-	54	1.40	22.0	48
-	53	1.50	22.0	48
1/16	52	1.60	22.0	48
-	51	1.70	25.0	51
-	50	1.80	25.0	51
-	49,48	1.90	25.0	51
5/64	47	2.00	25.0	51
-	46,45,44	2.10	29.0	54
-	-	2.20	32.0	57
3/32	43,42	2.30	32.0	57
-	41	2.40	35.0	60
-	40,39	2.50	35.0	60
-	38,37	2.60	37.0	64
-	36	2.70	37.0	64
7/64	35,34,33	2.80	38.0	67
-	32	2.90	41.0	70
-	31	3.00	41.0	70
-	-	3.10	41.0	70
1/8	30	3.20	41.0	70
-	-	3.30	44	73
-	29	3.40	44	73
9/64	28	3.50	44	73

Diameter			Flute Length	Overall Length
Fraction	Number & Letter Series	mm		
-	-	3.60	48	76
-	27,26	3.70	48	76
-	25	3.80	48	76
5/32	24,23,22	3.90	51	79
-	21	4.00	54	83
-	20	4.10	54	83
-	19	4.20	54	83
11/64	18	4.30	54	83
-	17	4.40	56	86
-	16	4.50	56	86
-	15,14	4.60	56	86
-	13	4.70	59	89
3/16	12,11	4.80	59	89
-	10	4.90	62	92
-	9	5.00	62	92
13/64	8,7	5.10	62	92
-	6,5	5.20	64	95
-	4	5.30	64	95
-	3	5.40	64	95
7/32	-	5.50	64	95
-	2	5.60	67	98
-	-	5.70	67	98
-	1	5.80	67	98
15/64	A	5.90	67	98
-	B	6.00	70	102
-	C	6.10	70	102
-	D	6.20	70	102
1/4	E	6.30	70	102
-	-	6.40	73	105
-	F	6.50	73	105
-	G	6.60	73	105
17/64	-	6.70	73	105
-	H	6.80	73	105



High Speed Steel PARALLEL SHANK TWIST DRILLS Jobber Series

Specifications Conform to
ASME B94. 11M-1993
Dimensions in mm / Inch



Diameter			Flute Length	Overall Length
Fraction	Letter Series	mm		
-	I	6.90	73	105
-	J	7.00	73	105
9/32	K	7.10	75	108
-	-	7.20	75	108
-	L	7.30	75	108
-	-	7.40	78	111
19/64	M	7.50	78	111
-	N	7.60	78	111
-	-	7.70	81	114
-	-	7.80	81	114
19/64	-	7.90	81	114
-	O	8.00	81	114
-	-	8.10	84	117
21/64	-	8.20	84	117
-	P	8.30	84	117
-	Q	8.40	87	121
-	-	8.50	87	121
-	R	8.60	87	121
11/32	-	8.70	87	121
-	S	8.80	89	124
-	-	8.90	89	124
-	T	9.00	89	124
23/64	-	9.10	89	124
-	-	9.20	92	127
-	U	9.30	92	127
-	-	9.40	92	127
3/8	V	9.50	92	127
-	-	9.60	95	130
-	-	9.70	95	130
-	W	9.80	95	130
25/64	-	9.90	95	130
-	X	10.00	95	130

Diameter			Flute Length	Overall Length
Fraction	Letter Series	mm		
13/32	Y	10.20	98	133
-	Z	10.50	98	133
27/64	-		100	137
-	-	10.80	103	140
7/16	-	11.00	103	140
-	-	11.20	106	143
29/64	-	11.50	106	143
15/32	-	11.80	110	146
-	-	12.00	111	149
31/64	-	12.20	111	149
-	-	12.50	114	152
1/2	-	12.80	114	152
-	-	13.00	114	152
33/64	-	13.20	122	168
17/32	-	13.50	122	168
35/64	-	13.80	122	168
-	-	14.00	122	168
9/16	-	14.25	122	168
37/64	-	14.50	122	168
-	-	14.75	132	181
19/32	-	15.00	132	181
-	-	15.25	132	181
39/64	-	15.50	132	181
5/8	-	15.75	132	181
-	-	16.00	132	181
41/64	-	16.25	132	181
21/32	-	16.50	132	181
-	-	16.75	143	194
43/64	-	17.00	143	194
-	-	17.25	143	194
11/16	-	17.50	143	194



High Speed Steel PARALLEL SHANK TWIST DRILLS Stub Series

Specifications Conform to
IS 5100 - 1969
ISO 235 - 1980
DIN 1897 - 1984
BS328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length
mm	Inches		
1.00	-	6	26
1.20	3/64	8	30
1.50	-	9	32
-	1/16	10	34
1.80	-	11	36
2.00	5/64	12	38
2.20	-	13	40
2.50	3/32	14	43
2.80	7/64	16	46
3.00	-	16	46
3.20	1/8	18	49
3.50	9/64	20	52
3.80	-	22	55
4.00	5/32	22	55
4.20	-	22	55
4.50	11/64	24	58
4.80	3/16	26	62
5.00	-	26	62
5.20	13/64	26	62
5.50	7/32	28	66
5.80	-	28	66
6.00	15/64	28	66

Diameters h8		Flute Length	Overall Length
mm	Inches		
6.20	-	31	70
6.50	1/4	31	70
6.80	17/64	34	74
7.00	-	34	74
7.20	9/32	34	74
7.50	-	34	74
7.80	19/64	37	79
8.00	5/16	37	79
8.20	21/64	37	79
8.50	-	37	79
8.80	11/32	40	84
9.00	-	40	84
9.20	23/64	40	84
9.50	-	40	84
9.80	3/8	43	89
10.00	25/64	43	89
10.20	13/32	43	89
10.50	-	43	89
10.80	27/64	47	95
11.00	-	47	95
11.20	7/16	47	95
11.50	29/64	47	95

A shortened form of parallel shank jobber series twist drill, the reduction in length being in the flute length.

Type 'N' Drills shall be supplied unless otherwise specified.



High Speed Steel PARALLEL SHANK TWIST DRILLS Stub Series

Specifications Conform to
IS 5100 - 1969
ISO 235 - 1980
DIN 1897 - 1984
BS328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length
mm	Inches		
11.80	-	47	95
12.00	15/32	51	102
12.20	31/64	51	102
12.50	-	51	102
12.80	1/2	51	102
13.00	33/64	51	102
13.20	-	51	102
13.50	17/32	54	107
13.80	35/64	54	107
14.00	-	54	107
14.25	9/16	56	111
14.50	-	56	111
14.75	37/64	56	111
15.00	-	56	111
15.25	19/32	58	115
15.50	39/64	58	115
15.75	5/8	58	115
16.00	-	58	115
16.25	41/64	60	119
16.50	-	60	119
16.75	21/32	60	119
17.00	-	60	119
17.25	43/64	62	123
17.50	11/16	62	123
17.75	45/64	62	123
18.00	-	62	123
18.25	23/32	64	127
18.50	-	64	127
18.75	47/64	64	127
19.00	-	64	127

Diameters h8		Flute Length	Overall Length
mm	Inches		
19.25	3/4	66	131
19.50	49/64	66	131
19.75	25/32	66	131
20.00	-	66	131
20.25	51/64	68	136
20.50	-	68	136
20.75	13/16	68	136
21.00	53/64	68	136
21.25	-	70	141
21.50	27/32	70	141
21.75	55/64	70	141
22.00	-	70	141
22.25	7/8	70	141
22.50	-	72	146
22.75	57/64	72	146
23.00	29/32	72	146
23.25	-	72	146
23.50	59/64	72	146
23.75	15/16	75	151
24.00	-	75	151
24.25	61/64	75	151
24.50	31/32	75	151
24.75	-	75	151
25.00	-	75	151
25.25	63/64	78	156
25.50	1	78	156
25.75	-	78	156
26.00	-	78	156
26.25	1 1/32	78	156
26.50	-	78	156



High Speed Steel PARALLEL SHANK TWIST DRILLS Stub Series

Specifications Conform to
IS 5100 - 1969
ISO 235 - 1980
DIN 1897 - 1984
BS328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length
MM	Inches		
26.75	-	81	162
27.00	1.1/16	81	162
27.25	-	81	162
27.50	-	81	162
27.75	1.3/32	81	162
28.00	-	81	162
28.25	-	84	168
28.50	1.1/8	84	168
28.75	-	84	168
29.00	-	84	168
29.25	-	84	168
29.50	1.5/32	84	168
29.75	-	84	168
30.00	-	84	168
30.25	1.3/16	87	174
30.50	-	87	174
30.75	-	87	174
31.00	1.7/32	87	174
31.25	-	87	174

Diameters h8		Flute Length	Overall Length
mm	Inches		
31.50	-	87	174
31.75	1.1/4	90	180
32.00	-	90	180
32.50	1.9/32	90	180
33.00	-	90	180
33.50	1.5/16	90	180
34.00	1.11/32	93	186
34.50	-	93	186
35.00	1.3/8	93	186
35.50	-	93	186
36.00	1.13/32	96	193
36.50	1.7/16	96	193
37.00	-	96	193
37.50	1.15/32	96	193
38.00	1.1/2	100	200
38.50	-	100	200
39.00	-	100	200
39.50	-	100	200
40.00	-	100	200



High Speed Steel PARALLEL SHANK TWIST DRILLS Long Series

Specifications Conform to :
IS 5102 - 1969
ISO 494 - 1975
DIN 340 - 1978
BS328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length
mm	Inches		
1.00	-	33	56
1.10	-	37	60
1.20	3/64	41	65
1.30	-	41	65
1.40	-	45	70
1.50	-	45	70
1.60	1/16	50	76
1.70	-	50	76
1.80	-	53	80
1.90	-	53	80
2.00	5/64	56	85
2.10	-	56	85
2.20	-	59	90
2.30	-	59	90
2.40	3/32	62	95
2.50	-	62	95
2.60	-	62	95
2.70	-	66	100
2.80	7/64	66	100
2.90	-	66	100
3.00	-	66	100

Diameters h8		Flute Length	Overall Length
mm	Inches		
3.10	-	69	106
3.20	1/8	69	106
3.30	-	69	106
3.40	-	73	112
3.50	-	73	112
3.60	9/64	73	112
3.70	-	73	112
3.80	-	78	119
3.90	-	78	119
4.00	5/32	78	119
4.10	-	78	119
4.20	-	78	119
4.30	-	82	126
4.40	11/64	82	126
4.50	-	82	126
4.60	-	82	126
4.70	-	82	126
4.80	3/16	87	132
4.90	-	87	132
5.00	-	87	132
5.10	-	87	132

A lengthened form of parallel shank jobber series twist drill, the increase in length being in the flute length.

Type 'N' Drills shall be supplied unless otherwise specified.



High Speed Steel PARALLEL SHANK TWIST DRILLS Long Series

Specifications Conform to
IS 5102 - 1969
ISO 494 - 1975
DIN 340 - 1978
BS328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length
mm	Inches		
5.20	13/64	87	132
5.30	-	87	132
5.40	-	91	139
5.50	-	91	139
5.60	7/32	91	139
5.70	-	91	139
5.80	-	91	139
5.90	-	91	139
6.00	15/64	91	139
6.10	-	97	148
6.20	-	97	148
6.30	-	97	148
6.40	1/4	97	148
6.50	-	97	148
6.60	-	97	148
6.70	-	97	148
6.80	17/64	102	156
6.90	-	102	156
7.00	-	102	156
7.10	9/32	102	156
7.20	-	102	156
7.30	-	102	156
7.40	-	102	156
7.50	-	102	156
7.60	19/64	109	165
7.70	-	109	165
7.80	-	109	165
7.90	5/16	109	165
8.00	-	109	165
8.10	-	109	165

Diameters h8		Flute Length	Overall Length
mm	Inches		
8.20	-	109	165
8.30	21/64	109	165
8.40	-	109	165
8.50	-	109	165
8.60	-	115	175
8.70	11/32	115	175
8.80	-	115	175
8.90	-	115	175
9.00	-	115	175
9.10	23/64	115	175
9.20	-	115	175
9.30	-	115	175
9.40	-	115	175
9.50	-	115	175
9.60	3/8	121	184
9.70	-	121	184
9.80	-	121	184
9.90	25/64	121	184
10.00	-	121	184
10.10	-	121	184
10.20	-	121	184
10.30	13/32	121	184
10.40	-	121	184
10.50	-	121	184
10.60	-	121	184
10.70	27/64	128	195
10.80	-	128	195
10.90	-	128	195
11.00	-	128	195
11.10	7/16	128	195



High Speed Steel PARALLEL SHANK TWIST DRILLS Long Series

Specifications Conform to
IS 5102 - 1969
ISO 494 - 1975
DIN 340 - 1978
BS328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length
mm	Inches		
11.20	-	128	195
11.30	-	128	195
11.40	-	128	195
11.50	29/64	128	195
11.60	-	128	195
11.70	-	128	195
11.80	-	128	195
11.90	15/32	134	205
12.00	-	134	205
12.10	-	134	205
12.20	-	134	205
12.30	31/64	134	205
12.40	-	134	205
12.50	-	134	205
12.60	-	134	205
12.70	1/2	134	205
12.80	-	134	205
12.90	-	134	205
13.00	-	134	205
13.10	33/64	134	205
13.20	-	134	205
13.30	-	140	214
13.40	-	140	214
13.50	17/32	140	214
13.60	-	140	214
13.70	-	140	214
13.80	-	140	214
13.90	35/64	140	214
14.00	-	140	214
14.25	9/16	144	220

Diameters h8		Flute Length	Overall Length
mm	Inches		
14.50	-	144	220
14.75	37/64	144	220
15.00	-	144	220
15.25	19/32	149	227
15.50	39/64	149	227
15.75	-	149	227
16.00	5/8	149	227
16.25	41/64	154	235
16.50	-	154	235
16.75	21/32	154	235
17.00	-	154	235
17.25	43/64	158	241
17.50	11/16	158	241
17.75	45/64	158	241
18.00	-	158	241
18.25	23/32	162	247
18.50	-	162	247
18.75	47/64	162	247
19.00	-	162	247
19.25	3/4	166	254
19.50	49/64	166	254
19.75	25/32	166	254
20.00	-	166	254
20.25	51/64	171	261
20.50	-	171	261
20.75	13/16	171	261
21.00	53/64	171	261
21.25	-	176	268
21.50	27/32	176	268
21.75	55/64	176	268



High Speed Steel PARALLEL SHANK TWIST DRILLS Long Series

Specifications Conform to
IS 5102 - 1969
ISO 494 - 1975
DIN 340 - 1978
BS328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length
mm	Inches		
22.00	-	176	268
22.25	7/8	176	268
22.50	-	180	275
22.75	57/64	180	275
23.00	29/32	180	275
23.25	-	180	275
23.50	59/64	180	275
23.75	15/16	185	282
24.00	-	185	282
24.25	61/64	185	282
24.50	31/32	185	282
24.75	-	185	282
25.00	-	185	282
25.25	63/64	190	290
25.50	1	190	290
25.75	-	190	290
26.00	-	190	290
26.25	1.1/32	190	290
26.50	-	190	290
26.75	-	195	298

Diameters h8		Flute Length	Overall Length
mm	Inches		
27.00	1.1/16	195	298
27.25	-	195	298
27.50	-	195	298
27.75	1.3/32	195	298
28.00	-	195	298
28.25	-	201	307
28.50	1.1/8	201	307
28.75	-	201	307
29.00	-	201	307
29.25	-	201	307
29.50	1.5/32	201	307
29.75	-	201	307
30.00	-	201	307
30.25	1.3/16	207	316
30.50	-	207	316
30.75	-	207	316
31.00	1.7/32	207	316
31.25	-	207	316
31.50	-	207	316



High Speed Steel PARALLEL SHANK TWIST DRILLS Extra Long Series

Specifications Conform to
IS 7823 - 2005.
ISO 3292 : 1995.
Dimensions in mm / Inch



Drill dia h8	Flute length	Overall Length
2	80	125
	100	160
2.5	80	125
	100	160
3	100	160
	150	200
3.5	100	160
	150	200
4	100	160
	150	200
4.5	100	160
	150	200
	200	250
5	150	200
	200	250
	250	315
5.5	150	200
	200	250
	250	315
6	150	200
	200	250
	250	315
6.5	150	200
	200	250
	250	315
7	150	200
	200	250
	250	315
7.5	150	200
	200	250
	250	315

Drill dia h8	Flute length	Overall Length
8	200	250
	250	315
	300	400
8.5	200	250
	250	315
	300	400
9	200	250
	250	315
	300	400
9.5	200	250
	250	315
	300	400
10	200	250
	250	315
	300	400
11	200	250
	250	315
	300	400
12	200	250
	250	315
	300	400
13	200	250
	250	315
	300	400
14	200	250
	250	315
	300	400

Ranges of Diameters h8	Ø2 to Ø2.65	Ø2 to Ø4.75	Ø2.65 to Ø 7.50	Ø3.35 to Ø 14.00	Ø3.75 to Ø 14.00	Ø4.75 to Ø 14.00
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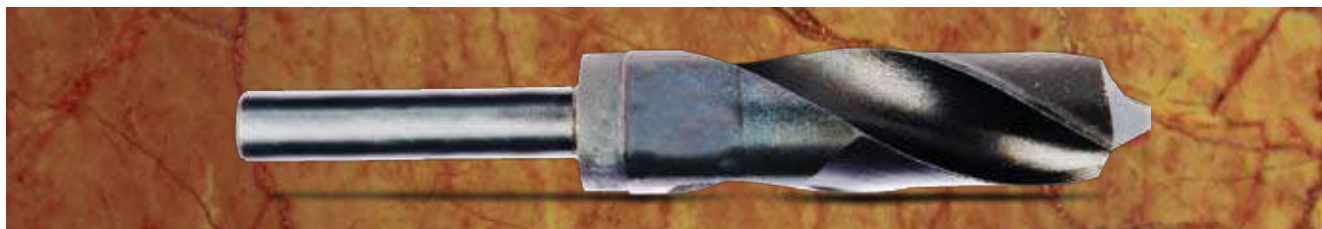
A lengthened form of the Parallel Shank Twist Drill , longer than long series.

Type 'N' Drills shall be supplied unless otherwise specified.



High Speed Steel SILVER AND DEMING DRILLS - 1/2" SHANK (Size of Shank : 1/2" Dia x 2 1/4" Shank Length)

Specifications Conform to
Dimensions in mm / Inch



Size	Flute Length	Overall Length
33/64	3	6
17/32	3	6
35/64	3	6
9/16	3	6
37/64	3	6
19/32	3	6
39/64	3	6
5/8	3	6
41/64	3	6
21/32	3	6
43/64	3	6
11/16	3	6
45/64	3	6
23/32	3	6
47/64	3	6
3/4	3	6
49/64	3	6
25/32	3	6
51/64	3	6
13/16	3	6
53/64	3	6
27/32	3	6
55/64	3	6
7/8	3	6

Size	Flute Length	Overall Length
57/64	3	6
29/32	3	6
59/64	3	6
15/16	3	6
61/64	3	6
31/32	3	6
63/64	3	6
1	3	6
1.1/32	3	6
1.1/16	3	6
1.3/32	3	6
1.1/8	3	6
1.5/32	3	6
1.3/16	3	6
1.7/32	3	6
1.1/4	3	6
1.9/32	3	6
1.5/16	3	6
1.11/32	3	6
1.3/8	3	6
1.13/32	3	6
1.7/16	3	6
1.15/32	3	6
1.1/2	3	6



High Speed Steel

SILVER AND DEMING DRILLS - 1/2" SHANK
(Size of Shank : 1/2" Dia x 2 1/4" Shank Length)

Specifications Conform to
Dimensions in mm / Inch



Size	Flute Length	Overall Length
13.50	3. 1/8	6
14.00	3. 1/8	6
14.50	3. 1/8	6
15.00	3. 1/8	6
15.50	3. 1/8	6
16.00	3. 1/8	6
16.50	3. 1/8	6
17.00	3. 1/8	6
17.50	3. 1/8	6
18.00	3. 1/8	6
18.50	3. 1/8	6
19.00	3. 1/8	6
19.50	3. 1/8	6
20.00	3. 1/8	6
20.50	3. 1/8	6
21.00	3. 1/8	6
21.50	3. 1/8	6

Size	Flute Length	Overall Length
22.00	3. 1/8	6
22.50	3. 1/8	6
23.00	3. 1/8	6
23.50	3. 1/8	6
24.00	3. 1/8	6
24.50	3. 1/8	6
25.00	3. 1/8	6
25.50	3. 1/8	6
26.00	3. 1/8	6
26.50	3. 1/8	6
27.00	3. 1/8	6
27.50	3. 1/8	6
28.00	3. 1/8	6
28.50	3. 1/8	6
29.00	3. 1/8	6
29.50	3. 1/8	6
30.00	3. 1/8	6



High Speed Steel TAPER SHANK TWIST DRILLS

Specifications Conform to
DRG.No.DES 101400 Issue :1
Dated 21.05.1993
Dimensions in mm
DIN : 338 : Mar 1978.



Size	Flute Length. L ₁	Overall Length. L
10.50	87	133
11.00	94	142
11.50	94	142
12.00	101	151
12.50	101	151
13.00	101	151
13.50	108	160

Size	Flute Length L ₁	Overall Length L
13.50	108	160
14.00	108	160
14.50	11	169
15.00	114	169
15.50	120	178
16.00	120	178
25.00	3. 1/8	6

26° to 32° R.H.Helix & R.H.CUTTING.
POINT ANGLE 118° ±3° with Std. Web Thickness.
Other Unspecified details to DIN : 338 (March 1978)

LENGTH		TOLERANCES	
OVER	UPTO	l	l ₁
30	120	+ 3 / - 0	± 1.50
120	315	+ 4 / - 0	± 2.00



High Speed Steel PARALLEL SHANK TWIST DRILLS

Specifications Conform to :
Dimensions in mm



TWIST DRILLS

Sl.No.	Size D h8	l ₁	l ₂ min	d f ₁₁	l ₃ ±1.50
1	10.50	133	87	10	30
2	11.00	142	94		
3	11.50	142	94		
4	12.00	151	101		
5	12.50	151	101		
6	13.00	151	101		
7	13.50	160	108		
8	14.00	160	108		
9	14.50	169	114		
10	15.00	169	114		
11	15.50	178	120		
12	16.00	178	120		

Sl.No.	Size D h8	l ₁	l ₂ min	d f ₁₁	l ₃ ±1.50
13	14.00	160	108	13	40
14	14.50	169	114		
15	15.00	169	114		
16	15.50	178	120		
17	16.00	178	120		
18	16.50	184	125		
19	17.00	184	125		
20	17.50	192	130		
21	18.00	192	130		
22	18.50	199	135		
23	19.00	199	135		
24	19.50	206	140		
25	20.00	206	140		

Note :

Upto and including Ø13 to be made out of one piece construction (Solid)

Over Ø13 to be made out of two piece construction (Welding).

LENGTH		TOLERANCES	
OVER	UPTO	l	l ₁
30	120	+ 3 / - 0	± 1.50
120	315	+ 4 / - 0	± 2.00



HSS PARALLEL SHANK TWIST DRILL WITH REDUCED SHANK (J.S.) (DIN - 338.)

Specifications Conform to
DRG.No.DES 106100 Issue :2
Dated 19.11.1997
Dimensions in mm



Sl. No.	Size D h8	l ₁	l ₂ min	d f ₁₁	l ₃ ±1.50
1	10.50	133	87	10	30
2	11.00	142	94		
3	11.50	142	94		
4	12.00	151	101		
5	12.50	151	101		
6	13.00	151	101		
7	13.50	160	108		
8	14.00	160	108		
9	14.50	169	114		
10	15.00	169	114		
11	15.50	178	120		
12	16.00	178	120		

Sl. No.	Size D h8	l ₁	l ₂ min	d f ₁₁	l ₃ ±1.50
13	16.50	184	125	13	40
14	17.00	184	125		
15	17.50	192	130		
16	18.00	192	130		
17	18.50	199	135		
18	19.00	199	135		
19	19.50	206	140		
20	20.00	206	140		

Note :

Upto and including Ø13 to be made out of one piece construction (Solid).

Over Ø13 to be made out of two piece construction (Welding).

LENGTH		TOLERANCES	
OVER	UPTO	l	l ₁
30	120	+ 3 / - 0	± 1.50
120	315	+ 4 / - 0	± 2.00



HSS PARALLEL SHANK TWIST DRILL

Specifications Conform to
DRG.No.DES 107200 Issue :2
Dated 28.09.1999
Dimensions in mm



Size D h8	l ₁	l ₂ min	d f ₁₁	l ₃ ± 1.50
10.50	133	87	10	30
11.00	142	94		
11.50	142	94		
12.00	151	101		
12.50	151	101		
13.00	151	101		
13.50	160	108		
14.00	160	108		
14.50	169	114		
15.00	169	114		
15.50	178	120		
16.00	178	120		

Size D h8	l ₁	l ₂ min	d f ₁₁	l ₃ ± 1.50
16.50	184	125	13	35
17.00	184	125		
17.50	191	130		
18.00	191	130		
18.50	198	135		
19.00	198	135		
19.50	205	140		
20.00	205	140		
22.00	205	140		
24.00	205	140		
25.00	205	140		

Note :

Upto and including Ø13 to be made out of one piece construction (Solid).

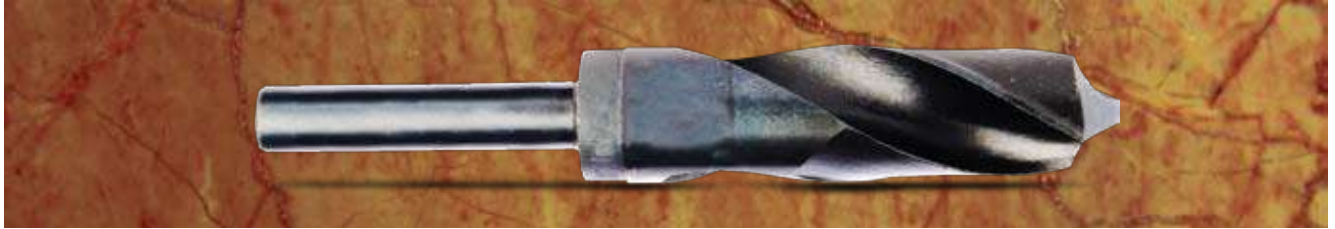
Over Ø13 to be made out of two piece construction (Welding).

LENGTH		TOLERANCES	
OVER	UPTO	l	l ₁
30	120	+ 3 / - 0	± 1.50
120	315	+ 4 / - 0	± 2.00



High Speed Steel SILVER AND DEMING DRILLS - 3/4" SHANK (Size of Shank : 3/4" Dia x 2 1/4" Shank Length)

Specifications Conform to :
Dimensions in Inch



Size	Flute Length	Overall Length
25/32	3	6
13/16	3	6
27/32	3	6
7/8	3	6
29/32	3	6
15/16	3	6
31/32	3	6
1	3	6
1.1/32	3	6
1.1/16	3	6
1.3/32	3	6
1.1/8	3	6
1.5/32	3	6
1.3/16	3	6
1.7/32	3	6
1.1/4	3	6
1.9/32	3	6
1.5/16	3	6
1.11/32	3	6
1.3/8	3	6

Size	Flute Length	Overall Length
1.13/32	3	6
1.7/16	3	6
1.15/32	3	6
1.1/2	3	6
1.17/32	3	6
1.9/16	3	6
1.19/32	3	6
1.5/8	3	6
1.21/32	3	6
1.11/16	3	6
1.23/32	3	6
1.3/4	3	6
1.25/32	3	6
1.13/16	3	6
1.27/32	3	6
1.7/8	3	6
1.29/32	3	6
1.15/16	3	6
1.31/32	3	6
2	3	6



High Speed Steel TAPER SHANK TWIST DRILLS

Specifications Conform to
IS 5103 - 1969
ISO 235 - 1980
DIN 345 - 1978
BS 328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length	Morse Taper No.
mm	inch			
3.00	-	33	114	1
3.20	1/8	36	117	1
3.50	9/64	39	120	1
3.80	-	43	124	1
4.00	5/32	43	124	1
4.20	-	43	124	1
4.50	11/64	47	128	1
4.80	3/16	52	133	1
5.00	-	52	133	1
5.20	13/64	52	133	1
5.50	7/32	57	138	1
5.80	-	57	138	1
6.00	15/64	57	138	1
6.20	-	63	144	1
6.50	1/4	63	144	1
6.80	17/64	69	150	1
7.00	-	69	150	1
7.20	9/32	69	150	1
7.50	-	69	150	1
7.80	19/64	75	156	1
8.00	5/16	75	156	1

Diameters h8		Flute Length	Overall Length	Morse Taper No.
mm	inch			
8.20	21/64	75	156	1
8.50	-	75	156	1
8.80	11/32	81	162	1
9.00	-	81	162	1
9.20	23/64	81	162	1
9.50	-	81	162	1
9.80	3/8	87	168	1
10.00	25/64	87	168	1
10.20	13/32	87	168	1
10.50	-	87	168	1
10.80	27/64	94	175	1
11.00	-	94	175	1
11.20	7/16	94	175	1
11.50	29/64	94	175	1
11.80	-	94	175	1
12.00	15/32	101	182	1
12.20	31/64	101	182	1
12.50	-	101	182	1
12.80	1/2	101	182	1
13.00	33/64	101	182	1
13.20	-	101	182	1

A drill having two helical flutes and a standard Morse Taper Shank.

Type 'N' Drills shall be supplied unless otherwise specified.



High Speed Steel TAPER SHANK TWIST DRILLS

Specifications Conform to
IS 5103 - 1969
ISO 235 - 1980
DIN 345 - 1978
BS 328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length	Morse Taper No.
mm	inch			
13.50	17/32	108	189	1
13.80	35/64	108	189	1
14.00	-	108	189	1
14.25	9/16	114	212	2
14.50	-	114	212	2
14.75	37/64	114	212	2
15.00	-	114	212	2
15.25	19/32	120	218	2
15.50	39/64	120	218	2
15.75	-	120	218	2
16.00	5/8	120	218	2
16.25	41/64	125	223	2
16.50	-	125	223	2
16.75	21/32	125	223	2
17.00	-	125	223	2
17.25	43/64	130	228	2
17.50	11/16	130	228	2
17.75	-	130	228	2
18.00	45/64	130	228	2
18.25	23/32	135	233	2
18.50	-	135	233	2
18.75	47/64	135	233	2
19.00	-	135	233	2
19.25	3/4	140	238	2
19.50	49/64	140	238	2
19.75	25/32	140	238	2
20.00	-	140	238	2
20.25	51/64	145	243	2
20.50	-	145	243	2
20.75	13/16	145	243	2

Diameters h8		Flute Length	Overall Length	Morse Taper No.
mm	inch			
21.00	53/64	145	243	2
21.25	-	150	248	2
21.50	27/32	150	248	2
21.75	55/64	150	248	2
22.00	-	150	248	2
22.25	7/8	150	248	2
22.50	57/64	155	253	2
22.75	-	155	253	2
23.00	29/32	155	253	2
23.25	-	155	253	3
23.50	59/64	155	253	3
23.75	15/16	160	281	3
24.00	-	160	281	3
24.25	61/64	160	281	3
24.50	31/32	160	281	3
24.75	-	160	281	3
25.00	-	160	281	3
25.25	63/64	165	286	3
25.50	1	165	286	3
25.75	1.1/64	165	286	3
26.00	-	165	286	3
26.25	1.1/32	165	286	3
26.50	-	165	286	3
26.75	1.3/64	170	291	3
27.00	1.1/16	170	291	3
27.25	-	170	291	3
27.50	1.5/64	170	291	3
27.75	1.3/32	170	291	3
28.00	-	170	291	3
28.25	1.7/64	175	296	3



High Speed Steel TAPER SHANK TWIST DRILLS

Specifications Conform to
IS 5103 - 1969
ISO 235 - 1980
DIN 345 - 1978
BS 328 : Part 1 : 1986
Dimensions in mm / Inch



Diameters h8		Flute Length	Overall Length	Morse Taper No.
mm	inch			
28.50	1.1/8	175	296	3
28.75	-	175	296	3
29.00	1.9/64	175	296	3
29.25	-	175	296	3
29.50	1.5/32	175	296	3
29.75	1.11/64	175	296	3
30.00	-	175	296	3
30.25	1.3/16	180	301	3
30.50	1 13/64	180	301	3
30.75	-	180	301	3
31.00	1.7/32	180	301	3
31.25	1.15/64	180	301	3
31.50	-	180	301	3
31.75	1.1/4	185	306	3
32.00	-	185	334	4
32.50	1.9/32	185	334	4
33.00	-	185	334	4
33.50	1.5/16	185	334	4
34.00	1.11/32	190	339	4
34.50	-	190	339	4
35.00	1.3/8	190	339	4
35.50	-	190	339	4
36.00	1.13/32	195	344	4
36.50	1.7/16	195	344	4
37.00	-	195	344	4
37.50	1.15/32	195	344	4
38.00	1.1/2	200	349	4
38.50	-	200	349	4
39.00	1.17/32	200	349	4
39.50	1.9/16	200	349	4
40.00	-	200	349	4

Diameters h8		Flute Length	Overall Length	Morse Taper No.
mm	inch			
40.50	1.19/32	205	354	4
41.00	-	205	354	4
41.50	1.5/8	205	354	4
42.00	1.21/32	205	354	4
42.50	-	205	354	4
43.00	1.11/16	210	359	4
43.50	1.23/32	210	359	4
44.00	-	210	359	4
44.50	1.3/4	210	359	4
45.00	-	210	359	4
45.50	1.25/32	215	364	4
46.00	1.13/16	215	364	4
46.50	-	215	364	4
47.00	1.27/32	215	364	4
47.50	-	215	364	4
48.00	1.7/8	220	369	4
48.50	1.29/32	220	369	4
49.00	1.15/16	220	369	4
49.50	-	220	369	4
50.00	-	220	369	4
50.50	1.31/32,2	225	374	4
51.00	-	225	412	5
52.00	2.1/16	225	412	5
53.00	-	225	412	5
54.00	2.1/8	230	417	5
55.00	-	230	417	5
56.00	2.3/16	230	417	5
57.00	2.1/4	235	422	5
58.00	-	235	422	5
59.00	2.5/16	235	422	5
60.00	-	235	422	5



High Speed Steel TAPER SHANK TWIST DRILLS

Specifications Conform to
IS 5103 - 1969
ISO 235 - 1980
DIN 345 - 1978
BS 328 : Part 1 : 1986
Dimensions in mm / Inch



Diameter h8		Flute Length	Overall Length	Morse Taper No.
mm	inch			
61.00	2.3/8	240	427	5
62.00	2.7/16	240	427	5
63.00	-	240	427	5
64.00	2.1/2	245	432	5
65.00	2.9/16	245	432	5
66.00	-	245	432	5
67.00	2.5/8	245	432	5
68.00	2.11/16	250	437	5
69.00	-	250	437	5
70.00	2.3/4	250	437	5
71.00	-	250	437	5
72.00	2.13/16	255	442	5
73.00	2.7/8	255	442	5
74.00	-	255	442	5
75.00	2.15/16	255	442	5
76.00	3	260	447	5
77.00	-	260	514	6
78.00	3.1/16	260	514	6
79.00	3.1/18	260	514	6
80.00	-	260	514	6
81.00	3.3/16	265	519	6

Diameter h8		Flute Length	Overall Length	Morse Taper No.
mm	inch			
82.00	-	265	519	6
83.00	3.1/4	265	519	6
84.00	3.5/16	265	519	6
85.00	-	265	519	6
86.00	3.3/8	270	524	6
87.00	3.7/16	270	524	6
88.00	-	270	524	6
89.00	3.1/2	270	524	6
90.00	-	270	524	6
91.00	3.9/16	275	529	6
92.00	3.5/8	275	529	6
93.00	-	275	529	6
94.00	3.11/16	275	529	6
95.00	-	275	529	6
96.00	3.3/4	280	534	6
97.00	3.13/16	280	534	6
98.00	3.7/8	280	534	6
99.00	-	280	534	6
100.00	-	280	534	6
101.00	3.15/16	285	539	6
102.00	4	285	539	6



High Speed Steel TAPER SHANK TWIST DRILLS

Specifications Conform to
ASME B94.11M - 1993
Dimensions in mm / Inch



TWIST DRILLS

Diameter h8		REGULAR SHANK		
Fraction	mm	Flute Length	Overall Length	Morse Taper No.
1/8	3.00	48	130	1
-	3.20	54	137	1
9/64	3.50	54	137	1
5/32	3.80	54	137	1
-	4.00	64	146	1
11/64	4.20	64	146	1
3/16	4.50	64	146	1
-	4.80	70	152	1
-	5.00	70	152	1
13/64	5.20	70	152	1
7/32	5.50	70	152	1
-	5.80	73	156	1
15/64	6.00	73	156	1
1/4	6.20	73	156	1
-	6.50	76	159	1
17/64	6.80	76	159	1
9/32	7.00	76	159	1
-	7.20	79	162	1
19/64	7.50	79	162	1
5/16	7.80	79	162	1
-	8.00	83	165	1

Diameter h8		REGULAR SHANK		
Fraction	mm	Flute Length	Overall Length	Morse Taper No.
21/64	8.20	83	165	1
11/32	8.50	83	165	1
-	8.80	89	171	1
-	9.00	89	171	1
23/64	9.20	89	171	1
3/8	9.50	89	171	1
-	9.80	92	178	1
25/64	10.00	92	178	1
13/32	10.20	92	178	1
-	10.50	98	184	1
27/64	10.80	98	184	1
7/16	11.00	98	184	1
-	11.20	105	190	1
29/64	11.50	105	190	1
15/32	11.80	105	190	1
-	12.00	111	210	2
31/64	12.20	111	210	2
1/2	12.50	111	210	2
-	12.80	117	216	2
33/64	13.00	117	216	2
-	13.20	117	216	2



High Speed Steel TAPER SHANK TWIST DRILLS

Specifications Conform to
ASME B94.11M - 1993
Dimensions in mm / Inch



Diameter h8		REGULAR SHANK		
Fraction	mm	Flute Length	Overall Length	Morse Taper No.
17/32	13.50	117	216	2
35/64	13.80	124	222	2
-	14.00	124	222	2
9/16	14.25	124	222	2
-	14.50	124	222	2
37/64	14.75	124	222	2
19/32	15.00	124	222	2
-	15.25	124	222	2
39/64	15.50	124	222	2
5/8	15.75	124	222	2
-	16.00	130	229	2
41/64	16.25	130	229	2
21/32	16.50	130	229	2
-	16.75	137	235	2
43/64	17.00	137	235	2
11/16	17.25	137	235	2
-	17.50	143	241	2
45/64	18.00	143	241	2
23/32	-	143	241	2
47/64	18.50	149	248	2
3/4	19.00	149	248	2
49/64	19.50	152	251	2
25/32	-	152	251	2
51/64	20.00	156	273	3
13/16	20.50	156	273	3
53/64	21.00	156	273	3
27/32	21.50	156	273	3
55/64	22.00	156	273	3
7/8, 57/64	22.50	156	273	3

Diameter h8		REGULAR SHANK		
Fraction	mm	Flute Length	Overall Length	Morse Taper No.
29/32	23.00	156	273	3
59/64, 15/16	23.50	156	273	3
61/64	24.00	162	279	3
31/32	24.50	162	279	3
63/64, 1	25.00	162	279	3
1.1/64	25.50	165	283	3
1.1/32	26.00	165	283	3
1.3/64	26.50	165	283	3
1.1/16	27.00	168	286	3
1.5/64, 1.3/32	27.50	175	318	4
1.7/64	28.00	181	324	4
1.1/8	28.50	181	324	4
1.9/64, 1.5/32	29.00	184	327	4
1.11/64	29.50	187	330	4
1.3/16	30.00	187	330	3
1.13/64, 1.7/32	30.50	190	353	4
1.15/64	31.00	200	343	4
1.1/4	31.50	200	343	4
1.17/64	32.00	216	359	4
1.9/32	32.50	216	359	4
1.19/64, 1.5/16	33.00	219	362	4
1.21/64	33.50	222	365	4
1.11/32	34.00	222	365	4



High Speed Steel TAPER SHANK TWIST DRILLS

Specifications Conform to
ASME B94.11M - 1993
Dimensions in mm / Inch



Diameter h8		REGULAR SHANK		
Fraction	mm	Flute Length	Overall Length	Morse Taper No.
1.23/64, 1.3/8	34.50	225	368	4
1.25/64	35.00	229	371	4
1.13/32	35.50	229	371	4
1.27/64	36.00	232	375	4
1.7/16	36.50	232	375	4
	37.00	235	378	4
1.31/64	37.50	238	381	4
1.1/2	38.00	238	381	4
1.17/32	-	238	416	5
1.9/16	39.00	244	422	5
1.19/32	40.00	251	429	5
1.5/8	41.00	254	432	5
1.21/32	42.00	257	435	5
1.11/16	43.00	257	435	5
1.23/32, 1.3/4	44.00	257	435	5
1.25/32	45.00	257	435	5
1.13/16	46.00	257	435	5
1.27/32	-	257	435	5
1.7/8	47.00	264	441	5
1.29/32	48.00	264	441	5
1.15/16	49.00	264	441	5
1.31/32	50.00	264	441	5
2, 2.1/32	51.00	264	441	5
2.1/16	52.00	260	441	5
2.3/32	53.00	260	441	5
2.1/8	54.00	260	441	5

Diameter h8		REGULAR SHANK		
Fraction	mm	Flute Length	Overall Length	Morse Taper No.
2.5/32, 2.3/16	55.00	260	441	5
2.7/32	56.00	257	441	5
2.1/4	57.00	257	441	5
-	58.00	257	441	5
2.5/16	59.00	257	441	5
2.3/8	60.00	257	441	5
-	61.00	286	476	5
2.7/16	62.00	286	476	5
2.1/2	63.00	286	476	5
-	64.00	302	495	5
2.9/16	65.00	302	324	5
2.5/8	66.00	302	495	5
-	67.00	324	518	5
2.11/16	68.00	324	518	5
2.3/4	69.00	324	518	5
-	70.00	340	537	5
2.13/16	71.00	340	537	5
-	72.00	340	537	5
2.7/8	73.00	340	537	5
-	74.00	356	552	5
2.15/16	75.00	356	552	5
3	76.00	356	552	5
-	77.00	371	622	6
	78.00	371	622	6
3.1/8	-	371	622	6
3.1/4	-	394	648	6



High Speed Steel TAPER SHANK TWIST DRILLS Long Series

Specifications Conform to
IS 8305: 1976
DIN 341: 1978
Dimensions in mm



Diameter h8	Flute Length	Overall Length	Morse Taper
5.00	74	155	1
5.10	74	155	1
5.20	74	155	1
5.30	74	155	1
5.40	80	161	1
5.50	80	161	1
5.60	80	161	1
5.70	80	161	1
5.80	80	161	1
5.90	80	161	1
6.00	80	161	1
6.10	86	167	1
6.20	86	167	1
6.30	86	167	1
6.40	86	167	1
6.50	86	167	1
6.60	86	167	1
6.70	86	167	1
6.80	93	174	1
6.90	93	174	1
7.00	93	174	1
7.10	93	174	1

Diameter h8	Flute Length	Overall Length	Morse Taper
7.20	93	174	1
7.30	93	174	1
7.40	93	174	1
7.50	93	174	1
7.60	100	181	1
7.70	100	181	1
7.80	100	181	1
7.90	100	181	1
8.00	100	181	1
8.10	100	181	1
8.20	100	181	1
8.30	100	181	1
8.40	100	181	1
8.50	100	181	1
8.60	107	188	1
8.70	107	188	1
8.80	107	188	1
8.90	107	188	1
9.00	107	188	1
9.10	107	188	1
9.20	107	188	1
9.30	107	188	1

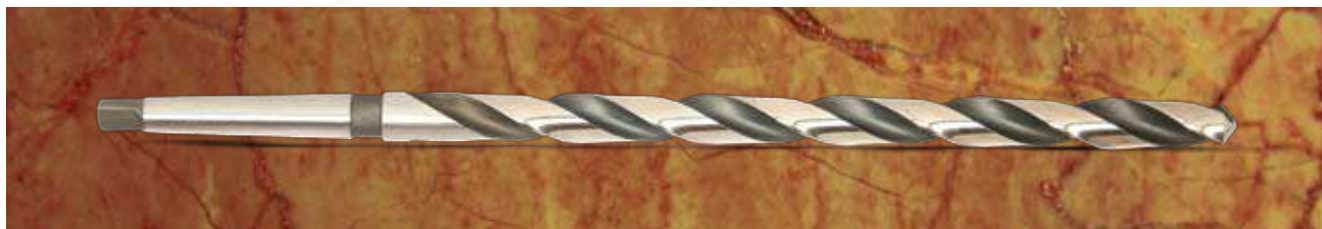
A lengthened form of Taper Shank Twist Drill, the increase in length being in the flute length

Type 'N' Drills shall be supplied unless otherwise specified.



High Speed Steel TAPER SHANK TWIST DRILLS Long Series

Specifications Conform to
IS 8305: 1976
DIN 341: 1978
Dimensions in mm



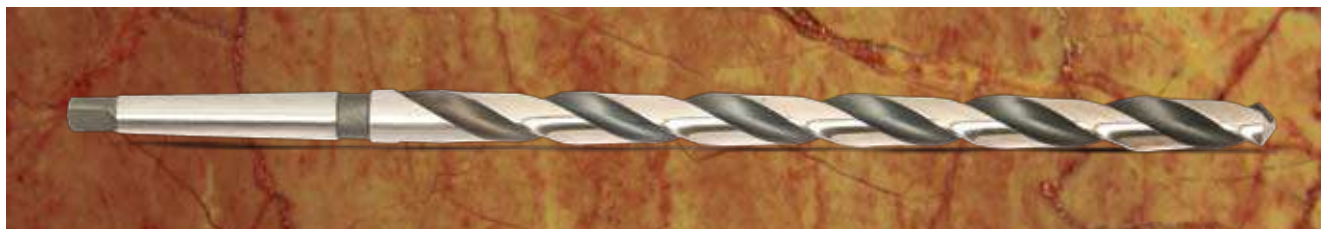
Diameter h8	Flute Length	Overall Length	Morse Taper No.
9.40	107	188	1
9.50	107	188	1
9.60	116	197	1
9.70	116	197	1
9.80	116	197	1
9.90	116	197	1
10.00	116	197	1
10.10	116	197	1
10.20	116	197	1
10.30	116	197	1
10.40	116	197	1
10.50	116	197	1
10.60	116	197	1
10.70	125	206	1
10.80	125	206	1
10.90	125	206	1
11.00	125	206	1
11.10	125	206	1
11.20	125	206	1
11.30	125	206	1
11.40	125	206	1
11.50	125	206	1
11.60	125	206	1
11.70	125	206	1
11.80	125	206	1
11.90	134	215	1
12.00	134	215	1
12.10	134	215	1
12.20	134	215	1
12.30	134	215	1
12.40	134	215	1

Diameter h8	Flute Length	Overall Length	Morse Taper No.
12.50	134	215	1
12.60	134	215	1
12.70	134	215	1
12.80	134	215	1
12.90	134	215	1
13.00	134	215	1
13.10	134	215	1
13.20	134	215	1
13.30	142	223	1
13.40	142	223	1
13.50	142	223	1
13.60	142	223	1
13.70	142	223	1
13.80	142	223	1
13.90	142	223	1
14.00	142	223	1
14.25	147	245	2
14.50	147	245	2
14.75	147	245	2
15.00	147	245	2
15.25	153	251	2
15.50	153	251	2
15.75	153	251	2
16.00	153	251	2
16.25	159	257	2
16.50	159	257	2
16.75	159	257	2
17.00	159	257	2
17.25	165	263	2
17.50	165	263	2
17.75	165	263	2



High Speed Steel TAPER SHANK TWIST DRILLS Long Series

Specifications Conform to
IS 8305: 1976
DIN 341: 1978
Dimensions in mm



Diameter h8	Flute Length	Overall Length	Morse Taper
18.00	165	263	2
18.25	171	269	2
18.26	171	269	2
18.27	171	269	2
18.28	171	269	2
19.25	177	275	2
19.50	177	275	2
19.75	177	275	2
20.00	177	275	2
20.25	184	282	2
20.50	184	282	2
20.75	184	282	2
21.00	184	282	2
21.25	191	289	2
21.50	191	289	2
21.75	191	289	2
22.00	191	289	2
22.25	191	289	2
22.50	198	296	2
22.75	198	296	2
23.00	198	296	2
23.25	198	319	3
23.50	198	319	3
23.75	206	327	3
24.00	206	327	3
24.25	206	327	3
24.50	206	327	3
24.75	206	327	3
25.00	206	327	3
25.25	214	335	3

Diameter h8	Flute Length	Overall Length	Morse Taper
25.50	214	335	3
25.75	214	335	3
26.00	214	335	3
26.25	214	335	3
26.50	214	335	3
26.75	222	343	3
27.00	222	343	3
27.25	222	343	3
27.50	222	343	3
27.75	222	343	3
28.00	222	343	3
28.25	230	351	3
28.50	230	351	3
28.75	230	351	3
29.00	230	351	3
29.25	230	351	3
29.50	230	351	3
29.75	230	351	3
30.00	230	351	3
30.25	239	360	3
30.50	239	360	3
30.75	239	360	3
31.00	239	360	3
31.25	239	360	3
31.50	239	360	3
31.75	248	369	3
32.00	248	397	4
32.50	248	397	4
33.00	248	397	4
33.50	248	397	4



High Speed Steel TAPER SHANK TWIST DRILLS Long Series

Specifications Conform to
IS 8305: 1976
DIN 341: 1978
Dimensions in mm



Diameter h8	Flute Length	Overall Length	Morse Taper
34.00	257	406	4
34.25	257	406	4
34.50	257	406	4
35.00	257	406	4
35.50	257	406	4
36.00	267	416	4
36.50	267	416	4
36.75	267	416	4
37.00	267	416	4
37.50	267	416	4
38.00	277	426	4
38.50	277	426	4
39.00	277	426	4
39.50	277	426	4
40.00	277	426	4
40.50	287	436	4
41.00	287	436	4
41.50	287	436	4

Diameter h8	Flute Length	Overall Length	Morse Taper
42.00	287	436	4
42.50	287	436	4
43.00	298	447	4
43.50	298	447	4
44.00	298	447	4
44.50	298	447	4
45.00	298	447	4
45.50	310	459	4
46.00	310	459	4
46.50	310	459	4
47.00	310	459	4
47.50	310	459	4
48.00	321	470	4
48.50	321	470	4
49.00	321	470	4
49.50	321	470	4
50.0	321	470	4



High Speed Steel TAPER SHANK TWIST DRILLS EXTRA LONG SERIES

Specifications Conform to
IS 7822 : 2005.
ISO 3291:1995
Dimensions in mm



Drill dia h8	Flute length	Overall Length	Morse Taper no.
6	110	200	1
	160	250	
	225	315	
6.5	110	200	1
	160	250	
	225	315	
7	110	200	1
	160	250	
	225	315	
7.5	110	200	1
	160	250	
	225	315	
8	110	200	1
	160	250	
	225	315	
8.5	110	200	1
	160	250	
	225	315	
9	110	200	1
	160	250	
	225	315	
9.5	110	200	1
	160	250	
	225	315	
10	160	250	1
	225	315	
	310	400	
11	160	250	1
	225	315	
	310	400	
12	160	250	1
	225	315	
	310	400	
13	160	250	1
	225	315	
	310	400	
14	160	250	1
	225	315	
	310	400	
15	215	315	2
	300	400	
	400	500	
16	215	315	2
	300	400	
	400	500	
17	215	315	2
	300	400	
	400	500	

Drill dia h8	Flute length	Overall Length	Morse Taper no.
18	215	315	2
	300	400	
	400	500	
19	215	315	2
	300	400	
	400	500	
20	215	315	2
	300	400	
	400	500	
21	215	315	2
	300	400	
	400	500	
22	215	315	2
	300	400	
	400	500	
23	215	315	2
	300	400	
	400	500	
24	275	400	3
	375	500	
	505	630	
25	275	400	3
	375	500	
	505	630	
28	275	400	3
	375	500	
	505	630	
30	275	400	3
	375	500	
	505	630	
32	250	400	4
	350	500	
	480	630	
35	250	400	4
	350	500	
	480	630	
38	250	400	4
	350	500	
	480	630	
40	250	400	4
	350	500	
	480	630	
42	350	500	4
	480	630	
	480	630	
45	350	500	4
	480	630	
	480	630	
48	350	500	4
	480	630	
	480	630	
50	350	500	4
	480	630	
	480	630	

A lengthened form of the Morse Taper Shank Twist Drill, longer than long series.
Type 'N' Drills shall be supplied unless otherwise specified.



High Speed Steel TAPER SHANK CORE DRILLS

Specifications Conform to
IS 5366 - 1978
ISO 7079 - 1981
DIN 343 - 1981
BS 328 : 1959
Dimensions in mm / Inch



Diameter h8		Flute Length	Over all Length	Morse Taper No.
mm	inch			
7.00	9/32	69	150	1
8.00	5/16	75	156	1
9.00	11/32	81	162	1
10.00	3/8, 13/32	87	168	1
11.00	7/16	94	175	1
12.00	15/32	101	182	1
13.00	1/2	101	182	1
14.00	17/32	108	189	1
15.00	9/16	114	212	2
16.00	19/32, 5/8	120	218	2
17.00	21/32	125	223	2
18.00	11/16	130	228	2
19.00	23/32	135	233	2
20.00	3/4, 25/32	140	338	2
21.00	13/16	145	243	2
22.00	27/32, 7/8	150	248	2
23.00	29/32	155	253	2
24.00	-	160	281	3
25.00	15/16, 31/32	160	281	3
26.00	1, 1/32	165	286	3
27.00	1.1/16	170	291	3
28.00	1.3/32	170	291	3

Diameter h8		Flute Length	Over all Length	Morse Taper No.
mm	inch			
29.00	1.1/8, 1.5/32	175	296	3
30.00	-	175	296	3
31.00	1.3/16, 1.7/32	180	301	3
-	1.1/4	185	306	3
32.00	1.9/32	185	334	4
33.00	1.5/16	185	334	4
34.00	1.11/32	190	339	4
35.00	1.3/8	190	339	4
36.00	1.13/32	195	344	4
37.00	-	195	344	4
38.00	1.1/2	200	349	4
39.00	-	200	349	4
40.00	1.9/16	200	349	4
41.00	1.5/8	205	354	4
42.00	-	205	354	4
43.00	1.11/16	210	359	4
44.00	1.3/4	210	359	4
45.00	-	210	359	4
46.00	1.13/16	215	364	4
47.00	-	215	364	4
48.00	1.7/8	220	369	4
49.00	1.15/16	220	369	4

A drill having three or more helical flutes and a Standard Morse Taper Shank designed for opening out or enlarging holes.



High Speed Steel TAPER SHANK CORE DRILLS

Specifications Conform to :
 IS 5366 - 1978
 ISO 7079 - 1981
 DIN 343 - 1981
 BS 328 : 1959
 Dimensions in mm / Inch



Diameter h8		Flute Length	Overall Length	Morse Taper No.
mm	inch			
50.00	-	220	369	4
50.50	2	225	374	4
51.00	-	225	412	5
52.00	2.1/16	225	412	5
53.00	-	225	412	5
54.00	2.1/8	230	417	5
55.00	-	230	417	5
56.00	2.3/16	230	417	5
57.00	2.1/4	235	422	5
58.00	-	235	422	5
59.00	2.5/16	235	422	5
60.00	-	235	422	5
61.00	2.3/8	240	427	5
62.00	2.7/16	240	427	5
63.00	-	240	427	5
64.00	2.1/2	245	432	5

Diameter h8		Flute Length	Overall Length	Morse Taper No.
mm	inch			
65.00	2.9/16	245	432	5
66.00	-	245	432	5
67.00	2.5/8	245	432	5
68.00	2.11/16	250	437	5
69.00	-	250	437	5
70.0	2.3/4	250	437	5
71.00	-	250	437	5
72.00	2.13/16	255	442	5
73.00	2.7/8	255	442	5
74.00	-	255	442	5
75.00	2.15/16	255	442	5
76.00	3	260	447	5
77.00	-	260	514	6
78.00	3.1/16	260	514	6
79.00	3.1/8	260	514	6
80.00	-	260	514	6

ISO 7079 : 1981 Specifies the Diameter ranges over 7.5 to 50mm.

DIN 343 : 1981 Specifies the Diameter ranges over 8.5 to 50mm.

- 1) Taper Shank Core drills upto and including 20mm dia are supplied with 3 flutes, over 20mm dia to 75mm dia are supplied with 4 flutes and over 75mm dia are supplied with 6 flutes.
(For DIN Specification, the No. of flutes shall be 3 for sizes upto & incl. 50mm dia.)
- 2) Type 'N' Drills shall be supplied unless otherwise specified.



High Speed Steel CENTRE DRILLS - Type 'A'

Specifications Conform to :
IS 6708 - 1977
ISO 866 - 1975
DIN 333 - 1986
Dimensions in mm



Pilot Dia k12	Body Dia h9	Overall Length		Pilot Length	
		Maximum	Minimum	Maximum	Minimum
1.00	3.15	33.50	29.50	1.90	1.30
1.25	3.15	33.50	29.50	2.20	1.60
1.60	4.00	37.50	33.50	2.80	2.00
2.00	5.00	42.00	38.00	3.30	2.50
2.50	6.30	47.00	43.00	4.10	3.10
3.15	8.00	52.00	48.00	4.90	3.90
4.00	10.00	59.00	53.00	6.20	5.00
5.00	12.50	66.00	60.00	7.50	6.30
6.30	16.00	74.00	68.00	9.20	8.00
8.00	20.00	83.00	77.00	11.50	10.10
10.00	25.00	103.00	97.00	14.20	12.80

Type - 'A' Centre Drill for centre holes without protecting chamfer.



High Speed Steel CENTRE DRILLS

Specifications Conform to :
BS 328 : Part 2 : 1950
Dimensions in inch



B.S.No.	Body Dia	Pilot Dia	Pilot Length		OAL	Tolerance on
			Max	Min		Overall Length
1	1/8	3/64	5/64	1/16	1.1/2	± 1/32
2	3/16	1/16	3/32	5/64	1.3/4	± 1/32
3	1/4	3/32	5/32	1/8	2	± 1/16
4	5/16	1/8	3/16	5/32	2.1/4	± 1/16
5	7/16	3/16	9/32	1/4	2.1/2	± 3/32
6	5/8	1/4	3/8	5/16	3	± 3/32
7	3/4	5/16	15/32	13/32	3.1/2	± 3/32



High Speed Steel CENTRE DRILLS - Type 'B'

Specifications Conform to :
IS 6709 - 1977
ISO 2540 - 1972
DIN 333 - 1986
Dimensions in mm



Pilot Dia	Body Dia	Overall Length		Pilot Length	
k12	h9	Maximum	Minimum	Maximum	Minimum
1.60	6.30	47.00	43.00	2.80	2.00
2.00	8.00	52.00	48.00	3.30	2.50
2.50	10.00	59.00	53.00	4.10	3.10
3.15	11.20	63.00	57.00	4.90	3.90
4.00	14.00	70.00	64.00	6.20	5.00
5.00	18.00	78.00	72.00	7.50	6.30
6.30	20.00	83.00	77.00	9.20	8.00
8.00	25.00	103.00	97.00	11.50	10.10

Type - 'B' Centre Drills for centre holes with protecting chamfers.



High Speed Steel CENTRE DRILLS - Type 'R'

Specifications Conform to :
IS 6710 - 1977
ISO 2541 - 1972
DIN 333 - 1986
Dimensions in mm



Pilot Dia k12	Body Dia h9	Overall Length		Pilot Length	Radius	
		Maximum	Minimum		Maximum	Minimum
1.00	3.15	33.50	29.50	3.00	3.15	2.50
1.25	3.15	33.50	29.50	3.35	4.00	3.15
1.60	4.00	37.50	33.50	4.25	5.00	4.00
2.00	5.00	42.00	38.00	5.30	6.30	5.00
2.50	6.30	47.00	43.00	6.70	8.00	6.30
3.15	8.00	52.00	48.00	8.50	10.00	8.00
4.00	10.00	59.00	53.00	10.60	12.50	10.00
5.00	12.50	66.00	60.00	13.20	16.00	12.50
6.30	16.00	74.00	68.00	17.00	20.00	16.00
8.00	20.00	83.00	77.00	21.20	25.00	20.00
10.00	25.00	103.00	97.00	26.50	31.50	25.00

Type - 'R' Centre Drills for centre holes with radius form.



COMBINED DRILLS AND COUNTERSINKS

Specifications Conform to :
ASME B94.11M - 1993
Dimensions in inch.



PLAIN TYPE

Size	Body Diameter	Drill Diameter	Overall Length
1	1/8	3/64	1.1/4
2	3/16	5/64	1.7/8
3	1/4	7/64	2
4	5/16	1/8	2.1/8
5	7/16	3/16	2.3/4
6	1/2	7/32	3
7	5/8	1/4	3.1/4
8	3/4	5/16	3.1/2



BELL TYPE

Size	Body Diameter	Drill Diameter	Overall Length
13	1/4	3/32	2
14	5/16	7/64	2.1/8
15	7/16	5/32	2.3/4
16	1/2	3/16	3
17	5/8	7/32	3.1/4
18	3/4	1/4	3.1/2



High Speed Steel SUBLAND TWIST DRILLS WITH PARALLEL SHANK

Specifications Conform to :
IS 12692 : 1989
Dimensions in mm



For Medium Series Type - A Countersinks

Body Dia h ₈	Small Dia h ₉	Step Length	Flute Length	Overall Length	Suitable for Countersunk Head Screws
13.00	6.60	15.00	101.00	151.00	M6 x 1
17.20	9.00	19.00	130.00	191.00	M8 x 1.25

For Fine Series Type - A Countersinks

Body Dia h ₈	Small Dia h ₉	Step Length	Flute Length	Overall Length	Suitable for Countersunk Head Screws
11.50	6.40	15.00	94.00	142.00	M6 x 0.75
15.00	8.40	19.00	114.00	169.00	M8 x 0.75
19.00	10.50	23.00	135.00	198.00	M10 x 0.75

Tool Type 'N' Subland Drills shall be supplied Unless otherwise Specified.



High Speed Steel SUBLAND TWIST DRILLS WITH PARALLEL SHANK

Specifications Conform to :
IS 12691 : 1989
Dimensions in mm



Body Dia h ₈	Small Dia h ₉	Step Length	Flute Length	Overall Length	Suitable for screw threads
9.00	6.80	21.00	81.00	125.00	M8 x 1.25
11.00	8.50	25.50	94.00	142.00	M10 x 1.50
14.00	10.20	30.00	108.00	160.00	M12 x 1.75
15.50	12.00	34.50	120.00	178.00	M14 x 2.0

Note : For fine pitch threads, subland twist drills shall be manufactured to the same dimensions of 'd' 'L' 'l₁' and 'l₂'. They can be ordered as special tools and diameter 'd₁' must be specified in such cases as given in IS : 10952 - 1984

Tool Type 'N' subland drills shall be supplied unless otherwise specified



High Speed Steel

**SUBLAND TWIST DRILLS WITH
PARALLEL SHANK**

Specifications Conform to :
IS 12689 : 1989
Dimensions in mm



Body Dia h ₈	Small Dia h ₉	Step Length	Flute Length	Overall Length	Suitable for Cheese Head Screws
11.00	6.60	15.00	94.00	142.00	M6 x 1
15.00	9.00	19.00	114.00	169.00	M8 x 1.25
18.00	11.00	23.00	130.00	191.00	M10 x 1.50

Tool Type 'N' Subland Drills shall be supplied Unless otherwise Specified.



High Speed Steel

**SUBLAND TWIST DRILLS WITH
MORSE TAPER SHANK**

Specifications Conform to :
IS 12688 : 1989
Dimensions in mm

for Clearance holes and countersinks for Countersunk head Screws



Body Dia h ₈	Small Dia h ₉	Step Length	Flute Length	Overall Length	Morse Taper No.	Suitable for Countersunk Head Screws
13.00	6.60	15.00	101.00	182.00	1	M6 x 1
17.20	9.00	19.00	130.00	228.00	2	M8 x 1.25
21.50	11.00	23.00	150.00	248.00	2	M10 x 1.50
25.00	13.50	27.00	160.00	281.00	3	M12 x 1.75
28.00	15.50	31.00	170.00	291.00	3	M14 x 2.0

Tool Type 'N' subland drills shall be supplied unless otherwise Specified.



High Speed Steel SUBLAND TWIST DRILLS WITH MORSE TAPER SHANK

for holes prior to tapping Screws threads

Specifications Conform to :
IS 12687 : 1989
Dimensions in mm



Big Dia h ₈	Small Dia h ₉	Step Length	Flute Length	Overall Length	Morse Taper No.	Suitable for Screw Threads
9.00	6.80	21.00	81.00	162	1	M8 x 1.25
11.00	8.50	25.50	94.00	175	1	M10 x 1.50
14.00	10.20	30.00	108.00	189	1	M12 x 1.75
16.00	12.00	34.50	120.00	218	2	M14 x 2.00
18.00	14.00	38.50	130.00	228	2	M16 x 2.00
20.00	15.50	43.50	140.00	238	2	M18 x 2.50
22.00	17.50	47.50	150.00	248	2	M20 x 2.50
24.00	19.50	51.50	160.00	281	3	M22 x 2.50
26.00	21.00	56.50	165.00	286	3	M24 x 3.00
30.00	24.00	62.50	175.00	296	3	M27 x 3.00
33.00	26.50	70.00	185.00	334	4	M30 x 3.50

Note : For fine pitch threads, subland twist drills shall be manufactured to the same dimensions of 'd' 'L' 'l₁' and 'l₂' and Morse Taper Number as given in the above table. But can be ordered as a special tool with diameter 'd₁' specified according to IS : 10952 - 1984.

Tool Type 'N' subland drills shall be supplied unless otherwise specified.



High Speed Steel SUBLAND TWIST DRILLS WITH MORSE TAPER SHANK

Specifications Conform to:
IS 12690 : 1989
Dimensions in mm

For Clearance holes and counterbores for slotted cheese head Screws



Big Dia h ₈	Small Dia h ₉	Step Length	Flute Length	Overall Length	Morse Taper No.	Suitable for Slotted Cheese head screws
11.00	6.60	15.00	94.00	175	1	M6 x 1.00
15.00	9.00	19.00	114.00	212	2	M8 x 1.25
18.00	11.00	23.00	130.00	228	2	M10 x 1.50
20.00	13.50	27.00	140.00	238	2	M12 x 1.75
24.00	15.50	31.00	160.00	281	3	M14 x 2.00
26.00	17.50	35.00	165.00	286	3	M16 x 2.00
30.00	20.00	39.00	175.00	296	3	M18 x 2.50
33.00	22.00	43.00	185.00	334	4	M20 x 2.50

Tool Type 'N' subland drills shall be supplied unless otherwise Specified.



TECHNICAL INFORMATION

1. High Speed Steels used for Cutting tools.
2. Technical calculations Drilling.
3. Helix Angle for Twist Drills
4. Recommended "Tool Types" & Point Angles for various materials.
5. Peripheral Speeds for HSS Twist Drills -
(Ferrous materials & Non - ferrous materials.)
6. Drilling Speeds for Thermo Plastics.
7. Table of Cutting Speeds - Fractional Size Drills
8. Table of Cutting Speeds - Metric Size Drills
9. Table of Cutting Speeds - Number Size Drills
10. Feeds for HSS Twist Drills.
11. Types of Drill Points.
12. Cutting Fluids
13. Decimal Equivalents
14. Decimal and Metric Equivalents for gauge and Letter Size Drills
15. Standard Tolerances and Deviations



HIGH SPEED STEELS USED FOR CUTTING TOOLS

Specifications Conform to :
IS 12690 : 1989
Dimensions in mm

For Clearance holes and counterbores for slotted cheese head Screws

Depending on the application, cutting tools are manufactured using different grades of HSS. Non - Cobalt and Cobalt grades are widely in use and material made by Powder route is also gaining increased adaptation. The Work material, its hardness, the machine tool used, part configuration, finish required on the components and volume of components to be produced are a few requirements that influence selection of different grades of HSS for Manufacture of Cutting Tools. Chemical Composition of some grades of High Speed Steels normally used is given below : -

Hss	CHEMICAL COMPOSITION %					
Grades	C	Cr	Mo	W	Co	V
M2	0.90	4.20	5.00	6.40	-	1.80
M7	1.02	3.80	8.60	1.80	-	1.90
M15	1.55	4.50	3.00	6.50	5.00	5.00
M35	0.93	4.20	5.00	6.40	4.80	1.80
M42	1.08	3.80	9.40	1.50	8.00	1.20
ASP2017	0.80	4.20	3.00	3.00	8.00	1.00
ASP 2030	1.28	4.20	5.00	6.40	8.50	3.10
ASP 2060	2.30	4.20	7.00	6.50	10.50	6.50

C - Carbon

Cr - Chromium

Mo - Molybdenum

W - Tungsten

Co - Cobalt

V - Vanadium



TECHNICAL CALCULATIONS - DRILLING

$$\text{Cutting Speed } V_c = \pi DN / 1000 \text{ (m / min.)}$$

$$\text{Feed Rate } V_f = f \times N \text{ (mm / min.)}$$

$$\text{Feed Force } F_f = 0.5 \times a_p \times f \times K_{CFZ} \times \sin K_f \text{ (N)}$$

$$\text{Torque } M_c = \frac{D \times F \times K_{CFZ} \times a_p}{2000} \left(1 - \frac{a_p}{D}\right) \text{ (NM)}$$

$$\text{Power Reqmnt. } P = \frac{a_p \times F \times K_{CFZ} \times V_c}{60 \times 10^3} \left(1 - \frac{a_p}{D}\right) \text{ (KW)}$$

Where, D = Drill Diameter (mm)

N = Spindle Speed (rpm)

K_{CFZ} = Specific Cutting force for (N/mm²) |

a_p = Cutting Depth (mm)

F = Feed per Revolution (mm/rev.)

K_f = Tool Cutting Angle (Degrees)



HELIX ANGLES FOR TWIST DRILL

DIAMETER		HELIX ANGLES		
OVER	Upto and Incl.	Type - N	Type - H	Type - S
0.70	1.00	20° - 26°	10° - 13°	30° - 35°
1.00	3.00	22° - 28°	11° - 14°	31° - 36°
3.00	8.00	24° - 30°	12° - 15°	33° - 38°
8.00	20.00	26° - 32°	12° - 16°	36° - 41°

DIAMETER		HELIX ANGLES		
OVER	Upto and Incl.	Type - N	Type - H	Type - S
20.00	35.00	27° - 34°	13° - 18°	38° - 43°
35.00	50.00	28° - 35°	13° - 18°	39° - 44°
50.00	80.00	29° - 37°	-	-

The helix angle which corresponds to the rake of the single point tool, depends upon materials and hole to be drilled. The drills are made in three types for Normal (N), Hard(H) and Soft (S) work piece materials. These type designations are based on the material to be cut and design requirements of drills. The range of helix angles for the three types of drills is given above.



RECOMMENDED 'TOOL TYPES' AND POINT ANGLES FOR VARIOUS MATERIALS.

Ref : 185099

Material of work piece		Tensile Strength (MPa)	Brinell Hardness HB	Tool Type*	Point Angle $\pm 3^\circ$
Steel and cast steel		400 to 700	115 to 205	N	118°
(alloyed and un alloyed)		700 to 1200	205 to 350	N	130°
Stainless steels				N	140°
Austenitic Steels				H	140°
Cast Iron			140 to 200	N	118°
			200 to 240	N	118°
			Over 240	N (H)	118°
Malleable Cast iron				N	118°
Brass	with copper up to 58%			H (N)	118°
	with copper above 58%			N	118°
German Silver				N	118°
Copper	Up to 30mm Drill Diameter			S (N)	140°
	Over 30mm Drill Diameter			N	140°
Aluminium Alloys	Long Chip Type			S (N)	140°
	Short Chip Type			N	140°
Magnesium Alloys Nickel				H (N)	140°
Zinc Alloys				S (N)	118°
White Metal				S (N)	118°
Moulded	Thickness $\leq$ Drill Dia			H	80°
Plastics	Thickness $>$ Drill Dia			S	80°
Laminated Plastics				H (N)	80°
Celluloid				S (N)	140°
Hard rubber and thin Plastic Materials				H (N)	80°
Marble Slate & Carbon				H	80°

Note : The twist drills are made in three 'tool types', namely, Normal (N), Hard (H) and Soft (S) depending upon the material to be drilled.

* 'Tool Types' within brackets are non - preferred.



PERIPHERAL SPEEDS FOR HSS TWIST DRILLS (FERROUS MATERIALS)

TYPE OF STEEL B.S.970 EN Series No.	Cutting Speed, Vc	
	Feet / min.	Meters /min.
NON - ALLOY STEELS (a) Up to 0.40% Carbon Content 2, 3, 4, 5, 6, 7, 8 & 32.	80 - 100	24 - 30
(b) 0.40% to 0.70% Carbon Content 9, 10, 43	60 - 80	18 - 24
(c) Over 0.70% Carbon Content 42, 44	40 - 60	12 - 18
ALLOY STEELS (a) Tensile Strength up to 60 Tons / Sq.Inch (94.50kg/Sq.mm) 11(T), 12, 13, 14, 15, 16 (RST), 17(RST) 18, 19(RST), 20(T), 21, 22, 23(ST), 24(ST), 25(T), 27(T), 29(RST), 31, 33, 34, 35, 37, 38, 39, 40(RST), 41, 51, 52, 53, 100(RST), 110(RST), 111(RST), 160(RST).	50 - 70	15 - 21
(b) Tensile Strength 60 - 80 Tons/Sq.Inch (94.50 to 126 Kg / Sq.mm) 11(V), 16(UV), 17(UV), 18(UVW), 19(UV), 20(V), 23(UV), 24(UVWX), 25(UVWX), 6(UVWX), 27(UVW), 28(UVW), 9(UVW), 40(U), 100(UV), 110(UVW), 111(U), 160(U).	30 - 50	9 - 15
(c) Tensile Over 80 Tons/Sq.Inch (126 Kg/Sq.mm) 19(W), 24(YZ), 25(Y,Z), 26(YZ), 28(Y), 29(Z)	15 - 30	4.50 - 9
MARTENSITIC STAINLESS STEEL (Magnetic) 56, 57.	40 - 60	12 - 18
AUSTENITIC STAINLESS STEEL AND IRONS (Non Magnetic) 54, 55, 58	20 - 40	6 - 12
12 / 14 % MANGANESE STEEL	10 - 12	3.0 - 3.50
GREY CAST - IRON	80 - 100	24 - 30
ALLOYED CAST IRON	50 - 70	15 - 21

PERIPHERAL SPEEDS FOR HSS TWIST DRILLS (NON-FERROUS MATERIALS)

NON - FERROUS MATERIALS	Cutting Speed, Vc	
	Feet/Min	Meters/Min
Aluminium and Aluminium Alloys	100 - 200	30 - 60
Brass	100 - 150	30 - 46
Brass, Lead	100 - 200	30 - 61
Bronze Ordinary	100 - 200	30 - 60
Bronze, High Tensile	70 - 100	21 - 30
Copper	100 - 150	30 - 46

NON - FERROUS MATERIALS	Cutting Speed, Vc	
	Feet/Min	Meters/Min
Magnesium and Magnesium Alloys	200 - 300	60 - 90
Monel Metal	20 - 50	6 - 15
Nickel	30 - 50	9 - 15
Nimonic Alloys	10 - 20	3 - 6
Zinc Base Alloys (mazzak)	150 - 250	45 - 75

The peripheral speeds in these two tables is a suggested basis. In many instances, due to good operating conditions it may be practicable to increase them substantially.



DRILLING SPEEDS FOR THERMOPLASTICS

Material	Type of Helix*	Included Point Angle	Cutting Speed 'Vc' in M/Min	
			Shallow holes upto 3 times Drill Dia	Deep holes 6 times Drill Dia
Cellulose Acetate	Quick	140°	45	30
Cellulose Nitrate	Standard	130°	45	24
Polystyrene	Quick	140°	6	6
High Impact Polystyrene	Quick	140°	45	27
Perspex	Slow	60°	27	6
Ethyl Cellulose	Quick	140°	18	6
Nylon	Quick	140°	45	30
Vulcanised Fibre	Quick	118°	60	45
P.V.C.	Quick	140°	6	6
P.V.C. with Filter	Quick	140°	45	30

*This table applies when using drills upto 12mm dia. Above this diameter standard helix drills can usually be used.

TABLE OF CUTTING SPEEDS - FRACTIONAL SIZE DRILLS

CUTTING SPEED 'Vc'					
Ft/min	50	60	70	80	100
M/min	15	18	21	24	30
Drill Dia. 'Inch'	REVOLUTIONS PER MINUTE				
1/64"	12,224	14,656	17,088	19,520	24,448
1/32"	6,112	7,328	8,544	9,760	12,224
3/64"	4,064	4,896	5,696	6,528	8,160
1/16"	3,056	3,664	4,272	4,880	6,112
5/64"	2,448	2,928	3,424	3,904	4,896
3/32"	2,032	2,448	2,848	3,264	4,080
1/8"	1,528	1,832	2,136	2,440	3,056
5/32"	1,224	1,464	1,712	1,952	2,448
3/16"	1,016	1,224	1,424	1,632	2,040
7/32"	872	1,048	1,224	1,400	1,744
1/4"	764	916	1,068	1,220	1,528
5/16"	612	732	856	976	1,224
3/8"	508	612	712	816	1,020
7/16"	436	524	612	700	872
1/2"	382	458	534	670	764
9/16"	340	408	476	544	680
5/8"	306	366	428	488	612
11/16"	278	334	388	444	556



TABLE OF CUTTING SPEEDS - FRACTIONAL SIZE DRILLS

CUTTING SPEED 'Vc'					
Ft/min	50	60	70	80	100
M/min	15	18	21	24	30
Drill Dia. 'Inch'	REVELUTIONS PER MINUTE				
3/4"	254	306	356	408	510
13/16"	234	282	330	376	470
7/8"	218	262	306	350	436
15/16"	204	244	286	326	408
1"	191	229	267	305	382
1.1/8"	170	204	238	272	340
1.1/4"	153	183	214	244	306
1.1/2"	127	153	178	204	255
1.3/4"	109	131	153	175	218
2"	95	114	133	152	191
2.1/4"	85	102	119	136	170
2.1/2"	76	92	107	122	153
2.3/4"	69	83	97	111	139
3"	64	76	89	102	127
4"	48	57	67	76	96

R.P.M. for Cutting Speeds not given. Can be obtained by simple addition or subtraction,

E.g. : 150 ft/Min = 100 + 50 = 1,146 R.P.M. (for 1/2" Dia.)

30 ft / Min = 80 - 50 = 7,296 R.P.M. (for 1/64" Dia.)

CUTTING SPEED 'Vc'					
Ft/min	50	60	70	80	100
M/min	15	18	21	24	30
Drill Dia. 'mm'	REVELUTIONS PER MINUTE				
0.50	9,695	11,634	13,573	15,512	19,390
1.00	4,847	5,817	6,786	7,756	9,695
1.50	3,327	3,884	4,532	5,179	6,474
2.00	2,427	2,912	3,397	3,883	4,854
2.50	1,941	2,329	2,717	3,105	3,882
3.00	1,617	1,940	2,264	2,587	3,234
4.00	1,213	1,455	1,698	1,940	2,425
5.00	970	1,164	1,359	1,553	1,941
6.00	808	970	1,132	1,294	1,617
7.00	693	832	970	1,109	1,386
8.00	606	728	849	970	1,213
9.00	539	647	755	862	1,078
10.00	485	582	679	776	970
11.00	441	529	617	706	882
12.00	404	485	566	647	808
13.00	373	448	522	597	746
14.00	346	416	485	554	693
15.00	323	388	453	517	647
16.00	303	364	424	485	606
17.00	285	342	399	456	571
18.00	269	323	377	431	539
19.00	255	306	357	408	511



TABLE OF CUTTING SPEEDS - METRIC SIZE DRILLS

CUTTING SPEED 'Vc'					
Ft/min	50	60	70	80	100
M/min	15	18	21	24	30
Drill Dia. No. Size	REVOLUTIONS PER MINUTE				
1	838	1,005	1,173	1,340	1,675
2	864	1,037	1,210	1,382	1,728
4	914	1,097	1,280	1,462	1,828
6	936	1,123	1,310	1,498	1,872
8	960	1,151	1,343	1,535	1,919
10	987	1,184	1,382	1,579	1,974
12	1,010	1,213	1,415	1,617	2,021
14	1,050	1,259	1,469	1,679	2,099
16	1,079	1,295	1,511	1,726	2,158
18	1,130	1,356	1,582	1,808	2,260
20	1,186	1,423	1,600	1,898	2,372
22	1,217	1,460	1,703	1,946	2,433
24	1,257	1,508	1,759	2,010	2,513
26	1,299	1,559	1,819	2,078	2,598
28	1,360	1,631	1,903	2,175	2,719
30	1,487	1,784	2,081	2,378	2,973
32	1,647	1,976	2,305	2,634	3,293
34	1,721	2,065	2,409	2,753	3,442
36	1,794	2,152	2,511	2,870	3,587
38	1,882	2,258	2,634	3,010	3,763
40	1,949	2,339	2,729	3,118	3,898
42	2,043	2,451	2,860	3,268	4,085
44	2,221	2,665	3,109	3,554	4,442
46	2,358	2,830	3,301	3,773	4,716
48	2,513	3,016	3,518	4,021	5,026
50	2,729	3,609	3,820	4,366	5,457
52	3,008	4,211	4,211	4,812	6,015
54	3,473	4,167	4,862	5,556	6,945
56	4,108	4,929	5,751	6,257	8,215
58	4,547	5,456	6,367	7,275	9,095
60	4,775	5,729	6,684	7,639	9,549
62	5,025	6,030	7,035	8,040	10,050
64	5,305	6,366	7,427	8,488	10,610
66	5,790	6,948	8,106	9,264	11,580
68	6,160	7,392	8,624	9,856	12,320
70	6,820	8,184	9,548	10,912	13,640
72	7,640	9,168	10,696	12,224	15,280
74	8,510	10,212	11,914	13,616	17,020
76	9,550	11,460	13,370	15,280	19,100
78	11,935	14,322	16,709	19,096	23,870
80	14,150	16,980	19,810	22,640	28,300



FEEDS FOR HSS TWIST DRILLS

FOR GENERAL PURPOSE			
Drill Diameter Inches	Feed / Rev Inches	Drill Diameter mm	Feed mm/Rev
1/16 - 3/32	0.0015 - 0.0025	1.6 - 3.0	0.04 - 0.06
1/8 - 5/32	0.002 - 0.004	3.0 - 4.0	0.05 - 0.10
3/16 - 7/32	0.003 - 0.006	4.0 - 5.50	0.075-0.15
1/4 - 5/16	0.004 - 0.008	5.50 - 8.0	0.10 - 0.20
3/8 - 7/16	0.006 - 0.010	8.0 - 11.0	0.15 - 0.25
1/2 - 9/16	0.008 - 0.012	11.0 - 14.5	0.20 - 0.30
5/8 - 11/16	0.009 - 0.013	14.5 - 17.5	0.23 - 0.33
3/4 - 13/16	0.010 - 0.014	17.5 - 20.5	0.25 - 0.36
7/8 - 15/16	0.011 - 0.015	20.5 - 24.0	0.28 - 0.38
1 - 1 1/8	0.012 - 0.016	24.0 - 28.5	0.30 - 0.40
1-1/4 - 1-1/2	0.014 - 0.018	28.5 - 38.0	0.35 - 0.45
Over 1-1/2	0.016 - 0.020*	Over 38.0	0.40 - 0.50*

FOR AUSTENITIC STAINLESS STEEL AND NIMONIC ALLOYS			
Drill Diameter Inches	Feed / Rev Inches	Drill Diameter mm	Feed mm/Rev
1/16 - 3/32	0.002 -0.0035	1.6 - 3.0	0.05 - 0.09
1/8 - 5/32	0.0025 - 0.006	3.0 - 4.0	0.06 - 0.15
3/16 - 7/32	0.004 - 0.009	4.0 - 5.50	0.10-0.23
1/4 - 5/16	0.005 - 0.012	5.50 - 8.0	0.125 - 0.30
3/8 - 7/16	0.0075 - 0.015	8.0 - 11.0	0.19 - 0.38
1/2 - 9/16	0.010 - 0.018	11.0 - 14.5	0.25 - 0.45
5/8 - 11/16	0.011 - 0.020	14.5 - 17.5	0.28 - 0.50
3/4 - 13/16	0.0125 - 0.021	17.5 - 20.5	0.31 - 0.53
7/8 - 15/16	0.0135 - 0.022	20.5 - 24.0	0.34 - 0.56
1 - 1 1/8	0.015 - 0.024	24.0 - 28.5	0.38 - 0.60
1-1/4 - 1-1/2	0.0175 - 0.027	28.5 - 38.0	0.44 - 0.68
Over 1-1/2	0.020 - 0.030	Over 38.0	0.50 - 0.750

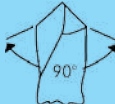
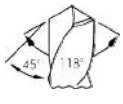
* Or greater according to the work & working Conditions

Note : - On New Work, commence at the slowest appropriate speed and lightest feed, and gradually increase until Optimum output per grind is obtained.



TYPES OF DRILL POINTS

FOR VARIOUS APPLICATIONS

	118° Point - General Purpose Point for most materials where work hardening or chip formation does not present a problem.
	135° Point - A greater point angle is used for tough or hard materials such as highly alloyed steels.
	90° Point - A Smaller point angle is used for soft and highly ductile materials such as plastics and non ferrous metals.
	Standard Point with 45° Chamfer - A corner chamfer is used to reduce the burr in soft materials or reduce corner breakdown in abrasive materials.
	Split or Crankshaft Point - This type is used to reduce thrust when hand drilling tough materials or to make self centering for NC equipment.

CUTTING FLUIDS

Hard Tool and Alloy Steel	Soluble Oil Compound or neat cutting oil
Low Carbon Steel	Soluble Oil
Copper, brass or bronze	Soluble Oil or dry.
Aluminium and magnesium alloys	Soluble Oil or neat cutting oil specially produced for light alloys.
Cast Iron	Dry or Compressed Air.
Stainless Steel, Nimonic alloys, Monal metals	Soluble Oils can be used but Sulphurised or chlorinated mineral or fatty oils are most suitable
Zinc base alloys (MAZAK)	Soluble Oil.



DECIMAL EQUIVALENTS

Frac.	mm	Inch
	0.32	0.0126
	0.35	0.0138
	0.38	0.0150
1/64	0.397	0.0156
	0.40	0.0157
	0.42	0.0165
	0.45	0.0177
	0.48	0.0189
	0.50	0.0197
	0.52	0.0205
	0.55	0.0217
	0.58	0.0228
	0.60	0.0236
	0.62	0.0244
	0.65	0.0256
	0.68	0.0268
	0.70	0.0276
	0.72	0.0283
	0.75	0.0295
	0.78	0.0307
1/32	0.7920	0.0312
	0.80	0.0315
	0.82	0.0323
	0.85	0.0335
	0.88	0.0346
	0.90	0.0354
	0.92	0.0362
	0.94	0.0370
	0.98	0.0386
	1.00	0.0394
	1.05	0.0413
	1.10	0.0433
	1.15	0.0453
3/64	1.191	0.0469
	1.20	0.0472
	1.25	0.0492
	1.30	0.0512
	1.35	0.0531
	1.40	0.0551
	1.45	0.0571
	1.50	0.0591
	1.55	0.0610
1/16	1.588	0.0625
	1.60	0.0630
	1.65	0.0650
	1.70	0.0669
	1.75	0.0689
	1.80	0.0709
	1.85	0.0728
	1.90	0.0748
	1.95	0.0768
5/64	1.984	0.0781
	2.00	0.0787
	2.05	0.0807
	2.10	0.0827
	2.15	0.0846
	2.20	0.0866

Frac.	mm	Inch
	2.25	0.0886
	2.30	0.0906
	2.35	0.0925
3/32	2.381	0.0937
	2.40	0.0945
	2.45	0.0965
	2.50	0.0984
	2.55	0.1004
	2.60	0.1024
	2.65	0.1043
	2.70	0.1063
	2.75	0.1083
7/64	2.778	0.1094
	2.80	0.1102
	2.85	0.1122
	2.90	0.1142
	2.95	0.1161
	3.00	0.1181
	3.10	0.1220
1/8	3.175	0.1250
	3.20	0.1260
	3.30	0.1299
	3.40	0.1339
	3.50	0.1378
9/64	3.572	0.1406
	3.60	0.1417
	3.70	0.1457
	3.80	0.1496
	3.90	0.1535
5/32	3.969	0.1562
	4.00	0.1575
	4.10	0.1614
	4.20	0.1654
	4.30	0.1693
11/64	4.366	0.1719
	4.40	0.1732
	4.50	0.1772
	4.60	0.1811
	4.70	0.1850
3/16	4.762	0.1875
	4.80	0.1890
	4.90	0.1929
	5.00	0.1969
	5.10	0.2008
13/64	5.159	0.2031
	5.20	0.2047
	5.30	0.2087
	5.40	0.2126
	5.50	0.2165
7/32	5.556	0.2188
	5.60	0.2205
	5.70	0.2244
	5.80	0.2283
	5.90	0.2323
15/64	5.953	0.2344
	6.00	0.2362
	6.10	0.2402



DECIMAL EQUIVALENTS

Frac.	mm	Inch
	6.20	0.2441
	6.30	0.2480
1/4	6.35	0.2500
	6.40	0.2520
	6.50	0.2559
	6.60	0.2598
	6.70	0.2638
17/64	6.747	0.2656
	6.80	0.2677
	6.90	0.2717
	7.00	0.2756
	7.10	0.2795
9/32	7.144	0.2812
	7.20	0.2835
	7.30	0.2874
	7.40	0.2913
	7.50	0.2953
19/64	7.541	0.2969
	7.60	0.2992
	7.70	0.3031
	7.80	0.3071
	7.90	0.3110
5/16	7.938	0.3125
	8.00	0.3150
	8.10	0.3189
	8.20	0.3228
	8.30	0.3268
21/64	8.334	0.3281
	8.40	0.3307
	8.50	0.3346
	8.60	0.3386
	8.70	0.3425
11/32	8.731	0.3438
	8.80	0.3456
	8.90	0.3504
	9.00	0.3543
	9.10	0.3583
23/64	9.128	0.3594
	9.20	0.3622
	9.30	0.3661
	9.40	0.3701
	9.50	0.3740
3/8	9.525	0.3750
	9.60	0.3780
	9.70	0.3819
	9.80	0.3858
	9.90	0.3898
25/64	9.922	0.3906
	10.00	0.3937
	10.10	0.3976
	10.20	0.4016
	10.30	0.4055
13/32	10.319	0.4062
	10.40	0.4094
	10.50	0.4134
	10.60	0.4173
	10.70	0.4213
27/64	10.716	0.4219

Frac.	mm	Inch
	10.80	0.4252
	10.90	0.4291
	11.00	0.4331
	11.10	0.4370
7/16	11.112	0.4375
	11.20	0.4409
	11.30	0.4449
	11.40	0.4488
	11.50	0.4528
29/64	11.509	0.4531
	11.60	0.4567
	11.70	0.4606
	11.80	0.4646
	11.90	0.4685
15/32	11.906	0.4688
	12.00	0.4724
	12.10	0.4764
	12.20	0.4803
	12.30	0.4843
31/64	12.303	0.4844
	12.40	0.4882
	12.50	0.4921
	12.60	0.4961
1/2	12.70	0.5000
	12.80	0.5039
	12.90	0.5079
	13.00	0.5118
33/64	13.097	0.5156
	13.10	0.5157
	13.20	0.5197
	13.30	0.5236
	13.40	0.5276
17/32	13.494	0.5312
	13.50	0.5315
	13.60	0.5354
	13.70	0.5394
	13.80	0.5433
35/64	13.891	0.5469
	13.90	0.5472
	14.00	0.5512
	14.25	0.5610
9/16	14.288	0.5625
	14.50	0.5709
37/64	14.684	0.5781
	14.75	0.5807
	15.00	0.5906
19/32	15.081	0.5938
	15.25	0.6004
39/64	15.478	0.6094
	15.50	0.6102
	15.75	0.6201
5/8	15.875	0.6250
	16.00	0.6229
	16.25	0.6398
41/64	16.272	0.6406
	16.50	0.6496
21/32	16.669	0.6562



DECIMAL EQUIVALENTS

Frac.	mm	Inch
	16.75	0.6594
	17.00	0.6693
43/64	17.066	0.6719
	17.25	0.6791
11/16	17.462	0.6875
	17.50	0.6890
	17.75	0.6988
45/64	17.859	0.7031
	18.00	0.7087
	18.25	0.7185
23/32	18.256	0.7188
	18.50	0.7283
47/64	18.653	0.7344
	18.75	0.7382
	19.00	0.7480
3/4	19.050	0.7500
	19.25	0.7579
49/64	19.44	0.7656
	19.50	0.7677
	19.75	0.7776
25/32	19.844	0.7812
	20.00	0.7874
51/64	20.241	0.7969
	20.25	0.7972
	20.50	0.8071
13/16	20.638	0.8125
	20.75	0.8169
	21.00	0.8268
53/64	21.034	0.8281
	21.25	0.8366
27/32	21.431	0.8438
	21.50	0.8465
	21.75	0.8563
55/64	21.828	0.8594
	22.00	0.8661
7/8	22.225	0.8750
	22.25	0.8760
	22.50	0.8858
57/64	22.622	0.8906
	22.75	0.8957
	23.00	0.9055
29/32	23.019	0.9062
	23.25	0.9154
59/64	23.416	0.9219
	23.50	0.9252
	23.75	0.9350
15/16	23.812	0.9375
	24.00	0.9449
61/64	24.209	0.9531
	24.25	0.9547
	24.50	0.9646
31/32	24.606	0.9688
	24.75	0.9744
	25.00	0.9843
63/64	25.003	0.9844
1	25.40	1.0000
	25.50	1.0039

Frac.	mm	Inch
1 - 1/64	25.797	1.0156
	26.000	1.0236
1 - 1/32	26.194	1.0312
	26.500	1.0433
1 - 3/64	26.591	1.0469
1 - 1/16	26.988	1.0625
	27.000	1.0630
1 - 5/64	27.384	1.0781
	27.500	1.0827
1 - 3/32	27.781	1.0938
	28.000	1.1024
1 - 7/64	28.178	1.1094
	28.500	1.1220
1 - 1/8	28.575	1.1250
1 - 9/64	28.972	1.1406
	29.000	1.1417
1 - 5/32	29.369	1.1562
	29.500	1.1614
1 - 11/64	29.766	1.1719
	30.000	1.1811
1 - 3/16	30.162	1.1875
	30.500	1.2008
1 - 13/64	30.559	1.2031
1 - 7/32	30.956	1.2188
	31.000	1.2205
1 - 15/64	31.353	1.2344
	31.500	1.2402
1 - 1/4	31.750	1.2500
	32.000	1.2598
1 - 17/64	32.147	1.2656
	32.500	1.2795
1 - 9/32	32.544	1.2812
1 - 19/64	33.941	1.2969
	33.000	1.2992
1 - 5/16	33.338	1.3125
	33.500	1.3189
1 - 21/64	33.734	1.3281
	34.000	1.3386
1 - 11/32	34.131	1.3438
	34.500	1.3583
1 - 23/64	34.528	1.3594
1 - 3/8	34.925	1.3750
	35.000	1.3780
1 - 25/64	35.322	1.3906
	35.500	1.3976
1 - 13/32	35.719	1.4062
	36.000	1.4173
1 - 27/64	36.116	1.4290
	36.500	1.4370
1 - 7/16	36.512	1.4375
1 - 29/64	36.909	1.4531
	37.000	1.4567
1 - 15/32	37.306	1.4688
	37.500	1.4764
1 - 31/64	37.703	1.4844
	38.000	1.4961
1 - 1/2	38.100	1.5000



DECIMAL EQUIVALENTS

Frac.	mm	Inch
1-33/64	38.497	1.5156
	38.50	1.5157
1-17/32	38.894	1.5312
	39.0	1.5354
1-35/64	39.291	1.5469
	39.50	1.5551
1-9/16	39.688	1.5625
	40.00	1.5748
1-37/64	40.084	1.5781
1-19/32	40.481	1.5938
	40.50	1.5945
1-39/64	40.878	1.6094
	41.00	1.6142
1-5/8	41.275	1.6250
	41.50	1.6339
1-41/64	41.672	1.6406
	42.00	1.6535
1 - 21/32	42.069	1.6562
1-43/64	42.466	1.6719
	42.50	1.6732
1-11/16	42.862	1.6875
	43.00	1.6929
1-45/64	43.259	1.7031
	43.50	1.7126
1-23/32	43.656	1.7188
	44.00	1.7223
1-47/64	44.053	1.7344
1-3/4	44.450	1.7500
	44.50	1.7520
1-49/64	44.847	1.7656
	45.00	1.7717
1-25/32	45.244	1.7812
	45.50	1.7913
1-51/64	45.641	1.7969
	46.00	1.8110
1 - 13/16	46.038	1.8125
1 - 53/64	46.434	1.8281
	46.50	1.8307
1 - 27/32	46.831	1.8438
	47.00	1.8504
1-55/64	47.228	1.8594
	47.50	1.8701
1- 7/8	47.625	1.8750
	48.00	1.8898
1 - 57/64	48.022	1.8906
1 - 29/32	48.419	1.9062
	48.50	1.9094
1- 59/64	48.816	1.9219
	49.00	1.9291
1- 15/16	49.212	1.9375
	49.50	1.9488
1- 61/64	49.609	1.9531
	50.00	1.9685
1-31/32	50.006	1.9688
1-63/64	50.403	1.9844
	50.50	1.9882
2	50.800	2.0000

	51.00	2.0079
2 - 1/32	51.594	2.0312
	52.00	2.0472
2 - 1/16	52.388	2.0625
	53.00	2.0866
2 - 3/32	53.181	2.0938
2 - 1/8	53.975	2.1250
	54.00	2.1260
2 - 5/32	54.769	2.1562
	55.00	2.1654
2 - 3/16	55.562	2.1875
	56.00	2.2047
2 - 7/32	56.356	2.2188
	57.00	2.2441
2 - 1/4	57.150	2.2500
2-9/32	57.944	2.2812
	58.00	2.2835
2 - 5/16	58.738	2.3125
	59.00	2.3228
2 - 11/32	59.531	2.3438
	60.00	2.3622
2 - 3/8	60.325	2.3750
	61.00	2.4016
2 - 13/32	61.119	2.4062
2 - 7/16	61.912	2.4375
	62.00	2.4409
2 - 15/32	62.706	2.4688
	63.00	2.4803
2 - 1/2	63.50	2.5000
	64.00	2.5197
2-17/32	64.294	2.5312
	65.00	2.5591
2 - 9/16	65.088	2.5625
2 - 19/32	65.881	2.5938
	66.00	2.5984
2 - 5/8	66.675	2.6250
	67.00	2.6378
2 - 21/32	67.469	2.6562
	68.00	2.6772
2 - 11/16	68.262	2.6875
	69.00	2.7165
2 - 23/32	69.056	2.7188
2 - 3/4	69.850	2.7500
	70.00	2.7559
2 - 25/32	70.644	2.7812
	71.00	2.7953
2 - 13/16	71.438	2.8125
	72.00	2.8346
2 - 27/32	72.231	2.8438
	73.00	2.8740
2 - 7/8	73.025	2.8750
2 - 29/32	73.819	2.9062
	74.00	2.9134
2-15/16	74.612	2.9375
	75.00	2.9528
2- 31/32	75.406	2.9688
	76.00	2.9921



DECIMAL EQUIVALENTS

Frac.	mm	Inch
3	76.200	3.0000
3 - 1/32	76.994	3.0312
	77.00	3.0315
3 - 1/16	77.788	3.0625
	78.00	3.0709
3 - 3/32	78.581	3.0938
	79.00	3.1102
3 - 1/8	79.375	3.1250
	80.00	3.1496
3 - 5/32	80.169	3.1562
3 - 3/16	80.962	3.1875
	81.00	3.1890
3 - 7/32	81.756	3.2188
	82.00	3.2283
3 - 1/4	82.550	3.2500
	83.00	3.2677
3 - 9/32	83.344	3.2812
	84.00	3.3071
3 - 5/16	84.138	3.3125
3 - 11/32	84.931	3.3438
	85.00	3.3465
3 - 3/8	85.725	3.3750
	86.00	3.3858
3 - 13/32	86.519	3.4062
	87.00	3.4252
3 - 7/16	87.312	3.4375
	88.00	3.4646
3 - 15/32	88.106	3.4688
3 - 1/2	88.90	3.5000
	89.00	3.5039
	90.00	3.5433
3 - 9/16	90.488	3.5625
	91.00	3.5827
	92.00	3.6220
3 - 5/8	92.075	3.6250

	93.00	3.6614
3 - 11/16	93.662	3.6875
	94.00	3.7008
	95.00	3.7402
3 - 3/4	95.250	3.7500
	96.00	3.7795
3 - 13/16	96.838	3.8125
	97.00	3.8189
	98.00	3.8583
3 - 7/8	98.425	3.8750
	99.00	3.8976
	100.00	3.9370
3 - 15/16	100.012	3.9375
4	101.600	4.0000
4 - 1/4	107.950	4.2500
4 - 1/2	114.300	4.5000
4 - 3/4	120.650	4.7500
5	127.000	5.0000
5 - 1/4	133.350	5.2500
5 - 1/2	139.70	5.5000
5 - 3/4	146.050	5.7500
6	152.400	6.0000
6 - 1/2	165.100	6.5000
7	177.800	7.0000
7 - 1/2	190.500	7.5000
8	203.200	8.0000
8 - 1/2	215.900	8.5000
9	228.600	9.0000
9 - 1/2	241.300	9.5000
10	254.000	10.0000
10 - 1/2	266.700	10.5000
11	279.400	11.0000
11 - 1/2	292.100	11.5000
12	304.800	12.0000



DECIMAL AND METRIC EQUIVALENTS FOR GAUGE AND LETTER SIZE DRILLS

Drill Gauge and Letter Size	Decimal Equivalent "Inch"	Metric Equivalent "mm"
68	0.0310	0.787
67	0.0320	0.813
66	0.0330	0.838
65	0.0350	0.889
64	0.0360	0.914
63	0.0370	0.940
62	0.0380	0.965
61	0.0390	0.991
60	0.0400	1.016
59	0.0410	1.041
58	0.0420	1.067
57	0.0430	1.092
56	0.0465	1.181
55	0.0520	1.321
54	0.0550	1.397
53	0.0595	1.511
52	0.0635	1.613
51	0.0670	1.702
50	0.0700	1.778
49	0.0730	1.854
48	0.0760	1.930
47	0.0785	1.994
46	0.0810	2.057
45	0.0820	2.083
44	0.0860	2.184
43	0.0890	2.261
42	0.0935	2.375
41	0.0960	2.438
40	0.0980	2.489
39	0.0995	2.527
38	0.1015	2.578
37	0.1040	2.642
36	0.1065	2.705
35	0.1100	2.794
34	0.1110	2.819
33	0.1130	2.870
32	0.1160	2.946
31	0.1200	3.048
30	0.1285	3.264
29	0.1360	3.454
28	0.1405	3.569
27	0.1440	3.658
26	0.1470	3.734
25	0.1495	3.797
24	0.1520	3.861
23	0.1540	3.912
22	0.1570	3.988

Drill Gauge and Letter Size	Decimal Equivalent "Inch"	Metric Equivalent "mm"
21	0.1590	4.039
20	0.1610	4.089
19	0.1660	4.216
18	0.1695	4.305
17	0.1730	4.394
16	0.1770	4.496
15	0.1800	4.572
14	0.1820	4.623
13	0.1850	4.699
12	0.1890	4.801
11	0.1910	4.851
10	0.1935	4.915
9	0.1960	4.978
8	0.1990	5.055
7	0.2010	5.105
6	0.2040	5.182
5	0.2055	5.220
4	0.2090	5.309
3	0.2130	5.410
2	0.2210	5.613
1	0.2280	5.791
A	0.2340	5.944
B	0.2380	6.045
C	0.2420	6.147
D	0.2460	6.248
E	0.2500	6.350
F	0.2570	6.528
G	0.2610	6.629
H	0.2660	6.756
I	0.2720	6.909
J	0.2770	7.036
K	0.2810	7.137
L	0.2900	7.366
M	0.2950	7.493
N	0.3020	7.671
O	0.3160	8.026
P	0.3230	8.204
Q	0.3320	8.433
R	0.3390	8.611
S	0.3480	8.839
T	0.3580	9.093
U	0.3680	9.347
V	0.3770	9.576
W	0.3860	9.804
X	0.3970	10.084
Y	0.4040	10.262
Z	0.4130	10.490



STANDARD TOLERANCES AND DEVIATIONS

Ref : IS 919

Diameter Steps in mm		Values of deviations in microns (1 micron = 0.001mm)														
Over	To	d9	d11	e8	e9	f7	f11	g6	h6	h8	h9	h11	h12	h13	h16*	j6
-	3 *	-20	-20	-14	-14	-6	-6	-2	0	0	0	0	0	0	0	+ 4
		-45	-80	-28	-39	-16	-66	-8	-6	-14	-25	-60	-100	-140	-600	-2
3	6	-30	-30	-20	-20	-10	-10	-4	0	0	0	0	0	0	0	+ 6
		-60	-105	-38	-50	-22	-85	-12	-8	-18	-30	-75	-120	-180	-750	-2
6	10	-40	-40	-25	-25	-13	-13	-5	0	0	0	0	0	0	0	+ 7
		-76	-130	-47	-61	-28	-103	-14	-9	-22	-36	-90	-150	-220	-900	-2
10	18	-50	-50	-32	-32	-16	-16	-6	0	0	0	0	0	0	0	+ 8
		-93	-160	-59	-75	-34	-126	-17	-11	-27	-43	-110	-180	-270		-3
18	30	-65	-65	-40	-40	-20	-20	-7	0	0	0	0	0	0	0	+ 9
		-117	-195	-73	-92	-41	-150	-20	-13	-33	-52	-130	-210	-330		-4
30	50	-80	-80	-50	-50	-25	-25	-9	0	0	0	0	0	0	0	+ 11
		-142	-240	-89	-112	-50	-185	-25	-16	-39	-62	-160	-250	-390		-5
50	80	-100	-100	-60	-60	-30	-30	-10	0	0	0	0	0	0	0	+ 12
		-174	-290	-106	-134	-60	-220	-29	-19	-46	-74	-190	-300	-460		-7
80	120	-120	-120	-72	-72	-36	-36	-12	0	0	0	0	0	0	0	+ 13
		-207	-340	-126	-159	-71	-256	-34	-22	-54	-87	-220	-350	-540		-9
120	180	-145	-145	-85	-85	-43	-43	-14	0	0	0	0	0	0	0	+ 14
		-245	-395	-148	-185	-83	-293	-39	-25	-63	-100	-250	-400	-630		-11
180	250	-170	-170	-100	-100	-50	-50	-15	0	0	0	0	0	0	0	+ 16
		-285	-460	-172	-215	-96	-340	-44	-29	-72	-115	-290	-460	-720		-13

* Upto 1mm, the grade 16 is not given

STANDARD TOLERANCES AND DEVIATIONS

Ref : IS 919

Diameter Steps in mm		Values of deviations in microns (1 micron = 0.001mm)													
Over	To	js4	js10	js11	js12	js14*	js15*	js16*	k11	k12	k16*	m5	m6	C11	H6
-	3*	±1.5	±20	±30	±50	±125	±200	±300	+60 0	+100 0	+600 0	+6 +2	+8 +2	+120 +60	+6 0
3	6	±2	±24	±37.5	±60	±150	±240	±375	+75 0	+120 0	+750 0	+9 +4	+12 +4	+145 +70	+8 0
6	10	±2	±29	±45	±75	±180	±290	±450	+90 0	+150 0	+900 0	+12 +6	+15 +6	+170 +80	+9 0
10	18	±2.5	±35	±55	±90	±215	±350	±550	+110 0	+180 0	+1100 0	+15 +7	+18 +7	+205 +95	+11 0
18	30	±3	±42	±65	±105	±260	±420	±650	+130 0	+210 0	+1300 0	+17 +8	+21 +8	+240 +110	+13 0
30	50	±3.5	±50	±80	±125	±310	±500	±800	+160 0	+250 0	+1600 0	+20 +9	+25 +9		+16 0
50	80	±4	±60	±95	±150	±370	±600	±950	+190 0	+300 0	+1900 0	+24 +11	+30 +11		+19 0
80	120	±5	±70	±110	±175	±435	±700	±1100	+220 0	+350 0	+2200 0	+28 +13	+35 +13		+22 0
120	180	±6	±80	±125	±200	±500	±800	±1250	+250 0	+400 0	+2500 0	+33 +15	+40 +15		+25 0
180	250	±7	±92.5	±145	±230	±575	±925	±1450	+290 0	+460 0	+2900 0	+37 +17	+46 +17		+29 0

* Upto 1mm, the grades 14,15 & 16 are not given

STANDARD TOLERANCES AND DEVIATIONS

Ref : IS 919

Diameter Steps in mm		Values of deviations in microns (1 micron = 0.001mm)							Diameter Steps in mm						
Over	To	H7	H8	H9	H11	H12	H13	H14*	H15*	N9*	N11*	IT16*	Over	To	z9
-	3*	+10 0	+14 0	+25 0	+60 0	+100 0	+140 0	+250 0	+400 0	- 4 - 29	- 4 - 64	600	-	3	+51 +26
3	6	+12 0	+18 0	+30 0	+75 0	+120 0	+180 0	+300 0	+480 0	0 - 30	0 - 75	750	3	6	+65 +35
6	10	+15 0	+22 0	+36 0	+90 0	+150 0	+220 0	+360 0	+580 0	0 - 36	0 - 90	900	6	10	+78 +42
10	18	+18 0	+27 0	+43 0	+110 0	+180 0	+270 0	+430 0	+700 0	0 - 43	0 - 110	1100	10	14	+93 +50
18	30	+21 0	+33 0	+52 0	+130 0	+210 0	+330 0	+520 0	+840 0	0 - 52	0 - 130	1300	14	18	+103 +60
30	50	+25 0	+39 0	+62 0	+160 0	+250 0	+390 0	+620 0	+1000 0	0 - 62	0 - 160	1600	18	24	+125 +73
50	80	+30 0	+46 0	+74 0	+190 0	+300 0	+460 0	+740 0	+1200 0	0 - 74	0 - 190	1900	24	30	+140 +88
80	120	+35 0	+54 0	+87 0	+220 0	+350 0	+540 0	+870 0	+1400 0	0 - 87	0 - 220	2200	30	40	+174 +112
120	180	+40 0	+63 0	+100 0	+250 0	+400 0	+630 0	+1000 0	+1600 0	0 - 100	0 - 250	2500	40	50	+198 +136
180	250	+46 0	+72 0	+115 0	+290 0	+460 0	+720 0	+1150 0	+1850 0	0 - 115	0 - 290	2900	50	65	+246 +172
* Upto 1mm, the grades 14,15, 16, N9 and N11 are not given															