CATALOGUE

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100 Years
1918 - 2018

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100 Years
1918 - 2018

FEW supports recycling.

CATALOGUE

HISTORY *Established*: 1918

1920's

1940's

Present Day

Historical Background

The French Engineering Works is a family business which was established in 1918 to manufacture Rock Drill spares for the mining industry in Johannesburg. The founder, Herman Moser, soon expanded into precision tools, including HSS cutting tools for the metal industry. His Swiss origins instilled a pride in quality and precision which persists to the present day.

Recognising the positive impact of specialisation on quality, Herman's sons restructured the diverse business in mid-century. The sharp focus on threading and decades of technical and market development, led to the recognition of FEW Taps and Dies in over forty countries. Distribution depots were strategically located to service major industrial regions.

Customer demand for a wider range of FEW quality cutting tools led to an ongoing search for focused manufacturers of complementary products. Today, over twenty specialists on five continents manufacture complementary products specified by FEW.

The appointment of exclusive agents, together with the technical and commercial support of FEW have led to FEW Cutting Tools being specified worldwide by end-users who insist on quality and value for money.

100 Years
1918 - 2018

Head Office in Johannesburg

CATALOGUE USAGE

PACKAGING

HOW TO USE THIS CATALOGUE

There are two methods to find the products or information you are looking for in this catalogue.

A. Table of Contents Method

This is the easiest way if you are looking for the general range of products or information, or already know the FEW range.

1. Look up the product or information required in the Table of Contents.
2. Find the correct page and look for the information or tool required by using the descriptions, type numbers or graphics.

B. Tap Selection Chart Method

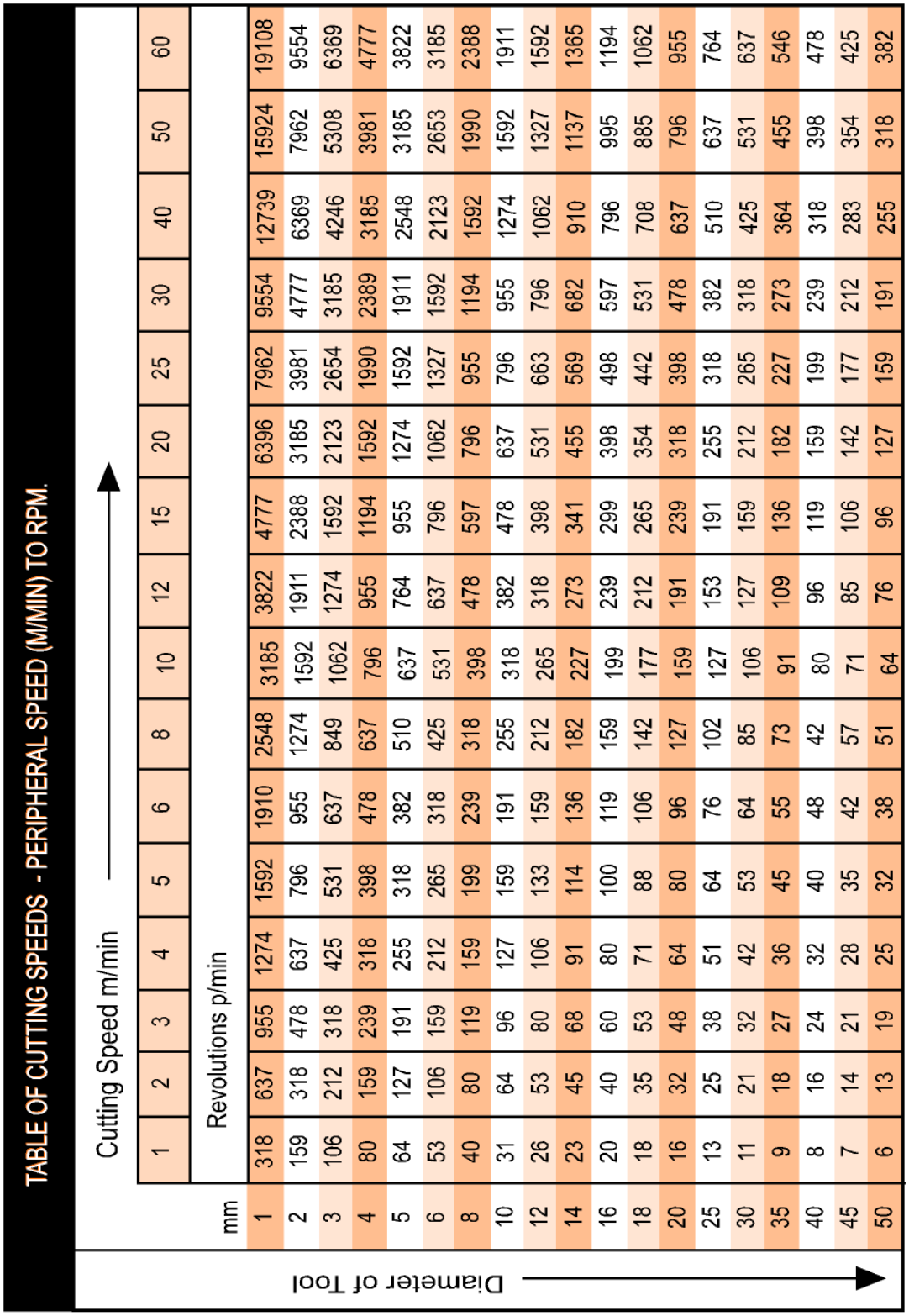
If you are looking for a specific tap for a known material, and are not aware of the complete range offered by FEW, The Tap Selection Chart will show you the way.

1. Using the Tap Selection Chart, look for the Most Suitable tap (black dot) by cross referencing Type of Material with Type of Hole. In addition to a graphic and chamfer or lead information, the chart will show a brief description, Type No and Catalogue Index Page No.
2. Turning to the indicated Index Page No, The Index of Stock Range by Threadform will show a photo and graphic of the tool, and a more detailed explanation about the application. The Table will show the various threadforms and norms (ISO, DIN or JIS) for which this type of tap is manufactured, and the relevant Catalogue Page No. Should this Type of tap not be available in the threadform required, go back to the Tap Selection Chart to find the next best choice - Suitable (white dot) - and repeat the above procedure.
3. The Catalogue / Price List page will display the sizes available for the product, the item code and price, as well as relevant information about general dimensions, surface treatments, tolerances and notes.

PACKAGING

FEW cutting tools are packed into sturdy and attractive Polypropylene packs of 3 (tap sets), 5 or 10 split packs (for single taps) or quadro tubes (for longer single taps, or milling cutters, or bulk drills). Certain products are packaged in cardboard. Most FEW packaging materials can be recycled.

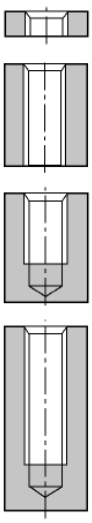
TABLE OF CUTTING SPEEDS



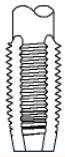
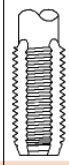
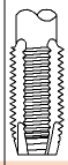
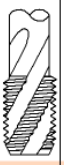
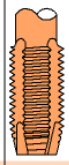
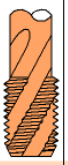
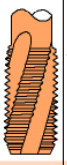
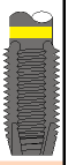
mm	1	2	3	4	5	6	8	10	12	15	20	25	30	40	50	60
1	318	637	955	1274	1592	1910	2548	3185	3822	4777	6396	7962	9554	12739	15924	19108
2	159	318	478	637	796	955	1274	1592	1911	2388	3185	3981	4777	6369	7962	9554
3	106	212	318	425	531	637	849	1062	1274	1592	2123	2654	3185	4246	5308	6369
4	80	159	239	318	398	478	637	796	955	1194	1592	1990	2389	3185	3981	4777
5	64	127	191	255	318	382	510	637	764	955	1274	1592	1911	2548	3185	3822
6	53	106	159	212	265	318	425	531	637	796	1062	1327	1592	2123	2653	3185
8	40	80	119	159	199	239	318	398	478	597	796	955	1194	1592	1990	2388
10	31	64	96	127	159	191	255	318	382	478	637	796	955	1274	1592	1911
12	26	53	80	106	133	159	212	265	318	398	531	663	796	1062	1327	1592
14	23	45	68	91	114	136	182	227	273	341	455	569	682	910	1137	1365
16	20	40	60	80	100	119	159	199	239	299	398	498	597	796	995	1194
18	18	35	53	71	88	106	142	177	212	265	354	442	531	708	885	1062
20	16	32	48	64	80	96	127	159	191	239	318	398	478	637	796	955
25	13	25	38	51	64	76	102	127	153	191	255	318	382	510	637	764
30	11	21	32	42	53	64	85	106	127	159	212	265	318	425	531	637
35	9	18	27	36	45	55	73	91	109	136	182	227	273	364	455	546
40	8	16	24	32	40	48	42	80	96	119	159	199	239	318	398	478
45	7	14	21	28	35	42	57	71	85	106	142	177	212	283	354	425
50	6	13	19	25	32	38	51	64	76	96	127	159	191	255	318	382

TAP SELECTION CHART

BY MATERIAL



TYPE OF HOLE

SUITABILITY OF TAP		HAND TAPS ISO 529 ISO 2284 JIS B4430		GENERAL PURPOSE MACHINE TAPS ISO 529 / 2283 / 2284 / JIS B4430 DIN 371 / 376 / 374 / 5156									
(●) MOST SUITABLE	DESCRIPTION	STD SET	(PILOT) SER SET	STR. FL TPR (FORM D)	STR. FL SEC (FORM C)	STR. FL BOT (FORM E)	BF SP	BF SF	BF SF	TIN SP	TIN SF	TIN SF	ST SP
(❍)SUITABLE	TYPE NO. (1)	0420	0720 (P)	0120	0220	0320	1220	4220	3220	1223	4223	3223	1221 SO SP
	INDEX PG NO	B3	B3	B4	B4	B4	B6	B7	B7	B6	B7	B7	B6
	CATALOGUE SYMBOL	TPR + (SEC) + BOT	NO. 1(P) + (NO. 2) + BOT										
	DIN CHAMFER	–	–	D	C	E	B	C	C	B	C	C	B
	LEAD (NO. OF THREADS)	–	–	6 - 8 (3,5 - 5)	3 - 4,5 (2 - 3)	1,5 - 2	3 - 5	2 - 3	2 - 3	3 - 5	2 - 3	2 - 3	3 - 5
SHORT CHIPPING		1 - 4	1 - 4	1 - 2	1 - 4	1 - 4	1 - 2	3 - 4	3 - 4	1 - 2	3 - 4	3 - 4	1 - 2
LONG CHIPPING		1 - 4	1 - 4	1 - 2	1 - 3	–	1 - 2	3 - 4	3 - 4	1 - 2	3 - 4	3 - 4	1 - 2

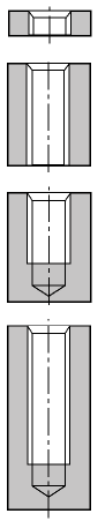
NOTE: STR. FL. Taps with larger diameter or fine pitch may be used to tap deeper in long chipping materials due to a greater Flute Volume: Metal Removal ratio.

TYPE OF MATERIAL												
STEELS UNDER 450 N/mm²	●	❍	❍	❍								●
STEELS UP TO 750 N/mm²	●	●	●	●		❍	❍	❍	❍	❍	❍	❍
STEELS UP TO 1000 N/mm²	●	●				❍	❍	❍	●	❍	●	
STEELS OVER 1000 N/mm²	❍	●							❍	❍	❍	
STAINLESS STEELS	❍	●		❍					❍	❍		
CAST IRON (SHORT CHIPPING)	●	●		❍	❍						❍	
MALLEABLE CAST IRON (LONG CHIPPING)	●	●		❍		❍	❍					
BRASS (SHORT CHIPPING)	●	❍		●	●			❍			❍	
BRASS (LONG CHIPPING)	●	❍		❍		●	●	●				
SOFT ALUMINIUM, COPPER, ZINC, ETC	●	❍		❍		❍	❍		❍	❍		
ALUMINIUM ALLOYS, MALLEABLE BRONZE, ETC	●	●		❍		●	●	❍				
TOUGH ALUMINIUM (Si > 10%) HARD BRONZE, ETC	❍	●		❍		❍	❍	❍	❍	❍	❍	
SOFT PLASTICS, THERMO PLASTICS, PVC, ETC	❍			❍		❍	❍	❍				
HARD PLASTICS, GRP, BAKELITE, ETC	❍			❍	❍						❍	
SPECIAL ALLOYS, TITANIUM, INCONEL, ETC	TAPS WITH SPECIAL GEOMETRY CAN BE SUPPLIED AGAINST SPECIAL REQUEST.											

Note (1) The full Type No, is preceded by the Norm letter. eg A0220 = ISO 529 STR. FL. SEC. D0220 = DIN 371 STR. FL. FORM C.
Note (2) Colour coded rings are available only on DIN Taps.

TABLE OF CUTTING SPEEDS

BY MATERIAL



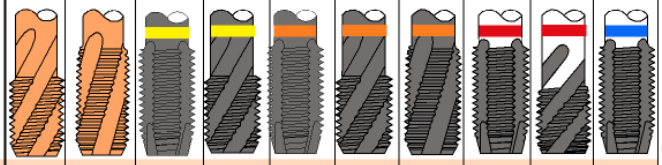
TYPE OF HOLE

SUITA-BILITY OF TAP

(●) MOST SUITABLE

(❍)SUITABLE

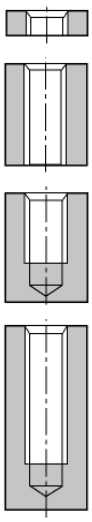
SPECIAL APPLICATION MACHINE TAPS
ISO 529 / 2283 / 2284 / JIS B4430
DIN 371 / 376 / 374 / 5156

TYPE OF MATERIAL	DESCRIPTION	TIN SF	TIN SF	ST SP	ST SF	ST SP	ST SF	ST SF15	RED RING SP	RED RING SF	BLUE RING SP	See Table of Cutting Speed for conver-sion from m/min to rpm (pg A5)	RECOMMENDED LUBRICATION
	TYPE NO. (1)	4223	3223	1221 SO SP	4221 SO SF	1221 (OR)	4221 (OR)	3221 OR	1224 HR	5224 HR	1221 IN		
	INDEX PG NO	B7	B7	B6	B7	B6	B7	B7	B5	B8	B5		
	CATALOGUE SYMBOL												
	DIN CHAMFER	C	C	B	C	B	C	C	B	C	B		
	LEAD (NO. OF THREADS)	2 - 3	2 - 3	3 - 5	2 - 3	3 - 5	2 - 3	2 - 3	3,5 - 5	2 - 3	3,5 - 5		
	SHORT CHIPPING	3 - 4	3 - 4	1 - 2	3 - 4	1 - 2	3 - 4	3 - 4	1 - 2	3 - 4	1 - 2		
	LONG CHIPPING	3 - 4	3 - 4	1 - 2	3 - 4	1 - 2	3 - 4	3 - 4	1 - 2	3 - 4	1 - 2		
NOTE: STR. FL. Taps with larger diameter or fine pitch may be used to tap deeper in long chipping materials due to a greater Flute Volume: Metal Removal ratio.												(3) Cutting Speed m/min	
STEELS UNDER 450 N/mm²				●	●	❍	❍					10 - 16	OIL/ EMULSION
STEELS UP TO 750 N/mm²		❍	❍	❍	❍	●	●	❍				10 - 16	OIL/ EMULSION
STEELS UP TO 1000 N/mm²		❍	●			❍	❍	●				5 - 10	OIL/ EMULSION
STEELS OVER 1000 N/mm²		❍	❍					❍	●	●		2 - 6	OIL/ EMULSION
STAINLESS STEELS		❍				❍	❍				●	4 - 8	SPECIAL CUTTING OIL
CAST IRON (SHORT CHIPPING)			❍									6 - 12	DRY/ EMULSION
MALLEABLE CAST IRON (LONG CHIPPING)						●	●	●				6 - 12	OIL/ EMULSION
BRASS (SHORT CHIPPING)			❍									20 - 25	DRY
BRASS (LONG CHIPPING)												15 - 20	LIGHT OIL/ EMULSION
SOFT ALUMINIUM, COPPER, ZINC, ETC		❍										15 - 25	LIGHT OIL/ EMULSION
ALUMINIUM ALLOYS, MALLEABLE BRONZE, ETC												12 - 20	LIGHT OIL/ EMULSION
TOUGH ALUMINIUM (Si > 10%) HARD BRONZE, ETC		❍	❍									12 - 18	LIGHT OIL/ EMULSION
SOFT PLASTICS, THERMO PLASTICS, PVC, ETC												12 - 20	DRY
HARD PLASTICS, GRP, BAKELITE, ETC			❍									5 - 10	DRY
SPECIAL ALLOYS, TITANIUM, INCONEL, ETC	TAPS WITH SPECIAL GEOMETRY CAN BE SUPPLIED AGAINST SPECIAL REQUEST.												

Note (1) The full Type No, is preceded by the Norm letter. eg A0220 = ISO 529 STR. FL. SEC. D0220 = DIN 371 STR. FL. FORM C.
Note (2) Colour coded rings are available only on DIN Taps.
Note (3) Cutting speeds can be increased by 50 – 100% when using TIN coated or Polygon taps. Experimenting is advisable.
Note (4) Additional surface treatments can be added to increase performance in certain applications.

TAP SELECTION CHART & TABLE OF CUTTING SPEEDS

BY MATERIAL



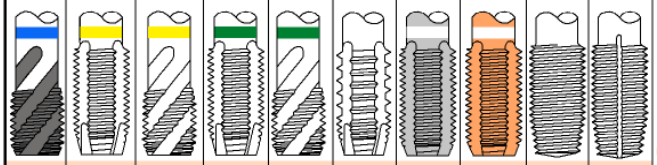
TYPE OF HOLE

SUITA-BILITY OF TAP

(●) MOST SUITABLE

(❍)SUITABLE

SPECIAL APPLICATION MACHINE TAPS
ISO 529 / 2283 / 2284 / JIS B4430
DIN 371 / 376 / 374 / 5156

TYPE OF MATERIAL	NOTE: STR. FL. Taps with larger diameter or fine pitch may be used to tap deeper in long chipping materials due to a greater Flute Volume: Metal Removal ratio.										See Table of Cutting Speed for conver-sion from m/min to rpm (pg A5)	RECOMMENDED LUBRICATION
DESCRIPTION	BLUE RING SF	YELLOW RING BF SP	YELLOW RING BF SF	GREEN RING SP	GREEN RING SF	INT. THRD SP	STR. FL. NITR	STR. FL. TIN	POLY-GON	POLY-GON + OG		
TYPE NO. (1)	5221 IN	1220 AL	5220 AL	1220 AS	5220 AS	1220 IT	0222 GG	0223 GG	6220	6220 G		
INDEX PG NO	B8	B5	B8	B5	B8	B6	B5	B5	B8	B8		
CATALOGUE SYMBOL												
DIN CHAMFER	C	B	C	B	C	B	C	C	C	C		
LEAD (NO. OF THREADS)	2 - 3	3,5 - 5	2 - 3	3 - 5	2 - 3	3 - 5	2 - 3	2 - 3	2 - 3	2 - 3		
SHORT CHIPPING	3 - 4	–	–	1 - 2	3 - 4	1 - 2	1 - 4	1 - 4	–	–		
LONG CHIPPING	3 - 4	1 - 2	3 - 4	1 - 2	3 - 4	1 - 2	–	–	1 - 2	1 - 4	(3) Cutting Speed m/min	
STEELS UNDER 450 N/mm²									●	●	10 - 16	OIL/ EMULSION
STEELS UP TO 750 N/mm²						●			●	●	10 - 16	OIL/ EMULSION
STEELS UP TO 1000 N/mm²						●					5 - 10	OIL/ EMULSION
STEELS OVER 1000 N/mm²											2 - 6	OIL/ EMULSION
STAINLESS STEELS	●			❍	❍	❍			❍	●	4 - 8	SPECIAL CUTTING OIL
CAST IRON (SHORT CHIPPING)							●	●			6 - 12	DRY/ EMULSION
MALLEABLE CAST IRON (LONG CHIPPING)						❍					6 - 12	OIL/ EMULSION
BRASS (SHORT CHIPPING)							❍				20 - 25	DRY
BRASS (LONG CHIPPING)						❍			❍	❍	15 - 20	LIGHT OIL/ EMULSION
SOFT ALUMINIUM, COPPER, ZINC, ETC		●	●			❍			●	❍	15 - 25	LIGHT OIL/ EMULSION
ALUMINIUM ALLOYS, MALLEABLE BRONZE, ETC						❍			❍	●	12 - 20	LIGHT OIL/ EMULSION
TOUGH ALUMINIUM (Si > 10%) HARD BRONZE, ETC				●	●	❍				❍	12 - 18	LIGHT OIL/ EMULSION
SOFT PLASTICS, THERMO PLASTICS, PVC, ETC		●	●								12 - 20	DRY
HARD PLASTICS, GRP, BAKELITE, ETC							❍	❍			5 - 10	DRY
SPECIAL ALLOYS, TITANIUM, INCONEL, ETC	TAPS WITH SPECIAL GEOMETRY CAN BE SUPPLIED AGAINST SPECIAL REQUEST.											

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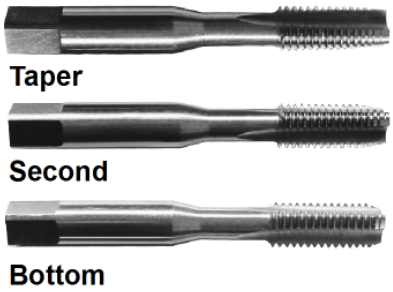
Note (2) Colour coded rings are available only on DIN Taps.
Note (3) Cutting speeds can be increased by 50 – 100% when using TIN coated or Polygon taps. Experimenting is advisable.
Note (4) Additional surface treatments can be added to increase performance in certain applications.

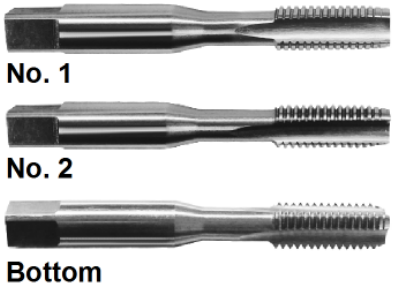
INDEX OF STOCK RANGE BY THREADFORM

HAND TAPS

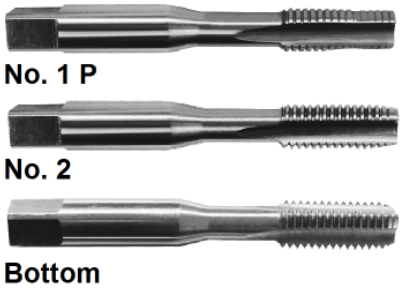
STANDARD SET



SERIAL SET



PILOT SERIAL SET



TYPE 0420 STD SET

Hand Taps with full thread profile for general purpose use; Right and Left Hand threads are available in most popular sizes for use in blind or through holes. Pipe and UNEF are in sets of 2. (Taper + Bottom)
Metric Coarse Hand Taps (sets & singles) are available in either M2 HSS or HSSE-V (default).

TYPE 0720 SER SET

Recommended for precision hand tapping in deep through or blind holes. The Progressive truncated threadform is especially suited for tough materials such as stainless or high tensile steels.

TYPE 0720P PILOT SER SET

Same as the Serial Set except that the No.1 has a pilot to assist alignment and concentricity when starting to tap. Used mainly where high value components require minimal tap breakage or imperfect threads.

THREAD FORM	NORM	FULL TYPE NO.		PAGE NO.
		STD SET	SER SET	
M	ISO 529	A0420	A0720/A0720P	B11
M LH	ISO 529	A0420L	-	B11
M	JIS B4430	J0420	-	B15
M	JIS B4430	J0410	-	B15
MF	ISO 529	A0420	A0720	B23
MF LH	ISO 529	A0420L	-	B23
UNC	ISO 529	A0420	A0720	B34
UNC LH	ISO 529	A0420L	-	B34
UNF	ISO 529	A0420	A0720	B38
UNF LH	ISO 529	A0420L	-	B38
UNEF	ISO 529	A0420	-	B42

THREAD FORM	NORM	FULL TYPE NO.		PAGE NO.
		STD SET	SER SET	
UN	ISO 529	A0420	-	B43
BSW	ISO 529	A0420	A0720	B44
BSW LH	ISO 529	A0420L	-	B44
BSF	ISO 529	A0420	-	B46
BSB	ISO 529	A0420	A0720	B47
BA	ISO 529	A0420	-	B48
G	ISO 2284	C0420	-	B49
G LH	ISO 2284	C0420L	-	B49
RP	ISO 2284	C0420	-	B50
RP LH	ISO 2284	C0420L	-	B50
NPS	ISO 2284	C0420	-	B53

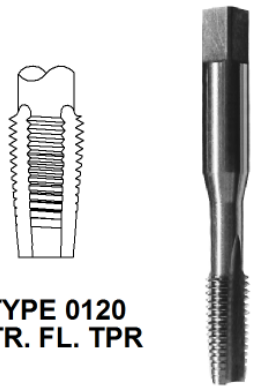
LEFT HAND TAPS

Left Hand Straight Flute taps are stocked in most popular sizes and thread forms. Special LH taps can also be manufactured against special request.
See index of Stock Range under Straight Flute or Standard Sets.

INDEX OF STOCK RANGE BY THREADFORM

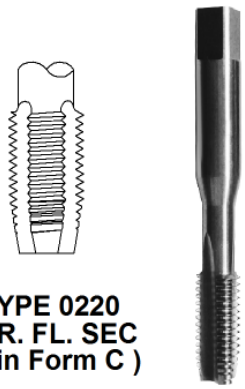
MACHINE TAPS

STRAIGHT FLUTE MACHINE TAPS



TYPE 0120
STR. FL. TPR

A straight flute tap for use mainly in shallow through holes. The ISO Coarse and Fine taps have a 5° and 7° lead respectively, whereas the DIN FORM D has an 8° lead. A 5° lead (Form A) is also available in DIN against special request.



TYPE 0220
STR. FL. SEC
(Din Form C)

For use in shallow or medium depth through holes in long chipping material or blind holes in short chipping materials. Fine thread holes can be threaded deeper without long chips choking the flutes. ISO Second lead = 10° (Coarse) and 12° (Fine) DIN FORM C = 15°

TYPE 0320
STR. FL. BOT
(Din Form E)

For use in through or blind holes in short chipping materials, and where it might be necessary to thread to the bottom of the hole. ISO Bottom lead = 23° (Coarse) and 20° (Fine) DIN FORM E LEAD = 23°

THREAD FORM	NORM	FULL TYPE NO.			PG. NO.
		TPR (Form D)	SEC (Form C)	BOT (Form E)	
M	ISO 529	A0120	A0220	A0320	B11
M LH	ISO 529	A0120L	A0220L	A0320L	B11
M	JIS B4430	J0120	J0220	J0320	B15
M	JIS B4430	J0110	J0210	J0310	B15
M	DIN 371	D0120	D0220	D0320	B17
M	DIN 376	E0120	E0220	E0320	B20
M	ISO 2283	B0120	B0220	B0320	B22
MF	ISO 529	A0120	A0220	A0320	B23
MF LH	ISO 529	A0120L	A0220L	A0320L	B23
MF	DIN 374	-	F0220	F0320	B32
MF	ISO 2283	B0120	B0220	B0320	B33
UNC	ISO 529	A0120	A0220	A0320	B34
UNC LH	ISO 529	A0120L	A0220L	A0320L	B34
UNF	ISO 529	A0120	A0220	A0320	B38
UNF LH	ISO 529	A0120L	A0220L	A0320L	B38
UNEF	ISO 529	A0120	-	A0320	B42
UN	ISO 529	A0120	A0220	A0320	B43

THREAD FORM	NORM	FULL TYPE NO.			PG. NO.
		TPR (Form D)	SEC (Form C)	BOT (Form E)	
BSW	ISO 529	A0120	A0220	A0320	B44
BSW LH	ISO 529	A0120L	A0220L	A0320	B44
BSF	ISO 529	A0120	A0220	A0320	B46
BSB	ISO 529	A0120	A0220	A0320	B47
BA	ISO 529	A0120	A0220	A0320	B48
G	ISO 2284	C0120	C0220	C0320	B49
G LH	ISO 2284	C0120L	C0220L	C0320L	B49
G	DIN 5156	-	G0220	G0320	B51
RP	ISO 2284	C0120	C0220	C0320	B50
RP LH	ISO 2284	C0120L	C0220L	C0320L	B50
RP	DIN 5156	-	G0220	G0320	B51
RC	ISO 2284	C0120	C0220	C0320	B52
NPS	ISO 2284	C0120	C0220	C0320	B53
NPSF	ISO 2284	C0120	C0220	C0320	B53
NPT	ISO 2284	C0120	C0220	C0320	B53
NPTF	ISO 2284	C0120	C0220	C0320	B53

INDEX OF STOCK RANGE BY THREADFORM

MACHINE TAPS

STRAIGHT FLUTE MACHINE TAPS

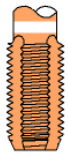
WHITE RING Ni
TYPE 0222 GG
STR. FL. NITRIDE
(DIN FORM C)

Straight flute tap with a modified rake angle, 15° lead and nitrided surface treatment for cast iron and other abrasive short chipping materials. ISO and JIS Bot or DIN Form E (23°) leads available against special request.

THREAD FORM	NORM	FULL TYPE NO.		PG. NO.
		STR. FL. NITRIDE	STR.FL. TiN	
M	ISO 529	A0222GG	-	B12
M	JIS B4430	J0212GG	-	B16
M	DIN 371	D0222GG	D0223GG	B17
M	DIN 376	E0222GG	E0223GG	B20
MF	ISO 529	A0222GG	-	B24
MF	DIN374	F0222GG	-	B32

6HX tolerance provides greater wear allowance for abrasive tapping. Ring displayed on DIN taps only.

WHITE RING TiN
TYPE 0223 GG
STR. FL. TiN
(DIN FORM C)



Straight flute tap with a modified rake angle, 15° lead and TiN coating suitable for cast iron and other abrasive short chipping materials. Suitable for high speed tapping. ISO and JIS Bot or DIN Form E (23°) leads available against special request.

THREAD FORM	NORM	FULL TYPE NO.		PG. NO.
		STR. FL. NITRIDE	STR.FL. TiN	
UNC	ISO 529	A0222GG	-	B35
UNF	ISO 529	A0222GG	-	B39
BSW	ISO 529	A0222GG	-	B45
G	DIN 5156	G0222GG	-	B51
RP	DIN 5156	G0222GG	-	B51

6HX tolerance provides greater wear allowance for abrasive tapping. Ring displayed on DIN taps only.

SPIRAL POINT TAPS (DIN FORM B) SPECIAL GEOMETRY

RED RING SP
TYPE 1224 HR

The Red Ring Spiral Point has been designed to cut threads in normal and deep through holes in High Resistance steels over 1000 N/mm²

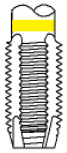
THREAD FORM	NORM	FULL TYPE NO.	PG. NO.
		RED RING SP	
M	DIN 371	D1224 HR	B19
M	DIN 376	E1224 HR	B19

BLUE RING SP
TYPE 1221 IN

The Blue Ring Spiral Point tap is designed to cut threads in normal and deep through holes in tough stainless steels and high alloyed tool steels which have a tendency to "close" after threading.

THREAD FORM	NORM	FULL TYPE NO.	PG. NO.
		BLUE RING SP	
M	DIN 371	D1221 IN	B19
M	DIN 376	E1221 IN	B19

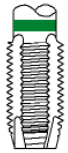
YELLOW RING SP
TYPE 1220 AL



The Yellow Ring Spiral Point has been designed with special geometry for tapping through holes in soft ductile aluminiums and long chipping light metals and plastics.

THREAD FORM	NORM	FULL TYPE NO.	PG. NO.
		YELLOW RING SP	
M	DIN 371	D1220 AL	B19
M	DIN 376	E1220 AL	B19

GREEN RING SP
TYPE 1220 AS



The Green Ring Spiral Point tap is designed to tap through holes in tough non-ferrous metals which have a tendency to "close" after threading. eg. Bronze (hard) or Alu with Si > 10% (TiCN recommended)

THREAD FORM	NORM	FULL TYPE NO.	PG. NO.
		GREEN RING SP	
M	DIN 371	D1220 AS	B19
M	DIN 376	E1220 AS	B19

* NOTE: Special Geometry taps are available in other thread forms against special request.

INDEX OF STOCK RANGE BY THREADFORM

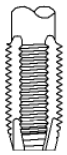
MACHINE TAPS

SPIRAL POINT TAPS (Din Form B)

Also known as Gun Type, Bull Nose or Chipdriver taps. FEW SP taps are designed for through hole tapping, as the chips are driven ahead of the tap, with coolant flowing freely through shallow flutes to the cutting edges.

The greater strength and reduced torque loads allow for higher tapping speeds, thus making this an ideal production machine tap. Various types are offered.

TYPE 1220
BF SP

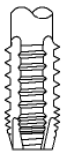


Bright Finish Spiral Point Taps have no surface treatment and are normally used for tapping through holes in non-ferrous materials or steels where cold welding does not pose a problem.

TYPE 1221 SO
SO SP

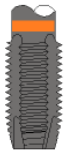
Yellow Ring Steam Tempered Spiral Point Taps have specially adapted geometry for tapping through holes in soft steels where oversizing can be a problem.

TYPE 1220 IT
IT SP



Interrupted Thread Spiral Point Taps have alternate threads removed, and are used for tapping through holes in all conventional steels and non-ferrous materials where a reduction in tapping torque is required.

TYPE 1221
ST SP



Orange Ring (on DIN only) Steam Tempered Spiral Point Taps are used for tapping through holes in most steels, especially where cold welding is a problem. This is the most common SP tap and is supplied as standard when no other surface treatment is specified.

TYPE 1223
TiN SP

Titanium Nitrided Spiral Point Taps are used for tapping through holes in abrasive materials, or where higher speeds and a longer tool life are required.

THREAD FORM	NORM	FULL TYPE NO.					PG. NO.
		BF SP	ST SP	TiN SP	SO SP	IT BF SP	
M	ISO 529	A1220	A1221	A1223	-	-	B12
M	JIS B4430	J1210	J1211	J1213	-	-	B16
M	JIS B4430	J1220	J1211	J1223	-	-	B16
M	DIN 371	D1220	D1221	D1223	D1221	D1220IT	B17
M	DIN 376	E1220	E1221	E1223	E1221	E1220IT	B20
M	ISO 2283	B1220	B1221	-	-	-	B22
MF	ISO 529	A1220	A1221	-	-	-	B24
MF	DIN374	F1220	F1221	F1223	-	-	B32
MF	ISO 2283	B1220	B1221	-	-	-	B33
UNC	ISO 529	A1220	A1221	-	-	-	B35

THREAD FORM	NORM	FULL TYPE NO.		PG. NO.
		BF SP	ST SP	
UNF	ISO 529	A1220	A1221	B39
UN	ISO 529	A1220	A1221	B43
BSW	ISO 529	A1220	A1221	B45
BSF	ISO 529	-	A1221	B46
BA	ISO 529	-	A1221	B48
G	ISO 2284	C1220	C1221	B49
RP	ISO 2284	C1220	C1221	B50
G	DIN 5156	G1220	G1221	B51
RP	DIN 5156	G1220	G1221	B51

INDEX OF STOCK RANGE BY THREADFORM

MACHINE TAPS

SPIRAL FLUTE TAPS (DIN Form C)

FEW Spiral Flute Taps are designed for machine tapping of blind holes and are particularly useful where chip disposal poses problems. The right hand spiral flutes direct the chips back along the flute and out of the hole. They are available in slow (15°), standard (30°), fast (40°) flute helixes. The Shortened thread length of the 30° and 40° DIN and ISO Spiral Flute taps allow for more efficient chip removal as well as lower torque loads. These are suitable for tapping deep holes in a variety of different materials. Various types are available.

TYPE 4220
BF SF 30°

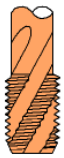
Bright Finish 30° Spiral Flute Taps are suitable for tapping blind holes in non-ferrous materials and steel where cold welding does not pose a problem.

TYPE 4221
ST SF 30°

Steam Tempered Spiral Flute Taps are suitable for tapping blind holes in most steels, where cold welding occurs. Supplied as standard where no helix or surface treatment is specified. (Orange ring on DIN only)

TYPE 4223
TiN SF 30°

Titanium Nitrided 30° Spiral Flute Taps are suitable for tapping blind holes in abrasive materials, or where higher speeds and a longer tool life are required.



TYPE 4221 SO
SO SF

Yellow Ring Steam Tempered Spiral Flute Taps have specially adapted geometry for tapping blind holes in soft steels where oversizing can be a problem.

THREAD FORM	NORM	FULL TYPE NO.				PG. NO.
		BF SF 30°	ST SF 30°	TiN SF 30°	SO SF	
M	ISO 529	A4220	A4221	A4223	-	B12
M	JIS B4430	J4210	J4211	J4213	-	B16
M	JIS B4430	J4220	J4211	J4223	-	B16
M	DIN 371	D4220	D4221	D4223	D4221	B18
M	DIN 376	E4220	E4221	E4223	E4221	B21
MF	ISO 529	A4220	A4221	-	-	B24

THREAD FORM	NORM	FULL TYPE NO.			PG. NO.
		BF SF 30°	ST SF 30°	TiN SF 30°	
MF	DIN 374	F4220	F4221	F4223	B32
UNC	ISO 529	A4220	A4221	-	B35
UNF	ISO 529	A4220	A4221	-	B39
BSW	ISO 529	A4220	A4221	-	B45
G	DIN 5156	G4220	G4221	-	B51
RP	DIN 5156	G4220	G4221	-	B51

SLOW SPIRAL FLUTE TAPS (~15°)

TYPE 3220
BF SF 15°

Bright Finish 15° Spiral Flute Taps are suitable for tapping blind holes in tougher non-ferrous materials with medium to long chips, or steels up to 1000 N/mm² where cold welding does not pose a problem.

TYPE 3221
ST SF 15° (Orange Ring)

Steam Tempered 15° Spiral Flute Taps are suitable for tapping blind holes in tough steels up to 1000 N/mm² where cold welding occurs. Supplied as standard where surface treatment not specified.

TYPE 3223
TiN SF 15°

Titanium Nitrided 15° Spiral Flute Taps are suitable for tapping blind holes in tough, abrasive materials where higher tapping speeds or longer tool life are required.

THREAD FORM	NORM	FULL TYPE NO.			PG. NO.
		BF SF 15°	ST SF 15°	TiN SF 15°	
M	DIN 371	D3220	D3221	D3223	B18
M	DIN 376	E3220	E3221	E3223	B21

INDEX OF STOCK RANGE BY THREADFORM

MACHINE TAPS

SPECIAL GEOMETRY FAST SPIRAL FLUTE TAPS (~ 40°)

RED RING SF TYPE 5224 HR

The Red Ring Spiral Flute tap is designed to tap blind holes in High Resistance steels of over 1000 N/mm².

THREAD FORM	NORM	FULL TYPE NO. RED RING SF	PG. NO.
M	DIN 371	D5224 HR	B19
M	DIN 376	E5224 HR	B19

BLUE RING SF TYPE 5221 IN

The Blue Ring Spiral Flute tap is designed to cut threads in blind holes in tough stainless steels and high alloyed tool steels which have a tendency to "close" after threading.

THREAD FORM	NORM	FULL TYPE NO. BLUE RING SF	PG. NO.
M	DIN 371	D5221 IN	B19
M	DIN 376	E5221 IN	B19

YELLOW RING SF TYPE 5220 AL

The Yellow Ring Spiral Flute is designed for tapping blind holes in soft, ductile aluminiums, and long chipping light metals and plastics.

THREAD FORM	NORM	FULL TYPE NO. YELLOW RING SF	PG. NO.
M	DIN 371	D5220 AL	B19
M	DIN 376	E5220 AL	B19

GREEN RING SF TYPE 5220 AS

The Green Ring Spiral Flute tap is designed to tap blind holes in tough non-ferrous metals which have a tendency to "close" after threading. eg. Bronze (hard) or Alu with Si > 10% (TiCN recommended)

THREAD FORM	NORM	FULL TYPE NO. GREEN RING SF	PG. NO.
M	DIN 371	D5220 AS	B19
M	DIN 376	E5220 AS	B19

* NOTE: Special Geometry taps are available in other thread forms against special request.

POLYGON TAPS

Polygon taps are also known as Roll, or Form Taps. They are primarily used for the chipless threading of ductile steels,aluminium, brass and copper. Good lubrication is required. Tapping drill sizes are different to those of thread cutting taps. See Technical section for details.

TYPE 6220 POLYGON

The Standard Polygon is used for forming threads in ductile materials. Supplied as standard if oil grooves are not specified.

THREAD FORM	NORM	FULL TYPE NO. STD. POLYGON	PG. NO.
M	ISO 529	A6220	B12
M	DIN 371	D6220	B18
M	DIN 376	E6220	B21
MF	DIN 374	F6220	B32

TYPE 6220G POLYGON + OG

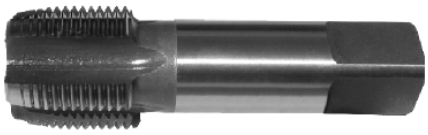
These Polygon taps have oil grooves to facilitate lubrication in the forming of threads in deep through or blind holes in ductile materials.

THREAD FORM	NORM	FULL TYPE NO. POLYGON + OG	PG. NO.
M	ISO 529	A6220 G	B12
M	DIN 371	D6220 G	B18
M	DIN 376	E6220 G	B21
MF	DIN 374	F6220 G	B32

INDEX OF STOCK RANGE BY THREADFORM

MACHINE TAPS

PIPE TAPS



FEW Pipe Taps are available in a variety of thread forms and norms which cover most popular applications. These cater for both ISO (Whitworth 55° - old BSP Thread Form) and American (60°) threading system. These may be categorised as follows:

PARALLEL PIPE THREADS

THREAD FORM	NORM	THREAD ANGLE	PG. NO
G (BSP Mechanical Joint)	ISO 2284	55°	B49
G (BSP Mechanical Joint)	DIN 5156	55°	B51
RP (BSP Leak-Proof Joint)	ISO 2284	55°	B50
RP (BSP Leak-Proof Joint)	DIN 5156	55°	B51
NPS (Mechanical Joint NPSM / NPSC)	ISO 2284	60°	B53
NPSF (Dryseal Leak-Proof Joint)	ISO 2284	60°	B53

CONICAL PIPE THREADS

THREAD FORM	NORM	THREAD ANGLE	PG. NO
RC (1:16 Taper)	ISO 2284	55°	B52
NPT (1:16 Taper)	ISO 2284	60°	B53
NPTF (Dryseal 1:16 Taper)	ISO 2284	60°	B53

Type C0221 Straight Flute Steam Tempered taps are kept in stock for applications where cold welding creates problems.
NOTE: All other pipe taps can be steam tempered against special request.
For more details see section under Tolerances.

CLOSE FIT AND FREE FIT TAPS

CLOSE FIT Taps are used when a close or tight fitting thread is required. They are also recommended when a standard tap generates an oversize thread due to machine run-out, soft material, or application conditions.
FREE FIT Taps are used when a free or loose fitting thread is required, or when the application allows for a tap with a greater wear allowance to be utilised in abrasive materials such as cast iron. These taps are available in most popular thread forms and types. For more details see section under Tolerances.

SPECIAL TAPS

Many sizes, overall geometry and threadforms not listed in this catalogue may be available and in some cases ex-stock at our factory. If not, custom made taps and dies may be manufactured to order.
The following data is required before quotations can be given:

1. Quantity required.
2. Nominal size.
3. Pitch or TPI (coarse pitch assumed unless specified).
4. Threadform.
5. Right hand or Left hand (right hand assumed unless specified).
6. Type of tap (i.e. taper, second, bottom, spiral point, spiral flute etc).
7. Class of fit required.
8. Material to be threaded.
9. Depth of hole.
10. Type of hole.
11. Through hole or Blind hole.
12. Will there be keyways or cross holes in the component to be tapped?
13. Is the job to be tapped vertically or horizontally?
14. And finally we would like to know the machine doing the tapping, if possible.

For better price and delivery, special taps and dies are normally made from ISO, DIN or JIS blanks held in stock. If this is unsuitable please supply overall dimensions or preferably drawings giving all relevant details.

NOTE: It is not always possible to produce the exact quantity. We, therefore, reserve the right to fill orders either 10% short or 10% in excess of the quantity ordered.

SPECIAL TAPS ENQUIRY FORM

FILL OUT & FAX to 011 887-0273

Should you have a tapping problem or require specialised threading tools, please fill out the form below, and if possible please send us samples of components and tools used. This will enable us to select the correct tool for your specialised application.

NAME OF COMPANY :		CONTACT NAME :	
ADDRESS :		TEL :	
		FAX :	
		E-MAIL :	
DEPARTMENT :		DATE :	REQUESTED BY:

A. TAP INFORMATION

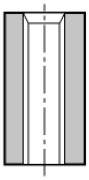
QTY REQUIRED:		DRAWING NO. (if any):	
SIZE OF TAP :		TOLERANCE :	
PITCH :		RIGHT / LEFT HAND :	
NORM REQUIRED :		TYPE OF TAP :	
(eg. ISO 529 / DIN 371 etc.)		(eg. Spiral Point / Spiral Flute etc.)	
SURFACE TREATMENT :		NO. OF FLUTES :	
(If any, eg. Steam Temper, Nitride, TiN etc.)		LEAD LENGTH :	

B. MATERIAL / WORKPIECE INFORMATION

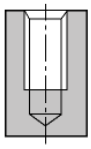
TYPE OF MATERIAL :		NO. OR CLASSIFICATION :	
(eg. Stainless Steel, Brass etc.)		(eg. 304, Cu Zn 37 etc.)	
TENSILE STRENGTH :		TEMPERED TO :	
(N/mm^2)		(N/mm^2)	
SHORT / LONG CHIP :		TYPE OF HOLE : Mark appropriate box below	

(Complete dimensions for appropriate hole eg. - Precise diameter, depth etc.)

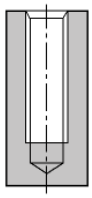
THROUGH HOLE



LONG THROUGH HOLE



BLIND HOLE



DEEP BLIND HOLE

C. MACHINE / METHOD

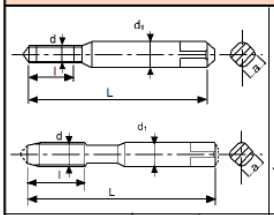
MACHINE TYPE :		HORIZONTAL / VERTICAL TAPPING :	
REVERSE / DROP THROUGH :		FEED (WITH / WITHOUT PITCH CONTROL) :	
CUTTING SPEED :			
TYPE OF TAPPING ATTACHMENT / HOLDER :		LUBRICANT TYPE :	
		APPLICATION :	
(Inflexible / with axial float / with radial float / with clutch)		(Brush / continuous / spray cooling etc.)	

D. DETAILS OF PROBLEM, OR OTHER INFORMATION

ISO METRIC COARSE To ISO 2857 M

ISO 529 SHORT HAND & MACHINE TAPS

DIMENSIONS



SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F
mm	mm	mm	mm	mm	mm

CODES

DESCRIPTION	STR. FL. SEC	STD SET (3)	STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	PILOT SER (3)	L/H SEC	L/H SET (3)
TYPE	A0220 M2 HSS	A0420 M2 HSS	A0120	A0220	A0320	A0420	A0720	A0720P	A0220L	A0420L
SURFACE TREATMENT	BF	BF	BF	BF	BF	BF	BF	BF	BF	BF
TAP / COMPONENT TOLERANCE	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H
		TPR + SEC + BOT				TPR + SEC + BOT	NO.1 + NO.2 + BOT	NO.1P + NO.2 + BOT		TPR + SEC + BOT

SIZE	PITCH	d_1	l	L	a										
mm	mm	mm	mm	mm	mm										
M1	**0,25**	2,5	5,5	38,5	2				0001120		0001100				
M1,2	**0,25**	2,5	5,5	38,5	2				0001380		0001400				
M1,4	**0,3**	2,5	7	40	2				0001620		0001600				
M1,6	**0,35**	2,5	8	41	2				0001670		0001700				
M2	**0,4**	2,5	8	41	2			0002800	0002900	0003000	0003100	0003300			
M2,2	**0,45**	2,8	9,5	44,5	2,24			0003900	0004000	0004100	0004200	0004400			
M2,5	**0,45**	2,8	9,5	44,5	2,24			0005700	0005800	0005900	0006000	0006200			
***M2,6**	**0,45**	2,8	9,5	44,5	2,24			0006800	0006900	0007000	0007100	0007300			
M3	**0,5**	3,15	11	48	2,5	3700320	3700300	0008400	0008500	0008600	0008700	0008900	0008850	0009830	0009800
M3,5	**0,6**	3,55	13	50	2,8			0010500	0010600	0010700	0010900	0011100			
M4	**0,7**	4	13	53	3,15	3700420	3700400	0013100	0013200	0013300	0013400	0013600	0013620	0014630	0014600
***M4**	**0,75**	4	13	53	3,15			0012400	0012500	0012600	0012700	0012900			
M4,5	**0,75**	4,5	13	53	3,55			0015400	0015500	0015600	0015700	0015900			
M5	**0,8**	5	16	58	4	3700520	3700500	0018200	0018300	0018400	0018500	0018700	0017450	0019670	0019800
***M5**	**0,9**	5	16	58	4			0016900	0017000	0017100	0017200	0017400			
M6	**1**	6,3	19	66	5	3700620	3700600	0022100	0022200	0022300	0022500	0022700	0022680	0024080	0024000
M7	**1**	7,1	19	66	5,6			0025800	0025900	0026000	0026100	0026300			
M8	**1,25**	8	22	72	6,3	3700820	3700800	0028000	0028100	0028200	0028300	0028500	0028470	0029530	0029500
M9	**1,25**	9	22	72	7,1			0030300	0030400	0030500	0030600	0030800		0031220	0031240
M10	**1,5**	10	24	80	8	3701020	3701000	0031900	0032000	0032100	0032300	0032500	0032460	0033391	0033400

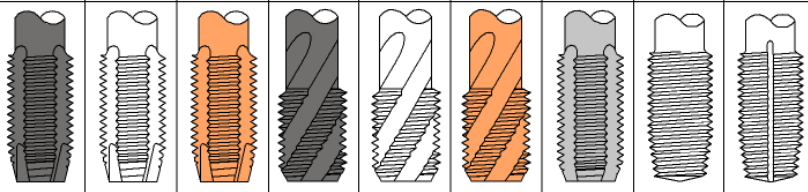
* = Non ISO sizes

Note : Many non popular sizes not shown in this catalogue are available ex-stock or against special request.

HSS/HSSE Ground Thread Taps

ISO METRIC COARSE To ISO 2857 M

ISO 529 SHORT MACHINE TAPS

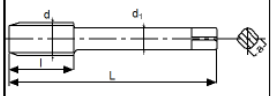
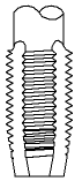
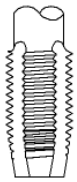
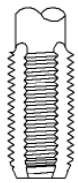
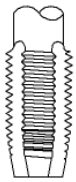
DESCRIPTION		CODES								
		ST SP	BF SP	TiN SP	ST SF	BF SF	TiN SF	STR. FL. NITRIDE	STD Polygon	Polygon + OG
TYPE		A1221	A1220	A1223	A4221	A4220	A4223	A0222GG	A6220	A6220G
SURFACE TREATMENT		ST	BF	TiN	ST	BF	TiN	Ni	BF	BF
TAP/COMPONENT TOLERANCE		ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	6HX/6H	6HX/6H	6HX/6H
SIZE	PITCH									
mm	mm									
M1	0,25									
M1,2	0,25									
M1,4	0,3									
M1,6	0,35									
M2	0,4	0003600	0003650		0003770	0003780				
M2,2	0,45	0004750	0004700							
M2,5	0,45	0006500	0006550							
*M2,6	0,45	0007600	0007650							
M3	0,5	0009200	0009250	0009280	0009500	0009550	0009600	0008620	0010450	
M3,5	0,6	0011400	0011450	0011500	0011800	0011810	0011700		0012250	
M4	0,7	0013900	0013950	0013980	0014200	0014250	0014300	0013320	0015300	0015350
*M4	0,75	0013000	0013050							
M4,5	0,75	0016000	0015950		0016050					
M5	0,8	0019000	0019050	0019200	0019300	0019450	0019350	0018450	0020600	0020650
*M5	0,9	0017700	0017750		0017800	0017830				
M6	1	0023000	0023050	0023100	0023400	0023450	0023480	0022350	0025100	0025150
M7	1	0026600	0026650	0026680	0026700	0026750				
M8	1,25	0028800	0028850	0028900	0029200	0029250	0029260	0028350	0030200	0030250
M9	1,25	0031100	0031150	0031180	0031200	0031190				
M10	1,5	0032800	0032850	0032980	0033100	0033150	0033180	0032150	0034200	0034250

* = Non ISO Sizes

Note : Many non popular sizes not shown in this catalogue are available ex-stock or against special request.

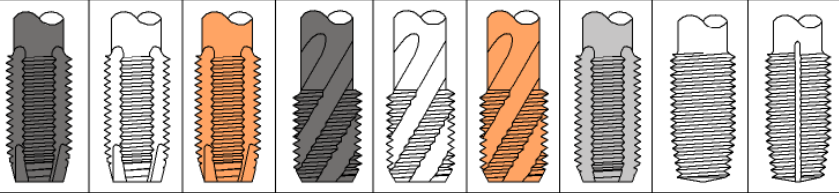
ISO METRIC COARSE To ISO 2857 M

ISO 529 SHORT HAND & MACHINE TAPS

DIMENSIONS						CODES									
				DESCRIPTION		M2 HSS SEC	M2 HSS SET (3)	STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	PILOT SER (3)	L/H SEC	L/H SET (3)
				TYPE		A0220	A0420	A0120	A0220	A0320	A0420	A0720	A0720P	A0220L	A0420L
				SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF	BF	BF	BF
				TAP/COMPONENT TOLERANCE		ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F		TPR + SEC + BOT				TPR + SEC + BOT	NO.1 + NO.2 + BOT	NO.1P + NO.2 + BOT		TPR + SEC + BOT
mm	mm	mm	mm	mm	mm										
M11	1,5	8	25	85	6,3			0034300	0034400	0034500	0034600	0034800			
M12	1,75	9	29	89	7,1	3701220	3701200	0035900	0036000	0036100	0036200	0036400	0036380	0037180	0037200
M14	2	11,2	30	95	9	3701420	3701400	0037900	0038000	0038100	0038200	0038400	0038390	0039100	0039300
M16	2	12,5	32	102	10	3701620	3701600	0040000	0040100	0040200	0040300	0040500	0040450	0041300	0041500
M18	2,5	14	37	112	11,2	3701820	3701800	0042400	0042500	0042600	0042700	0042900		0043700	0043900
M20	2,5	14	37	112	11,2	3702020	3702000	0044700	0044800	0044900	0045000	0045200	0045150	0045950	0046000
M22	2,5	16	38	118	12,5	3702220	3702200	0046800	0046900	0047000	0047100	0047300		0048000	0048150
M24	3	18	45	130	14	3702420	3702400	0048700	0048800	0048900	0049000	0049200	0049150	0050000	0050200
M27	3	20	45	135	16	3702720	3702700	0051000	0051100	0051200	0051300	0051500		0051900	0052050
M30	3,5	20	48	138	16	3703020	3703000	0052200	0052300	0052400	0052500	0052700		0053100	0053300
M33	3,5	22,4	51	151	18	3703320	3703300	0053700	0053800	0053900	0054000	0054200		0054500	0054650
M36	4	25	57	162	20	3703620	3703600	0054800	0054830	0054850	0054870	0054920		0055040	0055070
M39	4	28	60	170	22,4			0055100	0055150	0055200	0055250	0055350		0055450	0055530
M42	4,5	28	60	170	22,4			0055600	0055700	0055750	0055800	0055900		0056000	0056080
M45	4,5	31,5	67	187	25			0056150	0056200	0056250	0056300	0056400			
M48	5	31,5	67	187	25			0056450	0056500	0056550	0056600	0056700		0056800	0056880
M52	5	35,5	70	200	28			0056950	0057000	0057050	0057080				
M56	5,5	35,5	70	200	28			0057150	0057200	0057250	0057255				
M60	5,5	40	76	221	31,5			0057700	0057750	0057800	0057830				
M64	6	40	79	224	31,5			0057900	0057950	0058000	0058030				

ISO METRIC COARSE To ISO 2857 M

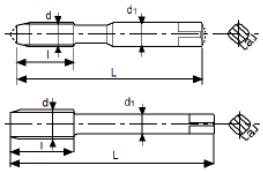
ISO 529 SHORT MACHINE TAPS

DESCRIPTION		CODES								
		ST SP	BF SP	TiN SP	ST SF	BF SF	TiN SF	STR. FL. NITRIDE	STD POLYGON	POLYGON + OG
TYPE		A1221	A1220	A1223	A4221	A4220	A4223	A0222GG	A6220	A6220G
SURFACE TREATMENT		ST	BF	TiN	ST	BF	TiN	Ni	BF	BF
TAP/COMPONENT TOLERANCE		ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	6HX/6H	6HX/6H	6HX/6H
SIZE	PITCH									
mm	mm									
M11	1,5	0035300	0035350	0035200						
M12	1,75	0036700	0036750	0036900	0037000	0037050	0037060	0036150	0037850	0037870
M14	2	0038500	0038550	0038450	0038800	0038850	0038870	0038150	0039470	0039480
M16	2	0040800	0040850	0040870	0041100	0041150	0041160	0040250	0041750	0041760
M18	2,5	0043200	0043250		0043400	0043420				
M20	2,5	0045600	0045650		0045800	0045850		0044950		
M22	2,5	0047600	0047650		0047800	0047850				
M24	3	0049500	0049550		0049800	0049750				
M27	3	0051700	0051720		0052170	0051791				
M30	3,5	0052800	0052820		0052900	0052930				
M33	3,5	0054300	0054320		0054360	0054370				
M36	4	0055000	0054990		0055012	0055013				
M39	4	0055395	0055385		0055470	0055480				
M42	4,5				0055940					
M45	4,5	0056160	0056170		0056370					
M48	5				0056730	0056740				
M52	5				0057120					
M56	5,5									
M60	5,5									
M64	6									

Note: Long Thread Length (max) Spiral Flute taps are available in most popular sizes. Price on application.

ISO METRIC COARSE To ISO 2857 M

~JIS B4430 TYPE J SHORT HAND & MACHINE TAPS



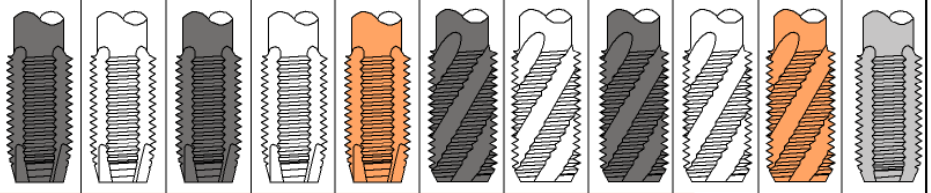
DIMENSIONS						CODES							
				DESCRIPTION		STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	JIS II TPR	JIS II SEC	JIS II BOT	JIS II SET (3)
				TYPE		J0120	J0220	J0320	J0420	J0110	J0210	J0310	J0410
				SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF	BF
				TAP / COMPONENT TOLERANCE *		6H/6H	6H/6H	6H/6H	6H/6H	II / 4H	II / 4H	II / 4H	II / 4H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F				TPR + SEC + BOT				TPR + SEC + BOT
mm	mm	mm	mm	mm	mm								
M3	0,5	4	11	46	3,2	6656000	6656200	6656300	6656500	6658200	6658300	6658400	6658600
M4	0,7	5	13	52	4	6660000	6660100	6660200	6660500	6662000	6662100	6662200	6662400
M5	0,8	5,5	16	60	4,5	6664000	6664200	6664400	6664800	6666600	6666700	6666800	6667000
M6	1	6	19	62	4,5	6668000	6668200	6668400	6668800	6673000	6673200	6673400	6673800
M8	1,25	6,2	22	70	5	6677200	6677400	6677500	6677800	6679600	6679700	6679800	6680000
M10	1,5	7	24	75	5,5	6682400	6682600	6682800	6683200	6687000	6687200	6687400	6687800
M12	1,75	8,5	29	82	6,5	6689000	6689200	6689400	6689800	6693000	6693200	6693400	6693700
M14	2	10,5	30	88	8	6696420	6696410	6696440	6696400	6696920	6696950	6696980	6697300
•M16	2	12,5	32	102	10	0040000	0040100	0040200	0040300				
M20	2,5	15	37	105	12	6699240	6699260	6699280	6699300	6710100	6710150	6710200	6710300
M24	3	19	45	120	15	6711240	6711260	6711280	6711300	6712250	6712260	6712270	6712300
M30	3,5	23	48	135	17	6713000	6713100	6713200	6713300	6714000	6714100	6714200	6714300

• ISO 529 OAL

* **NOTE:** For further information relating to JIS tolerances, see Pages T3 & T4

ISO METRIC COARSE To ISO 2857 M

~JIS B4430 TYPE J SHORT MACHINE TAPS

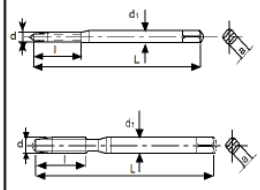
		CODES										
DESCRIPTION		ST SP	BF SP	JIS II ST SP	JIS II BF SP	JIS II TiN SP	ST SF	BF SF	JIS II ST SF	JIS II BF SF	JIS II TiN SF	JIS II STR. FL. NITRIDE
TYPE		J1221	J1220	J1211	J1210	J1213	J4221	J4220	J4211	J4210	J4213	J0212GG
SURFACE TREATMENT		ST	BF	ST	BF	TiN	ST	BF	ST	BF	TiN	Ni
TAP/COMPONENT TOLERANCE *		6H / 6H	6H / 6H	II / 4H	II / 4H	II / 4H	6H / 6H	6H / 6H	II / 4H	II / 4H	II / 4H	II / 4H
SIZE	PITCH											
mm	mm											
M3	0,5	6657000	6657100	6659100	6659300	6659450	6657500	6657700	6659500	6659600	6659800	6658500
M4	0,7	6661200	6661300	6662700	6662800	6662860	6661500	6661600	6662900	6663000	6663150	6662300
M5	0,8	6665600	6665800	6667400	6667500	6667580	6666000	6666200	6667600	6667700	6667850	6666900
M6	1,0	6670000	6670200	6675000	6675200	6675400	6671200	6671400	6676000	6676200	6676400	6673600
M8	1,25	6678600	6678800	6680600	6680800	6680850	6679000	6679200	6681000	6681200	6681300	6679905
M10	1,5	6684600	6684800	6688150	6688300	6688320	6685800	6686000	6688450	6688600	6688620	6687605
M12	1,75	6691000	6691200	6694200	6694400	6694420	6692200	6692400	6694800	6695000	6695200	6693605
M14	2	6696500	6696600	6697450	6697500		6696700	6696800	6697550	6697600		6696990
•M16	2	0040800	0040850				0041100	0041150				
M20	2,5	6699450	6699500	6710450	6710500		6699550	6699600	6710550	6710600		6710220
M24	3	6711450	6711500	6712450	6712500		6711550	6711600	6712550	6712600		
M30	3,5	6713450	6713500	6714450	6714500		6713550	6713600	6714550	6714600		

• ISO 529 OAL

* **Note:** For further information relating to JIS tolerances, see Pages T3 & T4

ISO METRIC COARSE To DIN EN 22857 M

DIN 371 LONG, FULL DIAMETER SHANK MACHINE TAPS

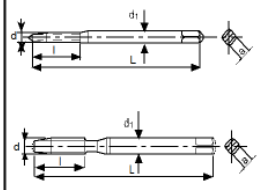


DIMENSIONS						CODES							
				DESCRIPTION		STR. FL. FORM C	STR. FL. FORM E	STR. FL. NITRIDE	STR. FL. TiN	ST SP	BF SP	TiN SP	SO ST SP
				TYPE		D0220	D0320	D0222GG	D0223GG	D1221OR	D1220	D1223	D1221SO
				CHAMFER (DIN)		C	E	C	C	B	B	B	B
				SURFACE TREATMENT		BF	BF	Ni	TiN	ST	BF	TiN	ST
				TAP/COMPONENT TOLERANCE		ISO2/6H	ISO2/6H	6HX/6H	6HX/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F								
mm	mm	mm	mm	mm	mm								
M2,5	**0,45**	2,8	9	50	2,1	6013550	6013500			6014200	6014400		
M2,6	**0,45**	2,8	9	50	2,1	6011550	6011500			6011900	6011950		
M3	**0,5**	3,5	11	56	2,7	6016200	6016400		6016600	6017000	6017200	6017400	6017010
M3,5	**0,6**	4	12	56	3	6020200	6020400		6020500	6021000	6021200	6021400	
M4	**0,7**	4,5	13	63	3,4	6025200	6025400	6025460	6025800	6026600	6026800	6026900	6026610
M5	**0,8**	6	16	70	4,9	6028800	6029000	6029200	6029400	6030200	6030400	6030500	6030210
M6	**1**	6	19	80	4,9	6032400	6032600	6032800	6033000	6033800	6034000	6034100	6033810
M7	**1**	7	19	80	5,5	6050900	6051000	6051200	6051300	6052400	6052600	6052900	
M8	**1,25**	8	22	90	6,2	6054000	6054200	6054400	6054600	6056000	6056200	6056300	6056010
M10	**1,5**	10	24	100	8	6059200	6059400	6059600	6059800	6061400	6061600	6061700	6061410

Note: Where applicable, taps will be made to DIN 2184 - 1 once old blank stocks have been depleted.

ISO METRIC COARSE To DIN EN 22857 M

DIN 371 LONG, FULL DIAMETER SHANK MACHINE TAPS

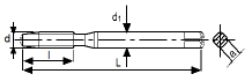


DIMENSIONS						CODES								
					DESCRIPTION	ST SF	BF SF	TiN SF	SO ST SF	ST SF 15°	BF SF 15°	TiN SF 15°	STD POLYGON	POLYGON + OG
					TYPE	D4221OR	D4220	D4223	D4221SO	D3221OR	D3220	D3223	D6220	D6220G
					CHAMFER (DIN)	C	C	C	C	C	C	C	C	C
					SURFACE TREATMENT	ST	BF	TiN	ST	ST	BF	TiN	BF	BF
					TAP/COMPONENT TOLERANCE	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	6HX/6H	6HX/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max) 30° 15°	L Overall Length	a Square A/F									
mm	mm	mm	mm	mm	mm									
M3	**0,5**	3,5	6 11	56	2,7	6018600	6018800	6018900	6018010	6019440	6019460	6019480		
M3,5	**0,6**	4	7 12	56	3	6022000	6022200	6022400						
M4	**0,7**	4,5	8 13	63	3,4	6027400	6027600	6027700	6027410	6028040	6028060	6028080	6028200	6028400
M5	**0,8**	6	10 16	70	4,9	6031000	6031200	6031300	6031010	6031640	6031660	6031680	6031800	6032000
M6	**1**	6	12 19	80	4,9	6034600	6034800	6034900	6034610	6035240	6035260	6035280	6036200	6037000
M7	**1**	7	14 19	80	5,5	6053200	6053400							
M8	**1,25**	8	14 22	90	6,2	6057000	6057200	6057300	6057010	6057640	6057660	6057680	6057800	6058000
M10	**1,5**	10	16 24	100	8	6062200	6062400	6062500	6062210	6062840	6062860	6062880	6063000	6063400

ISO METRIC COARSE To DIN EN 22857 M

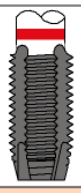
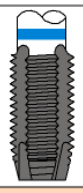
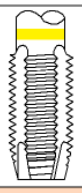
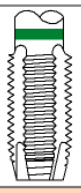
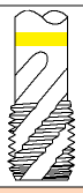
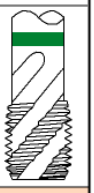
DIN371 / DIN376 SPECIAL GEOMETRY RING SERIES

DIN371 DIMENSIONS

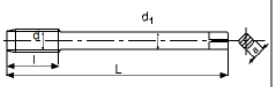


SIZE	PITCH	d Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F
mm	mm	mm	mm	mm	mm
M3	0,5	3,5	11	56	2,7
M4	0,7	4,5	13	63	3,4
M5	0,8	6	16	70	4,9
M6	1	6	19	80	4,9
M8	1,25	8	22	90	6,2
M10	1,5	10	24	100	8

LONG, FULL DIAMTER SHANK MACHINE TAP CODES

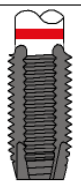
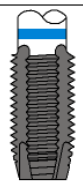
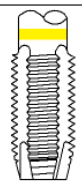
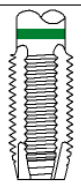
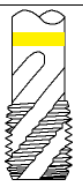
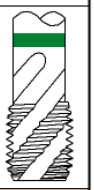
DESCRIPTION	RED RING SP	BLUE RING SP	YELLOW RING SP	GREEN RING SP	RED RING SF	BLUE RING SF	YELLOW RING SF	GREEN RING SF
TYPE	D1224HR	D1221IN	D1220AL	D1220AS	D5222HR	D5221IN	D5220AL	D5220AS
CHAMFER (DIN)	B	B	B	B	C	C	C	C
SURFACE TREATMENT	Ni + ST	ST	BF	BF	Ni + ST	ST	BF	BF
TAP/COMPONENT TOLERANCE	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H
								
M3	6017810	6017820	6017830	6017840	6019570	6019580	6019590	6019600
M4	6027210	6027220	6027230	6027240	6028165	6028170	6028175	6028180
M5	6030810	6030820	6030830	6030840	6031765	6031770	6031775	6031780
M6	6034410	6034420	6034430	6034440	6035370	6035380	6035390	6035400
M8	6056610	6056620	6056630	6056640	6057765	6057770	6057775	6057780
M10	6062100	6062110	6062120	6062130	6062965	6062970	6062975	6062980

DIN376 DIMENSIONS



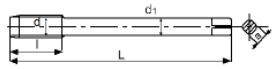
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F
mm	mm	mm	mm	mm	mm
M8	1,25	6	25	90	4,9
M10	1,5	7	28	100	5,5
M12	1,75	9	30	110	7
M14	2	11	30	110	9
M16	2	12	32	110	9
M20	2,5	16	34	140	12
M24	3	18	38	160	14,5

LONG, REDUCED SHANK MACHINE TAP CODES

DESCRIPTION	RED RING SP	BLUE RING SP	YELLOW RING SP	GREEN RING SP	RED RING SF	BLUE RING SF	YELLOW RING SF	GREEN RING SF
TYPE	E1224HR	E1221IN	E1220AL	E1220AS	E5224HR	E5221IN	E5220AL	E5220AS
CHAMFER (DIN)	B	B	B	B	C	C	C	C
SURFACE TREATMENT	Ni + ST	ST	BF	BF	Ni + ST	ST	BF	BF
TAP/COMPONENT TOLERANCE	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H
								
M8	6092650	6092660	6092670	6092680	6093965	6093970	6093975	6093980
M10	6098710	6098720	6098730	6098740	6100070	6100075	6100080	6100085
M12	6103810	6103820	6103830	6103840	6105565	6105570	6105575	6105580
M14	6108300	6108400	6108500	6108600	6109765	6109770	6109775	6109780
M16	6112650	6112660	6112670	6112680	6113760	6113780	6113785	6113790
M20	6120850	6120860	6120870	6120880	6122065	6122070	6122075	6122080
M24	6127820	6127830	6127840	6127850	6129065	6129070	6129075	6129080

ISO METRIC COARSE To DIN EN 22857 M

DIN376 LONG, REDUCED SHANK MACHINE TAPS

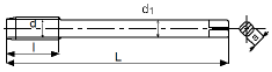


DIMENSIONS						CODES							
				DESCRIPTION		STR. FL. FORM C	STR. FL. FORM E	STR. FL. NITRIDE	STR. FL. TiN	ST SP	BF SP	TiN SP	SO ST SP
				TYPE		E0220	E0320	E0222GG	E0223GG	E1221OR	E1220	E1223	E1221ISO
				CHAMFER (DIN)		C	E	C	C	B	B	B	B
				SURFACE TREATMENT		BF	BF	Ni	TiN	ST	BF	TiN	ST
				TAP/COMPONENT TOLERANCE		ISO 2/6H	ISO 2/6H	6HX/6H	6HX/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F								
mm	mm	mm	mm	mm	mm								
M4	**0,7**	2,8	13	63	2,1	6069000	6069200			6070200	6070400	6070600	
M5	**0,8**	3,5	16	70	2,7	6072800	6073000			6074000	6074200	6074400	
M6	**1**	4,5	19	80	3,4	6078800	6079000	6079200	6079400	6081000	6081200	6081400	
M8	**1,25**	6	22	90	4,9	6089600	6089800	6090000	6090200	6091800	6092000	6092200	
M10	**1,5**	7	24	100	5,5	6096200	6096400	6096600	6096800	6098000	6098200	6098400	
M12	**1,75**	9	29	110	7	6101200	6101400	6101600	6101650	6103200	6103400	6103450	6103210
M14	**2**	11	30	110	9	6106600	6106800			6107800	6108000	6108050	6107810
M16	**2**	12	32	110	9	6111200	6111400			6112200	6112400	6112300	6112210
M18	**2,5**	14	37	125	11	6114600	6114800			6115800	6116000		
M20	**2,5**	16	37	140	12	6118400	6118600			6120000	6120200	6120220	6120010
M22	**2,5**	18	38	140	14,5	6122600	6122800			6123800	6124000		
M24	**3**	18	45	160	14,5	6126200	6126400			6127600	6127800		6127610
M27	**3,0**	20	36	160	16					6129100	6129120		
M30	**3,5**	22	40	180	18					6129200	6129220		
M33	**3,5**	25	40	180	20					6129300	6129320		
M36	**4**	28	45	200	22					6129400	6129420		

Form D (E0120) are normally also available ex-stock

ISO METRIC COARSE To DIN EN 22857 M

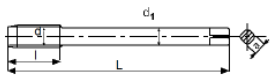
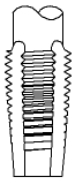
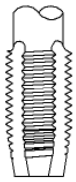
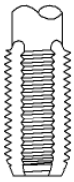
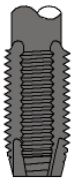
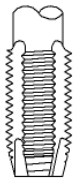
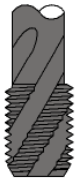
DIN 376 LONG, REDUCED SHANK MACHINE TAPS



DIMENSIONS						CODES								
				DESCRIPTION		ST SF	BF SF	TiN SF	SO ST SF	ST SF 15°	BF SF 15°	TiN SF 15°	STD POLYGON	POLYGON + OG
				TYPE		E4221OR	E4220	E4223	E4221SO	E3221OR	E3220	E3223	D6220	D6220G
				CHAMFER (DIN)		C	C	C	C	C	C	C	C	C
				SURFACE TREATMENT		ST	BF	TiN	ST	ST	BF	TiN	BF	BF
				TAP/COMPONENT TOLERANCE		ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	6HX/6H	6HX/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max) 30° 15°	L Overall Length	a Square A/F									
mm	mm	mm	mm	mm	mm									
M4	0,7	2,8	8 13	63	2,1	6071600	6071800	6072000		6072440	6072460	6072480		
M5	0,8	3,5	10 16	70	2,7	6075000	6075200	6075400		6076040	6076060	6076080		
M6	1	4,5	12 19	80	3,4	6082600	6082800	6083000		6083440	6083460	6083480		
M8	1,25	6	14 22	90	4,9	6093000	6093200	6093400		6093840	6093860	6093880		
M10	1,5	7	16 24	100	5,5	6099000	6099200	6099400		6099840	6099860	6099880		
M12	1,75	9	18 29	110	7	6104800	6105000	6105100	6104810	6105440	6105460	6105480	6105700	6105710
M14	2	11	22 30	110	9	6109000	6109200	6109250	6109010	6109640	6109660	6109680	6109810	6109820
M16	2	12	23 32	110	9	6113000	6113200	6113300	6113010	6113640	6113660	6113680	6113900	6113910
M18	2,5	14	25 37	125	11	6117000	6117200			6117840	6117860			
M20	2,5	16	26 37	140	12	6121200	6121400		6121210	6122040	6122060			
M22	2,5	18	28 38	140	14,5	6124800	6125000			6125440	6125460			
M24	3	18	30 45	160	14,5	6128200	6128400			6129040	6129060			
M27	3	20	35 38	160	16	6129110	6129130							
M30	3,5	22	38 45	180	18	6129210	6129230							
M33	3,5	25	38 50	180	20	6129310	6129330							
M36	4	28	42 56	200	22	6129410	6129430							

ISO METRIC COARSE To ISO 2857 M

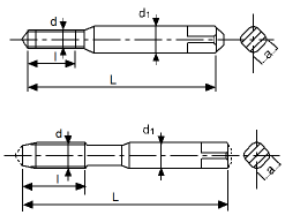
ISO 2283 EXTRA LONG MACHINE TAPS

DIMENSIONS						CODES						
				DESCRIPTION		L/S STR. FL. TAPER	L/S STR. FL. SEC	L/S STR. FL. BOT	L/S ST SP	L/S BF SP	L/S ST SF	L/S BF SF
				TYPE		B0120	B0220	B0320	B1221	B1220	B4221	B4220
				SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF
				TAP/COMPONENT TOLERANCE		ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F							
mm	mm	mm	mm	mm	mm							
M3	**0,5**	2,24	11	66	1,8	0009900	0010000	0010100	0010300	0010360	0010420	0010400
M3.5	**0,6**	2,25	13	68	2	0011850	0011900	0012000	0012200			
M4	**0,7**	3,15	13	73	2,5	0014800	0014900	0015000	0015200	0015250	0015290	0015280
M4.5	**0,75**	3,55	13	73	2,8	0016100	0016200	0016300	0016500			
M5	**0,8**	4	16	79	3,15	0020000	0020100	0020200	0020500	0020550	0020560	0020570
M6	**1**	4,5	19	89	3,55	0024400	0024500	0024600	0024800	0024850	0025000	0025050
M7	**1**	5,6	19	89	4,5	0026800	0026900	0027000	0027200	0027250		
M8	**1,25**	6,3	22	97	5	0029700	0029800	0029900	0030100	0030050	0030120	0030140
M9	**1,25**	7,1	22	97	5,6	0031400	0031500	0031600	0031800	0031850		
M10	**1,5**	8	24	108	6,3	0033600	0033700	0033800	0034000	0034050	0034100	0034150
M11	**1,5**	8	25	115	6,3	0035400	0035500	0035600	0035800	0035850		
M12	**1,75**	9	29	119	7,1	0037400	0037500	0037600	0037800	0037830	0037860	0037890
M14	**2**	11,2	30	127	9	0039500	0039600	0039700	0039900	0039950	0039980	0039990
M16	**2**	12,5	32	137	10	0041800	0041900	0042000	0042200	0042210	0042370	0042390
M18	**2,5**	14	37	149	11,2	0044200	0044300	0044400	0044600	0044650		
M20	**2,5**	14	37	149	11,2	0046100	0046200	0046300	0046500	0046505	0046530	0046550
M22	**2,5**	16	38	158	12,5	0048250	0048300	0048400	0048600	0048650		
M24	**3**	18	45	172	14	0050500	0050600	0050700	0050900	0050890	0050920	0050940

ISO METRIC FINE To ISO 2857 MF

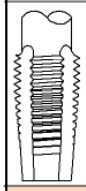
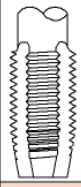
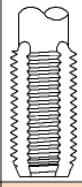
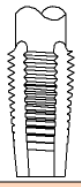
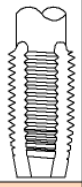
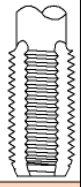
ISO 529 SHORT HAND & MACHINE TAPS

DIMENSIONS



SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F
mm	mm	mm	mm	mm	mm
M2	0,25	2,5	8	41	2
M2,2	0,25	2,8	9,5	44,5	2,24
M2,5	0,35	2,8	9,5	44,5	2,24
M3	0,35	3,15	11	48	2,5
M4	0,35§	4	13	53	3,15
M4	0,50	4	13	53	3,15
M5	0,50	5	16	58	4
M5	0,75§	5	16	58	4
M6	0,50§	6,3	19	66	5
M6	0,75	6,3	19	66	5
M7	0,75	7,1	19	66	5,6
M8	0,50§	8	22	72	6,3
M8	0,75§	8	22	72	6,3
M8	1,00	8	22	72	6,3
M9	0,75§	9	22	72	7,1
M9	1,00	9	22	72	7,1
M10	0,50§	10	24	80	8
M10	0,75§	10	24	80	8

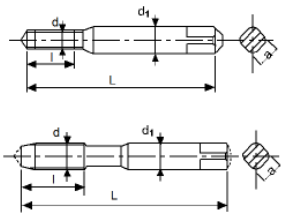
CODES

DESCRIPTION	STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	L/H TPR	L/H SEC	L/H BOT	L/H SET (3)
TYPE	A0120	A0220	A0320	A0420	A0720	A0120L	A0220L	A0320L	A0420L
SURFACE TREATMENT	BF	BF	BF	BF	BF	BF	BF	BF	BF
TAP / COMPONENT TOLERANCE	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H
				TPR + SEC + BOT	NO.1 + NO.2 + BOT				TPR + SEC + BOT
	0060100	0060200	0060300	0060400	0060600				
	0061100	0061000	0061200	0061300	0061500				
	0061800	0061700	0061900	0062000	0062200				
	0062900	0062800	0063000	0063250	0063380				
	0063630	0063610	0063650	0063670					
	0063800	0063700	0063900	0064050	0064250				
	0065400	0065300	0065500	0065650	0065850				
	0064600	0064700	0064800	0064900	0065100				
	0067500	0067400	0067600	0067850	0067950				
	0066600	0066500	0066700	0066950	0067050				
	0068300	0068200	0068400	0068650	0068680				
	0071050	0071060	0071100	0071250					
	0070600	0070500	0070700	0070850	0071080				
	0068900	0068800	0069000	0069150	0069350	0069580	0069600	0069610	0069750
	0072000	0071980	0072100	0072250	0072450				
	0071400	0071300	0071500	0071650	0071830				
	0077150	0077160	0077180	0077210					
	0076700	0076600	0076800	0076950	0077130				

§ = Not ISO Metric Fine

ISO METRIC FINE To ISO 2857 MF

ISO 529 SHORT HAND & MACHINE TAPS



DIMENSIONS						CODES				
				DESCRIPTION		STR. FL. NITRIDE	ST SP	BF SP	ST SF	BF SF
				TYPE		A0222GG	A1221	A1220	A4221	A4220
				SURFACE TREATMENT		Ni	ST	BF	ST	BF
				TAP / COMPONENT TOLERANCE		6HX/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F					
mm	mm	mm	mm	mm	mm					
M2	0,25	2,5	8	41	2					
M2,2	0,25	2,8	9,5	44,5	2,24					
M2,5	0,35	2,8	9,5	44,5	2,24					
M3	0,35	3,15	11	48	2,5					
M4	0,35 §	4	13	53	3,15					
M4	0,50	4	13	53	3,15		0064500	0064550		
M5	0,50	5	16	58	4				0066000	0065900
M5	0,75 §	5	16	58	4		0065200	0065210		
M6	0,50 §	6,3	19	66	5		0068050	0068060		
M6	0,75	6,3	19	66	5		0067300	0067330		
M7	0,75	7,1	19	66	5,6					
M8	0,50 §	8	22	72	6,3					
M8	0,75 §	8	22	72	6,3					
M8	1,00	8	22	72	6,3	0069270	0069400	0069420	0069500	0069520
M9	0,75 §	9	22	72	7,1					
M9	1,00	9	22	72	7,1		0071900	0071850		
M10	0,50 §	10	24	80	8					
M10	0,75 §	10	24	80	8					

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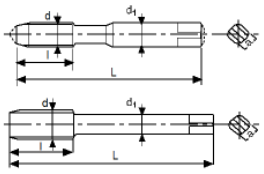
ISO METRIC FINE To ISO 2857 MF

ISO 529 SHORT HAND & MACHINE TAPS



DIMENSIONS						CODES								
					DESCRIPTION	STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	L/H TPR	L/H SEC	L/H BOT	L/H SET (3)
					TYPE	A0120	A0220	A0320	A0420	A0720	A0120L	A0220L	A0320L	A0420L
					SURFACE TREATMENT	BF	BF	BF	BF	BF	BF	BF	BF	BF
					TAP / COMPONENT TOLERANCE	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F				TPR + SEC + BOT	NO.1 + NO.2 + BOT				TPR + SEC + BOT
mm	mm	mm	mm	mm	mm									
M10	1,00†	10	24	80	8	0074600	0074500	0074700	0074950	0075100	0075880	0075850	0075890	0075810
M10	1,25	10	24	80	8	0072600	0072500	0072700	0073050	0073101	0073630	0073640	0073650	0073710
M11	1 §	8	25	85	6,3	0078400	0078300	0078500	0078650	0078740				
M11	1,25§	8	25	85	6,3	0077400	0077300	0077500	0077700	0077930	0078010	0078030	0078050	0078110
M12	1 §	9	29	89	7,1	0083300	0083200	0083400	0083550	0083730	0083830	0083850	0083870	0083810
M12	1,25†	9	29	89	7,1	0081600	0081500	0081700	0081930	0082010	0082370	0082380	0082390	0082490
M12	1,50	9	29	89	7,1	0079400	0079300	0079500	0079750	0079820	0080480	0080550	0080490	0080510
M14	1 §	11,2	30	95	9	0088300	0088200	0088400	0088750	0088730	0088871	0088873	0088875	
M14	1,25†	11,2	30	95	9	0086600	0086500	0086700	0086950	0087200	0087400	0087430	0087450	0087550
M14	1,50	11,2	30	95	9	0084800	0084700	0084900	0085130	0085250	0085600	0085500	0085700	0085730
M15	1 §	11,2	30	95	9	0089600	0089500	0089700	0089810	0090050				
M15	1,50	11,2	30	95	9	0089000	0088880	0089100	0089250	0089450				
M16	1 §	12,5	32	102	10	0092700	0092600	0092800	0092950	0093180	0093210	0093220	0093230	0093250
M16	1,50	12,5	32	102	10	0090800	0090700	0090900	0091050	0091190	0091700	0091600	0091800	0091860
M17	1 §	12,5	32	102	10	0094000	0093900	0094100	0094250	0094450				
M17	1,50	12,5	32	102	10	0093500	0093400	0093600	0093850	0093870				
M18	1 §	14	37	112	11,2	0097920	0097910	0097930	0097970	0097990				
M18	1,25§	14	37	112	11,2	0097300	0097200	0097400	0097550	0097750				

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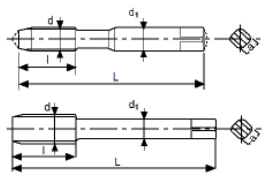
† = Sparkplug

HSS/HSSE Ground Thread Taps

ISO METRIC FINE To ISO 2857 MF

ISO 529 SHORT MACHINE TAPS



DIMENSIONS						CODES				
				DESCRIPTION		STR. FL. NITRIDE	ST SP	BF SP	ST SF	BF SF
				TYPE		A0222GG	A1221	A1220	A4221	A4220
				SURFACE TREATMENT		Ni	ST	BF	ST	BF
				TAP / COMPONENT TOLERANCE		6HX/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F					
mm	mm	mm	mm	mm	mm					
M10	1,00†	10	24	80	8	0074750	0075500	0075550	0075700	0075720
M10	1,25	10	24	80	8	0072750	0073400	0073450	0073530	0073540
M11	1 §	8	25	85	6,3				0078800	0078850
M11	1,25§	8	25	85	6,3				0077950	0077980
M12	1 §	9	29	89	7,1	0083420	0083720	0083740		
M12	1,25†	9	29	89	7,1	0081750	0082100	0082150	0082250	0082320
M12	1,50	9	29	89	7,1	0079830	0080100	0080150	0080400	0080430
M14	1 §	11,2	30	95	9		0088860	0088830	0088820	0088823
M14	1,25†	11,2	30	95	9	0087010	0087300	0087350		
M14	1,50	11,2	30	95	9	0084950	0085300	0085320	0085400	0085430
M15	1 §	11,2	30	95	9					
M15	1,50	11,2	30	95	9					
M16	1 §	12,5	32	102	10					
M16	1,50	12,5	32	102	10	0090930	0091300	0091350		
M17	1 §	12,5	32	102	10					
M17	1,50	12,5	32	102	10					
M18	1 §	14	37	112	11,2					
M18	1,25§	14	37	112	11,2					

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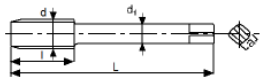
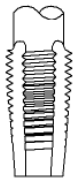
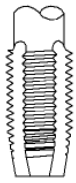
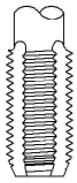
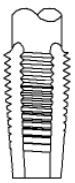
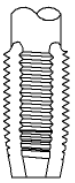
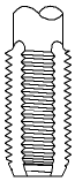
ISO METRIC FINE To ISO 2857 MF

ISO 529 SHORT MACHINE TAPS



DIMENSIONS						CODES								
				DESCRIPTION		STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	L/H TPR	L/H SEC	L/H BOT	L/H SET (3)
				TYPE		A0120	A0220	A0320	A0420	A0720	A0120L	A0220L	A0320L	A0420L
				SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF	BF	BF
				TAP / COMPONENT TOLERANCE		ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F				TPR + SEC + BOT	NO.1 + NO.2 + BOT				TPR + SEC + BOT
mm	mm	mm	mm	mm	mm									
M18	1,50†	14	37	112	11,2	0095200	0095100	0095300	0095450	0095650	0096300	0096350	0096400	0096510
M18	2	14	37	112	11,2	0094600	0094500	0094700	0094850	0095050				
M20	1 §	14	37	112	11,2	0101300	0101200	0101400	0101550	0101750	0101720	0101740	0101760	0101775
M20	1,50‡	14	37	112	11,2	0099200	0099100	0099300	0099450	0099650	0100200	0100250	0100300	0100450
M20	2	14	37	112	11,2	0098200	0098100	0098300	0098550	0098480	0098700	0098600	0098800	0098950
M22	1 §	16	38	118	12,5	0104200	0104100	0104300	0104450	0104590				
M22	1,50	16	38	118	12,5	0102500	0102400	0102600	0102750	0102960	0103300	0103200	0103400	0103550
M22	2	16	38	118	12,5	0101900	0101800	0102000	0102050	0102280				
M24	1 §	18	45	130	14	0107700	0107600	0107800	0107850	0108060				
M24	1,5	18	45	130	14	0106400	0106300	0106500	0106650	0106860	0106900	0106950	0107000	0107060
M24	2	18	45	130	14	0105100	0105000	0105200	0105350	0105650	0105700	0105750	0105800	0105950
M25	1 §	18	45	130	14	0109500	0109400	0109600	0109750	0109870				
M25	1,5 ‡	18	45	130	14	0109000	0108900	0109100	0109150	0109360				
M25	2	18	45	130	14	0108200	0108100	0108300	0108410	0108650				
M26	1,5	18	45	130	14	0110100	0110050	0110200	0110220					
M27	1,5	20	37	127	16	0111200	0111100	0111300	0111360		0111600	0111500	0111700	0111720

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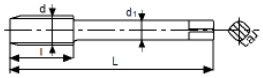
† = Sparkplug
‡ = Conduit pitch, if conduit required please specify

ISO METRIC FINE To ISO 2857 MF

ISO 529 SHORT MACHINE TAPS



DIMENSIONS						CODES				
				DESCRIPTION		STR. FL. NITRIDE	ST SP	BF SP	ST SF	BF SF
				TYPE		A0222GG	A1221	A1220	A4221	A4220
				SURFACE TREATMENT		Ni	ST	BF	ST	BF
				TAP / COMPONENT TOLERANCE		6HX/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F					
mm	mm	mm	mm	mm	mm					
M18	1,50 †	14	37	112	11,2		0096000	0096050		
M18	2	14	37	112	11,2					
M20	1 §	14	37	112	11,2					
M20	1,50 ‡	14	37	112	11,2		0099900	0099950		
M20	2	14	37	112	11,2				0098560	0098570
M22	1 §	16	38	118	12,5					
M22	1,50	16	38	118	12,5		0103000	0103020	0103100	0103150
M22	2	16	38	118	12,5				0102300	0102350
M24	1 §	18	45	130	14					
M24	1,5	18	45	130	14					
M24	2	18	45	130	14				0105680	0105690
M25	1 §	18	45	130	14					
M25	1,5 ‡	18	45	130	14				0109380	0109390
M25	2	18	45	130	14					
M26	1,5	18	45	130	14					
M27	1,5	20	37	127	16					

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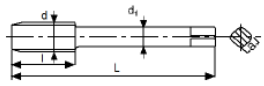
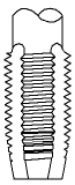
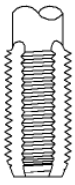
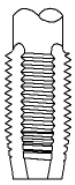
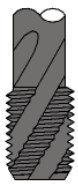
ISO METRIC FINE To ISO 2857 MF

ISO 529 SHORT HAND & MACHINE TAPS



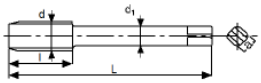
DIMENSIONS						CODES								
				DESCRIPTION		STR. FL. TPR	STR. FL. SEC	STR .FL. BOT	STD SET (3)	SER SET (3)	L/H SEC	L/H SET (3)	ST SF	BF SF
				TYPE		A0120	A0220	A0320	A0420	A0720	A0220L	A0420L	A4221	A4220
				SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF	ST	BF
				TAP / COMPONENT TOLERANCE		ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F				TPR + SEC + BOT	NO.1 + NO.2 + BOT		TPR + SEC + BOT		
mm	mm	mm	mm	mm	mm									
M27	2	20	37	127	16	0110500	0110400	0110600	0110730	0110960			0110970	0110975
M28	1,5	20	37	127	16	0112500	0112400	0112600	0112750		0112950	0113030		
M28	2	20	37	127	16	0112000	0111900	0112100	0112250					
M30	1 §	20	37	127	16	0116100	0116150	0116200	0116260					
M30	1,5	20	37	127	16	0115000	0114900	0115100	0115250	0115460	0115600	0115860	0115594	0115597
M30	2	20	37	127	16	0113800	0113700	0113900	0114050	0114260	0114400	0114710	0114370	0114380
M30	3	20	48	138	16	0113200	0113300	0113400	0113500					
M32	1,5 ‡	22,4	37	137	18	0116360	0116370	0116380	0116390				0116770	0116780
M32	2	22,4	37	137	18	0116500	0116400	0116600	0116660					
M33	1,5	22,4	37	137	18	0118800	0118700	0118900	0119020				0119160	0119170
M33	2	22,4	37	137	18	0117700	0117600	0117800	0117950	0118100	0118450	0118560	0118330	0118350
M33	3	22,4	51	151	18	0116900	0117000	0117100	0117150		0117350	0117440		
M35	1,5	25	39	144	20	0119400	0119300	0119500	0119560				0119690	0119695
M36	1,5	25	39	144	20	0121400	0121300	0121500	0121610		0121800	0122030	0121760	0121780
M36	2	25	39	144	20	0120700	0120600	0120800	0120910	0121060			0121170	0121190
M36	3	25	57	162	20	0119700	0119800	0119900	0119950		0120300	0120420	0120160	0120170

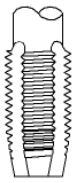
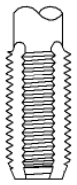
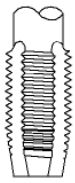
§ = Not ISO Metric Fine
‡ = Conduit pitch, if conduit required please specify

Note : LH TPR and LH BOT available on request

ISO METRIC FINE To ISO 2857 MF

ISO 529 SHORT HAND & MACHINE TAPS



DIMENSIONS						CODES								
				DESCRIPTION		STR. FL. TPR	STR. FL. SEC	STR .FL. BOT	STD SET (3)	SER SET (3)	L/H SEC	L/H SET (3)	ST SF	BF SF
				TYPE		A0120	A0220	A0320	A0420	A0720	A0220L	A0420L	A4221	A4220
				SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF	ST	BF
				TAP / COMPONENT TOLERANCE		ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F				TPR + SEC + BOT	NO.1 + NO.2 + BOT		TPR + SEC + BOT		
mm	mm	mm	mm	mm	mm									
M38	1,5 §	28	39	149	22,4	0122800	0122850	0122900	0123010					
M38	2 §	28	39	149	22,4	0122300	0122200	0122400	0122460					
M39	1,5	28	39	149	22,4	0124600	0124650	0124700	0124760					
M39	2	28	39	149	22,4	0123900	0123800	0124000	0124060		0124250	0124410	0124180	0124190
M39	3	28	60	170	22,4	0123400	0123500	0123600	0123650				0123780	0123790
M40	1,5 ‡	28	39	149	22,4	0124910	0124930	0124940	0124960				0124980	0124990
M40	2	28	39	149	22,4	0125500	0125400	0125600	0125630					
M40	3	28	60	170	22,4	0125000	0125100	0125200	0125220					
M42	1,5	28	39	149	22,4	0127900	0127800	0128000	0128030				0128142	0128145
M42	2	28	39	149	22,4	0127500	0127400	0127600	0127630				0127760	0127770
M42	3	28	60	170	22,4	0127000	0127100	0127200	0127220				0127380	0127390
M42	4	28	60	170	22,4	0126000	0126100	0126200	0126400		0126600			
M45	1,5	31,5	45	165	25	0129400	0129300	0129500	0129530					
M45	2	31,5	45	165	25	0129000	0129050	0129100	0129130					
M45	3	31,5	67	187	25	0128700	0128600	0128800	0128820					
M48	1,5	31,5	45	165	25	0131200	0131250	0131300	0131330					

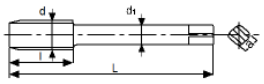
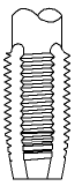
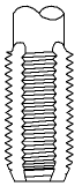
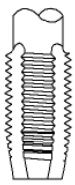
§ = Not ISO Metric Fine
‡ = Conduit pitch, if conduit required please specify

Note : LH TPR and LH BOT available on request

HSS/HSSE Ground Thread Taps

ISO METRIC FINE To ISO 2857 MF

ISO 529 SHORT HAND & MACHINE TAPS

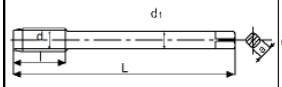
DIMENSIONS						CODES								
				DESCRIPTION		STR. FL. TPR	STR. FL. SEC	STR .FL. BOT	STD SET (3)	SER SET (3)	L/H SEC	L/H SET (3)	ST SF	BF SF
				TYPE		A0120	A0220	A0320	A0420	A0720	A0220L	A0420L	A4221	A4220
				SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF	ST	BF
				TAP / COMPONENT TOLERANCE		ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H	ISO2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F				TPR + SEC + BOT	NO.1 + NO.2 + BOT		TPR + SEC + BOT		
mm	mm	mm	mm	mm	mm									
M48	**2**	31,5	45	165	25	0130800	0130700	0130900	0131010					
M48	**3**	31,5	67	187	25	0130300	0130200	0130400	0130500					
M48	**4**	31,5	67	187	25	0129700	0129800	0129900	0130000					
M50	**1,5 ‡**	31,5	45	165	25	0131440	0131450	0131460	0131480					
M50	**3**	31,5	67	187	25	0131600	0131500	0131700	0131730					
M52	**2**	35,5	45	175	28	0132840	0132820	0132860	0132900					
M52	**3**	35,5	70	200	28	0132600	0132650	0132700	0132730					
M56	**2**	35,5	45	175	28	0133500	0133550	0133600	0133630					
M56	**4**	35,5	70	200	28	0133100	0133200	0133300	0133320					
M60	**2**	40	76	221	31,5	0134200	0134250	0134300	0134330					
M60	**4**	40	76	221	31,5	0133800	0133900	0134000	0134050					
M62	**2**	40	76	221	31,5	0134600	0134500	0134700	0134900					
M64	**2**	40	79	224	31,5	0135600	0135650	0135700	0135720					
M64	**3**	40	79	224	31,5	0135440	0135460	0135480	0135490					
M64	**4**	40	79	224	31,5	0135100	0135200	0135300	0135320					

§ = Not ISO Metric Fine
‡ = Conduit pitch, if conduit required please specify

Note : LH TAPS available against special request

ISO METRIC FINE To DIN EN 22857 MF

DIN 374 LONG REDUCED SHANK MACHINE TAPS

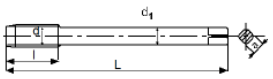
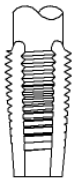
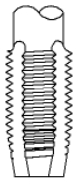
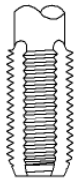
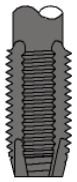
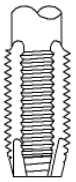


DIMENSIONS						CODES									
				DESCRIPTION		STR. FL. FORM C	STR. FL. NITRIDE	ST SP	BF SP	TiN SP	ST SF	BF SF	TiN SF	STD POLYGON	POLYGON + OG
				TYPE		F0220	F0222GG	F1221OR	F1220	F1223	F4221OR	F4220	F4223	D6220	D6220G
				CHAMFER (DIN)		C	C	B	B	B	C	C	C	C	C
				SURFACE TREATMENT		BF	Ni	ST	BF	TiN	ST	BF	TiN	BF	BF
				TAP/COMPONENT TOLERANCE		ISO 2/6H	6HX/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	6HX/6H	6HX/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F										
mm	mm	mm	mm	mm	mm										
M4	0,5	2,8	10	63	2,1	6136000	6136400	6140000	6140200	6140255					
M5	0,5	3,5	12	70	2,7	6140300	6140500	6140800	6141000	6141020	6142000	6142200	6142220		
M6	0,5	4,5	14	80	3,4	6142550	6142650	6142800	6143000	6143220					
M6	0,75	4,5	14	80	3,4	6143240	6143320	6143400	6143600	6143620	6144000	6144200	6144620		
M8	0,75	6	*18	*90	4,9	6144640	6144720	6144800	6145000	6145220					
M8	1	6	18	90	4,9	6145300	6145400	6145600	6145800	6145850	6146600	6146800	6146850	6147220	6147230
M9	1	7	18	90	5,5	6147300	6147500	6148000	6148200						
M10	1	7	20	90	5,5	6148700	6148900	6149600	6149800	6149850	6151000	6151200	6151220	6151620	6151630
M10	1,25	7	24	100	5,5	6151700	6151900	6152600	6152800	6152850	6153800	6154000	6154050	6154570	6154580
M12	1	9	22	100	7	6154600	6155000	6156400	6156600		6158000	6158200	6158250		
M12	1,25	9	22	100	7	6158650	6158750	6159000	6159200	6159250	6160000	6160200	6160250	6160660	6160670
M12	1,5	9	22	100	7	6160800	6161200	6161600	6161800	6161850	6163200	6163400	6163450	6163900	6163910
M14	1	11	22	100	9	6164000	6164400	6164800	6165000						
M14	1,25	11	22	100	9	6165600	6166000	6166300	6166400	6166450	6168000	6168200	6168250		
M14	1,5	11	22	100	9	6168800	6169200	6169600	6169800	6169850	6171200	6171400	6171450	6172750	6172760
M16	1,5	12	22	100	9	6173000	6173400	6173800	6174000	6174050	6175400	6175600	6175650	6176100	6176110
M18	1,5	14	25	110	11	6176600	6176700	6177000	6177200		6178600	6178800		6179300	6179310
M20	1,5	16	25	125	12	6181000		6182200	6182400		6183600	6183800		6184040	6184050
M22	1,5	18	25	125	14,5	6184100		6185000	6185200		6186400	6186600			
M24	1,5	18	28	140	14,5	6186900		6187800	6188000		6189200	6189400			

* Not DIN374 length

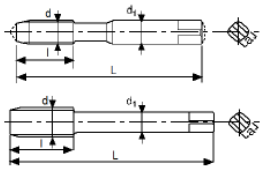
ISO METRIC FINE To ISO 2857 MF

ISO 2283 EXTRA LONG MACHINE TAPS

DIMENSIONS						CODES						
				DESCRIPTION		L/S STR. FL. TAPER	L/S STR. FL. SEC	L/S STR. FL. BOT	L/S ST SP	L/S BF SP	L/S ST SF	L/S BF SF
				TYPE		B0120	B0220	B0320	B1221	B1220	B4221	B4220
				SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF
				TAP/COMPONENT TOLERANCE		ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H	ISO 2/6H
SIZE	PITCH	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F							
mm	mm	mm	mm	mm	mm							
M8	**1**	6,3	19	97	5	0070000	0070050	0070100	0070300	0070350	0070400	0070450
M10	**1**	8	24	108	6,3	0076000	0076050	0076100	0076300	0076350	0076400	0076450
M10	**1,25**	8	24	108	6,3	0073900	0074000	0074100	0074300	0074310	0074400	0074410
M12	**1**	9	24	119	7,1	0084000	0084050	0084100	0084300	0084350	0084400	0084450
M12	**1,25**	9	24	119	7,1	0082700	0082750	0082800	0083000	0083050	0083100	0083110
M12	**1,5**	9	29	119	7,1	0080700	0080800	0080900	0081100	0081150	0081200	0081250
M14	**1,25**	11,2	25	127	9	0087700	0087750	0087800	0088000	0088050	0088100	0088150
M14	**1,5**	11,2	30	127	9	0086000	0086050	0086100	0086300	0086350	0086400	0086450
M16	**1,5**	12,5	32	137	10	0092100	0092150	0092200	0092400	0092450	0092500	0092550
M18	**1,5**	14	29	149	11,2	0096700	0096750	0096800	0097000	0097050	0097100	0097150
M20	**1,5**	14	29	149	11,2	0100700	0100750	0100800	0101000	0101050	0101100	0101150
M22	**1,5**	16	33	158	12,5	0103700	0103750	0103800	0104000	0104050		
M24	**1,5**	18	35	172	14	0107200	0107250	0107300			0107500	

UNIFIED NATIONAL COARSE To BS 949 UNC

ISO 529 SHORT HAND & MACHINE TAPS

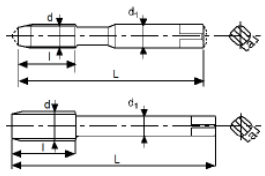


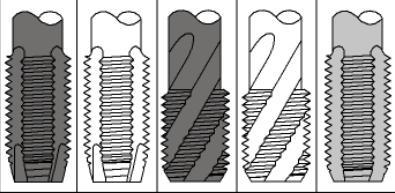
DIMENSIONS							CODES								
					DESCRIPTION		STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	L/H TPR	L/H SEC	L/H BOT	L/H SET (3)
					TYPE		A0120	A0220	A0320	A0420	A0720	A0120L	A0220L	A0320L	A0420L
					SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF	BF	BF
					TAP / COMPONENT TOLERANCE		ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B
SIZE No. or INCH	PITCH TPI	Ø Nominal Dia mm	d_1 Shank Dia mm	l Thread Length (max) mm	L Overall Length mm	a Square A/F mm				TPR + SEC + BOT	NO.1 + NO.2 + BOT				TPR + SEC + BOT
No 1	64	1,854	2,5	8	41	2		0190060		0190100					
No 2	56	2,184	2,8	9,5	44,5	2,24	0190240	0190260	0190280	0190300	0190360				
No 3	48	2,515	2,8	9,5	44,5	2,24	0190500	0190600	0190700	0190800	0190830				
No 4	40	2,845	3,15	11	48	2,5	0191000	0191100	0191200	0191300	0191450				
No 5	40	3,175	3,15	11	48	2,5	0191800	0191900	0192000	0192100	0192350				
No 6	32	3,505	3,55	13	50	2,8	0192700	0192800	0192900	0193000	0193450				
No 8	32	4,166	4,5	13	53	3,55	0194000	0194100	0194200	0194300	0194480				
No 10	24	4,826	5	16	58	4	0194800	0194900	0195000	0195100	0195400				
No 12	24	5,486	5,6	17	62	4,5	0195800	0195900	0196000	0196100	0196500				
1/4	20	6,350	6,3	19	66	5	0200000	0200100	0200200	0200300	0200500	0200770	0200760	0200790	0200800
5/16	18	7,938	8	22	72	6,3	0201000	0201100	0201200	0201300	0201500	0201840	0201860	0201880	0201800
3/8	16	9,525	10	24	80	8	0201950	0202000	0202050	0202100	0202200	0202410	0202420	0202430	0202450
7/16	14	11,112	8	25	85	6,3	0202600	0202650	0202700	0202750	0202840	0202940	0202960	0202980	0203000
1/2	13	12,7	9	29	89	7,1	0203200	0203300	0203400	0203500	0203700	0203970	0203980	0203990	0203950
9/16	12	14,288	11,2	30	95	9	0204100	0204200	0204300	0204400	0204600	0204930	0205000	0205100	0205200
5/8	11	15,875	12,5	32	102	10	0205400	0205500	0205600	0205700	0205900	0206200	0206300	0206400	0206500

Note: Popular sizes of UNC taps in USCTI Table 302 are available on request.

UNIFIED NATIONAL COARSE To BS 949 UNC

ISO 529 SHORT HAND & MACHINE TAPS

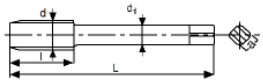


DIMENSIONS							CODES				
					DESCRIPTION		ST SP	BF SP	ST SF	BF SF	STR. FL NITRIDE
					TYPE		A1221	A1220	A4221	A4220	A0222GG
					SURFACE TREATMENT		ST	BF	ST	BF	Ni
					TAP / COMPONENT TOLERANCE		ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2X/2B
SIZE	PITCH	Ø Nominal Dia	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F					
No. or INCH	TPI	mm	mm	mm	mm	mm					
No 1	- 64	1,854	2,5	8	41	2					
No 2	- 56	2,184	2,8	9,5	44,5	2,24	0190400	0190450			
No 3	- 48	2,515	2,8	9,5	44,5	2,24	0190900	0190950			
No 4	- 40	2,845	3,15	11	48	2,5	0191500	0191550	0191700	0191750	
No 5	- 40	3,175	3,15	11	48	2,5	0192500	0192550	0192600	0192650	
No 6	- 32	3,505	3,55	13	50	2,8	0193700	0193750	0193900	0193910	
No 8	- 32	4,166	4,5	13	53	3,55	0194600	0194630	0194700	0194750	
No 10	- 24	4,826	5	16	58	4	0195600	0195650	0195700	0195750	
No 12	- 24	5,486	5,6	17	62	4,5	0196600	0196650			
1/4	- 20	6,350	6,3	19	66	5	0200600	0200610	0200700	0200750	0200250
5/16	- 18	7,938	8	22	72	6,3	0201600	0201650	0201700	0201750	0201250
3/8	- 16	9,525	10	24	80	8	0202300	0202310	0202350	0202370	0202080
7/16	- 14	11,112	8	25	85	6,3	0202850	0202870	0202900	0202920	0202740
1/2	- 13	12,7	9	29	89	7,1	0203800	0203850	0203900	0203930	0203450
9/16	- 12	14,288	11,2	30	95	9	0204700	0204750	0204900	0204905	
5/8	- 11	15,875	12,5	32	102	10	0206000	0206050	0206100	0206150	

Note: Popular sizes of UNC taps in USCTI Table 302 are available on request.

UNIFIED NATIONAL COARSE To BS 949 UNC

ISO 529 SHORT MACHINE TAPS

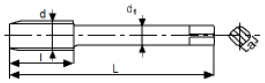


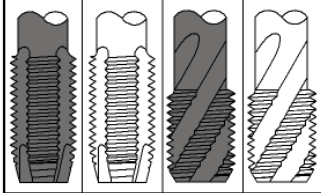
DIMENSIONS							CODES								
					DESCRIPTION		STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	L/H TPR	L/H SEC	L/H BOT	L/H SET (3)
					TYPE		A0120	A0220	A0320	A0420	A0720	A0120L	A0220L	A0320L	A0420L
					SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF	BF	BF
					TAP / COMPONENT TOLERANCE		ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B
SIZE No. or INCH	PITCH TPI	Ø Nominal Dia mm	d_1 Shank Dia mm	l Thread Length (max) mm	L Overall Length mm	a Square A/F mm				TPR + SEC + BOT	NO.1 + NO.2 + BOT				TPR + SEC + BOT
3/4	- 10	19,05	14	37	112	11,2	0206700	0206800	0206900	0207000	0207200	0207500	0207600	0207700	0207800
7/8	- 9	22,225	16	38	118	12,5	0208000	0208100	0208200	0208300	0208500	0208800	0208900	0209000	0209100
1"	- 8	25,4	18	45	130	14	0209300	0209400	0209500	0209600	0209800	0210100	0210200	0210300	0210320
1 1/8	- 7	28,575	20	48	138	16	0210500	0210600	0210700	0210800	0210930	0211080	0211090	0211100	0211120
1 1/4	- 7	31,75	22,4	51	151	18	0211300	0211400	0211500	0211600	0211800	0211670	0211680	0211690	0211695
1 3/8	- 6	34,925	25	57	162	20	0212000	0212100	0212200	0212300		0212470	0212480	0212490	0212495
1 1/2	- 6	38,1	28	60	170	22,4	0212600	0212700	0212800	0212900		0213100	0213200	0213300	0213320
1 3/4	- 5	44,45	31,5	67	187	25	0213500	0213600	0213700	0213800					
2"	- 4,5	50,8	35,5	70	200	28	0214000	0214100	0214200	0214300		0214430	0214450	0214470	0214490
2 1/4	- 4,5	57,15	40	76	221	31,5	0214550	0214600	0214700	0214720					
2 1/2	- 4	63,5	40	79	224	31,5	0214840	0214860	0214900	0214920					

Note: Popular sizes of UNC taps in USCTI Table 302 are available on request.

UNIFIED NATIONAL COARSE To BS 949 UNC

ISO 529 SHORT HAND & MACHINE TAPS

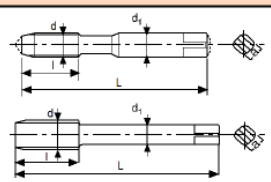


DIMENSIONS							CODES			
					DESCRIPTION		ST SP	BF SP	ST SF	BF SF
					TYPE		A1221	A1220	A4221	A4220
					SURFACE TREATMENT		ST	BF	ST	BF
					TAP / COMPONENT TOLERANCE		ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B
SIZE	PITCH	Ø Nominal Dia	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F				
No. or INCH	TPI	mm	mm	mm	mm	mm				
3/4	- 10	19,05	14	37	112	11,2	0207300	0207350	0207400	0207450
7/8	- 9	22,225	16	38	118	12,5	0208600	0208650	0208700	0208750
1"	- 8	25,4	18	45	130	14	0209900	0209850	0210000	0210050
1 1/8	- 7	28,575	20	48	138	16	0211000	0211050	0211060	
1 1/4	- 7	31,75	22,4	51	151	18			0211970	
1 3/8	- 6	34,925	25	57	162	20	0212550		0212570	
1 1/2	- 6	38,1	28	60	170	22,4			0213470	
1 3/4	- 5	44,45	31,5	67	187	25	0213980		0213960	
2"	- 4,5	50,8	35,5	70	200	28			0214560	
2 1/4	- 4,5	57,15	40	76	221	31,5				
2 1/2	- 4	63,5	40	79	224	31,5				

Note: Popular sizes of UNC taps in USCTI Table 302 are available on request.

UNIFIED NATIONAL FINE To BS 949 UNF

ISO 529 SHORT HAND & MACHINE TAPS

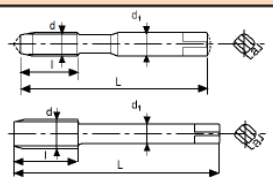


DIMENSIONS							CODES								
					DESCRIPTION		STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	L/H TPR	L/H SEC	L/H BOT	L/H SET (3)
					TYPE		A0120	A0220	A0320	A0420	A0720	A0120L	A0220L	A0320L	A0420L
					SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF	BF	BF
					TAP / COMPONENT TOLERANCE		ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B
		Ø	d_1	l	L	a									
SIZE	PITCH	Nominal Dia	Shank Dia	Thread Length (max)	Overall Length	Square A/F				TPR + SEC + BOT	NO.1 + NO.2 + BOT				TPR + SEC + BOT
No. or INCH	TPI	mm	mm	mm	mm	mm									
No 1	**72**	1,854	2,5	8	41	2		0250460		0250500					
No 2	**64**	2,184	2,8	9,5	44,5	2,24		0250860		0250900					
No 3	**56**	2,515	2,8	9,5	44,5	2,24		0251200		0251400					
No 4	**48**	2,845	3,15	11	48	2,5	0251550	0251580	0251600	0251700					
No 5	**44**	3,175	3,15	11	48	2,5									
No 6	**40**	3,505	3,55	13	50	2,8	0252300	0252400	0252500	0252600					
No 8	**36**	4,166	4,5	13	53	3,55	0253100	0253200	0253300	0253400	0253450				
No 10	**32**	4,826	5	16	58	4	0253800	0254000	0254100	0254200	0254400				
No 12	**28**	5,486	5,6	17	62	4,5	0254700	0254800	0254900	0255000	0255200				
1/4	**28**	6,350	6,3	19	66	5	0260000	0260100	0260200	0260300	0260500	0260820	0260840	0260860	0260800
5/16	**24**	7,938	8	22	72	6,3	0261000	0261100	0261200	0261300	0261500	0262000	0262030	0262060	0262100
3/8	**24**	9,525	10	24	80	8	0262400	0262300	0262500	0262680	0262850	0263130	0263160	0263190	0263220
7/16	**20**	11,112	8	25	85	6,3	0263600	0263500	0263700	0263850	0264010	0264470	0264480	0264490	0264550
1/2	**20**	12,7	9	29	89	7,1	0264800	0264700	0264900	0265050	0265210	0265470	0265480	0265490	0265510
9/16	**18**	14,288	11,2	30	95	9	0265900	0265800	0266000	0266150	0266310	0266580	0266590	0266600	0266710

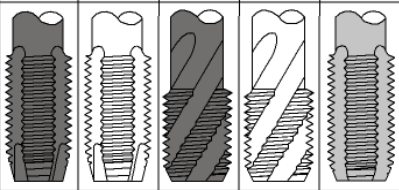
Note: Popular sizes of UNF taps in USCTI Table 302 are available on request.

UNIFIED NATIONAL FINE To BS 949 UNF

ISO 529 SHORT HAND & MACHINE TAPS



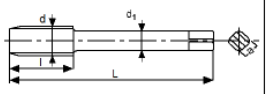
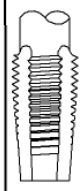
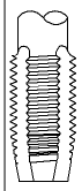
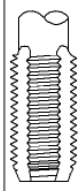
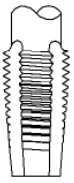
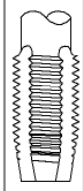
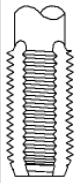
DIMENSIONS							CODES				
					DESCRIPTION		ST SP	BF SP	ST SF	BF SF	STR. FL. NITRIDE
					TYPE		A1221	A1220	A4221	A4220	A0222GG
					SURFACE TREATMENT		ST	BF	ST	BF	Ni
					TAP / COMPONENT TOLERANCE		ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2X/2B
SIZE	PITCH	Ø Nominal Dia	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F					
No. or INCH	TPI	mm	mm	mm	mm	mm					
No 1	72	1,854	2,5	8	41	2					
No 2	64	2,184	2,8	9,5	44,5	2,24					
No 3	56	2,515	2,8	9,5	44,5	2,24					
No 4	48	2,845	3,15	11	48	2,5					
No 5	44	3,175	3,15	11	48	2,5					
No 6	40	3,505	3,55	13	50	2,8	0252800	0252850	0253000	0253050	
No 8	36	4,166	4,5	13	53	3,55	0253600	0253650	0253700	0253750	
No 10	32	4,826	5	16	58	4	0254500	0254550	0254600	0254650	
No 12	28	5,486	5,6	17	62	4,5	0255600	0255400			
1/4	28	6,350	6,3	19	66	5	0260600	0260650	0260700	0260750	0260260
5/16	24	7,938	8	22	72	6,3	0261600	0261650	0261700	0261750	0261260
3/8	24	9,525	10	24	80	8	0262900	0262950	0263000	0263050	0262560
7/16	20	11,112	8	25	85	6,3	0264200	0264250	0264370	0264360	0263760
1/2	20	12,7	9	29	89	7,1	0265300	0265350	0265400	0265420	0264960
9/16	18	14,288	11,2	30	95	9	0266400	0266450	0266500	0266550	0266010



Note: Popular sizes of UNF taps in USCTI Table 302 are available on request.

UNIFIED NATIONAL FINE To BS 949 UNF

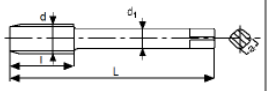
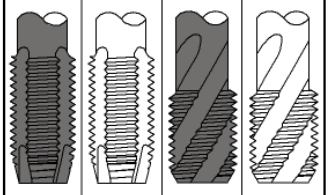
ISO 529 SHORT MACHINE TAPS

DIMENSIONS						CODES								
					DESCRIPTION	STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	L/H TPR	L/H SEC	L/H BOT	L/H SET (3)
					TYPE	A0120	A0220	A0320	A0420	A0720	A0120L	A0220L	A0320L	A0420L
					SURFACE TREATMENT	BF	BF	BF	BF	BF	BF	BF	BF	BF
					TAP / COMPONENT TOLERANCE	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B
		Ø	d_1	l	L	a				TPR + SEC + BOT	NO.1 + NO.2 + BOT				TPR + SEC + BOT
SIZE	PITCH	Nominal Dia	Shank Dia	Thread Length (max)	Overall Length	Square A/F								
No. or INCH	TPI	mm	mm	mm	mm	mm								
5/8	- 18	15,875	12,5	32	102	10	0267100	0267000	0267200	0267350	0267510	0267900	0267800	0268000	0268150
3/4	- 16	19,05	14	37	112	11,2	0268400	0268300	0268500	0268650	0268810	0269200	0269100	0269300	0269450
7/8	- 14	22,225	16	38	118	12,5	0269700	0269600	0269800	0269950	0270110	0270500	0270400	0270600	0270710
1"	- 12	25,4	18	45	130	14	0271000	0270900	0271100	0271250	0271410	0271700	0271750	0271800	0271950
1 1/8	- 12	28,575	20	37	127	16	0272200	0272100	0272300	0272450	0272660	0272700	0272750	0272800	0272820
1 1/4	- 12	31,75	22,4	37	137	18	0273100	0273000	0273200	0273350		0273620	0273600	0273650	0273750
1 3/8	- 12	34,925	25	39	144	20	0274000	0273900	0274100	0274250					
1 1/2	- 12	38,1	28	39	149	22,4	0274800	0274700	0274900	0275050		0275300	0275350	0275400	0275450

Note: Popular sizes of UNF taps in USCTI Table 302 are available on request.

UNIFIED NATIONAL FINE To BS 949 UNF

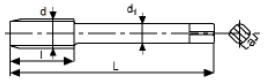
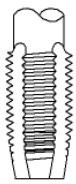
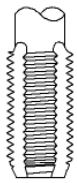
ISO 529 SHORT HAND & MACHINE TAPS

DIMENSIONS						CODES			
			DESCRIPTION			ST SP	BF SP	ST SF	BF SF
			TYPE			A1221	A1220	A4221	A4220
			SURFACE TREATMENT			ST	BF	ST	BF
			TAP / COMPONENT TOLERANCE			ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B
SIZE PITCH No. or INCH TPI	Ø Nominal Dia mm	d_1 Shank Dia mm	l Thread Length (max) mm	L Overall Length mm	a Square A/F mm				
5/8 - 18	15,875	12,5	32	102	10	0267600	0267650	0267700	0267750
3/4 - 16	19,05	14	37	112	11,2	0268900	0268930	0269000	0269050
7/8 - 14	22,225	16	38	118	12,5	0270200	0270250	0270300	0270350
1" - 12	25,4	18	45	130	14	0271500	0271550	0271600	0271650
1 1/8 - 12	28,575	20	37	127	16	0272550		0272570	0272580
1 1/4 - 12	31,75	22,4	37	137	18			0273450	
1 3/8 - 12	34,925	25	39	144	20			0274350	
1 1/2 - 12	38,1	28	39	149	22,4	0275600		0275150	

Note: Popular sizes of UNF taps in USCTI Table 302 are available on request.

UNIFIED NATIONAL EXTRA FINE To BS 949 UNEF

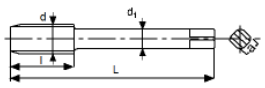
ISO 529 SHORT HAND & MACHINE TAPS

DIMENSIONS							CODES			
				DESCRIPTION			STR.FL TPR	STR.FL SEC	STR.FL. BOT	STD SET (3)
				TYPE			A0120	A0220	A0320	A0420
				SURFACE TREATMENT			BF	BF	BF	BF
				TAP / COMPONENT TOLERANCE			ISO 2/2B	ISO 2/2B	ISO 2/2B	ISO 2/2B
SIZE No. or INCH	PITCH TPI	Ø Nominal Dia mm	d_1 Shank Dia mm	l Thread Length (max) mm	L Overall Length mm	a Square A/F mm				TPR + SEC + BOT
1/4	- 32	6,35	6,3	19	66	5	0300040	0300050	0300060	0300120
5/16	- 32	7,938	8	19	69	6,3	0300200	0300250	0300280	0300310
3/8	- 32	9,525	10	20	76	8	0300380	0300390	0300400	0300530
1/2	- 28	12,7	9	29	89	7,1	0300710	0300720	0300730	0300750
5/8	- 24	15,875	12,5	32	102	10	0300950	0300900	0301000	0301150
3/4	- 20	19,05	14	37	112	11,2	0301600	0301500	0301700	0301850
7/8	- 20	22,225	16	38	118	12,5	0302200	0302600	0302300	0302450
1"	- 20	25,4	18	45	130	14	0303100	0303200	0303300	0303450
1 1/8	- 18	28,575	20	37	127	16	0303800	0303830	0303850	0303880
1 3/8	- 18	34,925	25	39	144	20	0303920	0303930	0303950	

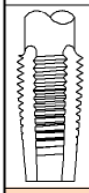
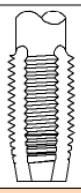
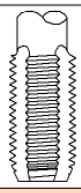
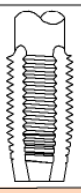
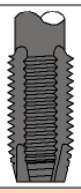
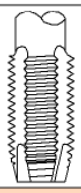
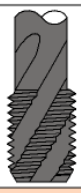
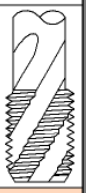
Note: Sets of 2 can be supplied against special request.

UNIFIED NATIONAL 8, 12, & 14 TPI SERIES UN

ISO 529 SHORT HAND & MACHINE TAPS



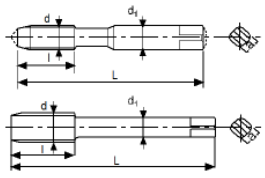
DESCRIPTION
TYPE
SURFACE TREATMENT
TAP / COMPONENT TOLERANCE

SIZE PITCH No. or INCH	TPI	Ø Nominal Dia mm	d1 Shank Dia mm	l Thread Length (max) mm	L Overall Length mm	a Square A/F mm	STR. FL. TPR A0120 BF ISO 2/2B	STR. FL. SEC A0220 BF ISO 2/2B	STR. FL. BOT A0320 BF ISO 2/2B	STD SET (3) A0420 BF ISO 2/2B	L/H SEC A0220L BF ISO 2/2B	ST SP A1221 ST ISO 2/2B	BF SP A1220 BF ISO 2/2B	ST SF A4221 ST ISO 2/2B	BF SF A4220 BF ISO 2/2B
										TPR + SEC + BOT					
1 1/8	- 8	28,575	20	48	138	16	0350000	0350100	0350200	0350300				0350480	0350490
1 1/4	- 8	31,75	22,4	51	151	18	0350500	0350600	0350700	0350800		0350960		0350980	0350990
1 3/8	- 8	34,925	25	57	162	20	0351000	0351100	0351200	0351300		0351460		0351480	0351490
1 1/2	- 8	38,1	28	60	170	22,4	0351500	0351600	0351700	0351800				0351980	0351990
1 5/8	- 8	41,275	28	60	170	22,4	0352000	0352100	0352200	0352300		0352460		0352480	0352490
1 3/4	- 8	44,45	31,5	67	187	25	0352500	0352600	0352700	0352800				0352980	0352990
1 7/8	- 8	47,625	31,5	67	187	25	0353000	0353100	0353200	0353300				0353480	0353490
2"	- 8	50,8	35,5	70	200	28	0353500	0353600	0353700	0353800				0353985	0353990
2 1/4	- 8	57,15	40	76	221	31,5	0353920	0353930	0353940	0353950					
2 1/2	- 8	63,5	40	79	224	31,5	0354000	0354100	0354200	0354300					
3"	- 8	76,2	50	85	258	40	0354610	0354620	0354630	0354640					
3 1/2	- 8	88,9	50	86	261	40	0354810	0354820	0354830	0354840					
1 1/16	- 12	26,988	20	37	127	16	0355000	0355100	0355200	0355250				0355480	0355490
1 3/16	- 12	30,163	20	37	127	16	0356000	0356100	0356200	0356250				0356380	0356390
1 5/16	- 12	33,338	22,4	37	137	18	0356450	0356400	0356500	0356550				0356680	0356690
1 5/8	- 12	41,275	28	39	149	22,4	0361100	0361000	0361200	0361350				0361460	0361470
1 3/4	- 12	44,45	31,5	45	165	25	0361530	0361520	0361560	0361650				0361685	0361690
1 7/8	- 12	47,625	31,5	45	165	25	0361800	0361850	0361900	0361950				0362080	0362090
2"	- 12	50,8	35,5	45	175	28	0362030	0362010	0362060	0362070				0362180	0362190
2 1/4	- 12	57,15	40	76	221	31,5	0372220	0372230	0372260	0372270					
2 1/2	- 12	63,5	40	79	224	31,5	0372330	0372320	0372360	0372370					
3"	- 12	76,2	50	83	258	40	0372610	0372620	0372630	0372640					
3 1/2	- 12	88,9	50	86	261	40	0372810	0372820	0372830	0372840					
1"	- 14	25,4	18	45	130	14	0370100	0370000	0370200	0370350		0370490	0370500		

BRITISH STANDARD WHITWORTH To BS 949 BSW

ISO 529 SHORT HAND & MACHINE TAPS

DIMENSIONS



DESCRIPTION

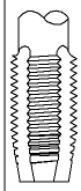
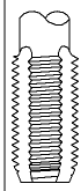
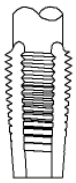
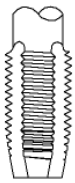
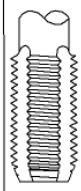
TYPE

SURFACE TREATMENT

TAP / COMPONENT TOLERANCE

SIZE	PITCH	Ø Nominal Dia	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F
INCH	TPI	mm	mm	mm	mm	mm
1/8	- 40	3,175	3,15	11	48	2,5
5/32	- 32	3,968	4	13	53	3,15
3/16	- 24	4,762	5	16	58	4
1/4	- 20	6,35	6,3	19	66	5
5/16	- 18	7,938	8	22	72	6,3
3/8	- 16	9,525	10	24	80	8
7/16	- 14	11,112	8	25	85	6,3
1/2	- 12	12,7	9	29	89	7,1
9/16	- 12	14,288	11,2	30	95	9
5/8	- 11	15,875	12,5	32	102	10
11/16	- 11	17,462	14	37	112	11,2
3/4	- 10	19,05	14	37	112	11,2
7/8	- 9	22,225	16	38	118	12,5
1"	- 8	25,4	18	45	130	14
1 1/8	- 7	28,575	20	48	138	16
1 1/4	- 7	31,75	22,4	51	151	18
1 3/8	- 6	35,25	25	57	162	20
1 1/2	- 6	38,1	28	60	170	22,4
1 3/4	- 5	44,45	31,5	67	187	25
2"	- 4,5	50,8	35,5	70	200	28
2 1/4	- 4	57,15	40	76	221	31,5
2 1/2	- 4	63,5	40	79	224	31,5

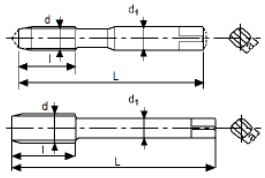
CODES

STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	L/H TPR	L/H SEC	L/H BOT	L/H SET (3)
A0120	A0220	A0320	A0420	A0720	A0120L	A0220L	A0320L	A0420L
BF	BF	BF	BF	BF	BF	BF	BF	BF
ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED
			TPR + SEC + BOT	NO.1 + NO.2 + BOT				TPR + SEC + BOT
0450300	0450400	0450500	0450600	0450800				
0451200	0451300	0451400	0451500	0451700				
0452000	0452100	0452200	0452300	0452600	0452860	0452880	0452890	0452900
0453300	0453400	0453500	0453600	0453800	0454320	0454340	0454360	0454300
0454500	0454600	0454700	0454800	0455000	0455320	0455340	0455350	0455300
0455500	0455600	0455700	0455800	0456000	0456270	0456280	0456290	0456300
0456500	0456600	0456700	0456800	0457000	0457270	0457280	0457290	0457300
0457500	0457600	0457700	0457800	0458000	0458295	0458296	0458297	0458300
0458700	0458800	0458900	0459000	0459200				
0459600	0459700	0459800	0459900	0460100	0460400	0460500	0460600	0460700
0461100	0461200	0461300	0461400	0461560	0461700	0461800	0461900	0462000
0462200	0462300	0462400	0462500	0462700	0463000	0463100	0463200	0463300
0464100	0464200	0464300	0464400	0464600	0464900	0465000	0465100	0465200
0465600	0465700	0465800	0465900	0466100	0466400	0466500	0466600	0466700
0467000	0467100	0467200	0467300	0467500	0467700	0467800	0467900	0468000
0468300	0468400	0468500	0468600	0468800	0469100	0469200	0469300	0469400
0469600	0469700	0469800	0469900					
0470300	0470400	0470500	0470600	0470800	0471000	0471100	0471200	0471300
0471500	0471600	0471700	0471800		0472200	0472300	0472400	0472420
0473400	0473500	0473600	0473700					
0474100	0474200	0474300	0474400					
0474700	0474800	0474900	0475000		0475200	0475300	0475400	

Note: Popular sizes of BSW taps in DIN371 available on request.

BRITISH STANDARD WHITWORTH To BS 949 BSW

ISO 529 SHORT HAND & MACHINE TAPS



DIMENSIONS							CODES						
						DESCRIPTION	ST SP	BF SP	ST SF	BF SF	STD POLYGON	POLYGON + OG	STR. FL. NITRIDE
						TYPE	A1221	A1220	A4221	A4220	A6220	A6220G	A0222GG
						SURFACE TREATMENT	ST	BF	ST	BF	BF	BF	Ni
						TAP / COMPONENT TOLERANCE	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2X /MED	ISO 2X /MED	ISO 2X /MED
SIZE	PITCH	Ø Nominal Dia	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F							
INCH	TPI	mm	mm	mm	mm	mm							
1/8	40	3,175	3,15	11	48	2,5	0450900	0450950	0451000	0451050			
5/32	32	3,968	4	13	53	3,15	0451800	0451850	0451900	0451950			
3/16	24	4,762	5	16	58	4	0452700	0452750	0452800	0452850			
1/4	20	6,35	6,3	19	66	5	0454100	0454150	0454200	0454180	0454020		0453550
5/16	18	7,938	8	22	72	6,3	0455100	0455150	0455200	0455250			0454750
3/8	16	9,525	10	24	80	8	0456100	0456150	0456200	0456250	0456020		0455750
7/16	14	11,112	8	25	85	6,3	0457100	0457150	0457200	0457240			0456750
1/2	12	12,7	9	29	89	7,1	0458100	0458150	0458200	0458250			0457750
9/16	12	14,288	11,2	30	95	9	0459300	0459350	0459400	0459420			
5/8	11	15,875	12,5	32	102	10	0460200	0460220	0460300	0460330			
11/16	11	17,462	14	37	112	11,2	0461600		0461650				
3/4	10	19,05	14	37	112	11,2	0462800	0462820	0462900	0462980			
7/8	9	22,225	16	38	118	12,5	0464700	0464750	0464800	0464830			
1"	8	25,4	18	45	130	14	0466200	0466210	0466300	0466350			
1 1/8	7	28,575	20	48	138	16	0467600	0467620	0467650	0467680			
1 1/4	7	31,75	22,4	51	151	18	0469000	0469020	0469050	0469080			
1 1/2	6	35,25	25	57	162	20			0470970	0470980			

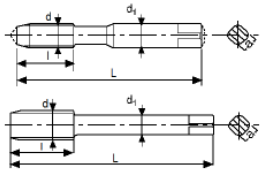
Note: Popular sizes of BSW taps in DIN371 available against request.

Note: Long Thread Length (max) Spiral Flute taps are available in certain popular sizes. Prices on application.

HSS/HSSE Ground Thread Taps

BRITISH STANDARD FINE To BS 949 BSF

ISO 529 SHORT HAND & MACHINE TAPS



DIMENSIONS						CODES					
					DESCRIPTION	STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	SER SET (3)	ST SP
					TYPE	A0120	A0220	A0320	A0420	A0720	A1221
					SURFACE TREATMENT	BF	BF	BF	BF	BF	ST
					TAP / COMPONENT TOLERANCE	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED
SIZE INCH	PITCH TPI	Ø Nominal Dia mm	d_1 Shank Dia mm	l Thread Length (max) mm	L Overall Length mm	a Square A/F mm				TPR + SEC + BOT	NO.1 + NO.2 + BOT	
3/16	- 32	4,762	5	16	58	4	0500000	0500100	0500200	0500300	0500500	0500600
1/4	- 26	6,35	6,3	19	66	5	0500900	0501000	0501100	0501200	0501400	0501600
5/16	- 22	7,938	8	22	72	6,3	0501900	0502000	0502100	0502200	0502400	0502500
3/8	- 20	9,525	10	24	80	8	0502900	0503000	0503100	0503200	0503400	0503500
7/16	- 18	11,112	8	25	85	6,3	0503900	0504000	0504100	0504200	0504400	0504600
1/2	- 16	12,7	9	29	89	7,1	0505100	0505200	0505300	0505400	0505600	0505700
9/16	- 16	14,288	11,2	30	95	9	0506100	0506200	0506300	0506400	0506600	
5/8	- 14	15,875	12,5	32	102	10	0506900	0507000	0507100	0507200	0507400	0507500
3/4	- 12	19,05	14	37	112	11,2	0508400	0508500	0508600	0508700	0508900	0509000
7/8	- 11	22,225	16	38	118	12,5	0510200	0510300	0510400	0510500	0510700	0510800
1"	- 10	25,4	18	45	130	14	0511800	0511900	0512000	0512100	0512300	0512400
1 1/8	- 9	28,575	20	48	138	16	0513100	0513200	0513300	0513400		
1 1/4	- 9	31,75	22,4	51	151	18	0513800	0513900	0514000	0514100	0514110	
1 3/8	- 8	34,925	25	57	162	20	0514300	0514400	0514500	0514550		
1 1/2	- 8	38,1	28	60	170	22,4	0514700	0514800	0514900	0515000	0515010	
1 5/8	- 8	41,275	28	60	170	22,4	0515300	0515400	0515500			
1 3/4	- 7	44,45	31,5	67	189	25	0515800	0515900	0516000			
2"	- 7	50,8	35,5	70	200	28	0516300	0516400	0516500			

Note: LH and large diameter BSF taps available on request.

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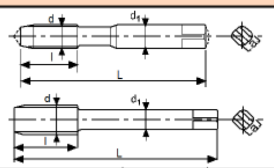
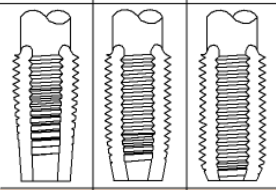
NEXT PAGE

BRITISH STANDARD BRASS To BS 949 BSB

ISO 529 SHORT HAND & MACHINE TAPS





DIMENSIONS							CODES			
DESCRIPTION							STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (2)
TYPE							A0120	A0220	A0320	A0420
SURFACE TREATMENT							BF	BF	BF	BF
TAP / COMPONENT TOLERANCE							ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED
		Ø	d_1	l	L	a				TPR + BOT
SIZE	PITCH	Nominal Dia	Shank Dia	Thread Length (max)	Overall Length	Square A/F				
INCH	TPI	mm	mm	mm	mm	mm				
*1/4	- 26	6,35	6,3	19	66	5	0500900	0501000	0501100	0501200
5/16	- 26	7,937	8	19	69	6,3	0650000	0649950	0650100	0650150
3/8	- 26	9,525	10	20	76	8	0650400	0650450	0650500	0650550
7/16	- 26	11,112	8	20	76	6,3	0650660	0650700	0650800	0650850
1/2	- 26	12,7	9	24	84	7,1	0651050	0651000	0651100	0651150
5/8	- 26	15,875	12,5	32	102	10	0651700	0652000	0651800	0651850
3/4	- 26	19,05	14	37	112	11,2	0652200	0652150	0652300	0652330

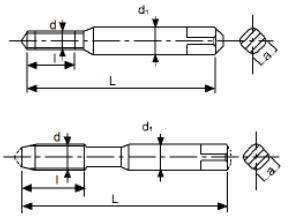
* = Use 1/4 -26 TPI BSF

Sets of 3 can be supplied against special request.

Note: Larger dimensions of BSB are normally available ex-stock on request.

BRITISH ASSOCIATION To BS 949 BA

ISO 529 SHORT HAND & MACHINE TAPS

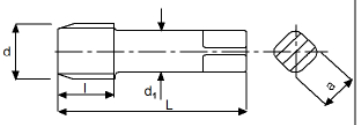


DIMENSIONS						CODES				
			DESCRIPTION			STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (3)	ST SP
			TYPE			A0120	A0220	A0320	A0420	A1221
			SURFACE TREATMENT			BF	BF	BF	BF	ST
			TAP / COMPONENT TOLERANCE			ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED	ISO 2 /MED
SIZE PITCH No. mm	Ø Nominal Dia mm	d_1 Shank Dia mm	l Thread Length (max) mm	L Overall Length mm	a Square A/F mm				TPR + SEC + BOT	
No 14 - 0,23	1	2,5	5,5	38,5	2					
No 13 - 0,25	1,2	2,5	5,5	38,5	2					
No 12 - 0,28	1,3	2,5	7	40	2	0608100	0608200	0608300	0608400	
No 11 - 0,31	1,5	2,5	8	41	2					
No 10 - 0,35	1,7	2,5	8	41	2	0607200	0607300	0607400	0607500	
No 9 - 0,39	1,9	2,5	8	41	2	0606700	0606800	0606900	0607000	
No 8 - 0,43	2,2	2,8	9,5	44,5	2,24	0606000	0606100	0606200	0606300	0606500
No 7 - 0,48	2,5	2,8	9,5	44,5	2,24	0605400	0605500	0605600	0605700	0605900
No 6 - 0,53	2,8	2,8	9,5	44,5	2,24	0604600	0604700	0604800	0604900	0605200
No 5 - 0,59	3,2	3,15	11	48	2,5	0603900	0604000	0604100	0604200	0604400
No 4 - 0,66	3,6	3,55	13	50	2,8	0603100	0603200	0603300	0603400	0603700
No 3 - 0,73	4,1	4,5	13	53	3,55	0602400	0602500	0602600	0602700	0602900
No 2 - 0,81	4,7	5	16	58	4	0601600	0601700	0601800	0601900	0602200
No 1 - 0,9	5,3	5,6	17	62	4,5	0600900	0601000	0601100	0601200	0601400
No 0 - 1	6	6,3	19	66	5	0600000	0600100	0600200	0600300	0600700

Note: Popular SF sizes available against special request.

(BSP MECHANICAL JOINT) To ISO 5969 G

ISO 2284 SHORT HAND & MACHINE TAPS



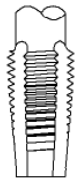
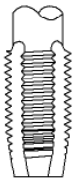
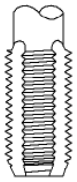
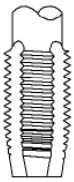
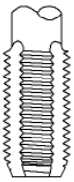
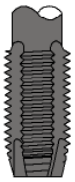
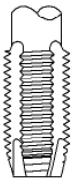
DIMENSIONS							CODES								
					DESCRIPTION		STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (2)	L/H SEC	L/H BOT	L/H SET (2)	ST SP	BF SP
					TYPE		C0120	C0220	C0320	C0420	C0220L	C0320L	C0420L	C1221	C1220
					SURFACE TREATMENT		BF	BF	BF	BF	BF	BF	BF	ST	BF
					COMPONENT * TOLERANCE		M	M	M	M	M	M	M	M	M
SIZE INCH	PITCH TPI	Ø Nominal Dia mm	d_1 Shank Dia mm	l Thread Length (max) mm	L Overall Length mm	a Square A/F mm				SEC + BOT			SEC + BOT		
1/8	- 28	9,728	8	15	59	6,3	0800000	0800100	0800200	0800300				0800500	0800520
1/4	- 19	13,157	10	19	67	8	0801200	0801300	0801400	0801500	0802500	0802600	0802700	0801700	0801720
3/8	- 19	16,662	12,5	21	75	10	0802900	0803000	0803100	0803200	0804200	0804300	0804400	0803400	0803420
1/2	- 14	20,955	16	26	87	12,5	0804600	0804700	0804800	0804900	0806000	0806100	0806200	0805200	0805250
5/8	- 14	22,911	18	26	91	14	0806800	0806900	0807000	0807100	0807400	0807500	0807510		
3/4	- 14	26,441	20	28	96	16	0807700	0807800	0807900	0808000	0809000	0809100	0809200	0808200	0808220
7/8	- 14	30,201	22,4	29	102	18	0809400	0809500	0809600	0809700					
1"	- 11	33,249	25	33	109	20	0809900	0810000	0810100	0810200	0811100	0811200	0811300	0810400	0810420
1 1/8	- 11	37,897	31,5	36	119	25	0812000	0812100	0812200	0812300					
1 1/4	- 11	41,91	31,5	36	119	25	0812500	0812600	0812700	0812800					
1 1/2	- 11	47,803	35,5	37	125	28	0813600	0813700	0813800	0813900					
1 3/4	- 11	53,746	35,5	39	132	28	0814600	0814700	0814800	0814900					
2"	- 11	59,614	40	41	140	31,5	0815100	0815200	0815300	0815400					
2 1/4	- 11	65,71	40	42	142	31,5	0816100	0816200	0816300	0816400					
2 1/2	- 11	75,184	45	45	153	35,5	0816600	0816700	0816800	0816900					
3"	- 11	87,884	50	48	164	40	0817650	0817700	0817800	0817900					

Note: Sets of 3 can be supplied against special request.

* Under normal usages G taps will cut threads to form a mechanical joint (M), whilst RP taps, being smaller in effective diameter, will cut threads to form a leakproof joint (L).

(BSP LEAKPROOF JOINT) To ISO 5969 RP

ISO 2284 SHORT HAND & MACHINE TAPS

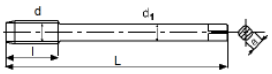
DESCRIPTION	CODES								
	STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (2)	L/H SEC	L/H BOT	L/H SET (2)	ST SP	BF SP
TYPE	C0120	C0220	C0320	C0420	C0220L	C0320L	C0420L	C1221	C1220
SURFACE TREATMENT	BF	BF	BF	BF	BF	BF	BF	ST	BF
COMPONENT * TOLERANCE	L	L	L	L	L	L	L	L	L
SIZE PITCH INCH TPI				SEC + BOT			SEC + BOT		
1/8 - 28	0800600	0800700	0800800	0800900				0801100	0801150
1/4 - 19	0801800	0801900	0802000	0802100				0802300	0802350
3/8 - 19	0803500	0803600	0803700	0803800	0804530	0804550		0804000	0804020
1/2 - 14	0805300	0805400	0805500	0805600	0806400	0806500	0806600	0805800	0805850
5/8 - 14	0807210	0807220	0807240	0807250					
3/4 - 14	0808300	0808400	0808500	0808600				0808800	0808820
1" - 11	0810500	0810600	0810700	0810800	0811600	0811700	0811800	0811000	0811020
1 1/4 - 11	0813000	0813100	0813200	0813300					
1 1/2 - 11	0814100	0814200	0814300	0814400					
2" - 11	0815600	0815700	0815800	0815900					
2 1/2 - 11	0817050	0817100	0817200	0817210					
3" - 11	0818050	0818100	0818200	0818210					

Note: Sets of 3 can be supplied against special request.

* Under normal usages G taps will cut threads to form a mechanical joint (M), whilst RP taps, being smaller in effective diameter, will cut threads to form a leakproof joint (L).

(BSP MECHANICAL JOINT) To ISO 5969 G

DIN 5156 LONG SHANK MACHINE TAPS



DIMENSIONS							CODES					
				DESCRIPTION			STR. FL. FORM C	STR. FL. NITRIDE	ST SP	BF SP	ST SF	BF SF
				TYPE			G0220	G0222GG	G1221OR	G1220	G4221OR	G4220
				CHAMFER			C	C	B	B	C/D	C/D
				SURFACE TREATMENT			BF	Ni	ST	BF	ST	BF
				COMPONENT TOLERANCE *			M/L	M/L	M/L	M/L	M/L	M/L
SIZE	PITCH	Ø Nominal Dia	d_1 Shank Dia	l Thread Length (max)	L Overall Length	a Square A/F						
INCH	TPI	mm	mm	mm	mm	mm						
1/8	- 28	9,728	7	20	90	5,5	6900500	6900550	6960000	6960200	6960400	6960600
1/4	- 19	13,157	11	22	100	9	6961700	6961750	6962000	6962200	6962400	6962600
3/8	- 19	16,662	12	22	100	9	6963500	6963550	6963600	6963800	6964000	6964200
1/2	- 14	20,955	16	25	125	12	6964800	6964850	6965000	6965200	6965400	6965600
5/8	- 14	22,911	18	25	125	14,5			6966600	6966800	6967000	6967200
3/4	- 14	26,441	20	28	140	16	6967500	6967550	6967800	6968000	6968200	6968400
1"	- 11	33,249	25	30	160	20	6969500	6969550	6969600	6969800	6970000	6970200
1 1/4	- 11	41,91	32	30	170	24	6971700		6972000	6972200	6972400	6972600
1 1/2	- 11	47,803	36	32	190	29	6973610		6974000	6974200		

(BSP LEAKPROOF JOINT) To ISO 5969 RP

DIN 5156 LONG SHANK MACHINE TAPS

1/8	- 28	9,728	7	20	90	5,5	6960800	6960850	6961000	6961200	6961400	6961600
1/4	- 19	13,157	11	22	100	9	6962700	6962750	6962800	6963000	6963200	6963400
3/8	- 19	16,662	12	22	100	9	6964300	6964350	6964400	6964500	6964600	6964700
1/2	- 14	20,955	16	25	125	12	6965700	6965750	6965800	6966000	6966200	6966400
3/4	- 14	26,441	20	28	140	16	6968500	6968550	6968600	6968800	6969000	6969200
1"	- 11	33,249	25	30	160	20	6970500	6970550	6971000	6971200	6971400	6971600
1 1/4	- 11	41,91	32	30	170	24	6972780	6972850	6973000	6973200	6973400	6973600
1 1/2	- 11	47,803	36	32	190	29	6974340	6974350	6974500	6974600		

* Under normal usages, G taps will cut threads to form a mechanical joint (M), whilst RP taps, being smaller in effective diameter, will cut threads to form a leakproof joint (L).

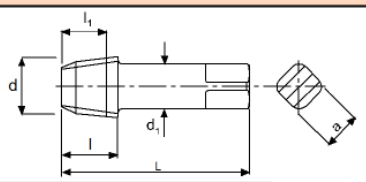
HSS/HSSE Ground Thread Taps

FEW

(BSPT – 1 : 16 TAPER) To ISO 5969 RC

ISO 2284 SHORT HAND & MACHINE TAPS

DIMENSIONS



SIZE	PITCH	Ø Nominal Dia	d_1 Shank Dia	l Thread Length (max)	l_1 Gauge Length	L Overall Length	a Square A/F
INCH	TPI	mm	mm	mm	mm	mm	mm
1/16	28	7,723	5,6	14	10,1	52	4,5
1/8	28	9,728	8	15	10,1	59	6,3
1/4	19	13,157	10	19	15	67	8
3/8	19	16,662	12,5	21	15,4	75	10
1/2	14	20,955	16	26	20,5	87	12,5
3/4	14	26,441	20	28	21,8	96	16
1"	11	33,249	25	33	26	109	20
1 1/4	11	41,91	31,5	36	28,3	119	25
1 1/2	11	47,803	35,5	37	28,3	125	28
2"	11	59,614	40	41	32,7	140	31,5
2 1/2	11	75,184	45	45	37,1	153	35,5

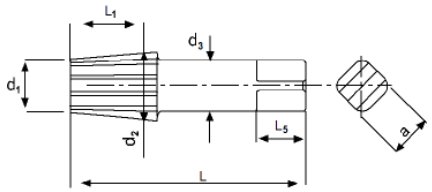
For easiest threading, use **1 : 16** Taper Reamer before tapping

CODES

DESCRIPTION	STR. FL. TPR	STR. FL. SEC	STR. FL. BOT	STD SET (2)	STR. FL. FORM C	ST SF	BF SF
TYPE	C0120	C0220	C0320	C0420	C0221	§ G4221	§ G4220
SURFACE TREATMENT	BF	BF	BF	BF	ST	ST	BF
TAP/COMPONENT TOLERANCE	–	–	–	–	–	–	–
				SEC + BOT			
	0819800	0819810	0819830	0819840			
	0819930	0819970	0820000	0820020	0819990	6961620	6961630
	0820030	0820070	0820100	0820120	0820090	6963420	6963430
	0820130	0820170	0820200	0820220	0820190	6964720	6964730
	0820260	0820280	0820300	0820320	0820290	6966510	6966520
	0820340	0820370	0820400	0820420	0820390		
	0820530	0820570	0820600	0820620	0820590		
	0820660	0820680	0820700				
	0820820	0820850	0820900				
	0821020	0821040	0821000				
	0821090	0821095	0821100				

§ = DIN 5156

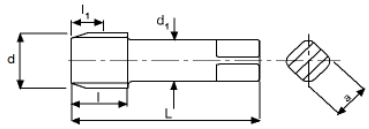
1:16 TAPER REAMERS



SIZE	d_1 Dia	d_2 Dia	d_3 Dia	L_1 Cutting Length	L Overall Length	L_5	a Square A/F	Code
1/16	5,935	6,998	7	17	70	8	4,9	1500010
1/8	8,042	9,105	9	17	70	8	6,2	1500020
1/4	10,308	11,996	12	27	80	11	8	1500030
3/8	13,728	15,416	15	27	85	12,7	9	1500040
1/2	16,938	19,126	19	35	95	16	12	1500050
3/4	22,253	24,411	24	35	105	17	16	1500060
1"	27,996	30,684	30	43	130	20	20	1500070

NATIONAL PIPE STRAIGHT To USAS 94.9 NPS/NPSF*

ISO 2284 SHORT HAND & MACHINE TAPS



DIMENSIONS								CODES						
						DESCRIPTION TYPE SURFACE TREATMENT		STR. FL. TPR C0120 BF	STR. FL. SEC C0220 BF	STR. FL. BOT C0320 BF	STD SET (2) C0420 BF	STR. FL. FORM C C0221 ST	ST SF § G4221 ST	BF SF § G4220 BF
SIZE INCH	PITCH TPI	Ø Nominal Dia mm	d_1 Shank Dia mm	l Thread Length (max) mm	l_1 Gauge Length mm	L Overall Length mm	a Square A/F mm				SEC + BOT			
1/8	- 27	10,272	8	15	-	59	6,3	0824950	0825000	0825100	0825200			
1/4	- 18	13,571	10	19	-	67	8	0825370	0825400	0825500	0825600			
3/8	- 18	17,053	12,5	21	-	75	10	0825750	0825800	0825900	0826000			
1/2	- 14	21,224	16	26	-	87	12,5	0826150	0826200	0826300	0826400			
3/4	- 14	26,568	20	28	-	96	16	0826550	0826600	0826700	0826800			
1"	- 11 1/2	33,228	25	33	-	109	20	0827150	0827200	0827300	0827400			
1 1/4	- 11 1/2	41,986	31,5	36	-	119	25	0827550	0827600	0827700	0827800			
1 1/2	- 11 1/2	48,054	35,5	37	-	125	28	0827950	0828000	0828100	0828200			
2"	- 11 1/2	60,091	40	41	-	140	31,5	0828350	0828400	0828500	0828550			

* **NPSF** taps available in most sizes

§ = DIN5156

NATIONAL PIPE TAPER To USAS 94.9 NPT/NPTF*

ISO 2284 SHORT HAND & MACHINE TAPS

1/16	- 27	7,894	8,1	17,5	10,1	54	6	0839900	0840000	0840100	0840200	0840090		
1/8	- 27	10,272	8	15	10,1	59	6,3	0840230	0840270	0840300	0840320	0840290		
1/4	- 18	13,571	10	19	15	67	8	0840330	0840370	0840400	0840420	0840390		
3/8	- 18	17,053	12,5	21	15,4	75	10	0840430	0840470	0840500	0840510	0840490		
1/2	- 14	21,224	16	26	20,5	87	12,5	0840530	0840570	0840600	0840620	0840590		
3/4	- 14	26,568	20	28	21,8	96	16	0840630	0840670	0840700	0840720	0840690		
1"	- 11 1/2	33,228	25	33	26	109	20	0840730	0840770	0840800	0840810	0840790		
1 1/4	- 11 1/2	41,986	31,5	36	28,3	119	25	0840830	0840870	0840900				
1 1/2	- 11 1/2	48,054	35,5	37	28,3	125	28	0840930	0840970	0841000				
2"	- 11 1/2	60,091	40	41	32,7	140	31,5	0841060	0841080	0841100				

1. For easiest threading, use **1 : 16** taper reamer before tapping.
2. Sets can be made up, but normally supplied with bottoming lead only.

* **NPTF** taps available in most sizes.

HSS/HSSE Ground Thread Taps

FEW

METRIC COARSE

ISO 529 & DIN EN 22568

TAPS & DIE SETS IN WOODEN BOXES

Includes: Tap Wrenches, Dies Stocks & Screw Pitch Gauges

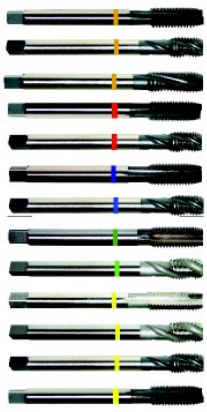
Code	Size	Description		
0059350	M3 - M12	STD HSSE-V TAP SETS & DIES	BF	M3, M4, M5, M6, M8, M10, M12
0059370	M3 - M12	SERIAL HSSE-V TAP SETS & DIES	BF	M3, M4, M5, M6, M8, M10, M12
0059400	M3 - M20	STD HSSE-V TAP SETS & DIES	BF	M3, M4, M5, M6, M8, M10, M12, M14, M16, M18, M20
0059450	M3 - M20	SERIAL HSSE-V TAP SETS & DIES	BF	M3, M4, M5, M6, M8, M10, M12, M14, M16, M18, M20
3709100	M3 - M12	STD HSS TAP SETS & DIES	BF	M3, M4, M5, M6, M8, M10, M12
3709200	M3 - M20	STD HSS TAP SETS & DIES	BF	M3, M4, M5, M6, M8, M10, M12, M14, M16, M18, M20

TAPS IN METAL BOXES

* Added Protection and Stock Control
* Easier Handling and Selection

Code	Size	Description		
0059100	M3 - M12	SECONDS	BF	M3, M4, M5, M6, M8, M10, M12
0059140	M3 - M12	SPIRAL POINT	BF	M3, M4, M5, M6, M8, M10, M12
0059150	M3 - M12	SPIRAL POINT	ST	M3, M4, M5, M6, M8, M10, M12
0059190	M3 - M12	SPIRAL FLUTE	BF	M3, M4, M5, M6, M8, M10, M12
0059200	M3 - M12	SPIRAL FLUTE	ST	M3, M4, M5, M6, M8, M10, M12
0059250	M3 - M12	STANDARD SETS	BF	M3, M4, M5, M6, M8, M10, M12
0059270	M3 - M12	SERIAL SETS	BF	M3, M4, M5, M6, M8, M10, M12

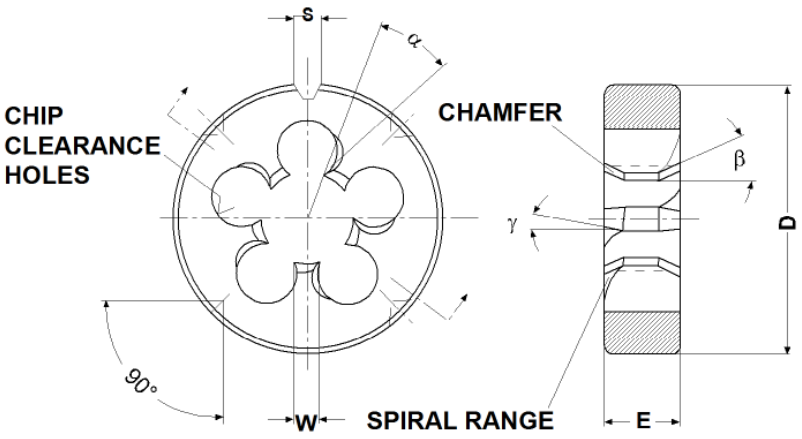
Code	Size	Description Machine Tap Sets	
6060405	M3-M12	DIN371/6 Straight Flute	BF
6060410	M3-M12	DIN371/6 Spiral Point	BF
6060415	M3-M12	DIN371/6 Spiral Flute	BF
6060420	M3-M12	DIN371/6 Spiral Flute 15°	BF



Code	Size	Description - Ring Tap Sets		
6062991	M3-M12	DIN371/6 Spiral Point	OR	ST
6062992	M3-M12	DIN371/6 Spiral Flute	OR	ST
6062961	M3-M12	DIN371/6 Spiral Flute 15°	OR	ST
6062102	M3-M12	DIN371/6 Spiral Point	RR	NIST
6062103	M3-M12	DIN371/6 Spiral Flute	RR	NIST
6062111	M3-M12	DIN371/6 Spiral Point	BR	ST
6062112	M3-M12	DIN371/6 Spiral Flute	BR	ST
6062981	M3-M12	DIN371/6 Spiral Point	GR	BF
6062982	M3-M12	DIN371/6 Spiral Flute	GR	BF
6062122	M3-M12	DIN371/6 Spiral Point	YR	BF
6062123	M3-M12	DIN371/6 Spiral Flute	YR	BF
6062977	M3-M12	DIN371/6 Spiral Point	YR SO	ST
6062978	M3-M12	DIN371/6 Spiral Flute	YR SO	ST

HSS Circular Dies (With Lapped Thread)

D = Diameter of die
E = Height of die
W = Web
S = Slot width
α = Rake Angle
β = Chamfer Angle
γ = Spiral entry Angle



CIRCULAR DIES STOCK RANGE

HSS STD These are standard general purpose dies for use on most common materials. The chamfer is ground, with lapped threads. Dies are solid, thus cutting thread consistently to size (Metric-6g, Unified-2A, Whitworth/Medium fit).

HSS SPLIT Same as above, but are split on request.

HSS SPIRAL ENTRY These dies are also solid, all dimensions ground, and have a lapped thread. Additionally they have a spiral entry, which causes a “peeling cut”, with swarf being forced ahead of the die. Recommended for use in attachments or machines.

HSS STD L/H For Left Hand threads.

HSS BRASS CUTTING These dies are specially manufactured with smaller rake angle, greater chamfer relief, spiral entry and lapped thread to give longer tool life in brass applications. Marked Ms. gel. Most sizes ordered against special request.

HSS-E SPIRAL ENTRY Mainly used in modern automatics where accurate threads are required in tough tool steels or stainless steels. Longer tool life may also be attained in normal free cutting steels. These dies are Nitrided for greater abrasion resistance.

HSS HEXAGON DIE NUTS

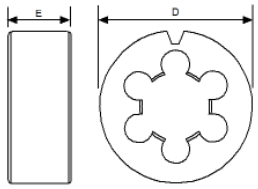
HSS HEX STD For general purpose repairing or cleaning of threads. General dimensions of hex dies will vary between DIN and imperial specifications.

HSS HEX L/H For Left Hand threads.

ISO METRIC COARSE To DIN 13 M

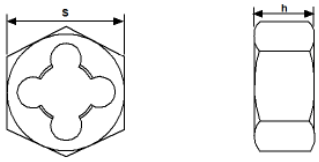
DIN EN 22568 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS				CODES				
SIZE	PITCH	Die Stock (Din225) =		HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H	HSSE Spiral Entry
	mm	D mm	E mm					
M1	0,25	16	5	2000000				
M1,2	0,25	16	5	2000100				
M1,4	0,3	16	5	2000200				
M1,6	0,35	16	5	2000250				
•M1,7	0,35	16	5	2000400				
M2	0,4	16	5	2000700		2000600	2000800	
M2,2	0,45	16	5	2001000				
•M2,3	0,4	16	5	2001100				
M2,5	0,45	16	5	2001200		2001300		
•M2,6	0,45	16	5	2001500				
M3	0,5	20	5	2001900	2001950	2002000	2002200	2002080
•M3	0,6	20	5	2002105				
M3,5	0,6	20	5	2002400		2002600		
M4	0,7	20	5	2003100	2003130	2003200	2003400	2003280
•M4	0,75	20	7	2003500				
M4,5	0,75	20	7	2003700				
M5	0,8	20	7	2004500	2004530	2004600	2004800	2004680
•M5	0,9	20	7	2005000				
M5	1	20	7	2005100				
M6	1	20	7	2005900	2005930	2006000	2006200	2006080

HEX DIES



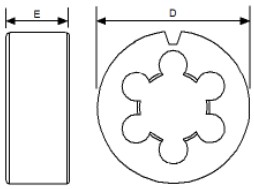
DIMENSIONS		CODE	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
18	5		
18	5		
18	5		
18	5	2000300	
18	5		
18	5	2000500	
18	5		
18	5		
18	5	2001400	
18	5		
18	5	2002100	
18	5	2002300	
18	5	2002700	
18	5	2003300	
18	7	2003600	
18	7	2003800	
18	7	2004700	2004900
18	7		
18	7	2005200	
18	7	2006100	2006300

• = Non-Standard sizes

ISO METRIC COARSE To DIN 13 M

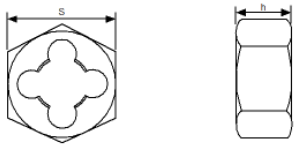
DIN EN 22568 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS				CODES				
SIZE	PITCH	Die Stock (Din225) = DxE		HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H	HSSE Spiral Entry
	mm	D mm	E mm					
M7	1	25	9	2006500			2006700	
M8	1,25	25	9	2007400	2007430	2007500	2007700	2007580
M9	1,25	25	9	2008200				
M10	1,5	30	11	2009100	2009130	2009200	2009400	2009280
M11	1,5	30	11	2009900				
M12	1,75	38	14	2010900	2010930	2011000	2011200	2011080
M14	2	38	14	2012200	2012230	2012250	2012400	2012290
M16	2	45	18	2013300	2013330	2013350	2013500	2013390
M18	2,5	45	18	2014300	2014330	2014350	2014500	2014380
M20	2,5	45	18	2015300	2015330	2015350	2015500	2015380
M22	2,5	55	22	2016100		2016150		
M24	3	55	22	2016800		2016850	2016905	
M27	3	65	25	2017600				
M30	3,5	65	25	2018300			2018500	
M33	3,5	65	25	2018900				
M36	4	65	25	2019100				
M39	4	75	30	2019450				
M42	4,5	75	30	2019750				
M45	4,5	90	36	2019840				
M48	5	90	36	2019950				
M52	5	90	36	2020600				

HEX DIES

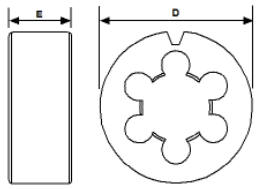


DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
21	9	2006600	
21	9	2007600	2007800
21	9	2008300	
27	11	2009300	2009500
27	11	2010000	
36	14	2011100	2011300
36	14	2012300	
41	18	2013400	
41	18	2014400	
41	18	2015400	
50	22	2016200	
50	22	2016900	
60	25	2017700	
60	25	2018400	2018600
60	25	2019000	
60	25	2019200	
70	30	2019500	
70	30	2019800	
85	36	2019900	
85	36	2020000	
85	36	2020650	

ISO METRIC FINE To DIN 13 MF

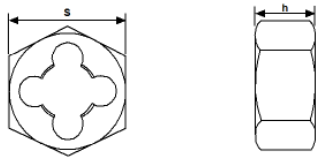
DIN EN 22568 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODES			
SIZE	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
M3X0,35	20	5	2001600			2001800
M4X0,5	20	5	2002800			2003000
M4,5X0,5	20	5	2003900			
M5X0,5	20	5	2004000			2004200
M5X0,75	20	7	2004300			
M6X0,5	20	5	2005400			
M6X0,75	20	7	2005600			2005800
M7X0,75	25	9	2006400			
M8X0,5	25	9	2006790			
M8X0,75	25	9	2006900			
M8X1	25	9	2007100		2007150	2007300
M9X0,75	25	9	2007900			
M9X1	25	9	2008100			
M10X0,75	30	11	2008400			
M10X1	30	11	2008500		2008550	2008700
M10X1,25	30	11	2008800		2008850	2009000
M11X1	30	11	2009600			
M12X1	38	10	2010100		2010150	
M12X1,25	38	10	2010300		2010350	2010500
M12X1,5	38	10	2010600		2010650	2010800
M14X1	38	10	2011500		2011550	
M14X1,25	38	10	2011700		2011750	
M14X1,5	38	10	2011900		2011950	2012100
M16X1	45	14	2012800		2012950	
M16X1,5	45	14	2013000		2013050	2013055

HEX DIES

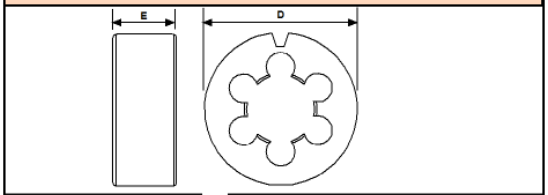


DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
18	5	2001700	
18	5	2002900	
18	5		
18	5	2004100	
18	7	2004400	2004450
18	5	2005500	
18	7	2005700	
21	9		
21	9	2006800	
21	9	2007000	
21	9	2007200	
21	9	2008000	
21	9		
27	11		
27	11	2008600	
27	11	2008900	
27	11	2009700	
36	10	2010200	
36	10	2010400	
36	10	2010700	
36	10	2011600	
36	10	2011800	
36	10	2012000	
41	14	2012900	
41	14	2013100	2013200

ISO METRIC FINE To DIN 13 MF

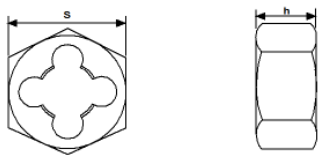
DIN EN 22568 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODES			
SIZE	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
M18X1	45	14	2013600		2013650	
M18X1,5	45	14	2013900		2013950	
M18X2	45	14	2014100		2014150	
M20X1	45	14	2014700		2014750	
M20X1,5	45	14	2014900		2014950	2015050
M20X2	45	14	2015100			
M22X1,5	55	16	2015700		2015750	2015900
M24X1	55	16	2016300			
M24X1,5	55	16	2016400		2016450	
M24X2	55	16	2016600		2016650	
M25X1	55	16	2017000			
M25X1,5	55	16	2017100		2017150	
M26X2	55	16	2017300			
M27X1,5	65	18	2017400			
M28X1,5	65	18	2017790			
M30X1,5	65	18	2018000			
M30X2	65	18	2018195			
M30X3	65	25	2018250			
M32X1,5	65	18	2018700			
M36X1,5	65	18	2019050			
M36X2	65	18				
M39X1,5	75	20				
M40X1,5	75	20	2019600			
M48X2	90	22	2020050			
M50X1,5	90	22	2020200			

HEX DIES

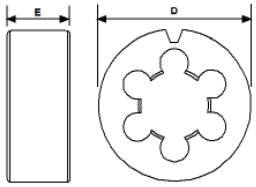


DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
41	14	2013700	
41	14	2014000	
41	14	2014200	
41	14	2014800	
41	14	2015000	
41	14	2015200	
50	16	2015800	
50	16		
50	16	2016500	
50	16	2016700	
50	16		
50	16	2017200	
60	18		
60	18	2017500	
60	18	2017800	
60	18	2018100	
60	18	2018200	
60	18		
60	18	2018800	
60	18	2019350	
60	18	2019300	
70	20	2019400	
70	20	2019700	
85	22	2020100	
85	22		

UNIFIED NATIONAL COARSE To ANSI B1,1 UNC

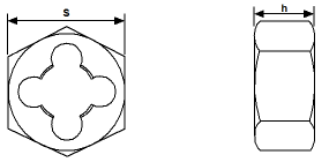
DIN EN 22568 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODES			
SIZE TPI	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
No 1 – 64	16	5	2170000			
No 2 – 56	16	5	2170100			
No 3 – 48	16	5				
No 4 – 40	16	5	2170200			
No 5 – 40	20	5	2170300			
No 6 – 32	20	7	2170400			
No 8 – 32	20	7	2170500			
No 10 – 24	20	7	2170700			
No 12 – 24	20	7	2170900			
1/4 – 20	20	7	2200000			2200200
5/16 – 18	25	9	2200300			2200500
3/8 – 16	30	11	2200600			2200650
7/16 – 14	30	11	2200900			2201100
1/2 – 13	38	14	2201200			2201400
9/16 – 12	38	14	2201500			2201700
5/8 – 11	45	18	2201800			2202000
3/4 – 10	45	18	2202100			2202300
7/8 – 9	55	22	2202400			
1" – 8	55	22	2202700			
1 1/8 – 7	65	25	2203000			
1 1/4 – 7	65	25	2203300			
1 3/8 – 6	65	25	2203500			
1 1/2 – 6	75	30	2203700			
1 3/4 – 5	90	36	2203830			
2" – 4 1/2	90	36	2203930			

HEX DIES

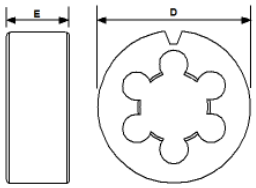


DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
18	5		
18	5		
18	5		
18	5		
18	5		
18	5		
18	5	2170600	
18	7	2170800	
18	7		
18	7	2200100	
21	9	2200400	
27	11	2200700	2200800
27	11	2201000	
36	14	2201300	
36	14	2201600	
41	18	2201900	
41	18	2202200	
50	22	2202500	2202600
50	22	2202800	2202900
60	25	2203100	
60	25	2203400	
60	25	2203600	
70	30	2203800	
85	36	2203850	
85	36	2203900	

UNIFIED NATIONAL FINE To ANSI B1,1 UNF

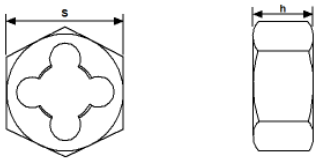
DIN EN 22568 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODES			
SIZE TPI	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
No 0 – 80	16	5				
No 1 – 72	16	5				
No 2 – 64	16	5				
No 3 – 56	16	5				
No 4 – 48	16	5	2249600			
No 5 – 44	20	5	2249800			
No 6 – 40	20	5	2250000			
No 8 – 36	20	5	2250050			
No 10 – 32	20	7	2250100			
No 12 – 28	20	7	2250400			
1/4 – 28	20	7	2264000			2264200
5/16 – 24	25	9	2264300			2264500
3/8 – 24	30	11	2264600			2264800
7/16 – 20	30	11	2264900			2265100
1/2 – 20	38	10	2265200			2265250
9/16 – 18	38	10	2265500			2265700
5/8 – 18	45	14	2265800			2266000
3/4 – 16	45	14	2266200			
7/8 – 14	55	16	2266500			
1" – 12	55	16	2266800			
1 1/8 – 12	65	18	2267200			
1 1/4 – 12	65	18	2267400			
1 3/8 – 12	65	18	2267600			
1 1/2 – 12	75	20	2267800			

HEX DIES

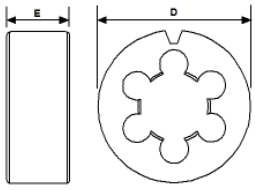


DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
18	5		
18	5		
18	5		
18	5		
18	5		
18	5		
18	5		
18	5		
18	7	2250200	
18	7		
18	7	2264100	
21	9	2264400	
27	11	2264700	
27	11	2265000	
36	10	2265300	2265400
36	10	2265600	
41	14	2265900	
41	14	2266300	2266400
50	16	2266600	2266700
50	16	2266900	2267000
60	18	2267300	
60	18	2267500	
60	18	2267700	
70	20	2267900	

UNIFIED NATIONAL EXTRA FINE To ANSI B1,1 UNEF

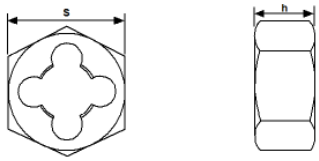
DIN EN 22568 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODES			
SIZE	TPI	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
No 12 –	32	20	7	2270000			
1/4 –	32	20	7	2270050			
5/16 –	32	25	9	2270100			
3/8 –	32	30	11	2270300			
7/16 –	28	30	11	2270430			
1/2 –	28	38	10	2270460			
9/16 –	24	38	10	2270550			
5/8 –	24	45	14	2270650			
11/16 –	24	45	14	2270750			
3/4 –	20	45	14	2270800			
7/8 –	20	55	16	2270900			
1" –	20	55	16	2271000			

HEX DIES

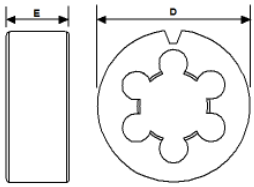


DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
18	7		
18	7		
21	9		
27	11		
27	11		
36	10	2270500	
36	10	2270600	
41	14		
41	14		
41	14		
50	16		
50	16		

UNIFIED NATIONAL To ANSI B1,1 UN

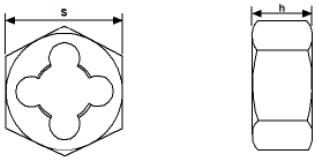
DIN EN 22568 8, 12, & 14 TPI SERIES CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODE			
SIZE TPI	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
1 1/8 – 8	65	18	2271900			
1 1/4 – 8	65	18	2272100			
1 3/8 – 8	65	18	2272300			
1 1/2 – 8	75	20	2272500			
1 5/8 – 8	90	22	2272700			
1 3/4 – 8	90	22	2272900			
1 7/8 – 8	90	22	2273100			
2" – 8	90	22	2273300			
2 1/4 – 8	105	22	2273500			
2 1/2 – 8	120	25	2273700			
3" – 8	125	25	2273900			
3 1/2 – 8	140	25	2274100			
1 1/16 – 12	65	18	2274300			
1 3/16 – 12	65	18	2274500			
1 5/16 – 12	65	18	2274700			
1 5/8 – 12	90	22	2274900			
1 3/4 – 12	90	22	2275100			
1 7/8 – 12	90	22	2275300			
2" – 12	90	22	2275500			
2 1/4 – 12	105	22	2275700			
2 1/2 – 12	120	25	2275900			
3" – 12	125	25	2276100			
3 1/2 – 12	140	25	2276300			
1" – 14	55	16	2271500			

HEX DIES

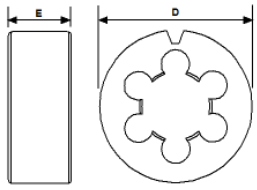


DIMENSIONS		CODE	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
60	18	2272000	
60	18	2272200	
60	18	2272400	
70	20	2272600	
85	22	2272800	
85	22	2273000	
85	22	2273200	
85	22	2273400	
100	25	2273600	
105	25	2273800	
115	25	2274000	
125	25	2274200	
60	18	2274400	
60	18	2274600	
60	18	2274800	
85	22	2275000	
85	22	2275200	
85	22	2275400	
85	22	2275600	
100	25	2275800	
105	25	2276000	
115	25	2276200	
125	25	2276400	
50	16	2271400	

BRITISH STANDARD WHITWORTH To BS 84 BSW

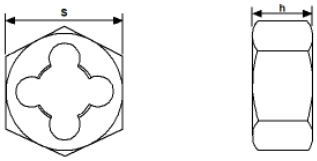
DIN EN 22568 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS		CODES			
SIZE TPI	Die Stock (Din225) = D mm / E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
1/16 – 60	16 / 5	2299600			
3/32 – 48	16 / 5	2299800			
1/8 – 40	20 / 5	2300000			
5/32 – 32	20 / 7	2300200			
3/16 – 24	20 / 7	2300400			2300600
7/32 – 24	20 / 7	2300800			
1/4 – 20	20 / 7	2300900			2301100
5/16 – 18	25 / 9	2301300			2301500
3/8 – 16	30 / 11	2301700			2301900
7/16 – 14	30 / 11	2302100			
1/2 – 12	38 / 14	2302400			2302600
9/16 – 12	38 / 14	2302800			
5/8 – 11	45 / 18	2303000			2303200
3/4 – 10	45 / 18	2303500			2303700
7/8 – 9	55 / 22	2303900			2303950
1" – 8	55 / 22	2304200			
1 1/8 – 7	65 / 25	2304405			
1 1/4 – 7	65 / 25	2304240			
1 3/8 – 6	65 / 25	2304250			
1 1/2 – 6	75 / 30	2304850			

HEX DIES

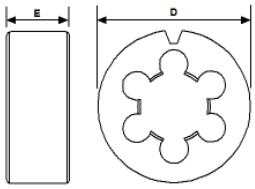


DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
18	5		
18	5		
18	5	2300100	
18	5	2300300	
18	7	2300500	2300700
18	7		
18	7	2301000	2301200
21	9	2301400	2301600
27	11	2301800	2302000
27	11	2302200	2302300
36	14	2302500	2302700
36	14	2302900	
41	18	2303100	2303300
41	18	2303600	2303800
50	22	2304000	2304100
50	22	2304300	2304400
60	25	2304500	
60	25	2304600	2304700
60	25	2304800	
70	30	2304900	

BRITISH STANDARD FINE To BS 84 BSF

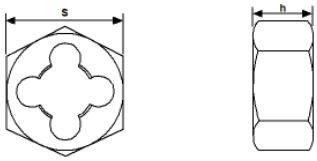
DIN EN 22568 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODES			
SIZE – TPI	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
3/16 – 32	20	7	2305000			
1/4 – 26	20	7	2305200			
5/16 – 22	25	9	2305400			
3/8 – 20	30	11	2305700			
7/16 – 18	30	11	2306000			
1/2 – 16	38	10	2306200			2306400
9/16 – 16	38	10	2306500			
5/8 – 14	45	14	2306800			
3/4 – 12	45	14	2307000			
7/8 – 11	55	16	2307300			2307500
1" – 10	55	16	2307700			2307900
1 1/8 – 9	65	18				
1 1/4 – 9	65	18				
1 3/8 – 8	65	18				
1 1/2 – 8	75	20				
1 3/4 – 7	90	22				
2" – 7	90	22				

HEX DIES

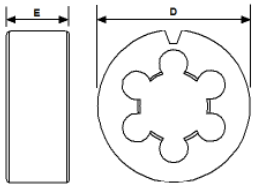


DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
18	7	2305100	
18	7	2305300	
21	9	2305500	
27	11	2305800	
27	11	2306100	
36	10	2306300	
36	10	2306600	2306700
41	14	2306900	
41	14	2307100	2307200
50	16	2307400	
50	16	2307800	
60	18	2308000	
60	18	2308100	
60	18	2308200	
70	20	2308300	
85	22	2308400	2308500
85	22	2308600	

BRITISH ASSOCIATION To BS 93 BA

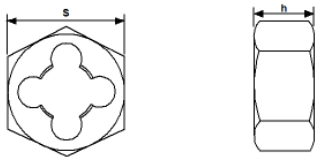
DIN EN 22568 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODES			
SIZE – PITCH	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
No 10 – 0,35	16	5	2351900			
No 9 – 0,39	16	5	2351800			
No 8 – 0,43	16	5	2351600			
No 7 – 0,48	16	5	2351400			
No 6 – 0,53	16	5	2351200			
No 5 – 0,59	20	5	2351000			
No 4 – 0,66	20	5	2350800			
No 3 – 0,73	20	5	2350600			
No 2 – 0,81	20	7	2350400			
No 1 – 0,90	20	7	2350200			
No 0 – 1	20	7	2350000			

HEX DIES



DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
19	5	2352000	
19	5		
19	5	2351700	
19	5		
19	5	2351300	
19	5	2351100	
19	5	2350900	
19	7	2350700	
19	7	2350500	
19	7	2350300	
19	7	2350100	

BSB

DIMENSIONS			CODES			
SIZE – TPI	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
1/4 * – 26	20	7				
5/16 – 26	25	9	2370100			
3/8 – 26	30	11	2370200			
7/16 – 26	30	11	2370300			
1/2 – 26	38	10	2370400			
5/8 – 26	45	14	2370600			
3/4 – 26	45	14	2370700			

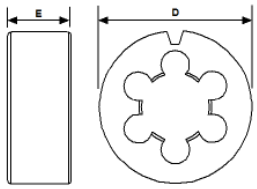
DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
19	7	2370000	
22	9		
27	11		
27	11		
36	10	2370500	
41	14		
41	14		

* Use 1/4" – 26 BSF

BSP To DIN ISO 228 G

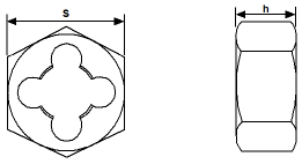
DIN EN 24231 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODES			
SIZE TPI	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
G 1/8 – 28	30	11	2400000			
G 1/4 – 19	38	10	2400300			2400500
G 3/8 – 19	45	14	2400600			2400800
G 1/2 – 14	45	14	2400900			2400950
G 5/8 – 14	55	16	2401200			2401400
G 3/4 – 14	55	16	2401500			
G 7/8 – 14	65	18	2401750			
G1" – 11	65	18	2401900			2402100
G1 1/4 – 11	75	20	2402200			
G1 1/2 – 11	90	22	2402350			
G1 3/4 – 11	90	22	2402450			
G2" – 11	105	22	2402550			

HEX DIES

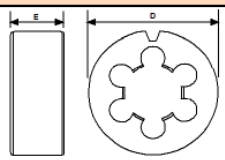


DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
27	11	2400100	2400200
36	10	2400400	
41	14	2400700	
41	14	2401000	
50	16	2401300	
50	16	2401600	2401700
60	18	2401800	
60	18	2402000	
70	20	2402300	
85	22	2402400	
100	22	2402500	
100	22	2402600	

BSPT (1 : 16 TAPER) To DIN 2999 & 3858, ISO 7/1 RC

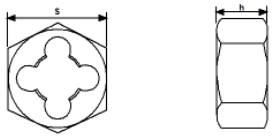
DIN EN 24230 CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODES			
SIZE TPI	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
1/8 – 28	30	11	2420000			
1/4 – 19	38	14	2420200			
3/8 – 19	45	14	2420400			
1/2 – 14	45	18	2420600			
3/4 – 14	55	22	2420800			
1" – 11	65	25	2421000			

HEX DIES

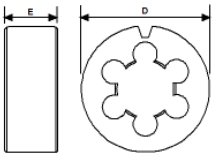


DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
27	11	2420100	
36	14	2420300	
41	14	2420500	
41	18	2420700	
60	18	2420900	
60	25	2421100	

NATIONAL PIPE TAPER To ANSI B1.20.1 NPT

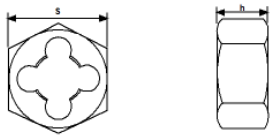
NPT (1 : 16 TAPER) CIRCULAR & HEX DIES

CIRCULAR DIES



DIMENSIONS			CODES			
SIZE TPI	Die Stock (Din225) = D mm	E mm	HSS Std.	HSS Split	HSS Spiral Entry	HSS Std L/H
1/16 – 27	25	9	2439950			
1/8 – 27	30	11	2440000			
1/4 – 18	38	14	2440200			
3/8 – 18	45	14	2440400			
1/2 – 14	45	18	2440600			
3/4 – 14	55	22	2440800			
1" – 11 1/2	65	25	2441000			
1.1/4 – 11 1/2	75	26	2441150			
1 1/2 – 11 1/2	90	27	2441190			
2" – 11 1/2	105	28	2441250			

HEX DIES



DIMENSIONS		CODES	
S mm	h mm	HSS Hex Std.	HSS Hex L/H
27	11		
27	11	2440100	
36	14	2440300	
41	14	2440500	
41	18	2440700	
60	18	2440900	
60	25	2441100	
70	30	2441160	
85	27	2441200	
100	28	2441260	

DIE STOCKS & TAP WRENCHES

DIN 225

DIE STOCKS

HEAVY DUTY STEEL BODY

D x h		Code
16	5	2600000
20	5	2600100
20	7	2600200
25	9	2600300
30	11	2600400
38	10	2600500
38	14	2600600
45	14	2600700
45	18	2600800

D x h		Code
55	16	2600900
55	22	2601000
65	18	2601100
65	25	2601200
75	20	2601300
75	30	2601400
90	22	2601500
90	36	2601600

TAP WRENCHES

ADJUSTABLE HEAVY DUTY FORGED STEEL
To DIN 1814

Size	Capacity		Heavy Duty
	ISO 529	DIN 352	Code
0	M1 - M7	M1 - M8	2700800
1	M1 - M8	M1 - M10	2701000
$1^1/_2$	M2 - M12	M2 - M12	2701100
2	M4 - M12	M4 - M12	2701200
3	M6 - M20	M5 - M18	2701400

Size	Capacity		Heavy Duty
	ISO 529	DIN 352	Code
4	M11 - M27	M11 - M27	2701600
5	M13 - M30	M13 - M32	2701800
6	M18 - M42	M18 - M42	2702000
7	M25 - M52	M25 - M52	2702200
8	M25 - M64	M25 - M64	2702400

RATCHET TYPE WRENCHES

Number	Length mm	Capacity ISO 529	Code
1	85	M2 - M6	2750050
2	100	M6 - M12	2750100

Number	Length mm	Capacity ISO 529	Code
10	250	M2 - M6	2750400
20	300	M6 - M12	2750500

ER COLLETS

DIN6499B HRC 44 - 48

SIZE	ER 16 CODE	ER 20 CODE	ER 25 CODE	ER 32 CODE	ER 40 CODE
1.5 - 1	2991601	2992001	2992501	2993201	
2 - 1.5	2991602	2992002	2992502	2993202	
3 - 2	2991603	2992003	2992503	2993203	2994003
4 - 3	2991604	2992004	2992504	2993204	2994004
5 - 4	2991605	2992005	2992505	2993205	2994005
6 - 5	2991606	2992006	2992506	2993206	2994006
7 - 6	2991607	2992007	2992507	2993207	2994007
8 - 7	2991608	2992008	2992508	2993208	2994008
9 - 8	2991609	2992009	2992509	2993209	2994009
10 - 9	2991610	2992010	2992510	2993210	2994010
11 - 10		2992011	2992511	2993211	2994011
12 - 11		2992012	2992512	2993212	2994012
13 - 12		2992013	2992513	2993213	2994013
14 - 13			2992514	2993214	2994014
15 - 14			2992515	2993215	2994015
16 - 15			2992516	2993216	2994016
17 - 16				2993217	2994017
18 - 17				2993218	2994018
19 - 18				2993219	2994019
20 - 19				2993220	2994020
21 - 20					2994021
22 - 21					2994022
23 - 22					2994023
24 - 23					2994024
25 - 24					2994025
26 - 25					2994026
27 - 26					2994027
28 - 27					2994028
29 - 28					2994029
30 - 29					2994030

COLLET KITS IN WOODEN DISPLAY		
DESCRIPTION		CODE
ER 16	1 - 10	2991615
ER 20	2 - 13	2992015
ER 25	2 - 16	2992520
ER 32	3 - 20	2993225
ER 40	4 - 26	2994035

THREAD FILES / GAUGES

Thread Restorer

TYPE	PITCHES AVAILABLE	Code
METRIC #8	0,8/ 1 / 1,25 / 1,5 / 1,75 / 2 / 2,5 / 3 mm	**2755130**
IMPERIAL #1	11 / 12 / 13 / 14 / 16 / 18 / 20 / 24 TPI	**2755110**
IMPERIAL #2	9 / 10 / 12 / 16 / 20 / 27 / 28 / 32 TPI	**2755120**
PIPE #4	8 / 11 / 12 / 14 / 18 TPI	**2755140**

Restores damaged threads in a jiffy. Any diameters ... Right or left hand.

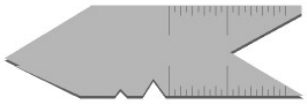
Screw Pitch Gauge Metric / Imperial, 54 Blades

Special FEW combination (with 2 extra blades / 11,5 and 27 tpi), for the widest range of Metric and Imperial threads.

Code
2756000

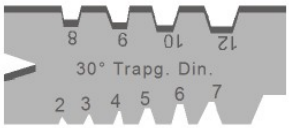
Turning & Thread Gauge 55° and 60°

Code 60°	Code 55°
2755700	2755600



Trapezoidal Thread Gauge

2-12mm Pitch with 30° Flank Angle



Code
2755500

Combined Screw Cutting Gauges

For Square, Trapezoidal, 60° + 55° Threads

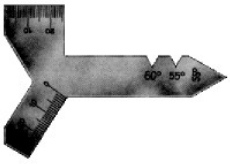
Code
2755800

For 60° (Metric, American), 55° (Whit), 14 1/2 (ACME half angle)

Code
2756500

Universal Grinding Gauge

Combined drill point gauge, centre gauge, 55° + 60°, hexagon and right angle



Code
2756520

HACKSAW & POWERSAW BLADES

HSS & BI-METAL

HSS ALL HARD BLADES

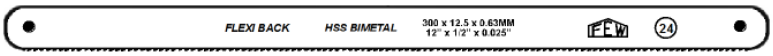
HAND HACKSAW BLADES

CODE	SIZE MM	SIZE INCHES	TEETH PER INCH (TPI)
BHA0010	300 X 12.5 X 0.63	12 X 1/2 X 23 G	14
BHA0020	300 X 12.5 X 0.63	12 X 1/2 X 23 G	18
BHA0030	300 X 12.5 X 0.63	12 X 1/2 X 23 G	24
BHA0040	300 X 12.5 X 0.63	12 X 1/2 X 23 G	32

POWER HACKSAW BLADES

CODE	SIZE MM	SIZE INCHES	TEETH PER INCH (TPI)
BPA0010	300 X 25 X 1.25	12 X 1 X 18 G	10
BPA0020	350 X 25 X 1.25	14 X 1 X 18 G	10
BPA0030	350 X 32 X 1.60	14 X 1.1/4 X 16 G	6
BPA0040	350 X 32 X 1.60	14 X 1.1/4 X 16 G	10
BPA0050	400 X 32 X 1.60	16 X 1.1/4 X 16 G	6
BPA0060	450 X 40 X 2.00	18 X 1.1/2 X 14 G	6
BPA0070	525 X 40 X 2.00	21 X 1.1/2 X 14 G	6
BPA0080	600 X 40 X 2.00	24 X 1.1/2 X 14 G	6
BPA0090	600 X 50 X 2.50	24 X 2 X 12 G	6

HSS BI-METAL BLADES



HAND HACKSAW BLADES

CODE	SIZE MM	SIZE INCHES	TEETH PER INCH (TPI)
BHB0010	300 X 12.5 X 0.63	12 X 1/2 X 23 G	14
BHB0020	300 X 12.5 X 0.63	12 X 1/2 X 23 G	18
BHB0030	300 X 12.5 X 0.63	12 X 1/2 X 23 G	24
BHB0040	300 X 12.5 X 0.63	12 X 1/2 X 23 G	32

POWER HACKSAW BLADES

CODE	SIZE MM	SIZE INCHES	TEETH PER INCH (TPI)
BPB0010	300 X 25 X 1.25	12 X 1 X 18 G	10
BPB0020	350 X 25 X 1.25	14 X 1 X 18 G	10
BPB0030	350 X 32 X 1.60	14 X 1.1/4 X 16 G	6
BPB0040	350 X 32 X 1.60	14 X 1.1/4 X 16 G	10
BPB0050	400 X 32 X 1.60	16 X 1.1/4 X 16 G	6
BPB0060	400 X 32 X 1.60	16 X 1.1/4 X 16 G	10
BPB0070	450 X 40 X 2.00	18 X 1.1/2 X 14 G	6
BPB0080	450 X 40 X 2.00	18 X 1.1/2 X 14 G	10
BPB0090	525 X 40 X 2.00	21 X 1.1/2 X 14 G	6
BPB0100	525 X 40 X 2.00	21 X 1.1/2 X 14 G	10
BPB0110	600 X 40 X 2.00	24 X 1.1/2 X 14 G	6
BPB0120	600 X 50 X 2.50	24 X 2 X 12 G	6

BANDSAW BLADES AVAILABLE AGAINST SPECIAL REQUEST

FEW CUTTING COMPOUND

Properties and Application

The high active sulphur and chlorine are unique in this compound and account for its wide acceptance and universal use as a heavy duty tapping compound, covering all types of material, eg. stainless steel, low carbon steel and monel metal. The balanced formulation of sulfo-chlorinated mineral oil, and sulfo-chlorinated fatty oil ensure longer tap life and eliminates tap seizure during operation.

Characteristic

Viscosity at 210F S.U.S. – 125 – 160

Sulphur % Weight – 5,1

Chlorine % Weight – 4,7

Capacity	CODE
500ml	3600000
2 litre	3601000

AEROSOL CUTTING OIL

- Aerosol cutting compound is economical, clean – no waste.
- Reduces tool wear, improves tap life.
- Clings at any angle.
- Suitable for ferrous and non ferrous materials.

Capacity	CODE
300 ml	3602500

Note: These items are available only when permitted by regulations concerning the transportation of hazardous materials.

FEW GREENLUBE CUTTING FLUID

FEW has introduced a non-dangerous, non-hazardous, biodegradable specialty tapping, drilling and reaming fluid. It has the required viscosity to enable the fluid to cling to the tool and parts. It provides outstanding lubricity as well as cooling, wear protection and friction reduction. Greenlube is used neat.

Advantages:

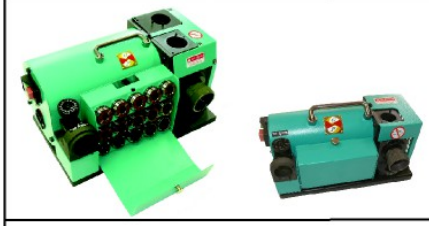
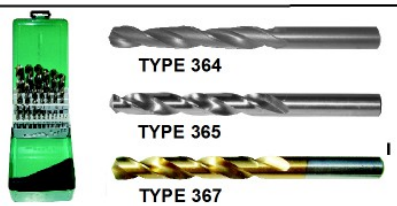
- For all steels and non-ferrous metals.
- Free of chlorine, sulphur and oil.
- Optimum lubricity and cooling function.
- Does not release harmful smoke during machining.
- Very mild odour.
- Rust and corrosion protection.
- Non staining on aluminium.

Capacity	CODE
500ml	3603005
2 litre	3603025
20 litre	3603200

DRILL RANGE INFORMATION

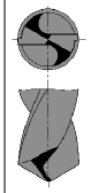
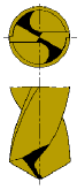
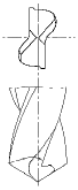
 TYPE 277 DIN 338	**HSS BF JOBBER.** An Industrial quality Bright Finish ground flute drill for general purpose applications.	F3 - F5
 TYPE 278 DIN 338	**HSS ST JOBBER.** Industrial quality Steam Tempered ground flute drill for drilling in steel where cold welding is a problem. (Milled Flutes over 13mm)	F3 - F5
 TYPE 287 DIN 338	**HEAVY DUTY COBALT JOBBER.** HSS-Co drill with ground flutes, 135° split point and Gold Oxide finish for heavy duty applications in tough materials.	F3 - F5
 TYPE 297 DIN 338	**PARABOLIC JOBBER.** Bright Finish HSS-Co drill withparabolic ground flutes and a 130° Split Point for high production and precision applications.	F3 - F5
 TYPE 285 DIN 340	**LONG SERIES DRILL.** Bright Finish HSS ground flute drill for general purpose long reach applications.	F6
 TYPE 298 DIN 340	**PARABOLIC LONG SERIES.** A Bright Finish HSS-Co LS drill with parabolic ground flutes and 130° Split Point for high production and precision long reach applications.	F6
 TYPE 375 / 376 / 377 / 378 / 379 FEW NORM	**EXTRA LONG SERIES DRILL.** Bright Finish HSS ground flute drill for general purpose long reach applications.	F6
 TYPE 282 DIN 1897	**BF STUB.** A shorter rigid HSS drill with Bright Finish ground flutes for general purpose applications.	F7 - F8
 TYPE 296 DIN 1897	**PARABOLIC STUB.** A shorter rigid HSS-Co drill with Bright Finish parabolic ground flutes and 130° Split Point for high production and precision applications.	F7 - F8
 TYPE 283 FEW NORM	**SINGLE ENDED SHEET METAL.** HSS single ended drill with 135° Split Point for sheet metal applications.	F8
 TYPE 283 FEW NORM	**DOUBLE ENDED SHEET METAL.** HSS double ended drill with 135° Split Point for sheet metal applications.	F8
 TYPE 295 FEW NORM	**REDUCED SHANK DRILLS.** For use in chucks with limited extensions of 10 mm (11 - 15,5 mm) and 12.7 mm (16 - 25 mm).	F9
 TYPE 291 / 292 DIN 333 / BS 328	**CENTRE DRILLS - TYPE A HSS.** 60° Centre drills for general purpose applications (Metric and Imperial).	F9
 TYPE 293 DIN 333	**CENTRE DRILLS - TYPE B HSS.** The double angle countersink produces a 60° protected centre.	F9
 TYPE 294 DIN 333	**CENTRE DRILLS - TYPE R HSS.** The radius on the countersink produces a protected centre to accomodate a variety of male centre angles.	F9

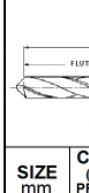
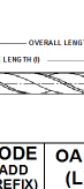
DRILL RANGE INFORMATION

 TYPE 289 / 290 DIN 1897	**NC SPOTTING DRILLS HSS - Co.** Available in 90° and 120° point angles. For accurate positioning of holes.	F10
 TYPE 280 DIN 345	**MTS DRILLS HSS.** Industrial quality Steam Tempered drill for general purpose applications.	F11 - F12
 TYPE 281 FEW NORM	**EXTRA LENGTH MTS DRILLS HSS.** Industrial quality Steam Tempered drill for general purpose applications.	F12
	**DRILL SETS IN METAL CASES.** Various combinations and types available.	F13
	**DRILL RE-SHARPENING MACHINES** 2mm - 13mm (90° ~ 140°) **YD-213** 12mm - 34mm (90° ~ 140°) **YD-1234** Complete with metal collets and CBN & SDS grinding wheels	F13
 TYPE 390 TYPE 391	**CORE DRILLS (ANNULAR CUTTERS)** 18mm - 60mm in two cutting lengths (25 & 50mm). For drilling steel, cast iron, stainless steel and non ferrous metals.	F14
 TYPE 271 DS DIN 345	**MT REDUCTION SLEEVES.** To reduce machine morse taper size to suit drill.	F15
 TYPE 271 ES DIN 345	**MT EXTENSION SOCKETS.** To extend spindle length, for a variety of MTS size combinations.	F15
 TYPE 271 DD DIN 345	**DRILL DRIFTS.** For use in MTS sleeves and extension sockets from MT1 - MT6.	F15
 TYPE 348	**COUNTERBORES.** To counterbore holes to accommodate standard cap screw heads.	F15
 FL SF 3F	**COUNTERSINKS.** Available in 90° Hollow Type (FL), Single Flute (SF) and Three Flute (3F) to suit countersunk head machine screws.	F16
 TYPE 364 TYPE 365 TYPE 367	**LLT JOBBER DRILLS.** M2 HSS jobber drills available in ST roll forged flute, BF ground flute and TIN coated ground flute split point versions.	F17

JOBBER DRILLS — HSS / HSS-Co

DIN 338 — GROUND FLUTE

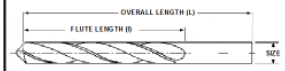
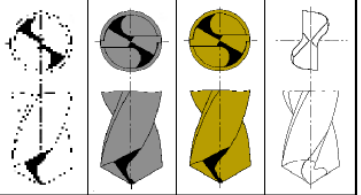
DIMENSIONS				CODES			
DESCRIPTION				BF JOBBER	ST JOBBER	HEAVY DUTY JOBBER	PARA-BOLIC JOBBER
TYPE (PREFIX)				277	278	287	297
SURFACE TREATMENT				BF	ST	GOLD	BF
SPECIFICATION				DIN 338	DIN 338	DIN 338	DIN 338
POINT				118° SPL PT	118° SPL PT	135° SPL PT	130° SPL PT
MATERIAL				HSS	HSS	HSS-Co	HSS-Co
							
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)				
0.25	0025	19	3	2770025			
0.30	0030	19	3	2770030			
0.35	0035	19	4	2770035			
0.40	0040	20	5	2770040			
0.45	0045	20	5	2770045			
0.50	0050	22	6	2770050			
0.55	0055	24	7	2770055			
0.60	0060	24	7	2770060			
0.65	0065	26	8	2770065			
0.70	0070	28	9	2770070			
0.75	0075	28	9	2770075			
0.80	0080	30	10	2770080			
0.85	0085	30	10	2770085			
0.90	0090	32	11	2770090			
0.95	0095	32	11	2770095			
1	0100	34	12	2770100	2780100	2870100	2970100
1.1	0110	36	14	2770110	2780110		
1.2	0120	38	16	2770120	2780120	2870120	
1.25	0125	38	16	2770125	2780125		
1.3	0130	38	16	2770130	2780130		
1.4	0140	40	18	2770140	2780140		
1.45	0145	40	18	2770145	2780145		
1.5	0150	40	18	2770150	2780150	2870150	2970150
1.6	0160	43	20	2770160	2780160	2870160	2970160
1.7	0170	43	20	2770170	2780170		
1.75	0175	46	22	2770175	2780175		
1.8	0180	46	22	2770180	2780180	2870180	2870180
1.9	0190	46	22	2770190	2780190		
2	0200	49	24	2770200	2780200	2870200	2970200
2.05	0205	49	24	2770205	2780205		
2.1	0210	49	24	2770210	2780210		
2.15	0215	53	27	2770215	2780215		
2.2	0220	53	27	2770220	2780220	2870220	

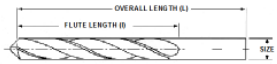
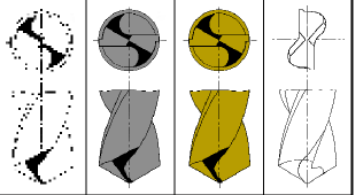
DIMENSIONS				CODES			
DESCRIPTION				BF JOBBER	ST JOBBER	HEAVY DUTY JOBBER	PARA-BOLIC JOBBER
TYPE (PREFIX)				277	278	287	297
SURFACE TREATMENT				BF	ST	GOLD	BF
SPECIFICATION				DIN 338	DIN 338	DIN 338	DIN 338
POINT				118° SPL PT	118° SPL PT	135° SPL PT	130° SPL PT
MATERIAL				HSS	HSS	HSS-Co	HSS-Co
							
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)				
2.3	0230	53	27	2770230	2780230		
2.4	0240	57	30	2770240	2780240		
2.5	0250	57	30	2770250	2780250	2870250	2970250
2.6	0260	57	30	2770260	2780260		
2.65	0265	57	30	2770265	2780265		
2.7	0270	61	33	2770270	2780270		
2.8	0280	61	33	2770280	2780280	2870280	
2.9	0290	61	33	2770290	2780290		
3	0300	61	33	2770300	2780300	2870300	2970300
3.1	0310	65	36	2770310	2780310		
3.2	0320	65	36	2770320	2780320	2870320	2970320
3.3	0330	65	36	2770330	2780330	2870330	2970330
3.4	0340	70	39	2770340	2780340		2970340
3.5	0350	70	39	2770350	2780350	2870350	2970350
3.6	0360	70	39	2770360	2780360		
3.7	0370	70	39	2770370	2780370	2870370	
3.75	0375	70	39	2770375	2780375		
3.8	0380	75	43	2770380	2780380	2870380	
3.9	0390	75	43	2770390	2780390		
4	0400	75	43	2770400	2780400	2870400	2970400
4.1	0410	75	43	2770410	2780410	2870410	
4.2	0420	75	43	2770420	2780420	2870420	2970420
4.3	0430	80	47	2770430	2780430		
4.4	0440	80	47	2770440	2780440		
4.5	0450	80	47	2770450	2780450	2870450	2970450
4.6	0460	80	47	2770460	2780460		
4.7	0470	80	47	2770470	2780470		
4.8	0480	86	52	2770480	2780480	2870480	2970480
4.9	0490	86	52	2770490	2780490	2870490	
5	0500	86	52	2770500	2780500	2870500	2970500
5.1	0510	86	52	2770510	2780510		
5.2	0520	86	52	2770520	2780520	2870520	2970520
5.25	0525	86	52	2770525	2780525		

NOTE: Should the HSS surface treatment not be specified **BF** drills will be supplied as standard. (0.25mm to 14mm)
Size 0.25 to 7.9 sold 10 drills per pack; Size 8 to 13 sold 5 drills per pack; Size 13.5 to 20 (Milled Flutes) sold as singles.
Drill Points: 0.25mm to 1.9mm Std Point; 2mm to 14mm Split Point; 14.25mm to 20mm Web Thinning

JOBBER DRILLS — HSS / HSS-Co

DIN 338 — GROUND FLUTE

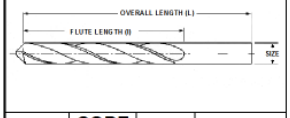
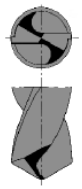
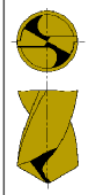
DIMENSIONS				CODES			
DESCRIPTION				BF JOBBER	ST JOBBER	HEAVY DUTY JOBBER	PARA-BOLIC JOBBER
TYPE (PREFIX)				277	278	287	297
SURFACE TREATMENT				BF	ST	GOLD	BF
SPECIFICATION				DIN 338	DIN 338	DIN 338	DIN 338
POINT				118° SPL PT	118° SPL PT	135° SPL PT	130° SPL PT
MATERIAL				HSS	HSS	HSS-Co	HSS-Co
							
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)				
5.3	0530	86	52	2770530	2780530		
5.4	0540	93	57	2770540	2780540		
5.5	0550	93	57	2770550	2780550	2870550	2970550
5.6	0560	93	57	2770560	2780560		2970560
5.7	0570	93	57	2770570	2780570		
5.8	0580	93	57	2770580	2780580	2870580	
5.9	0590	93	57	2770590	2780590		
6	0600	93	57	2770600	2780600	2870600	2970600
6.1	0610	101	63	2770610	2780610		
6.2	0620	101	63	2770620	2780620	2870620	
6.25	0625	101	63	2770625	2780625		
6.3	0630	101	63	2770630	2780630		
6.4	0640	101	63	2770640	2780640		
6.5	0650	101	63	2770650	2780650	2870650	2970650
6.6	0660	101	63	2770660	2780660		
6.7	0670	101	63	2770670	2780670	2870670	
6.75	0675	109	69	2770675	2780675		
6.8	0680	109	69	2770680	2780680	2870680	2970680
6.9	0690	109	69	2770690	2780690		
7	0700	109	69	2770700	2780700	2870700	2970700
7.1	0710	109	69	2770710	2780710		
7.2	0720	109	69	2770720	2780720	2870720	
7.25	0725	109	69	2770725	2780725		
7.3	0730	109	69	2770730	2780730	2870730	
7.4	0740	109	69	2770740	2780740		
7.5	0750	109	69	2770750	2780750	2870750	2970750
7.6	0760	117	75	2770760	2780760		
7.7	0770	117	75	2770770	2780770		
7.75	0775	117	75	2770775	2780775		
7.8	0780	117	75	2770780	2780780	2870780	
7.9	0790	117	75	2770790	2780790		
8	0800	117	75	2770800	2780800	2870800	2970800
8.1	0810	117	75	2770810	2780810		

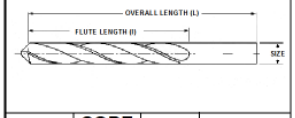
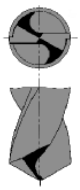
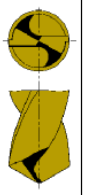
DIMENSIONS				CODES			
DESCRIPTION				BF JOBBER	ST JOBBER	HEAVY DUTY JOBBER	PARA-BOLIC JOBBER
TYPE (PREFIX)				277	278	287	297
SURFACE TREATMENT				BF	ST	GOLD	BF
SPECIFICATION				DIN 338	DIN 338	DIN 338	DIN 338
POINT				118° SPL PT	118° SPL PT	135° SPL PT	130° SPL PT
MATERIAL				HSS	HSS	HSS-Co	HSS-Co
							
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)				
8.2	0820	117	75	2770820	2780820	2870820	
8.25	0825	117	75	2770825	2780825		
8.3	0830	117	75	2770830	2780830		
8.4	0840	117	75	2770840	2780840		
8.5	0850	117	75	2770850	2780850	2870850	2970850
8.6	0860	125	81	2770860	2780860		
8.7	0870	125	81	2770870	2780870		2970870
8.75	0875	125	81	2770875	2780875		
8.8	0880	125	81	2770880	2780880	2870880	2970880
8.9	0890	125	81	2770890	2780890		
9	0900	125	81	2770900	2780900	2870900	2970900
9.1	0910	125	81	2770910	2780910		
9.2	0920	125	81	2770920	2780920	2870920	
9.25	0925	125	81	2770925	2780925		
9.3	0930	125	81	2770930	2780930		
9.4	0940	125	81	2770940	2780940		
9.5	0950	125	81	2770950	2780950	2870950	2970950
9.6	0960	133	87	2770960	2780960		
9.7	0970	133	87	2770970	2780970		
9.8	0980	133	87	2770980	2780980	2870980	
9.9	0990	133	87	2770990	2780990		
10	1000	133	87	2771000	2781000	2871000	2971000
10.1	1010	133	87	2771010	2781010		
10.2	1020	133	87	2771020	2781020	2871020	2971020
10.25	1025	133	87	2771025	2781025		
10.3	1030	133	87	2771030	2781030		
10.4	1040	133	87	2771040	2781040		
10.5	1050	133	87	2771050	2781050	2871050	2971050
10.6	1060	133	87	2771060	2781060		
10.7	1070	142	94	2771070	2781070		
10.75	1075	142	94	2771075	2781075		
10.8	1080	142	94	2771080	2781080	2871080	
10.9	1090	142	94	2771090	2781090		

NOTE: Should the HSS surface treatment not be specified **BF** drills will be supplied as standard. (0.25mm to 14mm)
Size 0.25 to 7.9 sold 10 drills per pack; Size 8 to 13 sold 5 drills per pack; Size 13.5 to 20 (Milled Flutes) sold as singles.
Drill Points: 0.25mm to 1.9mm Std Point; 2mm to 14mm Split Point; 14.25mm to 20mm Web Thinning

JOBBER DRILLS — HSS / HSS-Co

DIN 338 — GROUND FLUTE

DIMENSIONS				CODES			
DESCRIPTION				BF JOBBER	ST JOBBER	HEAVY DUTY JOBBER	PARA-BOLIC JOBBER
TYPE (PREFIX)				277	278	287	297
SURFACE TREATMENT				BF	ST	GOLD	BF
SPECIFICATION				DIN 338 118° SPL PT	DIN 338 118° SPL PT	DIN 338 135° SPL PT	DIN 338 130° SPL PT
POINT MATERIAL				HSS	HSS	HSS-Co	HSS-Co
							
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)				
11	1100	142	94	2771100	2781100	2871100	2971100
11.1	1110	142	94	2771110	2781110		
11.2	1120	142	94	2771120	2781120	2871120	
11.3	1130	142	94	2771130	2781130		
11.4	1140	142	94	2771140	2781140		
11.5	1150	142	94	2771150	2781150	2871150	2971150
11.6	1160	142	94	2771160	2781160		
11.7	1170	142	94	2771170	2781170		
11.8	1180	142	94	2771180	2781180	2871180	
11.9	1190	151	101	2771190	2781190		
12	1200	151	101	2771200	2781200	2871200	2971200
12.1	1210	151	101	2771210	2781210		
12.2	1220	151	101	2771220	2781220	2871220	
12.3	1230	151	101	2771230	2781230		
12.4	1240	151	101	2771240	2781240		
12.5	1250	151	101	2771250	2781250	2871250	2971250
12.6	1260	151	101	2771260	2781260		
12.7	1270	151	101	2771270	2781270	2871270	
12.75	1275	151	101	2771275	2781275		
12.8	1280	151	101	2771280	2781280		
12.9	1290	151	101	2771290	2781290		
13	1300	151	101	2771300	2781300	2871300	2971300
13.25	1325	160	108	2771325	2781325		
13.5	1350	160	108	2771350	2781350		
13.6	1360	160	108	2771360	2781360		
13.7	1370	160	108	2771370	2781370		
13.75	1375	160	108	2771375	2781375		
14	1400	160	108	2771400	2781400		

DIMENSIONS				CODES			
DESCRIPTION				BF JOBBER	ST JOBBER	HEAVY DUTY JOBBER	PARA-BOLIC JOBBER
TYPE (PREFIX)				277	278	287	297
SURFACE TREATMENT				BF	ST	GOLD	BF
SPECIFICATION				DIN 338 118° SPL PT	DIN 338 118° SPL PT	DIN 338 135° SPL PT	DIN 338 130° SPL PT
POINT MATERIAL				HSS	HSS	HSS-Co	HSS-Co
							
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)				
14.25	1425	169	114		2781425		
14.5	1450	169	114		2781450		
14.7	1470	169	114		2781470		
14.75	1475	169	114		2781475		
15	1500	169	114		2781500		
15.25	1525	178	120		2781525		
15.5	1550	178	120		2781550		
15.75	1575	178	120		2781575		
16	1600	178	120		2781600		
16.25	1625	184	125		2781625		
16.5	1650	184	125		2781650		
16.6	1660	184	125		2781660		
16.65	1665	184	125		2781665		
16.75	1675	184	125		2781675		
17	1700	184	125		2781700		
17.25	1725	191	130		2781725		
17.5	1750	191	130		2781750		
17.75	1775	191	130		2781775		
18	1800	191	130		2781800		
18.25	1825	198	135		2781825		
18.5	1850	198	135		2781850		
18.75	1875	198	135		2781875		
19	1900	198	135		2781900		
19.25	1925	205	140		2781925		
19.5	1950	205	140		2781950		
19.75	1975	205	140		2781975		
20	2000	205	140		2782000		

NOTE: Should the HSS surface treatment not be specified **BF** drills will be supplied as standard. (0.25mm to 14mm)
Size 0.25 to 7.9 sold 10 drills per pack; Size 8 to 13 sold 5 drills per pack; Size 13.5 to 20 (Milled Flutes) sold as singles.
Drill Points: 0.25mm to 1.9mm Std Point; 2mm to 14mm Split Point; 14.25mm to 20mm Web Thinning

LONG & XL SERIES DRILLS HSS / HSS-Co

DIN 340 GROUND FLUTE

DIMENSIONS				CODES	
DESCRIPTION				BF LONG SERIES	PARABOLIC (UDL) LONG SERIES
TYPE (PREFIX)				285	298
SURFACE TREATMENT				BF	BF
SPECIFICATION				DIN 340	DIN 340
POINT				118°	130°
MATERIAL				HSS	SPL PT HSS - Co
SIZE mm	CODE (ADD PREFIX)	Overall Length (L)	Flute Length (l)		
1	0100	56	33	2850100	2980100
1.5	0150	70	45	2850150	2980150
1.6	0160	76	50	2850160	2980160
2	0200	85	56	2850200	2980200
2.5	0250	95	62	2850250	2980250
3	0300	100	66	2850300	2980300
3.3	0330	106	69	2850330	2980330
3.5	0350	112	73	2850350	2980350
4	0400	119	78	2850400	2980400
4.2	0420	119	78	2850420	2980420
4.5	0450	126	82	2850450	2980450
4.8	0480	132	87	2850480	2980480
5	0500	132	87	2850500	2980500
5.5	0550	139	91	2850550	2980550
6	0600	139	91	2850600	2980600
6.5	0650	148	97	2850650	2980650
6.8	0680	156	102	2850680	2980680
7	0700	156	102	2850700	2980700
7.5	0750	156	102	2850750	2980750
8	0800	165	109	2850800	2980800
8.5	0850	165	109	2850850	2980850
9	0900	175	115	2850900	2980900
9.5	0950	175	115	2850950	2980950
10	1000	184	121	2851000	2981000
10.2	1020	184	121	2851020	2981020
10.5	1050	184	121	2851050	2981050
10.8	1080	195	128	2851080	
11	1100	195	128	2851100	2981100
11.5	1150	195	128	2851150	2981150
12	1200	205	134	2851200	2981200
12.5	1250	205	134	2851250	2981250
13	1300	205	134	2851300	2981300
14	1400	214	140	2851400	
15	1500	220	144	2851500	
16	1600	227	149	2851600	

EXTRA LENGTH MICRO DRILLS

DESCRIPTION	EXTRA LENGTH SERIES	CODE	SIZE mm	Overall Length (L)	Flute Length (l)
TYPE (PREFIX)	374				
SURFACE TREATMENT	BF				
SPECIFICATION	FEW				
POINT	118°				
MATERIAL	HSS				
		3740060	0.6	60	40
		3740101	1	125	80
		3740151	1.5	125	80
		3740153	1.5	160	100
		3740201	2	125	80
		3740203	2	160	100
		3740251	2.5	125	80
		3740253	2.5	160	100

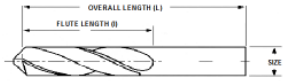
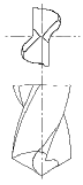
EXTRA LENGTH SERIES

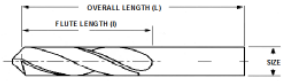
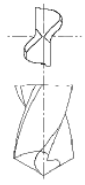
DESCRIPTION	EXTRA LENGTH SERIES	EXTRA LENGTH SERIES	EXTRA LENGTH SERIES	EXTRA LENGTH SERIES	EXTRA LENGTH SERIES	EXTRA LENGTH SERIES
TYPE (PREFIX)	375	376	377	378	379	380
SURFACE TREATMENT	BF	BF	BF	BF	BF	BF
SPECIFICATION	160(L)x 110(F)	200(L)x 150(F)	250(L)x 200(F)	300(L)x 250(F)	350(L)x 300(F)	400(L)x 350(F)
POINT	118°	118°	118°	118°	118°	118°
MATERIAL	HSS	HSS	HSS	HSS	HSS	HSS

SIZE mm	CODE (ADD PREFIX)	160 (L) x 110 (FL)	200 (L) x 150 (FL)	250 (L) x 200 (FL)	300 (L) x 250 (FL)	350 (L) x 300 (FL)	400 (L) x 300 (FL)
3	0300	3750300	3760300				
3.5	0350	3750350	3760350	3770350			
4	0400	3750400	3760400	3770400			
4.5	0450	3750450	3760450	3770450			
5	0500	3750500	3760500	3770500	3780500	3790500	3800500
5.5	0550	3750550	3760550	3770550			
6	0600	3750600	3760600	3770600	3780600	3790600	3800600
6.5	0650		3760650	3770650			
7	0700		3760700	3770700	3780700	3790700	3800700
7.5	0750		3760750	3770750			
8	0800		3760800	3770800	3780800	3790800	3800800
8.5	0850		3760850	3770850			
9	0900		3760900	3770900	3780900	3790900	3800900
9.5	0950		3760950	3770950			
10	1000		3761000	3771000	3781000	3791000	3801000
10.5	1050			3771050			
11	1100			3771100	3781100	3791100	3801100
11.5	1150			3771150			
12	1200			3771200	3781200	3791200	3801200
12.5	1250			3771250			
13	1300			3771300	3781300	3791300	3801300

SINGLE ENDED STUB DRILLS HSS / HSS - Co

DIN 1897 STD GROUND / PARABOLIC FLUTE

DIMENSIONS				CODES	
DESCRIPTION				BF STUB DRILL	PARABOLIC (UDL) STUB DRILL
TYPE (PREFIX)				282	296
SURFACE TREATMENT				BF	BF
SPECIFICATION				DIN 1897	DIN 1897
POINT				118°	130° SPL PT
MATERIAL				HSS	HSS - Co
					
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)		
1	0100	26	6	2820100	2960100
1.5	0150	32	9	2820150	2960150
1.6	0160	34	10	2820160	2960160
1.8	0180	36	11	2820180	
2	0200	38	12	2820200	2960200
2.1	0210	38	12	2820210	
2.2	0220	40	13	2820220	
2.3	0230	40	13	2820230	
2.4	0240	43	14	2820240	
2.5	0250	43	14	2820250	2960250
2.6	0260	43	14	2820260	
2.7	0270	46	16	2820270	
2.8	0280	46	16	2820280	
2.9	0290	46	16	2820290	
3	0300	46	16	2820300	2960300
3.1	0310	49	18	2820310	
3.2	0320	49	18	2820320	
3.3	0330	49	18	2820330	2960330
3.4	0340	52	20	2820340	
3.5	0350	52	20	2820350	2960350
3.6	0360	52	20	2820360	
3.7	0370	52	20	2820370	
3.8	0380	55	22	2820380	
3.9	0390	55	22	2820390	
4	0400	55	22	2820400	2960400
4.1	0410	55	22	2820410	
4.2	0420	55	22	2820420	2960420
4.3	0430	58	24	2820430	
4.4	0440	58	24	2820440	2960440
4.5	0450	58	24	2820450	2960450
4.6	0460	58	24	2820460	
4.7	0470	58	24	2820470	
4.8	0480	62	26	2820480	2960480

DIMENSIONS				CODES	
DESCRIPTION				BF STUB DRILL	PARABOLIC (UDL) STUB DRILL
TYPE (PREFIX)				282	296
SURFACE TREATMENT				BF	BF
SPECIFICATION				DIN 1897	DIN 1897
POINT				118°	130° SPL PT
MATERIAL				HSS	HSS - Co
					
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)		
4.9	0490	62	26	2820490	
5	0500	62	26	2820500	2960500
5.1	0510	62	26	2820510	
5.2	0520	62	26	2820520	
5.3	0530	62	26	2820530	
5.4	0540	66	28	2820540	
5.5	0550	66	28	2820550	2960550
5.6	0560	66	28	2820560	
5.7	0570	66	28	2820570	
5.8	0580	66	28	2820580	
5.9	0590	66	28	2820590	
6	0600	66	28	2820600	2960600
6.1	0610	70	31	2820610	
6.2	0620	70	31	2820620	
6.3	0630	70	31	2820630	
6.4	0640	70	31	2820640	
6.5	0650	70	31	2820650	2960650
6.8	0680	74	34	2820680	2960680
7	0700	74	34	2820700	2960700
7.2	0720	74	34	2820720	
7.5	0750	74	34	2820750	2960750
7.8	0780	79	37	2820780	
8	0800	79	37	2820800	2960800
8.2	0820	79	37	2820820	
8.5	0850	79	37	2820850	2960850
8.8	0880	84	40	2820880	
9	0900	84	40	2820900	2960900
9.2	0920	84	40	2820920	
9.5	0950	84	40	2820950	2960950
9.8	0980	89	43	2820980	
10	1000	89	43	2821000	2961000
10.2	1020	89	43	2821020	2961020
10.5	1050	89	43	2821050	2961050

SINGLE ENDED STUB DRILLS HSS / HSS - Co

DIN 1897 STD GROUND / PARABOLIC FLUTE

DIMENSIONS				CODES	
DESCRIPTION				BF STUB DRILL	PARABOLIC (UDL) STUB DRILL
TYPE (PREFIX)				282	296
SURFACE TREATMENT				BF	BF
SPECIFICATION				DIN 1897	DIN 1897
POINT				118°	130° SPL PT
MATERIAL				HSS	HSS - Co
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)		
10.8	1080	95	47	2821080	
11	1100	95	47	2821100	2961100
11.2	1120	95	47	2821120	
11.5	1150	95	47	2821150	2961150
11.8	1180	95	47	2821180	
12	1200	102	51	2821200	2961200
12.2	1220	102	51	2821220	
12.5	1250	102	51	2821250	2961250
12.8	1280	102	51	2821280	
13	1300	102	51	2821300	2961300
13.2	1320	102	51	2821320	
13.5	1350	107	54	2821350	
13.8	1380	107	54	2821380	

DIMENSIONS				CODES	
DESCRIPTION				BF STUB DRILL	PARABOLIC (UDL) STUB DRILL
TYPE (PREFIX)				282	296
SURFACE TREATMENT				BF	BF
SPECIFICATION				DIN 1897	DIN 1897
POINT				118°	130° SPL PT
MATERIAL				HSS	HSS - Co
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)		
14	1400	107	54	2821400	
15	1500	111	56	2821500	
16	1600	115	58	2821600	
17	1700	119	60	2821700	
18	1800	123	62	2821800	
19	1900	127	64	2821900	
20	2000	131	66	2822000	
21	2100	136	68	2822100	
22	2200	141	70	2822200	
23	2300	146	72	2822300	
24	2400	151	75	2822400	
25	2500	151	75	2822500	

SHEET METAL DRILLS HSS

FEW SPEC 135° SPLIT POINT

SINGLE ENDED SHEET METAL DRILLS

SIZE	CODE	SIZE	CODE
3	2880300	4.2	2880420
3.2	2880320	4.8	2880480
3.3	2880330	4.9	2880490
3.5	2880350	5	2880500
4	2880400	6	2880600
4.1	2880410		

DOUBLE ENDED STUB DRILLS

SIZE	CODE	SIZE	CODE	SIZE	CODE
2.5	2830250	4.2	2830420	5.8	2830580
2.8	2830280	4.5	2830450	6	2830600
3	2830300	4.8	2830480	6.2	2830620
3.2	2830320	4.9	2830490	6.5	2830650
3.3	2830330	5	2830500	7	2830700
3.5	2830350	5.2	2830520	7.5	2830750
4	2830400	5.5	2830550	8	2830800
4.1	2830410				

CENTRE DRILLS HSS

DIN 333 / BS 328



CENTRE DRILLS TYPE A

60° METRIC TO DIN 333

PILOT SIZE MM	BODY SIZE MM	FEW CODE
* 0.7	3.15	2910070
* 0.8	3.15	2910080
1	3.15	2910100
1.25	3.15	2910125
1.6	4	2910160
2	5	2910200
2.5	6.3	2910250
3.15	8	2910315
4	10	2910400
5	12.5	2910500
6.3	16	2910630
8	20	2910800
10	25	2911000

60° SIZES TO BS 328

BS No.	PIL/BOD SIZE Ins	FEW CODE
BS1	($^3/_{64}$ x $^1/_8$)	2920119
BS2	($^1/_{16}$ x $^3/_{16}$)	2920159
BS3	($^3/_{32}$ x $^1/_4$)	2920238
BS4	($^1/_8$ x $^5/_{16}$)	2920318
BS5	($^3/_{16}$ x $^7/_{16}$)	2920476
BS6	($^1/_4$ x $^5/_8$)	2920635
BS7	($^5/_{16}$ x $^3/_4$)	2920794

* Single Ended Centre Drills

TYPE B

60° PROTECTED CENTRE DIN 333

PILOT SIZE MM	BODY SIZE MM	FEW CODE
1	4	2930100
1.25	5	2930125
1.6	6.3	2930160
2	8	2930200
2.5	10	2930250
3.15	11.2	2930315
4	14	2930400
5	18	2930500
6.3	20	2930630
8	25	2930800

TYPE R

RADIUSED CENTRE DIN 333

PILOT SIZE MM	BODY SIZE MM	FEW CODE
1	3.15	2940100
1.25	3.15	2940125
1.6	4	2940160
2	5	2940200
2.5	6.3	2940250
3.15	8	2940315
4	10	2940400
5	12.5	2940500
6.3	16	2940630
8	20	2940800
10	25	2941000

NC SPOTTING DRILLS HSSCo

DIN 1897 90° / 120°

SIZE MM	OVERALL LENGTH	FLUTE LENGTH	90° POINT TYPE 289 CODE	120° POINT TYPE 290 CODE
3	46	21	2890300	2900300
4	55	23	2890400	2900400
5	62	26	2890500	2900500
6	66	30	2890600	2900600
8	79	33	2890800	2900800
10	89	35	2891000	2901000
12	102	40	2891200	2901200
16	115	40	2891600	2901600
20	131	55	2892000	2902000

REDUCED SHANK DRILLS HSS

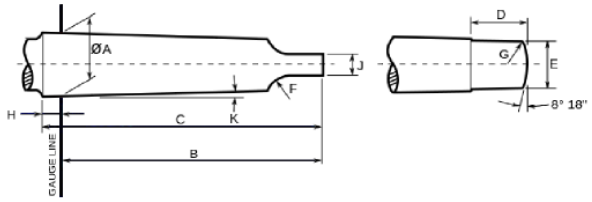
FEW SPEC 118° POINT

CODE	SIZE	SHANK DIA	OVERALL LENGTH	FLUTE LENGTH
2951100	11	10	142	94
2951150	11.5	10	142	94
2951200	12	10	151	101
2951250	12.5	10	151	101
2951300	13	12.7	152	80
2951350	13.5	12.7	152	80
2951400	14	12.7	152	80
2951450	14.5	12.7	152	80
2951500	15	12.7	152	80
2951550	15.5	12.7	152	80
2951600	16	12.7	152	80
2951650	16.5	12.7	152	80
2951700	17	12.7	152	80
2951750	17.5	12.7	152	80
2951800	18	12.7	152	80

CODE	SIZE	SHANK DIA	OVERALL LENGTH	FLUTE LENGTH
2951850	18.5	12.7	152	80
2951900	19	12.7	152	80
2951950	19.5	12.7	152	76
2952000	20	12.7	152	76
2952050	20.5	12.7	152	76
2952100	21	12.7	152	76
2952150	21.5	12.7	152	76
2952200	22	12.7	152	76
2952250	22.5	12.7	152	76
2952300	23	12.7	152	76
2952350	23.5	12.7	152	76
2952400	24	12.7	152	76
2952450	24.5	12.7	152	76
2952500	25	12.7	152	76

MORSE TAPER

DIMENSIONS



MORSE TAPER NUMBER	TAPER	A mm	B (max) mm	C (max) mm	D (max) mm	E (max) mm	F mm	G mm	H mm	J mm	K
0	1:19.212	9.045	56.5	59.5	10.5	6	4	1	3	3.9	1° 29' 26"
1	1:20.047	12.065	62	65.5	13	8.7	5	1.2	3.5	5.2	1° 25' 43"
2	1:20.020	17.780	75	80	16	13.5	6	1.6	5	6.3	1° 25' 50"
3	1:19.922	23.825	94	99	20	18.5	7	2	5	7.9	1° 26' 16"
4	1:19.254	31.267	117.5	124	24	24.5	8	2.5	6.5	11.9	1° 29' 15"
5	1:19.002	44.399	149.5	156	29	35.7	10	3	6.5	15.9	1° 30' 26"
6	1:19.180	63.348	210	218	40	51	13	4	8	19	1° 29' 36"
7	1:19.231	83.058	285.75	294.1	34.9	-	-	19.05	-	19	1° 29' 22"

MORSE TAPER DRILLS HSS

DIN 345

CODE	SIZE	OA LENGTH	FLUTE LENGTH	SLEEVE SIZE
2800400	4	124	43	MT1
2800450	4.5	128	47	MT1
2800500	5	133	52	MT1
2800525	5.25	133	52	MT1
2800550	5.5	138	57	MT1
2800575	5.75	138	57	MT1
2800600	6	138	57	MT1
2800625	6.25	144	63	MT1
2800650	6.5	144	63	MT1
2800675	6.75	150	69	MT1
2800700	7	150	69	MT1
2800725	7.25	150	69	MT1
2800750	7.5	150	69	MT1
2800775	7.75	156	75	MT1
2800800	8	156	75	MT1
2800825	8.25	156	75	MT1
2800840	8.4	156	75	MT1
2800850	8.5	156	75	MT1
2800875	8.75	162	81	MT1
2800900	9	162	81	MT1
2800925	9.25	162	81	MT1
2800950	9.5	162	81	MT1
2800975	9.75	168	87	MT1
2801000	10	168	87	MT1
2801025	10.25	168	87	MT1
2801050	10.5	168	87	MT1
2801075	10.75	175	94	MT1
2801100	11	175	94	MT1
2801125	11.25	175	94	MT1
2801150	11.5	175	94	MT1
2801175	11.75	175	94	MT1
2801200	12	182	101	MT1
2801225	12.25	182	101	MT1
2801250	12.5	182	101	MT1
2801275	12.75	182	101	MT1
2801300	13	182	101	MT1
2801325	13.25	189	108	MT1
2801350	13.5	189	108	MT1
2801375	13.75	189	108	MT1
2801400	14	189	108	MT1
2801425	14.25	212	114	MT2
2801450	14.5	212	114	MT2
2801475	14.75	212	114	MT2
2801500	15	212	114	MT2
2801525	15.25	218	120	MT2
2801550	15.5	218	120	MT2
2801575	15.75	218	120	MT2
2801600	16	218	120	MT2
2801625	16.25	223	125	MT2
2801650	16.5	223	125	MT2
2801675	16.75	223	125	MT2
2801700	17	223	125	MT2
2801725	17.25	228	130	MT2
2801750	17.5	228	130	MT2
2801775	17.75	228	130	MT2
2801800	18	228	130	MT2
2801825	18.25	233	135	MT2

CODE	SIZE	OA LENGTH	FLUTE LENGTH	SLEEVE SIZE
2801850	18.5	233	135	MT2
2801875	18.75	233	135	MT2
2801900	19	233	135	MT2
2801925	19.25	238	140	MT2
2801950	19.5	238	140	MT2
2801975	19.75	238	140	MT2
2802000	20	238	140	MT2
2802050	20.5	243	145	MT2
2802075	20.75	243	145	MT2
2802100	21	243	145	MT2
2802150	21.5	248	150	MT2
2802175	21.75	248	150	MT2
2802200	22	248	150	MT2
2802225	22.25	253	155	MT2
2802250	22.5	253	155	MT2
2802275	22.75	253	155	MT2
2802300	23	253	155	MT2
2802350	23.5	276	155	MT3
2802375	23.75	281	160	MT3
2802400	24	281	160	MT3
2802450	24.5	281	160	MT3
2802475	24.75	281	160	MT3
2802500	25	281	160	MT3
2802550	25.5	286	165	MT3
2802600	26	286	165	MT3
2802650	26.5	286	165	MT3
2802700	27	291	170	MT3
2802750	27.5	291	170	MT3
2802775	27.75	291	170	MT3
2802800	28	291	170	MT3
2802850	28.5	296	175	MT3
2802900	29	296	175	MT3
2802950	29.5	296	175	MT3
2803000	30	296	175	MT3
2803050	30.5	301	180	MT3
2803100	31	301	180	MT3
2803150	31.5	301	180	MT3
2803200	32	334	185	MT4
2803250	32.5	334	185	MT4
2803300	33	334	185	MT4
2803350	33.5	334	185	MT4
2803400	34	339	190	MT4
2803450	34.5	339	190	MT4
2803500	35	339	190	MT4
2803550	35.5	339	190	MT4
2803600	36	344	195	MT4
2803650	36.5	344	195	MT4
2803700	37	344	195	MT4
2803750	37.5	344	195	MT4
2803800	38	349	200	MT4
2803850	38.5	349	200	MT4
2803900	39	349	200	MT4
2803950	39.5	349	200	MT4
2804000	40	349	200	MT4
2804050	40.5	354	205	MT4
2804100	41	354	205	MT4
2804200	42	354	205	MT4

MORSE TAPER DRILLS HSS

DIN 345

CODE	SIZE	OA LENGTH	FLUTE LENGTH	SLEEVE SIZE
2804300	43	359	210	MT4
2804350	43.5	359	210	MT4
2804400	44	359	210	MT4
2804500	45	359	210	MT4
2804550	45.5	359	210	MT4
2804600	46	364	215	MT4
2804700	47	364	215	MT4
2804800	48	369	220	MT4
2804850	48.5	369	220	MT4
2804900	49	369	220	MT4
2805000	50	369	220	MT4
2805100	51	412	225	MT5
2805150	51.5	412	225	MT5
2805200	52	412	225	MT5
2805300	53	412	225	MT5
2805400	54	417	230	MT5
2805450	54.5	417	230	MT5
2805500	55	417	230	MT5
2805550	55.5	417	230	MT5
2805600	56	417	230	MT5

CODE	SIZE	OA LENGTH	FLUTE LENGTH	SLEEVE SIZE
2805700	57	422	235	MT5
2805800	58	422	235	MT5
2805900	59	422	235	MT5
2806000	60	422	235	MT5
2806100	61	427	240	MT5
2806200	62	427	240	MT5
2806300	63	427	240	MT5
2806400	64	432	245	MT5
2806500	65	432	245	MT5
2806600	66	432	245	MT5
2806700	67	432	245	MT5
2806800	68	437	250	MT5
2806900	69	437	250	MT5
2807000	70	437	250	MT5
2807100	71	437	250	MT5
2807200	72	442	255	MT5
2807300	73	442	255	MT5
2807400	74	442	255	MT5
2807500	75	442	255	MT5
2807600	76	447	260	MT5

EXTRA LENGTH MORSE TAPER DRILLS

FEW SPEC

CODE	SIZE	OA LENGTH	FLUTE LENGTH	SLEEVE SIZE
2811005	10	315	225	MT1
2811105	11	315	225	MT1
2811205	12	315	225	MT1
2811305	13	315	225	MT1
2811405	14	315	225	MT1
2811407	14	400	310	MT1
2811505	15	315	215	MT2
2811507	15	400	300	MT2
2811509	15	500	400	MT2
2811605	16	315	215	MT2
2811607	16	400	300	MT2
2811609	16	500	400	MT2
2811705	17	315	215	MT2
2811707	17	400	300	MT2
2811709	17	500	400	MT2
2811805	18	315	215	MT2
2811807	18	400	300	MT2
2811809	18	500	400	MT2
2811905	19	315	215	MT2
2811907	19	400	300	MT2
2811909	19	500	400	MT2
2812005	20	315	215	MT2
2812007	20	400	300	MT2
2812009	20	500	400	MT2
2812105	21	315	215	MT2
2812107	21	400	300	MT2
2812109	21	500	400	MT2
2812205	22	315	215	MT2
2812207	22	400	300	MT2

CODE	SIZE	OA LENGTH	FLUTE LENGTH	SLEEVE SIZE
2812209	22	500	400	MT2
2812305	23	315	190	MT3
2812307	23	400	275	MT3
2812309	23	500	375	MT3
2812407	24	400	275	MT3
2812409	24	500	375	MT3
2812507	25	400	275	MT3
2812509	25	500	375	MT3
2812607	26	400	275	MT3
2812609	26	500	375	MT3
2812707	27	400	275	MT3
2812709	27	500	375	MT3
2812807	28	400	275	MT3
2812809	28	500	375	MT3
2813007	30	400	275	MT3
2813009	30	500	375	MT3
2813207	32	400	250	MT4
2813209	32	500	350	MT4
2813507	35	400	250	MT4
2813509	35	500	350	MT4
2813807	38	400	250	MT4
2813809	38	500	350	MT4
2814007	40	400	250	MT4
2814009	40	500	350	MT4
2814209	42	500	350	MT4
2814509	45	500	350	MT4
2814809	48	500	350	MT4
2815009	50	500	350	MT4

HSS / HSS-Co DRILL SETS

DIN 338

METAL DRILL BOX SETS

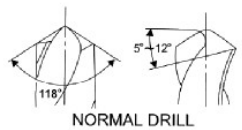
CODE	RANGE	TYPE	SURFACE TREATMENT	NO. DRILLS PER SET
2779105	1-7 X 0.5	HSS	BF	13
2789105	1-7 X 0.5	HSS	ST	13
2779110	1-10 X 0.5	HSS	BF	19
2789110	1-10 X 0.5	HSS	ST	19
2779111	1-13 X 0.5	HSS	BF	25
2789111	1-13 X 0.5	HSS	ST	25
2879111	1-13 X 0.5	HSSCo	GO	25
2779116	1-6 X 0.1	HSS	BF	51
2779117	6-10 X 0.1	HSS	BF	41

METAL COUNTER STAND WITH DRILLS

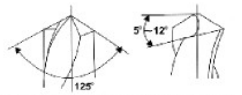
CODE	SIZE
2779001	10 each: 1, 2, 3, 3.2, 3.3, 4, 4.8, 5,
	6, 6.5, 6.8, 7, 8, 9
	5 each: 1.2, 1.5, 1.8, 2.2, 2.5, 2.8, 3.5, 3.8,
	4.2, 4.5, 5.2, 5.5, 5.8, 6.2, 7.5, 8.5,
	9.5, 10, 10.2, 10.5, 11, 11.5, 12, 12.5, 13

DRILL RE-SHARPENING MACHINES

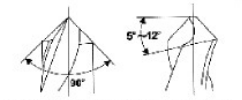
LIGHT, CONVENIENT & SPACE SAVING



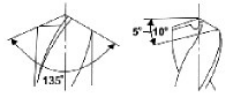
NORMAL DRILL



FOR ALLOY & STAINLESS STEEL



FOR CAST IRON & ALUMINIUM



FOR HARDER MATERIALS

GP-1234

Standard Accessories Model GP-1234

- Metal Collets 12mm - 34mm (20pcs)
- Collet Holder
- Allen Keys (2pcs)
- Setting Master & Shims
- Extractor Attachment
- CBN Grinding Wheel (1pc)

SDS Grinding Wheels also available

Standard Accessories Model GP-0213

- Metal Collets 2mm - 13mm (12pcs)
- Collet Holder
- Allen Keys (2pcs)
- Setting Master & Shims
- Extractor Attachment
- CBN Grinding Wheel (1pc)

SDS Grinding Wheels also available

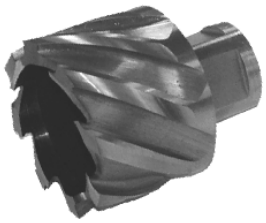
GP-0213

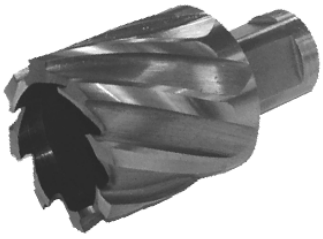
MODEL NUMBER	GRINDING RANGE	POINT ANGLE	MOTOR SPEED	CODE
GP - 0213	2mm ~ 13mm	90° ~ 140°	5300 RPM	2990213
GP - 1234	13mm ~ 34mm	90° ~ 140°	4600 RPM	2991234

CORE DRILLS (ANNULAR CUTTERS) HSS/HSSE

FEW SPEC

SIZE	CUTTING LENGTH	M2 HSS CODE	M35 HSSE CODE
14	25	3901400	3921400
15	25	3901500	3921500
16	25	3901600	3921600
17	25	3901700	3921700
18	25	3901800	3921800
19	25	3901900	3921900
20	25	3902000	3922000
21	25	3902100	3922100
22	25	3902200	3922200
23	25	3902300	3922300
24	25	3902400	3922400
25	25	3902500	3922500
26	25	3902600	3922600
27	25	3902700	3922700
28	25	3902800	3922800
29	25	3902900	3922900
30	25	3903000	3923000
31	25	3903100	3923100
32	25	3903200	3923200
33	25	3903300	3923300
34	25	3903400	3923400
35	25	3903500	3923500
36	25	3903600	3923600
37	25	3903700	3923700
38	25	3903800	3923800
39	25	3903900	3923900
40	25	3904000	3924000
41	25	3904100	3924100
42	25	3904200	3924200
43	25	3904300	3924300
44	25	3904400	3924400
45	25	3904500	3924500
46	25	3904600	3924600
47	25	3904700	3924700
48	25	3904800	3924800
49	25	3904900	3924900
50	25	3905000	3925000
51	25	3905100	3925100
52	25	3905200	3925200
53	25	3905300	3925300
54	25	3905400	3925400
55	25	3905500	3925500
56	25	3905600	3925600
57	25	3905700	3925700
58	25	3905800	3925800
59	25	3905900	3925900
60	25	3906000	3926000





SIZE	CUTTING LENGTH	M2 HSS CODE	M35 HSSE CODE
14	50	3911400	3931400
15	50	3911500	3931500
16	50	3911600	3931600
17	50	3911700	3931700
18	50	3911800	3931800
19	50	3911900	3931900
20	50	3912000	3932000
21	50	3912100	3932100
22	50	3912200	3932200
23	50	3912300	3932300
24	50	3912400	3932400
25	50	3912500	3932500
26	50	3912600	3932600
27	50	3912700	3932700
28	50	3912800	3932800
29	50	3912900	3932900
30	50	3913000	3933000
31	50	3913100	3933100
32	50	3913200	3933200
33	50	3913300	3933300
34	50	3913400	3933400
35	50	3913500	3933500
36	50	3913600	3933600
37	50	3913700	3933700
38	50	3913800	3933800
39	50	3913900	3933900
40	50	3914000	3934000
41	50	3914100	3934100
42	50	3914200	3934200
43	50	3914300	3934300
44	50	3914400	3934400
45	50	3914500	3934500
46	50	3914600	3934600
47	50	3914700	3934700
48	50	3914800	3934800
49	50	3914900	3934900
50	50	3915000	3935000
51	50	3915100	3935100
52	50	3915200	3935200
53	50	3915300	3935300
54	50	3915400	3935400
55	50	3915500	3935500
56	50	3915600	3935600
57	50	3915700	3935700
58	50	3915800	3935800
59	50	3915900	3935900
60	50	3916000	3936000

Pilot Pin for 25FL Core Drills	
6.34 X 75mm	3909925

Pilot Pin for 50FL Core Drills	
6.34 X 98mm	3919950

MORSE TAPER SLEEVES & EXTENSION SOCKETS

HARDENED & GROUND PRECISION & WORKSHOP GRADES

DRILL SLEEVES - Hardened & tempered. Externally & internally ground.

TYPE	EXT. MTS	INT. MTS	OAL mm	PRECISION CODE	WORKSHOP CODE
DS 2 - 1	2	1	92	2711010	2721010
DS 3 - 1	3	1	99	2711020	2721020
DS 4 - 1	4	1	124	2711030	
DS 3 - 2	3	2	112	2711040	2721040
DS 4 - 2	4	2	124	2711050	2721050
DS 5 - 2	5	2	156	2711060	2721060

TYPE	EXT. MTS	INT. MTS	OAL mm	PRECISION CODE	WORKSHOP CODE
DS 4 - 3	4	3	140	2711070	2721070
DS 5 - 3	5	3	156	2711080	2721080
DS 6 - 3	6	3	218	2711090	
DS 5 - 4	5	4	171	2711100	2721100
DS 6 - 4	6	4	218	2711110	
DS 6 - 5	6	5	218	2711120	2721120

EXTENSION ADAPTOR SOCKETS - Hardened & ground externally & internally.

CODE	TYPE	EXTERNAL MTS	INTERNAL MTS	OAL mm
2714000	ES 1 - 1	1	1	145
2714010	ES 1 - 2	1	2	160
2714020	ES 2 - 1	2	1	160
2714030	ES 2 - 2	2	2	175
2714040	ES 2 - 3	2	3	196
2714050	ES 3 - 2	3	2	194
2714060	ES 3 - 3	3	3	215
2714070	ES 3 - 4	3	4	240
2714080	ES 4 - 2	4	2	215

CODE	TYPE	EXTERNAL MTS	INTERNAL MTS	OAL mm
2714090	ES 4 - 3	4	3	240
2714100	ES 4 - 4	4	4	265
2714110	ES 4 - 5	4	5	300
2714120	ES 5 - 3	5	3	268
2714130	ES 5 - 4	5	4	300
2714140	ES 5 - 5	5	5	335
2714150	ES 6 - 3	6	3	330
2714160	ES 6 - 4	6	4	355
2714170	ES 6 - 5	6	5	390

DRILL DRIFTS - Hardened and Steam Tempered.

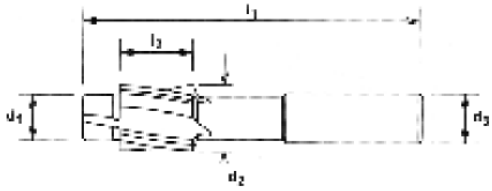
CODE	TYPE	FOR MTS
2719000	DD 1 - 2	1 & 2
2719010	DD 2 - 3	2 & 3
2719020	DD 3 - 4	3 & 4
2719030	DD 4 - 6	4, 5 & 6

PIN CHUCK - For holding Micro Drills (<2.5mm)

CODE	COLLETS	RANGE
	A	0.2 - 0.8
2730000	B	0.8 - 1.5
	C	1.5 - 2.4
Pin chuck includes all 3 collets		

COUNTERBORES

HSS-E

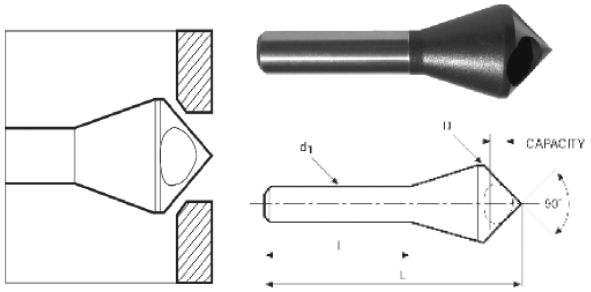


Capacity mm	d1 Pilot mm	d2 Dia mm	l1 OAL mm	l2 Fl Length mm	d3 Shank mm	CODE
M3	3.4	6	71	14	5	3480300
M4	4.5	8	71	14	5	3480400
M5	5.5	10	80	18	8	3480500
M6	6.4	11	80	18	8	3480600
M8	9	15	100	22	12.5	3480800
M10	11	18	100	22	12.5	3481000
M12	14	20	100	22	12.5	3481200
M14	14.4	24	90	25	12	3481400
M16	16.5	26	100	29	16	3481600

COUNTERSINKS COBALT HSS-E

HOLLOW TYPE / SINGLE FLUTE / THREE FLUTE 90°

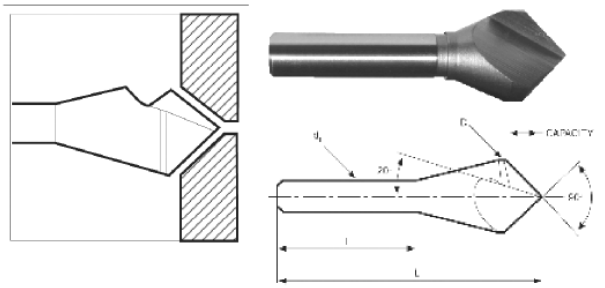
HOLLOW TYPE 90° Used in the execution of small chamfers in metals and plastics.



STRAIGHT SHANK

D Size mm	Capacity mm	d_1 Shank Dia. mm	L Length mm	Code
10	4 to 9	6	45	3532010
15	6 to 14	8	55	3532015
20	8 to 18	10	65	3532020
25	10 to 23	12	78	3532025
30	12 to 28	12	88	3532030

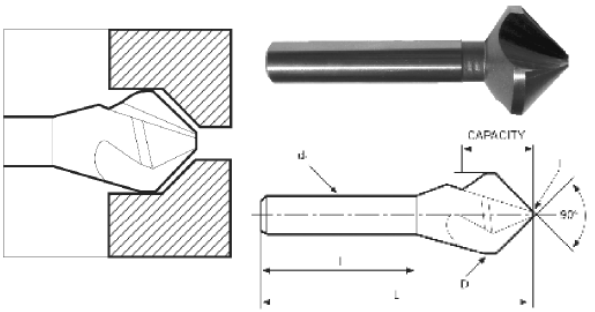
SINGLE FLUTE 90° Used in the execution of counter-sinking within the capacity of each individual sized tool.



STRAIGHT SHANK

D Size mm	Capacity mm	d_1 Shank Dia. mm	L Length mm	Code
12.7	1 to 12	6	45	3533010
16	2 to 16	8	55	3533015
20	2 to 20	10	65	3533020
25	3 to 25	12	78	3533025
32	3 to 32	12	88	3533030

THREE FLUTE 90° Used in the execution of counter boring within the capacity of each individual sized tool.

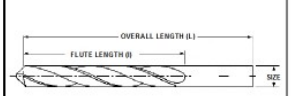
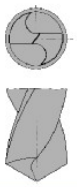
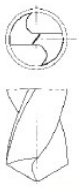
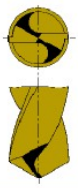


STRAIGHT SHANK

D Size mm	Capacity mm	d_1 Shank Dia. mm	L Length mm	T	Code
6.3	M3	6	50	2	3534010
8.3	M4	6	50	2.5	3534015
10.4	M5	8	56	3	3534020
12.4	M6	8	55	4	3534025
16.5	M8	10	63	4	3534030
20.5	M10	10	67	6	3534035
25	M12	12	71	6	3534040
32	M16	12	71	6	3534045

JOBBER DRILLS HSS

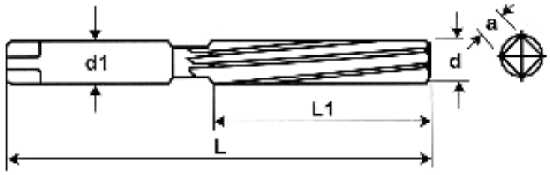
DIN 338 LLT

DIMENSIONS				CODES		
DESCRIPTION				ST JOBBER ROLL FORGED	BF JOBBER GROUND FLUTE	TT JOBBER GROUND FLUTE
TYPE (PREFIX)				364	365	367
SURFACE TREATMENT				ST	BF	TIN
SPECIFICATION				DIN 338	DIN 338	DIN 338
POINT				118°	118°	135° SPL PT
MATERIAL				HSS	HSS	HSS
						
SIZE mm	CODE (ADD PREFIX)	OAL (L)	Flute Length (l)			
1	0100	34	12	3640100	3650100	3670100
1.5	0150	40	18	3640150	3650150	3670150
2	0200	49	24	3640200	3650200	3670200
2.5	0250	57	30	3640250	3650250	3670250
3	0300	61	33	3640300	3650300	3670300
3.2	0320	65	36	3640320	3650320	3670320
3.3	0330	65	36	3640330	3650330	3670330
3.5	0350	70	39	3640350	3650350	3670350
3.7	0370	70	39	3640370	3650370	3670370
3.8	0380	75	43			3670380
4	0400	75	43	3640400	3650400	3670400
4.2	0420	75	43	3640420	3650420	3670420
4.5	0450	80	47	3640450	3650450	3670450
4.8	0480	86	52	3640480	3650480	3670480
5	0500	86	52	3640500	3650500	3670500
5.3	0530	86	52	3640530	3650530	3670530
5.5	0550	93	57	3640550	3650550	3670550
6	0600	93	57	3640600	3650600	3670600
6.5	0650	101	63	3640650	3650650	3670650
6.8	0680	109	69	3640680	3650680	3670680
7	0700	109	69	3640700	3650700	3670700
7.5	0750	109	69	3640750	3650750	3670750
8	0800	117	75	3640800	3650800	3670800
8.5	0850	117	75	3640850	3650850	3670850
9	0900	125	81	3640900	3650900	3670900
9.5	0950	125	81	3640950	3650950	3670950
10	1000	133	87	3641000	3651000	3671000
10.2	1020	133	87	3641020	3651020	3671020
10.5	1050	133	87	3641050	3651050	3671050
11	1100	142	94	3641100	3651100	3671100
11.5	1150	142	94	3641150	3651150	3671150
12	1200	151	101	3641200	3651200	3671200
12.5	1250	151	101	3641250	3651250	3671250
13	1300	151	101	3641300	3651300	3671300

CODE	RANGE	TYPE	SURFACE TREATMENT	NO. DRILLS PER SET
3649105	1-7 X 0.5	HSS	ST	13
3659105	1-7 X 0.5	HSS	BF	13
3679105	1-7 X 0.5	HSS	TIN	13
3649110	1-10 X 0.5	HSS	ST	19
3659110	1-10 X 0.5	HSS	BF	19
3679110	1-10 X 0.5	HSS	TIN	19
3649111	1-13 X 0.5	HSS	ST	25
3659111	1-13 X 0.5	HSS	BF	25
3679111	1-13 X 0.5	HSS	TIN	25

REAMERS HSS

PARALLEL SHANK HAND REAMERS DIN 206

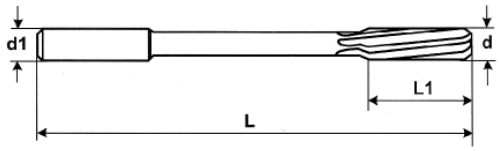


Cutting Dia d mm	Shank Dia d1 mm	Flute Length L1 mm	Overall Length L mm	Number of Flutes No.s	Square Size a. mm	Code
4	4	38	76	6	3.15	1450400
4.5	4.5	41	81	6	3.55	1450450
5	5	44	87	6	4	1450500
5.5	5.5	47	93	6	4.5	1450550
6	6	47	93	6	4.5	1450600
6.5	6.5	50	100	6	5	1450650
7	7	54	107	6	5.6	1450700
7.5	7.5	54	107	6	5.6	1450750
8	8	58	115	6	6.3	1450800
8.5	8.5	58	115	6	6.3	1450850
9	9	62	124	6	7.1	1450900
9.5	9.5	62	124	6	7.1	1450950
10	10	66	133	6	8	1451000
10.5	10.5	66	133	6	8	1451050
11	11	71	142	6	9	1451100
11.5	11.5	71	142	6	9	1451150
12	12	76	152	6	10	1451200
12.5	12.5	76	152	6	10	1451250
13	13	76	152	6	10	1451300
13.5	13.5	81	163	6	11.2	1451350
14	14	81	163	6	11.2	1451400
14.5	14.5	81	163	8	11.2	1451450
15	15	81	163	8	11.2	1451500
15.5	15.5	87	175	8	12.5	1451550
16	16	87	175	8	12.5	1451600
17	17	87	175	8	12.5	1451700
18	18	93	188	8	14	1451800
19	19	93	188	8	14	1451900
20	20	100	201	8	16	1452000
21	21	100	201	8	16	1452100
22	22	107	215	8	18	1452200
23	23	107	215	8	18	1452300
24	24	115	231	10	20	1452400
25	25	115	231	10	20	1452500
26	26	115	231	10	20	1452600
28	28	124	247	10	22.4	1452800
30	30	124	247	10	22.4	1453000
35	35	142	284	10	28	1453500
40	40	152	305	12	31.5	1454000

Description	Standard
Helix Angle	7° Left hand helix/ Right hand cut
Required finished hole tolerance	H7
Holding	Straight shank with square end
Taper Lead	1/2" to 1" / Length of taper - 1.5 x cutting diameter max. up to 20mm
Bevel Lead	45°
Applications	Intended to finish existing holes to H7 tolerance in most ferrous and non-ferouls metals

REAMERS HSS

PARALLEL SHANK CHUCKING REAMERS DIN 212

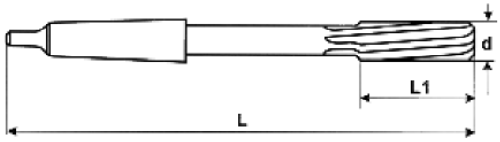


Cutting Dia d mm	Shank Dia d1 mm	Flute Length L1 mm	Overall Length L mm	Number of Flutes No.s	Code
4	4	19	75	6	1460400
4.5	4.5	21	80	6	1460450
5	5	23	86	6	1460500
5.5	5.6	26	93	6	1460550
6	5.6	26	93	6	1460600
6.5	6.3	28	101	6	1460650
7	7.1	31	109	6	1460700
7.5	7.1	31	109	6	1460750
8	8	33	117	6	1460800
8.5	8	33	117	6	1460850
9	9	36	125	6	1460900
9.5	9	36	125	6	1460950
10	10	38	133	6	1461000
10.5	10	38	133	6	1461050
11	10	41	142	6	1461100
11.5	10	41	142	6	1461150
12	10	44	151	6	1461200
12.5	10	44	151	6	1461250
13	10	44	151	6	1461300
13.5	12.5	47	160	8	1461350
14	12.5	47	160	8	1461400
14.5	12.5	50	162	8	1461450
15	12.5	50	162	8	1461500
15.5	12.5	52	170	8	1461550
16	12.5	52	170	8	1461600

Description	Standard
Helix Angle	7° Left hand helix/ Right hand cut
Required finished hole tolerance	H7
Holding	Straight shank with square end
Taper Lead	No taper lead
Bevel Lead	45°
Applications	For general purpose machine use in batch or mass production Intended to finish existing holes to H7 tolerance in most ferrous and non-ferrous metals

REAMERS HSS

TAPER SHANK CHUCKING REAMERS DIN 208



Cutting Dia d mm	Shank	Flute Length L1 mm	Overall Length L mm	Number of Flutes No.s	Code
6	MT1	26	138	6	1480600
7	MT1	31	150	6	1480700
8	MT1	33	156	6	1480800
9	MT1	36	162	6	1480900
10	MT1	38	168	6	1481000
11	MT1	41	175	6	1481100
12	MT1	44	182	6	1481200
13	MT1	44	182	6	1481300
14	MT1	47	189	8	1481400
15	MT2	50	204	8	1481500
16	MT2	52	210	8	1481600
17	MT2	54	214	8	1481700
18	MT2	56	219	8	1481800
19	MT2	58	223	8	1481900
20	MT2	60	228	8	1482000
22	MT2	64	237	8	1482200
24	MT3	68	268	8	1482400
25	MT3	68	268	8	1482500
26	MT3	70	273	8	1482600
28	MT3	71	277	10	1482800
30	MT3	73	281	10	1483000
32	MT4	77	317	10	1483200
34	MT4	78	321	10	1483400
35	MT4	78	321	10	1483500
36	MT4	79	325	10	1483600
38	MT4	81	329	10	1483800
40	MT4	81	329	10	1484000

Description	Standard
Helix Angle	7° Left hand helix/ Right hand cut
Required finished hole tolerance	H7
Holding	Taper shank
Taper Lead	No taper lead
Bevel Lead	45°
Applications	For general purpose machine use in batch or mass production Intended to finish existing holes to H7 tolerance in most ferrous and non-ferrous metals

REAMERS HSS

TAPER BRIDGE REAMERS DIN 311

Cutting Dia d mm	Shank	d1	Flute Length L1 mm	Overall Length L mm	Code
6.4	MT1	3.4	75	151	1490640
8.4	MT1	5	85	161	1490840
9	MT1	5.4	90	166	1490900
10.4	MT1	6.6	95	171	1491040
11	MT1	7	100	176	1491100
12	MT2	7.8	105	199	1491200
13	MT2	8.8	105	199	1491300
14	MT2	9.4	115	209	1491400
15	MT2	10	125	219	1491500
16	MT2	10.6	135	229	1491600
17	MT3	11.6	135	251	1491700
18	MT3	12.2	145	261	1491800
19	MT3	13.2	145	261	1491900
20	MT3	13.8	155	271	1492000
21	MT3	14.8	155	271	1492100
22	MT3	15.4	165	281	1492200
23	MT3	16.4	165	281	1492300
24	MT3	16.8	180	296	1492400
25	MT3	17.8	180	296	1492500
26	MT3	18.8	180	296	1492600
27	MT3	19.2	195	311	1492700
28	MT3	20.2	195	311	1492800
30	MT3	22.2	195	311	1493000
32	MT4	23.6	210	354	1493200
33	MT4	24.6	210	354	1493300
34	MT4	25.2	220	364	1493400
37	MT4	28.2	220	364	1493700
38	MT4	28.8	230	374	1493800
40	MT4	30.8	230	374	1494000

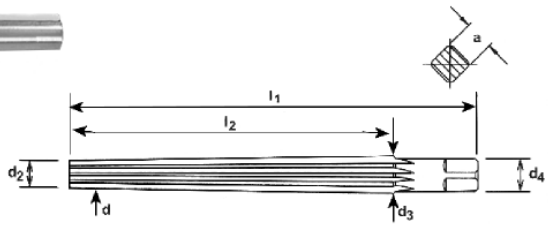
Description	Standard
Helix Angle	7° Left hand helix/ Right hand cut
Required finished hole tolerance	K11
Holding	Taper shank
Taper	1 : 10
Applications	For opening out existing holes for alignment on structural steel work and fabrications

REAMERS HSS

TAPER PIN REAMERS DIN 9A / DIN 9B

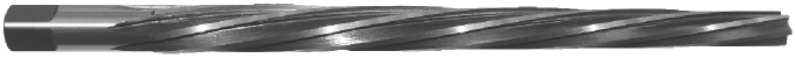
STRAIGHT FLUTE DIN9A

Nominal Dia d mm	Point Dia d2	End Dia d3	Flute Length L2 mm	Overall Length L1 mm	Shank mm d4	Square a/f a	Code
4	3.9	5.26	68	93	5	4	1510400
5	4.9	6.36	73	100	6.3	5	1510500
6	5.9	8	105	135	8	6.3	1510600
8	7.9	10.8	145	180	10	8	1510800
10	9.9	13.4	175	215	12.5	10	1511000
12	11.8	16	210	255	14	11.2	1511200
16	15.8	20.4	230	280	18	14	1511600
20	19.8	24.8	250	310	22.4	18	1512000
25	24.7	30.7	300	370	28	22.4	1512500
30	29.7	36.1	320	400	31.5	25	1513000

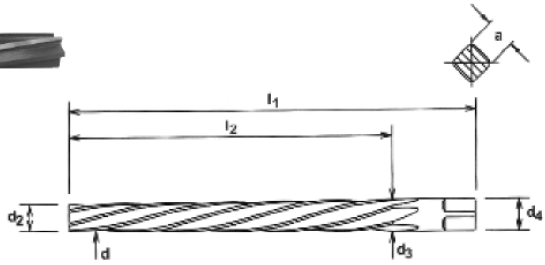


Description	Standard
Helix Angle	Straight Flute
Tolerance	d3 will conform to d2 tolerance and taper angle tolerance
Holding	Parallel shank with square
Taper	1 : 50
Applications	To suit standard taper pins

SPIRAL FLUTE DIN9B



Nominal Dia d mm	Point Dia d2	End Dia d3	Flute Length L2 mm	Overall Length L1 mm	Shank mm d4	Square a/f a	Code
4	3.9	5.26	68	93	5	4	1520400
5	4.9	6.36	73	100	6.3	5	1520500
6	5.9	8	105	135	8	6.3	1520600
8	7.9	10.8	145	180	10	8	1520800
10	9.9	13.4	175	215	12.5	10	1521000
12	11.8	16	210	255	14	11.2	1521200
16	15.8	20.4	230	280	18	14	1521600
20	19.8	24.8	250	310	22.4	18	1522000
25	24.7	30.7	300	370	28	22.4	1522500
30	29.7	36.1	320	400	31.5	25	1523000



Description	Standard
Helix Angle	10° LH Spiral Flute
Tolerance	d3 will conform to d2 tolerance and taper angle tolerance
Holding	Parallel shank with square
Taper	1 : 50
Applications	To suit standard taper pins

ADJUSTABLE HAND REAMERS

ALLOY AND HSS BLADES

Size mm	Blade Material	Code
6.5 - 7.0	ALLOY	**1530650**
7.0 - 7.75	ALLOY	**1530700**
7.75 - 8.5	ALLOY	**1530775**
8.5 - 9.25	ALLOY	**1530850**
9.25 - 10.0	ALLOY	**1530925**
10.0 - 10.75	ALLOY	**1531000**
10.75 - 11.75	ALLOY	**1531075**
11.75 -12.75	ALLOY	**1531175**
12.75 -13.75	ALLOY	**1531275**
13.75 - 15.25	HSS	**1531375**
15.25 - 17.0	HSS	**1531525**
17.0 - 19.0	HSS	**1531700**
19.0 - 21.0	HSS	**1531900**
21.0 - 23.0	HSS	**1532100**
23.0 - 26.0	HSS	**1532300**
26.01 - 29.5	HSS	**1532600**
29.5 - 33.5	HSS	**1532950**
33.5 - 38.0	HSS	**1533350**
38.0 - 44.0	HSS	**1533800**
44.0 - 54.0	HSS	**1534400**
54.04 - 64.0	HSS	**1535400**
64.0 - 74	HSS	**1536400**

- Blades made from quality alloy and high speed steel
- Hardened and ground blades
- Accurately tapered slots
- Specially designed for light cuts by hand operations
- Suitable for repair work
- Right hand cutting

MILLING CUTTER INFORMATION

STOCK RANGE HSSE - Co8 / HSS - Co

 822 HSS M2 REG TH DIN 327  830 HSS M2 LS TH BS 122	**HSS - 2 Flute End Mills** For plunging in slots or keyways in general purpose applications.	H3 H3
 868 HSS M2 REG TH BS 122  876 HSS M2 LS TH BS 122	**HSS - Multi - Flute End Mills** For profiling in general purpose applications.	H3 H3
 820 HSSE Co8 REG TH DIN 327  826 HSSE Co8 REG FL DIN 327  828 HSSE Co8 LS TH BS 122  834 HSSE Co8 LS FL DIN 844	**HSSE - Co8 - 2 Flute End Mills** For plunging in slots or keyways, in tough materials or high production.	H4-H5 H4-H5 H4-H5 H4-H5
 836 HSSE Co8 REG TH DIN 327  840 HSSE Co8 REG FL DIN 327  842 HSSE Co8 LS TH BS 122  846 HSSE Co8 LS FL BS 122	**HSSE - Co8 - 2 Flute Ball Nose** For plunging radiused slots and keyways in tough materials and general purpose applications.	H4-H5 H4-H5 H4-H5 H4-H5
 848 HSSE Co8 REG TH DIN 844  854 HSSE Co8 REG FL DIN 844  856 HSSE Co8 LS TH BS 122  862 HSSE Co8 LS FL DIN 844	**HSSE - Co8 - 3 Flute End Mills** These are flexible multi - purpose tools for plunging, slotting and profiling in tough materials and general purpose production applications.	H6 H6 H6 H6
 866 HSSE Co8 REG TH BS 122  872 HSSE Co8 REG FL DIN 844  874 HSSE Co8 LS TH BS 122  880 HSSE Co8 LS FL DIN 844	**HSSE - Co8 - Multi - Flute End Mills** For profiling in production applications in tough materials, yet are flexible in being able to plunge and slot due to their centre cutting characteristics.	H6 H6 H6 H6
 882 HSSE Co8 REG TH BS 122  883 HSSE Co8 REG FL DIN 844  886 HSSE Co8 LS TH BS 122  887 HSSE Co8 LS FL DIN 844	**HSSE - Co8 - Roughing Cutters** Coarse knuckle profile for high speed metal removal.	H7 H7 H7 H7

MILLING CUTTER INFORMATION

STOCK RANGE HSSE - Co8 / HSS - Co

 896 T HSS - Co TH FEW NORM  896 F HSS - Co FL DIN 850AB	**T - Slot Cutters** For cutting a T - slot in a previously milled slot.	H8 H8
 893 T HSS - Co TH DIN 850  893 F HSS - Co FL DIN 850	**Woodruff Cutters** For cutting a seat for woodruff keys.	H8 H8
 898 T HSS - Co TH FEW NORM  898 F HSS - Co FL DIN 1833C	**Dovetail Cutters** For cutting dovetail slides.	H9 H9
 899 T HSS - Co TH FEW NORM  899 F HSS - Co FL DIN 1833D	**Inverted Dovetail Cutters** For cutting the inverse section of a dovetail slide.	H9 H9
 895 T HSS - Co TH DIN 6518D  895 F HSS - Co FL DIN 6518D	**Corner Rounding Cutters** For cutting a radius on a corner.	H10 H10

MILLING CUTTERS

SHANK TYPE

HSS M2 HIGH SPEED STEEL

DESCRIPTION	CODES			
	2 FLUTE END MILL (SLOT DRILL)	2 FLUTE END MILL (SLOT DRILL)	MULTI FLUTE END MILL	MULTI FLUTE END MILL
LENGTH	REGULAR	LONG SERIES	REGULAR	LONG SERIES
SHANK	THREADED	THREADED	THREADED	THREADED
BASED ON	DIN 327	BS 122	BS 122	BS 122
HSS	HSS M2	HSS M2	HSS M2	HSS M2
CENTRE CUTTING	YES	YES	YES *	YES *
TYPE NO.	822	830	868	876
				
SIZE MM				
3	8220300	8300300	8680300	8760300
4	8220400	8300400	8680400	8760400
5	8220500	8300500	8680500	8760500
6	8220600	8300600	8680600	8760600
8	8220800	8300800	8680800	8760800
10	8221000	8301000	8681000	8761000
12	8221200	8301200	8681200	8761200
14	8221400	8301400	8681400	8761400
15	8221500			
16	8221600	8301600	8681600	8761600
18	8221800	8301800	8681800	8761800
20	8222000	8302000	8682000	8762000
22	8222200	8302200	8682200	8762200
24	8222400	8302400	8682400	8762400
25	8222500	8302500	8682500	8762500
26	8222600			
28	8222800		8682800	8762800
30	8223000	8303000	8683000	8763000
32	8223200		8683200	8763200
36	8223600			

* CENTRE CUTTING UP TO 20 MM.

For General Dimensions, see pg. T17

MILLING CUTTERS

SHANK TYPE

HSSE Co8 8% COBALT SUPER HIGH SPEED STEEL

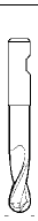
	CODES							
DESCRIPTION	2 FLUTE END MILL (SLOT DRILL)	2 FLUTE END MILL (SLOT DRILL)	2 FLUTE END MILL (SLOT DRILL)	2 FLUTE END MILL (SLOT DRILL)	2 FLUTE BALL NOSE	2 FLUTE BALL NOSE	2 FLUTE BALL NOSE	2 FLUTE BALL NOSE
LENGTH	REGULAR	REGULAR	LONG SERIES	LONG SERIES	REGULAR	REGULAR	LONG SERIES	LONG SERIES
SHANK	THREADED	FLATTED	THREADED	FLATTED	THREADED	FLATTED	THREADED	FLATTED
BASED ON	DIN 327	DIN 327	BS 122	DIN 844	DIN 327	DIN 327	BS 122	BS 122
HSS	HSSE Co8	HSSE Co8	HSSE Co8	HSSE Co8	HSSE Co8	HSSE Co8	HSSE Co8	HSSE Co8
CENTRE CUTTING	YES	YES	YES	YES	YES	YES	YES	YES
TYPE NO.	820	826	828	834	836	840	842	846
SIZE MM								
2	8200200							
2.5	8200250							
3	8200300	8260300	8280300	8340300	8360300	8400300	8420300	8460300
3.5	8200350							
4	8200400	8260400	8280400	8340400	8360400	8400400	8420400	8460400
4.5	8200450							
5	8200500	8260500	8280500	8340500	8360500	8400500	8420500	8460500
5.5	8200550							
6	8200600	8260600	8280600	8340600	8360600	8400600	8420600	8460600
6.5	8200650							
7	8200700	8260700		8340700	8360700	8400700		
7.5	8200750							
8	8200800	8260800	8280800	8340800	8360800	8400800	8420800	8460800
8.5	8200850							
9	8200900	8260900			8360900	8400900		
9.5	8200950							
10	8201000	8261000	8281000	8341000	8361000	8401000	8421000	8461000
10.5	8201050							

For General Dimensions, see pg. T17

MILLING CUTTERS

SHANK TYPE

HSSE Co8 8% COBALT SUPER HIGH SPEED STEEL

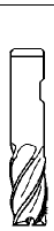
	CODES							
DESCRIPTION	**2 FLUTE END MILL (SLOT DRILL)**	**2 FLUTE END MILL (SLOT DRILL)**	**2 FLUTE END MILL (SLOT DRILL)**	**2 FLUTE END MILL (SLOT DRILL)**	**2 FLUTE BALL NOSE**	**2 FLUTE BALL NOSE**	**2 FLUTE BALL NOSE**	**2 FLUTE BALL NOSE**
LENGTH	REGULAR	REGULAR	LONG SERIES	LONG SERIES	REGULAR	REGULAR	LONG SERIES	LONG SERIES
SHANK	THREADED	FLATTED	THREADED	FLATTED	THREADED	FLATTED	THREADED	FLATTED
BASED ON	DIN 327	DIN 327	BS 122	DIN 844	DIN 327	DIN 327	BS 122	BS 122
HSS	HSSE Co8	HSSE Co8	HSSE Co8	HSSE Co8	HSSE Co8	HSSE Co8	HSSE Co8	HSSE Co8
CENTRE CUTTING	YES	YES	YES	YES	YES	YES	YES	YES
TYPE NO.	**820**	**826**	**828**	**834**	**836**	**840**	**842**	**846**
SIZE MM								
11	8201100	8261100						
12	8201200	8261200	8281200	8341200	8361200	8401200	8421200	8461200
13	8201300	8261300						
14	8201400	8261400	8281400	8341400	8361400	8401400	8421400	8461400
15	8201500	8261500						
16	8201600	8261600	8281600	8341600	8361600	8401600	8421600	8461600
17	8201700	8261700						
18	8201800	8261800	8281800	8341800	8361800	8401800	8421800	8461800
19	8201900	8261900						
20	8202000	8262000	8282000	8342000	8362000	8402000	8422000	8462000
22	8202200	8262200			8362200	8402200		
24	8202400	8262400			8362400	8402400		
25	8202500							
26	8202600							
28	8202800							
30	8203000							

For General Dimensions, see pg. T17

MILLING CUTTERS

SHANK TYPE

HSSE Co8 8% COBALT SUPER HIGH SPEED STEEL

DESCRIPTION LENGTH SHANK BASED ON HSS CENTRE CUTTING TYPE NO.	CODES							
	3 FLUTE END MILL REGULAR THREADED BS 122 HSSE Co8 YES 848	3 FLUTE END MILL REGULAR FLATTED DIN 844 HSSE Co8 YES 854	3 FLUTE END MILL LONG SERIES THREADED BS 122 HSSE Co8 YES 856	3 FLUTE END MILL LONG SERIES FLATTED DIN 844 HSSE Co8 YES 862	MULTI FLUTE END MILL REGULAR THREADED BS 122 HSSE Co8 YES ✱ 866	MULTI FLUTE END MILL REGULAR FLATTED DIN 844 HSSE Co8 YES ✱ 872	MULTI FLUTE END MILL LONG SERIES THREADED BS 122 HSSE Co8 YES ✱ 874	MULTI FLUTE END MILL LONG SERIES FLATTED DIN 844 HSSE Co8 YES ✱ 880
SIZE MM								
3	8480300	8540300			8660300	8720300	8740300	8800300
4	8480400	8540400			8660400	8720400	8740400	8800400
5	8480500	8540500			8660500	8720500	8740500	8800500
6	8480600	8540600	8560600	8620600	8660600	8720600	8740600	8800600
7	8480700				8660700	8720700		
8	8480800	8540800	8560800	8620800	8660800	8720800	8740800	8800800
9	8480900				8660900	8720900		
10	8481000	8541000	8561000	8621000	8661000	8721000	8741000	8801000
11	8481100				8661100	8721100		
12	8481200	8541200	8561200	8621200	8661200	8721200	8741200	8801200
13	8481300				8661300	8721300		
14	8481400	8541400	8561400	8621400	8661400	8721400	8741400	8801400
15	8481500				8661500	8721500		
16	8481600	8541600	8561600	8621600	8661600	8721600	8741600	8801600
18	8481800	8541800	8561800	8621800	8661800	8721800	8741800	8801800
19					8661900			
20	8482000	8542000	8562000	8622000	8662000	8722000	8742000	8802000
22	8482200	8542200	8562200	8622200	8662200	8722200		
24					8662400	8722400		
25	8482500	8542500	8562500	8622500	8662500	8722500	8742500	8802500
28					8662800	8722800		
30					8663000	8723000	8743000	8803000

✱ CENTRE CUTTING UP TO 20 MM.

For General Dimensions, see pg. T17

RIPPING CUTTERS

SHANK TYPE

HSSE Co8 8% COBALT SUPER HIGH SPEED STEEL

	CODES			
DESCRIPTION	ROUGHING END MILL	ROUGHING END MILL	ROUGHING END MILL	ROUGHING END MILL
LENGTH SHANK BASED ON HSS CENTRE CUTTING TYPE NO.	REGULAR THREADED BS 122 HSSE Co8 YES ✱ 882	REGULAR FLATTED DIN 844 HSSE Co8 YES ✱ 883	LONG SERIES THREADED BS 122 HSSE Co8 YES ✱ 886	LONG SERIES FLATTED DIN 844 HSSE Co8 YES ✱ 887
SIZE MM				
6	8820600	8830600		
8	8820800	8830800		8870800
10	8821000	8831000	8861000	8871000
12	8821200	8831200	8861200	8871200
14	8821400	8831400	8861400	8871400
16	8821600	8831600	8861600	8871600
18	8821800	8831800	8861800	8871800
20	8822000	8832000	8862000	8872000
22	8822200	8832200	8862200	8872200
25	8822500	8832500	8862500	8872500
28	8822800	8832800	8862800	8872800
30	8823000	8833000	8863000	8873000
32	8823200	8833200	8863200	8873200
35	8823500	8833500	8863500	8873500
38	8823800	8833800	8863800	8873800
40	8824000	8834000	8864000	8874000
45	8824500		8864500	
50	8825000		8865000	

✱ CENTRE CUTTING UP TO 20 MM.

For General Dimensions, see pg. T17

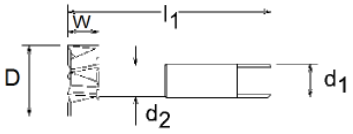
MILLING CUTTERS

SHANK TYPE

T - SLOT CUTTERS

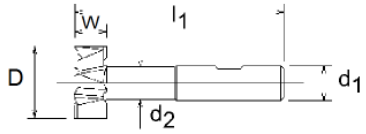
HSS - Co

TYPE 896T HSS - Co **FEW NORM**



Bolt Size mm	D Body mm	W Body mm	d_1 Shank mm	d_2 Recess mm	l_1 Length mm	Code
6	12.5	6	10	5	55	8960060
8	16	8	10	7	60	8960080
10	18	8	12	8	62	8960100
12	21	9	12	10	68	8960120
14	25	11	16	12	70	8960140
16	28	12	16	13	75	8960160
18	32	14	25	15	90	8960180
20	36	16	25	17	95	8960200
22	40	18	25	19	100	8960220

TYPE 896F HSS - Co **DIN 850 AB**

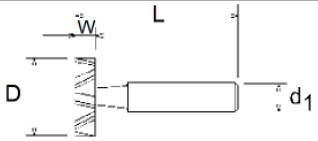


Bolt Size mm	D Body mm	W Body mm	d_1 Shank mm	d_2 Recess mm	l_1 Length mm	Code
6	12.5	6	10	5	57	8962060
8	16	8	10	7	62	8962080
10	18	8	12	8	70	8962100
12	21	9	12	10	74	8962120
14	25	11	16	12	82	8962140
16	28	12	16	13	75	8962160
18	32	14	25	15	90	8962180
20	36	16	25	17	95	8962200
22	40	18	25	19	108	8962220

WOODRUFF CUTTERS

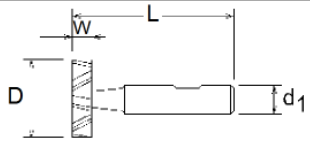
HSS - Co

TYPE 893T HSS - Co **DIN 850**



DXW mm	L	d_1	Code
10.5 x 2	56	12	8930010
10.5 x 2.5	56	12	8930020
10.5 x 3	56	12	8930030
13.5 x 3	56	12	8930040
13.5 x 4	56	12	8930050
16.5 x 3	56	12	8930060
16.5 x 4	56	12	8930070
16.5 x 5	56	12	8930080
19.5 x 4	57	12	8930090
19.5 x 5	57	12	8930100
19.5 x 6	57	12	8930110
22.5 x 5	64	12	8930120
22.5 x 6	64	12	8930130
22.5 x 8	64	12	8930140
25.5 x 6	70	12	8930150
28.5 x 6	70	12	8930160
28.5 x 8	70	12	8930170
28.5 x 10	70	12	8930180
32.5 x 8	70	12	8930200
32.5 x 10	70	12	8930210
45.5 x 10	76	12	8930220

TYPE 893F HSS - Co **DIN 850**



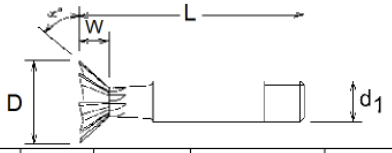
DXW mm	L	d_1	Code
10.5 x 2	50	6	8930400
10.5 x 2.5	50	6	8930410
10.5 x 3	50	6	8930420
13.5 x 3	56	10	8930430
13.5 x 4	56	10	8930440
16.5 x 3	56	10	8930450
16.5 x 4	56	10	8930460
16.5 x 5	56	10	8930470
19.5 x 4	63	10	8930480
19.5 x 5	63	10	8930490
19.5 x 6	63	10	8930500
22.5 x 5	63	10	8930510
22.5 x 6	63	10	8930520
22.5 x 8	63	10	8930530
25.5 x 6	63	12	8930540
28.5 x 6	63	12	8930550
28.5 x 8	63	12	8930560
28.5 x 10	71	12	8930570
32.5 x 8	71	12	8930580
32.5 x 10	71	12	8930590
45.5 x 10	71	12	8930600

MILLING CUTTERS

SHANK TYPE

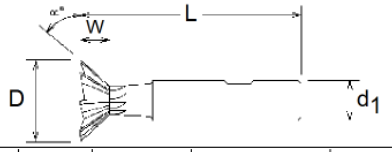
DOVETAIL CUTTERS HSS - Co

TYPE 898T HSS - Co FEW NORM



DX∝° Body mmxdeg	W Body mm	d1 Shank mm	L Overall mm	Code
16 x 45°	4	12	60	8980010
20 x 45°	5	12	63	8980020
25 x 45°	6.3	12	67	8980030
32 x 45°	8	16	71	8980040
40 x 45°	10	16	71	8980050
16 x 60°	6.3	12	60	8980060
20 x 60°	8	12	63	8980070
25 x 60°	10	12	67	8980080
32 x 60°	12.5	16	71	8980090
40 x 60°	16	16	71	8980100

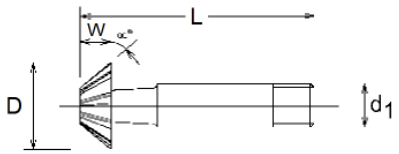
TYPE 898F HSS - Co DIN 1833C



DX∝° Body mmxdeg	W Body mm	d1 Shank mm	L Overall mm	Code
16 x 45°	4	12	60	8981010
20 x 45°	5	12	63	8981020
25 x 45°	6.3	12	67	8981030
32 x 45°	8	16	71	8981040
40 x 45°	10	16	71	8981050
16 x 60°	6.3	12	60	8981060
20 x 60°	8	12	63	8981070
25 x 60°	10	12	67	8981080
32 x 60°	12.5	16	71	8981090
40 x 60°	16	16	71	8981100

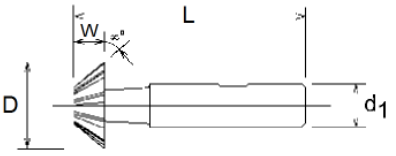
INVERTED DOVETAIL CUTTERS HSS - Co

TYPE 899T HSS - Co FEW NORM



DX∝° Body mmxdeg	W Body mm	d1 Shank mm	L Overall mm	Code
16 x 45°	4	12	60	8990010
20 x 45°	5	12	63	8990020
25 x 45°	6.3	12	67	8990030
32 x 45°	8	16	71	8990040
40 x 45°	10	16	71	8990050
16 x 60°	6.3	12	60	8990060
20 x 60°	8	12	63	8990070
25 x 60°	10	12	67	8990080
32 x 60°	12.5	16	71	8990090
40 x 60°	16	16	71	8990100

TYPE 899F HSS - Co DIN 1833D



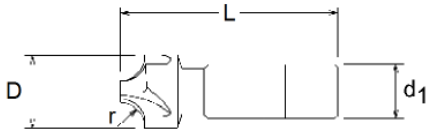
DX∝° Body mmxdeg	W Body mm	d1 Shank mm	L Overall mm	Code
16 x 45°	4	12	60	8991010
20 x 45°	5	12	63	8991020
25 x 45°	6.3	12	67	8991030
32 x 45°	8	16	71	8991040
40 x 45°	10	16	71	8991050
16 x 60°	6.3	12	60	8991060
20 x 60°	8	12	63	8991070
25 x 60°	10	12	67	8991080
32 x 60°	12.5	16	71	8991090
40 x 60°	16	16	71	8991100

MILLING CUTTERS

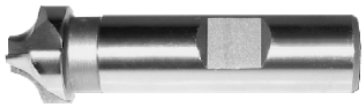
SHANK TYPE

CORNER ROUNDING CUTTERS HSS - Co

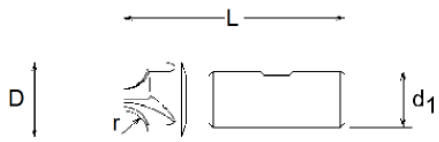
TYPE 895T **HSS - Co** **DIN 6518D**



r Radius mm	D Body mm	d_1 Shank mm	L Overall mm	Code
2	10	10	60	8950020
3	12	12	60	8950030
4	14	12	60	8950040
5	16	12	60	8950050
6	20	16	67	8950060
8	24	16	71	8950080
10	28	25	85	8950100
12	34	25	90	8950120
14	44	25	100	8950140
16	48	25	100	8950160
20	56	32	112	8950200



TYPE 895F **HSS - Co** **DIN 6518D**



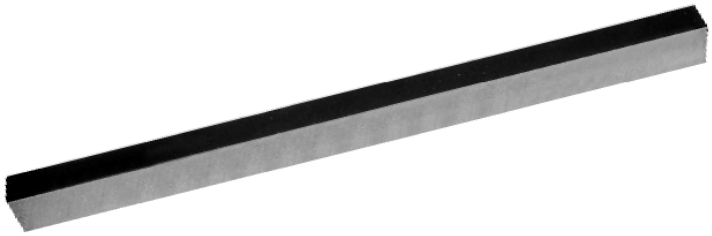
r Radius mm	D Body mm	d_1 Shank mm	L Overall mm	Code
2	10	10	60	8952020
3	12	12	60	8952030
4	14	12	60	8952040
5	16	12	70	8952050
6	20	16	70	8952060
8	24	16	70	8952080
10	28	25	85	8952100
12	34	25	100	8952120
14	44	25	100	8952140
16	48	25	105	8952160

SQUARE TOOLBITS HSS / HSSE - Co8

ISO 5421 Tolerance h13

METRIC

Square Section mm	Length mm	HSS CODE	HSSE-Co8 CODE
4	63	1542500	1552500
5	63	1542600	1552600
5	80	1542650	1552700
5	100		1552730
6	63	1542750	1552750
6	80	1542800	1552800
6	100	1542900	1552900
6	125	1542925	1553000
6	160	1543100	1553100
6	200	1543150	1553150
8	63	1543200	1553200
8	80	1543300	1553300
8	100	1543400	1553400
8	125		1553500
8	160	1543600	1553600
8	200	1543700	1553700
10	63	1543750	1553750
10	80	1543780	1553780
10	100	1543800	1553800
10	160	1544000	1554000
10	200	1544100	1554100
12	100	1544200	1554200
12	160	1544400	1554400
12	200	1544500	1554500
16	100	1544750	1554750
16	160	1544800	1554800
16	200	1544900	1554900
20	160	1544950	1554950
20	200	1545000	1555000
25	200	1545100	1555100



IMPERIAL

Square Section Inch	Length Inch	HSSE-Co8 CODE
3/16	2 1/2	1550000
1/4	2 1/2	1550100
1/4	4	1550200
1/4	8	1550300
5/16	2 1/2	1550400
5/16	3	1550500
5/16	4	1550600
5/16	8	1550700
3/8	3	1550800
3/8	4	1550900
3/8	5	1551000
3/8	8	1551100
1/2	4	1551400
1/2	6	1551500
1/2	8	1551600
5/8	6	1551800
5/8	8	1552000
3/4	6	1552100
3/4	8	1552150
3/4	12	1552200
1"	6	1552300
1"	8	1552400

ROUND TOOLBITS HSS / HSSE - Co8

ISO 5421 Tolerance h9

METRIC

Dia mm	Length mm	HSS CODE	HSSE-Co8 CODE
3	63		1556900
4	63	1546950	1556950
4	80	1547000	1557000
4	100	1547050	1557050
5	63	1547150	1557150
5	80	1547200	1557200
5	100	1547250	1557250
6	63	1547280	1557280
6	80	1547300	1557300
6	100	1547400	1557400
6	160	1547500	1557500
6	200	1547550	1557550
8	63	1547600	1557600
8	80	1547700	1557700
8	100	1547800	1557800
8	160	1547900	1557900
8	200	1547950	1557950
10	63	1547970	1557970
10	80	1547980	1557980
10	100	1548000	1558000
10	160	1548020	1558020
10	200	1548040	1558040
12	100	1548100	1558100
12	160	1548200	1558200
12	200	1548220	1558220
16	100	1548400	1558400
16	160	1548500	1558500
16	200	1548520	1558520
20	160	1548800	1558800
20	200	1548900	1558900
25	200	1549000	1559000

IMPERIAL

Dia Inch	Length Inch	HSSE-Co8 CODE
1/8	2 1/2	1555700
3/16	2 1/2	1555800
1/4	2 1/2	1555900
1/4	4	1556000
5/16	2 1/2	1556100
5/16	4	1556200
3/8	3	1556300
3/8	5	1556400
1/2	4	1556600
5/8	4 1/2	1556700
3/4	5	1556800

Chemical Composition (%)

Alloy	M2 HSS	M42 HSSE-Co8
C	0,9 %	**1,08 %**
Cr	4,2 %	**3,9 %**
V	1,8 %	**1,2 %**
Co	---	**8,0 %**
W	6,4 %	**1,5 %**
Mo	5.0 %	**9,4 %**

RECTANGULAR TOOLBITS HSSE - Co8

ISO 5421 Tolerance h13

METRIC SIZES

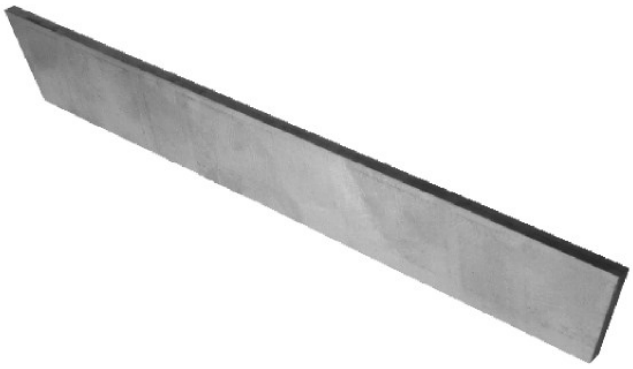
WIDTH mm	HEIGHT mm	LENGTH mm	CODE
4	6	100	1559550
4	8	100	1559570
5	8	100	1559590
5	10	100	1559610
6	10	100	1559640
6	10	200	1559660
6	12	160	1559680
6	12	200	1559690
8	12	160	1559710
8	12	200	1559720

METRIC SIZES

WIDTH mm	HEIGHT mm	LENGTH mm	CODE
8	16	160	1559740
8	16	200	1559750
10	16	160	1559780
10	16	200	1559790
10	20	160	1559810
10	20	200	1559820
12	20	160	1559850
12	20	200	1559860
12	25	200	1559880
16	25	200	1559890

PARTING BLADES HSSE - Co8

DOUBLE BEVEL



METRIC SIZES

WIDTH mm	HEIGHT mm	LENGTH mm	CODE
3	12	120	1559910
3	16	140	1559920
4	18	140	1559930
3	20	140	1559940
4	20	140	1559950
4	25	250	1559960
6	25	250	1559970

THE RECOIL SYSTEM

THREAD REPAIR KITS / INSERTS / TAPS

PRO XL KITS CONSISTING OF HIGH SPEED STEEL TAP, DRILL, MAGNETIC TANG BREAKOFF (up to 12mm) / INSERTING TOOL, INSERTS, CONTAINER AND INSTRUCTIONS

Pro XL Kit

304 Stainless

Spiral point (gun tap)

Pilot nose

METRIC COARSE SIZE	DRILL SIZE mm	KITS		INSERTS			TAPS	
		INSERTS PER KIT	CODE	LENGTH: 1 D	LENGTH: 1-5 D	LENGTH: 2 D	INTER (SEC)	SPIRAL POINT
M 2 X 0,4	2.1	15	7350200		7050230	7050240	7450250	
M 3 X 0,5	3.2	15	7350300	7050320	7050330	7050340	7450350	7450380
M 3,5 X 0,6	3.7	15	7353500		7053530	7053540	7453550	
M 4 X 0,7	4.2	15	7350400	7050420	7050430	7050440	7450450	7450480
M 5 X 0,8	5.2	15	7350500	7050520	7050530	7050540	7450550	7450580
M 6 X 1	6.3	15	7350600	7050620	7050630	7050640	7450650	7450680
M 7 X 1	7.3	15	7350700	7050720	7050730	7050740	7450750	
M 8 X 1,25	8.3	15	7350800	7050820	7050830	7050840	7450850	7450880
M 9 X 1,25	9.4	15	7350900		7050930	7050940	7450950	
M 10 X 1,5	10.3	10	7351000	7051020	7051030	7051040	7451050	7451080
M 11 X 1,5	11.5	10			7051130	7051140	7451150	
M 12 X 1,75	12.5	10	7351200	7051220	7051230	7051240	7451250	7451280
M 14 X 2	14.5	6	7351400	7051420	7051430		7451450	7451480
M 15 X 2	15.5	6			7051530		7451550	
M 16 X 2	16.5	6	7351600	7051620	7051630	7051640	7451650	7451680
M 18 X 2,5	18.8	6	7351800	7051820	7051830	7051840	7451850	7451880
M 20 X 2,5	20.8	6	7352000	7052020	7052030	7052040	7452050	7452080
M 22 X 2,5	22.8	5	7352200	7052220	7052230		7452250	
M 24 X 3	24.8	5	7352400	7052420	7052430	7052440	7452450	7452480
M 27 X 3	28.0	5	7352700	7052720	7052730	7052740	7452750	
M 30 X 3,5	30.5	5	7352000		7053030	7053040	7453050	
M 33 X 3,5	34.0	5						
M 36 X 4	37.0	4						

PLEASE NOTE: M3 to M12 Sold 10 inserts per packet; M14 to M24 Sold 5 inserts per packet.

THE RECOIL SYSTEM

THREAD REPAIR KITS / INSERTS / TAPS

PRO XL KITS CONSISTING OF HIGH SPEED STEEL TAP, DRILL, MAGNETIC TANG BREAKOFF (up to 12mm) / INSERTING TOOL, INSERTS, CONTAINER AND INSTRUCTIONS

METRIC FINE		KITS		INSERTS			TAPS	
SIZE	DRILL SIZE mm	INSERTS PER KIT	CODE	LENGTH: 1 D	LENGTH: 1-5 D	LENGTH: 2 D	INTER (SECOND)	PILOT NOSE
M 8 X 1	8.3	15	7370800	7070820	7070830	7070840	7470850	
M 9 X 1	9.4	10	7370900	7070920	7070930		7470950	
M 10 X 1	10.3	10	7381010	7081020	7081030	7081040	7481050	7481070
M 10 X 1,25	10.3	10	7371000	7071020	7071030	7071040	7471050	
M 11 X 1	11.3	10			7081130	7081140		
M 12 X 1,25	12.3	10	7381210		7081230	7081240	7481250	7481270
M 12 X 1,5	12.3	10	7371200	7071220	7071230	7071240	7471250	
M 14 X 1,25	14.3	6	7381410	7081480	7081490	7081400	7481450	7481470
M 14 X 1,5	14.3	6	7371400	7071420	7071430	7071440	7471450	
M 16 X 1,5	16.5	6	7371600		7071630	7071640	7471650	
M 18 X 1,5	18.5	6	7381810		7081830	7081840	7481850	
M 18 X 2	18.5	6			7071830	7071840	7471850	
M 20 X 1,5	20.5	5	7382000		7082030		7482050	
M 20 X 2	20.5	5			7072030			
M 22 X 1,5	22.5	5	7382200		7082230		7482250	
M 22 X 2	22.5	5			7072230		7472250	
M 24 X 1,5	24.5	5	7382400		7082430		7482450	
M 24 X 2	24.5	5			7072430		7472450	
M 27 X 2	27.5	5			7072730		7472750	
M 30 X 1,5	30.5	5			7083030		7483050	
M 30 X 2	30.5	5			7073030		7473050	

SPARKPLUG (SPECIAL KITS INCLUDE PILOT NOSE TAP – NO DRILLING REQUIRED)

M 10 X 1		10	7381000	7081020	7081030	7081040		
M 12 X 1,25		10	7381200		7081230	7081240		
M 14 X 1,25 A/N		10	7381420	† 7081480	‡ 7081490	# 7081400		
M 14 X 1,25*		10	7381400	† 7081480	‡ 7081490	# 7081400		
M 18 X 1,5		6	7381800		7081830	7081840		

* Incl Extracting tool in large TiN † 3/8" ‡ 1/2" # 3/4"
PLEASE NOTE: M3 to M12 Sold 10 inserts per packet; M14 to M24 Sold 5 inserts per packet.

THE RECOIL SYSTEM

THREAD REPAIR KITS / INSERTS / TAPS

PRO XL KITS CONSISTING OF HIGH SPEED STEEL TAP, DRILL, MAGNETIC TANG BREAKOFF (up to 12mm) / INSERTING TOOL, INSERTS, CONTAINER AND INSTRUCTIONS

UNC	KITS			INSERTS			TAPS	
SIZE	DRILL SIZE mm	INSERTS PER KIT	CODE	LENGTH: 1 D	LENGTH: 1-5 D	LENGTH: 2 D	INTER (SECOND)	SPIRAL POINT
No4 X 40	3.0	15	7335400					
No6 X 32	3.7	15	7335600		7035630		7435650	
No8 X 32	4.4	15	7335800		7035830		7435850	
No10 X 24	5.0	15	7336000	7036020	7036030	7036040	7436050	
1/4 X 20	6.7	15	7330400	7030420	7030430	7030440	7430450	
5/16 X 18	8.3	15	7330500	7030520	7030530	7030540	7430550	
3/8 X 16	9.9	15	7330600	7030620	7030630	7030640	7430650	
7/16 X 14	11.5	10	7330700	7030720	7030730	7030740	7430750	
1/2 X 13	13.0	10	7330800	7030820	7030830	7030840	7430850	
9/16 X 12	14.5	6	7330900		7030930			
5/8 X 11	16.5	6	7331000	7031020	7031030	7031040	7431050	
3/4 X 10	19.8	6	7331200	7031220	7031230	7031240	7431250	
7/8 X 9	23.0	5	7331400	7031420	7031430	7031440	7431450	
1" X 8	26.0	5	7331600	7031620	7031630	7031640	7431650	

UNF

No6 X 40	3.7	10	7345600		7045630		7445650	
No8 X 36	4.4	10	7345800		7045830		7445850	
No10 X 32	5.1	10	7346000		7046030		7446050	
1/4 X 28	6.6	10	7340400		7040430		7440450	
5/16 X 24	8.2	10	7340500		7040530		7440550	
3/8 X 24	9.8	10	7340600		7040630		7440650	
7/16 X 20	11.5	5	7340700		7040730		7440750	
1/2 X 20	13.0	5	7340800		7040830		7440850	
9/16 X 18	14.5	5	7340900		7040930		7440950	
5/8 X 18	16.3	5	7341000		7041030		7441050	
3/4 X 16	19.5	5	7341200		7041230		7441250	
7/8 X 14	22.5	5	7341400		7041430			
1" X 12	26.0	5	7341600		7041630			

PLEASE NOTE: M3 to M12 Sold 10 inserts per packet; M14 to M24 Sold 5 inserts per packet.

THE RECOIL SYSTEM

THREAD REPAIR KITS / INSERTS / TAPS

PRO XL KITS CONSISTING OF HIGH SPEED STEEL TAP, DRILL, MAGNETIC TANG BREAKOFF (up to 12mm) / INSERTING TOOL, INSERTS, CONTAINER AND INSTRUCTIONS

BSW SIZE	DRILL SIZE mm	KITS: INSERTS PER KIT	KITS: CODE	INSERTS: LENGTH: 1 D	INSERTS: LENGTH: 1-5 D	INSERTS: LENGTH: 2 D	TAPS: INTER (SECOND)	TAPS: SPIRAL POINT
1/8 X 40	3.4	15	7320200		7020230		7420250	
3/16 X 24	5.0	15	7320300		7020330		7420350	
1/4 X 20	6.7	15	7320400		7020430		7420450	
5/16 X 18	8.3	15	7320500		7020530		7420550	
3/8 X 16	9.9	10	7320600		7020630		7420650	
7/16 X 14	11.5	10	7320700		7020730		7420750	
1/2 X 12	13.0	10	7320800	7020820	7020830	7020840	7420850	
9/16 X 12	15.0	6	7320900		7020930		7420950	
5/8 X 11	16.5	6	7321000		7021030		7421050	
3/4 X 10	19.8	6	7321200		7021230		7421250	
7/8 X 9	23.0	5	7321400		7021430		7421450	
1" X 8	26.0	5	7321600		7021630		7421650	
BSF								
3/16 X 32	5.0	15				7000340	7400350	
1/4 X 26	6.6	15	7300400			7000440	7400450	
5/16 X 22	8.2	15	7300500			7000540	7400550	
3/8 X 20	9.8	10	7300600			7000640	7400650	
7/16 X 18	11.5	10	7300700			7000740	7400750	
1/2 X 16	13.0	10	7300800			7000840	7400850	
9/16 X 16	14.5	6				7000940	7400950	
5/8 X 14	16.2	6				7001040	7401050	
3/4 X 12	19.5	6				7001240	7401250	
1" X 10	26.0	5			7001630	7001640	7401650	
BSP								
1/8 X 28	9.9	10	7310200		7010230		7410250	
1/4 X 19	13.5	6	7310400		7010430		7410450	
3/8 X 19	17.0	6	7310600		7010630		7410650	
1/2 X 14	21.5	5	7310800		7010830		7410850	
3/4 X 14	27.0	5		7011220	7011230		7411250	
1" X 11	33.5	5			7011630		7411650	

PLEASE NOTE: M3 to M12 Sold 10 inserts per packet; M14 to M24 Sold 5 inserts per packet.

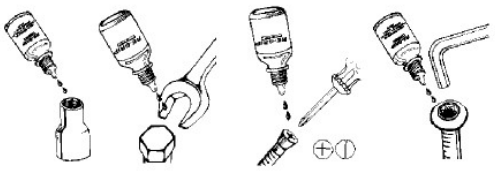
THE RECOIL SYSTEM

THREAD REPAIR KITS / MERCHANDISERS / TOOLS

RANGE KITS	CODE
UNC 1/4, 5/16, 3/8, 7/16, 1/2	7330040
UNF 1/4, 5/16, 3/8, 7/16, 1/2	7340040
METRIC M5X0.8, M6X1, M8X1.25, M10X1.5, M12X1.75	7350040
METRIC M6X1, M8X1.25, M10X1.5, M12X1.75, M16X2	7350050
METRIC M6X1, 8X1.25, 10X1, 10X1.25, 12X1.25, 14X1.25	7380060

RANGE KITS CONSISTING OF HIGH SPEED STEEL TAP, DRILL, INSERTS, TANG BREAKOFF / INSERTING TOOL, CONTAINER AND INSTRUCTIONS

Re-Grip 15mm Tube CODE 7507725



EXTRACTING TOOLS

FITS		CODE
SIZE	METRIC	
2-52 thru to 8 gauge	M2 thru to 8 gauge	7500010
4-40 thru to 3/8	M3 thru to M10	7500020
6-32 thru to 1"	M4 thru to M24	7500030

Extracting tools are simple and easy to use, and the best way of removing inserts. Correct positioning will make extraction a lot easier.

MINI WALL OR COUNTER STAND

DIMENSIONS - 480mm x 300mm x 170mm

RKVS-M CODE 7500150
METRIC M3X0.5, M4X0.7, M5X0.8, M6X1, M8X1.25, M10X1.5, M12X1.75, M14X1.25, M16X2

INSTALLATION TOOLS

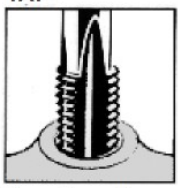
SIZE mm	CODE	SIZE mm	CODE
2	7500610	9	7502810
2.5	7500690	10	7503130
3	7500890	12	7503750
3.5	7500950	14	7504380
4	7501250	16	7505000
5	7501560	18	7505910
6	7501880	22	7506880
7	7502190	24	7507500
8	7502500	30	7507501
		3/16"	7501400

RECOIL INSTALLATION

DRILL

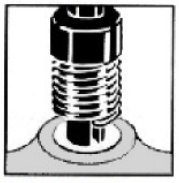
Drill to clear out the damaged thread (if necessary).

TAP



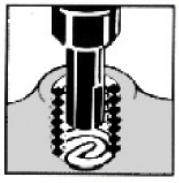
Thread insert tap supplied. Tap thread should match up with bolt.

INSTALL

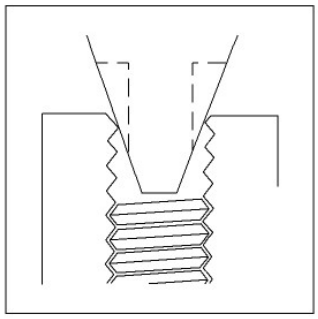


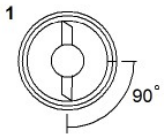
Wind insert in with light downward pressure until 1/4 to 1/2 turn below surface, driving tang towards bottom of the hole.

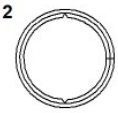
TANG REMOVAL



Remove tool and sit back on top of tang. Tap down sharply. Do not try to twist tang off. Sparkplug and large fine threads, use long nose pliers and pull tang out.







1 Insert the extracting tool 90° from the start of the coil, this makes it much easier for the insert to wind out.

2 If trouble continues, file a small notch in the insert for the tool to bite into.

BROACHES - HSS AMERICAN STANDARD

METRIC KEYWAY BROACH SETS 2MM TO 18MM

No 60 Metric Set

The most common metric keyway combination for small keyways and bores.

2 broaches and 3 bushings = 6 keyway combinations

Keyway Sizes	Broach Style	mm Bushing Diameters (bore sizes)	Code
2mm	A	6, 8, 10	3045000
3mm	A		

Collared bushings only.

No 70 Metric Set

Our most popular metric broach set.

4 broaches and 13 bushings = 26 keyway combinations

Keyway Sizes	Broach Style	mm Bushing Diameters (bore sizes)	Code
4mm	B - 1	12, 14	3045200
5mm	B - 1	15, 16	
6mm	C - 1	18, 19, 20, 22	
8mm	C - 1	24, 25, 26, 28, 30	

Collared bushings only.

No 80 Metric Set

The most common metric keyway combination for medium sized keyways and bores.

3 broaches and 12 bushings = 36 keyway combinations

Keyway Sizes	Broach Style	mm Bushing Diameters (bore sizes)	Code
10mm	D - 1	32, 34, 35, 36	3045600
12mm	D - 1	38, 40, 42, 44	
14mm	D - 1	45, 46, 48, 50	

Plain bushings only.

No 90 Metric Set

The most common metric keyway combination for large keyways and bores.

2 broaches and 8 bushings = 16 keyway combinations

Keyway Sizes	Broach Style	mm Bushing Diameters (bore sizes)	Code
16mm	E - 1	52, 54, 55, 56	3045800
18mm	E - 1	58, 60, 62, 65	

Plain bushings only.

APPLICATIONS

- Short Run Production
- General Maintenance

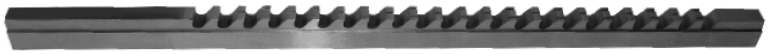
BROACHES - HSS AMERICAN STANDARD

KEYWAY BROACHES

METRIC STANDARDS

Stock Sizes

All required shims are provided.



Keyway Width mm	Tolerances Decimal Equiv. in Inches	Broach Dimensions in Inches	Standard Millimeter Keys
2 - A	0.0782 - 0.0792	1/8 x 5	2 x 2
3 - A	0.1176 - 0.1186	1/8 x 5	3 x 3
4 - B - 1	0.1568 - 0.1581	1/4 x 6 3/4	4 x 4
5 - B - 1	0.1963 - 0.1974	1/4 x 6 3/4	5 x 5
5 - C	0.1963 - 0.1974	3/8 x 11 3/4	5 x 5
6 - C - 1	0.2356 - 0.2368	3/8 x 11 3/4	6 x 6
8 - C - 1	0.3143 - 0.3157	3/8 x 11 3/4	8 x 7
10 - D - 1	0.3930 - 0.3944	9/16 x 13 7/8	10 x 8
12 - D - 1`	0.4716 - 0.4733	9/16 x 13 7/8	12 x 8
14 - D - 1	0.5503 - 0.5520	9/16 x 13 7/8	14 x 9
16 - E - 1	0.6290 - 0.6307	3/4 x 15 1/2	16 x 10
18 - E - 1	0.7078 - 0.7095	3/4 x 15 1/2	18 x 11
20 - F - 1	0.7864 - 0.7884	1 x 20 1/4	20 x 12
22 - F - 1	0.8651 - 0.8671	1 x 20 1/4	22 x 14
24 - F	0.9439 - 0.9459	1 x 20 1/4	24 x 14
25 - F - 1	0.9832 - 0.9852	1 x 20 1/4	25 x 14

Shims Required	Tooth Pitch	Number of Teeth	Length of Cut Min. & Max.		Code
0	1/16	18	13/64	1 1/8	3045880
1	3/16	18	13/64	1 1/8	3045900
1	9/32	16	19/64	1 11/16	3050000
1	9/32	16	19/64	1 11/16	3050200
1	3/8	20	25/64	2 1/2	
1	3/8	20	25/64	2 1/2	3050400
2	3/8	20	25/64	2 1/2	3050600
2	5/8	17	1	6	3050800
2	5/8	17	1	6	3051000
2	5/8	17	1	6	3051200
3	5/8	20	1	6	3051400
3	5/8	20	1	6	3051600
3	5/8	26	1	6	3051800
4	5/8	26	1	6	3052000
4	5/8	26	1	6	
4	5/8	26	1	6	

Imperial Sizes

American Standards

Stock Sizes

All required shims are provided

Broach Size	Tolerances	Broach Dimensions
3/16 x B	0.1877 - 0.1887	3/16 x 6 3/4
1/4 x C	0.2502 - 0.2512	3/8 x 11 3/4
5/16 x C	0.3127 - 0.3137	3/8 x 11 3/4
3/8 x C	0.3755 - 0.3765	3/8 x 11 3/4
1/2 x D	0.5006 - 0.5016	9/16 x 13 7/8

Shims Required	Tooth Pitch	Number of Teeth	Length of Cut Min. & Max.		Code
1	9/32	16	19/64	1 11/16	3060000
1	3/8	20	25/64	2 1/2	3060200
2	3/8	20	25/64	2 1/2	3060400
2	3/8	20	25/64	2 1/2	3060600
3	5/8	17	1	6	3060800

Note: Broaches are made with 8° - 10° rake and relieved for cutting steels and cast iron. If keyways are to be cut in brass or similar soft metals, the rake should be removed. The broaches can then be used only on such soft metals. Broaches and shims should be ordered by SIZE and LETTER.

BROACHES - HSS AMERICAN STANDARD

KEYWAY BUSHINGS (METRIC STANDARDS)

A Bushings for A Broaches

Diameter mm	Decimal Equivalent Inches	EDP No. Plain Only	Code
6	0.02362	44501	3069200
8	0.315	44431	3069300
10	0.3937	44432	3069400
12	0.4724	44502	3069600
15	0.5905	44503	3069800

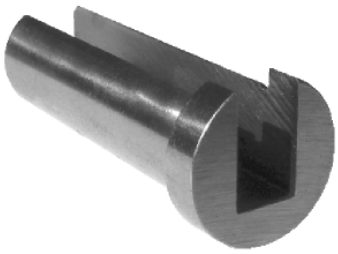
B Bushings for B Broaches

Diameter mm	Decimal Equivalent Inches	EDP No. Plain Only	Code
12	0.4724	44433	3070000
14	0.5512	44434	3070200
15	0.5905	44504	3070400
16	0.6299	44435	3070600
17	0.6693	44505	3070700
18	0.7087	44436	3070800
19	0.7480	44506	3071000

C Bushings for C Broaches

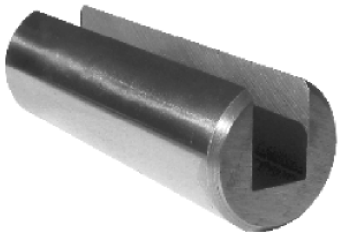
Diameter mm	Decimal Equivalent Inches	EDP No. Plain Only	Code
18	0.7087	44437	3071200
19	0.7480	44438	3071400
20	0.7874	44439	3071600
22	0.8661	44440	3071800
24	0.9449	44441	3072000
25	0.9842	44442	3072200
26	1.0236	44443	3072400
28	1.1024	44444	3072600
30	1.1811	44445	3072800
32	1.2598	44446	3073000
34	1.3386	44447	3073200
35	1.3779	44507	3073400
36	1.4173	44448	3073600

COLLARED BUSHING



Collared bushings supplied on A,B & C broach style

PLAIN BUSHING



Plain bushings supplied on D,E & F broach style

D Bushings for D Broaches

Diameter mm	Decimal Equivalent Inches	EDP No. Plain Only	Code
32	1.2598	44449	3073800
34	1.3386	44450	3074000
35	1.3779	44451	3074200
36	1.4173	44452	3074400
38	1.4961	44453	3074600
40	1.5748	44454	3074800
42	1.6535	44455	3075000
44	1.7323	44456	3075200
45	1.7716	44457	3075400
46	1.8110	44458	3075600
48	1.8898	44459	3075800
50	1.9685	44460	3076000
52	2.0472	44461	3076200
54	2.1260	44462	3076400
56	2.2047	44463	3076600

E Bushings for E Broaches

Diameter mm	Decimal Equivalent Inches	EDP No. Plain Only	Code
52	2.0472	44464	3076800
54	2.1260	44465	3077000
55	2.1653	44466	3077200
56	2.2047	44467	3077400
58	2.2835	44468	3077600
60	2.3622	44469	3077800
62	2.4409	44470	3078000
63	2.4803	44471	3078200
64	2.5197	44472	3078400
65	2.5590	44473	3078600
66	2.5984	44474	3078800
68	2.6772	44475	3079000
70	2.7559	44476	3079200
72	2.8346	44477	3079400

Metric Keyway Bushings enable the operator to use individual metric keyway broaches in a variety of bore sizes. Both bushings and broaches are designated by a letter which signifies the width of the keyway broach and bushing opening. For proper fit, use bushing with the same letter designation as the broach being used - i.e. Metric A Bushings with Metric A Broaches, Metric B Bushings with Metric B Broaches, etc. F Style bushings are available for F Style broaches on short delivery.

BROACHES - HSS AMERICAN STANDARD

SQUARE BROACHES

METRIC STANDARDS
Stock Sizes

Square Size mm	Tolerances Decimal Equiv. in Inches	Across Corners Dimensions in Inches	Pilot Dia in Inches	Drill Size mm	Broach Length Inches	Code
6	0.2367 - 0.2377	0.3295 - 0.3300	0.2500	6.3	7	3080060
8	0.3155 - 0.3165	0.4405 - 0.4410	0.3267	8.3	9	3080080
10	0.3942 - 0.3952	0.5435 - 0.5445	0.4057	10.3	11	3080100
12	0.4729 - 0.4739	0.6540 - 0.6550	0.4921	12.5	13	3080120
16	0.6310 - 0.6320	0.8780 - 0.8790	0.6693	17	17	3080160
18	0.7092 - 0.7102	0.9880 - 0.9890	0.7874	20	19	3080180
20	0.7879 - 0.7889	1.0990 - 1.1000	0.8661	22	19	3080200
25	0.9848 - 0.9858	1.3730 - 1.3740	1.0630	27	25	3080250

Imperial Sizes

American Standards
Stock Sizes

Square Size Inches	Tolerances Decimal Equiv. in Inches	Across Corners Dimensions in Inches	Pilot Dia in Inches	Drill Size mm	Broach Length Inches	Code
$^{3}/_{16}$	0.1880 - 0.1890	0.2620 - 0.2640	0.1935	4.9	6	3080500
$^{1}/_{4}$	0.2505 - 0.2515	0.3500 - 0.3520	0.2656	6.75	7	3080520
$^{5}/_{16}$	0.3130 - 0.3140	0.4370 - 0.4390	0.3281	8.3	8	3080540
$^{3}/_{8}$	0.3755 - 0.3765	0.5230 - 0.5250	0.3906	9.9	10	3080560
$^{7}/_{16}$	0.4385 - 0.4395	0.6110 - 0.6130	0.4531	11.5	11	3080580
$^{1}/_{2}$	0.5005 - 0.5015	0.6970 - 0.6990	0.5312	13.5	12	3080600
$^{5}/_{8}$	0.6260 - 0.6270	0.8710 - 0.8730	0.6562	16.7	17	3080620
$^{3}/_{4}$	0.7510 - 0.7520	1.0450 - 1.0470	0.8125	20.5	18	3080640
$^{7}/_{8}$	0.8765 - 0.8775	1.2280 - 1.2300	0.9375	23.8	23	3080660
1”	1.0020 - 1.0030	1.4030 - 1.4050	1.0938	27.80	25	3080680

BROACHES - HSS AMERICAN STANDARD

HEXAGON BROACHES

METRIC STANDARDS
Stock Sizes

Square Size mm	Tolerances Decimal Equiv. in Inches	Diagonal Dimensions in Inches	Pilot Dia in Inches	Drill Size mm	Broach Length Inches	Code
6	0.2367 - 0.2377	0.2730 - 0.2740	0.2362	6	7	3081060
8	0.3155 - 0.3165	0.3634 - 0.3644	0.3150	8	9	3081080
10	0.3942 - 0.3952	0.4543 - 0.4553	0.3937	10	10	3081100
12	0.4729 - 0.4739	0.5452 - 0.5462	0.4724	12	13	3081120
16	0.6310 - 0.6320	0.7248 - 0.7258	0.6230	16	17	3081160
18	0.7092 - 0.7102	0.8150 - 0.8160	0.7087	18	17	3081180
20	0.7879 - 0.7889	0.9049 - 0.9059	0.7874	20	18	3081200
25	0.9848 - 0.9858	1.1323 - 1.1333	0.9852	25	20	3081250

Imperial Sizes

American Standards
Stock Sizes

Square Size Inches	Tolerances Decimal Equiv. in Inches	Across Corners Dimensions in Inches	Pilot Dia in Inches	Drill Size mm	Broach Length Inches	Code
3/16	0.1880 - 0.1890	0.2145 - 0.2155	3/16	4.7	6	3081500
1/4	0.2505 - 0.2515	0.2865 - 0.2875	1/4	6.3	6	3081520
5/16	0.3130 - 0.3140	0.3580 - 0.3590	5/16	7.9	8	3081540
3/8	0.3755 - 0.3765	0.4300 - 0.4310	3/8	9.5	9	3081560
7/16	0.4385 - 0.4395	0.5020 - 0.5030	7/16	11.1	11	3081580
1/2	0.5005 - 0.5015	0.5740 - 0.5750	1/2	12.7	12	3081600
5/8	0.6260 - 0.6270	0.7170 - 0.7185	5/8	15.9	17	3081620
3/4	0.7510 - 0.7520	0.8610 - 0.8625	3/4	19	18	3081640
7/8	0.8765 - 0.8775	1.0085 - 1.0095	7/8	22.2	19	3081660
1"	1.0020 - 1.0030	1.1520 - 1.1530	1"	25.4	20	3081680

GAUGES

SCREW PLUG GAUGES GO AND NO GO

MC PLUG GAUGE 6H

SIZE	CODE Double Ended
M2 X 0,4	2756820
M2,5 X 0,45	2756880
M3 X 0,5	2757000
M3,5 X 0,6	2757070
M4 X 0,7	2757100
M5 X 0,8	2757200
M6 X 1,0	2757300
M7 X 1,0	2757370
M8 X 1,25	2757400
M10 X 1,5	2757500
M12 X 1,75	2757600
M14 X 2,0	2757700
M16 X 2,0	2757800
M18 X 2,5	2757850
M20 X 2,5	2757900
M22 X 2,5	2757990
M24 X 3,0	2758060
M27 X 3,0	2758120
M30 X 3,5	2758210
M33 X 3,5	2758300
M36 X 4,0	2758390

MF PLUG GAUGE 6H

SIZE	CODE Double Ended
M6 X 0,75	2758600
M8 X 0,75	2758820
M8 X 1,0	2758910
M10 X 1,0	2758990
M10 X 1,25	2759080
M12 X 1,0	2759150
M12 X 1,25	2759230
M12 X 1,5	2759320
M14 X 1,0	2759400
M14 X 1,25	2759490
M14 X 1,5	2759580
M16 X 1,5	2759640
M20 X 1,5	2759730
M22 X 1,5	2759820
M24 X 1,5	2759910

UNC PLUG GAUGE 2B

SIZE	CODE Double Ended
NO4 - 40	2759990
NO5 - 40	2760080
NO6 - 32	2760170
NO8 - 32	2760260
NO10 - 24	2760340
NO12 - 24	2760430
1/4 - 20	2760520
5/16 - 18	2760610
3/8 - 16	2760700
7/16 - 14	2760790
1/2 - 13	2760880
9/16 - 12	2760970
5/8 - 11	2761080
3/4 - 10	2761170
7/8 - 9	2761260
1" - 8	2761330

UNF PLUG GAUGE 2B

SIZE	CODE Double Ended
NO4 - 48	2761420
NO5 - 44	2761510
NO6 - 40	2761600
NO8 - 36	2761690
NO10 - 32	2761780
NO12 - 28	2761870
1/4 - 28	2761960
5/16 - 24	2762050
3/8 - 24	2762140
7/16 - 20	2762230
1/2 - 20	2762320
9/16 - 18	2762370
5/8 - 18	2762410
3/4 - 16	2762490
7/8 - 14	2762580
1" - 12	2762680

G BSP PLUG

SIZE	CODE Double Ended
G 1/8 - 28	2762770
G 1/4 - 19	2762860
G 3/8 - 19	2762950
G 1/2 - 14	2763040
G 5/8 - 14	2763130
G 3/4 - 14	2763220
G 7/8 - 14	2763310
G 1" - 11	2763390

RC BSPT PLUG GAUGE

SIZE	CODE System B
RC 1/8 - 28	2763500
RC 1/4 - 19	2763530
RC 3/8 - 19	2763560
RC 1/2 - 14	2763590
RC 3/4 - 14	2763620
RC 1" - 11	2763650

NPT PLUG GAUGE

SIZE	CODE Basic Step L1
1/8 - 27	2763680
1/4 - 18	2763710
3/8 - 18	2763740
1/2 - 14	2763770
3/4 - 14	2763800
1" - 11.5	2763830

GAUGES

SCREW RING GAUGES GO AND NO GO

MC RING GAUGE 6g

SIZE	Go CODE	No Go CODE
M2 X 0,4	2756840	2756860
M2,5 X 0,45	2756900	2756920
M3 X 0,5	2757050	2757060
M3,5 X 0,6	2757080	2757090
M4 X 0,7	2757150	2757160
M5 X 0,8	2757250	2757260
M6 X 1,0	2757350	2757360
M7 X 1,0	2757380	2757390
M8 X 1,25	2757450	2757460
M10 X 1,5	2757550	2757560
M12 X 1,75	2757650	2757660
M14 X 2,0	2757750	2757780
M16 X 2,0	2757820	2757840
M18 X 2,5	2757860	2757880
M20 X 2,5	2757930	2757960
M22 X 2,5	2758020	2758040
M24 X 3,0	2758080	2758100
M27 X 3,0	2758150	2758180
M30 X 3,5	2758240	2758270
M33 X 3,5	2758330	2758360
M36 X 4,0	2758420	2758440

MF RING GAUGE 6g

SIZE	Go CODE	No Go CODE
M6 X 0,75	2758630	2758660
M8 X 0,75	2758850	2758880
M8 X 1,0	2758940	2758970
M10 X 1,0	2759020	2759050
M10 X 1,25	2759090	2759120
M12 X 1,0	2759180	2759200
M12 X 1,25	2759260	2759290
M12 X 1,5	2759350	2759380
M14 X 1,0	2759430	2759460
M14 X 1,25	2759520	2759550
M14 X 1,5	2759610	2759630
M16 X 1,5	2759670	2759700
M20 X 1,5	2759760	2759790
M22 X 1,5	2759850	2759880
M24 X 1,5	2759940	2759970

UNC RING GAUGE 2A

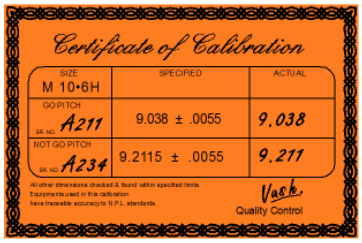
SIZE	Go CODE	No Go CODE
NO4 - 40	2760020	2760050
NO5 - 40	2760110	2760140
NO6 - 32	2760200	2760230
NO8 - 32	2760290	2760310
NO10 - 24	2760370	2760400
NO12 - 24	2760460	2760490
1/4 - 20	2760550	2760580
5/16 - 18	2760640	2760670
3/8 - 16	2760730	2760760
7/16 - 14	2760820	2760850
1/2 - 13	2760910	2760940
9/16 - 12	2761000	2761050
5/8 - 11	2761110	2761140
3/4 - 10	2761200	2761230
7/8 - 9	2761290	2761310
1" - 8	2761360	2761390

UNF RING GAUGE 2A

SIZE	Go CODE	No Go CODE
NO4 - 48	2761450	2761480
NO5 - 44	2761540	2761570
NO6 - 40	2761630	2761660
NO8 - 36	2761720	2761750
NO10 - 32	2761810	2761840
NO12 - 28	2761900	2761930
1/4 - 28	2761990	2762020
5/16 - 24	2762080	2762110
3/8 - 24	2762170	2762200
7/16 - 20	2762260	2762290
1/2 - 20	2762350	2762360
9/16 - 18	2762380	2762390
5/8 - 18	2762440	2762470
3/4 - 16	2762520	2762550
7/8 - 14	2762610	2762640
1" - 12	2762710	2762740

G BSP RING GAUGE

SIZE	Go CODE	No Go CODE
G 1/8 - 28	2762800	2762830
G 1/4 - 19	2762890	2762920
G 3/8 - 19	2762980	2763010
G 1/2 - 14	2763070	2763100
G 5/8 - 14	2763160	2763190
G 3/4 - 14	2763250	2763280
G 7/8 - 14	2763330	2763360
G 1" - 11	2763420	2763450



1) CERTIFICATE OF CALIBRATION INDICATING SPECIFIED AND ACTUAL PITCH DIAMETER PROVIDED WITH EACH THREAD GAUGE AS STANDARD.

2) DETAILED CERTIFICATE OF CALIBRATION PROVIDED AT A NOMINAL CHARGE IF DESIRED FOR THREAD GAUGES.

3) FOR SPECIAL THREAD PLUG AND RING GAUGES, PRICES WILL BE FURNISHED AGAINST SPECIFIC ENQUIRIES.

SOLID CARBIDE CUTTER INFORMATION

STOCK RANGE

	**2 Flute End Mill Regular & Long Series** Micrograin Solid Carbide 10% Co with 0.6 µm Grain Size 35° Right Hand Spiral	**M2**
	**2 Flute Ball Nose End Mill Regular & Long Series** Micrograin Solid Carbide 10% Co with 0.6 µm Grain Size 30° Right Hand Spiral	**M2**
	**4 Flute End Mill Regular & Long Series** Micrograin Solid Carbide 10% Co with 0.6 µm Grain Size 35° Right Hand Spiral	**M3**
	**4 Flute Ball Nose End Mill Regular** Micrograin Solid Carbide 10% Co with 0.6 µm Grain Size 35° Right Hand Spiral	**M3**
	**High Helix End Mill for Hard Steels** Micrograin Solid Carbide 12% Co with 0.4 µm Grain Size 45° Right Hand Spiral	**M3**
	**3 Flute End Mill - Aluminium** Micrograin Solid Carbide 10% Co with 0.6 µm Grain Size 55° Right Hand Spiral	**M3**
	**4 Flute Roughing Cutter - Fine Pitch** Ultra Micrograin Solid Carbide 40° Right Hand Spiral	**M4**
	**4 Flute Rip-Fin End Mill Regular & Long Series** Ultra Micrograin Solid Carbide 45° Right Hand Spiral	**M4**
	**Double-Edge Cutters** **2 Flute End Mill - 4 Cutting Edges** Ultra Micrograin Solid Carbide 35° Right Hand Spiral	**M4**
	**Double-Edge Cutters** **4 Flute End Mill - 8 Cutting Edges** Ultra Micrograin Solid Carbide 35° Right Hand Spiral	**M4**
	**4 Flute Corner Radius Cutter** Micrograin Solid Carbide 10% Co with 0.6 µm Grain Size 35° Right Hand Spiral	**M5**
	**Single Flute End Mill** Ultra Micrograin Solid Carbide 30° Right Hand Spiral	**M5**

SOLID CARBIDE CUTTERS

SPECIFICATIONS

Micrograin Solid Carbide
10% Co with 0.6 µm Grain Size
35° Right Hand Spiral
Right Hand Cutting
Centre Cutting
TiAlN Coated
HRC < 55

2 FLUTE END MILL REG

SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
0.2	4	0.4	50	C010020
0.3	4	0.6	50	C010030
0.4	4	0.8	50	C010040
0.5	4	1	50	C010050
0.6	4	1.2	50	C010060
0.7	4	1.4	50	C010070
0.8	4	1.6	50	C010080
0.9	4	1.8	50	C010090
1	6	3	50	C010100
1.5	6	4	50	C010150
2	6	6	50	C010200
2.5	6	8	50	C010250
3	6	8	50	C010300
3.5	6	10	50	C010350
4	6	11	50	C010400
4.5	6	13	50	C010450
5	6	13	50	C010500
5.5	6	13	50	C010550
6	6	16	50	C010600
7	8	16	60	C010700
8	8	20	60	C010800
9	10	20	75	C010900
10	10	25	75	C011000
12	12	32	75	C011200
14	16	40	100	C011400
16	16	40	100	C011600
18	20	45	100	C011800
20	20	45	100	C012000
22	22	38	100	C012200

Micrograin Solid Carbide
10% Co with 0.6 µm Grain Size
30° Right Hand Spiral
Right Hand Cutting
Centre Cutting
TiAlN Coated
HRC < 55

2 FLUTE BALL NOSE END MILL REG

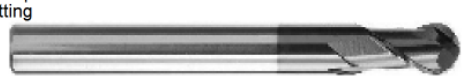
SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
0.3	4	0.6	50	C140030
0.4	4	0.8	50	C140040
0.5	4	1	50	C140050
0.6	4	1.2	50	C140060
0.7	4	1.4	50	C140070
0.8	4	1.6	50	C140080
0.9	4	1.8	50	C140090
1	6	2	50	C140100
1.5	6	3	50	C140150
2	6	4	50	C140200
2.5	6	5	50	C140250
3	6	6	50	C140300
3.5	6	7	50	C140350
4	6	8	50	C140400
4.5	6	9	50	C140450
5	6	10	50	C140500
5.5	6	11	50	C140550
6	6	12	50	C140600
7	8	14	60	C140700
8	8	16	60	C140800
9	10	18	75	C140900
10	10	20	75	C141000
12	12	24	75	C141200
14	16	28	100	C141400
16	16	32	100	C141600
18	20	36	100	C141800
20	20	40	100	C142000
22	22	40	100	C142200
25	25	40	100	C142500

Micrograin Solid Carbide
10% Co with 0.6 µm Grain Size
35° Right Hand Spiral
Right Hand Cutting
Centre Cutting
TiAlN Coated
HRC < 55

2 FLUTE END MILL LONG SERIES

SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
1	4	7	50	C050100
1.5	4	9	50	C050150
2	4	12	50	C050200
2.5	4	12	50	C050250
3	6	15	60	C050300
3.5	6	15	60	C050350
4	6	20	75	C050400
5	6	25	75	C050500
6	6	30	75	C050600
8	8	40	100	C050800
10	10	40	100	C051000
12	12	50	100	C051200
14	16	50	150	C051400
16	16	60	150	C051600
18	18	60	150	C051800
20	20	90	200	C052000

Micrograin Solid Carbide
10% Co with 0.6 µm Grain Size
30° Right Hand Spiral
Right Hand Cutting
Centre Cutting
TiAlN Coated
HRC < 55



2 FLUTE BALL NOSE END MILL LONG SERIES

SIZE mm	SHANK DIAMETER	LENGTH OF CUT	OVERALL LENGTH	CODE
1	6	2	75	C210100
1.5	6	3	75	C210150
2	6	4	75	C210200
2.5	6	5	75	C210250
3	6	6	75	C210300
3.5	6	7	100	C210350
4	6	8	75	C210400
5	6	10	75	C210500
6	6	12	75	C210600
8	8	16	75	C210800
10	10	20	100	C211000
12	12	24	100	C211200
16	16	32	150	C211600
18	18	57	100	C211800
20	20	57	100	C212000
25	25	57	100	C212500

SOLID CARBIDE CUTTERS

SPECIFICATIONS

Micrograin Solid Carbide
10% Co with 0.6 µm Grain Size
35° Right Hand Spiral
Right Hand Cutting
Centre Cutting
TiAlN Coated
HRC < 55

4 FLUTE END MILL REG

SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
1	6	3	50	C410100
2	6	6	50	C410200
3	6	8	50	C410300
4	6	11	50	C410400
5	6	13	50	C410500
6	6	16	50	C410600
8	8	20	60	C410800
9	10	20	75	C410900
10	10	30	75	C411000
12	12	32	75	C411200
14	16	40	100	C411400
16	16	40	100	C411600
18	20	45	100	C411800
20	20	45	100	C412000
25	25	40	100	C412500

Micrograin Solid Carbide
10% Co with 0.6 µm Grain Size
35° Right Hand Spiral
Right Hand Cutting
Centre Cutting
TiAlN Coated
HRC < 55

4 FLUTE BALL NOSE END MILL REG

SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
1	6	2	50	C510100
1.5	6	3	50	C510150
2	6	4	50	C510200
2.5	6	5	50	C510250
3	6	6	50	C510300
4	6	8	50	C510400
5	6	10	50	C510500
6	6	12	50	C510600
8	8	16	60	C510800
10	10	20	75	C511000
12	12	24	75	C511200
14	16	28	100	C511400
16	16	32	100	C511600
18	20	36	100	C511800
20	20	40	100	C512000

Micrograin Solid Carbide
10% Co with 0.6 µm Grain Size
35° Right Hand Spiral
Right Hand Cutting
Centre Cutting
TiAlN Coated
HRC < 55

4 FLUTE END MILL LONG SERIES

SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
3	6	15	60	C450300
4	6	20	75	C450400
5	6	25	75	C450500
6	6	30	75	C450600
8	8	40	100	C450800
10	10	40	100	C451000
12	12	50	100	C451200
14	16	50	150	C451400
16	16	60	150	C451600
18	18	60	130	C451800
20	20	90	200	C452000
25	25	60	130	C452500

Micrograin Solid Carbide
12% Co with 0.4 µm Grain Size
45° Right Hand Spiral
Right Hand Cutting
Centre Cutting
TiAlN Coated
HRC < 60

END MILL FOR HARD STEELS

SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
2	4	4	50	C640200
3	6	6	50	C640300
4	6	8	50	C640400
5	6	13	50	C640500
6	6	15	50	C640600
8	8	20	60	C640800
10	10	30	75	C641000
12	12	32	75	C641200
16	16	40	100	C641600
20	20	45	100	C642000
25	25	45	100	C642500

3 FLUTE END MILL - ALUMINIUM

SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
3	6	9	50	C340300
4	6	12	50	C340400
5	6	15	50	C340500
6	6	18	50	C340600
8	8	20	60	C340800
10	10	30	75	C341000
12	12	32	75	C341200
16	16	45	100	C341600
20	20	45	100	C342000

Micrograin Solid Carbide
10% Co with 0.6 µm Grain Size
55° Right Hand Spiral
Right Hand Cutting
Centre Cutting
Un-Coated
HRC < 40

SOLID CARBIDE CUTTERS

SPECIFICATIONS

Ultra Micrograin Solid Carbide
40° Right Hand Spiral
Right Hand Cutting
Centre Cutting
RS Coated
HRC < 50

4 FLUTE FINE PITCH ROUGHING CUTTERS				
SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
5	6	13	50	C550500
6	6	16	50	C550600
8	8	19	60	C550800
10	10	25	75	C551000
12	12	30	75	C551200
14	16	35	100	C551400
16	16	35	100	C551600
20	20	45	100	C552000

4 FLUTE RIP-FIN END MILL: Combines the advantage of roughing and finish milling in one!

The tool produces short and long chips simultaneously. This chip mixture is evacuated more easily than each individual chip type, an excellent solution in slotting and cavity applications.

Excellent performance in machining titanium, inconel, stainless steel and high temperature alloys.
The AlCrSiN Coating is suitable for dry machining.

Ultra Micrograin Solid Carbide
45° Right Hand Spiral
Right Hand Cutting
Centre Cutting
AlCrSiN Coated
HRC < 60

4 FLUTE RIP- FIN END MILL REG				
SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
6	6	13	60	C580600
8	8	19	60	C580800
10	10	22	75	C581000
12	12	26	100	C581200
16	16	35	100	C581600
20	20	40	100	C582000

4 FLUTE RIP- FIN END MILL LONG SERIES				
SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
6	6	25	75	C610600
8	8	30	75	C610800
10	10	35	80	C611000
12	12	40	100	C611200
16	16	55	110	C611600
20	20	60	125	C612000

DOUBLE-EDGE CUTTERS:

Designed especially for High Hardness Materials (45 - 65 HRC)
Two flutes with four cutting edges, Four flutes with eight cutting edges
High performance, Efficient, Double tool life, Saving time and cost.

Ultra Micrograin Solid Carbide
35° Right Hand Spiral
Right Hand Cutting
Centre Cutting
AlTiSiN Coated
HRC < 60

2 FLUTE END MILL - 4 CUTTING EDGES				
SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
10	10	22	75	C721000
12	12	26	75	C721200
16	16	35	110	C721600
20	20	40	110	C722000
25	25	45	110	C722500

4 FLUTE END MILL - 8 CUTTING EDGES				
SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
10	10	25	75	C741000
12	12	30	75	C741200
16	16	40	110	C741600
20	20	45	110	C742000
25	25	50	110	C742500

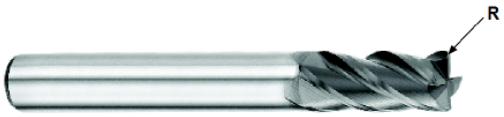
Adding a second cutting edge near the major cutting edge improves cutting performance.
Unique Geometry enables longer tool life, low vibration, high feed rate and a smooth surface finish.
Reason for the longer tool life is when the major cutting edge wears, the second cutting edge is still sharp.

SOLID CARBIDE CUTTERS

SPECIFICATIONS

4 FLUTE CORNER RADIUS					
SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	RADIUS	CODE
2	4	6	50	0.2	C802002
2	4	6	50	0.3	C802003
2	4	6	50	0.5	C802005
2.5	4	8	50	0.2	C802502
3	3	8	50	0.2	C803002
3	3	8	50	0.3	C803003
3	3	8	50	0.5	C803005
3	3	8	50	1	C803010
4	4	10	50	0.2	C804002
4	4	10	50	0.3	C804003
4	4	10	50	0.5	C804005
4	4	10	50	1	C804010
4	6	10	50	1.5	C804015
5	6	13	50	0.2	C805002
5	6	13	50	0.3	C805003
5	6	13	50	0.5	C805005
5	6	13	50	1	C805010
6	6	15	50	0.2	C806002
6	6	15	50	0.3	C806003
6	6	15	50	0.5	C806005
6	6	15	50	1	C806010
6	6	15	50	1.5	C806015
6	8	15	50	2	C806020
8	8	20	60	0.3	C808003
8	8	20	60	0.5	C808005
8	8	20	60	1	C808010
8	8	20	60	1.5	C808015
8	8	20	60	2	C808020
8	8	20	60	2.5	C808025
8	8	20	60	3	C808030
10	10	25	75	0.3	C810003
10	10	25	75	0.5	C810005
10	10	25	75	1	C810010
10	10	25	75	1.5	C810015
10	10	25	75	2	C810020
10	10	25	75	2.5	C810025
10	10	25	75	3	C810030
12	12	30	75	0.3	C812003
12	12	30	75	0.5	C812005
12	12	30	75	1	C812010
12	12	30	75	1.5	C812015
12	12	30	75	2	C812020
12	12	30	75	2.5	C812025
12	12	30	75	3	C812030

Micrograin Solid Carbide
10% Co with 0.6 µm Grain Size
35° Right Hand Spiral
Right Hand Cutting
Centre Cutting
ALTIN Coated
HRC < 55



Please adjust the speeds and feeds when the cutting depth is large or when machines with low rigidity are used.

During dry milling please use air to remove disposable chips from the milling area and to eliminate chip packing.

SINGLE FLUTE END MILL				
SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
2	3	8	50	C910202
3	3	10	50	C910300
4	4	12	60	C910400
5	5	16	70	C910500
6	6	16	60	C910600
8	8	22	75	C910800
10	10	30	80	C911000
12	12	30	100	C911200

Ultra Micrograin Solid Carbide
30° Right Hand Spiral
Right Hand Cutting
Centre Cutting
Uncoated
HRC < 55

SOLID CARBIDE DRILLS

SPECIFICATIONS

Micrograin Solid Carbide
12% Co with 0.4 µm Grain Size
35° Right Hand Spiral
Right Hand Cutting
SPLIT POINT
AITIN Coated
HRC < 60

Micrograin Solid Carbide
12% Co with 0.4 µm Grain Size
35° Right Hand Spiral
Right Hand Cutting
SPLIT POINT
AITIN Coated
HRC < 60

SOLID CARBIDE DRILL (3Xd)

SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
1	1	3	50	CD30100
1.5	1.5	4.5	50	CD30150
2	2	6	50	CD30200
2.5	2.5	7.5	50	CD30250
3	3	9	50	CD30300
3.3	3.3	10	55	CD30330
3.5	3.5	11	55	CD30350
4	6	24	66	CD30400
4.2	4.2	13	60	CD30420
4.5	6	24	66	CD30450
5	6	28	66	CD30500
5.5	6	28	66	CD30550
6	6	28	66	CD30600
6.3	6.3	19	66	CD30630
6.5	8	34	79	CD30650
6.8	6.8	21	66	CD30680
7	8	41	79	CD30700
7.5	8	41	79	CD30750
8	8	41	79	CD30800
8.5	10	47	89	CD30850
9	10	47	89	CD30900
9.5	10	47	89	CD30950
10	10	47	89	CD31000
10.2	10.2	31	89	CD31020
10.5	12	55	102	CD31050
11	12	55	102	CD31100
11.5	12	55	102	CD31150
12	12	55	102	CD31200
12.5	14	60	107	CD31250
12.7	12.7	39	107	CD31270
13	14	60	107	CD31300
13.5	14	60	107	CD31350
14	14	60	107	CD31400

SOLID CARBIDE DRILL (5Xd)

SIZE mm	SHANK DIAMETER	FLUTE LENGTH	OVERALL LENGTH	CODE
1	1	5	50	CD50100
1.5	1	7.5	50	CD50150
2	1	10	50	CD50200
2.5	2.5	13	50	CD50250
3	3	15	55	CD50300
3.3	3.3	18	55	CD50330
3.5	3.5	18	55	CD50350
4	6	36	74	CD50400
4.2	4.2	21	60	CD50420
4.5	6	36	74	CD50450
5	6	44	82	CD50500
5.5	6	44	82	CD50550
6	6	44	82	CD50600
6.3	6.3	32	75	CD50630
6.5	8	53	91	CD50650
6.8	6.8	34	75	CD50680
7	8	53	91	CD50700
7.5	8	53	91	CD50750
8	8	53	91	CD50800
8.5	10	61	103	CD50850
9	10	61	103	CD50900
9.5	10	61	103	CD50950
10	10	61	103	CD51000
10.2	10.2	52	103	CD51020
10.5	12	71	118	CD51050
11	12	71	118	CD51100
11.5	12	71	118	CD51150
12	12	71	118	CD51200
12.5	14	77	127	CD51250
12.7	12.7	64	127	CD51270
13	14	77	127	CD51300
13.5	14	77	127	CD51350
14	14	77	127	CD51400

HIGH SPEED STEEL SELECTION

SURFACE TREATMENTS

HIGH SPEED STEEL SELECTION

Various types of High Speed Steel are available to the cutting tool manufacturer. Each type is composed of varying amounts of the major alloys (Molybdenum, Tungsten, Vanadium and Cobalt). The percentage of each alloy contained in a High Speed Steel will dictate the properties of each type, as follows:

- **Molybdenum** increases toughness, abrasion resistance, heat resistance and hardness.
- **Tungsten** increases toughness, abrasion resistance, heat resistance and hardness.
- **Vanadium** increases mainly abrasion resistance, as well as heat resistance and hardness.
- **Cobalt** increases mainly hardness and heat resistance, as well as abrasion resistance, but reduces impact resistance.

The requirements of each type of cutting tool will therefore dictate what type of HSS is chosen.

Taps require toughness to minimize chipping while reversing, and abrasion resistance for longer tool life in production applications. FEW has for almost half a century used a combination of premium High Speed Steels (M9V, M35, GV3 and other highly refined high speed steels that have been developed to bridge the gap between conventional and PM high speed steels). Powder Metallurgy high speed steels are also utilised for special applications and are marked PM. While popular FEW hand taps are also available in HSSE-V for higher performance in tough materials, M2 and M7 hand taps are offered for general purpose applications.

Drills for general purpose usage require all the alloying properties of toughness, abrasion resistance, heat resistance and hardness, as well as being price competitive. M2 HSS is the most common choice. For heavier duty applications, a Cobalt drill is offered (M35) for it's "red hardness" properties.

Milling Cutters also come in two HSS versions. M2 for general purpose and M42 for heavy duty applications.

Toolbits are offered in M2 HSS and M42 HSSE-Co8 versions.

High Speed Steels used for FEW tools are as follows:

AISI OR EQUIV.	WERK STOFF	% COMPOSITION						FEW DESCRIPTION
		C	Cr	W	Mo	V	Co	
GV3	1.3347	1.2	3.9	7.0	5.2	2.7	-	HSSE-V
M9V	-	1.2	4.2	3.5	8.5	2.7	-	HSSE-V
M35	1.3243	0.93	4.2	6.4	5.0	1.8	4.8	HSSE / HSS - Co
M42	1.3247	1.08	3.8	1.5	9.4	1.2	8.0	HSSE - Co8
M3-2	1.3344	1.2	4.1	6.2	5.0	3.0	-	HSSE-V3
M7	1.3348	1.02	3.8	1.8	8.6	1.9	-	HSS
M2	1.3343	0.9	4.2	6.4	5.0	1.8	-	HSS

SURFACE TREATMENTS

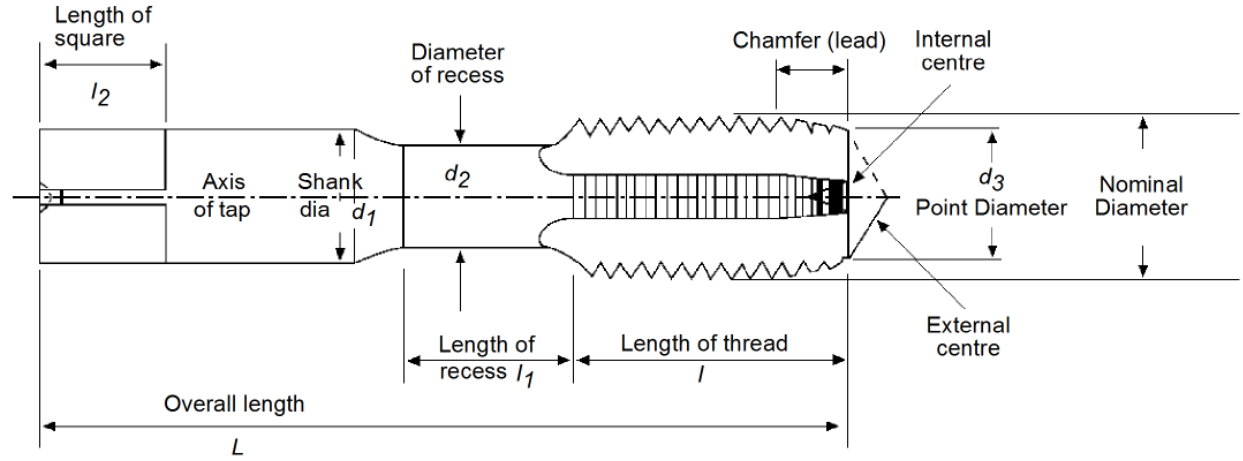
Surface treatments offered by FEW are as follows:

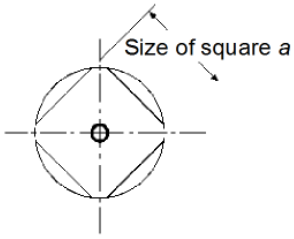
BF - Bright Finish - for non-ferous metals or steels which do not cold-weld.
ST - Steam Tempered - black oxide treatment for all steels, especially those prone to cold welding. Supplied as standard, unless otherwise specified.
Ni - Nitride - hard grey wear resistant treatment for abrasive short chipping materials.
TiN - Titanium Nitride - PVD process imparts a hard wear-resistant golden surface with low friction, thus allowing for greater tapping speeds.

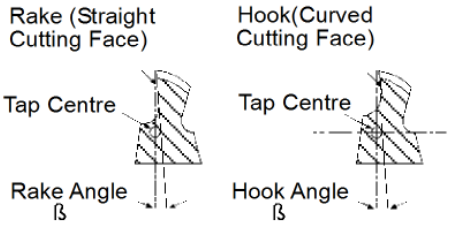
TiCN and TiAlN treatments have similar properties, and are also available against special request.

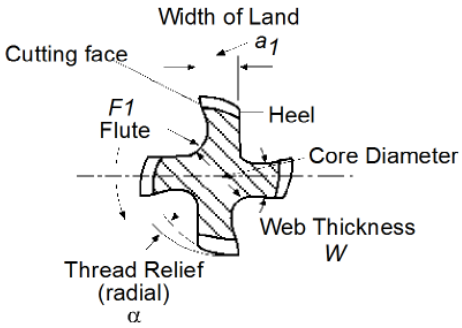
TAP TERMINOLOGY

ABBREVIATIONS









STR. FL.	Straight Flute
STD	Standard
TPR	Taper
SEC	Second
BOT	Bottom
SER	Serial (Sets)
SP	Spiral Point
SF	Spiral Flute
M	Metric Coarse
MF	Metric Fine
BSW	British Standard Whitworth Coarse Thread
BSF	British Standard Whitworth Fine Thread
BA	British Association Standard Thread
BSC	British Standard Cycle Thread
BSB	British Standard Brass
G	British Standard Parallel Pipe (Mechanical Joint)
RP	British Standard Parallel Pipe (Leak - Proof Joint)
RC	British Standard Tapered Pipe (1 : 16 Conical Taper)
NC	American National Coarse Thread
UNC	Unified Coarse Thread
NF	American National Fine Thread

UNF	Unified Fine Thread
UNEF	Unified Extra Fine Thread
UN	Unified
UNS	Unified Special Thread
NPS	American Standard Straight Pipe
NPSF	Dryseal American Standard Pipe Thread (Leak - Proof Joint)
NPT	American Standard Taper Pipe Thread
NPTF	Dryseal American Standard Taper Pipe Thread (Leak - Proof Joint)
NGT	National Gas Taper Thread
API	American Petroleum - Institute Pipe Thread
BF	Bright Finish
ST	Steam Tempered
Ni	Nitride
TiN	Titanium Nitride
TICN	Titanium Carbide Nitride
LS	Long Shank
LH	Left Hand
RH	Right Hand
S	Normally ex - stock : price on application

CHAMFER LEADS

NUMBERING SYSTEM

CHAMFER LEADS

Generally speaking, the following chamfer, or lead, angles will be used for different types of taps in ISO, JIS and DIN. These angles should be used as a guide only, as angles and clearances are often altered according to no. of flutes, geometry and application of tool.

COARSE THREADS (ISO & JIS)	FINE THREADS (ISO)	DIN		NO. OF THREADS	LEAD ANGLE
		FORM	FLUTES		
Taper		A	Straight	6 - 8	5°
	Taper			6 - 8	7°
		D	Straight	3.5 - 5	8°
Second Spiral Point	Spiral Point	B	Straight with Spiral Point	3 - 5	8 - 10°
	Second (Optional for 3 per set)			3 - 5	12°
Spiral Flute	Spiral Flute	C	Straight or Spiral Point	2 - 3	15°
	Bottom			1.5 - 2.5	20°
Bottom		E		1.5 - 2	23°

TYPE NUMBERING SYSTEM

The taps are numbered to differentiate one type from another. The first letter describes the norm (general dimensions) of the tap and it is not included in the tap selection chart.

1ST LETTER	1ST NUMBER	2ND NUMBER	3RD NUMBER	4TH NUMBER
NORM	FLUTE NORM	LEAD	TOLERANCE	SURFACE TREATMENT
A ISO 529	**0** STR. FLUTE	**0** NO LEAD	**0** U/S	**0** BF
B ISO 2283	**1** STR. FL. with SP	**1** 4° < LEAD ≤ 8°	**1** CL1/4H/5H/3B/JIS II	**1** ST
C ISO 2284	**2** SP ALONE	e.g Taper, Form D	**2** CL2/6H/2B	**2** Ni
D DIN 371	**3** SF ≤ 20°	**2** 8° < LEAD ≤ 16°	**3** CL3/7H/6G/1B	**3** TiN
E DIN376	**4** 20° < SF ≤ 35°	e.g. Sec, Form B, C	**4** O/S	**4** ST + Ni
F DIN 374	**5** SF ≥ 35°	**3** LEAD > 16°		**5** TiCN
G DIN 5156	**6** POLYGON	e.g. Bot, Form E		**6** Other
J JIS B4430	**8** LH SF	**4** STD SET		
S Special Tap	**9** Other	**7** SER SET		
T USCTI Table 302				
W STD. NUT TAP		**9** NUT TAP LEAD		

ADDITIONAL INFORMATION: eg. (Added on end of type No.)

L = LEFT HAND
G = OIL GROOVE
IN = STAINLESS STEEL
HR = HIGH RESISTANCE
AL = ALUMINIUM (SOFT)
AS = ALUMINIUM + SILICON (HARD)

TOLERANCES

TAP AND COMPONENT TOLERANCES

Generally speaking, taps will cut threads larger than the taps themselves. This oversizing will depend on material, speed, lubrication and alignment of tap to hole amongst other variables. However, under normal conditions, FEW tap size can be selected according to the component size required as per the tables shown below. These tables do not apply to Polygon taps, which are manufactured to a higher tolerance band, and marked 6HX on both ISO and DIN taps. Tolerances " to manufacturer's discretion " (eg 6HX, 4HX) are applied to some GG taps and certain specials.

METRIC THREAD FORMS									
TAP SIZE			GENERAL CLASS OF COMPONENT THREAD						
ISO MARK	† DIN MARK	JIS MARK	JIS CLASS	ISO AND DIN CLASS					
		Ia, Ib	1st						
ISO 1	ISO 1 (4H)	II *	2nd	4H	5H				
ISO 2	ISO 2 (6H)	III, 6H *	3rd	4G	5G	6H			
ISO 3	ISO 3 (6G)	6G *				6G	7H	8H	

† Until the DIN EN22857 becomes more accepted in general practice, FEW will mark DIN taps as shown above, so as to avoid confusion.

* **Note:** Because the JIS system is in transition to ISO 2857, JIS II taps (~ISO 1/4H) are offered for users of the old B4430 Type J Spec, whilst 6H (ISO 2) and 6G (ISO 3) taps are offered to users who require ISO 2857 tolerances, but still use Type J collet sizes in their machines.

WHITWORTH THREAD FORMS			
TAP SIZE			COMPONENT TOLERANCE
ISO MARK	DIN MARK	JIS MARK	B.S. CLASS
CL 1	CF	CF	CLOSE FIT
CL 2	MF	MF	MEDIUM FIT
CL 3	FF	FF	FREE FIT

UNIFIED THREAD FORMS		
TAP SIZE		COMPONENT TOLERANCE
ISO MARK	DIN MARK	CLASS
CL 1	3B	3B
CL 2	2B	2B
CL 3	1B	1B

BSP THREAD FORM 55°				
TAP SIZE				COMPONENT
ISO 5969	BS EQUIV	DIN EQUIV	JIS EQUIV	TYPE OF THREAD GENERATED
G	BSPF	228	PF	ISO 228 Mechanical Joint
Rp	BSPP	2999	PS	ISO 7/1 Leakproof Joint
Rc	BSPT	2999	PT	ISO 7/1 CONIC, 1 : 16 Taper

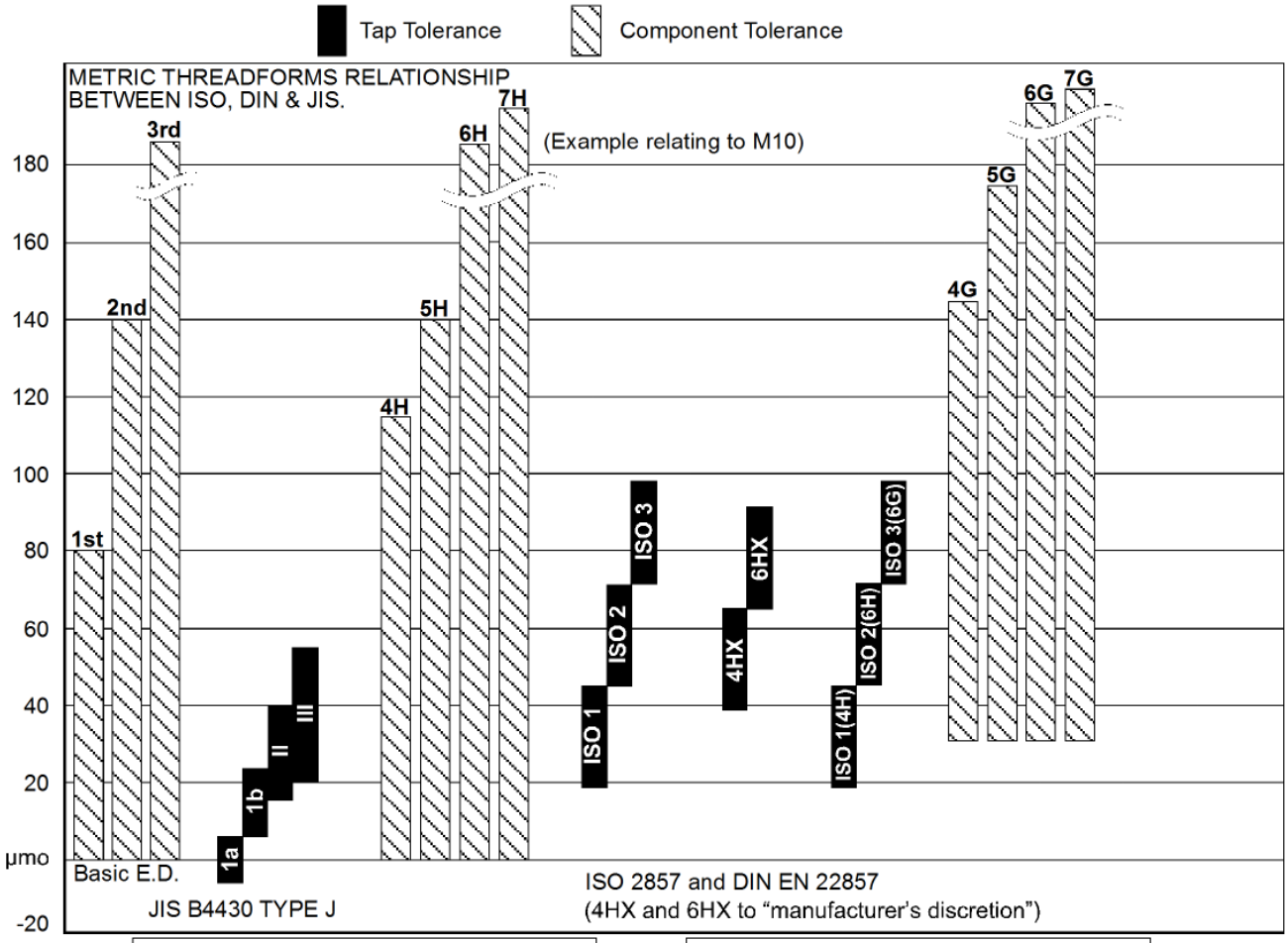
NATIONAL (Unified) PIPE THREAD FORM 60°	
TAP SIZE	COMPONENT
USAS 94.9	TYPE OF THREAD GENERATED
NPS	Mechanical Joint or Coupling
* NPSF	Dryseal (leak proof)
NPT	1 : 16 Taper
* NPTF	Dryseal, 1 : 16 Taper

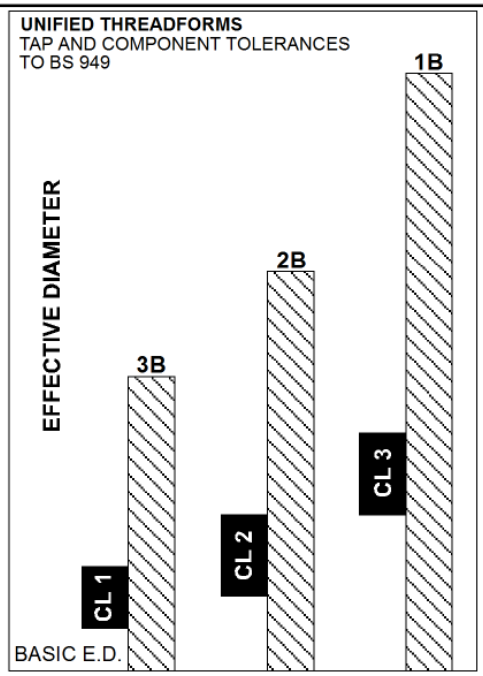
* **Note:** 1. When BSP taps are ordered without further details, G taps will be supplied as a default. If these are not in stock RP will be supplied.

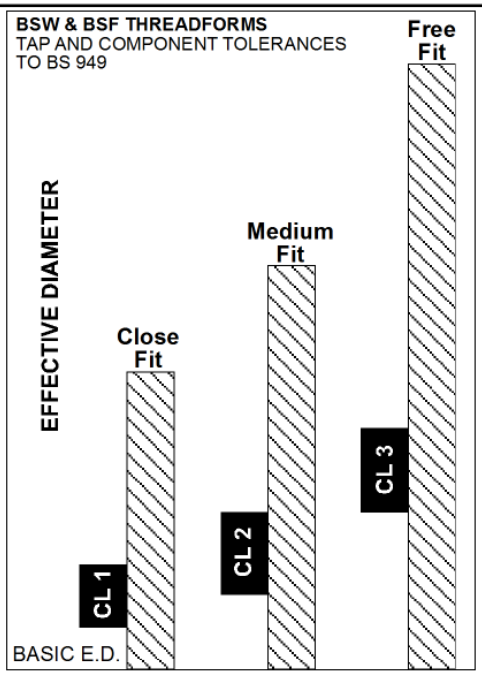
2. Use of a 1:16 Tapered Reamer prior to tapping a conical thread (eg. Rc, NPT) will improve tap life and thread finish.

* **Note:** Altered crest and root profiles of Dryseal taps ensures an interference fit on crests and roots which prevent leakage.

TAP AND COMPONENT TOLERANCES







RECOMMENDED TAPPING DRILL / BLANK SIZE

(BEFORE TAPPING OR THREADING WITH CIRCULAR DIE.)

M ISO METRIC COARSE

SIZE mm	PITCH mm	DRILL mm	BLANK d mm
M1	0.25	0.75	0.97
M1.1	0.25	0.85	1.07
M1.2	0.25	0.95	1.17
M1.4	0.3	1.1	1.36
M1.6	0.35	1.25	1.54
*M1.7	0.35	1.35	1.64
M1.8	0.35	1.45	1.74
M2	0.4	1.6	1.93
*M2	0.45	1.55	1.93
M2.2	0.45	1.75	2.13
*M2.3	0.4	1.9	2.23
M2.5	0.45	2.05	2.43
*M2.6	0.45	2.15	2.53
M3	0.5	2.5	2.92
*M3	0.6	2.4	2.91
M3.5	0.6	2.9	3.41
M4	0.7	3.3	3.91
*M4	0.75	3.25	3.91
M4.5	0.75	3.75	4.41
M5	0.8	4.2	4.9
*M5	0.9	4.1	4.89
*M5.5	0.9	4.6	5.39
M6	1	5	5.88
M7	1	6	6.88
M8	1.25	6.75	7.87
M9	1.25	7.75	8.87
M10	1.5	8.5	9.85
M11	1.5	9.5	10.85
M12	1.75	10.2	11.83
M14	2	12	13.82
M16	2	14	15.82
M18	2.5	15.5	17.79
M20	2.5	17.5	19.79
M22	2.5	19.5	21.79
M24	3	21	23.77
M27	3	24	26.77
M30	3.5	26.5	29.73
M33	3.5	29.5	32.73
M36	4	32	35.7
M39	4	35	38.7
M42	4.5	37.5	41.69
M45	4.5	40.5	44.69
M48	5	43	47.66
M52	5	47	51.66
M56	5.5	50.5	55.63
M60	5.5	54.5	59.63
M64	6	58	63.6
M68	6	62	67.6
M72	6	66	71.6
M76	6	70	75.6

MF ISO METRIC FINE

SIZE mm	PITCH mm	DRILL mm	BLANK d mm
M2	0.25	1.75	1.97
M2.2	0.25	1.95	2.17
M2.3	0.25	2.05	2.27
M2.5	0.35	2.15	2.44
M2.6	0.35	2.25	2.54
M3	0.35	2.65	2.94
M3.5	0.35	3.15	2.94
M4	0.35	3.65	3.94
M4	0.5	3.5	3.93
M5	0.35	4.65	4.94
M5	0.5	4.5	4.93
M5	0.75	4.25	4.9
M5.5	0.5	5	5.43
M6	0.5	5.5	5.93
M6	0.75	5.25	5.9
M7	0.75	6.25	6.9
M8	0.5	7.5	7.93
M8	0.75	7.25	7.9
M8	1	7	7.88
M9	0.75	8.25	8.9
M9	1	8	8.88
M10	0.5	9.5	9.93
M10	0.75	9.25	9.9
M10	1	9	9.88
M10	1.25	8.75	9.86
M11	0.75	10.25	10.9
M11	1	10	10.88
M11	1.25	9.75	10.86
M12	0.5	11.5	11.93
M12	0.75	11.25	11.9
M12	1	11	11.88
M12	1.25	10.75	11.86
M12	1.5	10.5	11.85
M14	1	13	13.88
M14	1.25	12.75	13.86
M14	1.5	12.5	13.85
M15	0.75	14.25	14.9
M15	1	14	14.88
M15	1.5	13.5	14.85
M16	0.5	15.5	15.93
M16	0.75	15.25	15.9
M16	1	15	15.88
M16	1.25	14.75	15.86
M16	1.5	14.5	15.85
M17	1	16	16.88
M17	1.5	15.5	16.85
M18	0.75	17.25	17.9
M18	1	17	17.88
M18	1.25	16.75	17.86
M18	1.5	16.5	17.85

MF (Continued) ISO METRIC FINE

SIZE mm	PITCH mm	DRILL mm	BLANK d mm
M18	2	16	17.82
M19	1	18	18.88
M20	1	19	19.88
M20	1.5	18.5	19.85
M20	2	18	19.82
M22	1	21	21.88
M22	1.5	20.5	21.85
M22	2	20	21.82
M24	1	23	23.88
M24	1.5	22.5	23.85
M24	2	22	23.82
M25	1	24	24.88
M25	1.5	23.5	24.85
M25	2	23	24.82
M27	1	26	26.88
M27	1.5	25.5	26.85
M27	2	25	26.82
M28	1	27	27.88
M28	1.5	26.5	27.85
M28	2	26	27.82
M30	1	29	29.88
M30	1.5	28.5	29.85
M30	2	28	29.82
M30	3	27	29.76
M32	1	31	31.88
M32	1.5	30.5	31.85
M32	2	30	31.82
M33	1.5	31.5	32.85
M33	2	31	32.82
M33	3	30	32.76
M35	1.5	33.5	34.85
M35	2	33	34.82
M35	3	32	34.76
M36	1	35	35.88
M36	1.5	34.5	35.85
M36	2	34	35.82
M36	3	33	35.76
M38	1	37	37.88
M38	1.5	36.5	37.85
M38	2	36	37.82
M39	1.5	37.5	38.85
M39	2	37	38.82
M39	3	36	38.76
M40	1	39	39.88
M40	1.5	38.5	39.85
M40	2	38	39.82
M40	3	37	39.76
M42	1.5	40.5	41.85
M42	2	40	41.82
M42	3	39	41.76

MF (Continued) ISO METRIC FINE

SIZE mm	PITCH mm	DRILL mm	BLANK d mm
M42	4	38	41.7
M45	1.5	43.5	44.85
M45	2	43	44.82
M45	3	42	44.76
M48	1.5	46.5	47.85
M48	2	46	47.82
M48	3	45	47.76
M48	4	44	47.7
M50	1.5	48.5	49.85
M50	2	48	49.82
M50	3	47	49.76
M52	1.5	50.5	51.85
M52	2	50	51.82
M52	3	49	51.76
M52	4	48	51.7
M56	2	54	55.82
M56	4	52	55.7

G (BSP) MECHANICAL JOINT
RP (BSP) LEAKPROOF JOINT

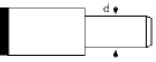
SIZE Inch	PITCH TPI	G DRILL mm	RP DRILL mm	G BLANK d mm
1/8	28	8.8	8.6	9.62
1/4	19	11.8	11.5	13.03
3/8	19	15.25	15	16.53
1/2	14	19	18.5	20.81
5/8	14	21	20.5	22.77
3/4	14	24.5	24	26.3
7/8	14	28.25	27.75	30.06
1"	11	30.75	30.25	33.07
1 1/4	11	39.5	39	41.73
1 1/2	11	45.25	44.75	47.62
1 3/4	11	51.3	50.5	53.56
2"	11	57.2	56.5	59.43
2 1/4	11	63.3	62.5	65.52
2 1/2	11	72.8	72.3	75
3"	11	85.5	85	87.7

RC (BSPT)

SIZE Inch	PITCH TPI	DRILL mm
1/8	28	8.6
1/4	19	11.5
3/8	19	15
1/2	14	18.5
3/4	14	24
1"	11	30
1 1/4	11	39
1 1/2	11	45
2"	11	56.5
2 1/2	11	71.5

RECOMMENDED TAPPING DRILL / BLANK SIZE

(BEFORE TAPPING OR THREADING WITH CIRCULAR DIE.)



UNC

SIZE No or Inch	PITCH TPI	DRILL mm	BLANK d mm
No. 1	64	1.55	1.79
No. 2	56	1.85	2.12
No. 3	48	2.1	2.44
No. 4	40	2.35	2.76
No. 5	40	2.65	3.09
No. 6	32	2.85	3.41
No. 8	32	3.5	4.07
No. 10	24	3.9	4.71
No. 12	24	4.5	5.37
1/4	20	5.1	6.22
5/16	18	6.6	7.8
3/8	16	8	9.37
7/16	14	9.4	10.95
1/2	13	10.8	12.52
9/16	12	12.2	14.1
5/8	11	13.5	15.68
3/4	10	16.5	18.84
7/8	9	19.5	22
1"	8	22.25	25.16
1 1/8	7	25	28.31
1 1/4	7	28	31.49
1 3/8	6	30.75	34.63
1 1/2	6	34	37.81
1 3/4	5	39.5	44.12
2"	4.5	45	50.45
2 1/4	4.5	51.5	56.8
2 1/2	4	57.25	63.1
2 3/4	4	63.5	69.45
3"	4	70	75.8

UNEF

SIZE No or Inch	PITCH TPI	DRILL mm	BLANK d mm
No.12	32	4.7	5.39
1/4	32	5.5	6.25
5/16	32	7.1	7.84
3/8	32	8.6	9.43
7/16	28	10.1	11.01
1/2	28	11.7	12.6
9/16	24	13	14.17
5/8	24	14.75	15.76
11/16	24	16.25	17.34
3/4	20	17.5	18.92
13/16	20	19.25	20.51
7/8	20	20.75	22.09
15/16	20	22.25	23.67
1"	20	23.75	25.26
1 1/8	18	26.75	28.43
1 1/4	18	30	31.61
1 3/8	18	33	34.78
1 1/2	18	36	37.95

BSW

SIZE Inch	PITCH TPI	DRILL mm	BLANK d mm
1/8	40	2.6	3.08
5/32	32	3.1	3.85
3/16	24	3.6	4.61
1/4	20	5.1	6.61
5/16	18	6.5	7.74
3/8	16	7.9	9.3
7/16	14	9.3	10.89
1/2	12	10.5	12.43
9/16	12	12	14.02
5/8	11	13.5	15.60
11/16	11	15	17.18
3/4	10	16.5	18.76
7/8	9	19.25	21.92
1"	8	22	25.08
1 1/8	7	24.75	28.21
1 1/4	7	28	31.38
1 1/2	6	33.5	37.71
1 3/4	5	39	44.03
2"	4.5	44.5	50.36
2 1/4	4	50	56.69
2 1/2	4	56.5	63.04

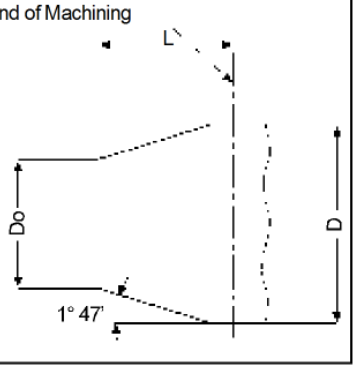
UN - 8

SIZE Inch	PITCH TPI	DRILL mm	BLANK d mm
1 1/8	8	25.3	28.34
1 1/4	8	28.5	31.51
1 3/8	8	31.6	34.69
1 1/2	8	34.8	37.86
1 5/8	8	38	41.03
1 3/4	8	41.2	44.21
1 7/8	8	44.3	47.38
2"	8	47.5	50.56
2 1/4	8	55	56.91
2 1/2	8	61.3	63.26

NPT / NPTF

(1:16 TAPER) SIZE Inch	PITCH TPI	DRILL mm	Major - ø Do min. mm	Major - ø Do max. mm	Do Turning - ø mm	L Standard Value
1/16	27	6.3	7.521	7.643	7.58	8
1/8	27	8.5	9.866	9.988	9.93	8.1
1/4	18	11.1	13.099	13.255	13.18	12.3
3/8	18	14.7	16.518	16.674	16.60	12.5
1/2	14	18	20.551	20.713	20.63	16.2
3/4	14	23	25.866	26.028	25.95	16.6
1"	11 1/2	29	32.419	32.591	32.51	20.7
1 1/4	11 1/2	38	41.144	41.316	41.23	21.3
1 1/2	11 1/2	44	47.214	47.386	47.30	21.7
2"	11 1/2	56	59.226	59.398	59.31	22.5

End of Machining



BSF

SIZE Inch	PITCH TPI	DRILL mm	BLANK d mm
3/16	32	4	4.64
7/32	28	4.7	5.43
1/4	26	5.4	6.21
9/32	26	6.2	7
5/16	22	6.8	7.77
3/8	20	8.3	9.34
7/16	18	9.8	10.91
1/2	16	11.2	12.48
9/16	16	12.7	14.07
5/8	14	14	15.64
11/16	14	15.75	17.22
3/4	12	17	18.78
7/8	11	20	21.95
1"	10	23	25.11
1 1/8	9	26	28.27
1 1/4	9	29	31.44
1 3/8	8	32	34.6
1 1/2	8	35	37.78
1 5/8	8	37.5	40.95
1 3/4	7	40	44.08
2"	7	46.5	50.43

UN - 12 / 14

SIZE No or Inch	PITCH TPI	DRILL mm	BLANK d mm
1 5/8	12	39.1	41.09
1 3/4	12	42.3	44.26
1 7/8	12	45.4	47.43
2"	12	48.6	50.61
2 1/4	12	55	56.96
2 1/2	12	61.3	63.31
1"	14	23.5	25.22

UNF

SIZE No or Inch	PITCH TPI	DRILL mm	BLANK d mm
No. 0	80	1.25	1.47
No. 1	72	1.55	1.79
No. 2	64	1.9	2.12
No. 3	56	2.15	2.44
No. 4	48	2.4	2.77
No. 5	44	2.7	3.1
No. 6	40	2.95	3.42
No. 8	36	3.5	4.08
No. 10	32	4.1	4.73
N0. 12	28	4.7	5.38
1/4	28	5.5	6.24
5/16	24	6.9	7.82
3/8	24	8.5	9.41
7/16	20	9.9	10.98
1/2	20	11.5	12.56
9/16	18	12.9	14.14
5/8	18	14.5	15.73
3/4	16	17.5	18.89
7/8	14	20.4	22.05
1"	12	23.25	25.21
1 1/8	12	26.5	28.38
1 1/4	12	29.5	31.56
1 3/8	12	32.75	34.73
1 1/2	12	36	37.91

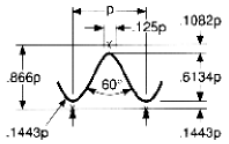
NPS + NPSF

SIZE No or Inch	PITCH TPI	NPS DRILL mm	NPSF DRILL mm	NPS BLANK d mm
1/8	27	8.9	8.7	10.17
1/4	18	11.5	11.3	13.43
3/8	18	15	14.7	16.91
1/2	14	18.5	18.2	21.05
3/4	14	24	23.5	26.39
1"	11 1/2	30	29.5	33.04
1 1/4	11 1/2	39	38.5	41.8
1 1/2	11 1/2	45	44.5	47.86
2"	11 1/2	57	56.5	59.9

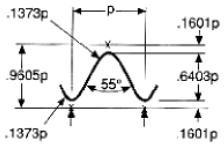
COMMON THREAD FORMS

POLYGON TAPS (FLUTELESS OR ROLL TAPS)

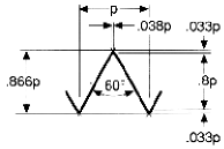
COMMON THREAD FORM PROFILES



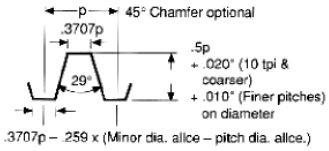
ISO METRIC/ISO INCH
UNIFIED



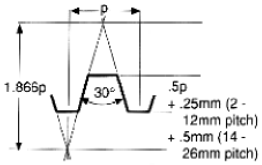
British Standard
WHITWORTH



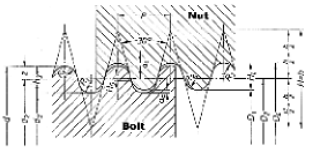
American Standard
PIPE STRAIGHT



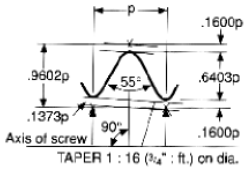
British and American Standard
GENERAL PURPOSE ACME



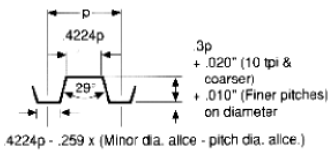
TRAPEZOIDAL



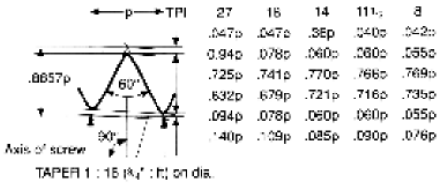
DIN 405 **ROUND THREAD**



Rc British Standard PIPE TAPER
ISO TAPER PIPE



American Standard
STUB ACME



American Standard Pipe Taper
PIPE TAPER

POLYGON TAPPING DRILL SIZES

METRIC SIZES			IMPERIAL SIZES					
Nominal size of tap	Pitch mm	Tap Drill size mm	Nominal size of tap	Tap Drill Sizes (mm)				
				UNC	UNF	BSW	BSF	BA
1.6	0.35	1.45	No. 0		1.4			5.6
1.8	0.35	1.65	No. 1	1.65	1.7			4.9
2	0.4	1.8	No. 2	1.95	2			4.4
2.2	0.45	2	No. 3	2.25	2.3			3.8
2.5	0.45	2.3	No. 4	2.55	2.6			3.3
3	0.5	2.8	No. 5	2.9	2.9			2.95
3.5	0.6	3.2	No. 6	3.2	3.2			2.6
4	0.7	3.7	No. 8	3.8	3.8			2
4.5	0.75	4.2	No. 10	4.3	4.5			1.55
5	0.8	4.6	No. 12	5	5.1			
6	1	5.6	1/8			2.9		
7	1	6.5	3/16			4.3	4.4	
8	1.25	7.4	1/4	5.8	5.9	5.8	5.9	
10	1.5	9.3	5/16	7.3	7.5	7.3	7.34	
12	1.75	11.2	3/8	8.8	9	8.8	9	

NOTE: The recommended tapping drill size has been calculated to give between 60% and 75% depth of thread. If not acceptable, the user may wish to experiment to achieve the desired thread depth for his particular application.

POLYGON TAPPING TIPS

1. **DUCTILE MATERIALS**
   Polygon taps may be used on ductile materials, such as Aluminium, Copper, Brass, Low Carbon and Stainless Steels.
2. **THROUGH HOLES**
   Use standard Polygon Taps (STD P Polygon).
3. **BLIND OR DEEP HOLES**
   Use Polygon Taps with oil grooves for better lubrication and oil venting (B + O/G Polygon).
4. **STRENGTH OF THREAD**
   Due to the grain structure of the material flowing with the thread form, the strength of a 60% rolled thread is roughly equivalent to a 75% cut thread.
5. **TAPPING SPEEDS**
   In some cases tapping speeds can be increased up to twice that of a thread cutting tap. Experimenting is advisable.
6. **THIN - WALLED MATERIALS**
   Polygon taps are not recommended if the wall of the component is less than 2/3 the nominal diameter of the tap.
7. **COUNTERSINKING**
   Because Polygon taps have a tendency to upset the work surface, countersinking is recommended if interference of mating parts is to be avoided.

TAP TROUBLESHOOTING CHART

CAUSES	FAULTS						SOLUTIONS
	Over Sized or BellMouthed Holes	Poor Finish Threads	Tap Teeth Chipping	Excessive Rate of Wear on Tap	Tap Breakage	Cold Welding	
MISALIGNMENT	●	●	●		●		Ensure correct alignment of the tap to the drilled hole
TAP LEAD REGROUND ECCENTRIC	●						Regrind taps on a tap lead grinder or special purpose attachment, or replace.
INCORRECT FEED RATE	●	●					Use a pitch controlled tapping machine or an attachment with axial float
WRONG TYPE OF TAP FOR THE JOB	●	●		●	●		Use manufacturer's recommended tap for the job
BLUNT TAP		●		●	●	●	Replace or resharpen tap
INCORRECT SHARPENING OF TAP	●	●	●	●	●	●	Taps should be reground to the manufacturer's specifications
INCORRECT LUBRICATION OR LACK OF LUBRICATION	●	●		●	●	●	Ensure that correct lubricant is used, see that it reaches the cutting edges of the tap
TAP HITTING BOTTOM OF HOLE			●				Reset machine to prevent tap from hitting bottom of hole
TAP SPEED TOO HIGH OR TOO LOW		●		●	●	●	Adjust speed to manufacturer's recommendations
WORK HARDENED SKIN IN DRILLED HOLE			●	●	●		Normally caused by a blunt drill or cutter. Replace or resharpen
EXCESSIVE RUN - OUT	●	●	●		●		Recondition machine or replace
CHIPS NOT BEING REMOVED PROPERLY		●			●		Use correct tap for job, see that lubrication under necessary pressure to wash out chips
TAP DRILL SIZE INCORRECT	●				●		Use manufacturer's recommended tap drill size
MATERIAL TOO SOFT INCORRECT STRUCTURE						●	Use material better suited for job

TENSILE STRENGTH

Comparison Table • Tensile Strength • Vickers - Brinell & Rockwell Hardness

Part of DIN 50 150

Tensile Strength N / mm²	Vickers Hardness (F ≥ 98 N)	Brinell Hardness $(0{,}102 \cdot \frac{F}{D^2} = 30 \frac{N}{mm^2})$	HRC
255	80	76.0	
270	85	80.7	
285	90	85.5	
305	95	90.2	
320	100	95.0	
335	105	99.8	
350	110	105	
370	115	109	
385	120	114	
400	125	119	
415	130	124	
430	135	128	
450	140	133	
465	145	138	
480	150	143	
495	155	147	
510	160	152	
530	165	156	
545	170	162	
560	175	166	
575	180	171	
595	185	176	
610	190	181	
625	195	185	
640	200	190	
660	205	195	
675	210	199	
690	215	204	
705	220	209	
720	225	214	
740	230	219	
755	235	223	
770	240	228	20.3
785	245	233	21.3
800	250	238	22.2
820	255	242	23.1
835	260	247	24.0
850	265	252	24.8
865	270	257	25.6
880	275	261	26.4
900	280	266	27.1
915	285	271	27.8
930	290	276	28.5
950	295	280	29.2
965	300	285	29.8
995	310	295	31.0
1030	320	304	32.2
1060	330	314	33.3
1095	340	323	34.4
1125	350	333	35.5

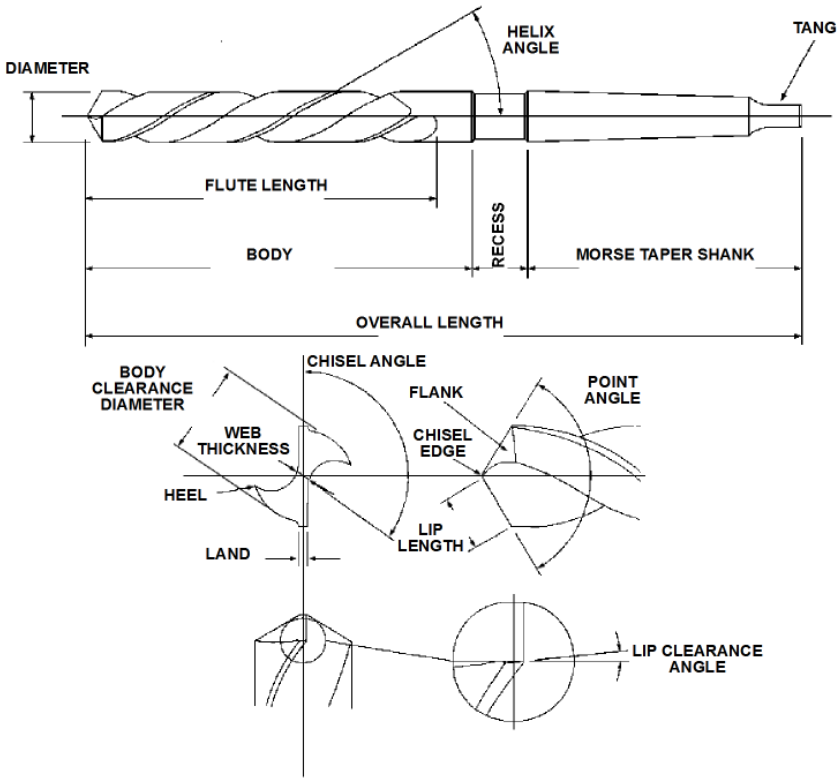
Tensile Strength N / mm²	Vickers Hardness (F ≥ 98 N)	Brinell Hardness $(0{,}102 \cdot \frac{F}{D^2} = 30 \frac{N}{mm^2})$	HRC
1155	360	342	36.6
1190	370	352	37.7
1220	380	361	38.8
1255	390	371	39.8
1290	400	380	40.8
1320	410	390	41.8
1350	420	399	42.7
1385	430	409	43.6
1420	440	418	44.5
1455	450	428	45.3
1485	460	437	46.1
1520	470	447	46.9
1555	480	(456)	47.7
1595	490	(466)	48.4
1630	500	(475)	49.1
1665	510	(485)	49.8
1700	520	(494)	50.5
1740	530	(504)	51.1
1775	540	(513)	51.7
1810	550	(523)	52.3
1845	560	(532)	53.0
1880	570	(542)	53.6
1920	580	(551)	54.1
1955	590	(561)	54.7
1995	600	(570)	55.2
2030	610	(580)	55.7
2070	620	(589)	56.3
2105	630	(599)	56.8
2145	640	(608)	57.3
2180	650	(618)	57.8
	660		58.3
	670		58.8
	680		59.2
	690		59.7
	700		60.1
	720		61.0
	740		61.8
	760		62.5
	780		63.3
	800		64.0
	820		64.7
	840		65.3
	860		65.9
	880		66.4
	900		67.0
	920		67.5
	940		68.0

METRIC / IMPERIAL CONVERSION TABLE

FRACTIONAL / MILLIMETRES / DECIMAL INCH

FRAC	mm	INCH	FRAC	mm	INCH	FRAC	mm	INCH	FRAC	mm	INCH	FRAC	mm	INCH	FRAC	mm	INCH	FRAC	mm	INCH
	.3	.0118		2.083	.0820		4.7	.1850		8.75	.3445	41/64	16.272	.6406	1 3/16	30.162	1.1875	1 31/32	50.006	1.9688
	.325	.0128		2.1	.0827		4.75	.1870		8.8	.3465		16.5	.6496		30.5	1.2008	1 63/64	50.403	1.9844
	.343	.0135		2.15	.0846	3/16	4.762	.1875		8.839	.3480	21/32	16.669	.6562	1 13/64	30.559	1.2031	2	50.800	2.0000
	.35	.0138		2.184	.0860		4.8	.1890		8.9	.3504		16.75	.6594	1 7/32	30.956	1.2188		51.0	2.0079
	.368	.0145		2.2	.0866		4.85	.1909		9.00	.3543		17.00	.6693		31.0	1.2205	2 1/32	51.594	2.0312
	.375	.0148		2.25	.0886		4.851	.1910		9.093	.3580	43/64	17.066	.6719	1 15/64	31.353	1.2344		52.0	2.0472
1/64	.397	.0156		2.261	.0890		4.9	.1929		9.1	.3583		17.25	.6791		31.5	1.2402	2 1/16	52.388	2.0625
	.4	.0157		2.3	.0906		4.915	.1935	23/64	9.128	.3594	11/16	17.462	.6875	1 1/4	31.750	1.2500		53.0	2.0866
	.406	.0160		2.35	.0925		4.95	.1949		9.2	.3622		17.5	.6890		32.0	1.2598	2 3/32	53.181	2.0938
	.425	.0167		2.375	.0935		4.978	.1960		9.25	.3642		17.75	.6988	1 17/64	32.147	1.2656	2 1/8	53.975	2.1250
	.45	.0177	3/32	2.381	.0938		5.00	.1968		9.3	.3661	45/64	17.859	.7031		32.5	1.2795		54.0	2.1260
	.457	.0180		2.4	.0945		5.055	.1990		9.347	.3680		18.00	.7087	1 9/32	32.544	1.2812	2 5/32	54.769	2.1562
	.475	.0187		2.438	.0960		5.1	.2008		9.4	.3701		18.25	.7185	1 19/64	32.941	1.2969		55.0	2.1654
	.5	.0197		2.45	.0965		5.105	.2010		9.5	.3740	23/32	18.256	.7188		33.0	1.2992	2 3/16	55.562	2.1875
	.508	.0200		2.489	.0980	13/64	5.159	.2031	3/8	9.525	.3750		18.5	.7283	1 5/16	33.338	1.3125		56.0	2.2047
	.525	.0207		2.5	.0984		5.182	.2040		9.576	.3770	47/64	18.653	.7344		33.5	1.3189	2 7/32	56.356	2.2188
	.533	.0210		2.527	.0995		5.2	.2047		9.6	.3780		18.75	.7382	1 21/64	33.734	1.3281		57.0	2.2441
	.55	.0217		2.55	.1004		5.220	.2055		9.7	.3819		19.00	.7480		34.0	1.3386	2 1/4	57.150	2.2500
	.572	.0225		2.578	.1015		5.25	.2067		9.75	.3839	3/4	19.050	.7500	1 11/32	34.131	1.3438	2 9/32	57.944	2.2812
	.575	.0226		2.6	.1024		5.3	.2087		9.8	.3858		19.25	.7579		34.5	1.3583		58.0	2.2835
	.6	.0236		2.642	.1040		5.309	.2090		9.804	.3860	49/64	19.447	.7656	1 23/64	34.528	1.3594	2 5/16	58.738	2.3125
	.610	.0240		2.65	.1043		5.4	.2126		9.9	.3898		19.5	.7677	1 3/8	34.925	1.3750		59.0	2.3228
	.625	.0246		2.7	.1063		5.410	.2130	25/64	9.922	.3906		19.75	.7776		35.0	1.3780	2 11/32	59.531	2.3438
	.635	.0250		2.705	.1065		5.5	.2165		10.00	.3937	25/32	19.844	.7812	1 25/64	35.322	1.3906		60.0	2.3622
	.65	.0256		2.75	.1083	7/32	5.556	.2188		10.084	.3970		20.00	.7874		35.5	1.3976	2 3/8	60.325	2.3750
	.660	.0260	7/64	2.778	.1094		5.6	.2205		10.1	.3976	51/64	20.241	.7969	1 13/32	35.719	1.4062		61.0	2.4016
	.675	.0266		2.794	.1100		5.613	.2210		10.2	.4016		20.25	.7972		36.0	1.4173	2 13/32	61.119	2.4062
	.7	.0276		2.8	.1102		5.7	.2244		10.25	.4035		20.5	.8071	1 27/64	36.116	1.4219	2 7/16	61.912	2.4375
	.711	.0280		2.819	.1110		5.75	.2264		10.262	.4040	13/16	20.638	.8125		36.5	1.4370		62.0	2.4409
	.725	.0285		2.85	.1122		5.791	.2280		10.3	.4055		20.75	.8169	1 7/16	36.512	1.4375	2 15/32	62.706	2.4688
	.742	.0292		2.870	.1130		5.8	.2283	13/32	10.319	.4062		21.00	.8268	1 29/64	36.909	1.4531		63.0	2.4803
	.75	.0295		2.9	.1142		5.9	.2323		10.4	.4094	53/64	21.034	.8281		37.0	1.4567	2 1/2	63.500	2.5000
	.775	.0305		2.946	.1160		5.944	.2340		10.490	.4130		21.25	.8366	1 15/32	37.306	1.4688		64.0	2.5197
	.787	.0310		2.95	.1161	15/64	5.953	.2344		10.5	.4134	27/32	21.431	.8438		37.5	1.4764	2 17/32	64.294	2.5312
1/32	.794	.0312		3.00	.1181		6.00	.2362		10.6	.4173		21.5	.8465	1 31/64	37.703	1.4844		65.0	2.5591
	.8	.0315		3.048	.1200		6.045	.2380		10.7	.4213		21.75	.8563		38.0	1.4961	2 9/16	65.088	2.5625
	.813	.0320		3.05	.1201		6.1	.2402	27/64	10.716	.4219	55/64	21.828	.8594	1 1/2	38.100	1.5000	2 19/32	65.881	2.5938
	.825	.0325		3.1	.1220		6.147	.2420		10.75	.4232		22.00	.8661	1 33/64	38.497	1.5156		66.0	2.5984
	.838	.0330		3.15	.1240		6.2	.2441		10.8	.4252	7/8	22.225	.8750		38.5	1.5157	2 5/8	66.675	2.6250
	.85	.0335	1/8	3.175	.1250		6.248	.2460		10.9	.4291		22.25	.8760	1 17/32	38.894	1.5312		67.0	2.6378
	.875	.0344		3.2	.1260		6.25	.2461		11.00	.4331		22.5	.8858		39.0	1.5354	2 21/32	67.469	2.6562
	.889	.0350		3.25	.1280		6.3	.2480		11.1	.4370	57/64	22.622	.8906	1 35/64	39.291	1.5469		68.0	2.6772
	.9	.0354		3.264	.1285	1/4	6.350	.2500	7/16	11.112	.4375		22.75	.8957		39.5	1.5551	2 11/16	68.262	2.6875
	.914	.0360		3.3	.1299		6.4	.2520		11.2	.4409		23.00	.9055	1 9/16	39.688	1.5625		69.0	2.7165
	.925	.0364		3.35	.1319		6.5	.2559		11.25	.4429	29/32	23.019	.9062		40.0	1.5748	2 23/32	69.056	2.7188
	.940	.0370		3.4	.1339		6.528	.2570		11.3	.4449		23.25	.9154	1 37/64	40.084	1.5781	2 3/4	69.850	2.7500
	.95	.0374		3.45	.1358		6.6	.2598		11.4	.4488	59/64	23.416	.9219	1 19/32	40.481	1.5938		70.0	2.7559
	.965	.0380		3.454	.1360		6.629	.2610		11.5	.4528		23.5	.9252		40.5	1.5945	2 25/32	70.644	2.7812
	.975	.0384		3.5	.1378		6.7	.2638	29/64	11.509	.4531		23.75	.9350	1 39/64	40.878	1.6094		71.0	2.7953
	.991	.0390		3.55	.1398	17/64	6.747	.2656		11.6	.4567	15/16	23.812	.9375		41.0	1.6142	2 13/16	71.438	2.8125
	1.00	.0394		3.569	.1405		6.75	.2657		11.7	.4606		24.00	.9449	1 5/8	41.275	1.6250		72.0	2.8346
	1.016	.0400	9/64	3.572	.1406		6.756	.2660		11.75	.4626	61/64	24.209	.9531		41.5	1.6339	2 27/32	72.231	2.8438
	1.041	.0410		3.6	.1417		6.8	.2677		11.8	.4646		24.25	.9547	1 41/64	41.672	1.6406		73.0	2.8740
	1.05	.0413		3.65	.1437		6.9	.2717		11.9	.4685		24.5	.9646		42.0	1.6535	2 7/8	73.025	2.8750
	1.067	.0420		3.658	.1440		6.909	.2720	15/32	11.906	.4688	31/32	24.606	.9688	1 21/32	42.069	1.6562	2 29/32	73.819	2.9062
	1.092	.0430		3.7	.1457		7.00	.2756		12.00	.4724		24.75	.9744	1 43/64	42.466	1.6719		74.0	2.9134
	1.1	.0433		3.734	.1470		7.036	.2770		12.1	.4764		25.00	.9842		42.5	1.6732	2 15/16	74.612	2.9375
	1.15	.0453		3.75	.1476		7.1	.2795		12.2	.4803	63/64	25.003	.9844	1 11/16	42.862	1.6875		75.0	2.9528
	1.181	.0465		3.797	.1495		7.137	.2810		12.25	.4823		25.25	.9941		43.0	1.6929	2 31/32	75.406	2.9688
3/64	1.191	.0469		3.8	.1496	9/32	7.144	.2812		12.3	.4843	1	25.400	1.0000	1 45/64	43.259	1.7031		76.0	2.9921
	1.2	.0472		3.85	.1516		7.2	.2835	31/64	12.303	.4844		25.5	1.0039		43.5	1.7126	3	76.200	3.0000
	1.25	.0492		3.861	.1520		7.25	.2854		12.4	.4882		25.75	1.0138	1 23/32	43.656	1.7188		77.0	3.0315
	1.3	.0512		3.9	.1535		7.3	.2874		12.5	.4921	1 1/64	25.797	1.0156		44.0	1.7323	3 1/16	77.788	3.0625
	1.321	.0520		3.912	.1540		7.366	.2900		12.6	.4961		26.0	1.0236	1 47/64	44.053	1.7344		78.0	3.0709
	1.35	.0532		3.95	.1555		7.4	.2913	1/2	12.7	.5000	1 1/32	26.194	1.0312	1 3/4	44.450	1.7500		79.0	3.1102
	1.397	.0550	5/32	3.969	.1562		7.493	.2950		12.75	.5020		26.25	1.0335		44.5	1.7520	3 1/8	79.375	3.1250
	1.4	.0551		3.988	.1570		7.5	.2953		12.8	.5039		26.5	1.0433	1 49/64	44.847	1.7656		80.0	3.1496
	1.45	.0571		4.00	.1575	19/64	7.541	.2969		12.9	.5079	1 3/64	26.591	1.0469		45.0	1.7716	3 3/16	80.962	3.1875
	1.5	.0591		4.039	.1590		7.6	.2992		13.00	.5118		26.75	1.0531	1 25/32	45.244	1.7812		81.0	3.1890
	1.511	.0595		4.05	.1594		7.671	.3020	33/64	13.097	.5156	1 1/16	26.988	1.0625		45.5	1.7913		82.0	3.2283
	1.55	.0610		4.089	.1610		7.7	.3032		13.25	.5217		27.0	1.0630	1 51/64	45.641	1.7969	3 1/4	82.550	3.2500
1/16	1.588	.0625		4.1	.1614		7.75	.3051	17/32	13.494	.5312		27.25	1.0728		46.0	1.8110		83.0	3.2677
	1.6	.0630		4.15	.1634		7.8	.3071		13.5	.5315	1 5/64	27.384	1.0781	1 13/16	46.038	1.8125		84.0	3.3071
	1.613	.0635		4.2	.1654		7.9	.3110		13.75	.5413		27.5	1.0827	1 53/64	46.434	1.8281	3 5/16	84.138	3.3125
	1.65	.0650		4.216	.1660	5/16	7.938	.3125	35/64	13.891	.5469		27.75	1.0925		46.5	1.8307		85.0	3.3465
	1.7	.0669		4.25	.1673		8.00	.3150		14.00	.5512	1 3/32	27.781	1.0938	1 27/32	46.831	1.8438	3 3/8	85.725	3.3750
	1.702	.0670		4.3	.1693		8.026	.3160		14.25	.5610		28.0	1.1024		47.0	1.8504		86.0	3.3858
	1.75	.0689		4.305	.1695		8.1	.3189	9/16	14.288	.5625	1 7/64	28.178	1.1094	1 55/64	47.228	1.8594		87.0	3.4252
	1.778	.0700		4.35	.1713		8.2	.3228		14.5	.5709		28.25	1.1122		47.5	1.8701	3 7/16	87.312	3.4375
	1.8	.0709	11/64	4.366	.1719		8.204	.3230	37/64	14.684	.5781		28.5	1.1220	1 7/8	47.625	1.8750		88.0	3.4646
	1.85	.0728		4.394	.1730		8.25	.3248		14.75	.5807	1 1/8	28.575	1.1250		48.0	1.8898	3 1/2	88.900	3.5000
	1.854	.0730		4.4	.1732		8.3	.3268		15.00	.5906		28.75	1.1319	1 57/64	48.022	1.8906	3 5/8	92.075	3.6250
	1.9	.0748		4.45	.1752	21/64	8.334	.3281	19/32	15.081	.5938	1 9/64	28.972	1.1406	1 29/32	48.419	1.9062	3 3/4	95.250	3.7500
	1.930	.0760		4.496	.1770		8.4	.3307		15.25	.6004		29.0	1.1417		48.5	1.9094	3 7/8	98.425	3.8750
	1.95	.0768		4.5	.1772		8.433	.3320	39/64	15.479	.6094		29.25	1.1516	1 59/64	48.816	1.9219	4	101.600	4.0000
5/64	1.984	.0781		4.55	.1791		8.5	.3346		15.5	.6102	1 5/32	29.369	1.1562		49.0	1.9291			
	1.994	.0785		4.572	.1800		8.6	.3386		15.75	.6201		29.5	1.1614	1 15/16	49.212	1.9375			
	2.0	.0787		4.6	.1811		8.611	.3390	5/8	15.875	.6250		29.75	1.1713		49.5	1.9488			
	2.05	.0807		4.623	.1820		8.7	.3425		16.00	.6299	1 11/64	29.766	1.1719	1 61/64	49.609	1.9531			
	2.057	.0810		4.65	.1831	11/32	8.731	.3438		16.25	.6398		30.0	1.1811		50.0	1.9685			

DRILL TERMINOLOGY



DRILL SPEEDS & FEED

DRILL SERIES	STANDARD DRILLS					
Helix angle	STANDARD (20°- 30°)					
Flute width	STANDARD					
Web thickness	STANDARD					
Choice standard	It is most suitable for drilling of steel, cast iron, alloy steel, and malleable cast iron and possible to drill stainless drill, brass, shallow hole of aluminium alloy, nickel and almost all kinds of material.					
Work material / Cutting condition	Steel		Cast iron		Alloy steel	
Dia.(mm)	rpm	mm/rev	rpm	mm/rev	rpm	mm/rev
2	3550	0.03	3550	0.03	1800	0.02
3	2240	0.06	2240	0.06	1120	0.03
5	1400	0.11	1400	0.11	710	0.05
8	900	0.16	900	0.16	450	0.08
12	560	0.22	560	0.22	280	0.11
16	450	0.26	450	0.26	224	0.13
20	355	0.30	355	0.30	180	0.15
25	280	0.34	280	0.34	140	0.17
32	224	0.38	224	0.38	112	0.19
40	180	0.42	180	0.42	90	0.21
50	140	0.45	140	0.45	71	0.23
Pointing — Point angle	118°		118°		118° 145	
Pointing — Relief angle	12° - 15°		12° - 15°		6° - 9°	
Cutting fluid	Soluble		Dry, airjet, soluble oil		Sulfurized Oil	

CUTTING DIAMETER TOLERANCE ON TWIST DRILLS

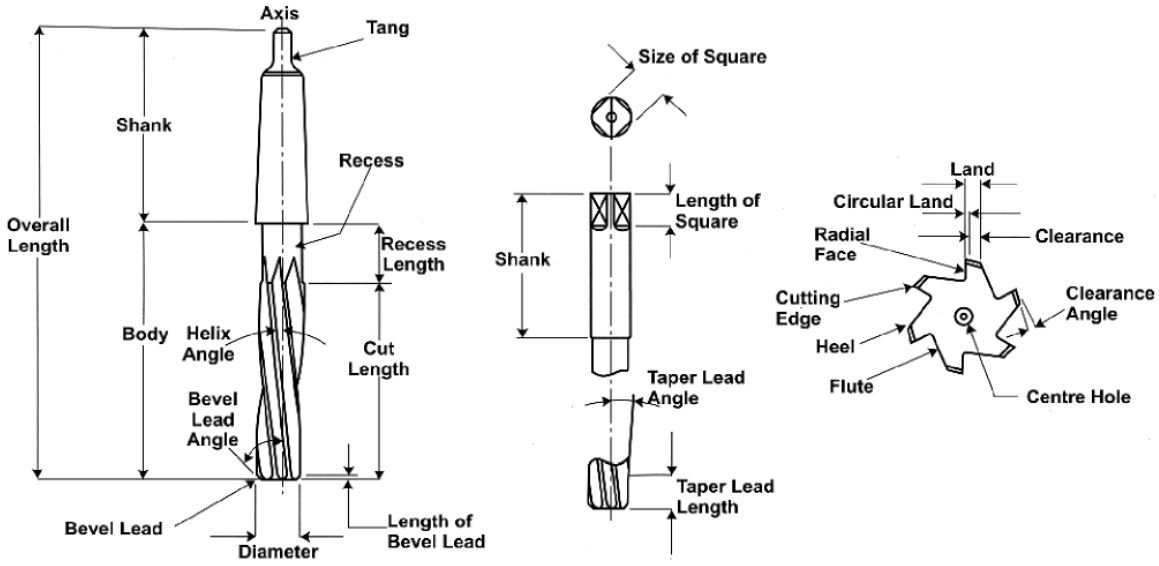
Drill Diameter (mm)		Diameter Tolerance (mm)	
Above	Up To	Plus	Minus
-	3	+ 0	- 0,014
3	6	+ 0	- 0,018
6	10	+ 0	- 0,022
10	18	+ 0	- 0,027
18	30	+ 0	- 0,033
30	50	+ 0	- 0,039
50	80	+ 0	- 0,046

DRILL TROUBLESHOOTING CHART

INDICATIONS	CAUSES
Failure	Imperfect fit between taper shank and socket, caused by dirt, chips, burrs or badly worn out shanksand sockets.
Splitting of the drill at the web	Excessive feed. Excessive web-thinning. Careless ejection of drill from spindle causing the drill to fall on the table.
Excessive wear of outer corners	Excessive speed. No coolant. Clogging of Flutes.
Breaking or flattening of outer corners of drill at flute run off	Spring or backlash in the drill press and fixture or work.
Chipped cutting lips	Excessive feed. Excessive clearance angle.
Cracks in cutting lips	Overheating or quick-cooling while sharpening or drilling.
Breaking of drill	Point improperly ground. Heavy feed. Insecure clamping of drill or work piece. Drill too dull. Flute clogging by chips.
Holes rough	Point improperly ground or dull drill. No coolant. Heavy feed. Fixture not rigid.
Holes oversize	Unequal angle or length of the cutting edges or both loose spindle.
Large chip coming out of one flute, small chip at the other	Point improperly ground One lip doing all the cutting.

REAMER TERMINOLOGY

REAMER TERMS & GENERAL FEATURES



Recommended Cutting Parameters

Material	Cutting Speed m/mim		Feed Rate Code		Reaming stock allowance in mm				
	Spiral Flute	Straight Flute	Spiral Flute	Straight Flute	dia. up to 6mm	dia. up to 10mm	dia. up to 16mm	dia. up to 25mm	dia. up to 40mm
Steel up to tensile strength 700 N/mm²	14	11	C	B	0.1 - 0.2	0.2	0.2 - 0.3	0.3 - 0.4	0.4 - 0.5
Steel above tensile strength 700 N/mm²	11	9	C	B	0.1 - 0.2	0.2	0.2	0.3	0.3 - 0.4
Cast Steel	10	8	D	C	0.1 - 0.2	0.2	0.2	0.2 - 0.3	0.3 - 0.4
Grey Cast Iron	12	9	D	C	0.1 - 0.2	0.2	0.2 0.3	0.3 - 0.4	0.4 - 0.5
Malleable Cast Iron	10	8	C	B	0.1 - 0.2	0.2	0.3	0.4	0.5
Copper	17	14	D	C	0.1 - 0.2	0.2 - 0.3	0.3 - 0.4	0.4 - 0.5	0.5
Brass, Bronze	20	17	E	D	0.1 - 0.2	0.2	0.2 - 0.3	0.3	0.3 - 0.4
Light Alloys	17-20	14-18	F	E	0.1 - 0.2	0.2 - 0.3	0.3 - 0.4	0.4 - 0.5	0.5
Plastics	20	16	B	A	0.1 - 0.2	0.2	0.4	0.4 - 0.5	0.5

Cutting speeds and feed may vary by 10 - 15% depending upon specific appliction

Reamer Feed Chart

Feed Code	Reaming Diameter								
	5mm	8mm	10mm	12mm	16mm	20mm	25mm	30mm	40mm
A	0.100	0.150	0.170	0.185	0.220	0.250	0.280	0.320	0.390
B	0.150	0.180	0.210	0.240	0.280	0.310	0.360	0.400	0.500
C	0.185	0.220	0.260	0.285	0.335	0.390	0.440	0.480	0.600
D	0.200	0.270	0.320	0.360	0.410	0.470	0.540	0.600	0.730
E	0.250	0.350	0.390	0.430	0.500	0.530	0.640	0.750	0.910
F	0.350	0.440	0.500	0.550	0.630	0.700	0.800	0.930	1.200

Feed rates are given in mm/rev

REAMERS

REAMERS & THEIR ECONOMICAL APPLICATION

Reamer Selection

- Hand reamers
- Machine reamers

Hand Reamers

Hand reamers are turned in the hole by means of a tap wrench which is mounted on the square. The feeding action is produced manually. To ensure a proper guidance in the hole the taper lead length of hand reamers is made considerbaly longer than that of machine reamers.

A basic rule for reaming by hand : Turn the tool only in the cutting direction. i.e. Never reverse the tool contrary to standard practice in thread cutting. Cutting edges will become immediately blunt if the reamer is turned back.

Machine Reamers

Machine reamers are, as the name implies, exclusively designed for use on machines. Depending on the type of tool carrier, machine reamers can be divided in to the following categories:

- Reamers with straight shank
- Reamers with morse taper shank
- Reamers with shanks of special design

A further distinctive feature of hand and machine reamers is the geometry of the cutting section, standardised under the following headings :

- Straight-fluted reamers
- LH spiral reamers
- Reamers with quick spiral (25° / 45°) left-hand flutes

Tool with right-hand spiral flutes are only applied in special cases. They produce, like twist drills, a chip flow up the flutes, which often results in an unsatisfactory surface finish quality.

Reamers with straight flutes are suitable for the machining of blind holes. Here again the absence of chip space at the bottom of the hole means that swarf must be evacuated up the reamer flutes. For all other machining tasks, and particulary for interrupted holes (e.g. hole with keyways, intersecting holes and the like), reamers with left-hand spiral flutes are much more suitable. Chip removal is always in the direction of the feed and for this reason this flute geometry is used almost exclusively for through holes. Their application in blind holes is limited to tasks where reaming to the full depth is not required, so that sufficient space for the chip volume created is available.

A reamer always follows the direction of the predrilled hole and does not correct alignment error of predrilled holes. Use of core drill after drilling is recommended for correct reaming results.

REAMERS

REAMERS & THEIR ECONOMICAL APPLICATION

Practical Tips for Reaming

Always use :

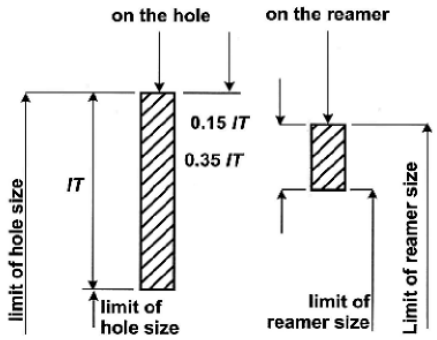
- Low cutting speeds
- High feed rates
- Good and sufficient coolant
- Floating holders to eliminate alignment errors of drilled hole & spindle axis

Resharpening of Reamers

Before resharpening reamers check concentricity between centers and only then decide whether resharpening is economical. Should diameter and back taper be still within the required tolerance regrinding of the bevel lead only is sufficient. As a basic rule always resharpen between centers and position with indexing finger.

Calculating Tolerance Limits

When it is necessary to define the dimensions of a special reamer, which is intended to cut to a specific tolerance, eg. D8. this well proven guide can be used:



Example of a 10mm hole with tolerance D8

Maximum diameter of hole		= 10.062
Minimum diameter of hole		= 10.040
Hole tolerance (IT8)		= 0.022

The maximum limit for the reamer is the maximum limit of the hole size reduced by 0.15 times the tolerance for the hole. The value is rounded up to the next higher multiple of 0.001mm.

0.15 x hole tolerance (IT8)		= 0.0033
Rounded up		= 0.004

The minimum limit for the reamer is the maximum limit of the reamer reduced by 0.35 times the tolerance for the hole. The value is rounded up to the next higher multiple of 0.001mm.

0.35 x hole tolerance (IT8)		= 0.0077
Rounded up		= 0.008
Maximum limit for reamer	= 10.062 - 0.004	= 10.058
Minimum limit for reamer	= 10.058 - 0.008	= 10.050

A similar method can be used for other tolerance when required.

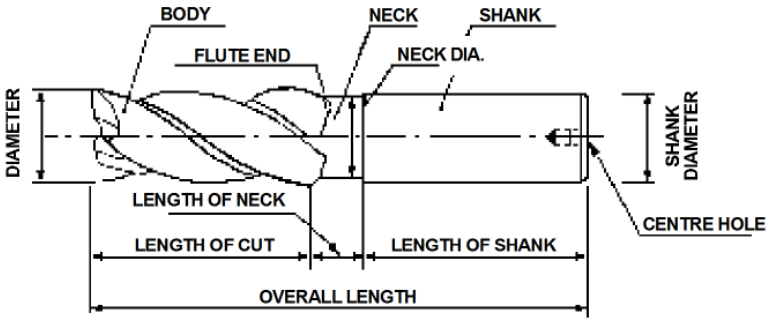
COMMON REAMER PROBLEMS

CAUSES & SOLUTIONS

INDICATIONS	CAUSES	SOLUTIONS
Oversize holes	Concentricity error of machine spindle, holder or tool. Damaged fit between tool shank, chuck & collet Bevel lead of tool incorrect. Cutting speed too high. Feed rate too high. Incorrect coolant for material.	Correct concentricity error. Ensure proper fit. Resharpen bevel lead. Reduce speed. Reduce feed. Use recommended coolant.
Undersize holes	Tool tolerance incorrect. Material ductile hence contracts after reaming Excessive heating during reaming. Reamer blunt. Cutting speed / feed rate too low. Insufficienct stock for reaming.	Use properly designed reamer. Use quick spiral reamer. Use sufficient and correct coolant. Resharpen / change reamer Increase speeed / feed. Keep recommended stock for reaming.
Bell mouthing, oblong & other hole problems	Machine spindle non-concentric. Bevel lead incorrect. Axis of predrilled hole & reamer not in line.	Correct machine error. Sharpen reamer correctly. Use floating reamer holder or use core drill before reaming.
Unsatisfactory surface finish	Reamer blunt. Built up edge on reamer. Cutting speed too high & feed rate too slow. Stock removal allowance too small. Bevel lead incorrect.	Change / resharpen reamer. Use richer coolant, possibly cutting oil or reduce circular land width to almost zero. Adjust speed / feed. Keep recommended stock for reaming. Resharpen the bevel lead correctly.
Reamer seizes & breaks	Back taper incorrect. Excessive land wear. Circular land too wide for work material. Hard spots in the material. Stock removal allowance too small. Material tends to promote jamming.	Refer to the manufacturer. Reduce speed. Refer to manufacturer. Normalise / anneal material. Keep recommended stock for reaming. Use quick spiral reamers.

MILLING CUTTER TERMINOLOGY

SPECIFICATIONS AND TOLERANCES



BS 122 (LS)

SIZE mm	SHANK DIAMETER α	CUT 3F/MF/RC l	OAL 3F/MF/RC L	CUT 2F/BN l	OAL 2F/BN L
3	6	19	63.5	11	60.5
4	6	25.5	70	12.5	66.5
5	6	31.5	76	12.5	70
6	6	31.5	76	16	76
7	10	34	79.5	16	76
8	10	34	79.5	19	79.5
9	10	37	82.5	22	82.5
10	10	37	82.5	22	82.5
11	12	41.5	89	22	89
12	12	49.5	95	25.5	95
13	12	50	95	25.5	95
14	12	57	101.5	28.5	101.5
15	12	58.5	103	31.5	108
16	16	58.5	108.5	31.5	108
18	16	70	115	35	114.5
19	16	76	121.5	38	120.5
20	16	76	121.5	38	120.5
22	25	85.5	143	41.5	140
24	25	92	149	41.5	152.5
25	25	100	157	44.5	159
28	25	98.5	157	47.5	159
30	25	98.5	157	51	159
32	32	101.5	163.5	51	159

DIN 327 (REG)

SIZE mm	SHANK DIAMETER α	LENGTH OF CUT l	OVERALL LENGTH L
3	6	5	49
4	6	7	51
5	6	8	52
6	6	8	52
7	10	10	60
8	10	11	61
9	10	11	61
10	10	13	63
11	12	13	70
12	12	16	73
13	12	16	73
14	12	16	73
15	12	16	73
16	16	19	79
17	16	19	79
18	16	19	79
19	16	19	79
20	20 (16)	22	88
22	20	22	88
24	25	26	102
25	25	26	102
28	25	26	102
30	25	26	102
32	32	32	112
36	32	32	112

DIN 844 (REG)

SIZE mm	SHANK DIAMETER α	LENGTH OF CUT l	OVERALL LENGTH L
3	6	8	52
4	6	11	55
5	6	13	57
6	6	13	57
7	10	16	66
8	10	19	69
9	10	19	69
10	10	22	72
11	12	22	79
12	12	26	83
13	12	26	83
14	12	26	83
15	12	26	83
16	16	32	92
18	16	32	92
19	16	32	92
20	20	38	104
22	20	38	104
24	25	45	121
25	25	45	121
28	25	45	121
30	25	45	121

DIN 844 (LS)

SIZE mm	SHANK DIAMETER α	LENGTH OF CUT l	OVERALL LENGTH L
3	6	12	56
4	6	19	63
5	6	24	68
6	6	24	68
7	10	30	80
8	10	38	88
9	10	38	88
10	10	45	95
11	12	45	102
12	12	53	110
13	12	53	110
14	12	53	110
15	12	53	110
16	16	63	123
18	16	63	123
19	16	63	123
20	20	75	141
22	20	75	141
25	25	90	166
30	25	90	166

BS 122 (REG)

SIZE mm	SHANK DIAMETER α	LENGTH OF CUT l	OVERALL LENGTH L
3	6	9.5	54
4	6	12.5	57
5	6	16	60.5
6	6	16	60.5
7	10	15	60.5
8	10	18	63.5
9	10	21	66.5
10	10	21	66.5
11	12	19	66.5
12	12	24	70
13	12	24.5	70
14	12	28.5	73
15	12	26.5	71
16	16	26.5	77
18	16	35	80
19	16	38	83.5
20	16	38	83.5
22	25	41.5	98.5
24	25	41.5	98.5
25	25	44.5	101.5
28	25	46	104.5
30	25	46	104.5

FEW TYPE	DESCRIPTION	STD	BODY DIA. TOLERANCE	SHANK DIA. TOLERANCE	FLUTE LTH. TOLERANCE	OAL TOLERANCE
820	M42-THREADED SHANK-2F-REGULAR LENGTH	DIN 327	e8	+.000/-0.025	Up to 6mm	Over 30mm to
826	M42-FLATTED SHANK-2F-REGULAR LENGTH	DIN 327	e8	h6	TOL=±.5mm	80mm
828	M42-THREADED SHANK-2F-LONG SERIES	BS 122 P-4	e8	+.000/-0.025		TOL. =±1.5mm
834	M42-FLATTED SHANK-2F-LONG SERIES	DIN 844	e8	h6	Over 6mm to	
836	M42-THREADED SHANK-2F-REGULAR LENGTH BALLNOSE	DIN 327	e8	+.000/-0.025	30mm	Above 80mm to
840	M42-FLATTED SHANK-2F-REGULAR LENGTH BALLNOSE	DIN 327	e8	h6	TOL=±1mm	180mm
842	M42-THREADED SHANK-2F-LONG SERIES BALLNOSE	BS 122 P-4	e8	+.000/-0.025		TOL=±2mm
846	M42-FLATTED SHANK-2F-LONG SERIES BALLNOSE	DIN 844	e8	h6	Over 30mm to	
848	M42-THREADED SHANK-3F-REGULAR LENGTH	BS 122 P-4	+0.063/-0.013	+.000/-0.025	80mm	
854	M42-FLATTED SHANK- 3F-REGULAR LENGTH	DIN 844	JS 12	h6	TOL=±1.5mm	
856	M42-THREADED SHANK-3F-LONG SERIES	BS 122 P-4	+0.063/-0.013	+.000/-0.025		
862	M42-FLATTED SHANK-3F-LONG SERIES	DIN 844	JS 12	h6		
866	M42-THREADED SHANK-4F-REGULAR LENGTH	BS 122 P-4	+0.063/-0.013	+.000/-0.025		
872	M42-FLATTED SHANK-4F-REGULAR LENGTH	DIN 844	JS 12	h6		
874	M42-THREADED SHANK-4F-LONG SERIES	BS 122 P-4	+0.063/-0.013	+.000/-0.025		
880	M42-FLATTED SHANK-4F-LONG SERIES	DIN 844	JS 12	h6		
822	M2-THREADED SHANK-2F-REGULAR LENGTH	DIN 327	e8	+.000/-0.025		
830	M2-THREADED SHANK-2F-LONG SERIES	BS 122 P-4	e8	+.000/-0.025		
868	M2-THREADED SHANK-4F-REGULAR LENGTH	BS 122 P-4	+0.063/-0.013	+.000/-0.025		
876	M2-FLATTED SHANK-4F-LONG SERIES	BS 122 P-4	+0.063/-0.013	h6		

FEW RECOMMENDED MILLING SPEEDS AND FEEDS

FOR MILLING WITH HSS CUTTERS

ENGINEERING DATA - SPEED AND FEED CALCULATIONS

v	=	Speed	m/min
D	=	Cutter - Diameter	mm
n	=	Revolutions per minute	rpm
Sn	=	Feed per revolution	mm
S^1	=	Feed per minute	mm
S^a	=	Feed per tooth	mm
Z	=	No. of teeth	
V	=	Chip volume	cm^3/min
a	=	Depth of cut	mm
b	=	Length of cut	mm
t	=	Machining time	minutes
l	=	Length of workpiece	mm

FORMULA:

$$v = \frac{\pi \cdot D \cdot n}{1000} \qquad S^1 = n \cdot z \cdot S^a$$

$$n = \frac{v \cdot 1000}{\pi \cdot D} \qquad V = \frac{a \cdot b \cdot S^1}{1000}$$

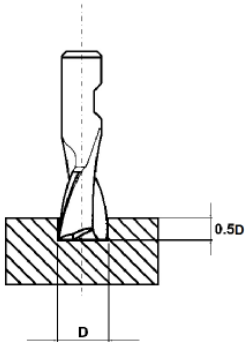
$$Sn = \frac{S^1}{n} \qquad t = \frac{l}{S^1}$$

$$S^a = \frac{S^1}{n \cdot z}$$

TWO FLUTE SLOTTING.

For long series slot drills reduce the feed by 50%

8% cobalt HSS cutters

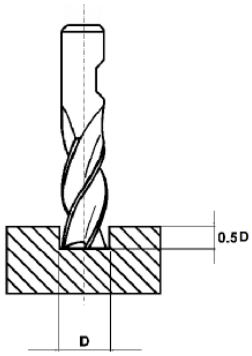


Tensile Strength / Cutting Speed		> 500 N/mm² v = 28 - 40 m/min			500 - 800 N/mm² v = 24 - 32 m/min			800 - 1000 N/mm² v = 18 - 25 m/min			1100 - 1300 N/mm² v = 12 - 16 m/min			Tool Steel v = 7 - 12 m/min			Alluminium v = 75 - 102 m/min		
D	Z	n	S^a	S^1	n	S^a	S^1	n	S^a	S^1	n	S^a	S^1	n	S^a	S^1	n	S^a	S^1
2	2	5600	0.003	40	4500	0.003	30	4000	0.003	30	2240	0.003	15	1600	0.003	10	12500	0.006	160
3	2	3550	0.007	55	3150	0.007	45	2500	0.008	40	1600	0.006	20	1000	0.007	15	11200	0.011	250
4	2	2800	0.012	70	2240	0.012	55	1800	0.012	45	1120	0.013	30	800	0.012	20	8000	0.018	290
5	2	2240	0.020	90	1800	0.019	70	1600	0.018	60	900	0.019	35	630	0.019	25	6300	0.025	315
6	2	1800	0.025	90	1600	0.025	80	1250	0.024	60	800	0.025	40	500	0.025	25	5600	0.028	315
8	2	1400	0.035	100	1120	0.040	90	900	0.038	70	560	0.040	45	400	0.037	30	4000	0.048	387
10	2	1120	0.044	100	900	0.050	90	800	0.050	80	450	0.050	45	315	0.047	30	3150	0.063	400
12	2	900	0.061	110	800	0.062	100	630	0.063	80	400	0.062	50	250	0.060	30	2500	0.075	375
14	2	800	0.068	110	710	0.063	90	560	0.071	80	355	0.070	50	224	0.067	30	2240	0.079	355
16	2	710	0.077	110	560	0.080	90	450	0.077	70	280	0.080	45	180	0.083	30	2000	0.086	345
18	2	630	0.079	100	500	0.090	90	400	0.087	70	250	0.090	45	160	0.093	30	1800	0.095	345
20	2	560	0.089	100	450	0.100	90	400	0.087	70	224	0.100	45	160	0.093	30	1600	0.098	315
22	2	500	0.100	100	450	0.100	90	355	0.098	70	224	0.100	45	140	0.107	30	1400	0.107	300
25	2	450	0.100	90	400	0.100	80	315	0.095	60	180	0.097	35	125	0.100	25	1250	0.112	280
28	2	400	0.100	80	355	0.098	70	280	0.098	55	160	0.093	30	112	0.089	20	1120	0.118	265
30	2	355	0.098	70	315	0.095	60	250	0.100	50	160	0.093	30	100	0.100	25	1120	0.118	265
32	2	355	0.098	70	280	0.098	55	224	0.100	45	140	0.107	30	90	0.111	20	1000	0.118	236
36	2	315	0.095	60	250	0.100	50	200	0.100	40	125	0.100	25	80	0.125	20	900	0.124	224
40	2	280	0.107	60	224	0.111	50	180	0.111	40	112	0.111	25	80	0.125	20	800	0.125	200

THREE FLUTE SLOTTING.

For long series slot drills reduce the feed by 50%

8% cobalt HSS cutters



Tensile Strength / Cutting Speed		> 500 N/mm² v = 28 - 40 m/min			500 - 800 N/mm² v = 24 - 32 m/min			800 - 1000 N/mm² v = 18 - 25 m/min			1100 - 1300 N/mm² v = 12 - 16 m/min			Tool Steel v = 7 - 12 m/min			Alluminium v = 75 - 102 m/min		
D	Z	n	S^a	S^1	n	S^a	S^1	n	S^a	S^1	n	S^a	S^1	n	S^a	S^1	n	S^a	S^1
2	3	5600	0.004	80	4500	0.004	60	4000	0.004	50	2240	0.004	30	1600	0.004	20			
3	3	3550	0.009	100	3150	0.009	90	2500	0.009	70	1600	0.009	45	1000	0.010	30	11200	0.009	315
4	3	2800	0.013	110	2240	0.013	90	1800	0.014	85	1120	0.013	45	800	0.012	30	8000	0.015	375
5	3	2240	0.020	140	1800	0.020	110	1600	0.020	100	900	0.020	55	630	0.021	40	6300	0.021	400
6	3	1800	0.026	140	1600	0.026	125	1250	0.026	100	800	0.025	60	500	0.026	40	5600	0.023	400
8	3	1400	0.037	155	1120	0.037	125	900	0.037	100	560	0.035	60	400	0.037	45	4000	0.041	500
10	3	1120	0.046	155	900	0.046	125	800	0.045	110	450	0.044	60	315	0.047	45	3150	0.056	530
12	3	900	0.057	155	800	0.058	140	630	0.058	110	400	0.058	70	250	0.060	45	2500	0.066	500
14	3	800	0.064	155	710	0.065	140	560	0.065	110	355	0.065	70	224	0.067	45	2240	0.070	475
16	3	710	0.072	155	560	0.074	125	450	0.081	110	280	0.071	60	180	0.074	40	2000	0.075	450
18	3	630	0.082	155	500	0.083	125	400	0.091	110	250	0.080	60	160	0.083	40	1800	0.083	450
20	3	560	0.092	155	450	0.092	125	400	0.091	110	224	0.089	60	160	0.083	40	1600	0.083	400
22	3	500	0.093	140	450	0.092	125	355	0.093	100	224	0.089	60	140	0.095	40	1400	0.095	400
25	3	450	0.092	125	400	0.091	110	315	0.095	90	180	0.092	50	125	0.093	35	1250	0.100	375
28	3	400	0.104	125	355	0.103	110	280	0.107	90	160	0.104	50	112	0.104	35	1120	0.105	355
30	3	355	0.103	110	315	0.105	100	250	0.106	80	160	0.104	50	100	0.100	30	1120	0.105	355

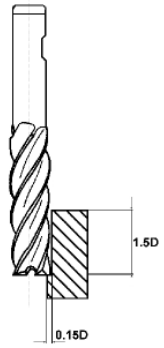
FEW RECOMMENDED MILLING SPEEDS AND FEEDS

FOR MILLING WITH HSS CUTTERS

FOUR & SIX FLUTE SIDE CUTTING.

For long series end mills reduce the feed by 50%

8% cobalt HSS cutters

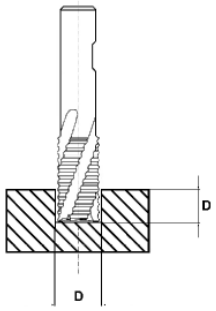


Tensile Strength / Cutting Speed		> 500 N/mm² v = 28 - 40 m/min			500 - 800 N/mm² v = 24 - 32 m/min			800 - 1000 N/mm² v = 18 - 25 m/min			1100 - 1300 N/mm² v = 12 - 16 m/min			Tool Steel v = 7 - 12 m/min			Alluminium v = 75 - 102 m/min		
D	Z	n	Sª	S¹	n	Sª	S¹	n	Sª	S¹	n	Sª	S¹	n	Sª	S¹	n	Sª	S¹
2	4	5600	0.002	50	4500	0.002	45	4000	0.002	40	2240	0.002	20	1600	0.002	15			
3	4	3550	0.004	60	3150	0.004	55	2500	0.004	45	1600	0.003	20	1000	0.003	15	18000	0.011	800
4	4	2800	0.007	80	2240	0.006	60	1800	0.007	50	1120	0.006	30	800	0.006	20	12500	0.018	900
5	4	2240	0.010	90	1800	0.009	70	1600	0.009	60	900	0.009	35	630	0.010	25	10000	0.025	1000
6	4	1800	0.015	110	1600	0.015	100	1250	0.016	80	800	0.015	50	500	0.015	30	9000	0.027	1000
8	4	1400	0.031	175	1120	0.031	140	900	0.030	110	560	0.031	70	400	0.031	50	6300	0.046	1180
10	4	1120	0.044	200	900	0.048	175	800	0.048	155	450	0.050	90	315	0.047	60	5000	0.062	1250
12	4	900	0.068	245	800	0.062	200	630	0.069	175	400	0.068	110	250	0.070	70	4000	0.073	1180
14	4	800	0.085	275	710	0.070	200	560	0.076	175	355	0.077	110	224	0.078	70	3550	0.078	1120
16	4	710	0.096	275	560	0.089	200	450	0.097	175	280	0.098	110	180	0.097	70	3150	0.084	1060
18	4	630	0.109	275	500	0.110	220	400	0.109	175	250	0.110	110	160	0.109	70	2800	0.094	1060
20	4	560	0.122	275	450	0.122	220	400	0.125	200	224	0.122	110	160	0.125	80	2500	0.100	1000
22	6	500	0.138	415	450	0.137	370	355	0.138	295	224	0.137	185	140	0.137	115	2000	0.088	1060
25	6	450	0.153	415	400	0.154	370	315	0.156	295	180	0.152	165	125	0.140	105	1800	0.092	1000
28	6	400	0.173	415	355	0.155	330	280	0.157	265	160	0.171	165	112	0.156	105	1600	0.099	950
30	6	355	0.173	370	315	0.174	330	250	0.176	265	160	0.171	165	100	0.175	105	1600	0.099	950

SLOTTING WITH A ROUGHING END MILL.

For long series end mills reduce the feed by 50%

8% cobalt HSS cutters

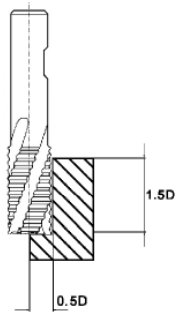


Tensile Strength / Cutting Speed		> 500 N/mm² v = 28 - 40 m/min			500 - 800 N/mm² v = 24 - 32 m/min			800 - 1000 N/mm² v = 18 - 25 m/min			1100 - 1300 N/mm² v = 12 - 16 m/min			Tool Steel v = 7 - 12 m/min		
D	Z	n	Sª	S¹	n	Sª	S¹	n	Sª	S¹	n	Sª	S¹	n	Sª	S¹
6	3	1800	0.013	70	1600	0.011	55	1250	0.012	45	800	0.010	25	500	0.013	20
8	3	1400	0.015	65	1120	0.014	50	900	0.016	45	560	0.014	25	400	0.016	20
10	4	1120	0.022	100	900	0.022	80	800	0.021	70	450	0.022	40	315	0.023	30
12	4	900	0.030	110	800	0.028	90	630	0.035	90	400	0.028	45	250	0.030	30
14	4	800	0.034	110	710	0.031	90	560	0.040	90	355	0.031	45	224	0.033	30
16	4	710	0.038	110	560	0.040	90	450	0.050	90	280	0.040	45	180	0.041	30
18	4	630	0.043	110	500	0.045	90	400	0.056	90	250	0.045	45	160	0.046	30
20	4	560	0.049	110	450	0.055	100	400	0.056	90	224	0.050	45	160	0.046	30
22	4	500	0.056	140	450	0.055	125	355	0.062	110	224	0.049	55	140	0.057	40
25	4	450	0.062	140	400	0.062	125	315	0.069	110	180	0.061	55	125	0.064	40
28	6	400	0.054	130	355	0.061	130	280	0.062	105	160	0.062	60	112	0.059	40
30	6	355	0.070	150	315	0.068	130	250	0.070	105	160	0.062	60	100	0.066	40
32	6	355	0.070	150	280	0.077	130	224	0.078	105	140	0.071	60	90	0.074	40
36	6	315	0.079	150	250	0.086	130	200	0.087	105	125	0.080	60	80	0.083	40
40	6	280	0.074	125	224	0.093	125	180	0.092	100	112	0.081	55	80	0.083	40
50	6	224	0.093	125	180	0.129	140	160	0.104	100	90	0.101	55	63	0.105	40

SIDE CUTTING WITH A ROUGHING END MILL.

For long series end mills reduce the feed by 50%

8% cobalt HSS cutters



Tensile Strength / Cutting Speed		> 500 N/mm² v = 28 - 40 m/min			500 - 800 N/mm² v = 24 - 32 m/min			800 - 1000 N/mm² v = 18 - 25 m/min			1100 - 1300 N/mm² v = 12 - 16 m/min			Tool Steel v = 7 - 12 m/min		
D	Z	n	Sª	S¹	n	Sª	S¹	n	Sª	S¹	n	Sª	S¹	n	Sª	S¹
6	3	1800	0.014	80	1600	0.012	60	1250	0.014	55	800	0.012	30	500	0.031	20
8	3	1400	0.025	105	1120	0.022	75	900	0.024	65	560	0.020	35	400	0.025	30
10	4	1120	0.034	155	900	0.034	125	800	0.034	110	450	0.033	60	315	0.035	45
12	4	900	0.048	175	800	0.043	140	630	0.043	110	400	0.043	70	250	0.045	45
14	4	800	0.054	175	710	0.049	140	560	0.049	110	355	0.049	70	224	0.050	45
16	4	710	0.061	175	560	0.062	140	450	0.061	110	280	0.062	70	180	0.062	45
18	4	630	0.069	175	500	0.070	140	400	0.068	110	250	0.070	70	160	0.070	45
20	4	560	0.078	175	450	0.077	140	400	0.068	110	224	0.078	70	160	0.070	45
22	4	500	0.088	220	450	0.075	170	355	0.078	140	224	0.075	85	140	0.078	55
25	4	450	0.097	220	400	0.085	170	315	0.088	140	180	0.094	85	125	0.088	55
28	6	400	0.087	210	355	0.077	165	280	0.077	130	160	0.088	85	112	0.081	55
30	6	355	0.098	210	315	0.087	165	250	0.086	130	160	0.088	85	100	0.100	60
32	6	355	0.098	210	280	0.098	165	224	0.096	130	140	0.101	85	90	0.111	60
36	6	315	0.111	210	250	0.110	165	200	0.108	130	125	0.113	85	80	0.125	60
40	6	280	0.119	200	224	0.115	155	180	0.115	125	112	0.119	80	80	0.114	55
50	6	224	0.148	200	180	0.162	175	160	0.145	140	90	0.145	80	63	0.145	55

FEW MILLING CUTTERS

HELPFUL TIPS FOR MILLING

Tips on Milling

Setting up

Good machining practice requires a rigid setup in addition to the proper cutting speed, feed, tool material, tool geometry and cutting fluid. The machine tool must be capable of providing the rigidity required for the machining conditions used. If the size of the machine tool is inadequate or excessive wear exists in the moving parts such as spindle bearings or machine tables, chatter will occur and poor tool life will result. When a rigid set up cannot be made, the feed and/or depth of cut must be reduced accordingly.

Excessive tool overhang

When this condition exists, poor tool life and surface finish result and dimensional accuracy is difficult to maintain. Milling cutters should be mounted as close to the spindle as the job will allow.

Cleanliness

Clean all equipment before setting up. Dirt or swarf trapped between adjoining surfaces on chucks, arbors, milling cutters and collets can cause early tool failure and poor finish results.

Long slender workpieces

On machining long slender workpieces, there is a tendency for chatter to develop because of the lack of rigidity of the work piece. The major effort to avoid chatter should be toward providing rigid support with as massive a fixture as possible, especially in the vicinity of the cut.

Milling Failures and Causes

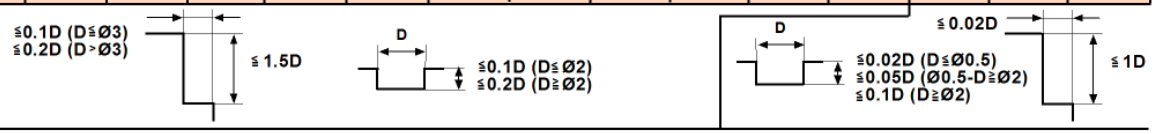
1. Broken cutter	• movement of workpiece due to lack of rigidity in set up • feed to heavy • excessive tool overhang • arbor or chuck not running true • cutter incorrectly mounted • swarf choking and fusing in flute
2. Rapid tool wear	• speed to fast • feed to slow • wrong type or insufficient coolant • wrong type of cutter for material being machined • worn machine parts causing vibration
3. Poor finish	• incorrect speeds and feeds • cutter requires re-sharpening • vibration from worn machine bearings • machine slides loose • wrong type or insufficient coolant
4. Inaccuracy when milling to size	• machine slides and lead screws worn • spring in workpiece clamping or vice set up • excessive tool overhang • depth of cut too great

RECOMMENDED CUTTING CONDITIONS FOR CARBIDE END MILLS

2 FLUTE REG / 2 FLUTE LONG SERIES

Work Material	Copper			(~30HRC) Carbon Steels, Alloy Steels, AISI 1049, Cast Iron			(30~45HRC) Alloy Steels,Tool Steels, Prehardened Steels, AISI H13			Austenitic Stainless Steels AISI 304, AISI 316			(45~50HRC) Hardened Steels AISI H13		
Cutting Speed	80~150m/min			50~100m/min			50~70m/min			30~60m/min			20~40m/min		
		Feed Rate mm/min			Feed Rate mm/min			Feed Rate mm/min			Feed Rate mm/min			Feed Rate mm/min	
End Mill Dia	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting
0.2	40,000	90	30	40,000	-	120	40,000	-	100	28,000	-	60	32,000	-	25
0.3	40,000	130	40	40,000	-	160	40,000	-	120	28,000	-	70	32,000	-	35
0.4	40,000	170	55	40,000	-	200	40,000	-	160	28,000	-	90	24,000	-	35
0.5	40,000	210	70	40,000	320	250	40,000	240	190	25,000	200	120	19,000	75	60
0.6	40,000	245	85	38,000	380	300	33,000	270	210	21,000	220	130	16,000	75	60
0.7	40,000	285	95	36,000	420	330	28,000	300	240	18,000	240	140	14,000	75	60
0.8	40,000	330	110	34,000	480	380	25,000	340	270	16,000	260	150	12,000	75	60
0.9	40,000	375	125	32,000	540	430	22,000	370	290	14,000	280	160	10,600	75	60
1	40,000	420	140	30,000	600	480	20,000	400	320	12,600	300	180	9,600	75	60
1.5	32,000	800	270	20,000	600	480	14,000	400	320	8,400	300	180	6,400	75	60
2	24,000	1,000	330	15,000	600	480	10,000	400	400	6,300	300	180	4,800	75	60
2.5	19,000	1,000	330	12,000	600	480	8,200	400	320	5,100	300	180	3,800	75	60
3	16,000	1,000	330	10,000	600	480	7,000	400	320	4,200	300	180	3,200	75	60
4	12,000	1,000	330	7,500	600	480	5,200	400	320	3,100	300	180	2,400	75	60
5	9,600	1,000	330	6,000	600	480	4,200	400	320	2,500	300	180	1,900	75	60
6	8,000	1,000	330	5,000	600	480	3,500	400	320	2,100	300	180	1,600	75	60
8	6,000	1,000	330	4,000	520	410	2,800	350	280	1,600	260	150	1,200	65	50
10	4,800	1,000	330	3,200	450	360	2,200	300	240	1,300	230	130	1,000	65	50
12	4,000	1,000	330	2,700	410	320	1,900	270	210	1,100	210	120	800	65	50
16	3,000	1,000	330	2,000	240	190	1,400	210	160	840	160	100	600	60	45
20	2,400	1,000	330	1,600	200	160	1,100	170	130	680	140	80	480	50	40

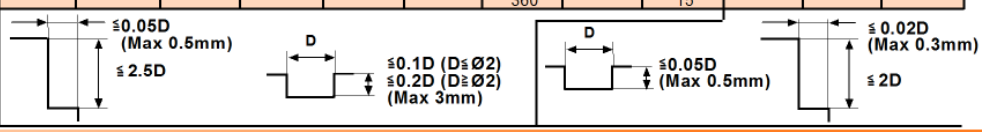
Depth of Cut (D = Dia)



2 FLUTE LONG SERIES STANDARD CUTTING CONDITIONS

Work Material	(~30HRC) Carbon Steels, Alloy Steels, AISI 1049, Cast Iron			(30~45HRC) Alloy Steels,Tool Steels, Prehardened Steels, AISI H13			Austenitic Stainless Steels AISI 304, AISI 316			(45~50HRC) Hardened Steels AISI H13		
Cutting Speed	30~50m/min			30~40m/min			20~30m/min			15~25m/min		
		Feed Rate mm/min			Feed Rate mm/min			Feed Rate mm/min			Feed Rate mm/min	
End Mill Dia	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting
1	13,000	60	60	9,500	45	45	8,000	35	35	6,400	25	25
1.5	8,500	60	60	6,400	45	45	5,300	35	35	4,200	25	25
2	6,400	60	60	4,800	45	45	4,000	35	35	3,200	25	25
2.5	5,100	60	60	3,800	45	45	3,200	40	40	2,500	25	25
3	4,200	65	60	3,400	55	45	2,600	40	40	2,100	25	25
4	3,400	80	60	2,700	65	45	2,100 1,600	50 30		1,700	35	25
5	2,900	100	60	2,300	80	45	1,800 1,350	60 30		1,500	40	25
6	2,500	120	60	2,000	100	50	1,500 1,100	75 30		1,300	50	25
8	1,900	130	60	1,500	100	50	1,200 900	80 30		1,000	50	25
10	1,600	130	60	1,300	100	50	950 710	75 30		800	50	25
12	1,300	120	60	1,100	100	50	800 600	75 30		670	50	25
16	1,000	80	40	820	65	30	600 450	45 20		500	30	15
20	800	65	30	650	50	25	480 360	40 15		400	25	13

Depth of Cut (D = Dia)

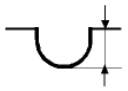


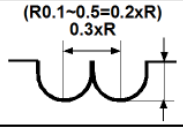
RECOMMENDED CUTTING CONDITIONS FOR CARBIDE END MILLS

2 FLUTE BALL NOSE REG & LONG SERIES / 4 FLUTE REG

Work Material	Copper		Carbon Steels		Alloy Steels, Prehardened Steels		(45~50HRC) Hardened Steels		Aluminium	
Cutting Speed	100~150m/min		150m/min		120~150m/min		80~100m/min		150m/min	
End Mill Dia	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min
0.3	40,000	400	40,000	400	40,000	360	40,000	330	40,000	440
0.4	40,000	480	40,000	500	40,000	480	40,000	500	40,000	480
0.5	40,000	540	40,000	620	40,000	610	40,000	620	40,000	540
0.6	40,000	600	40,000	750	40,000	750	40,000	750	40,000	600
0.7	40,000	700	40,000	890	40,000	900	40,000	870	40,000	700
0.8	40,000	800	40,000	960	40,000	1,000	36,000	900	40,000	800
0.9	40,000	800	40,000	1,000	40,000	1,000	32,000	900	40,000	900
1	40,000	830	40,000	1,200	38,000	1,200	29,000	900	40,000	1,000
1.5	30,000	1,160	30,000	1,270	25,500	1,100	19,000	700	40,000	1,360
2	24,000	1,200	24,000	1,160	19,000	800	14,300	600	40,000	2,000
2.5	19,000	1,200	19,000	1,000	15,300	670	11,500	510	38,000	2,400
3	16,000	1,200	16,000	930	13,000	600	9,600	460	32,000	2,400
3.5	13,600	1,200	13,700	930	11,400	580	8,200	450	27,300	2,400
4	12,000	1,200	12,000	930	10,000	570	7,200	450	24,000	2,400
4.5	10,300	1,200	10,300	930	9,000	570	6,400	450	21,000	2,400
5	9,600	1,200	9,600	930	8,000	560	5,700	450	19,000	2,400
5.5	8,800	1,200	8,800	930	7,200	550	5,250	450	17,500	2,400
6	8,000	1,200	8,000	930	6,400	540	4,800	450	16,000	2,400
7	7,000	1,200	7,000	920	5,400	540	4,200	450	14,000	2,400
8	6,000	1,200	6,000	900	4,800	540	3,600	450	12,000	2,400
9	5,400	1,200	5,400	900	4,300	540	3,300	450	10,800	2,300
10	4,800	1,150	4,800	900	3,800	540	2,900	450	9,600	2,300
12	4,000	1,050	4,000	900	3,200	540	2,400	450	8,000	2,100
14	3,400	1,000	3,400	900	2,750	540	2,050	450	6,800	2,000
16	3,000	1,000	3,000	900	2,400	540	1,800	450	6,000	2,000
18	2,700	1,000	2,700	900	2,150	540	1,620	450	5,300	2,000
20	2,400	1,000	2,400	900	1,900	520	1,450	450	4,800	2,000

Depth of Cut (R)



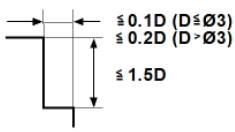


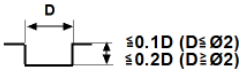
~0.16xR R ≦ 0.3 ~45HRC
~0.25xR R ≦ 3 ~45HRC
~0.17xR R ≧ 4 ~45HRC
~0.05xR ~50HRC

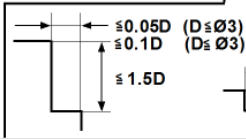
4 FLUTE REG

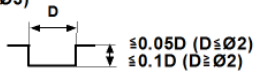
Work Material	(~30HRC) Carbon Steels, Alloy Steels, AISI 1049, Cast Iron			(30~45HRC) Alloy Steels,Tool Steels, Prehardened Steels, AISI H13			Austenitic Stainless Steels AISI 304, AISI 316			(45~50HRC) Hardened Steels AISI H13		
Cutting Speed	50~100m/min			50~70m/min			30~60m/min			20~40m/min		
		Feed Rate mm/min			Feed Rate mm/min			Feed Rate mm/min			Feed Rate mm/min	
End Mill Dia	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting
1	30,000	900	720	20,000	600	480	12,600	450	270	15,000	180	140
2	15,000	900	720	10,000	600	480	6,300	450	270	8,000	180	140
3	10,000	900	720	7,000	600	480	4,200	450	270	5,000	180	140
4	7,500	900	720	5,200	600	480	3,100	450	270	4,000	180	140
5	6,000	900	720	4,200	600	480	2,500	450	270	3,200	180	140
6	5,000	900	720	3,500	600	480	2,100	450	270	2,700	180	140
8	4,000	780	620	2,800	520	410	1,600	390	230	2,000	160	125
10	3,200	680	540	2,200	450	360	1,300	340	200	1,600	140	110
12	2,700	620	490	1,900	410	320	1,100	310	180	1,300	120	95
16	2,000	360	280	1,400	310	240	840	240	140	1,000	100	80
20	1,600	300	240	1,100	250	200	680	210	120	800	90	70

Depth of Cut









RECOMMENDED CUTTING CONDITIONS FOR CARBIDE END MILLS

4 FLUTE LONG SERIES / 4 FLUTE BALL NOSE

Work Material	(~30HRC) Carbon Steels, Alloy Steels, AISI 1049, Cast Iron			(30~45HRC) Alloy Steels,Tool Steels, Prehardened Steels, AISI H13			Austenitic Stainless Steels AISI 304, AISI 316			(45~50HRC) Hardened Steels AISI H13		
Cutting Speed	35~50m/min			30~40m/min			20~30m/min			15~25m/min		
		Feed Rate mm/min			Feed Rate mm/min			Feed Rate mm/min			Feed Rate mm/min	
End Mill Dia	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting	rpm	Side Milling	Slotting
3	4,200	100	50	3,400	90	45	2,600	60		2,100	35	17
							2,080		24			
4	3,400	125	60	2,700	90	45	2,100	70		1,700	50	25
							1,680		28			
5	2,900	155	75	2,300	110	55	1,800	85		1,500	55	27
							1,440		34			
6	2,500	180	90	2,000	140	70	1,500	110		1,300	70	35
							1,200		44			
8	1,900	200	100	1,500	140	70	1,200	110		1,000	70	35
							960		44			
10	1,600	205	100	1,300	140	70	950	110		800	70	35
							760		44			
12	1,300	180	90	1,100	140	70	800	110		670	70	35
							640		44			
16	1,000	120	60	820	100	50	600	80		500	50	25
							480		32			
20	800	95	45	650	75	35	480	70		400	40	20
							384		28			
Depth of Cut	≦0.05 (Max 0.5mm) ≦2.5D			D ≦0.1D (D≦Ø2) ≦0.2D (D≧Ø2) (Max 3mm)			≦0.02D (Max 0.3mm) ≦2D			D ≦0.05D (Max 0.5mm)		

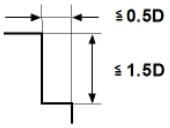
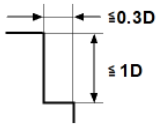
4 FLUTE BALL NOSE

Work Material	HRC 30 ~ 45		HRC 52 ~ 62	
	Rotational Speed	Feeding Speed	Rotational Speed	Feeding Speed
End Mill Dia	rpm	mm/min	rpm	mm/min
3	10,300	920	8,900	570
4	9,800	860	8,060	780
5	8,900	1,100	6,330	690
6	8,700	1,090	5,760	630
8	4,600	1,300	2,880	750
10	2,300	1,030	1,840	570
12	2,300	1,150	1,380	520
16	940	470	630	320
20	610	370	440	220
25	470	230	350	170

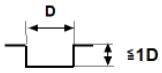
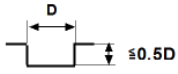
RECOMMENDED CUTTING CONDITIONS FOR CARBIDE END MILLS

4 FLUTE FINE PITCH ROUGHING CUTTERS / 3 FLUTE ALUMINIUM

SIDE MILLING

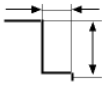
Work Material	(~30HRC) AISI 1050		(30~35HRC) AISI H13, AISI D2		AISI 304, AISI 316		(45~50HRC) SKD 61		Copper Alloy, Aliminium Alloy	
End Mill Dia	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min
5	7,600	740	4,500	380	3,800	260	3,200	100	2,500	70
6	6,400	750	3,700	390	3,200	290	2,700	110	2,100	75
8	4,800	780	2,800	420	2,400	340	2,000	140	1,600	95
10	3,800	790	2,200	420	1,900	340	1,650	150	1,300	105
12	3,200	790	1,900	420	1,600	320	1,300	150	1,100	110
16	2,400	770	1,400	390	1,200	300	1,000	150	800	110
20	1,900	760	1,100	370	1,000	300	800	140	600	100
Depth of Cut										

SLOTTING

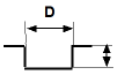
Work Material	(~30HRC) AISI 1050		(30~35HRC) AISI H13, AISI D2		AISI 304, AISI 316		(45~50HRC) SKD 61		Copper Alloy, Aliminium Alloy	
End Mill Dia	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min
5	6,400	570	3,800	280	3,200	190	1,900	50	1,300	25
6	5,300	580	3,200	290	2,700	200	1,600	55	1,100	30
8	4,000	600	2,400	320	2,000	220	1,200	70	800	35
10	3,200	600	1,900	310	1,600	220	1,000	70	600	35
12	2,700	600	1,600	310	1,300	210	800	75	500	40
16	2,000	570	1,200	320	1,000	180	600	75	400	45
20	1,600	540	1,000	270	800	160	500	70	300	40
Depth of Cut										

3 FLUTE END MILL - ALUMINIUM

SIDE MILLING

Work Material	Aluminium Alloy A7075		Cast Aluminium AC4B	
Cutting Speed	300m/min		240m/min	
End Mill Dia	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min
3	32,000	1,400	25,000	950
4	24,000	1,500	19,000	1,000
5	19,000	1,600	15,000	1,000
6	16,000	1,900	13,000	1,100
8	12,000	1,900	9,500	1,200
10	9,500	1,900	7,600	1,200
12	8,000	1,900	6,400	1,200
16	6,000	1,900	4,800	1,200
20	4,800	1,500	3,800	1,000
Depth of Cut	 ≦0.2D (D≦Ø2) ≦0.5D (D≧Ø3) ≦1D			

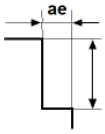
SLOT MILLING

Work Material	Aluminium Alloy A7075		Cast Aluminium AC4B	
Cutting Speed	240m/min		200m/min	
End Mill Dia	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min
3	25,000	950	21,000	600
4	19,000	1,000	16,000	650
5	15,000	1,000	13,000	700
6	13,000	1,100	11,000	750
8	9,500	1,200	8,000	800
10	7,600	1,200	6,400	800
12	6,400	1,200	5,300	800
16	4,800	1,200	4,000	720
20	3,800	970	3,200	660
Depth of Cut	 ≦1D (Max 0.5mm)			

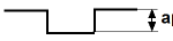
RECOMMENDED CUTTING CONDITIONS FOR CARBIDE END MILLS

4 FLUTE RIP - FIN

SIDE MILLING

Work Material	Mild Steels, Carbon Steels, Cast Iron (-750N/mm2)		Alloy Steels, Tool Steels (-30HRC)		Prehardened Steels, Hardened Steels, (Free Cutting) (30~38HRC)		Hardened Steels, Stainless Steels (38~45HRC)		Hardened Steels, Titanium Alloys, Heat Resistant Alloy Steels (45~55HRC)		Hardened Steels, (55~60HRC)	
Cutting Speed	100m/min		78m/min		66m/min		62m/min		60m/min		60m/min	
End Mill Dia	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min
3	8,840	975	6,640	760	5,600	560	5,280	555	4,820	485	2,560	190
4	6,360	1,000	4,960	820	4,200	565	3,960	590	3,800	515	1,920	190
5	5,080	1,050	3,960	845	3,360	590	3,160	630	3,040	535	1,520	190
6	4,240	1,250	3,320	945	2,800	700	2,640	660	2,560	545	1,280	190
8	3,200	1,250	2,480	895	2,120	660	1,960	640	1,920	555	960	175
10	2,560	1,100	2,000	855	1,680	605	1,560	590	1,520	525	764	160
12	2,120	1,100	1,640	850	1,400	565	1,320	535	1,280	475	636	160
16	1,600	955	1,240	745	1,040	500	1,000	445	960	400	476	160
20	1,280	765	1,000	595	840	455	788	395	764	355	380	160
Depth of Cut			ap 1,5D | ae 0,2D				ap 1,5D | ae 0,1D				ap 1D | ae 0,05D	

SLOTTING

Work Material	Mild Steels, Carbon Steels, Cast Iron (-750N/mm2)		Alloy Steels, Tool Steels (-30HRC)		Prehardened Steels, Hardened Steels, (Free Cutting) (30~38HRC)		Hardened Steels, Stainless Steels (38~45HRC)		Hardened Steels, Titanium Alloys, Heat Resistant Alloy Steels (45~55HRC)		Hardened Steels, (55~60HRC)	
Cutting Speed	100m/min		78m/min		66m/min		62m/min		60m/min		60m/min	
End Mill Dia	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min
3	6,800	705	5,080	959	4,680	455	4,400	400	3,560	320	1,680	110
4	5,080	705	3,800	675	3,520	455	3,320	450	2,680	360	1,280	120
5	4,080	715	3,040	660	2,800	475	2,640	475	2,120	385	1,000	125
6	3,400	715	2,560	560	2,320	500	2,200	495	1,800	400	840	125
8	2,560	660	1,920	550	1,760	545	1,640	515	1,320	415	636	125
10	2,040	610	1,520	535	1,400	475	1,320	470	1,080	380	508	115
12	1,680	610	1,280	475	1,160	450	1,120	440	880	355	424	115
16	1,280	610	960	430	880	370	840	370	668	300	320	88
20	1,000	510	764	380	700	350	664	330	536	265	256	89
Depth of Cut	 ap = 0,5D								ap = 0,05D			

RECOMMENDED CUTTING CONDITIONS FOR CARBIDE END MILLS

HIGH HELIX (HARD STEELS) / 4 FLUTE CORNER RADIUS

HIGH HELIX (HARD STEELS)

Work Material	HRC 45 ~ 52		HRC 52 ~ 62	
	Rotational Speed	Feeding Speed	Rotational Speed	Feeding Speed
End Mill Dia	rpm	mm/min	rpm	mm/min
3	14,040	1,500	6,760	749
4	10,920	1,770	5,200	842
5	9,360	2,010	4,620	983
6	8,320	2,710	4,160	1,350
8	4,640	2,710	2,400	1,350
10	3,360	2,660	2,000	1,350
12	2,480	2,240	1,520	1,120
16	1,440	1,680	1,080	842
20	612	576	504	456
25	468	360	342	216

It is the best way to cool steel material by spraying or air in order to make TiALN efficiently; we commend to adopt non-water cutting liquid to cool the stainless steel, titanium alloy or heat-resisting alloy liquid.

4 FLUTE CORNER RADIUS

Work Material	HRC30		HRC40		HRC40	
End Mill Dia	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min	rpm	Feed Rate mm/min
2mm x 0.2R	8,960	840	7,050	500	4,030	280
2mm x 0.3R	8,960	840	7,050	500	4,030	280
2mm x 0.5R	7,840	580	6,370	440	4,500	290
3mm x 0.2R	7,280	1,000	5,480	670	4,200	280
3mm x 0.3R	7,280	1,000	5,480	670	4,200	280
3mm x 0.5R	7,280	1,120	5,480	840	4,200	280
3mm x 1R	3,870	1,280	6,310	960	4,830	320
4mm x 0.2R	7,000	1,120	5,200	580	3,800	280
4mm x 0.3R	7,000	1,120	5,200	580	3,800	280
4mm x 0.5R	7,000	1,120	5,200	580	3,800	280
4mm x 1R	8,050	1,580	5,980	670	4,370	320
6mm x 0.5R	6,440	1,680	4,920	1,120	2,570	420
6mm x 1R	7,400	1,930	5,660	1,280	2,960	480
6mm x 1.5R	7,720	2,010	5,910	1,340	3,090	500
6mm x 2R	8,370	2,180	6,400	1,450	3,340	540
8mm x 0.5R	4,840	1,980	2,990	950	2,150	450
8mm x 1R	5,570	2,190	3,440	1,090	2,480	520
8mm x 1.5R	5,810	2,280	3,590	1,140	2,580	550
8mm x 2R	6,290	2,470	3,890	1,230	2,800	590
8mm x 2.5R	6,540	2,570	4,040	1,280	2,910	620
8mm x 3R	5,720	2,240	3,530	1,120	2,540	540
10mm x 0.5R	2,690	1,370	1,560	540	810	280
10mm x 1R	3,540	1,790	2,010	700	1,060	370
10mm x 1.5R	3,690	1,880	2,150	740	1,100	390
10mm x 2R	4,000	2,030	2,330	800	1,200	420
10mm x 2.5R	4,150	2,110	2,410	830	1,240	430
10mm x 3R	3,630	1,850	2,110	720	1,090	380
12mm x 0.5R	2,270	1,420	1,070	460	630	260
12mm x 1R	2,990	1,860	1,410	790	830	340
12mm x 1.5R	3,120	1,940	1,470	630	870	350
12mm x 2R	3,380	2,110	1,600	690	940	380
12mm x 2.5R	3,510	2,190	1,660	710	980	400
12mm x 3R	3,070	1,910	1,450	620	860	350

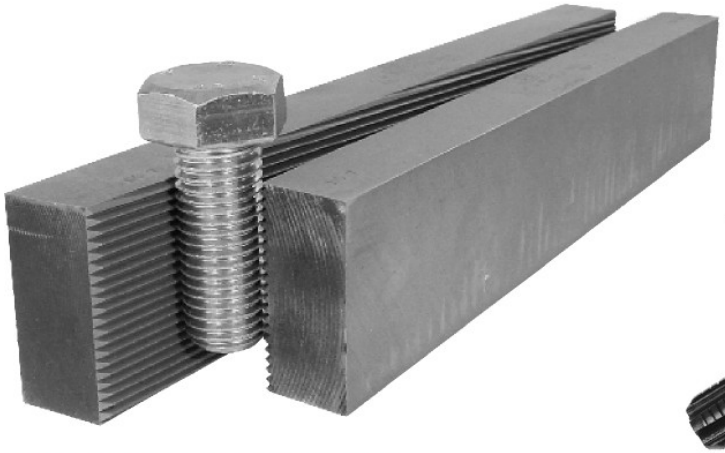
SPECIAL TOOLS

(MANUFACTURED AGAINST SPECIAL REQUEST)

CIRCULAR THREAD ROLLING DIES

2 STAGE ACME TAP

CARD SHANK TAP



FLAT THREAD ROLLING DIES

NUT TAP NIBS

BENT SHANK NUT TAP

CONDITIONS OF SALE

CONDITIONS OF SALE

1. This catalogue/price list cancels all previous issues and shows Stock Range/Prices ruling at the date of issue.

   - Due to constant revision and improvement, we reserve the right to change or modify any information contained in this catalogue without prior notification.
   - New ranges will normally be introduced only once old stocks have been depleted.

2. All orders are accepted and executed on the understanding that the customer is bound by the Conditions of Sale. Where there is an inconsistency between these Conditions of Sale and any conditions which the customer seeks to impose, the Company's Conditions of Sale shall prevail.

3. 'Specials' i.e. non catalogued items, must be covered by an official order. When an order calls for specials, the company reserves the right to despatch a maximum of 10% over or under the specified quantity.

4. Returned Goods policy:

   a) **Returned goods will be charged at 10% for handling.**

   b) No 'specials' which have been quoted for separately, whether manufactured locally or imported, can be cancelled or returned.

   c) No items discontinued from the price list can be returned.

   d) No merchandise can be returned after 1 month from the date of purchase, under any circumstances.

   e) No merchandise will be accepted for return without an accompanying statement of purchase, the FEW invoice number and customer's original order number.

   f) Freight both ways, if any, must be paid by the customer.

   g) Credit will be passed at the purchase price less the handling charge.

5. The risk in goods shall pass on collection by customer or delivery to carriers as appropriate.

6. The company's responsibility in respect of loss, damage or delay ceases upon acceptance of the goods by the carriers. Any damage or shortages must be notified in writing to the company and the carriers within a period of seven days of receipt of the goods. Claims for non-delivery of the whole or part of any consignment must be made in writing within seven days from receipt of invoice.

7. Goods are normally supplied in multiples of the company's standard packed quantities (Normally fives, tens, singles or sets) and adjustments to customer's order may be made to avoid split quantities.
   Goods are normally dispatched carriage free to the customer unless otherwise advised. We reserve the right to charge carriage under certain circumstances. (Packing materials are not returnable for credit).

8. Carriage will be paid by FEW on all orders over R3000 nett (in SACU region).

9. Payment for goods supplied is due not later than the last day of the month following the month of sale or as otherwise agreed in writing, and the company reserves the right to charge interest at 2% per month on overdue accounts.

10. Goods are illustrated and described as accurately as possible and are manufactured to the level of internationally accepted standards. Insignificant variations of goods from their stated dimensions or descriptions will not constitute a breach of contract.

11. The company will not accept responsibility of goods supplied to customer's designs if they are subject of any patent or registered design, and the placing of such an order shall constitute an undertaking by the customer to indemnify the company against all claims and liability in respect of any infringement of such patent or registered design.

12. The company reserves the right to supply the customer the nearest alternative norm when the specification shown in this price list is not available.

13. All our products are guaranteed for workmanship and material; should any complaint or dissatisfaction arise from our tools or service we would appreciate our being notified immediately.

14. If our product is found to be faulty we will replace free of charge. Our guarantee covers only the replacement of the tool without any other indemnity.

15. We cannot be held liable for any errors contained in this catalogue/price list.

16. Ownership of Goods shall pass to the purchaser only when payment is made.

17. The purchaser shall be liable for all costs including attorney and client costs and collection commision incurred by us in the recovery of payment for the goods.

18. The terms and conditions contained in the application for credit with us shall apply in addition to these conditions of sale.

EXPORT

(i) The above conditions shall apply to Export Sales as stated below or where varied in writing as mutually agreed.

(ii) An order is valid only when formally acknowledged by the company.

(iii) Customers must supply the company with all the necessary information to enable it to comply with the import regulations current in their country and to advise the company of any modification thereto affecting any order in process.

(iv) The provisions of condition (7) & (8) may be varied at the company's discretion to meet the requirements of specific markets.