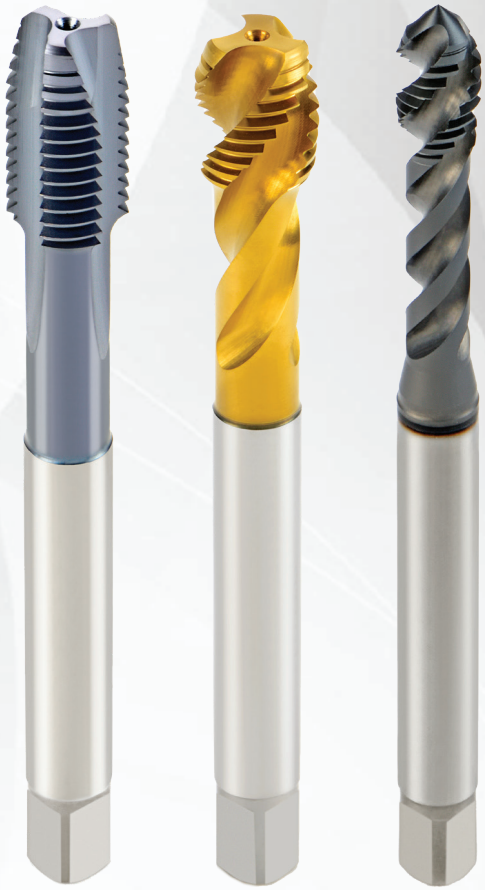
C.P.T.
Präzisions Werkzeuge



Supercut Taps

Englisch

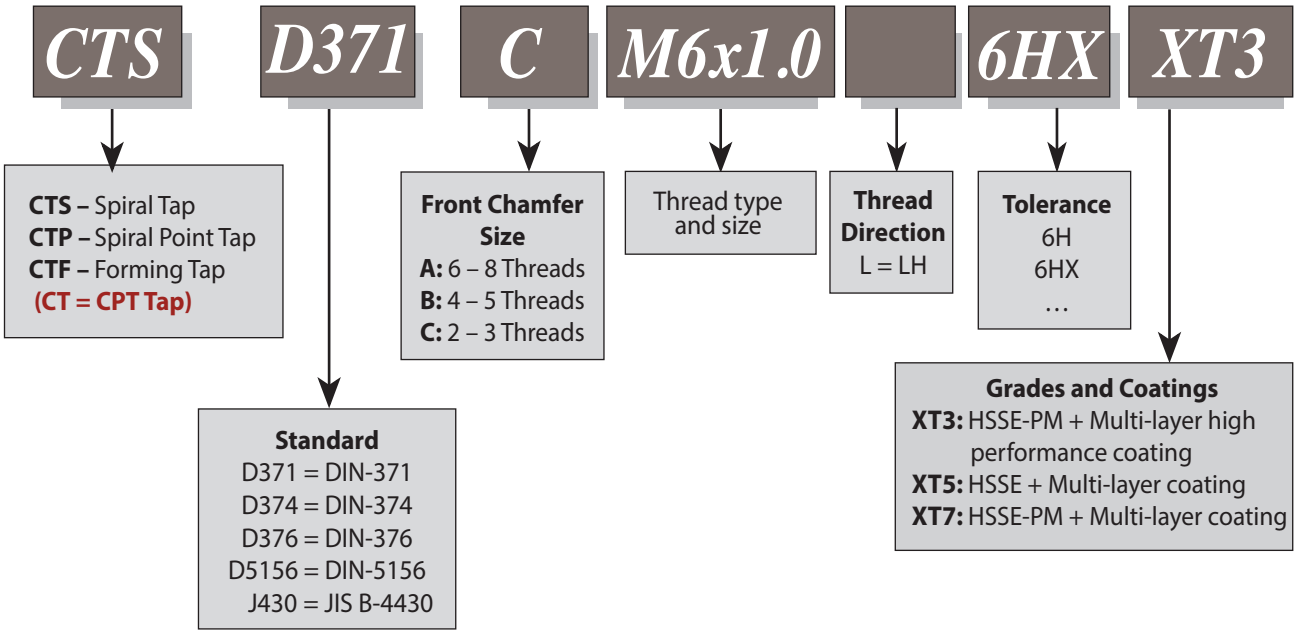
Contents:

Key Features

- High performance taps, designed for long-lasting tool life, durability, and high cutting speed to ensure that each thread is as good and accurate as the first one and as little time-consuming as possible.
- A variety of tap designs and grades ensures that there is a perfect tap for each work application.

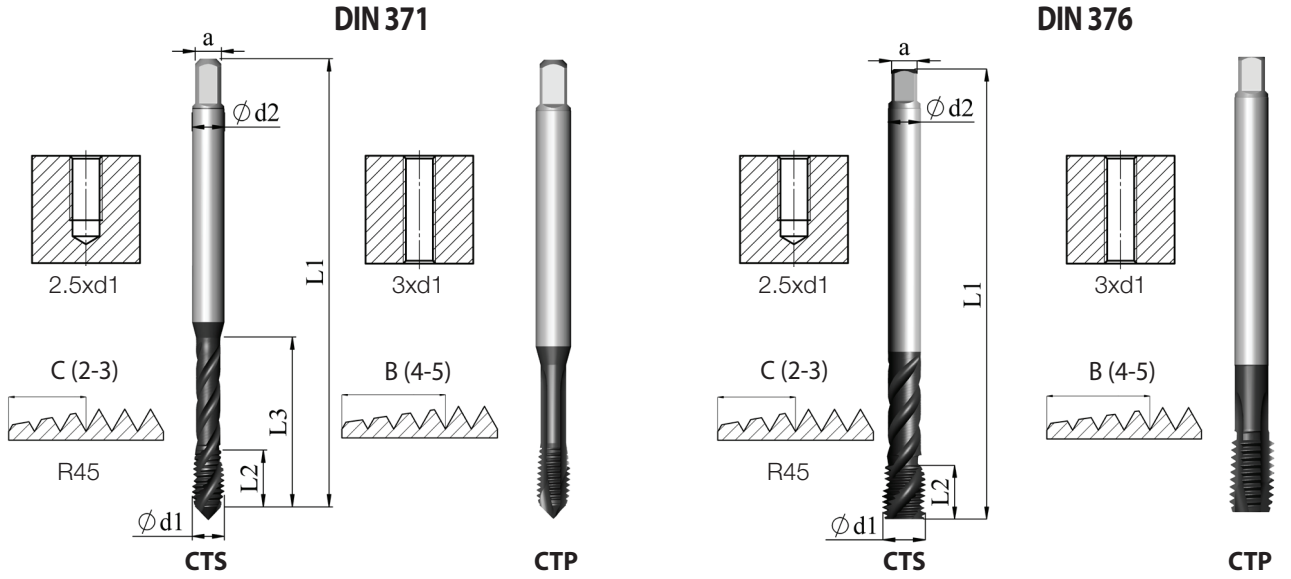
Product Identification

Ordering Codes



HPC Taps

ISO metric coarse M – DIN13



ISO	P	M	K	N	S	H
XT3 Grade	●	●	●	●	●	

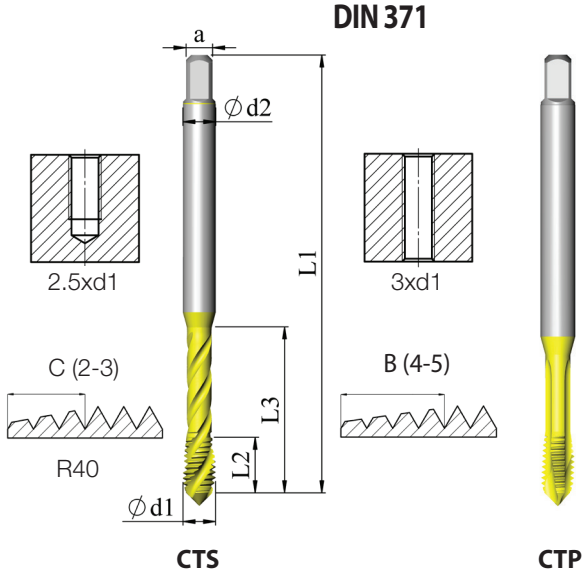
d1	Pitch mm	Ordering Code	d2	L1	L2	L3	a	d
M3	0.5	**CTS D371 C M3x0.5 6HX XT3**	3.5	56	5	18	2.7	2.50
		CTP D371 B M3x0.5 6HX XT3	3.5	56	5	18	2.7	2.50
M4	0.7	**CTS D371 C M4x0.7 6HX XT3**	4.5	63	7	21	3.4	3.30
		CTP D371 B M4x0.7 6HX XT3	4.5	63	7	21	3.4	3.30
M5	0.8	**CTS D371 C M5x0.8 6HX XT3**	6.0	70	8	25	4.9	4.20
		CTP D371 B M5x0.8 6HX XT3	6.0	70	8	25	4.9	4.20
M6	1.0	**CTS D371 C M6x1.0 6HX XT3**	6.0	80	10	30	4.9	5.00
		CTP D371 B M6x1.0 6HX XT3	6.0	80	10	30	4.9	5.00
M8	1.25	**CTS D371 C M8x1.25 6HX XT3**	8.0	90	13	35	6.2	6.80
		CTP D371 B M8x1.25 6HX XT3	8.0	90	13	35	6.2	6.80
M10	1.5	**CTS D371 C M10x1.5 6HX XT3**	10.0	100	15	39	8.0	8.50
		CTP D371 B M10x1.5 6HX XT3	10.0	100	15	39	8.0	8.50
M12	1.75	**CTS D376 C M12x1.75 6HX XT3**	9.0	110	18	-	7.0	10.20
		CTP D376 B M12x1.75 6HX XT3	9.0	110	18	-	7.0	10.20
M16	2.0	**CTS D376 C M16x2.0 6HX XT3**	12.0	110	20	-	9.0	14.00
		CTP D376 B M16x2.0 6HX XT3	12.0	110	20	-	9.0	14.00

Order example: CTS D371 C M6x1.0 6HX XT3

Machine Taps

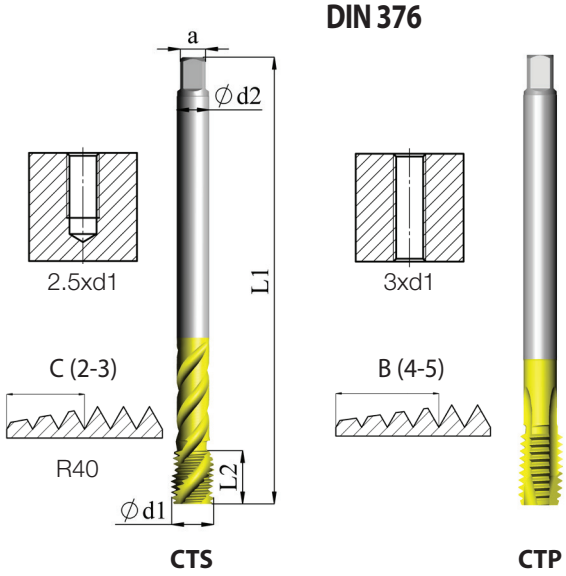
ISO metric coarse M – DIN13

DIN 371



CTS **CTP**

DIN 376



CTS **CTP**

ISO	P	M	K	N	S	H
XT5 Grade	●	●	●	●		

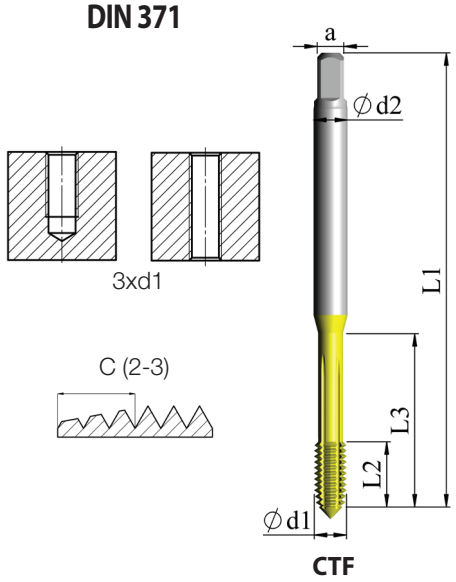
d1	Pitch mm	Ordering Code	d2	L1	L2	L3	a	
M3	0.5	**CTS D371 C M3x0.5 6H XT5**	3.5	56	5	18	2.7	2.50
		CTP D371 B M3x0.5 6H XT5	3.5	56	10	18	2.7	2.50
M4	0.7	**CTS D371 C M4x0.7 6H XT5**	4.5	63	7	21	3.4	3.30
		CTP D371 B M4x0.7 6H XT5	4.5	63	12	21	3.4	3.30
M5	0.8	**CTS D371 C M5x0.8 6H XT5**	6.0	70	8	25	4.9	4.20
		CTP D371 B M5x0.8 6H XT5	6.0	70	14	25	4.9	4.20
M6	1.0	**CTS D371 C M6x1.0 6H XT5**	6.0	80	10	30	4.9	5.00
		CTP D371 B M6x1.0 6H XT5	6.0	80	18	30	4.9	5.00
M8	1.25	**CTS D371 C M8x1.25 6H XT5**	8.0	90	13	35	6.2	6.80
		CTP D371 B M8x1.25 6H XT5	8.0	90	20	35	6.2	6.80
M10	1.5	**CTS D371 C M10x1.5 6H XT5**	10.0	100	15	39	8.0	8.50
		CTP D371 B M10x1.5 6H XT5	10.0	100	20	39	8.0	8.50
M12	1.75	**CTS D376 C M12x1.75 6H XT5**	9.0	110	18	-	7.0	10.20
		CTP D376 B M12x1.75 6H XT5	9.0	110	24	-	7.0	10.20
M16	2.0	**CTS D376 C M16x2.0 6H XT5**	12.0	110	20	-	9.0	14.00
		CTP D376 B M16x2.0 6H XT5	12.0	110	32	-	9.0	14.00
M20	2.5	**CTS D376 C M20x2.5 6H XT5**	16.0	140	25	-	12.0	17.50
		CTP D376 B M20x2.5 6H XT5	16.0	140	32	-	12.0	17.50
M24	3.0	**CTS D376 C M24x3.0 6H XT5**	18.0	160	30	-	14.5	21.00
		CTP D376 B M24x3.0 6H XT5	18.0	160	38	-	14.5	21.00

Order example: CTS D371 C M8x1.25 6H XT5

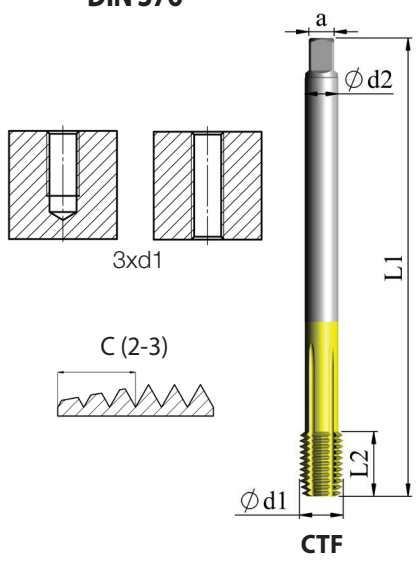
Forming Taps

ISO metric coarse M – DIN13

DIN 371



DIN 376



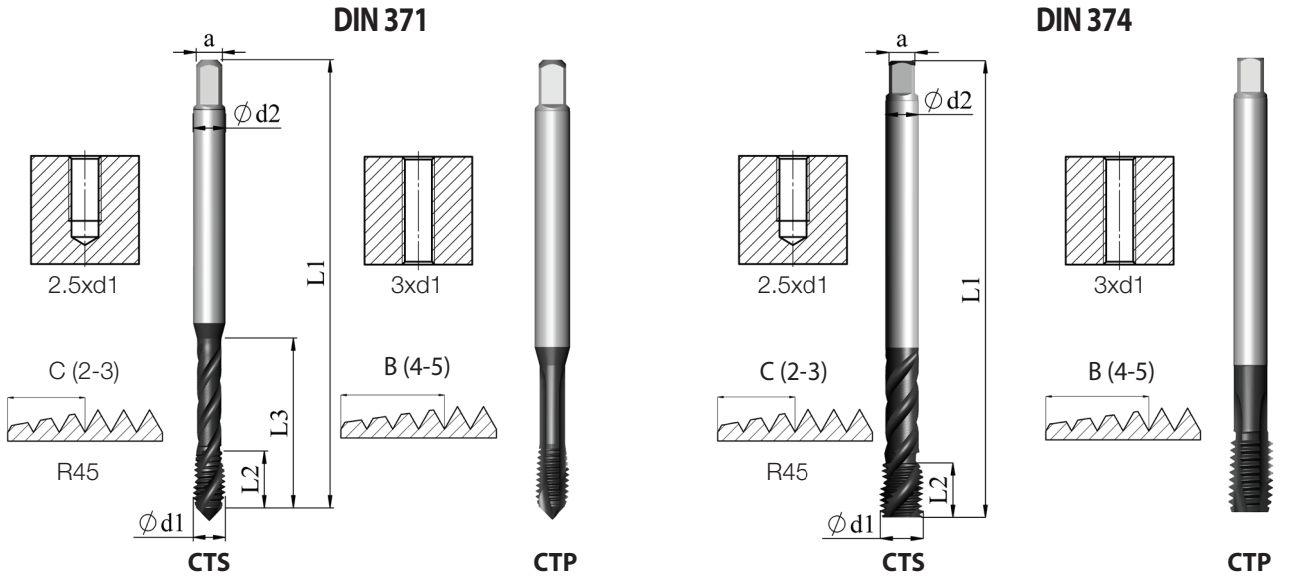
ISO	P	M	K	N	S	H
XT7 Grade	●	●		●		

d1	Pitch mm	Ordering Code	d2	L1	L2	L3	a	
M3	0.5	**CTF D371 C M3x0.5 6HX XT7**	3.5	56	10	18	2.7	2.80
M3.5	0.6	**CTF D371 C M3.5x0.6 6HX XT7**	4.0	56	12	20	3.0	3.25
M4	0.7	**CTF D371 C M4x0.7 6HX XT7**	4.5	63	7	21	3.4	3.70
M5	0.8	**CTF D371 C M5x0.8 6HX XT7**	6.0	70	8	25	4.9	4.65
M6	1.0	**CTF D371 C M6x1.0 6HX XT7**	6.0	80	10	30	4.9	5.60
M7	1.0	**CTF D371 C M7x1.0 6HX XT7**	7.0	80	10	30	5.5	6.60
M8	1.25	**CTF D371 C M8x1.25 6HX XT7**	8.0	90	13	35	6.2	7.45
M9	1.25	**CTF D371 C M9x1.25 6HX XT7**	9.0	90	13	35	7.0	8.45
M10	1.5	**CTF D371 C M10x1.5 6HX XT7**	10.0	100	15	39	8.0	9.35
M12	1.75	**CTF D376 C M12x1.75 6HX XT7**	9.0	110	18	-	7.0	11.25
M14	2.0	**CTF D376 C M14x2.0 6HX XT7**	11.0	110	20	-	9.0	13.10
M16	2.0	**CTF D376 C M16x2.0 6HX XT7**	12.0	110	20	-	9.0	15.10

Order example: CTF D371 C M6x1.0 6HX XT7

HPC Taps

ISO metric fine MF – DIN13



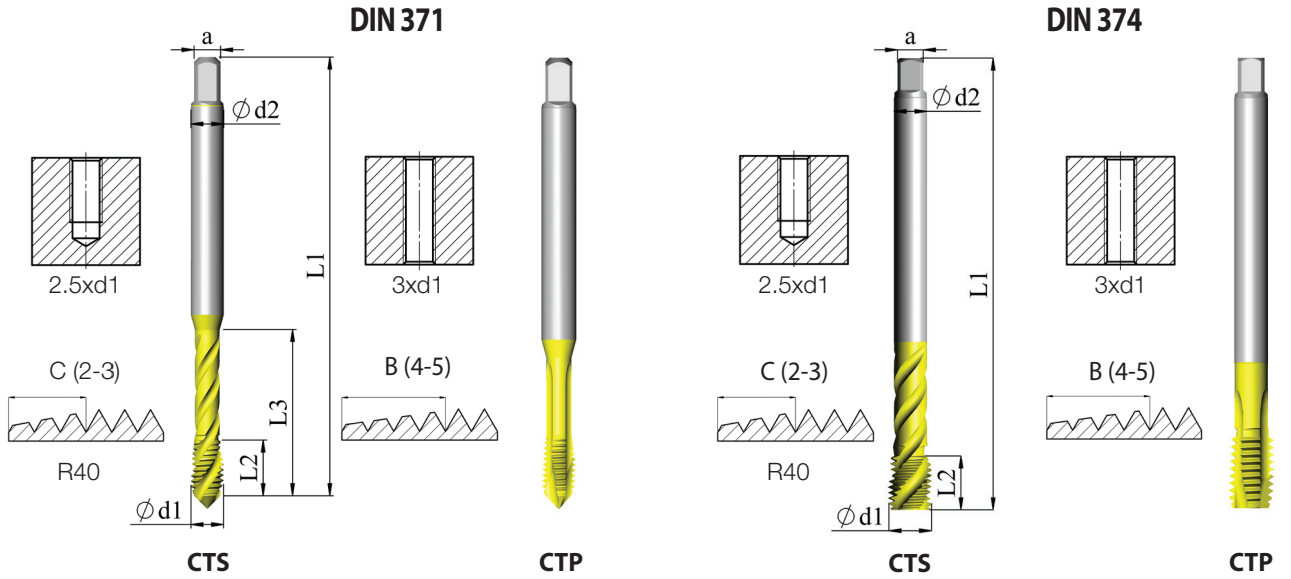
ISO	P	M	K	N	S	H
XT3 Grade	●	●	●	●	●	

d1	Pitch mm	Ordering Code	d2	L1	L2	L3	a	
M8	1.0	**CTS D371 C M8x1.0 6HX XT3**	8.0	90	13	35	6.2	7.00
		CTP D371 B M8x1.0 6HX XT3	8.0	90	13	35	6.2	7.00
M10	1.0	**CTS D371 C M10x1.0 6HX XT3**	10.0	90	13	35	8.0	9.00
		CTP D371 B M10x1.0 6HX XT3	10.0	90	13	35	8.0	9.00
M12	1.25	**CTS D374 C M12x1.25 6HX XT3**	9.0	100	15	-	7.0	10.80
		CTP D374 B M12x1.25 6HX XT3	9.0	100	15	-	7.0	10.80

Order example: CTP D374 B M12x1.25 6HX XT3

Machine Taps

ISO metric fine MF – DIN13



ISO	P	M	K	N	S	H
XT5 Grade	●	●	●	●		

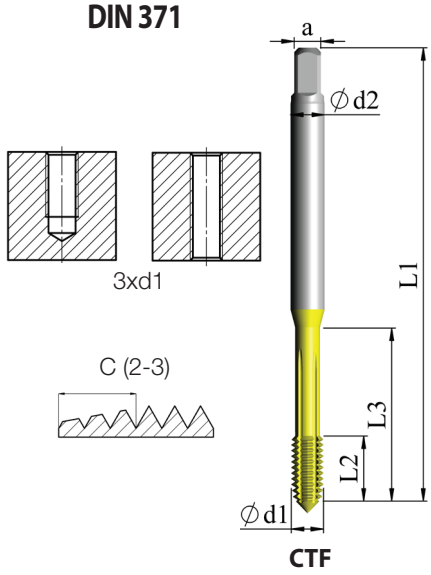
d1	Pitch mm	Ordering Code	d2	L1	L2	L3	a	d
M8	1.0	**CTS D371 C M8x1.0 6H XT5**	8.0	90	13	35	6.2	7.0
		CTP D371 B M8x1.0 6H XT5	8.0	90	20	35	6.2	7.0
M10	1.0	**CTS D371 C M10x1.0 6H XT5**	10.0	90	13	35	8.0	9.0
		CTP D371 B M10x1.0 6H XT5	10.0	90	20	35	8.0	9.0
M12	1.25	**CTS D374 C M12x1.25 6H XT5**	9.0	100	15	-	7.0	10.8
		CTP D374 B M12x1.25 6H XT5	9.0	100	20	-	7.0	10.8

Order example: CTP D371 B M10x1.0 6H XT5

Forming Taps

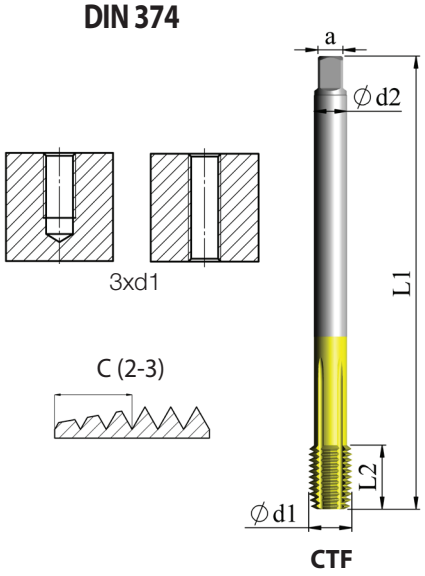
ISO metric fine MF – DIN13

DIN 371



CTF

DIN 374



CTF

ISO	P	M	K	N	S	H
XT7 Grade	●	●		●		

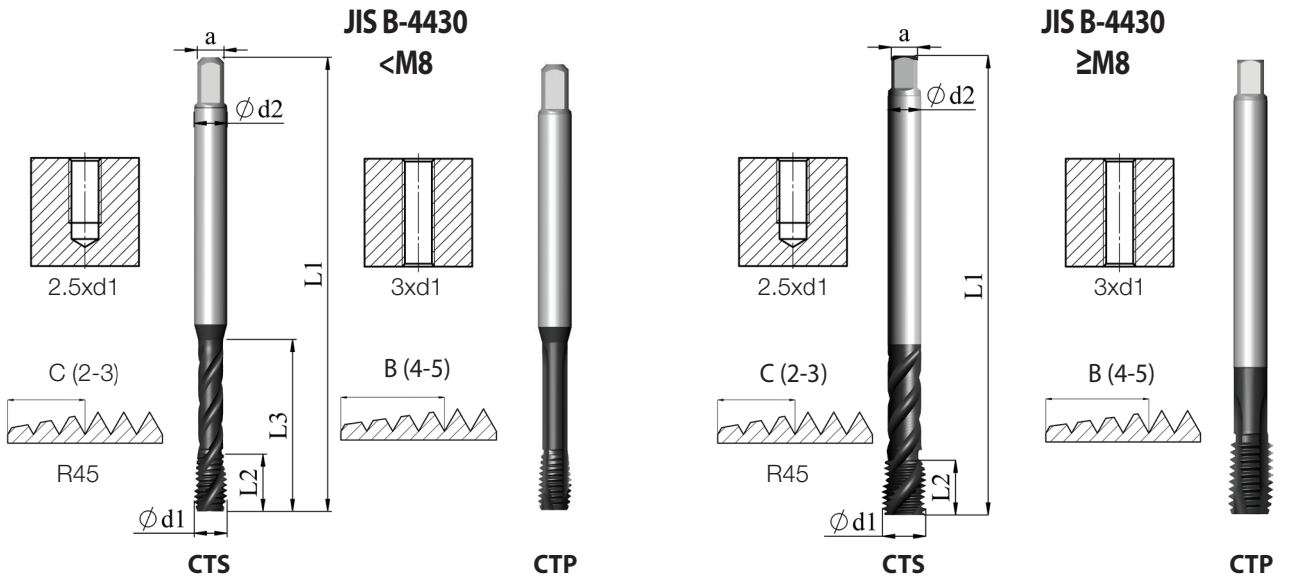
d1	Pitch mm	Ordering Code	d2	L1	L2	L3	a	d
M8	1.0	**CTF D371 C M8x1.0 6HX XT7**	8.0	90	13	35	6.2	7.6
M10	1.0	**CTF D371 C M10x1.0 6HX XT7**	9.0	90	13	35	7.0	9.6
M10	1.0	**CTF D374 C M10x1.0 6HX XT7**	7.0	90	10	-	5.5	9.6
M12	1.0	**CTF D374 C M12x1.0 6HX XT7**	9.0	100	10	-	7.0	11.6
M12	1.5	**CTF D374 C M12x1.5 6HX XT7**	9.0	100	15	-	7.0	11.35
M16	1.5	**CTF D374 C M16x1.5 6HX XT7**	12.0	100	15	-	9.0	15.35

Order example: CTF D371 C M8x1.0 6HX XT7

HPC Taps

ISO metric – JIS

JIS = **J**apanese **I**ndustrial **S**tandard

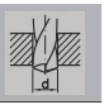


ISO	P	M	K	N	S	H
XT3 Grade	●	●	●	●	●	

d1	Pitch mm	Ordering Code	d2	L1	L2	L3	a	
M3	0.5	**CTS J430 C M3x0.5 OH2 XT3**	4.0	46	5	19	3.2	2.5
		CTP J430 B M3x0.5 OH2 XT3	4.0	46	5	19	3.2	2.5
M4	0.7	**CTS J430 C M4x0.7 OH3 XT3**	5.0	52	7	21	4.0	3.3
		CTP J430 B M4x0.7 OH3 XT3	5.0	52	7	21	4.0	3.3
M5	0.8	**CTS J430 C M5x0.8 OH3 XT3**	5.5	60	8	24	4.5	4.2
		CTP J430 B M5x0.8 OH3 XT3	5.5	60	8	24	4.5	4.2
M6	1.0	**CTS J430 C M6x1.0 OH3 XT3**	6.0	62	10	29	4.5	5.0
		CTP J430 B M6x1.0 OH3 XT3	6.0	62	10	29	4.5	5.0

HPC Taps

ISO metric – JIS

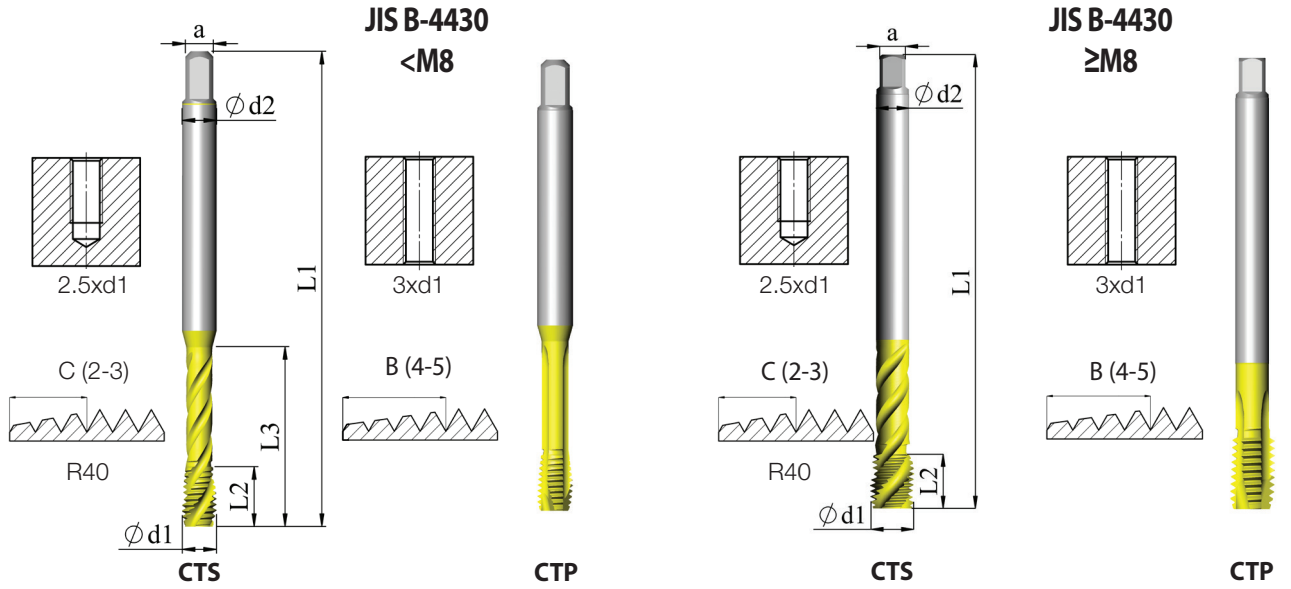
d1	Pitch mm	Ordering Code	d2	L1	L2	L3	a	
M8	1.25	**CTS J430 C M8x1.25 OH3 XT3**	6.2	70	13	-	5.0	6.8
		CTP J430 B M8x1.25 OH3 XT3	6.2	70	13	-	5.0	6.8
M8	1.0	**CTS J430 C M8x1.0 OH3 XT3**	6.2	70	10	-	5.0	7.0
		CTP J430 B M8x1.0 OH3 XT3	6.2	70	10	-	5.0	7.0
M10	1.5	**CTS J430 C M10x1.5 OH3 XT3**	7.0	75	15	-	5.5	8.5
		CTP J430 B M10x1.5 OH3 XT3	7.0	75	15	-	5.5	8.5
M10	1.25	**CTS J430 C M10x1.25 OH3 XT3**	7.0	75	15	-	5.5	8.8
		CTP J430 B M10x1.25 OH3 XT3	7.0	75	15	-	5.5	8.8
M10	1.0	**CTS J430C M10x1.0 OH3 XT3**	7.0	75	10	-	5.5	9.0
		CTP J430 B M10x1.0 OH3 XT3	7.0	75	10	-	5.5	9.0
M12	1.75	**CTS J430 C M12x1.75 OH4 XT3**	8.5	82	18	-	6.5	10.2
		CTP J430 B M12x1.75 OH4 XT3	8.5	82	18	-	6.5	10.2
M12	1.5	**CTS J430 C M12x1.5 OH3 XT3**	8.5	82	15	-	6.5	10.5
		CTP J430 B M12x1.5 OH3 XT3	8.5	82	15	-	6.5	10.5
M14	2.0	**CTS J430 C M14x2.0 OH4 XT3**	10.5	88	20	-	8.0	12.0
		CTP J430 B M14x2.0 OH4 XT3	10.5	88	20	-	8.0	12.0
M14	1.5	**CTS J430 C M14x1.5 OH3 XT3**	10.5	88	15	-	8.0	12.5
		CTP J430 B M14x1.5 OH3 XT3	10.5	88	15	-	8.0	12.5
M16	2.0	**CTS J430 C M16x2.0 OH4 XT3**	12.5	95	20	-	10.0	14.0
		CTP J430 B M16x2.0 OH4 XT3	12.5	95	20	-	10.0	14.0
M16	1.5	**CTS J430 C M16x1.5 OH3 XT3**	12.5	95	15	-	10.0	14.5
		CTP J430 B M16x1.5 OH3 XT3	12.5	95	15	-	10.0	14.5

Order example: CTS J430 C M3x0.5 OH2 XT3

Machine Taps

ISO metric – JIS

JIS = **J**apanese **I**ndustrial **S**tandard



ISO	P	M	K	N	S	H
XT5 Grade	●	●	●	●		

d1	Pitch mm	Ordering Code	d2	L1	L2	L3	a	
M3	0.5	**CTS J430 C M3x0.5 OH2 XT5**	4.0	46	5	19	3.2	2.5
		CTP J430 B M3x0.5 OH2 XT5	4.0	46	10	19	3.2	2.5
M4	0.7	**CTS J430 C M4x0.7 OH3 XT5**	5.0	52	7	21	4.0	3.3
		CTP J430 B M4x0.7 OH3 XT5	5.0	52	12	21	4.0	3.3
M5	0.8	**CTS J430 C M5x0.8 OH3 XT5**	5.5	60	8	24	4.5	4.2
		CTP J430 B M5x0.8 OH3 XT5	5.5	60	14	24	4.5	4.2
M6	1.0	**CTS J430 C M6x1.0 OH3 XT5**	6.0	62	10	29	4.5	5.0
		CTP J430 B M6x1.0 OH3 XT5	6.0	62	18	29	4.5	5.0

Machine Taps

ISO metric – JIS

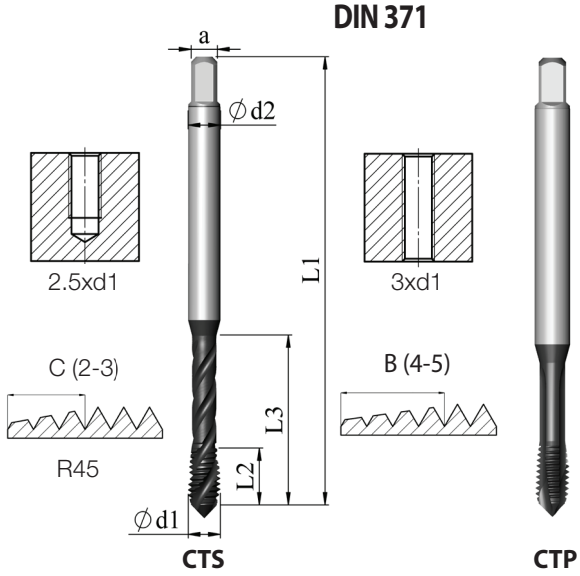
d1	Pitch mm	Ordering Code	d2	L1	L2	L3	a	
M8	1.25	**CTS J430 C M8x1.25 OH3 XT5**	6.2	70	13	-	5.0	6.8
		CTP J430 B M8x1.25 OH3 XT5	6.2	70	20	-	5.0	6.8
M8	1.0	**CTS J430 C M8x1.0 OH3 XT5**	6.2	70	10	-	5.0	7.0
		CTP J430 B M8x1.0 OH3 XT5	6.2	70	20	-	5.0	7.0
M10	1.5	**CTS J430 C M10x1.5 OH3 XT5**	7.0	75	15	-	5.5	8.5
		CTP J430 B M10x1.5 OH3 XT5	7.0	75	20	-	5.5	8.5
M10	1.25	**CTS J430 C M10x1.25 OH3 XT5**	7.0	75	15	-	5.5	8.8
		CTP J430 B M10x1.25 OH3 XT5	7.0	75	20	-	5.5	8.8
M10	1.0	**CTS J430C M10x1.0 OH3 XT5**	7.0	75	10	-	5.5	9.0
		CTP J430 B M10x1.0 OH3 XT5	7.0	75	20	-	5.5	9.0
M12	1.75	**CTS J430 C M12x1.75 OH4 XT5**	8.5	82	18	-	6.5	10.2
		CTP J430 B M12x1.75 OH4 XT5	8.5	82	24	-	6.5	10.2
M12	1.5	**CTS J430 C M12x1.5 OH3 XT5**	8.5	82	15	-	6.5	10.5
		CTP J430 B M12x1.5 OH3 XT5	8.5	82	20	-	6.5	10.5
M14	2.0	**CTS J430 C M14x2.0 OH4 XT5**	10.5	88	20	-	8.0	12.0
		CTP J430 B M14x2.0 OH4 XT5	10.5	88	25	-	8.0	12.0
M14	1.5	**CTS J430 C M14x1.5 OH3 XT5**	10.5	88	15	-	8.0	12.5
		CTP J430 B M14x1.5 OH3 XT5	10.5	88	20	-	8.0	12.5
M16	2.0	**CTS J430 C M16x2.0 OH4 XT5**	12.5	95	20	-	10.0	14.0
		CTP J430 B M16x2.0 OH4 XT5	12.5	95	32	-	10.0	14.0
M16	1.5	**CTS J430 C M16x1.5 OH3 XT5**	12.5	95	15	-	10.0	14.5
		CTP J430 B M16x1.5 OH3 XT5	12.5	95	20	-	10.0	14.5

Order example: CTS J430 C M3x0.5 OH2 XT5

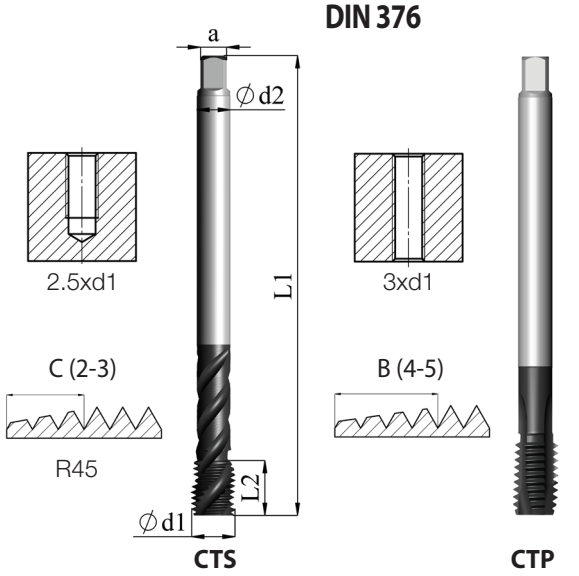
HPC Taps

UN Coarse ANSI B-1.1

DIN 371



DIN 376



ISO	P	M	K	N	S	H
XT3 Grade	●	●	●	●	●	

UNC	d1	Ordering Code	d2	L1	L2	L3	a	d
2-56	2.184	**CTS D371 C 2-56UNC 2BX XT3**	2.8	45	10	13	2.1	1.85
		CTP D371 B 2-56UNC 2BX XT3	2.8	45	10	13	2.1	1.85
4-40	2.844	**CTS D371 C 4-40UNC 2BX XT3**	3.5	56	5	18	2.7	2.35
		CTP D371 B 4-40UNC 2BX XT3	3.5	56	5	18	2.7	2.35
5-40	3.175	**CTS D371 C 5-40UNC 2BX XT3**	3.5	56	7	18	2.7	2.65
		CTP D371 B 5-40UNC 2BX XT3	3.5	56	7	18	2.7	2.65
6-32	3.505	**CTS D371 C 6-32UNC 2BX XT3**	4.0	56	6	20	3.0	2.85
		CTP D371 B 6-32UNC 2BX XT3	4.0	56	6	20	3.0	2.85
8-32	4.165	**CTS D371 C 8-32UNC 2BX XT3**	4.5	63	7	21	3.4	3.50
		CTP D371 B 8-32UNC 2BX XT3	4.5	63	7	21	3.4	3.50
10-24	4.826	**CTS D371 C 10-24UNC 2BX XT3**	6.0	70	8	25	4.9	3.90
		CTP D371 B 10-24UNC 2BX XT3	6.0	70	8	25	4.9	3.90
12-24	5.486	**CTS D371 C 12-24UNC 2BX XT3**	6.0	80	10	30	4.9	4.50
		CTP D371 B 12-24UNC 2BX XT3	6.0	80	10	30	4.9	4.50

HPC Taps

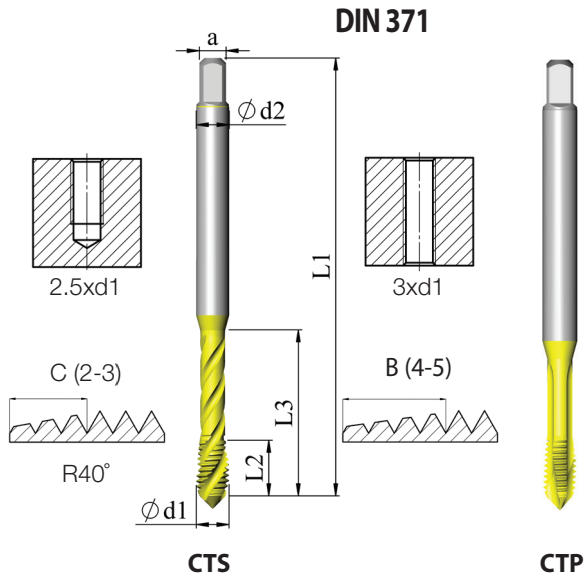
UN Coarse ANSI B-1.1

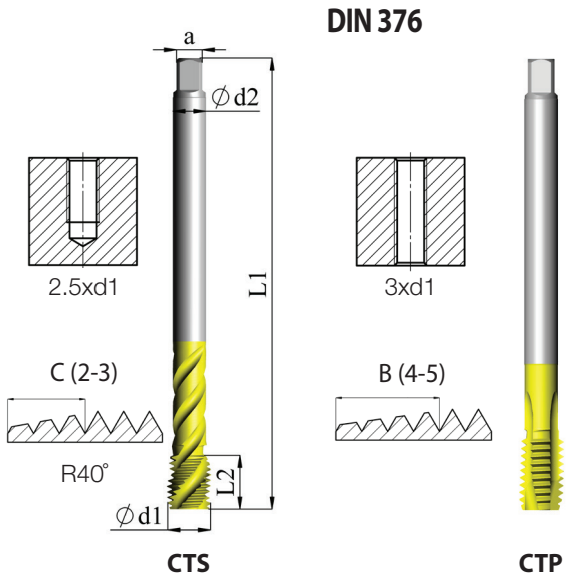
UNC	d1	Ordering Code	d2	L1	L2	L3	a	
1/4-20	6.350	**CTS D371 C 0250-20UNC 2BX XT3**	7.0	80	13	30	5.5	5.10
		CTP D371 B 0250-20UNC 2BX XT3	7.0	80	13	30	5.5	5.10
5/16-18	7.938	**CTS D371 C 0312-18UNC 2BX XT3**	8.0	90	13	35	6.0	6.60
		CTP D371 B 0312-18UNC 2BX XT3	8.0	90	13	35	6.0	6.60
3/8-16	9.525	**CTS D371 C 0375-16UNC 2BX XT3**	10.0	100	15	39	8.0	8.00
		CTP D371 B 0375-16UNC 2BX XT3	10.0	100	15	39	8.0	8.00
7/16-14	11.112	**CTS D376 C 0437-14UNC 2BX XT3**	8.0	100	15	-	6.2	9.40
		CTP D376 B 0437-14UNC 2BX XT3	8.0	100	15	-	6.2	9.40
1/2-13	12.700	**CTS D376 C 0500-13UNC 2BX XT3**	9.0	110	18	-	7.0	10.80
		CTP D376 B 0500-13UNC 2BX XT3	9.0	110	18	-	7.0	10.80
9/16-12	14.288	**CTS D376 C 0562-12UNC 2BX XT3**	11.0	110	20	-	9.0	12.20
		CTP D376 B 0562-12UNC 2BX XT3	11.0	110	20	-	9.0	12.20
5/8-11	15.875	**CTS D376 C 0625-11UNC 2BX XT3**	12.0	110	22	-	9.0	13.50
		CTP D376 B 0625-11UNC 2BX XT3	12.0	110	22	-	9.0	13.50

Order example: CTS D376 C 0562-12UNC 2BX XT3

Machine Taps

UN Coarse ANSI B-1.1



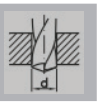


ISO	P	M	K	N	S	H
XT5 Grade	●	●	●	●		

UNC	d1	Ordering Code	d2	L1	L2	L3	a	d
2-56	2.184	**CTS D371 C 2-56UNC 2B XT5**	2.8	45	10	13	2.1	1.85
		CTP D371 B 2-56UNC 2B XT5	2.8	45	10	13	2.1	1.85
4-40	2.844	**CTS D371 C 4-40UNC 2B XT5**	3.5	56	5	18	2.7	2.35
		CTP D371 B 4-40UNC 2B XT5	3.5	56	10	18	2.7	2.35
5-40	3.175	**CTS D371 C 5-40UNC 2B XT5**	3.5	56	7	18	2.7	2.65
		CTP D371 B 5-40UNC 2B XT5	3.5	56	10	18	2.7	2.65
6-32	3.505	**CTS D371 C 6-32UNC 2B XT5**	4.0	56	6	20	3.0	2.85
		CTP D371 B 6-32UNC 2B XT5	4.0	56	12	20	3.0	2.85
8-32	4.165	**CTS D371 C 8-32UNC 2B XT5**	4.5	63	7	21	3.4	3.50
		CTP D371 B 8-32UNC 2B XT5	4.5	63	12	21	3.4	3.50
10-24	4.826	**CTS D371 C 10-24UNC 2B XT5**	6.0	70	8	25	4.9	3.90
		CTP D371 B 10-24UNC 2B XT5	6.0	70	14	25	4.9	3.90
12-24	5.486	**CTS D371 C 12-24UNC 2B XT5**	6.0	80	10	30	4.9	4.50
		CTP D371 B 12-24UNC 2B XT5	6.0	80	18	30	4.9	4.50

Machine Taps

UN Coarse ANSI B-1.1

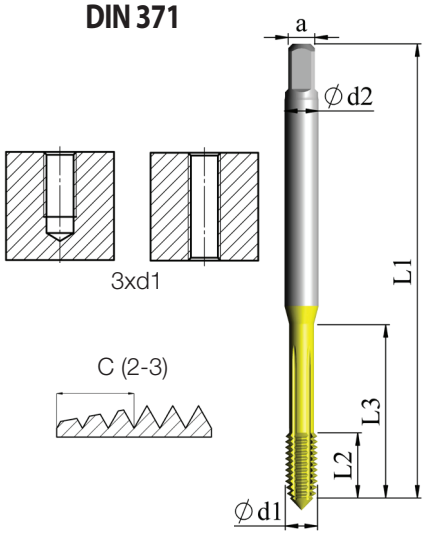
UNC	d1	Ordering Code	d2	L1	L2	L3	a	
1/4-20	6.350	**CTS D371 C 0250-20UNC 2B XT5**	7.0	80	13	30	5.5	5.10
		CTP D371 B 0250-20UNC 2B XT5	7.0	80	18	30	5.5	5.10
5/16-18	7.938	**CTS D371 C 0312-18UNC 2B XT5**	8.0	90	13	35	6.0	6.60
		CTP D371 B 0312-18UNC 2B XT5	8.0	90	20	35	6.0	6.60
3/8-16	9.525	**CTS D371 C 0375-16UNC 2B XT5**	10.0	100	15	39	8.0	8.00
		CTP D371 B 0375-16UNC 2B XT5	10.0	100	20	39	8.0	8.00
7/16-14	11.112	**CTS D376 C 0437-14UNC 2B XT5**	8.0	100	15	-	6.2	9.40
		CTP D376 B 0437-14UNC 2B XT5	8.0	100	22	-	6.2	9.40
1/2-13	12.700	**CTS D376 C 0500-13UNC 2B XT5**	9.0	110	18	-	7.0	10.80
		CTP D376 B 0500-13UNC 2B XT5	9.0	110	24	-	7.0	10.80
9/16-12	14.288	**CTS D376 C 0562-12UNC 2B XT5**	11.0	110	20	-	9.0	12.20
		CTP D376 B 0562-12UNC 2B XT5	11.0	110	25	-	9.0	12.20
5/8-11	15.875	**CTS D376 C 0625-11UNC 2B XT5**	12.0	110	22	-	9.0	13.50
		CTP D376 B 0625-11UNC 2B XT5	12.0	110	32	-	9.0	13.50
3/4-10	19.050	**CTS D376 C 0750-10UNC 2B XT5**	14.0	125	25	-	11.0	16.50
		CTP D376 B 0750-10UNC 2B XT5	14.0	125	32	-	11.0	16.50
7/8-9	22.225	**CTS D376 C 0875-9UNC 2B XT5**	18.0	140	30	-	14.5	19.50
		CTP D376 B 0875-9UNC 2B XT5	18.0	140	32	-	14.5	19.50
1-8	25.400	**CTS D376 C 1-8UNC 2B XT5**	20.0	160	30	-	16.0	22.25
		CTP D376 B 1-8UNC 2B XT5	20.0	160	38	-	16.0	22.25

Order example: CTP D371 B 0250-20UNC 2B XT5

Forming Taps

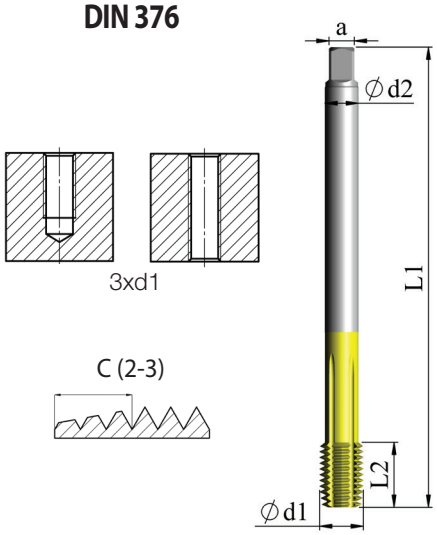
UN Coarse ANSI B-1.1

DIN 371



CTF

DIN 376



CTF

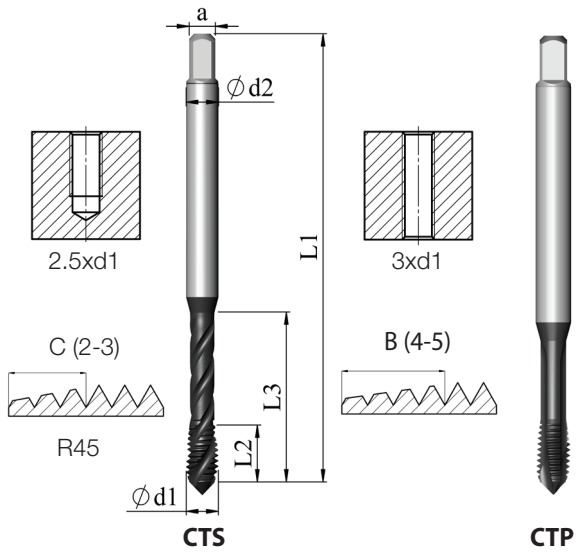
ISO	P	M	K	N	S	H
XT7 Grade	●	●		●		

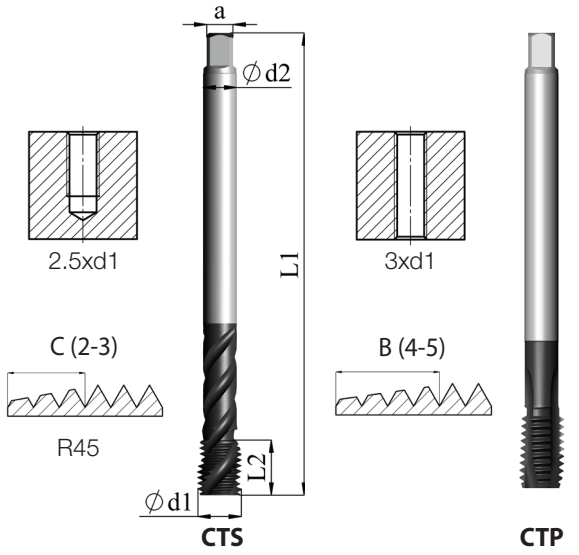
UNC	d1	Ordering Code	d2	L1	L2	L3	a	d
5-40	3.175	**CTF D371 C 5-40UNC 2BX XT7**	3.5	56	7	18	2.7	2.90
6-32	3.505	**CTF D371 C 6-32UNC 2BX XT7**	4.0	56	6	20	3.0	3.15
8-32	4.165	**CTF D371 C 8-32UNC 2BX XT7**	4.5	63	7	21	3.4	3.80
10-24	4.826	**CTF D371 C 10-24UNC 2BX XT7**	6.0	70	8	25	4.9	4.35
12-24	5.486	**CTF D371 C 12-24UNC 2BX XT7**	6.0	80	10	30	4.9	5.00
1/4-20	6.350	**CTF D371 C 0250-20UNC 2BX XT7**	7.0	80	13	30	5.5	5.75
5/16-18	7.938	**CTF D371 C 0312-18UNC 2BX XT7**	8.0	90	13	35	6.0	7.30
3/8-16	9.525	**CTF D371 C 0375-16UNC 2BX XT7**	10.0	100	15	39	8.0	8.80
7/16-14	11.112	**CTF D376 C 0437-14UNC 2BX XT7**	8.0	100	15	-	6.2	10.25
1/2-13	12.700	**CTF D376 C 0500-13UNC 2BX XT7**	9.0	110	18	-	7.0	11.80
5/8-11	15.875	**CTF D376 C 0625-11UNC 2BX XT7**	12.0	110	20	-	9.0	14.80

Order example: CTF D371 C 0312-18UNC 2BX XT7

HPC Taps

UN Fine ANSI B-1.1





ISO	P	M	K	N	S	H
XT3 Grade	●	●	●	●	●	

UNF	d1	Ordering Code	d2	L1	L2	L3	a	
4-48	2.844	**CTS D371 C 4-48UNF 2BX XT3**	3.5	56	5	18	2.7	2.40
		CTP D371 B 4-48UNF 2BX XT3	3.5	56	5	18	2.7	2.40
5-44	3.175	**CTS D371 C 5-44UNF 2BX XT3**	3.5	56	7	18	2.7	2.70
		CTP D371 B 5-44UNF 2BX XT3	3.5	56	7	18	2.7	2.70
6-40	3.505	**CTS D371 C 6-40UNF 2BX XT3**	4.0	56	6	20	3.0	2.95
		CTP D371 B 6-40UNF 2BX XT3	4.0	56	6	20	3.0	2.95
8-36	4.165	**CTS D371 C 8-36UNF 2BX XT3**	4.5	63	7	21	3.4	3.50
		CTP D371 B 8-36UNF 2BX XT3	4.5	63	7	21	3.4	3.50
10-32	4.826	**CTS D371 C 10-32UNF 2BX XT3**	6.0	70	8	25	4.9	4.10
		CTP D371 B 10-32UNF 2BX XT3	6.0	70	8	25	4.9	4.10
12-28	5.486	**CTS D371 C 12-28UNF 2BX XT3**	6.0	80	10	30	4.9	4.60
		CTP D371 B 12-28UNF 2BX XT3	6.0	80	10	30	4.9	4.60
1/4-28	6.350	**CTS D371 C 0250-28UNF 2BX XT3**	7.0	80	10	30	5.5	5.50
		CTP D371 B 0250-28UNF 2BX XT3	7.0	80	10	30	5.5	5.50
5/16-24	7.938	**CTS D371 C 0312-24UNF 2BX XT3**	8.0	90	13	35	6.0	6.90
		CTP D371 B 0312-24UNF 2BX XT3	8.0	90	13	35	6.0	6.90

HPC Taps

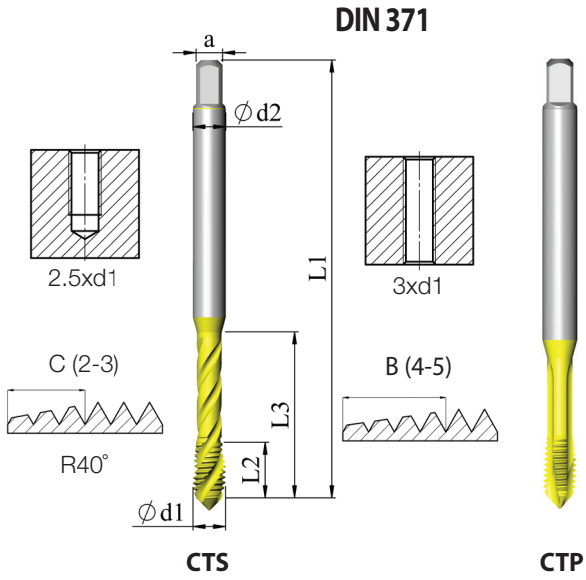
UN Fine ANSI B-1.1

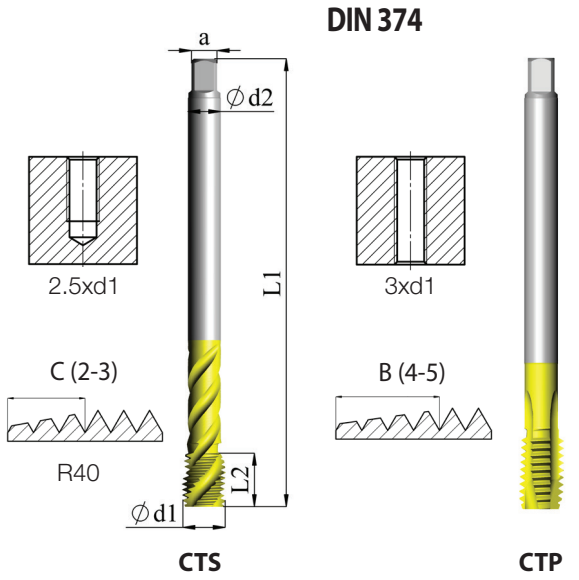
UNF	d1	Ordering Code	d2	L1	L2	L3	a	
3/8-24	9.525	**CTS D371 C 0375-24UNF 2BX XT3**	10.0	100	15	39	8.0	8.50
		CTP D371 B 0375-24UNF 2BX XT3	10.0	100	15	39	8.0	8.50
7/16-20	11.112	**CTS D374 C 0437-20UNF 2BX XT3**	8.0	100	15	-	6.2	9.90
		CTP D374 B 0437-20UNF 2BX XT3	8.0	100	15	-	6.2	9.90
1/2-20	12.700	**CTS D374 C 0500-20UNF 2BX XT3**	9.0	100	15	-	7.0	11.50
		CTP D374 B 0500-20UNF 2BX XT3	9.0	100	15	-	7.0	11.50
9/16-18	14.288	**CTS D374 C 0562-18UNF 2BX XT3**	11.0	100	15	-	9.0	12.90
		CTP D374 B 0562-18UNF 2BX XT3	11.0	100	15	-	9.0	12.90
5/8-18	15.875	**CTS D374 C 0625-18UNF 2BX XT3**	12.0	100	15	-	9.0	14.50
		CTP D374 B 0625-18UNF 2BX XT3	12.0	100	15	-	9.0	14.50

Order example: CTP D371 B 0375-24UNF 2BX XT3

Machine Taps

UN Fine ANSI B-1.1





ISO	P	M	K	N	S	H
XT5 Grade	●	●	●	●		

UNF	d1	Ordering Code	d2	L1	L2	L3	a	d
6-40	3.505	**CTS D371 C 6-40UNF 2B XT5**	4.0	56	6	20	3.0	2.95
		CTP D371 B 6-40UNF 2B XT5	4.0	56	12	20	3.0	2.95
8-36	4.165	**CTS D371 C 8-36UNF 2B XT5**	4.5	63	7	21	3.4	3.50
		CTP D371 B 8-36UNF 2B XT5	4.5	63	12	21	3.4	3.50
10-32	4.826	**CTS D371 C 10-32UNF 2B XT5**	6.0	70	8	25	4.9	4.10
		CTP D371 B 10-32UNF 2B XT5	6.0	70	14	25	4.9	4.10
12-28	5.486	**CTS D371 C 12-28UNF 2B XT5**	6.0	80	10	30	4.9	4.60
		CTP D371 B 12-28UNF 2B XT5	6.0	80	18	30	4.9	4.60
1/4-28	6.350	**CTS D371 C 0250-28UNF 2B XT5**	7.0	80	10	30	5.5	5.50
		CTP D371 B 0250-28UNF 2B XT5	7.0	80	18	30	5.5	5.50
5/16-24	7.938	**CTS D371 C 0312-24UNF 2B XT5**	8.0	90	13	35	6.0	6.90
		CTP D371 B 0312-24UNF 2B XT5	8.0	90	20	35	6.0	6.90
3/8-24	9.525	**CTS D371 C 0375-24UNF 2B XT5**	10.0	100	15	39	8.0	8.50
		CTP D371 B 0375-24UNF 2B XT5	10.0	100	20	39	8.0	8.50
7/16-20	11.112	**CTS D374 C 0437-20UNF 2B XT5**	8.0	100	15	-	6.2	9.90
		CTP D374 B 0437-20UNF 2B XT5	8.0	100	20	-	6.2	9.90

Machine Taps

UN Fine ANSI B-1.1

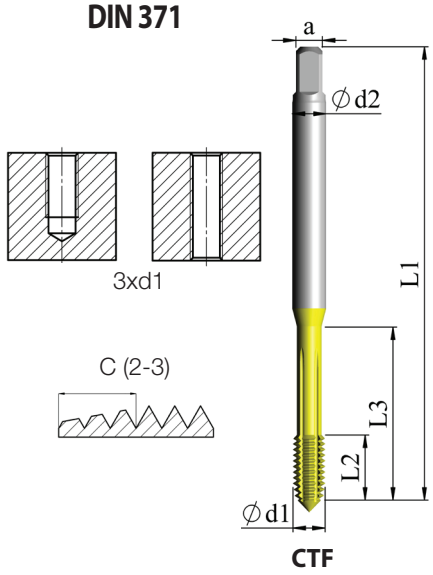
UNF	d1	Ordering Code	d2	L1	L2	L3	a	
1/2-20	12.700	**CTS D374 C 0500-20UNF 2B XT5**	9.0	100	15	-	7.0	11.50
		CTP D374 B 0500-20UNF 2B XT5	9.0	100	20	-	7.0	11.50
9/16-18	14.288	**CTS D374 C 0562-18UNF 2B XT5**	11.0	100	15	-	9.0	12.90
		CTP D374 B 0562-18UNF 2B XT5	11.0	100	20	-	9.0	12.90
5/8-18	15.875	**CTS D374 C 0625-18UNF 2B XT5**	12.0	100	15	-	9.0	14.50
		CTP D374 B 0625-18UNF 2B XT5	12.0	100	20	-	9.0	14.50
3/4-16	19.050	**CTS D374 C 0750-16UNF 2B XT5**	14.0	110	17	-	11.0	17.50
		CTP D374 B 0750-16UNF 2B XT5	14.0	110	24	-	11.0	17.50
7/8-14	22.225	**CTS D374 C 0875-14UNF 2B XT5**	18.0	125	17	-	14.5	20.40
		CTP D374 B 0875-14UNF 2B XT5	18.0	125	24	-	14.5	20.40
1-12	25.400	**CTS D374 C 1-12UNF 2B XT5**	18.0	140	20	-	14.5	23.25
		CTP D374 B 1-12UNF 2B XT5	18.0	140	27	-	14.5	23.25

Order example: CTP D374 B 0875-14UNF 2B XT5

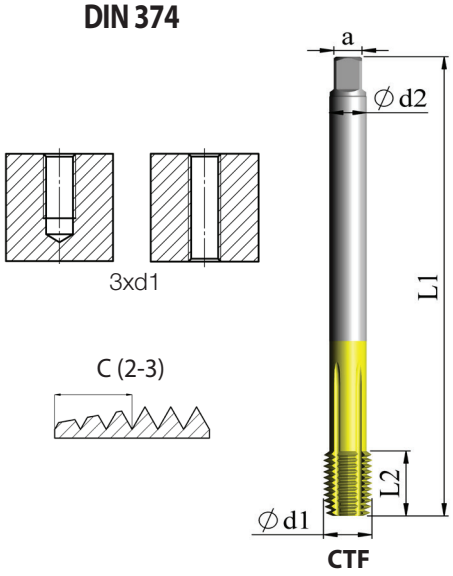
Forming Taps

UN Fine ANSI B-1.1

DIN 371



DIN 374



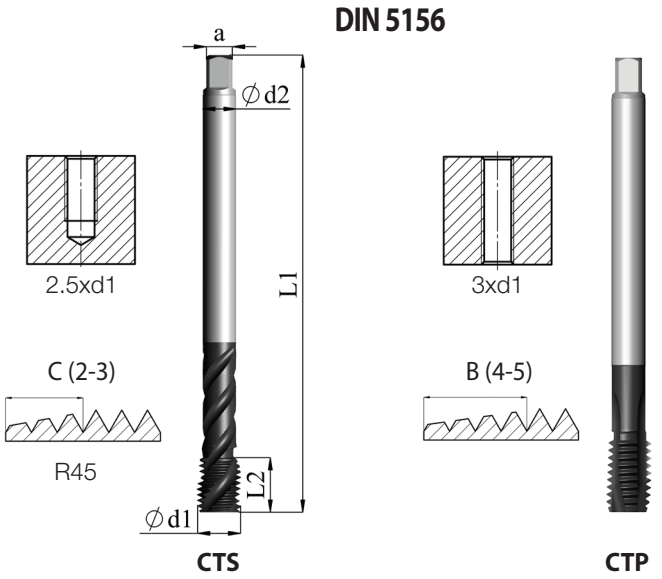
ISO	P	M	K	N	S	H
XT7 Grade	●	●		●		

UNF	d1	Ordering Code	d2	L1	L2	L3	a	d
5-44	3.175	**CTF D371 C 5-44UNF 2BX XT7**	3.5	56	7	18	2.7	2.92
6-40	3.505	**CTF D371 C 6-40UNF 2BX XT7**	4.0	56	6	20	3.0	3.22
8-36	4.165	**CTF D371 C 8-36UNF 2BX XT7**	4.5	63	7	21	3.4	3.85
10-32	4.826	**CTF D371 C 10-32UNF 2BX XT7**	6.0	70	8	25	4.9	4.45
12-28	5.486	**CTF D371 C 12-28UNF 2BX XT7**	6.0	80	10	30	4.9	5.10
1/4-28	6.350	**CTF D371 C 0250-28UNF 2BX XT7**	6.0	80	10	30	4.9	5.95
5/16-24	7.938	**CTF D371 C 0312-24UNF 2BX XT7**	8.0	90	13	35	6.2	7.45
3/8-24	9.525	**CTF D371 C 0375-24UNF 2BX XT7**	10.0	100	15	39	8.0	9.05
7/16-20	11.112	**CTF D374 C 0437-20UNF 2BX XT7**	8.0	100	15	-	6.2	10.55
1/2-20	12.700	**CTF D374 C 0500-20UNF 2BX XT7**	9.0	110	15	-	7.0	12.15
5/8-18	15.875	**CTF D374 C 0625-18UNF 2BX XT7**	12.0	110	15	-	9.0	15.25
3/4-16	19.050	**CTF D374 C 0750-16UNF 2BX XT7**	14.0	120	17	-	11.0	18.35

Order example: CTF D371 C 10-32UNF 2BX XT7

HPC Taps

Whitworth pipe thread G, DIN-ISO 228



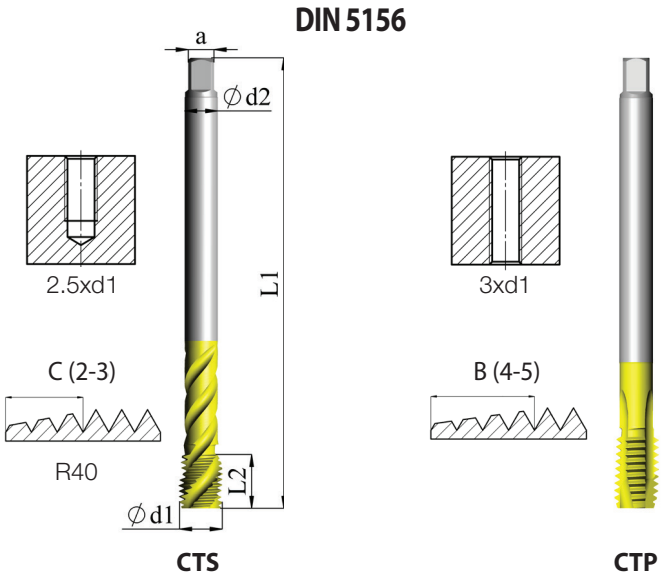
ISO	P	M	K	N	S	H
XT3 Grade	●	●	●	●	●	

G	d1	Ordering Code	d2	L1	L2	a	
G1/8-28	9.728	**CTS D5156 C G1/8 XT3**	7.0	90	10	5.5	8.80
		CTP D5156 B G1/8 XT3	7.0	90	10	5.5	8.80
G1/4-19	13.157	**CTS D5156 C G1/4 XT3**	11.0	100	14	9.0	11.80
		CTP D5156 B G1/4 XT3	11.0	100	14	9.0	11.80
G3/8-19	16.662	**CTS D5156 C G3/8 XT3**	12.0	100	15	9.0	15.25
		CTP D5156 B G3/8 XT3	12.0	100	15	9.0	15.25
G1/2-14	20.955	**CTS D5156 C G1/2 XT3**	16.0	125	17	12.0	19.00
		CTP D5156 B G1/2 XT3	16.0	125	17	12.0	19.00
G3/4-14	26.441	**CTS D5156 C G3/4 XT3**	20.0	140	20	16.0	24.50
		CTP D5156 B G3/4 XT3	20.0	140	20	16.0	24.50
G1-11	33.249	**CTS D5156 C G1 XT3**	25.0	160	24	20.0	30.75
		CTP D5156 B G1 XT3	25.0	160	24	20.0	30.75

Order example: CTS D5156 C G1 XT3

Machine Taps

Whitworth pipe thread G, DIN-ISO 228



ISO	P	M	K	N	S	H
XT5 Grade	●	●	●	●		

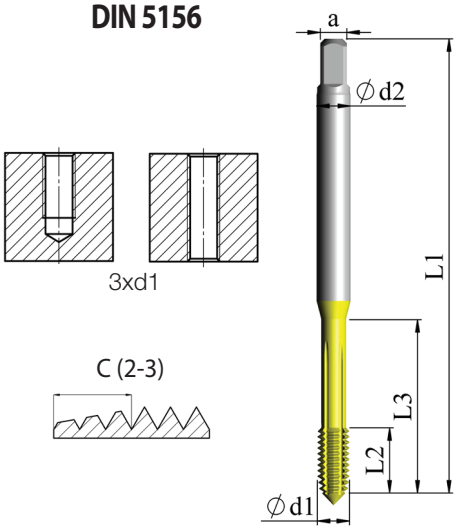
G	d1	Ordering Code	d2	L1	L2	a	d
G1/8-28	9.728	**CTS D5156 C G1/8 XT5**	7.0	90	10	5.5	8.80
		CTP D5156 B G1/8 XT5	7.0	90	18	5.5	8.80
G1/4-19	13.157	**CTS D5156 C G1/4 XT5**	11.0	100	14	9.0	11.80
		CTP D5156 B G1/4 XT5	11.0	100	22	9.0	11.80
G3/8-19	16.662	**CTS D5156 C G3/8 XT5**	12.0	100	15	9.0	15.25
		CTP D5156 B G3/8 XT5	12.0	100	22	9.0	15.25
G1/2-14	20.955	**CTS D5156 C G1/2 XT5**	16.0	125	17	12.0	19.00
		CTP D5156 B G1/2 XT5	16.0	125	25	12.0	19.00
G3/4-14	26.441	**CTS D5156 C G3/4 XT5**	20.0	140	20	16.0	24.50
		CTP D5156 B G3/4 XT5	20.0	140	28	16.0	24.50
G1-11	33.249	**CTS D5156 C G1 XT5**	25.0	160	24	20.0	30.75
		CTP D5156 B G1 XT5	25.0	160	24	20.0	30.75

Order example: CTP D5156 B G1/2 XT5

Forming Taps

Whitworth pipe thread G, DIN-ISO 228

DIN 5156



CTF

ISO	P	M	K	N	S	H
XT7 Grade	●	●		●		

G	d1	Ordering Code	d2	L1	L2	a	
G1/8-28	9.728	**CTF D5156 C G1/8 XT7**	7.0	90	13	5.5	9.25
G1/4-19	13.157	**CTF D5156 C G1/4 XT7**	11.0	100	16	9.0	12.55
G3/8-19	16.662	**CTF D5156 C G3/8 XT7**	12.0	100	16	9.0	16.05
G1/2-14	20.955	**CTF D5156 C G1/2 XT7**	16.0	125	18	12.0	20.10
G3/4-14	26.441	**CTF D5156 C G3/4 XT7**	20.0	140	22	16.0	25.60

Order example: CTF D5156 C G1/4 XT7

Technical Section

Cutting data

ISO Standard	Materials Class	Vc [m/min]		
		Grades		
		XT3	XT5	XT7
P	Low & Medium Carbon Steels < 0.55 % C	5-45	5-40	10-35
	High Carbon Steels ≥ 0.55 % C			
	Alloy Steels, Treated Steels			
M	Stainless Steel-Free Cutting	5-20	5-20	10-30
	Stainless Steel-Austenitic			
	Cast Steels			
K	Cast Iron	10-35	5-30	-
N	Aluminum ≤ 12 % Si, Copper	10-35	10-35	15-45
	Aluminum > 12 % Si			
	Synthetics, duroplastics, thermoplastics			
S	Nickel alloys, Titanium alloys	1-10	-	-

$$Rotation\ speed\ (rpm): n = \frac{1000 \cdot v_c}{\pi \cdot d_1}$$

$$Feed\ \left(\frac{mm}{min}\right): f = p \cdot N$$

$$Torque\ (\mathrm{N} \cdot m): M = \frac{p^2 \cdot d_1 \cdot k_c}{8000}$$

$d_1 - nominal\ diameter\ (mm)$

$v_c - cutting\ speed\ (m/min)$

$n - spindle\ rotating\ speed$

$p - thread\ pitch$

$f - feed$

$k_c - specific\ resistance\ of\ workpiece\ material\ (N/mm^2)$

$M - torque\ when\ tapping\ (N*m)$

Taps Grades and material used

CPT Grades	Material Symbol	Coatings	Hardness	Toughness	Temperature resistance	Cutting edge Stability
XT3	HSSE-PM	Multi-layer high performance coating	++	++	++	++
XT5	HSSE	Multi-layer coating	+	+	+	+
XT7	HSSE-PM	Multi-layer coating	++	++	+	++

Grades application:
XT3 **–** high performance grade, with high hardness and high temperature resistance, for tough and difficult to cut materials. High edge stability.

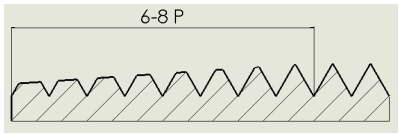
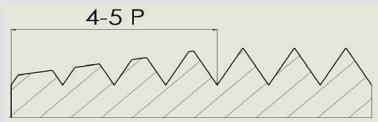
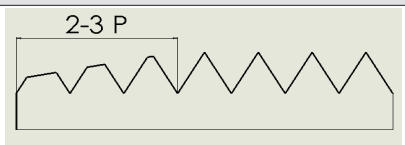
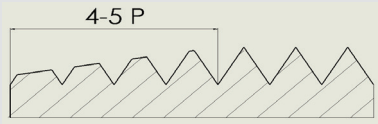
XT5 **–** excellent solution for wide range of materials and applications, can be used with unstable conditions. High wear resistance thanks to the multi-layer smooth and polished coating.

XT7 **–** best solution for chip-free materials, high hardness and toughness grade provides smooth thread finish and allows high working parameters.

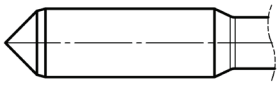
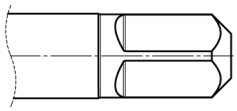
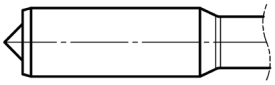
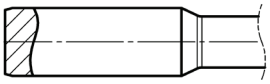
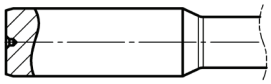
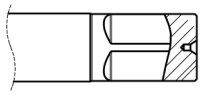
Taps standards

Symbol	Description
DIN-371	Taps with reinforced shank for metric coarse and fine threads up to M10 and for UNC and UNF threads up to 3/8" nominal diameter
DIN-376	Taps with reduced shank diameter for metric coarse threads and for UNC threads
DIN-374	Taps with reduced shank diameter for metric fine threads and for UNF threads
DIN-5156	Taps with reduced shank diameter for G threads
JIS B-4430	Taps for JIS metric threads

Types of front chamfers

Symbol	Sketch	Chamfer length (No. of threads)
A		6-8 P
B		4-5 P
C		2-3 P
D (straight flute taps only)		4-5 P
E		1.5-2 P

Tap Center

Working Part			Shank
Solid Cone/Male center	(1)		 (5) Chamfer
Half center	(2)		
Chamfer without center hole	(3)		
Internal center hole	(4)		 (6) Internal Center Hole

Standard	External thread Diameter (mm)	Type of center cone/hole			Type of center hole on shank side
		Chamfers A, C, D	Chamfer B	Chamfer E	
DIN-371	≤7.2	(1)	(1)	(3)	(5)
	7.2-8.2	(2)	(1)	(3)	(5)
	8.2-10.2	(2)	(2)	(3)	(5)
DIN-374	≤7.2	(1)	(1)	(3)	(5)
DIN-376 DIN-5156	>7.2	(4)	(4)	(3)	(6)
JIS B-4430		(3)	(3)	(3)	(5)

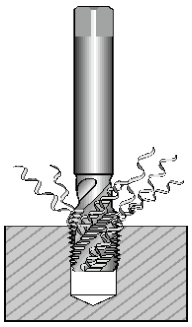
Length of Solid Cones

(Length of stepped cone is 1.8 mm for all Taps)

M		MF	
M1	0.6	M2.5x0.35	1.9
M1.2	0.8	M2.6x0.35	1.9
M1.4	1.0	M3x0.35	1.3
M1.6	1.1	M3.5x0.35	1.6
M1.7	1.2	M4x0.5	1.8
M1.8	1.3	M5x0.5	2.3
M2	1.4	M6x0.75	2.6
M2.5	1.8	M7x0.75	3.1
M2.6	1.8		
M3	1.3		
M3.5	1.5		
M4	1.7		
M4.5	1.9		
M5	2.1		
M6	2.5		
M7	3.0		
UNC		UNF	
4-40	2.0	4-48	2.1
5-40	1.3	5-44	1.4
6-32	1.4	6-40	1.5
8-32	1.8	8-36	1.8
10-24	2.0	10-32	2.1
12-24	2.3	12-28	2.3
1/4-20	2.6	1/4-28	2.8
5/16-18	3.3	5/16-24	3.5

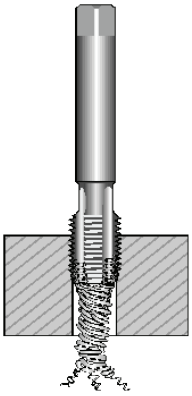
Types of Thread Taps

Spiral fluted taps



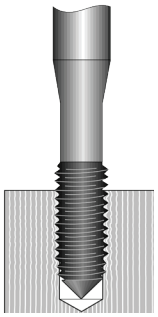
Spiral fluted taps are suitable for threading blind hole applications. The spiral flute drives the chip towards the shank and out of the hole. The spiral fluted taps are not suitable for tapping through holes.

Spiral point Taps



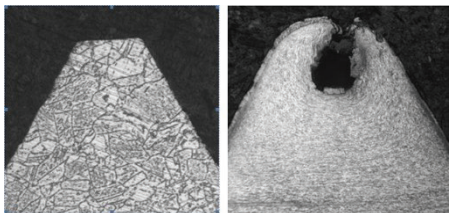
Spiral point taps have straight flutes with a spiral point.
The spiral point drives the chip in the direction of feed, that makes spiral point taps ideal for threading through hole applications as chips are evacuated through the hole.
Because of this design, spiral point taps are not suitable for blind hole applications. Moreover, when tapping a through hole, the tap must go through until the spiral point has passed the hole.

Forming Taps



Forming taps make thread by method of plastic deformation instead of cutting it. These taps are suitable for ductile materials.
The rule of thumb is if the material produces continuous stringy chip, it is probably a good candidate for thread forming.
Forming is ideal when absolutely chip free production is desired.
Note that the bore diameter required for formed thread is greater than the bore diameter for cut thread.

Cut thread vs. formed thread



Advantages of forming taps/formed threads

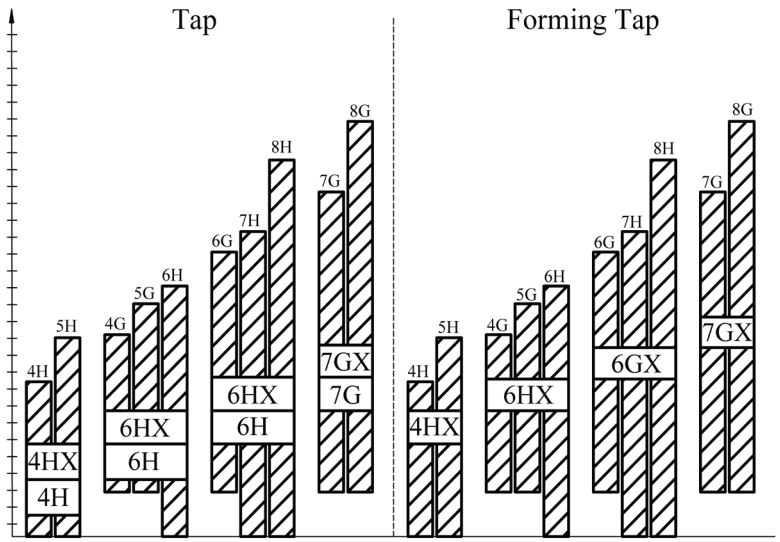
+ The same tool is suitable for both blind and through holes.
+ No chips – eliminates problems with chip evacuation.
+ Able to tap at higher speeds than cutting taps.
+ No flutes, larger core diameter – stronger tool.
+ Longer tool life.
+ Smoother thread surface.

Disadvantages of forming taps/formed threads

- Greater working torque required.
- Incomplete formation of the thread top, as can be seen on the photo above, which can make the thread more prone to cross-threading.
- Limited to ductile materials.

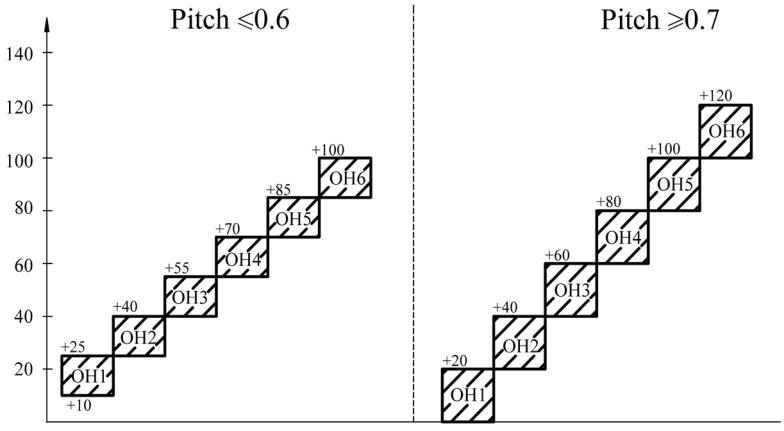
Tolerances

Metric internal thread



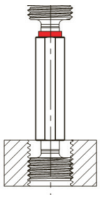
Tap tolerance According to DIN 802	Tolerance field of internal thread				
4H	4H	5H	-	-	-
6H	4G	5G	6H	-	-
6G	-	-	6G	7H	8H
7G	-	-	-	7G	8G

OH internal thread

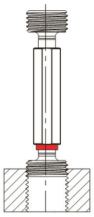


Thread gauges

Go and no-go thread gauges are used to check internal threads. The go gauge should be manually screwed freely for the whole length of the thread.



The no-go gauge should not go in further than two thread pitches when screwed manually.



Test Report

Application:
Internal right hand thread: M6x1
Thread depth: 16 mm
Bore size: Ø 5 mm, blind hole

Workpiece Material:
Steel SAE 4340 Hardened to: 17 HRc

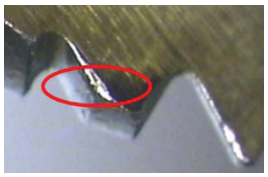
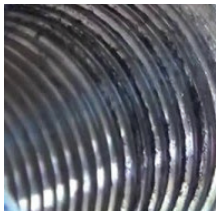
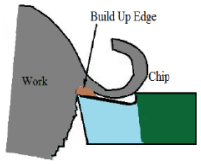
Tool Description:
CTS D371 C M6x1.0 6HX XT3
Shank diameter: Ø 6 mm
Max. thread length: 2.5 x D
Chamfer size: 2 – 3 threads

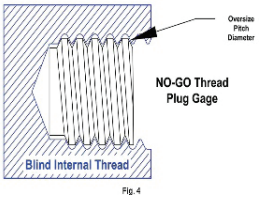
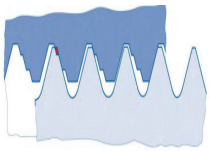
Cutting conditions:
Cutting speed: 20 m/min
Rotational speed: 1060 rpm

Machine:
Mori Seiki NV5000.
Coolant: emulsion 5 %

Test Results:
Tool life: 1720 threads
Cycle time: 3 sec

Troubleshooting

Problem	Possible cause	Possible Solution	
Chipped teeth	High tool run out	Use grip with better mounting precision	
	Too high cutting speed	Decrease cutting speed	
	Drill hole is too small	Use recommended drill size	
High tap wear	Too high cutting speed	Decrease cutting speed	
	Poor coolant flow to the cutting area	Adjust direction of coolant flow into the hole	
	High tool run out	Use grip with better mounting precision	
Chips fill up flutes	Change tool selection	If work conditions/material suitable, try forming tap instead of cutting tap	
	Too low cutting speed	Increase cutting speed	
	Poor chips flow	Apply internal cooling	
Poor finish on workpiece	Tap is worn out	Replace tap	
	Built-up edge	Replace tool and check “built-up edge” section for solution	
	Poor coolant flow to the cutting area	Adjust direction of coolant flow into the hole	
	Wrong cutting parameters	Use recommended cutting parameters	
Built-up edge	Too low cutting speed	Increase cutting speed	
	Poor coolant flow to the cutting area	Adjust direction of coolant flow into the hole	
	Worn out cutting edges	Replace tap	

Problem	Possible cause	Possible Solution	
Tap breakage	Mismatch between Tap location and hole	Correct alignment between tap and hole	
	Drilled hole not deep enough	Check actual hole depth	
	Excessive run out	Use grip with better mounting precision	
	Flutes filled up with chips	Check “chips fill up flutes” section on this table	
	Built-up edge	Replace tool, check “built-up” edge section for solution	
	Drill hole is too small	Use recommended drill size	
	Too high cutting speed	Decrease cutting speed	
Oversized thread	Tap tolerance and requested workpiece tolerance don’t fit	Choose different tap with suitable tolerance	
	Flutes filled up with chips	Remove chips and check “chips fill up flutes” section to prevent the problem from returning	
	Built-up edge	Replace tool, check “built-up” edge section for solution	
	Too high cutting speed	Decrease cutting speed	
	Unstable tool	Increase cutting speed – may improve tool stability	
Undersized thread	Worn out tap	Replace tap	
	Tap tolerance and requested workpiece tolerance don’t fit	Choose different tap with suitable tolerance	
	Drill hole is too small	Use recommended size drill	
Excessive power requirement	Worn out tap	Replace tap	
	Poor coolant flow to the cutting area	Adjust direction of coolant flow into the hole	
	Drill hole is too small	Use recommended size drill	

C.P.T.
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