

**THREAD TECHNOLOGY  
MADE IN GERMANY.  
SINCE 1905.**



**CATALOGUE 2.0**

**Neoboss**

## »The strength is in the quality.«

Friedrich Nietzsche (German philosopher, 1844–1900)

### **Neoboss is producing high-quality tools for more than 100 years now.**

Our philosophy is simple and convincing: we constantly work on improving the quality of your goods and help to increase the profitability of your production.

Our way: with selected materials from internationally renowned suppliers, our own heat treatment technology, various cutting edge preparations, and our 100 years of experience in product engineering, we are producing tools which are successfully used all over the world. Together with our partners, we offer state-of-the-art coating technologies to provide a reproducible manufacturing process for top level quality.

Our success is our best reference – we serve well-known and demanding international business partners:

- the automotive industry and their subcontractors
- the fastener industry
- the engineering industry
- the aerospace industry
- the mold and die production industry
- the electrical engineering industry

The technological progress, marked by the accelerated development of materials, and the demand for increased productivity, is the motivation in our daily work of research, engineering and production. We are continuously investing to advance our products.

The result: skilled employees are producing millions of innovative tools each year in our factories in Germany and abroad. Established products are improved continuously by Neoboss, for future generations of applications.

New parts are designed based on your individual requirements. Coatings of our tools are constantly updated and added to your product portfolio.

To find out more about our tools and our service please contact us. Our sales experts and our application engineers are happy to assist you.

# Neoboss Taps Catalogue 2.0



## IMPRINT

### Editor

Neoboss GmbH

### Editing/Coordination

Marco Hee, Natalie Abt, Rocco Zito

### Idea/Layout

Arcus Marketing Michael Soukop e.K.  
72379 Hechingen

Changes of any kind or printing errors regarding technical details do not justify any claims.

## Orientation Guide

In order to find the best type of tap quickly, please, use the orientation guide below.

### 3 steps to find the best tool for your application

1. Possibility		
Machining 42CrMo 4; 900 N/mm <sup>2</sup> / material-no. 1.7225 / DIN 371 M6 6H through hole		
<p><b>First Step</b></p> <p><b>1.</b></p> <p>Look at the chart: <b>Example of Materials</b> page 6-9</p> <p>▼</p> <p>The a.m. material 42CrMo 4 (heat treatable steel), 900 N/mm<sup>2</sup> is line 1.2</p>	<p><b>Second Step</b></p> <p><b>2.</b></p> <p>Move on to the <b>Recommendation table</b> page 10-17</p> <p>You will find the right tools in line 1.2</p> <p>▼</p> <p>Depending on hole type, chamfer type and thread type you will find the catalogue-no. and the corresponding page.</p>	<p><b>Third Step</b></p> <p><b>3.</b></p> <p>Move on to the according page in the Catalogue</p> <p>▼</p> <p>Here you find all necessary information concerning your tool.</p>
2. Possibility		
You already know the Neoboss-Catalogue-No.		
See page 4-5 of the Chart of Catalogue-No.s and look for the appropriate page.		

<b>Contents</b>	<b>Page</b>
Chart of Catalogue Numbers	4 - 5
Example of Materials	6 - 9
Recommendation Table	10 - 17
Neoboss Coatings and Internal Cooling (KSS)	18
Product Range	19 - 156
<b>Technical Part - Contents</b>	157 - 164
Dry Cutting / MKS = Minimum Lubrication System	158
Coatings	159
Recommended Core Hole Diameter for Taps for Roll Taps	160 - 162 163
Recommended Cutting Speeds and RPMs	164
Taps - Technical Vocabulary	165
Tolerances (Thread Portion of Taps)	166
Tool Squares	167
General Terms and Conditions of Business	168
How to Find the Right Tool	169

# Neoboss Chart of Catalogue Numbers

Cat.-No.	Type of Thread	Page
2000	M	71
	MF	96
	BSW	102
	G	110
	UNC	130
	UNF	141
	Pg	147
2000/LH Left	M	71
2005/06	M	72
2006/06	M	72
2008/06	M	73
2010	M	73
2010/08	M	73
2030	M	73
2040	M	73
2700/78	NPT	115
	NPTF	117
2750/78	NPT	115
3000	Tr	149
3010	Tr	148
3070	M	20
3080	M	21
4040	M	28
	BSW	100
	UNC	122
	UNF	133
4040/LH Left	M	28
4040/54	EG-M	152
	EG-UNC	154
4040/78	M	28
4044	M	52
4045	M	36
	UNC	124
	UNF	135
4045/78	M	36
4045/80	M	36
4050	M	66
4052	M	66
	BSW	100
	UNC	128
	UNF	139
4052/LH Left	M	66
4056/06	M	59
4057	M	58
4057/92	M	58

Cat.-No.	Type of Thread	Page
4058/06	M	48
	UNC	126
	UNF	137
4060/80	M	60
B4060/80	M	60
4061/80	M	60
4063/80	M	60
4064/79	M	60
4065/80	M	61
4067/80	M	61
4069/81	M	61
4071	M	69
4072/81	M	61
4076/80	M	61
4158/06	M	69
4230	M	68
	BSW	100
4235	M	40
4245	M	40
	UNC	124
	UNF	135
4245/81	M	40
4255	M	32
4340/70	M	64
B4340/70	M	64
4341	M	32
4345	M	32
	UNC	122
	UNF	133
4345/54/80	EG-M	152
	EG-UNC	154
4345/80	M	24
	UNC	120
	UNF	131
B4345/80	M	24
4350/77	M	56
B4350/77	M	56
4351/77	M	56
B4351/77	M	56
4358/70	M	48/65
B4358/70	M	48/65
4359/70	M	48
4365/78	M	46
	UNC	126
	UNF	137

Cat.-No.	Type of Thread	Page
4365/81	M	46
4430	M	69
4445/78	M	46
4445/81	M	46
4659	M	75
4853/81	M	42
4880/78	M	59
4890/80	M	42
4920	M	74
6000	M	67
6002	M	67
	MF	92
	BSW	101
	G	109
	Rp	111
	NPSM	118
	UNC	129
	UNF	140
	Pg	146
6002/LH Left	M	67
	MF	95
6008/06	M	49
	MF	89
	G	107
	UNC	127
	UNF	138
6030	M	68
	MF	92
	G	109
	Pg	146
6035	M	41
6040	M	29
	MF	81
	BSW	101
	G	104
	UNC	123
	UNF	134
6040/54	EG-M	153
	EG-UNC	155
6040/78	M	29
	MF	80
	G	104
6044	M	53
6045	M	37
	MF	85

Cat.-No.	Type of Thread	Page
6045	G	106
	UNC	125
	UNF	136
6045/78	M	37
	UNEF	142
6045/80	M	37
6055	M	33
	MF	84
6060/80	M	62
	MF	90
	G	108
B6060/80	M	62
6064/79	M	62
	MF	90
6071	M	70
6108/06	M	70
6130	M	70
6245	M	41
	MF	86
	UNC	125
	UNF	136
6245/81	M	41
	MF	86
6308/70	M	49/65
	MF	89/91
	G	107
B6308/70	M	49
	MF	89
6340/70	M	64
6341	M	33
6345	M	33
	MF	84
	G	105
	UNC	123
	UNF	134
6345/54/80	EG-M	153
	EG-UNC	155
6345/80	M	25
	MF	79
	G	103
	UNC	121
	UNF	132
B6345/80	M	25
	MF	79
6350/77	M	57

Cat.-No.	Type of Thread	Page
B6350/77	M	57
6351/77	M	57
6365/78	M	47
	MF	87
	G	106
	UNC	127
	UNF	138
	UN	143
6365/81	M	47
	MF	87
6445/78	M	47
	MF	88
6445/81	M	47
	MF	88
6700/78	Rc	112
	NPT	114
	NPTF	116
6750/78	NPT	114
6750/80	NPT	114
6853/81	M	43
6880/78	M	59
6890/80	M	43
7010	M	26
	BSW	100
	UNC	122
	UNF	133
7010/LH Left	M	26
7010/54	EG-M	152
	EG-UNC	154
7010/78	M	26
7011	M	27
	MF	81
	BSW	101
	G	104
	UNC	123
	UNF	134
	Pg	146
7011/54	EG-M	153
	EG-UNC	155
7011/78	M	27
	MF	80
	G	104
7045/06	M	34
	UNC	124
	UNF	135

Cat.-No.	Type of Thread	Page
7045/80	M	34
7055/06	M	35
	MF	85
	G	106
	UNC	125
	UNF	136
7055/80	M	35
7055/78	UNEF	142
7225/78	M	44
	UNC	126
	UNF	137
7225/81	M	44
7235/78	M	45
	MF	87
	G	106
	UNC	127
	UNF	138
7235/81	M	45
	MF	87
7245/06	M	38
	UNC	124
	UNF	135
7245/81	M	38
7255/06	M	39
	MF	86
	UNC	125
	UNF	136
7255/81	M	39
	MF	86
7265	M	30
	UNC	122
	UNF	133
7265/54/80	EG-M	152
	EG-UNC	154
7265/80	M	22
	UNC	120
	UNF	131
B7265/80	M	22
7270/70	M	63
B7270/70	M	63
7271/70	M	63
7275	M	31
	MF	84
	G	105
	UNC	123

Cat.-No.	Type of Thread	Page
7275	UNF	134
7275/54/80	EG-M	153
	EG-UNC	155
7275/80	M	23
	MF	78
	G	103
	UNC	121
	UNF	132
B7275/80	M	23
	MF	78
7365/78	M	44
7365/81	M	44
7375/78	M	45
	MF	88
7375/81	M	45
	MF	88
7410	M	50
7410/08	M	50
7411	M	51
7411/08	M	51
7450/77	M	54
B7450/77	M	54
7451/77	M	55
B7451/77	M	55
7850/81	M	42
7880/81	M	43
8000	M	76
	MF	98

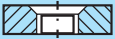

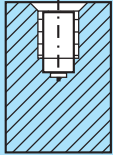
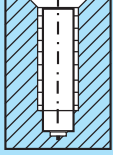
Material Main Group	Material Sub Group	Designation	Standard Designation	DIN-Number	Tensile Strength (N/mm <sup>2</sup> )	Hardness (HB)	AISI/SAE/ASTM
1. Steel	1.1. Unalloyed Steels; Tensile Strength $\leq 800$ N/mm <sup>2</sup>	Structural Steels	St37-3	1.0116	370 - 450	110 - 130	A 264
			St52-3	1.0570	450 - 680	140 - 210	
			St60-2	1.0060	600 - 720	180 - 210	A 572
		Carbon Steels	C10	1.0301	490 - 780	150 - 230	M 1010
			C22	1.0402	470 - 650	140 - 190	1020
			C35	1.0501	550 - 780	170 - 230	1035
			C40	1.0511	600 - 800	180 - 240	1040
		Cast Steels	GS-38 (GE200)	1.0420	380	114	
			GS-45 (GE240)	1.0446	450	133	
			GS-52 (GE260)	1.0552	520	155	
			GS-60 (GE300)	1.0558	600	178	
		Free Cutting Steels	35S 20	1.0726	510 - 880	150 - 260	1140
			9S 20	1.0711	370 - 450	110 - 130	
			9SMn 28	1.0715	390 - 580	110 - 170	1213
			9SMn 36	1.0736	390 - 800	110 - 240	1215
			9SMnPb 28	1.0718	380 - 810	110 - 240	12L13
			9SMnPb 36	1.0737	390 - 800	110 - 240	12L14
		Fine Grain Structural Steels	StE 255 (S255N)	1.0461	310 - 480	90 - 143	
			StE 460 (P460N)	1.8905	520 - 720	152 - 214	
			StE 500 (S500N)	1.8907	560 - 800	166 - 238	
		Cementation Steels	13Cr 3	1.7012	500 - 800	160 - 240	
		16MnCr 5	1.7131	500 - 700	160 - 210	5115	
	Heat Treatable Steels	C15	1.0401	600 - 900	180 - 270	1015	
	1.2. Unalloyed and Alloyed Steels; Tensile Strength $\leq 1000$ N/mm <sup>2</sup>	Structural Steels	Cf53	1.1213	650 - 800	190 - 240	1050
			Ck45	1.1191	650 - 850	190 - 250	1045
			Ck55	1.1203	700 - 950	210 - 280	1055
			Ck60	1.1221	750 - 1000	220 - 300	1060
		Heat Treatable Steels	15Cr 3	1.7015	690 - 1000	200 - 300	5015
			15CrMo 5	1.7262			
			25CrMo 4	1.7218	800 - 1000	240 - 300	4130
			32CrMo 12	1.7361	690 - 1000	200 - 300	
			34Cr 4	1.7033	700 - 1000	210 - 300	5132
			35CrMo 4	1.2330		4135	
			35CrNiMo 6	1.6582	800 - 1000	240 - 300	4340
			40Mn 4	1.1157	800 - 1000	240 - 300	1039
			41Cr 4	1.7035	800 - 1000	240 - 300	5140
			42CrMo 4	1.7225	800 - 1000	240 - 300	4140
			47CrMo 4	1.2332		4142	
			C35 E	1.1181	550 - 780	170 - 240	1035
			C45	1.0503	650 - 850	190 - 250	1045
			C55	1.0535	700 - 950	210 - 280	1055
			C60	1.0601	750 - 1000	220 - 300	1060
			Cf35	1.1183	540 - 780	160 - 230	1035
			Ck22	1.1151	470 - 650	150 - 200	1020
			Ck25	1.1158	500 - 700	150 - 210	1025
		Cementation Steels	14NiCr 14	1.5752	880 - 1000	260 - 300	3310
			16MnCr 5	1.7131	780 - 1000	230 - 300	5116
		Ck15	1.1141	590 - 880	180 - 260	1015	
1.3.1. Unalloyed and Alloyed Steels; Tensile Strength $\leq 1200$ N/mm <sup>2</sup>		Cementation Steels	14NiCr 14	1.5752	1000 - 1280	300 - 380	3310
			16MnCr 5 V	1.7131	1000 - 1200	300 - 360	5117
			17CrNiMo 6	1.6587	1080 - 1200	320 - 360	
			17CrNiMo 6	1.6587	1200 - 1400	320 - 410	
		Nitriding Steels	31CrMo V 9	1.8519	1000 - 1250	300 - 370	
		34CrAlNi 7	1.8550				
		35CrNiMo 6	1.6582	1000 - 1200	300 - 360	4340	
		39CrMoV 13 9	1.8523	1000 - 1200	300 - 380		
	Heat Treatable Steels	100Cr 6	1.3505		5210()		
		25CrMo 4	1.7218	1000 - 1100	300 - 330	4130	
		30CrNiMo 8	1.6580	1000 - 1200	300 - 360		
		32CrMo12	1.7361	1000 - 1100	300 - 330		
		34Cr 4	1.7033	1000 - 1100	300 - 330	5132	
		40Mn4	1.1157	1000 - 1100	300 - 330	1039	
		41CrMo 4	1.7223	1000 - 1200	300 - 360	4140	
		42CrMo 4 V	1.7225	1000 - 1200	300 - 380	4141	
	Fine Grain Structural Steels	StE690 V	1.8931				
		StE960 V	1.8941				
	Wear-resistant Steels	HARDOX400					





















Material Main Group	Material Sub Group	Designation	Standard Designation	DIN-Number	Tensile Strength (N/mm <sup>2</sup> )	Hardness (HB)	AISI/SAE/ASTM	
1. Steel	1.3.1. Unalloyed and Alloyed Steels; Tensile Strength $\leq 1200$ N/mm <sup>2</sup>	Tool Steels for Cold Work	100Cr 6	1.2067			L3	
			100MnCrW 4	1.2510			O1	
			100V 1	1.2833			W210	
			115CrV 3	1.2210			L2	
			50CrV 4	1.8159	1000 - 1200	300 - 360	6150	
			58CrV 4	1.8161				
			60WCrV 7	1.2550			S1	
			90MnCrV 8	1.2842			O2	
			S10-4-3-10	1.3207				
			X100 CrMoV 5 1	1.2363			A2	
			X165 CrMoV 12	1.2601				
			X210 Cr 12	1.2080			D3	
			X210 CrW 12	1.2436				
			X50 CrMoW 9 11	1.2631				
			Tool Steels for Hot Work	35NiCrMo 16	1.2766			
				40CrMnMo 7	1.2311			
				45WCrV 7	1.2542			S1
				55NiCrMoV 6	1.2713			L6
				60NiCrMoV 12 4	1.2743			
				X30WCrV 5 3	1.2567			
				X30WCrV 9 3	1.2581			H21
				X32CrMoV 3 3	1.2365			H10
				X36CrMo 17	1.2316			
				X38CrMoV 5 1	1.2343			H11
			X40CrMoV 5 1	1.2344			H13	
			X42Cr 13	1.2083			420	
		1.3.2. Unalloyed and Alloyed Steels; Tensile Strength $\geq 1200$ N/mm <sup>2</sup>	Heat Proof Steels	35CrNiMo 6	1.6582	1200 -1400	380 - 410	4340
				NiCr19 CoMo	2.4973	1200 -1320	360 - 380	
				X5NiCrTi 26 15	1.4980	930 -1180	280 - 360	
			Tool Steels	50CrV 4	1.8159	1200 -1300	360 - 80	6150
				56NiCrMoV 7	1.2714	1200 -1400	360 - 410	
		1.3.3. Hardened Steels; 42-50 HRC	Tool Steels	X155CrVMo 12 1	1.2379			D2
				X210CrW 12	1.2436			
				90MnCrV 8	1.2842			O2
			High Speed Steels	S6-5-2	1.3343			M2
				S6-5-3	1.3344			M3 Class 2
			Wear-resistant Steels	HARDOX500				
				TOOLOX 44 HARDOX 400				
		1.4. Stainless Steels (V2A-Steels)	Normal Alloyed	GX10CrNi 18 8	1.4312			
				GX20Cr 14	1.4027	590 - 700	180 - 210	
				GX5CrNi 19 10	1.4308	460 - 640	140 - 190	CF-8
				GX8CrNi 13	1.4008	590 - 790	180 - 230	
				X10Cr 13	1.4006	450 - 650	130 - 190	410
				X10CrNiS 18 9	1.4305	500 - 750	160 - 220	303
				X105CrMo 17	1.4125	900	270	440C
				X12CrMoS 17	1.4104	540 - 840	160 - 250	430F
				X12CrNi 17 7	1.4310	700 - 950	210 - 280	301
			X12CrS 13	1.4005			416	
			X15Cr 13	1.4024	650 - 800	190 - 240		
			X2CrNi 18 9	1.4306	460 - 850	140 - 250	304L	
			X2CrNiN 18 10	1.4311	550 - 760	160 - 220	304LN	
			X20Cr 13	1.4021	650 - 950	190 - 280	420	
			X20CrNi 17 2	1.4057	800 - 950	240 - 280	431	
			X22CrNi 17	1.4057	750 - 950	220 - 280	431	
			X3CrNiN 17 8	1.4319			302	
			X30Cr 13	1.4028	600 - 780	180 - 230	420F	
			X39Cr 13	1.4031	560 - 800	170 - 240		
			X46Cr 13	1.4034	580 - 800	170 - 240		
			X5CrNi 18 12	1.4303	490 - 690	150 - 210	305	
			X5CrNi 18 9	1.4301	500 - 700	160 - 210	304	
			X5CrNi 18 9	1.4350			304	
		X6CrAl 13	1.4002	400 - 700	120 - 210	405		
		X6CrMo 17	1.4113	450 - 650	130 - 190	434		
		X7Cr 13	1.4000	400 - 700	120 - 210	403		
		X8Cr 17	1.4016	450 - 600	130 - 180	430		

Material Main Group	Material Sub Group	Designation	Standard Designation	DIN-Number	Tensile Strength (N/mm <sup>2</sup> )	Hardness (HB)	AISI/SAE/ASTM	
1. Steel	1.5. Stainless Steels with high Chromium-Nickel-Content (V4A-Steels)	High Alloyed	GX5CrNiMo 19 11	1.4408	460 - 640	140 - 190	CF-8M	
			GX5CrNiNb 19 10	1.4552	440 - 640	130 - 190		
			X1NiCrMoCuN 25 20 5	1.4539	520 - 720	150 - 210	UNSN08904	
			X6CrNiTi 18-10	1.4541	500 - 700	150 - 210	321	
			X2CrMoTi 18 2	1.4521	450 - 650	130 - 190	443	
			X2CrNiMo 17 13 2	1.4404	490 - 850	150 - 250	316L	
			X2CrNiMo 18 12	1.4435	490 - 690	150 - 210	316L	
			X2CrNiMo 18 16	1.4438	490 - 690	150 - 210	317L	
			X2CrNiMoN 17 12 2	1.4406	580 - 800	170 - 240	316LN	
			X2CrNiMoN 17 13 3	1.4429	580 - 800	170 - 240	316LN	
			X2CrNiMoN 22 5 3	1.4462	680 - 880	200 - 260		
			X3NiCrCuMoTi 27 23	1.4503	500 - 700	160 - 210		
			X4CrNiMoN 27 5 2	1.4460	600 - 800	180 - 240	329	
			X5CrNiCuNb 17 4	1.4542			630	
			X5CrNiMo 17 1	1.4401	510 - 710	150 - 210	316	
			X5CrNiMo 17 13	1.4449			317	
			X5CrNiMo 17 13 3	1.4436	510 - 710	150 - 210	316	
			X5CrNiNb 18 10	1.4546	410 - 610	130 - 190	348	
			X5NiCrMoCuNb 20 18	1.4505	490 - 740	160 - 220		
			X6CrNb 17	1.4511	450 - 600	130 - 180		
			X6CrNiMoTi 17 12 2	1.4571	500 - 730	160 - 220	316Ti	
		X6CrNiNb 18 10	1.4550	550 - 750	160 - 220	347		
		X6CrTi 12	1.4512	330 - 560	100 - 170	409		
		X6CrTi 17	1.4510	450 - 600	130 - 180	439		
		High Temperature	X12CrNiMo12	1.4939	950 - 1150	280 - 340	S 64152	
			X5NiCrTi26-15	1.4980	930 - 1180	275 - 348	660	
			X5CrNi 13 4	1.4313	1000 - 1200	295 - 354	S 41500	
			GX30CrSi6	1.4710	1190 - 1550	350 - 450		
			X50CrMnNiNbN21-9	1.4882	950 - 1150	280 - 340	S 63019	
			X55CrMnNiN20-8	1.4875	900 - 1150	266 - 340	S 63012	
			X19CrMoNbVN11-1	1.4913	950 - 1150	280 - 340		
			X14CrMoS17	1.4104	~ 930	275	430 F	
			X4CrNiMo16-5-1	1.4418	~1250	370		
			X5CrNiCuNb16-4	1.4542	800 - 1270	238 - 375	630	
			GX25CrNi13-4	1.4317	900 - 1100	266 - 325		
			X20CrMo13	1.4120	880 - 1470	260 - 435		
		1.7. High Speed Steels	High Speed Steels	S12-1-4-5	1.3202			T15
				S18-0-1	1.3355			T1
				S18-1-2-10	1.3265			T5
				S18-1-2-5	1.3255			T4
				S2-10-1-8	1.3247			M42
				S2-9-1	1.3346			M1
				S2-9-2	1.3348			M7
			S2-9-2-8	1.3249			M34	
			S5-5-3	1.3344			M3 Class2	
			S6-5-2	1.3343			M2	
			S6-5-2-5	1.3243				
			S7-4-2-5	1.3246			M41	
			SC6-5-2	1.3342			M3	
2. Cast Iron	2.1. Grey Cast Iron (GG)	Grey Cast Iron	GG10 (EN-GJL-100)	0.6010			A48-20 B	
			GG15 (EN-GJL-150)	0.6015	110 - 150	35 - 50	A48-25 B	
			GG20 (EN-GJL-200)	0.6020	150 - 200	50 - 60	A48-30 B	
			GG25 (EN-GJL-250)	0.6025	200 - 250	60 - 80	A48-35 B	
			GG30 (EN-GJL-300)	0.6030	240 - 270	75 - 85	A48-45 B	
			GG35 (EN-GJL-350)	0.6035	280 - 320	90 - 100	A48-50 B	
			GG40 (EN-GJL-400)	0.6040	350 - 450	110 - 130	A48-55 B	
			Nodular Cast Iron	GGG40 (EN-GJS-400-2 <sup>+</sup> )	0.7040	400	120	60-40-18
				GGG50 (EN-GJS-500-7)	0.7050	500	160	80-55-06
			GGG60 (EN-GJS-600-3)	0.7060	600	190	80-55-06	
			GGG70 (EN-GJS-700-2)	0.7070	700	210	100-70-03	
			GGG80 (EN-GJS-800-2)	0.7080	800	238	120-90-02	
		Malleable Cast Iron	GTS55-05	0.8055	550	170	50005	
			GTW35-04	0.8035	350	110		
		2.3. Vermicular Cast Iron (GGV, GJV, CGI)	Vermicular Cast Iron	GJV-300				
				GJV-400				
				GGV-30				
				GGV-40				

Material Main Group	Material Sub Group	Designation	Standard Designation	DIN-Number	Tensile Strength (N/mm <sup>2</sup> )	Hardness (HB)	AISI/SAE/ASTM	
3. Nonferrous Metals	3.1. Aluminium, Copper, Copper Alloys	Unalloyed Aluminium	Al99	3.0205	75 - 140	20 - 50		
			Al99.9	3.0305	100 - 120	30 - 40		
			Al99.9 R	3.0400	60 - 120	20 - 40		
			E-Al	3.0257				
		Unalloyed Copper	SF-Cu	2.0090	300 - 350	90 - 110		
		Longchipping Brass	CuZn20 (Ms80)	2.0250				
			CuZn30 (Ms70)	2.0265				
			CuZn37	2.0321	300 - 400	90 - 110		
		Bronze	G-CuSn 6 ZnNi	2.1093	400 - 450	120 - 130		
		Red Brass	G-CuSn 5 ZnPb	2.1096	200 - 250	60 - 80		
		Aluminium Alloys	G-AlSi 12	3.2581	160 - 210	50 - 70	A413.2	
			G-AlSi 10 Mg	3.2383	170 - 220	50 - 70		
			G-AlSi 12 (Cu)	3.2583	150 - 220	50 - 70		
			G-AlSi 5 Mg	3.2341	140 - 300	50 - 90		
			G-AlSi 6 Cu	3.2151	160 - 200	50 - 90		
	G-AlSi 7 Mg		3.2371	170 - 300	50 - 90			
	G-AlSi 8 Cu 3		3.2161	160 - 200	50 - 60			
	G-AlSi 9 Mg		3.2373	250 - 300	80 - 90			
	G-CuAl 10 Ni		2.0975	650 - 750	190 - 220			
	GD-AlSi 12 (Cu)		3.2982	450 - 550	130 - 170			
	3.2.2. Special Aluminium Alloys	Bronze, Hard	CuSn 6 Zn 6	2.1080	550 - 700	170 - 210		
		Special Aluminium Alloys	AlCuMg 1	3.1325	215 - 395	70 - 120		
			AlMg 1	3.3315	105 - 210	30 - 70		
			AlMg 1,5	3.3316	130 - 240	40 - 75		
			AlMg 1 SiCu	3.3211	150 - 290	50 - 90		
			AlMg 2,5	3.3523	170 - 290	50 - 90		
			AlMg 3	3.3535	190 - 305	60 - 100		
			AlMg 5	3.3555	250 - 280	80 - 90		
			AlMgSi 0,5	3.3206	140 - 200	40 - 60		
			AlMgSi 1	3.2315	150 - 315	50 - 100		
AlMn 1 Mg 0,5			3.0525	125 - 20	40 - 70			
AlMnCu			3.0517	125 - 210	40 - 70			
AlZnMgCu 0,5			3.4345	400 - 460	120 - 180			
AlZnMgCu 1,5			3.4365	480 - 530	150 - 170			
G-AlMg 5			3.3561	160 - 220	50 - 70			
G-AlMg 5Si	3.3261	160 - 200	50 - 60					
3.3. Copper Alloys, Short Chipping	Short Chipping Brass	CuZn39Pb 2 (Ms58)	2.0380	~630	190			
		CuZn40 (Ms60)	2.0360					
		CuZn40MnPb	2.0580	400	120			
		CuZn44Pb 2	2.0410	630	190			
4. Special Alloys	4.1. Nickel Alloys	Nickel Alloys	NiCr17Mo17FeW (Hastelloy C)		DIN-Nr. 2.4602			
			NiCR19Fe19NbMo (Inconel 718)		DIN-Nr. 2.4668			
			Ni-Cr20Ti (Nimonic 75)		DIN-Nr. 2.4630			
			NiCr20TiAl (Nimonic 80/80A)		DIN-Nr. 2.4631			
			NiCr20Co14MoTi (Waspaloy)		DIN-Nr. 2.4654			
			NiCr21Mo (Incoloy 825)		DIN-Nr. 2.4858			
			NiCu30Fe (Monel 400)		DIN-Nr. 2.4360			
			NiCo15Cr10MoAlTi (Nimocast PK24)		DIN-Nr. 2.4674			
	4.2. Titanium Alloys	Titanium Alloys	TiAl 5 Sn 2	3.7115	790 - 980	230 - 290		
			TiAl 6 V 4	3.7165	980 - 1140	290 - 340		
	4.3. Cu-Al-Fe-Alloys	Chilled Cast Iron	Ampco 21		965 - 1060	285 - 311		
			Ampco 22		1090 - 1130	321 - 352		
			Ampco 25		1140 - 1280	356 - 394		
			Ampco 26		1290 - 1450	395 - 450		
	5. Plastics	5.1. Thermoplastics	Thermoplastics	Polyamid				
Polystyrol								
Polyvinylchloride								
Ultramid								
5.2. Thermosetting Plastics and Fibre Reinforced Plastics		Thermosetting Plastics	Fibre Reinforced Plastics	Bakelit				
				Ferrozell				
				Pertinax				
			Fibre Reinforced Plastics	CFK GFK	190 - 210	60 - 70		

Type of Hole		Type of Hole			
<div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div style="text-align: center;"> <p>1</p>  <p>Through Hole Depth of Thread up to 2 x d<sub>1</sub></p> </div> <div style="text-align: center;"> <p>2</p>  <p>Through Hole Depth of Thread up to 3 x d<sub>1</sub></p> </div> <div style="text-align: center;"> <p>3</p>  <p>Blind Hole Depth of Thread up to 2 x d<sub>1</sub></p> </div> <div style="text-align: center;"> <p>4</p>  <p>Blind Hole Depth of Thread up to 3 x d<sub>1</sub></p> </div> </div>		<p><b>Chamfer</b></p> <p>M</p> <p>MF</p> <p>BSW</p> <p>G</p> <p>Rp</p> <p>Rc</p> <p>NPT</p> <p>NPTF</p> <p>NPSM</p> <p>UNC</p> <p>UNF</p> <p>UNEF</p> <p>UN</p> <p>Pg</p> <p>Tr</p> <p>Rd</p> <p>EG-M</p> <p>EG-UNC</p>			
<p><b>Chamfer</b></p> <p>Form A 5 - 6 Threads</p> <p>Form B 4 - 5 Threads</p> <p>Form C 2 - 3 Threads</p> <p>Form D 3,5 - 5 Threads</p> <p>Form E 1,5 - 2 Threads</p> <p>Form F 1 - 1,5 Threads</p>		<p>KA*) Axial Internal Cooling</p> <p>KR*) Radial Internal Cooling</p> <p><b>Coolant</b></p> <p>Ö = Cutting Oil</p> <p>E = Emulsion</p> <p>S = Special Cutting Oil</p> <p>T = Dry, Air</p>			
Material Main Groups	Material Sub Groups	Cutting Speed v <sub>c</sub> = m/min			Cat.-No. DIN 371 _____ DIN 376/374 _____
		Uncoated	Coated	Coolant	
<b>1. Steels</b>	1.1. Unalloyed Steels; RM ≤ 800 N/mm <sup>2</sup>	10 - 20	20 - 50	Ö/E	
	1.2. Unalloyed and Alloyed Steels; RM ≤ 1000 N/mm <sup>2</sup>	10 - 20	20 - 50	Ö/E	
	1.3.1 Unalloyed and Alloyed Steels; RM ≤ 1200 N/mm <sup>2</sup>	3 - 10	5 - 20	Ö/E	
	1.3.2. Unalloyed and Alloyed Steels; RM ≥ 1200 N/mm <sup>2</sup>	2 - 5	3 - 10	Ö/S	
	1.3.3. Hardened Steels; 42 - 50 HRC		2 - 5	Ö/S	
	1.4. Stainless Steels (V2A-Steels)	6 - 10	10 - 20	Ö/E	
	1.5. Stainless Steels with high Chromium-Nickel-Content (V4A-Steels)	6 - 10	10 - 20	Ö/E	
	1.6. High Temperature Stainless Steels (V2A- and V4A-Steels)	3 - 10	5 - 20	Ö/E	
1.7. High Speed Steels	6 - 10	10 - 20	Ö/E		
<b>2. Cast Iron</b>	2.1. Grey Cast Iron (GG)	10 - 20	20 - 50	T/E	
	2.2. Nodular and Malleable Cast Iron (GGG, GT)	10 - 20	20 - 50	T/E	
	2.3. Vermicular Cast Iron (GGV, GJV, CGI)	10 - 20	20 - 50	T/E	
<b>3. Nonferrous Metals</b>	3.1. Aluminium, Copper, Copper Alloys	20 - 40	30 - 50	Ö/E	
	3.2.1. Aluminium Alloys, Copper Alloys	10 - 30	30 - 50	Ö/E	
	3.2.2. Special Aluminium Alloys	20 - 30	30 - 50	Ö/E	
	3.3. Copper Alloys, Short Chipping	10 - 30		Ö/E	
<b>4. Special Alloys</b>	4.1. Nickel Alloys		2 - 4	S	
	4.2. Titanium Alloys	4 - 6		S	
	4.3. Cu-Al-Fe-Alloys		3 - 10	Ö/E	
<b>5. Plastics</b>	5.1. Thermoplastics	20 - 30	20 - 30	T	
	5.2. Thermosetting Plastics and Fibre Reinforced Plastics	10 - 15	15 - 20	T	

## Type of Thread and Catalogue Page




















	2	2	3/4	3/4	2	2	3/4	3/4	1/3	3	2	2	3/4	3/4	2/4	2/4	2/4	2/4
	B	B	C	C	B	B	C	C	C	C	B	B	C	C	C	C	E	C
	22/23	22/23	24/25	24/25	26/27	26/27	28/29	28/29	66/67	68	63	63	64	64	48/65	48/65	48	48/49
	78	78	79	79	81	80	81	80	92	92					91	89		89
	103		103		100/101	104	100/101	104	100/101	100								107
									111									
									118									
	120/121		120/121		122/123		122/123		128/129									126/127
	131/132		131/132		133/134		133/134		139/140									137/138
					146				146	146								
	Rapid-UNI TiN	Rapid-UNI KR*) TiN	Grulo-UNI TiN	Grulo-UNI KA*) TiN	Rapid	Rapid vap.	Grulo	Grulo vap.	C	RSP	Rapid TM TiAlN	Rapid TM KR*) TiAlN	Grulo TM TiAlN	Grulo TM KA*) TiAlN	C-GG TM TiAlN	C-GG TM KA*) TiAlN	C-GG TM TiAlN	C-GG nit.
																		
	7265/80 7275/80	B7265/80 B7275/80	4345/80 6345/80	B4345/80 B6345/80	7010 7011	7010/78 7011/78	4040 6040	4040/78 6040/78	4052 6002	4230 6030	7270/70 7271/70	B7270/70 B7271/70	4340/70 6340/70	B4340/70 B6340/70	4358/70 6308/70	B4358/70 B6308/70	4359/70 6309/70	4058/06 6008/06
	●	●	●	●	●	●	●	●	●	●	■	■	■	■				
	●	●	●	●		○		○			■	■	■	■				
	●	●	●	●							●	●	●	●				
	●	●	●	●														
	○	○	○	○														
	○	○	○	○														
	○	○	○	○														
	○	○	○	○							□	□	□	□	■	■	■	●
	○	○	○	○							■	■	■	■	■	■	■	●
	○	○	○	○							■	■	■	■	■	■	■	
	○	○	○	○														
	○	○	○	○														
	○	○	○	○														
	○	○	○	○														
	○	○	○	○														
	○	○	○	○														

Application: ● recommended ○ suitable ■ also recommended for dry cutting / MKS □ suitable

Type of Hole						Type of Hole			
Chamfer						Chamfer			
M						M			
MF						MF			
BSW						BSW			
G						G			
Rp						Rp			
Rc						Rc			
NPT						NPT			
NPTF						NPTF			
NPSM						NPSM			
UNC						UNC			
UNF						UNF			
UNEF						UNEF			
UN						UN			
Pg						Pg			
Tr						Tr			
Rd						Rd			
EG-M						EG-M			
EG-UNC						EG-UNC			
						KA*) Axial Internal Cooling KR*) Radial Internal Cooling			
						<b>Coolant</b> Ö = Cutting Oil E = Emulsion S = Special Cutting Oil T = Dry, Air			
Material Main Groups	Material Sub Groups					Cutting Speed $v_c = \text{m/min}$			Cat.-No. DIN 371 _____ DIN 376/374 _____
						Uncolæted	Coated	Coolant	
<b>1. Steels</b>	1.1.	Unalloyed Steels; $RM \leq 800 \text{ N/mm}^2$				10 - 20	20 - 50	Ö/E	
	1.2.	Unalloyed and Alloyed Steels; $RM \leq 1000 \text{ N/mm}^2$				10 - 20	20 - 50	Ö/E	
	1.3.1	Unalloyed and Alloyed Steels; $RM \leq 1200 \text{ N/mm}^2$				3 - 10	5 - 20	Ö/E	
	1.3.2.	Unalloyed and Alloyed Steels; $RM \geq 1200 \text{ N/mm}^2$				2 - 5	3 - 10	Ö/S	
	1.3.3.	Hardened Steels; 42 - 50 HRC					2 - 5	Ö/S	
	1.4.	Stainless Steels (V2A-Steels)				6 - 10	10 - 20	Ö/E	
	1.5	Stainless Steels with high Chromium-Nickel-Content (V4A-Steels)				6 - 10	10 - 20	Ö/E	
	1.6.	High Temperature Stainless Steels (V2A- and V4A-Steels)				3 - 10	5 - 20	Ö/E	
	1.7.	High Speed Steels				6 - 10	10 - 20	Ö/E	
<b>2. Cast Iron</b>	2.1.	Grey Cast Iron (GG)				10 - 20	20 - 50	T/E	
	2.2.	Nodular and Malleable Cast Iron (GGG, GT)				10 - 20	20 - 50	T/E	
	2.3.	Vermicular Cast Iron (GGV, GJV, CGI)				10 - 20	20 - 50	T/E	
<b>3. Nonferrous Metals</b>	3.1.	Aluminium, Copper, Copper Alloys				20 - 40	30 - 50	Ö/E	
	3.2.1.	Aluminium Alloys, Copper Alloys				10 - 30	30 - 50	Ö/E	
	3.2.2.	Aluminium Special Alloys				20 - 30	30 - 50	Ö/E	
	3.3	Copper Alloys, Short Chipping				10 - 30		Ö/E	
<b>4. Special Alloys</b>	4.1.	Nickel Alloys					2 - 4	S	
	4.2.	Titanium Alloys				4 - 6		S	
	4.3.	Cu-Al-Fe-Alloys					3 - 10	Ö/E	
<b>5. Plastics</b>	5.1.	Thermoplastics				20 - 30	20 - 30	T	
	5.2.	Thermosetting Plastics and Fibre Reinforced Plastics				10 - 15	15 - 20	T	

### Type of Thread and Catalogue Page

	2	2	3	3/4	2	2	3/4	3/4	2	3/5	2/3	2	2	3/4	3/4	2	2	3/4	3/4
	B	C	C	E	B	B	C	C	B	C	D	B	B	C	C	B	B	C	C
	30/31	32/33	32/33	32/33	38/39	40/41	40/41	38/39	42/43	42/43	42/43	44/45	44/45	46/47	46/47	44/45	44/45	46/47	46/47
	84	84	84		86	86	86	86				88	88	88	88	87	87	87	87
	105	105														106			106
	122/123	122/123					124/125	124/125									126/127		126/127
	133/134	133/134					135/136	135/136									137/138		137/138
																			143

	Rapid-VA-G	Grulo-Spez-G	RSP-Spez-G	Grulo-Spez-G	Rapid-Spez-R TiCN	Rapid-Spez-R nit.	Grulo-Spez-R TiCN	Grulo-Spez-R	Rapid-S TiCN	RSP-Spez-S TiN	D-PM TiCN	Rapid-VA-G TiCN	Rapid-VA-G vap.	Grulo-VA-G TiCN	Grulo-Spez-G vap.	Rapid-V4A TiCN	Rapid-V4A vap.	Grulo-V4A TiCN	Grulo-V4A vap.
																			
	7265 7275	4345 6345	4255 6055	4341 6341	7245/81 7255/81	7245/06 7255/06	4245/81 6245/81	4245 6245	7850/81 7880/81	4890/80 6890/80	4853/81 6853/81	7365/81 7375/81	7365/78 7375/78	4445/81 6445/81	4445/78 6445/78	7225/81 7235/81	7225/78 7235/78	4365/81 6365/81	4365/78 6365/78
→	●	●	●	●															
→	○	○	○	○										○					
					●	●	●	●						○					
					●	○	●	○	●	●	○								
	○	○	○	○					○	○	●			●	●	●	●	●	●
	●	●	●	●										○	○	○	○	○	○
														○	○	○	○	○	○
	○	○	○	○															
	●	●	●	●												●	●	○	●
									●	●	●								
																			●
					○	○	○	○											

**Application:** ● recommended ○ suitable ■ also recommended for dry cutting / MKS □ suitable

Type of Hole						Type of Hole			
						Chamfer			
						M			
						MF			
						BSW			
						G			
						Rp			
						Rc			
						NPT			
						NPTF			
						NPSM			
						UNC			
						UNF			
						UNEF			
						UN			
						Pg			
						Tr			
						Rd			
						EG-M			
						EG-UNC			
						KA*) Axial Internal Cooling KR*) Radial Internal Cooling			
						Coolant Ö = Cutting Oil E = Emulsion S = Special Cutting Oil T = Dry, Air			
Material Main Groups	Material Sub Groups					Cutting Speed $v_c = \text{m/min}$			Cat.-No. DIN 371 _____ DIN 376/374 _____
						Uncoated	Coated	Coolant	
<b>1. Steels</b>	1.1. Unalloyed Steels; $RM \leq 800 \text{ N/mm}^2$					10 - 20	20 - 50	Ö/E	
	1.2. Unalloyed and Alloyed Steels; $RM \leq 1000 \text{ N/mm}^2$					10 - 20	20 - 50	Ö/E	
	1.3.1 Unalloyed and Alloyed Steels; $RM \leq 1200 \text{ N/mm}^2$					3 - 10	5 - 20	Ö/E	
	1.3.2. Unalloyed and Alloyed Steels; $RM \geq 1200 \text{ N/mm}^2$					2 - 5	3 - 10	Ö/S	
	1.3.3. Hardened Steels; 42 - 50 HRC						2 - 5	Ö/S	
	1.4. Stainless Steels (V2A-Steels)					6 - 10	10 - 20	Ö/E	
	1.5. Stainless Steels with high Chromium-Nickel-Content (V4A-Steels)					6 - 10	10 - 20	Ö/E	
	1.6. High Temperature Stainless Steels (V2A- and V4A-Steels)					3 - 10	5 - 20	Ö/E	
	1.7. High Speed Steels					6 - 10	10 - 20	Ö/E	
<b>2. Cast Iron</b>	2.1. Grey Cast Iron (GG)					10 - 20	20 - 50	T/E	
	2.2. Nodular and Malleable Cast Iron (GGG, GT)					10 - 20	20 - 50	T/E	
	2.3. Vermicular Cast Iron (GGV, GJV, CGI)					10 - 20	20 - 50	T/E	
<b>3. Nonferrous Metals</b>	3.1. Aluminium, Copper, Copper Alloys					20 - 40	30 - 50	Ö/E	
	3.2.1. Aluminium Alloys, Copper Alloys					10 - 30	30 - 50	Ö/E	
	3.2.2. Special Aluminium Alloys					20 - 30	30 - 50	Ö/E	
	3.3. Copper Alloys, Short Chipping					10 - 30		Ö/E	
<b>4. Special Alloys</b>	4.1. Nickel Alloys						2 - 4	S	
	4.2. Titanium Alloys					4 - 6		S	
	4.3. Cu-Al-Fe-Alloys						3 - 10	Ö/E	
<b>5. Plastics</b>	5.1. Thermoplastics					20 - 30	20 - 30	T	
	5.2. Thermosetting Plastics and Fibre Reinforced Plastics					10 - 15	15 - 20	T	



### Type of Thread and Catalogue Page

2	2	3/4	3/4	3/4	2	2	3/4	3/4	3/4	3/4	2	3/4	2/4	2/4	2/4	2/4		
B	B	C	C	C	B	B	C	C	E	E	B	C	C	C	C	C		
34/35 85	34/35	36/37 85	36/37	36/37	54/55	54/55	56/57	56/57	56/57	56	50/51	52/53	58	58	59	59		
106		106																
124/125 135/136		124/125 135/136		142														
Rapid-Spez nit.	Rapid-Spez TiN	Grulo-Spez	Grulo-Spez vap.	Grulo-Spez TiN	Rapid-Alutop DLC	Rapid-Alutop KR*) DLC	Grulo-Alutop DLC	Grulo-Alutop KA*) DLC	Grulo-Alutop DLC	Grulo-Alutop KA*) DLC	Rapid-Al	Grulo-Al	C-Ms	C-Ms	C-VA-S-Ti vap.	C-Bak nit.		
7045/06 7055/06	7045/80 7055/80	4045 6045	4045/78 6045/78	4045/80 6045/80	7450/77 7451/77	B7450/77 B7451/77	4350/77 6350/77	B4350/77 B6350/77	4351/77 6351/77	B4351/77 B6351/77	7410 7411	4044 6044	4057	4057/92	4880/78 6880/78	4056/06		
●	●	●	●	●														
○	○		○	○														
					●	●	●	●	●	●	●	●						
					●	●	●	●	●	●	●	●						
													●	●				
															●			
													○					
																		●

Application:

● recommended

○ suitable

■ also recommended for dry cutting / MKS

□ suitable

Type of Hole						Type of Hole			
Chamfer						Chamfer			
Form A						M			
Form B						MF			
Form C						BSW			
Form D						G			
Form E						Rp			
Form F						Rc			
						NPT			
						NPTF			
						NPSM			
						UNC			
						UNF			
						UNEF			
						UN			
						Pg			
						Tr			
						Rd			
						EG-M			
						EG-UNC			
						KA*) Axial Internal Cooling KR*) Radial Internal Cooling			
						Coolant Ö = Cutting Oil E = Emulsion S = Special Cutting Oil T = Dry, Air			
Material Main Groups	Material Sub Groups					Cutting Speed $v_c = \text{m/min}$			Cat.-No. DIN 371 DIN 376/374
							Coated	Coolant	
<b>1. Steels</b>	1.1.	Unalloyed Steels; $RM \leq 800 \text{ N/mm}^2$				20 - 30	Ö/E		
	1.2.	Unalloyed and Alloyed Steels; $RM \leq 1000 \text{ N/mm}^2$				20 - 30	Ö/E		
	1.3.1	Unalloyed and Alloyed Steels; $RM \leq 1200 \text{ N/mm}^2$					Ö/E		
	1.3.2.	Unalloyed and Alloyed Steels; $RM \geq 1200 \text{ N/mm}^2$							
	1.3.3.	Hardened Steels; 42 - 50 HRC							
	1.4.	Stainless Steels (V2A-Steels)				10 - 20	Ö/E		
	1.5	Stainless Steels with high Chromium-Nickel-Content (V4A-Steels)				10 - 20	Ö/E		
	1.6.	High Temperature Stainless Steels (V2A- and V4A-Steels)				10 - 20	Ö/E		
	1.7.	High Speed Steels							
<b>2. Cast Iron</b>	2.2.	Grey Cast Iron (GG)							
	2.3.	Nodular and Malleable Cast Iron (GGG, GT)				20 - 30	Ö/E		
	2.4.	Vermicular Cast Iron (GGV, GJV, CGI)							
<b>3. Nonferrous Metals</b>	3.1.	Aluminium, Copper, Copper Alloys				30 - 40	Ö/E		
	3.2.1.	Aluminium Alloys, Copper Alloys				30 - 40	Ö/E		
	3.2.2.	Special Aluminium Alloys				30 - 40	Ö/E		
	3.3	Copper Alloys, Short Chipping							
<b>4. Special Alloys</b>	4.1.	Nickel Alloys							
	4.2.	Titanium Alloys							
	4.3.	Cu-Al-Fe-Alloys							
<b>5. Plastics</b>	5.1.	Thermoplastics							
	5.2.	Thermosetting Plastics and Fibre Reinforced Plastics							

Roll Taps



## Neoboss Coatings

### Advantages:

- improved thread quality
- precise accuracy to gauge
- increased cutting speed
- extended tool life

### TiN

TiN-coated Neoboss taps can be used universally.

### TiCN

Due to its high hardness and favourable viscosity TiCN-coating is recommended for difficult chipping and hard materials.

### TiAlN

Its extreme hardness and gliding quality guarantees high wear resistance against abrasive materials such as cast iron and Aluminium alloys. Its high ductility as well as thermal and chemical stability is extremely well suited for dry cutting and high speed cutting.

### CrN

This chrome nitride-coating with its high adhesive strength and excellent chemical durability is extremely well suited for thread rolling in Aluminium.

### DLC

With its high wear resistance and slight adhesion on nonferrous metals DLC-coating is perfectly recommended for cutting Aluminium and Aluminium alloys.

Micro Hard. (HV 0,05)

2300

3000

3300

1750

2800

Colour of Coating

gold

blue-grey

purple - dark grey

silver-grey

black

Application

universal

difficult chipping materials

abrasive material; dry cutting / MKS

Rolling of Aluminium

Aluminium, Aluminium alloys

## Recommendation of Tools with Internal Cooling System (KSS)

### Taps with Internal Cooling:

All machine taps size M5 and above are available with Internal Cooling System (KSS)

### Advantages of KSS:

- excellent cooling and lubrication
- improved removal of chips
- high quality of thread surface
- increased cutting speed
- higher tool life

Blind Holes: KSS axial

Designation:

**KA**




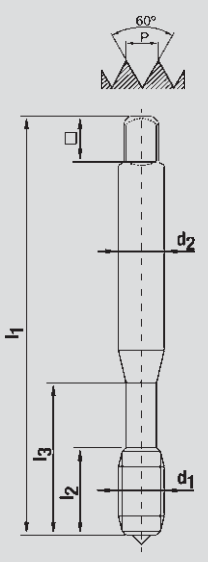

Through Holes: KSS radial


Designation:

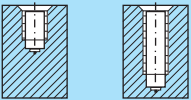
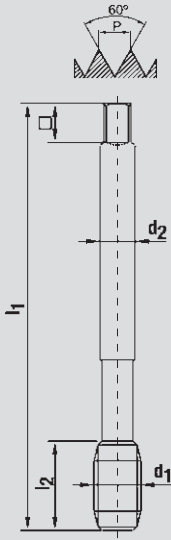

**KR**








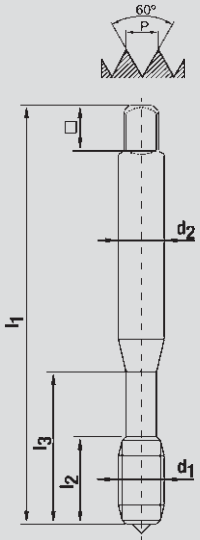



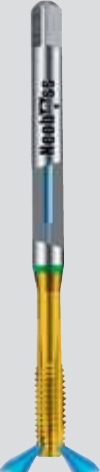
<b>Contents</b>	<b>Page</b>
<b>Metric ISO Standard Thread DIN 13</b>	
Machine Taps DIN 371 / 376	20 - 70
Machine Taps DIN 371 / 376 with Internal Cooling	20 - 70
Roll Taps	60 - 62
Roll Taps with Internal Cooling	60 - 62
Machine Taps for Dry Cutting / MKS	63 - 65
Machine Taps for Dry Cutting / MKS with Internal Cooling	63 - 65
Machine Taps with extra long shank	69 - 70
Hand Taps HSS DIN 352	71
Hand Taps HSSE DIN 352	72
Short Machine Taps DIN 352	73
Short Machine Taps for turning centers	74
Combined Spiral-Machine Taps	75
Nut Taps DIN 357	76


<b>Version</b>	Straight Flute, Form B, with spiral point, 4 - 5 threads chamfer Available as Set in a plastic box. Content M3 - M12 Single taps also available
<b>Type of Hole</b>	
<b>Surface Treatment</b>	TiN-Coating
<b>Catalogue-No.</b>	<b>3070</b>
<b>Tolerance</b>	ISO 2-6H
	
<b>Application</b> add. see Page 10, 11	UNiversal Use in a Broad Material Range
<b>Coolant</b>	see Page 10
<b>Cutting Speed <math>v_c</math></b>	see Page 10

d1	P (mm)	l1	l2	l3	d2	□	
M 3	0,5	56	10	18	3,5	2,7	2,50
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1,0	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50
M 12	1,75	110	22		9	7	10,20



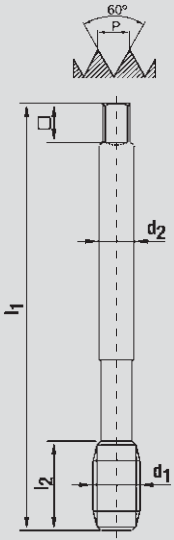
<b>Version</b>	▶	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer Available as Set in a plastic box. Content M3 - M12 Single taps also available
<b>Type of Hole</b>	▶	
<b>Surface Treatment</b>	▶	TiN-Coating
<b>Catalogue-No.</b>	▶	<b>3080</b>
<b>Tolerance</b>	▶	ISO 2-6H
		
<b>Application</b>	▶	UNIversal Use in a Broad Material Range add. see Page 10, 11
<b>Coolant</b>	▶	see Page 10
<b>Cutting Speed <math>v_c</math></b>	▶	see Page 10


d1	P (mm)	l1	l2	l3	d2	□	
M 3	0,5	56	7	18	3,5	2,7	2,50
M 4	0,7	63	8	21	4,5	3,4	3,30
M 5	0,8	70	10	25	6	4,9	4,20
M 6	1,0	80	12	30	6	4,9	5,00
M 8	1,25	90	15	35	8	6,2	6,80
M 10	1,5	100	18	39	10	8	8,50
M 12	1,75	110	18		9	7	10,20

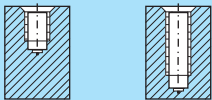
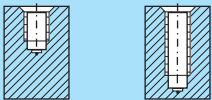
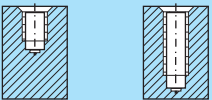
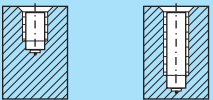
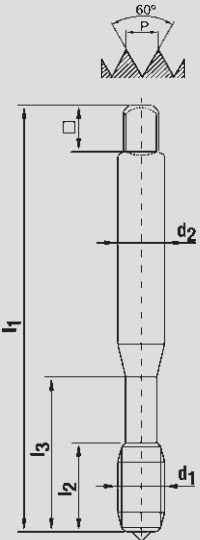
<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer, KR = Radial Internal Cooling · Size M8 and up
<b>Type of Hole</b>				
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>7265/80</b>	<b>7265/80</b>	<b>7265/80</b>	<b>B7265/80</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G	7G	ISO 2-6H
	Rapid-UNI	Rapid-UNI	Rapid-UNI	Rapid-UNI with KR
				
<b>Application</b>	UNiversal Use for a Broad Material Range			
add. see Page 10, 11				
<b>Coolant</b>	see Page 10			
<b>Cutting Speed v<sub>c</sub></b>	see Page 10			


d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
M 2	0,4	45	8		2,8	2,1	1,60
M 2,5	0,45	50	9		2,8	2,1	2,05
M 3	0,5	56	10	18	3,5	2,7	2,50
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50

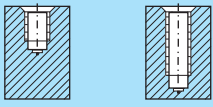
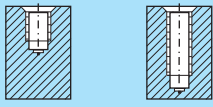
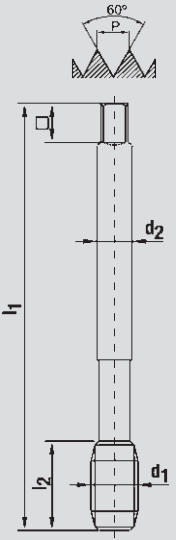





<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4-5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4-5 Threads Chamfer, KR = Radial Internal Cooling Size M8 and up
<b>Type of Hole</b>		
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>7275/80</b>	<b>B7275/80</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Rapid-UNI	Rapid-UNI with KR
<b>Application</b>	UNIversal Use for a Broad Range of Materials	
add. see Page 10, 11		
<b>Coolant</b>	see Page 10	
<b>Cutting Speed v<sub>c</sub></b>	see Page 10	





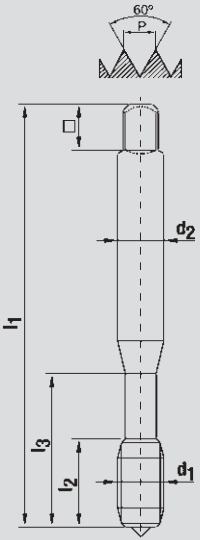




d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 6	1	80	16	4,5	3,4	5,00
M 8	1,25	90	18	6	4,9	6,80
M 10	1,5	100	20	7	5,5	8,50
M 12	1,75	110	22	9	7	10,20
M 14	2	110	24	11	9	12,00
M 16	2	110	26	12	9	14,00
M 20	2,5	140	30	16	12	17,50
M 24	3	160	36	18	14,5	21,00
M 27	3	160	36	20	16	24,00
M 30	3,5	180	40	22	18	26,50



<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer, KA = Axial Internal Coolant · Size M6 and up
<b>Type of Hole</b>				
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>4345/80</b>	<b>4345/80</b>	<b>4345/80</b>	<b>B4345/80</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G	7G	ISO 2-6H
	Grulo-UNI	Grulo-UNI	Grulo-UNI	Grulo-UNI with KA
<b>Application</b> add. see Page 10, 11	UNiversal Use in a Broad Material Range			
<b>Coolant</b>	see Page 10			
<b>Cutting Speed <math>v_c</math></b>	see Page 10			

$d_1$	P (mm)	$l_1$	$l_2$	$l_3$	$d_2$	□	
M 2	0,4	45	6	10	2,8	2,1	1,60
M 2,5	0,45	50	6	12	2,8	2,1	2,05
M 3	0,5	56	7	18	3,5	2,7	2,50
M 4	0,7	63	8	21	4,5	3,4	3,30
M 5	0,8	70	10	25	6	4,9	4,20
M 6	1	80	12	30	6	4,9	5,00
M 8	1,25	90	15	35	8	6,2	6,80
M 10	1,5	100	18	39	10	8	8,50




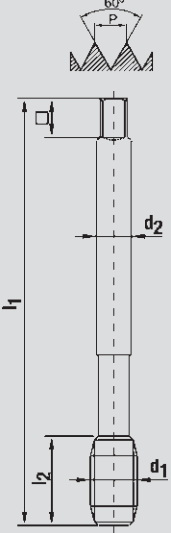



<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer, KA = Axial Internal Cooling Size M6 and up
<b>Type of Hole</b>		
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>6345/80</b>	<b>B6345/80</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Grulo-UNI 	Grulo-UNI with KA 
<b>Application</b> add. see Page 10, 11	UNiversal Use in a Broad Material Range	
<b>Coolant</b>	see Page 10	
<b>Cutting Speed <math>v_c</math></b>	see Page 10	



d1	P (mm)	l1	l2	d2	□	
M 6	1	80	12	4,5	3,4	5,00
M 8	1,25	90	15	6	4,9	6,80
M 10	1,5	100	18	7	5,5	8,50
M 12	1,75	110	18	9	7	10,20
M 14	2	110	20	11	9	12,00
M 16	2	110	20	12	9	14,00
M 20	2,5	140	25	16	12	17,50
M 24	3	160	30	18	14,5	21,00
M 27	3	160	30	20	16	24,00
M 30	3,5	180	35	22	18	26,50

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer		Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer		Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer		Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer, Left Hand Version	
<b>Type of Hole</b>								
<b>Surface Treatment</b>	Steam Tempered							
<b>Catalogue-No.</b>	<b>7010/78</b>		<b>7010</b>		<b>7010</b>		<b>7010/LH Left</b>	
<b>Tolerance</b>	ISO 2-6H		ISO 2-6H		ISO 3-6G		ISO 2-6H-LH	
	Rapid Vap.		Rapid		Rapid		Rapid-LH	
								
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$							
<b>Coolant</b>	Cutting Oil or Emulsion							
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min							

$d_1$	P (mm)	$l_1$	$l_2$	$l_3$	$d_2$	□		$d_1$	P (mm)	$l_1$	$l_2$	$l_3$	$d_2$	□	
M 2	0,4	45	8		2,8	2,1	1,60	M 4,5	0,75	70	14	25	6	4,9	3,70
M 2,2	0,45	45	9		2,8	2,1	1,75	M 5	0,8	70	14	25	6	4,9	4,20
(M 2,3)	0,4	45	9		2,8	2,1	1,90	M 6	1	80	16	30	6	4,9	5,00
M 2,5	0,45	50	9		2,8	2,1	2,05	M 7	1	80	16	30	7	5,5	6,00
(M 2,6)	0,45	50	9		2,8	2,1	2,15	M 8	1,25	90	18	35	8	6,2	6,80
M 3	0,5	56	10	18	3,5	2,7	2,50	M 9	1,25	90	18	35	9	7	7,80
M 3,5	0,6	56	10	20	4	3	2,90	M 10	1,5	100	20	39	10	8	8,50
M 4	0,7	63	12	21	4,5	3,4	3,30								

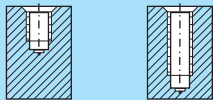
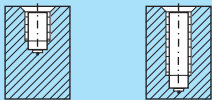
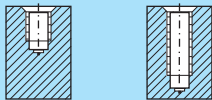
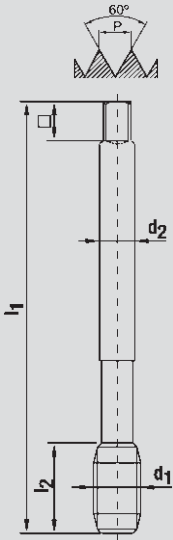
( ) DIN Profile not ISO



<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Steam Tempered		
<b>Catalogue-No.</b>	<b>7011/78</b>	<b>7011</b>	<b>7011</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 3-6G
	Rapid Vap.	Rapid	Rapid
			
<b>Application</b> add. see Page 10, 11	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min		

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 3	0,5	56	10	2,2		2,50	M 20	2,5	140	30	16	12	17,50
M 3,5	0,6	56	11	2,5	2,1	2,90	M 22	2,5	140	30	18	14,5	19,50
M 4	0,7	63	12	2,8	2,1	3,30	M 24	3	160	36	18	14,5	21,00
M 5	0,8	70	14	3,5	2,7	4,20	M 27	3	160	36	20	16	24,00
M 6	1	80	16	4,5	3,4	5,00	M 30	3,5	180	40	22	18	26,50
M 7	1	80	16	5,5	4,3	6,00	M 33	3,5	180	40	25	20	29,50
M 8	1,25	90	18	6	4,9	6,80	M 36	4	200	45	28	22	32,00
M 9	1,25	90	18	7	5,5	7,80							
M 10	1,5	100	20	7	5,5	8,50							
M 11	1,5	100	20	8	6,2	9,50							
M 12	1,75	110	22	9	7	10,20							
M 14	2	110	24	11	9	12,00							
M 16	2	110	26	12	9	14,00							
M 18	2,5	125	30	14	11	15,50							

Version	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer		Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer		Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer		Ca. 40° Left Hand Spiral, Form C, 2 - 3 Threads Chamfer Left Hand Version								
Type of Hole															
Surface Treatment	Steam Tempered														
Catalogue-No.	4040/78		4040		4040		4040/LH Left								
Tolerance	ISO 2-6H		ISO 2-6H		ISO 3-6G		ISO 2-6H-LH								
	Grulo Vap.		Grulo		Grulo		Grulo-LH								
Application	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>														
Coolant	Cutting Oil or Emulsion														
Cutting Speed v <sub>c</sub>	10 - 20 m/min														
d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
M 1,4	0,3	40	7		2,5	2,1	1,10	M 3,5	0,6	56	7	20	4	3	2,90
M 1,6	0,35	40	8		2,5	2,1	1,25	M 4	0,7	63	8	21	4,5	3,4	3,30
(M 1,7)	0,35	40	8		2,5	2,1	1,35	M 5	0,8	70	10	25	6	4,9	4,20
M 2	0,4	45	6	10	2,8	2,1	1,60	M 6	1	80	12	30	6	4,9	5,00
M 2,2	0,45	45	6	10	2,8	2,1	1,75	M 7	1	80	12	30	7	5,5	6,00
(M 2,3)	0,4	45	6	10	2,8	2,1	1,90	M 8	1,25	90	15	35	8	6,2	6,80
M 2,5	0,45	50	6	12	2,8	2,1	2,05	M 9	1,25	90	15	35	9	7	7,80
(M 2,6)	0,45	50	6	12	2,8	2,1	2,15	M 10	1,5	100	18	39	10	8	8,50
M 3	0,5	56	7	18	3,5	2,7	2,50								

( ) DIN Profile not ISO

<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Steam Tempered		
<b>Catalogue-No.</b>	<b>6040/78</b>	<b>6040</b>	<b>6040</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 3-6G
	Grulo Vap.	Grulo	Grulo
<b>Application</b> add. see Page 10, 11	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min		


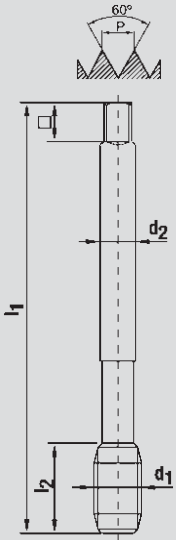

d1	P (mm)	l1	l2	d2	□		d1	P (mm)	l1	l2	d2	□	
M 3	0,5	56	7	2,2		2,50	M 22	2,5	140	25	18	14,5	19,50
M 4	0,7	63	8	2,8	2,1	3,30	M 24	3	160	30	18	14,5	21,00
M 5	0,8	70	10	3,5	2,7	4,20	M 27	3	160	30	20	16	24,00
M 6	1	80	12	4,5	3,4	5,00	M 30	3,5	180	35	22	18	26,50
M 7	1	80	12	5,5	4,3	6,00	M 33	3,5	180	40	25	20	29,50
M 8	1,25	90	15	6	4,9	6,80	M 36	4	200	45	28	22	32,00
M 9	1,25	90	15	7	5,5	7,80							
M 10	1,5	100	18	7	5,5	8,50							
M 11	1,5	100	18	8	6,2	9,50							
M 12	1,75	110	18	9	7	10,20							
M 14	2	110	20	11	9	12,00							
M 16	2	110	20	12	9	14,00							
M 18	2,5	125	25	14	11	15,50							
M 20	2,5	140	25	16	12	17,50							


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4-5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>7265</b>	<b>7265</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G
	Rapid-VA-G 	Rapid-VA-G 
<b>Application</b> add. see Page 12, 13	Aluminium Alloys, Copper Alloys	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 30 m/min	

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
M 1	0,25	40	5,5		2,5	2,1	0,75	M 3	0,5	56	10	18	3,5	2,7	2,50
M 1,4	0,3	40	7		2,5	2,1	1,10	M 3,5	0,6	56	10	20	4	3	2,90
M 1,6	0,35	40	8		2,5	2,1	1,25	M 4	0,7	63	12	21	4,5	3,4	3,30
(M 1,7)	0,35	40	8		2,5	2,1	1,35	M 5	0,8	70	14	25	6	4,9	4,20
M 2	0,4	45	8		2,8	2,1	1,60	M 6	1	80	16	30	6	4,9	5,00
M 2,2	0,45	45	9		2,8	2,1	1,75	M 7	1	80	16	30	7	5,5	6,00
(M 2,3)	0,4	45	9		2,8	2,1	1,90	M 8	1,25	90	18	35	8	6,2	6,80
M 2,5	0,45	50	9		2,8	2,1	2,05	M 10	1,5	100	20	39	10	8	8,50
(M 2,6)	0,45	50	9		2,8	2,1	2,15								

( ) DIN Profile not ISO



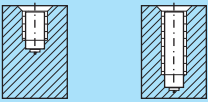
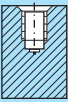
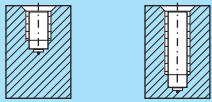
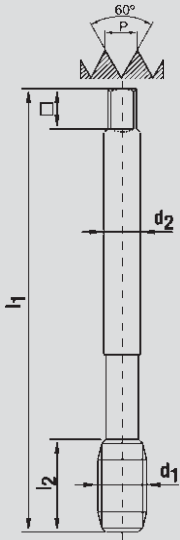



<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>7275</b>	
<b>Tolerance</b>	ISO 2-6H	
	Rapid-VA-G 	
<b>Application</b> add. see Page 12, 13	Aluminium Alloys, Copper Alloys	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 30 m/min	


$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 4	0,7	63	12	2,8	2,1	3,30
M 5	0,8	70	14	3,5	2,7	4,20
M 6	1	80	16	4,5	3,4	5,00
M 8	1,25	90	18	6	4,9	6,80
M 10	1,5	100	20	7	5,5	8,50
M 12	1,75	110	22	9	7	10,20
M 14	2	110	24	11	9	12,00
M 16	2	110	26	12	9	14,00
M 18	2,5	125	30	14	11	15,50
M 20	2,5	140	30	16	12	17,50
M 22	2,5	140	30	18	14,5	19,50
M 24	3	160	36	18	14,5	21,00
M 27	3	160	36	20	16	24,00
M 30	3,5	180	40	22	18	26,50

<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form E, 1,5 - 2 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>				
<b>Catalogue-No.</b>	<b>4345</b>	<b>4345</b>	<b>4255</b>	<b>4341</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G	ISO 2-6H	ISO 2-6H
	Grulo-Spez.-G	Grulo-Spez.-G	RSP-Spez.-G	Grulo-Spez.-G
<b>Application</b> add. see Page 12, 13	Aluminium Alloys, Copper Alloys			
<b>Coolant</b>	Cutting Oil or Emulsion			
<b>Cutting Speed. v<sub>c</sub></b>	10 - 30 m/min			


d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
M 1,4	0,3	40	7		2,5	2,1	1,10	M 3,5	0,6	56	7	20	4	3	2,90
M 1,6	0,35	40	8		2,5	2,1	1,25	M 4	0,7	63	8	21	4,5	3,4	3,30
(M 1,7)	0,35	40	8		2,5	2,1	1,35	M 5	0,8	70	10	25	6	4,9	4,20
M 1,8	0,35	40	8		2,5	2,1	1,45	M 6	1	80	12	30	6	4,9	5,00
M 2	0,4	45	6	10	2,8	2,1	1,60	M 7	1	80	12	30	7	5,5	6,00
M 2,5	0,45	50	6	12	2,8	2,1	2,05	M 8	1,25	90	15	35	8	6,2	6,80
(M 2,6)	0,45	50	6	12	2,8	2,1	2,15	M 10	1,5	100	18	39	10	8	8,50
M 3	0,5	56	7	18	3,5	2,7	2,50								

( ) DIN Profile not ISO


<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form E, 1,5 - 2 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>			
<b>Catalogue-No.</b>	<b>6345</b>	<b>6055</b>	<b>6341</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 2-6H
	Grulo-Spez.-G	RSP-Spez.-G	Grulo-Spez.-G
			
<b>Application</b> add. see Page 12, 13	Aluminium Alloys, Copper Alloys		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed <math>v_c</math></b>	10 - 30 m/min		

d1	P (mm)	l1	l2	d2	□	
M 4	0,7	63	8	2,8	2,1	3,30
M 5	0,8	70	10	3,5	2,7	4,20
M 6	1	80	12	4,5	3,4	5,00
M 8	1,25	90	15	6	4,9	6,80
M 10	1,5	100	18	7	5,5	8,50
M 12	1,75	110	18	9	7	10,20
M 14	2	110	20	11	9	12,00
M 16	2	110	20	12	9	14,00
M 18	2,5	125	25	14	11	15,50
M 20	2,5	140	25	16	12	17,50
M 22	2,5	140	25	18	14,5	19,50
M 24	3	160	30	18	14,5	21,00
M 27	3	160	30	20	16	24,00
M 30	3,5	180	35	22	18	26,50

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Nitrided	Nitrided	TiN-Coating
<b>Catalogue-No.</b>	<b>7045/06</b>	<b>7045/06</b>	<b>7045/80</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G	ISO 2-6H
	Rapid-Spez.	Rapid-Spez.	Rapid-Spez. TiN
			
<b>Application</b> add. see Page 14, 15	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1000 \text{ N/mm}^2$		
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Emulsion
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min		20 - 50 m/min

$d_1$	P (mm)	$l_1$	$l_2$	$l_3$	$d_2$	□	
M 2	0,4	45	8		2,8	2,1	1,60
M 2,5	0,45	50	9		2,8	2,1	2,05
(M 2,6)	0,45	50	9		2,8	2,1	2,15
M 3	0,5	56	10	18	3,5	2,7	2,50
M 3,5	0,6	56	10	20	4	3	2,90
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50
()							
() DIN Profile not ISO							



<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	Nitrided	TiN-Coating
<b>Catalogue-No.</b>	<b>7055/06</b>	<b>7055/80</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Rapid-Spez.	Rapid-Spez. TiN
		
<b>Application</b> add. see Page 14, 15	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1000 \text{ N/mm}^2$	
<b>Coolant</b>	Cutting Oil or Emulsion	Cutting Oil or Emulsion
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min	20 - 50 m/min

$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 4	0,7	63	12	2,8	2,1	3,30
M 5	0,8	70	14	3,5	2,7	4,20
M 6	1	80	16	4,5	3,4	5,00
M 8	1,25	90	18	6	4,9	6,80
M 10	1,5	100	20	7	5,5	8,50
M 12	1,75	110	22	9	7	10,20
M 14	2	110	24	11	9	12,00
M 16	2	110	26	12	9	14,00
M 20	2,5	140	30	16	12	17,50
M 24	3	160	36	18	14,5	21,00
M 30	3,5	180	40	22	18	26,50


<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer		Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer		Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer		Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	
<b>Type of Hole</b>								
<b>Surface Treatment</b>					Steam Tempered		TiN-Coating	
<b>Catalogue-No.</b>	4045		4045		4045/78		4045/80	
<b>Tolerance</b>	ISO 2-6H		ISO 3-6G		ISO 2-6H		ISO 2-6H	
	Grulo-Spez.		Grulo-Spez.		Grulo-Spez. Vap.		Grulo-Spez. TiN	
<b>Application</b> add. see Page 14, 15	Unalloyed and Alloyed Steels; Tensile Strength ≤ 1000 N/mm <sup>2</sup>							
<b>Coolant</b>	Cutting Oil or Emulsion						Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min						20 - 50 m/min	

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
M 2	0,4	45	6	10	2,8	2,1	1,60
M 2,5	0,45	50	6	12	2,8	2,1	2,05
(M 2,6)	0,45	50	6	12	2,8	2,1	2,15
M 3	0,5	56	7	18	3,5	2,7	2,50
M 3,5	0,6	56	7	20	4	3	2,90
M 4	0,7	63	8	21	4,5	3,4	3,30
M 5	0,8	70	10	25	6	4,9	4,20
M 6	1	80	12	30	6	4,9	5,00
M 8	1,25	90	15	35	8	6,2	6,80
M 10	1,5	100	18	39	10	8	8,50
() DIN Profile not ISO							

<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>		Steam Tempered	TiN-Coating
<b>Catalogue-No.</b>	<b>6045</b>	<b>6045/78</b>	<b>6045/80</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 2-6H
	Grulo-Spez.	Grulo-Spez. Vap.	Grulo-Spez. TiN
			
<b>Application</b> add. see Page 14, 15	Unalloyed and Alloyed Steels; Tensile Strength ≤ 1000 N/mm <sup>2</sup>		
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Emulsion
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min		20 - 50 m/min

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 3	0,5	56	7	2,2		2,50	M 16	2	110	20	12	9	14,00
M 4	0,7	63	8	2,8	2,1	3,30	M 18	2,5	125	25	14	11	15,50
M 5	0,8	70	10	3,5	2,7	4,20	M 20	2,5	140	25	16	12	17,50
M 6	1	80	12	4,5	3,4	5,00	M 22	2,5	140	25	18	14,5	19,50
M 8	1,25	90	15	6	4,9	6,80	M 24	3	160	30	18	14,5	21,00
M 10	1,5	100	18	7	5,5	8,50	M 27	3	160	30	20	16	24,00
M 12	1,75	110	18	9	7	10,20	M 30	3,5	180	35	22	18	26,50
M 14	2	110	20	11	9	12,00							


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Nitrided	Nitrided	TiCN-Coating
<b>Catalogue-No.</b>	<b>7245/06</b>	<b>7245/06</b>	<b>7245/81</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G	ISO 2-6H
	Rapid-Spez.-R	Rapid-Spez.-R	Rapid-Spez.-R TiCN
			
<b>Application</b> add. see Page 12, 13	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1200 \text{ N/mm}^2$		Unalloyed and Alloyed Steels; Tensile Strength $\leq 1400 \text{ N/mm}^2$
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Special Cutting Oil
<b>Cutting Speed <math>v_c</math></b>	3 - 10 m/min		3 - 10 m/min

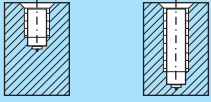
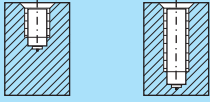


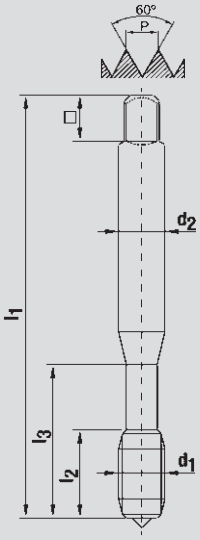




d1	P (mm)	l1	l2	l3	d2	□	
M 2	0,4	45	8		2,8	2,1	1,60
M 2,2	0,45	45	9		2,8	2,1	1,75
(M 2,3)	0,4	45	9		2,8	2,1	1,90
M 2,5	0,45	50	9		2,8	2,1	2,05
(M 2,6)	0,45	50	9		2,8	2,1	2,15
M 3	0,5	56	10	18	3,5	2,7	2,50
M 3,5	0,6	56	10	20	4	3	2,90
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M10	1,5	100	20	39	10	8	8,50


( ) DIN Profile not ISO




<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	Nitrided	TiCN-Coating
<b>Catalogue-No.</b>	<b>7255/06</b>	<b>7255/81</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Rapid Spez.-R	Rapid-Spez.-R TiCN
		
<b>Application</b> add. see Page 12, 13	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1200 \text{ N/mm}^2$	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1400 \text{ N/mm}^2$
<b>Coolant</b>	Cutting Oil or Emulsion	Cutting Oil or Special Cutting Oil
<b>Cutting Speed <math>v_c</math></b>	3 - 10 m/min	5 - 20 m/min

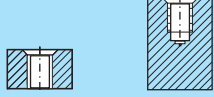
$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 4	0,7	63	12	2,8	2,1	3,30
M 5	0,8	70	14	3,5	2,7	4,20
M 6	1	80	16	4,5	3,4	5,00
M 8	1,25	90	18	6	4,9	6,80
M 10	1,5	100	20	7	5,5	8,50
M 12	1,75	110	22	9	7	10,20
M 14	2	110	24	11	9	12,00
M 16	2	110	26	12	9	14,00
M 18	2,5	125	30	14	11	15,50
M 20	2,5	140	30	16	12	17,50
M 22	2,5	140	30	18	14,5	19,50
M 24	3	160	36	18	14,5	21,00
M 27	3	160	36	20	16	24,00
M 30	3,5	180	40	22	18	26,50


<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>				TiCN-Coating
<b>Catalogue-No.</b>	<b>4245</b>	<b>4245</b>	<b>4235</b>	<b>4245/81</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G	ISO 2-6H	ISO 2-6H
	Grulo-Spez.-R	Grulo-Spez.-R	Rsp-Spez.-R	Grulo-Spez.-R TiCN
				
<b>Application</b> add. see Page 12, 13	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1200 \text{ N/mm}^2$			Unalloyed and Alloyed Steels; Tensile Strength $\leq 1400 \text{ N/mm}^2$
<b>Coolant</b>	Cutting Oil or Emulsion			Cutting Oil or Special Cutting Oil
<b>Cutting Speed. <math>v_c</math></b>	3 - 10 m/min			5 - 20 m/min

d1	P (mm)	l1	l2	l3	d2	□	
M 2	0,4	45	6		2,8	2,1	1,60
M 2,5	0,45	50	6		2,8	2,1	2,05
(M 2,6)	0,45	50	6		2,8	2,1	2,15
M 3	0,5	56	7	18	3,5	2,7	2,50
M 4	0,7	63	8	21	4,5	3,4	3,30
M 5	0,8	70	10	25	6	4,9	4,20
M 6	1	80	12	30	6	4,9	5,00
M 8	1,25	90	15	35	8	6,2	6,80
M 10	1,5	100	18	39	10	8	8,50
() DIN Profile not ISO							


<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>			TiCN-Coating
<b>Catalogue-No.</b>	<b>6245</b>	<b>6035</b>	<b>6245/81</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 2-6H
	Grulo-Spez.-R 	Rsp-Spez.-R 	Grulo-Spez.-R TiCN 
<b>Application</b> add. see Page 12, 13	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1200 \text{ N/mm}^2$		Unalloyed and Alloyed Steels; Tensile Strength $\leq 1400 \text{ N/mm}^2$
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Special Cutting Oil
<b>Cutting Speed <math>v_c</math></b>	3 - 10 m/min		5 - 20 m/min



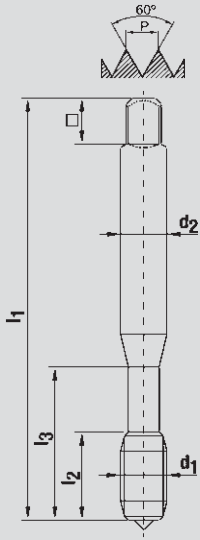

$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 4	0,7	63	8	2,8	2,1	3,30
M 5	0,8	70	10	3,5	2,7	4,20
M 6	1	80	12	4,5	3,4	5,00
M 8	1,25	90	15	6	4,9	6,80
M 10	1,5	100	18	7	5,5	8,50
M 12	1,75	110	18	9	7	10,20
M 14	2	110	20	11	9	12,00
M 16	2	110	20	12	9	14,00
M 18	2,5	125	25	14	11	15,50
M 20	2,5	140	25	16	12	17,50
M 22	2,5	140	25	18	14,5	19,50
M 24	3	160	30	18	14,5	21,00
M 27	3	160	30	20	16	24,00
M 30	3,5	180	35	22	18	26,50


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer with Interrupted Threads	Ca. 25° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form D, 3,5 - 5 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	TiCN-Coating	TiN-Coating	TiCN-Coating
<b>Catalogue-No.</b>	<b>7850/81</b>	<b>4890/80</b>	<b>4853/81</b>
<b>Tolerance</b>	6HX	6HX	6HX
	Rapid-S	Rsp-Spez.-S	D-PM
			
<b>Application</b> add. see Page 12, 13	Nickel Alloys, Heat-Treatable Steels ≤ 1600 N/mm <sup>2</sup>	Nickel Alloys, Heat-Treatable Steels ≤ 1400 N/mm <sup>2</sup>	Cu-Al-Fe-Alloys and Hardened Steels, 42 - 50 HRC 1300-1600 N/mm <sup>2</sup>
<b>Coolant</b>	Special Cutting Oil	Special Cutting Oil	Cutting Oil or Emulsion
<b>Cutting Speed v<sub>c</sub></b>	2 - 4 m/min	2 - 4 m/min	3 - 10 m/min


d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
M 2	0,4	45	8		2,8	2,1	1,60
M 2,2	0,45	45	9		2,8	2,1	1,75
M 2,5	0,45	50	9		2,8	2,1	2,05
M 3	0,5	56	10	18	3,5	2,7	2,50
M 3,5	0,6	56	10	20	4	3	2,90
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer, with Interrupted Threads	Ca. 25° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form D, 3,5 - 5 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	TiCN-Coating	TiN-Coating	TiCN-Coating
<b>Catalogue-No.</b>	<b>7880/81</b>	<b>6890/80</b>	<b>6853/81</b>
<b>Tolerance</b>	6HX	6HX	6HX
	Rapid-S	Rsp-Spez.-S	D-PM
			
<b>Application</b> add. see Page 12, 13	Nickel Alloys, Heat-Treatable Steels $\leq 1600 \text{ N/mm}^2$	Nickel Alloys, Heat-Treatable Steels $\leq 1400 \text{ N/mm}^2$	Cu-Al-Fe-Alloys, and Hardened Steels, 42 - 50 HRC $1300-1600 \text{ N/mm}^2$
<b>Coolant</b>	Special Cutting Oil	Special Cutting Oil	Cutting Oil or Emulsion
<b>Cutting Speed <math>v_c</math></b>	2 - 4 m/min	2 - 4 m/min	3 - 10 m/min

$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 12	1,75	110	22	9	7	10,20
M 14	2	110	24	11	9	12,00
M 16	2	110	26	12	9	14,00
M 20	2,5	140	30	16	12	17,50
M 24	3	160	36	18	14,5	21,00
M 30	3,5	180	40	22	18	26,50

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Steam Tempered	TiCN-Coating	Steam Tempered	TiCN-Coating
<b>Catalogue-No.</b>	<b>7365/78</b>	<b>7365/81</b>	<b>7225/78</b>	<b>7225/81</b>
<b>Tolerance</b>	6HX	6HX	6HX	6HX
	Rapid-VA-G	Rapid-VA-G TiCN	Rapid-V4A	Rapid-V4A TiCN
				
<b>Application</b> add. see Page 12, 13	Stainless Steels (V2A-Steels); High Temperature Stainless Steels (V2A- and V4A-Steels)		Stainless Steels with High Chromium-Nickel-Content (VA-Steels)	
<b>Coolant</b>	Cutting Oil or Emulsion	Cutting Oil or Emulsion	Cutting Oil or Emulsion	Cutting Oil or Emulsion
<b>Cutting Speed <math>v_c</math></b>	6 - 10 m/min	10 - 20 m/min	6 - 10 m/min	10 - 20 m/min

$d_1$	P (mm)	$l_1$	$l_2$	$l_3$	$d_2$	□	
M 2	0,4	45	8		2,8	2,1	1,60
M 2,5	0,45	50	9		2,8	2,1	2,05
M 3	0,5	56	10	18	3,5	2,7	2,50
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50

<b>Version</b>	Straight Flute, Form B, with Spiral Point 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point 4 - 5 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Steam Tempered	TiCN-Coating	Steam Tempered	TiCN-Coating
<b>Catalogue-No.</b>	<b>7375/78</b>	<b>7375/81</b>	<b>7235/78</b>	<b>7235/81</b>
<b>Tolerance</b>	6HX	6HX	6HX	6HX
	Rapid-VA-G	Rapid-VA-G TiCN	Rapid-V4A	Rapid-V4A TiCN
				
<b>Application</b> add. see Page 12, 13	Stainless Steels (V2A-Steels); High Temperature Stainless Steels (V2A- and V4A-Steels)		Stainless Steels with High Chromium-Nickel-Content (V4A-Steels)	
<b>Coolant</b>	Cutting Oil or Emulsion	Cutting Oil or Emulsion	Cutting Oil or Emulsion	Cutting Oil or Emulsion
<b>Cutting Speed <math>v_c</math></b>	6 - 10 m/min	10 - 20 m/min	6 - 10 m/min	10 - 20 m/min


$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 4	0,7	63	12	2,8	2,1	3,30
M 5	0,8	70	14	3,5	2,7	4,20
M 6	1	80	16	4,5	3,4	5,00
M 8	1,25	90	18	6	4,9	6,80
M 10	1,5	100	20	7	5,5	8,50
M 12	1,75	110	22	9	7	10,20
M 14	2	110	24	11	9	12,00
M 16	2	110	26	12	9	14,00
M 20	2,5	140	30	16	12	17,50
M 24	3	160	36	18	14,5	21,00
M 30	3,5	180	40	22	18	26,50

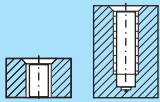
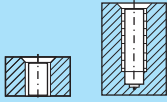
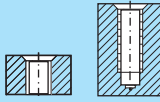
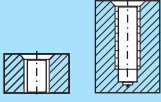
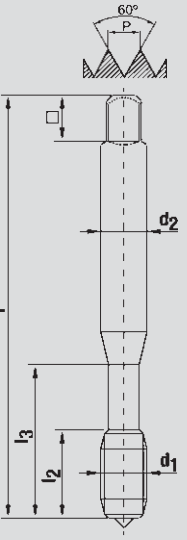
<b>Version</b>	Ca. 40° Right Hand Spiral Form C, 2 - 3 Threads Chamfer		Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer		Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer		Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	
<b>Type of Hole</b>								
<b>Surface Treatment</b>	Steam Tempered		TiCN-Coating		Steam Tempered		TiCN-Coating	
<b>Catalogue-No.</b>	4445/78		4445/81		4365/78		4365/81	
<b>Tolerance</b>	6HX		6HX		6HX		6HX	
	Grulo-Spez.-G		Grulo-Spez.-G TiCN		Grulo-V4A		Grulo-V4A TiCN	
<b>Application</b> add. see Pages 12, 13	Stainless Steels (V2A-Steels); High Temperature Stainless Steels (V2A- und V4A-Steels)				Stainless Steels with High Chromium-Nickel-Content (VA-Steels)			
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Emulsion		Cutting Oil or Emulsion		Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	6 - 10 m/min		10 - 20 m/min		6 - 10 m/min		10 - 20 m/min	


d1	P (mm)	l1	l2	l3	d2	□	
M 2	0,4	45	6	10	2,8	2,1	1,60
M 2,5	0,45	50	6	12	2,8	2,1	2,05
M 3	0,5	56	7	18	3,5	2,7	2,50
M 4	0,7	63	8	21	4,5	3,4	3,30
M 5	0,8	70	10	25	6	4,9	4,20
M 6	1	80	12	30	6	4,9	5,00
M 8	1,25	90	15	35	8	6,2	6,80
M 10	1,5	100	18	39	10	8	8,50

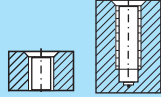
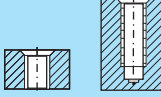
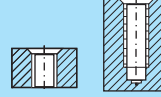
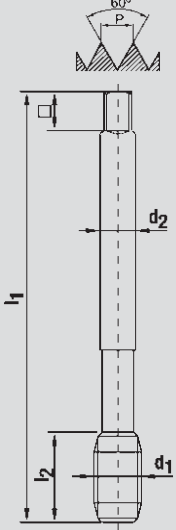



<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Steam Tempered	TiCN-Coating	Steam Tempered	TiCN-Coating
<b>Catalogue-No.</b>	<b>6445/78</b>	<b>6445/81</b>	<b>6365/78</b>	<b>6365/81</b>
<b>Tolerance</b>	6HX	6HX	6HX	6HX
	Grulo-Spez.-G	Grulo-Spez.-G TiCN	Grulo-V4A	Grulo-V4A TiCN
<b>Application</b> add. see Page 12, 13	Stainless Steels (V2A-Steels); High Temperature Stainless Steels (V2A- and V4A-Steels)		Stainless Steels with High Chromium-Nickel-Content (VA-Steels)	
<b>Coolant</b>	Cutting Oil or Emulsion	Cutting Oil or Emulsion	Cutting Oil or Emulsion	Cutting Oil or Emulsion
<b>Cutting Speed <math>v_c</math></b>	6 - 10 m/min	10 - 20 m/min	6 - 10 m/min	10 - 20 m/min



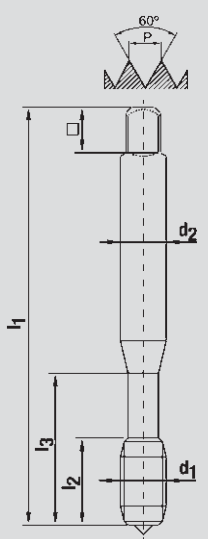


<b>d1</b>	<b>P (mm)</b>	<b>l1</b>	<b>l2</b>	<b>d2</b>	□	
M 4	0,7	63	8	2,8	2,1	3,30
M 5	0,8	70	10	3,5	2,7	4,20
M 6	1	80	12	4,5	3,4	5,00
M 8	1,25	90	15	6	4,9	6,80
M 10	1,5	100	18	7	5,5	8,50
M 12	1,75	110	18	9	7	10,20
M 14	2	110	20	11	9	12,00
M 16	2	110	20	12	9	14,00
M 20	2,5	140	25	16	12	17,50
M 24	3	160	30	18	14,5	21,00
M 30	3,5	180	35	22	18	26,50


<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer, KA = Axial Internal Cooling Size M6 and up	Straight Flute, Form E, 1,5 - 2 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Nitrided	TiAlN-Coating	TiAlN-Coating	TiAlN-Coating
<b>Catalogue-No.</b>	<b>4058/06</b>	<b>4358/70</b>	<b>B4358/70</b>	<b>4359/70</b>
<b>Tolerance</b>	6HX	6HX	6HX	6HX
	C-GG	C-GG TM	C-GG TM with KA	E-GG TM
<b>Application</b> add. see Page 10, 11	Grey Cast Iron	Grey Cast Iron; Nodular Cast Iron; Malleable Cast Iron; Vermicular Cast Iron		
<b>Coolant</b>	Cutting Oil	Dry, Air or Emulsion		
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min	20 - 50 m/min		



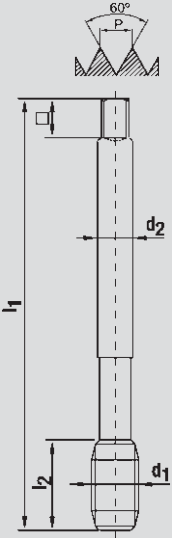


d1	P (mm)	l1	l2	l3	d2	□	
M 2	0,4	45	8		2,8	2,1	1,60
M 2,5	0,45	50	9		2,8	2,1	2,05
M 3	0,5	56	10	18	3,5	2,7	2,50
M 3,5	0,6	56	10	20	4	3	2,90
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 7	1	80	16	30	7	5,5	6,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50


<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2- 3 Threads Chamfer, KA = Axial Internal Cooling Size M8 and up
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Nitrided	TiAlN-Coating	TiAlN-Coating
<b>Catalogue-No.</b>	<b>6008/06</b>	<b>6308/70</b>	<b>B6308/70</b>
<b>Tolerance</b>	6HX	6HX	6HX
	C-GG	C-GG TM	C-GG TM with KA
<b>Application</b> add. see Page 10, 11	Grey Cast Iron	Grey Cast Iron; Nodular Cast Iron; Malleable Cast Iron, Vermicular Cast Iron	
<b>Coolant</b>	Cutting Oil	Dry, Air or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min	20 - 50 m/min	

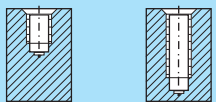
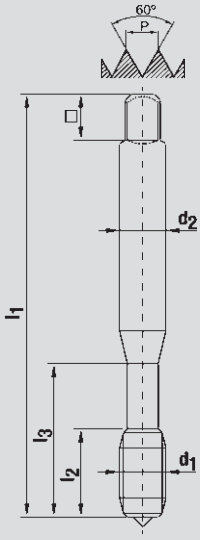

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 4	0,7	63	12	2,8	2,1	3,30
M 5	0,8	70	14	3,5	2,7	4,20
M 6	1	80	16	4,5	3,4	5,00
M 8	1,25	90	18	6	4,9	6,80
M 10	1,5	100	20	7	5,5	8,50
M 12	1,75	110	22	9	7	10,20
M 14	2	110	24	11	9	12,00
M 16	2	110	26	12	9	14,00
M 18	2,5	125	30	14	11	15,50
M 20	2,5	140	30	16	12	17,50
M 22	2,5	140	30	18	14,5	19,50
M 24	3	160	36	18	14,5	21,00
M 30	3,5	180	40	22	18	26,50


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer with Interrupted Threads
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>7410</b>	<b>7410/08</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Rapid-Al	Rapid-Al a. Z.
		
<b>Application</b> add. see Page 14, 15	Aluminium, Copper, Copper Alloys	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 30 m/min	

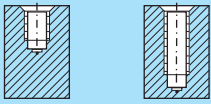
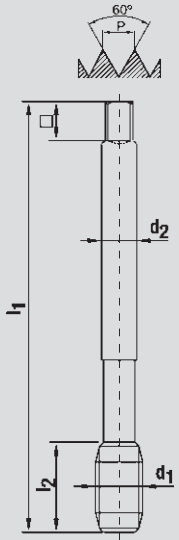

d1	P (mm)	l1	l2	l3	d2	□	
M 2	0,4	45	8		2,8	2,1	1,60
M 2,5	0,45	50	9		2,8	2,1	2,05
M 3	0,5	56	10	18	3,5	2,7	2,50
M 3,5	0,6	56	10	20	4	3	2,90
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer, with Interrupted Threads
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>7411</b>	<b>7411/08</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Rapid-Al	Rapid-Al a. Z.
		
<b>Application</b> add. see Page 14, 15	Aluminium, Copper, Copper Alloys	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 30 m/min	



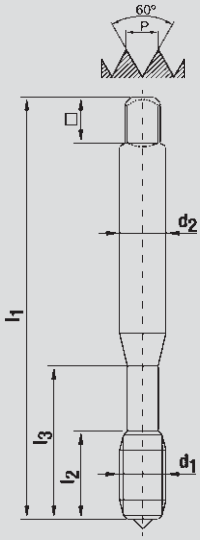


$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 6	1	80	16	4,5	3,4	5,00
M 8	1,25	90	18	6	4,9	6,80
M 10	1,5	100	20	7	5,5	8,50
M 12	1,75	110	22	9	7	10,20
M 14	2	110	24	11	9	12,00
M 16	2	110	26	12	9	14,00
M 18	2,5	125	30	14	11	15,50
M 20	2,5	140	30	16	12	17,50


<b>Version</b>	▶	Ca. 45° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>	▶	
<b>Surface Treatment</b>	▶	
<b>Catalogue-No.</b>	▶	<b>4044</b>
<b>Tolerance</b>	▶	ISO 2-6H
		Grulo-Alu 
<b>Application</b>		Aluminium, Copper, Copper Alloys add. see Page 14, 15
<b>Coolant</b>	▶	Cutting Oil or Emulsion
<b>Cutting Speed v<sub>c</sub></b>	▶	10 - 30 m/min

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
M 2	0,4	45	6	10	2,8	2,1	1,60
M 2,5	0,45	50	6	12	2,8	2,1	2,05
M 3	0,5	56	7	18	3,5	2,7	2,50
M 3,5	0,6	56	7	20	4	3	2,90
M 4	0,7	63	8	21	4,5	3,4	3,30
M 5	0,8	70	10	25	6	4,9	4,20
M 6	1	80	12	30	6	4,9	5,00
M 7	1	80	12	30	7	5,5	6,00
M 8	1,25	90	15	35	8	6,2	6,80
M 10	1,5	100	18	39	10	8	8,50



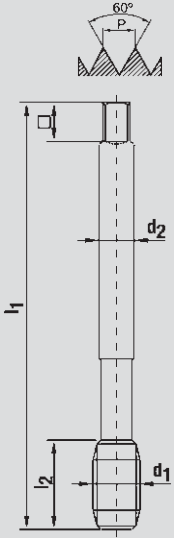


<b>Version</b>	Ca. 45° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>	
<b>Surface Treatment</b>	
<b>Catalogue-No.</b>	<b>6044</b>
<b>Tolerance</b>	ISO 2-6H
	Grulo-Alu 
<b>Application</b> add. see Page 14, 15	Aluminium, Copper, Copper Alloys
<b>Coolant</b>	Cutting Oil or Emulsion
<b>Cutting Speed <math>v_c</math></b>	10 - 30 m/min


$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 6	1	80	12	4,5	3,4	5,00
M 8	1,25	90	15	6	4,9	6,80
M 10	1,5	100	18	7	5,5	8,50
M 12	1,75	110	18	9	7	10,20
M 14	2	110	20	11	9	12,00
M 16	2	110	20	12	9	14,00
M 20	2,5	140	25	16	12	17,50

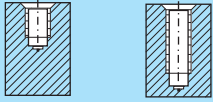
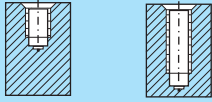


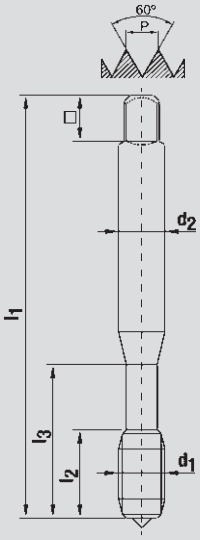
<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer, KR = Radial Internal Cooling Size M8 and up
<b>Type of Hole</b>		
<b>Surface Treatment</b>	DLC-Coating	DLC-Coating
<b>Catalogue-No.</b>	<b>7450/77</b>	<b>B7450/77</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Rapid-Alutop 	Rapid-Alutop with KR 
<b>Application</b> add. see Page 14, 15	Aluminium Alloys, Copper Alloys	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	20 - 50 m/min	


d1	P (mm)	l1	l2	l3	d2	□	
M 2	0,4	45	8		2,8	2,1	1,60
M 2,5	0,45	50	9		2,8	2,1	2,05
M 3	0,5	56	10	18	3,5	2,7	2,50
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50



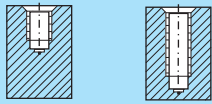
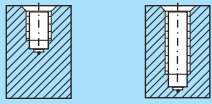
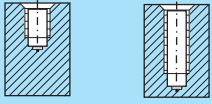
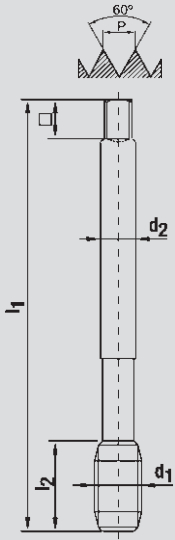
<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer, KR = Radial Internal Cooling Size M8 and up
<b>Type of Hole</b>		
<b>Surface Treatment</b>	DLC-Coating	DLC-Coating
<b>Catalogue-No.</b>	<b>7451/77</b>	<b>B7451/77</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Rapid-Alutop 	Rapid-Alutop with KR 
<b>Application</b> add. see Page 14, 15	Aluminium Alloys, Copper Alloys	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	20 - 50 m/min	


$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 6	1	80	16	4,5	3,4	5,00
M 8	1,25	90	18	6	4,9	6,80
M 10	1,5	100	20	7	5,5	8,50
M 12	1,75	110	22	9	7	10,20
M 14	2	110	24	11	9	12,00
M 16	2	110	26	12	9	14,00
M 18	2,5	125	30	14	11	15,50
M 20	2,5	140	30	16	12	17,50

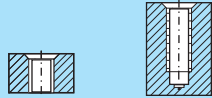
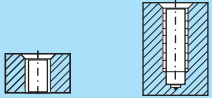
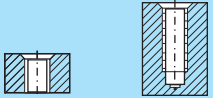
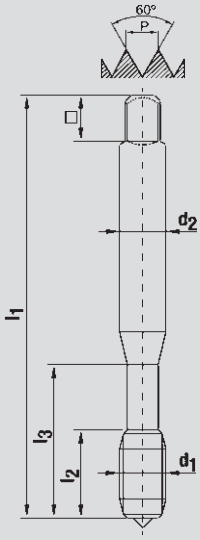



<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer, KA = Axial Internal Cooling · Size M6 and up	Ca. 40° Right Hand Spiral, Form E, 1,5 - 2 Threads Chamfer	Ca. 40° Right Hand Spiral, Form E, 1,5 - 2 Threads Chamfer, KA = Axial Internal Cooling · Size M6 and up
<b>Type of Hole</b>				
<b>Surface Treatment</b>	DLC-Coating	DLC-Coating	DLC-Coating	DLC-Coating
<b>Catalogue-No.</b>	<b>4350/77</b>	<b>B4350/77</b>	<b>4351/77</b>	<b>B4351/77</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 2-6H	ISO 2-6H
	Grulo-Alutop	Grulo-Alutop with KA	Grulo-Alutop	Grulo-Alutop with KA
<b>Application</b> add. see Page 14, 15	Aluminium Alloys, Copper Alloys			
<b>Coolant</b>	Cutting Oil or Emulsion			
<b>Cutting Speed v<sub>c</sub></b>	20 - 50 m/min			


d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
(M 1,7)	0,35	40	8		2,5	2,1	1,35
M 2	0,4	45	6	10	2,8	2,1	1,60
M 2,5	0,45	50	6	12	2,8	2,1	2,05
(M 2,6)	0,45	50	6	12	2,8	2,1	2,15
M 3	0,5	56	7	18	3,5	2,7	2,50
M 3,5	0,6	56	7	20	4	3	2,90
M 4	0,7	63	8	21	4,5	3,4	3,30
M 5	0,8	70	10	25	6	4,9	4,20
M 6	1	80	12	30	6	4,9	5,00
M 8	1,25	90	15	35	8	6,2	6,80
M 10	1,5	100	18	39	10	8	8,50

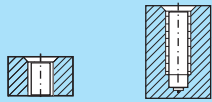
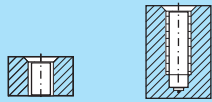
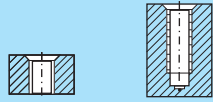
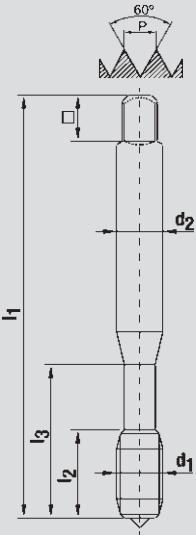



( ) DIN Profile not ISO


<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer, KA = Axial Internal Cooling Size M6 and up	Ca. 40° Right Hand Spiral, Form E, 1,5 - 2 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	DLC-Coating	DLC-Coating	DLC-Coating
<b>Catalogue-No.</b>	<b>6350/77</b>	<b>B6350/77</b>	<b>6351/77</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 2-6H
	Grulo-Alutop	Grulo-Alutop with KA	Grulo-Alutop
<b>Application</b> add. see Page 14, 15	Aluminium Alloys, Copper Alloys		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed v<sub>c</sub></b>	20 - 50 m/min		

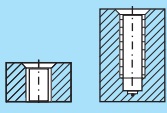
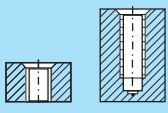
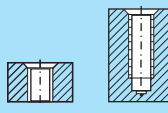

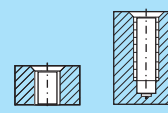
d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 6	1	80	12	4,5	3,4	5,00
M 8	1,25	90	15	6	4,9	6,80
M 10	1,5	100	18	7	5,5	8,50
M 12	1,75	110	18	9	7	10,20
M 14	2	110	20	11	9	12,00
M 16	2	110	20	12	9	14,00
M 18	2,5	125	25	14	11	15,50
M 20	2,5	140	25	16	12	17,50

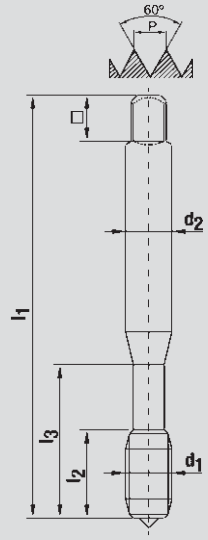
<b>Version</b>	3 Straight Flutes, Form C, 2 - 3 Threads Chamfer	2 Straight Flutes, Form C, 2 - 3 Threads Chamfer	2 Straight Flutes, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>			
<b>Catalogue-No.</b>	4057	4057/92	4057/92
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 3-6G
	C-Ms	C-Ms	C-Ms
			
<b>Application</b>	Copper Alloys, Short Chipping		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed <math>v_c</math></b>	10 - 30 m/min		


d1	P (mm)	l1	l2	l3	d2	□	
M 2	0,4	45	8		2,8	2,1	1,60
M 2,5	0,45	50	9		2,8	2,1	2,05
M 3	0,5	56	10	18	3,5	2,7	2,50
M 3,5	0,6	56	10	20	4	3	2,90
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50

<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer, with Interrupted Threads HSSE	Straight Flute, Form C, 2 - 3 Threads Chamfer, with Interrupted Threads PM	Straight Flute, Form C, 2 - 3 Threads Chamfer, with Interrupted Threads PM
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Nitrided	Steam Tempered	Steam Tempered
<b>Catalogue-No.</b>	<b>4056/06</b>	<b>4880/78</b>	<b>6880/78</b>
<b>Tolerance</b>	6HX	6HX	6HX
	C-Bak	C-VA-S-Ti	C-VA-S-Ti
			
<b>Application</b>	Thermosetting Plastics and Fibre Reinforced Plastics	Titanium Alloys	
<b>Coolant</b>	Dry, Air	Special Cutting Oil	
<b>Cutting Speed <math>v_c</math></b>	10 - 15 m/min	4 - 6 m/min	

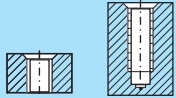
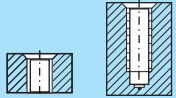
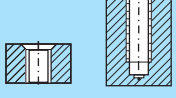
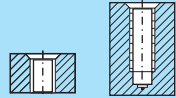
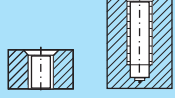





$d_1$	P (mm)	$l_1$	$l_2$	$l_3$	$d_2$	□	
M 3	0,5	56	10	18	3,5	2,7	2,50
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50
M 12	1,75	110	22		9	7	10,20
M 16	2	110	26		12	9	14,00
M 20	2,5	140	30		16	12	17,50

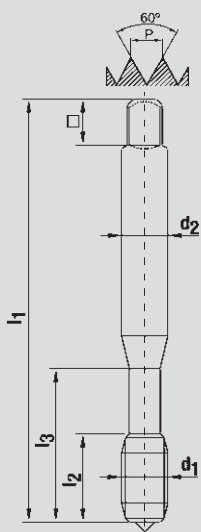
Version	Form C, 2-3 Threads Chamfer, from M 5 with Oil Flutes	Form C, 2-3 Threads Chamfer, from M 5 with Oil Flutes, KA = Axial Internal Cooling · Size M6 and up	Form C, 2-3 Threads Chamfer, from M 5 with Oil Flutes	Form D, 3,5-5 Threads Chamfer, from M 5 with Oil Flutes	Form C, 2-3 Threads Chamfer, from M 5 with Oil Flutes
Type of Hole					
Surface Treatment	TiN-Coating	TiN-Coating	TiN-Coating	TiN-Coating	CrN-Coating
Catalogue-No.	4060/80	B4060/80	4061/80	4063/80	4064/79
Tolerance	6HX	6HX	6GX	6HX	6HX
Application	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>				Aluminium Alloys, Copper Alloys
Coolant	Cutting Oil or Emulsion				Cutting Oil or Emulsion
Cutting Speed v <sub>c</sub>	20 - 30 m/min				30 - 40 m/min




d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	 *
M 3	0,5	56	10	18	3,5	2,7	2,80
M 4	0,7	63	12	21	4,5	3,4	3,70
M 5	0,8	70	14	25	6	4,9	4,65
M 6	1	80	16	30	6	4,9	5,55
M 8	1,25	90	18	35	8	6,2	7,40
M 10	1,5	100	20	39	10	8	9,30

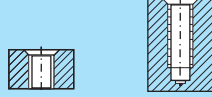
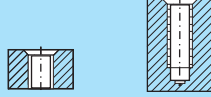
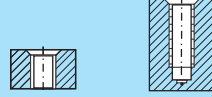




\* The recommended core hole diameters are for reference purpose only.

Version	Form E, 1,5-2 Threads Chamfer, from M 5 with Oil Flutes	Form F, 1-1,5 Threads Chamfer, from M 5 with Oil Flutes	Form C, 2-3 Threads Chamfer, from M 5 with Oil Flutes	Form C, 2-3 Threads Chamfer, from M 5 with Oil Flutes	Form E, 1,5-2 Threads Chamfer, from M 5 with Oil Flutes
Type of Hole					
Surface Treatment	TiN-Coating	TiN-Coating	TiN-Coating	TiCN-Coating	TiCN-Coating
Catalogue-No.	<b>4065/80</b>	<b>4067/80</b>	<b>4076/80</b>	<b>4069/81</b>	<b>4072/81</b>
Tolerance	6HX	6HX	6HX	6HX	6HX
	Formex TiN	Formex TiN	Formex TiN	Formex TiCN	Formex TiCN
					
Application	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1200 \text{ N/mm}^2$		Unalloyed and Alloyed Steels; Tensile Strength $\leq 1200 \text{ N/mm}^2$		Stainless Steels (V2A- and V4A-Steels)
Coolant	Cutting Oil or Emulsion		Cutting Oil		Cutting Oil or Emulsion
Cutting Speed $v_c$	20 - 30 m/min		20 - 30 m/min		10 - 20 m/min



$d_1$	P (mm)	$l_1$	$l_2$	$l_3$	$d_2$	
M 3	0,5	56	10	18	3,5	2,80
M 4	0,7	63	12	21	4,5	3,70
M 5	0,8	70	14	25	6	4,65
M 6	1	80	16	30	6	5,55
M 8	1,25	90	18	35	8	7,40
M 10	1,5	100	20	39	10	9,30

\* The recommended core hole diameters are for reference purpose only.

Version	Form C, 2 - 3 Threads Chamfer, with Oil Flutes		Form C, 2 - 3 Threads Chamfer, with Oil Flutes, KA = Axial Internal Cooling		Form C, 2 - 3 Threads Chamfer, with Oil Flutes	
Type of Hole						
Surface Treatment	TiN-Coating		TiN-Coating		CrN-Coating	
Catalogue-No.	6060/80		B6060/80		6064/79	
Tolerance	6HX		6HX		6HX	
Application	Formex TiN		Formex TiN with KA		Formex CrN	
						
Application	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>				Aluminium Alloys, Copper Alloys	
Coolant	Cutting Oil or Emulsion				Cutting Oil or Emulsion	
Cutting Speed v <sub>c</sub>	20 - 30 m/min				30 - 40 m/min	
d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	 *
M 12	1,75	110	22	9	7	11,20
M 16	2	110	26	12	9	15,10
M 20	2,5	140	30	16	12	18,90
* The recommended core hole diameters are for reference purpose only.						



<b>Version</b>	Straight Flute Form B, 4 - 5 Threads Chamfer, MKS and Dry	Straight Flute Form B, 4 - 5 Threads Chamfer, MKS with KR = Radial Internal Cooling Size M8 and up	Straight Flute, Form B, 4 - 5 Threads Chamfer, MKS and Dry
<b>Type of Hole</b>			
<b>Surface Treatment</b>	TiAlN-Coating	TiAlN-Coating	TiAlN-Coating
<b>Catalogue-No.</b>	<b>7270/70</b>	<b>B7270/70</b>	<b>7271/70</b>
<b>Tolerance</b>	6HX	6HX	6HX
	Rapid TM 	Rapid TM with KR 	Rapid TM 

#### Application and Cutting Speed in Dry Cutting / MKS

##### Dry Cutting / MKS:

For further details refer to Page 158

	Dry	MKS = Minim. Lubrication Syst.
Unalloyed Steels; Tensile Strength $\leq 1000 \text{ N/mm}^2$	$v_c = 10 - 20 \text{ m/min}$	$v_c = 20 - 50 \text{ m/min}$
Nodular- and Malleable Cast Iron	$v_c = 15 - 30 \text{ m/min}$	$v_c = 20 - 50 \text{ m/min}$
add. see Page 10, 11		

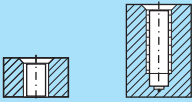
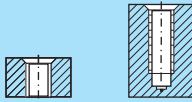
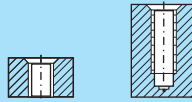
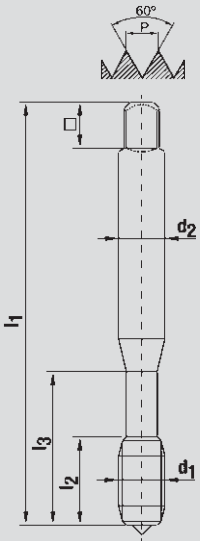



$d_1$	P (mm)	$l_1$	$l_2$	$l_3$	$d_2$	□	
M 3	0,5	56	10	18	3,5	2,7	2,50
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50
M 12	1,75	110	22		9	7	10,20
M 16	2	110	26		12	9	14,00

<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer, MKS and Dry	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer, MKS with KA = Axial Internal Cooling Size M6 and up	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer, MKS and Dry
<b>Type of Hole</b>			
<b>Surface Treatment</b>	TiAlN-Coating	TiAlN-Coating	TiAlN-Coating
<b>Catalogue-No.</b>	<b>4340/70</b>	<b>B4340/70</b>	<b>6340/70</b>
<b>Tolerance</b>	6HX	6HX	6HX
	Grulo TM	Grulo TM with KA	Grulo TM

### Application and Cutting Speed in Dry Cutting / MKS


<b>Dry Cutting / MKS:</b> <b>For further details refer to Page 158</b>		Dry	MKS = Minim. Lubrication Syst.
	Unalloyed Steels; Tensile Strength $\leq 1000 \text{ N/mm}^2$	$v_c = 10 - 20 \text{ m/min}$	$v_c = 20 - 50 \text{ m/min}$
	Nodular- and Malleable Cast Iron	$v_c = 15 - 30 \text{ m/min}$	$v_c = 20 - 50 \text{ m/min}$
	add. see Page 10, 11		

$d_1$	P (mm)	$l_1$	$l_2$	$l_3$	$d_2$	□	
M 3	0,5	56	7	18	3,5	2,7	2,50
M 4	0,7	63	8	21	4,5	3,4	3,30
M 5	0,8	70	10	25	6	4,9	4,20
M 6	1	80	12	30	6	4,9	5,00
M 8	1,25	90	15	35	8	6,2	6,80
M 10	1,5	100	18	39	10	8	8,50
M 12	1,75	110	18		9	7	10,20
M 16	2	110	20		12	9	14,00

<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer, MKS and Dry	Straight Flute, Form C, 2 - 3 Threads Chamfer, MKS with KA = Axial Internal Cooling Size M6 and up	Straight Flute, Form C, 2 - 3 Threads Chamfer, MKS and Dry
<b>Type of Hole</b>			
<b>Surface Treatment</b>	TiAlN-Coating	TiAlN-Coating	TiAlN-Coating
<b>Catalogue-No.</b>	<b>4358/70</b>	<b>B4358/70</b>	<b>6308/70</b>
<b>Tolerance</b>	6HX	6HX	6HX
	C-GG TM 	C-GG TM with KA 	C-GG TM 

#### Application and Cutting Speed in Dry Cutting / MKS


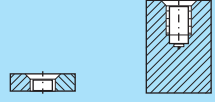
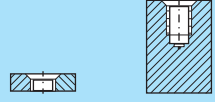
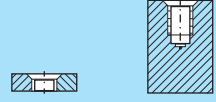
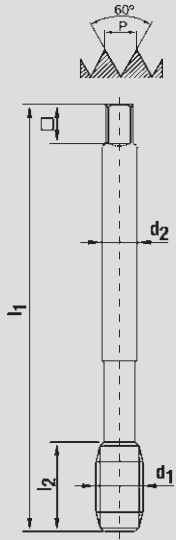
<b>Dry Cutting / MKS:</b> <b>For further details refer to Page 158</b>		Dry	MKS = Minim. Lubrication Syst.
	Grey-, Nodular- and Malleable Cast Iron	$v_c = 15 - 30 \text{ m/min}$	$v_c = 20 - 50 \text{ m/min}$
	add. see Page 10, 11		



$d_1$	P (mm)	$l_1$	$l_2$	$l_3$	$d_2$	□	
M 3	0,5	56	10	18	3,5	2,7	2,50
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 8	1,25	90	18	35	8	6,2	6,80
M 10	1,5	100	20	39	10	8	8,50
M 12	1,75	110	22		9	7	10,20
M 16	2	110	26		12	9	14,00

<b>Version</b>	Straight Flute, Form A, 5 - 6 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute Form C, 2 - 3 Threads Chamfer, Left Hand Version
<b>Type of Hole</b>				
<b>Surface Treatment</b>				
<b>Catalogue-No.</b>	<b>4050</b>	<b>4052</b>	<b>4052</b>	<b>4052/LH Left</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 3-6G	ISO 2-6H-LH
	A	C	C	C-LH
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$			
<b>Coolant</b>	Cutting Oil or Emulsion			
<b>Cutting Speed <math>v_c</math></b>	15 - 20 m/min			

d1	P (mm)	l1	l2	l3	d2	□		d1	P (mm)	l1	l2	l3	d2	□	
M 1	0,25	40	5,5		2,5	2,1	0,75	M 4	0,7	63	12	21	4,5	3,4	3,30
M 1,1	0,25	40	5,5		2,5	2,1	0,85	M 4,5	0,75	70	14	25	6	4,9	3,70
M 1,2	0,25	40	5,5		2,5	2,1	0,95	M 5	0,8	70	14	25	6	4,9	4,20
M 1,4	0,3	40	7		2,5	2,1	1,10	M 6	1	80	16	30	6	4,9	5,00
M 1,6	0,35	40	8		2,5	2,1	1,25	M 7	1	80	16	30	7	5,5	6,00
(M 1,7)	0,35	40	8		2,5	2,1	1,35	M 8	1,25	90	18	35	8	6,2	6,80
M 1,8	0,35	40	8		2,5	2,1	1,45	M 9	1,25	90	18	35	9	7	7,80
M 2	0,4	45	8		2,8	2,1	1,60	M 10	1,5	100	20	39	10	8	8,50
M 2,2	0,45	45	9		2,8	2,1	1,75								
(M 2,3)	0,4	45	9		2,8	2,1	1,90								
M 2,5	0,45	50	9		2,8	2,1	2,05								
(M 2,6)	0,45	50	9		2,8	2,1	2,15								
M 3	0,5	56	10	18	3,5	2,7	2,50								
M 3,5	0,6	56	10	20	4	3	2,90								

( ) DIN Profile not ISO

<b>Version</b>	Straight Flute, Form A, 5 - 6 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer, Left Hand Version
<b>Type of Hole</b>				
<b>Surface Treatment</b>				
<b>Catalogue-No.</b>	<b>6000</b>	<b>6002</b>	<b>6002</b>	<b>6002/LH Left</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 3-6G	ISO 2-6H-LH
	A	C	C	C-LH
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>			
<b>Coolant</b>	Cutting Oil or Emulsion			
<b>Cutting Speed v<sub>c</sub></b>	15 - 20 m/min			

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 3	0,5	56	10	2,2		2,50	M 20	2,5	140	30	16	12	17,50
M 3,5	0,6	56	11	2,5	2,1	2,90	M 22	2,5	140	30	18	14,5	19,50
M 4	0,7	63	12	2,8	2,1	3,30	M 24	3	160	36	18	14,5	21,00
M 5	0,8	70	14	3,5	2,7	4,20	M 27	3	160	36	20	16	24,00
M 6	1	80	16	4,5	3,4	5,00	M 30	3,5	180	40	22	18	26,50
M 7	1	80	16	5,5	4,3	6,00	M 33	3,5	180	40	25	20	29,50
M 8	1,25	90	18	6	4,9	6,80	M 36	4	200	45	28	22	32,00
M 9	1,25	90	18	7	5,5	7,80	M 39	4	200	45	32	24	35,00
M 10	1,5	100	20	7	5,5	8,50	M 42	4,5	200	50	32	24	37,50
M 11	1,5	100	20	8	6,2	9,50	M 45	4,5	220	50	36	29	40,50
M 12	1,75	110	22	9	7	10,20	M 48	5	250	56	36	29	43,00
M 14	2	110	24	11	9	12,00	M 52	5	250	56	40	32	47,00
M 16	2	110	26	12	9	14,00							
M 18	2,5	125	30	14	11	15,50							

<b>Version</b>	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>4230</b>	<b>6030</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Rsp 	Rsp 
<b>Application</b> add. see Page 10, 11	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min	

d1	P (mm)	l1	l2	l3	d2	□	
M 3	0,5	56	10	18	3,5	2,7	2,50
M 3,5	0,6	56	10	20	4	3	2,90
M 4	0,7	63	12	21	4,5	3,4	3,30
M 5	0,8	70	14	25	6	4,9	4,20
M 6	1	80	16	30	6	4,9	5,00
M 7	1	80	16	30	7	5,5	6,00
M 8	1,25	90	18	35	8	6,2	6,80
M 9	1,25	90	18	35	9	7	7,80
M 10	1,5	100	20	39	10	8	7,80
( ) DIN Profile not ISO							

d1	P (mm)	l1	l2	d2	□	
M 6	1	80	16	4,5	3,4	5,00
M 8	1,25	90	18	6	4,9	6,80
M 10	1,5	100	20	7	5,5	8,50
M 12	1,75	110	22	9	7	10,20
M 14	2	110	24	11	9	12,00
M 16	2	110	26	12	9	14,00
M 18	2,5	125	30	14	11	15,50
M 20	2,5	140	30	16	12	17,50
M 22	2,5	140	30	18	14,5	19,50
M 24	3	160	36	18	14,5	21,00
M 27	3	160	36	20	16	24,00
M 30	3,5	180	40	22	18	26,50

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer, Total Length ≈ 2 x DIN 371	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer, Total Length ≈ 2 x DIN 371	Straight Flute, Form C, 2 - 3 Threads Chamfer, Total Length ≈ 2 x DIN 371
<b>Type of Hole</b>			
<b>Surface Treatment</b>			Nitrided
<b>Catalogue-No.</b>	<b>4071</b>	<b>4430</b>	<b>4158/06</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	6HX
	Rapid	Grulo	C-GG
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>		Grey Cast Iron
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min		10 - 20 m/min

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
M 4	0,7	125	12	21	4,5	3,4	3,30
M 5	0,8	140	14	25	6	4,9	4,20
M 6	1	160	16	30	6	4,9	5,00

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer, Total Length ≈ 2 x DIN 376	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer, Total Length ≈ 2 x DIN 376	Straight Flute, Form C, 2 - 3 Threads Chamfer Total Length ≈ 2 x DIN 376
<b>Type of Hole</b>			
<b>Surface Treatment</b>			Nitrided
<b>Catalogue-No.</b>	<b>6071</b>	<b>6130</b>	<b>6108/06</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	6HX
	Rapid	Grulo	C-GG
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>		Grey Cast Iron
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min		10 - 20 m/min

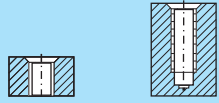
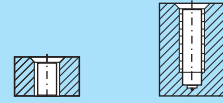
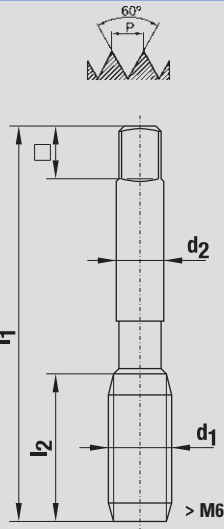




d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 8	1,25	180	18	6	4,9	6,80
M 10	1,5	200	20	7	5,5	8,50
M 12	1,75	220	22	9	7	10,20
M 14	2	220	24	11	9	12,00
M 16	2	220	26	12	9	14,00





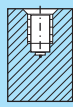
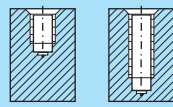
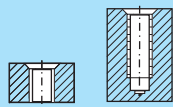






<b>Version</b>	Neoboss Graduation *No. 3 in ISO 2-6H		Neoboss Graduation *No. 3 in ISO 2-6H-LH Left Hand Version	
<b>Type of Hole</b>				
<b>Surface Treatment</b>				
<b>Catalogue-No.</b>	2000	2000	2000/LH Left	2000/LH Left
<b>Tolerance</b>	ISO 2-6H		ISO 2-6H-LH	
	Complete Set	V à3 M à3 F à3*	Complete Set	V à3 M à3 F à3*
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>			


d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 1	0,25	32	5,5		2,5	2,1	0,75	M 10	1,5	70	23	7	5,5	8,50
M 1,1	0,25	32	5,5		2,5	2,1	0,85	M 11	1,5	70	23	8	6,2	9,50
M 1,2	0,25	32	5,5		2,5	2,1	0,95	M 12	1,75	75	28	9	7	10,20
M 1,4	0,3	32	7		2,5	2,1	1,10	M 14	2	80	30	11	9	12,00
M 1,6	0,35	32	8		2,5	2,1	1,25	M 16	2	80	30	12	9	14,00
(M 1,7)	0,35	32	8		2,5	2,1	1,35	M 18	2,5	95	35	14	11	15,50
M 1,8	0,35	32	8		2,5	2,1	1,45	M 20	2,5	95	34	16	12	17,50
M 2	0,4	36	8		2,8	2,1	1,60	M 22	2,5	100	34	18	14,5	19,50
M 2,2	0,45	36	9		2,8	2,1	1,75	M 24	3	110	38	18	14,5	21,00
(M 2,3)	0,4	36	9		2,8	2,1	1,90	M 27	3	110	38	20	16	24,00
M 2,5	0,45	40	9		2,8	2,1	2,05	M 30	3,5	125	40	22	18	26,50
(M 2,6)	0,45	40	9		2,8	2,1	2,15	M 33	3,5	125	40	25	20	29,50
M 3	0,5	41,5	12,2		3,5	2,7	2,50	M 36	4	150	45	28	22	32,00
M 3,5	0,6	45	14		4	3	2,90	M 39	4	150	50	32	24	35,00
M 4	0,7	46,4	14		4,5	3,4	3,30	M 42	4,5	150	50	32	24	37,50
M 4,5	0,75	50	16		6	4,9	3,70	M 45	4,5	160	50	36	29	40,50
M 5	0,8	50	16		6	4,9	4,20	M 48	5	180	56	36	29	43,00
M 6	1	52,5	18		6	4,9	5,00	M 52	5	180	56	40	32	47,00
M 7	1	50	18		6	4,9	6,00							
M 8	1,25	63	18		6	4,9	6,80							
M 9	1,25	63	18		7	5,5	7,80							

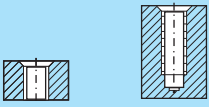
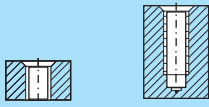
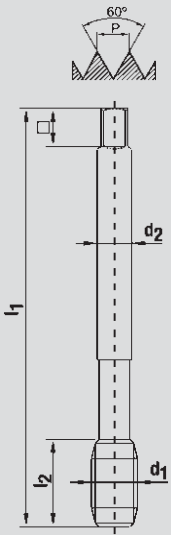


( ) DIN Profile not ISO


<b>Version</b>	Neoboss Graduation Taper with Pilot *No. 3 in ISO 2-6H		Neoboss Graduation Taper with Pilot *No. 3 in Tolerance 6HX	
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Nitrided		Nitrided	
<b>Catalogue-No.</b>	2005/06	2005/06	2006/06	2006/06
<b>Tolerance</b>	ISO 2-6H		6HX	
	Complete Set	V à3 M à3 F à3*	Complete Set	V à3 M à3 F à3*
				
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 1000 N/mm <sup>2</sup>		Unalloyed and Alloyed Steels; Tensile Strength ≤ 1200 N/mm <sup>2</sup>	


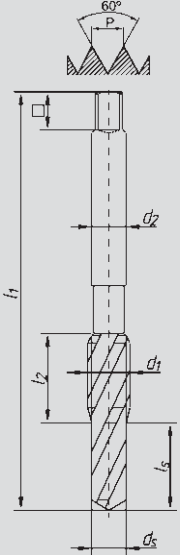

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 3	0,5	41,5	12,2	3,5	2,7	2,50
M 4	0,7	46,4	14	4,5	3,4	3,30
M 5	0,8	50	16	6	4,9	4,20
M 6	1	52,5	18	6	4,9	5,00
M 8	1,25	63	18	6	4,9	6,80
M 10	1,5	70	23	7	5,5	8,50
M 12	1,75	75	28	9	7	10,20
M 14	2	80	30	11	9	12,00
M 16	2	80	30	12	9	14,00
M 20	2,5	95	34	16	12	17,50

Version	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer, with Interrupted Threads
Type of Hole					
Surface Treatment				Nitrided	
Catalogue-No.	2010	2030	2040	2008/06	2010/08
Tolerance	ISO 2-6H	ISO 2-6H	ISO 2-6H	6HX	ISO 2-6H
	B	Rsp	Grulo	C-GG	B-a.Z.
					
Application	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>			Grey Cast Iron	Aluminium, Copper, Copper Alloys
Coolant	Cutting Oil or Emulsion			Cutting Oil	Cutting Oil or Emulsion
Cutting Speed v <sub>c</sub>	10 - 20 m/min			10 - 15 m/min	20 - 40 m/min


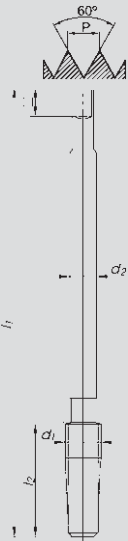


d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
M 3	0,5	40	11	18	3,5	2,7	2,50
M 4	0,7	45	13	21	4,5	3,4	3,30
M 5	0,8	50	16	24	6	4,9	4,20
M 6	1	56	18	27	6	4,9	5,00
M 8	1,25	63	18		6	4,9	6,80
M 10	1,5	70	23		7	5,5	8,50
M 12	1,75	75	28		9	7	10,20

<b>Version</b>	2-Flutes, Form C, 2 - 3 Threads Chamfer	2-Flutes, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>4920</b>	<b>4920</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G
	C-Ms	C-Ms
		
<b>Application</b>	Copper Alloys, Short Chipping	
<b>Coolant</b>	Dry, Air or Cutting Oil	
<b>Cutting Speed <math>v_c</math></b>	20 - 30 m/min	




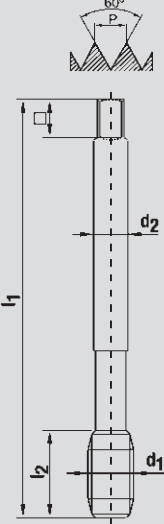



$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 2,5	0,45	41	8	2,8	1,8	2,05
(M 2,6)	0,45	41	8	2,8	1,8	2,15
M 3	0,5	41	9	3	2,1	2,50
M 3,5	0,6	49	10	3,5	2,4	2,90
M 4	0,7	49	12	4	2,7	3,30
M 5	0,8	56	15	5	3,4	4,20
M 6	1	62	17	6	4	5,00
( ) DIN Profile not ISO						


<b>Version</b>	▶ Neobosscom is a combined Spiral-Machine Tap, Core Hole and Thread are produced with Neobosscom in one Operation without Tool Change. Form C, 2 - 3 Threads Chamfer	
<b>Type of Hole</b>	▶ 	
<b>Surface Treatment</b>	▶	
<b>Catalogue-No.</b>	▶ <b>4659</b>	
<b>Tolerance</b>	▶ ISO 2-6H	
	▶ 	
	▶ 	
<b>Application</b>	▶ Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$	
<b>Coolant</b>	▶ Cutting Oil or Emulsion	

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>s</sub>	d <sub>2</sub>	d <sub>s</sub>	□
M 3	0,5	62	12,5	9	3,5	2,55	2,7
M 3,5	0,6	66	16	10	4	2,95	3
M 4	0,7	66	16	10	4,5	3,36	3,4
M 5	0,8	76	18	12,5	6	4,26	4,9
M 6	1	81	20	14	6	5,05	4,9
M 8	1,25	93	12	20	6	6,80	4,9
M 10	1,5	99	14	22	7	8,55	5,5
M 12	1,75	106	16	25	9	10,30	7
M 14	2	114	18	28	11	12,10	9
M 16	2	123	20	32	12	14,10	9

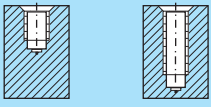
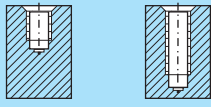
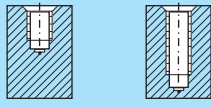
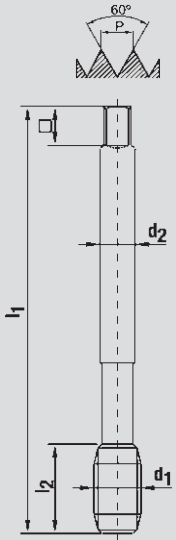
<b>Version</b>	Straight Flute, Long Chamfer = 2/3 of Thread Length					
<b>Type of Hole</b>						
<b>Surface Treatment</b>						
<b>Catalogue-No.</b>	<b>8000</b>					
<b>Tolerance</b>	ISO 2-6H					
						
<b>Application</b>	Unalloyed and Alloyed Steels; Tensile Strength $\leq 900 \text{ N/mm}^2$					
<b>d1</b>	<b>P (mm)</b>	<b>l1</b>	<b>l2</b>	<b>d2</b>	$\square$	
M 3	0,5	70	22	2,2		2,50
M 3,5	0,6	80	25	2,5	2,1	2,90
M 4	0,7	90	25	2,8	2,1	3,30
M 5	0,8	100	28	3,5	2,7	4,20
M 6	1	110	32	4,5	3,4	5,00
M 8	1,25	125	40	6	4,9	6,80
M 10	1,5	140	45	7	5,5	8,50
M 12	1,75	180	50	9	7	10,20
M 14	2	200	56	11	9	12,00
M 16	2	200	63	12	9	14,00
M 20	2,5	250	70	16	12	17,50


<b>Contents</b>	<b>Page</b>
<b>Metric ISO Fine Thread DIN 13</b>	
Machine Taps DIN 374	78 - 95
Machine Taps DIN 374 with Internal Cooling	78 - 89
Roll Taps	90
Machine Taps for Dry Cutting / MKS	91
Hand Taps HSS DIN 2181	96 - 97
Nut Taps $\approx$ DIN 357	98



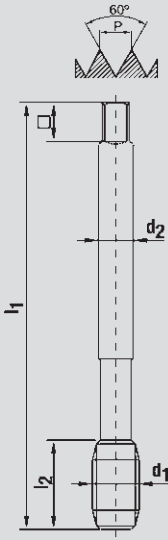


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer, KR = Radial Internal Cooling
<b>Type of Hole</b>			
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>7275/80</b>	<b>7275/80</b>	<b>B7275/80</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G	ISO 2-6H
	Rapid-UNI	Rapid-UNI	Rapid-UNI with KR
			
<b>Application</b> add. see Page 10, 11	UNiversal Use in a Braod Material Range		
<b>Coolant</b>	see Page 10		
<b>Cutting Speed v<sub>c</sub></b>	see Page 10		



d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 8	x 1	90	15	6	4,9	7,00
M 10	x 1	90	18	7	5,5	9,00
M 10	x 1,25	100	18	7	5,5	8,80
M 12	x 1	100	18	9	7	11,00
M 12	x 1,5	100	18	9	7	10,50
M 14	x 1,5	100	18	11	9	12,50
M 16	x 1,5	100	18	12	9	14,50
M 18	x 1,5	110	20	14	11	16,50
M 20	x 1,5	125	24	16	12	18,50



<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer, KA = Axial Internal Cooling
<b>Type of Hole</b>			
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>6345/80</b>	<b>6345/80</b>	<b>B6345/80</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G	ISO 2-6H
	Grulo-UNI	Grulo-UNI	Grulo-UNI with KA
<b>Application</b> add. see Page 10, 11	UNIversal Use in a Braod Material Range		
<b>Coolant</b>	see Page 10		
<b>Cutting Speed v<sub>c</sub></b>	see Page 10		


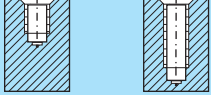

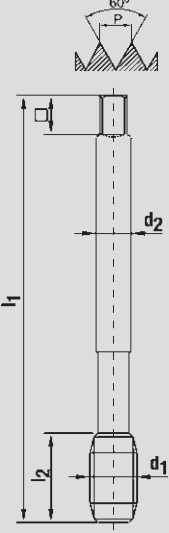



d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 8	x 1	90	15	6	4,9	7,00
M 10	x 1	90	18	7	5,5	9,00
M 10	x 1,25	100	18	7	5,5	8,80
M 12	x 1	100	18	9	7	11,00
M 12	x 1,5	100	18	9	7	10,50
M 14	x 1,5	100	18	11	9	12,50
M 16	x 1,5	100	18	12	9	14,50
M 18	x 1,5	110	20	14	11	16,50
M 20	x 1,5	125	24	16	12	18,50



<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	Steam Tempered	Steam Tempered
<b>Catalogue-No.</b>	<b>7011/78</b>	<b>6040/78</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Rapid Vap.	Grulo Vap.
		
<b>Application</b> add. see Page 10, 11	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min	


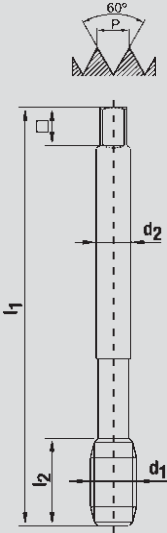

d1		P (mm)	l1	l2	d2	□		d1		P (mm)	l1	l2	d2	□	
M 6	x	0,75	80	12	4,5	3,4	5,20	M 14	x	1,25	100	18	11	9	12,80
M 8	x	0,75	80	15	6	4,9	7,20	M 14	x	1,5	100	18	11	9	12,50
M 8	x	1	90	15	6	4,9	7,00	M 16	x	1,5	100	18	12	9	14,50
M 10	x	1	90	18	7	5,5	9,00	M 18	x	1,5	110	20	14	11	16,50
M 10	x	1,25	100	18	7	5,5	8,80	M 20	x	1,5	125	24	16	12	18,50
M 12	x	1	100	18	9	7	11,00	M 22	x	1,5	125	24	18	14,5	20,50
M 12	x	1,25	100	18	9	7	10,80	M 24	x	1,5	140	24	18	14,5	22,50
M 12	x	1,5	100	18	9	7	10,50								



<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>			
<b>Catalogue-No.</b>	<b>7011</b>	<b>6040</b>	<b>6040</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 3-6G
	Rapid	Grulo	Grulo
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min		


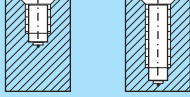

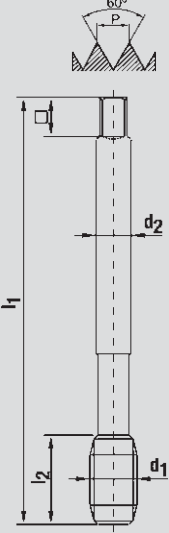



d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 3	x 0,35	56	8	2,2		2,65	M 10	x 0,5	90	18	7	5,5	9,50
M 3,5	x 0,35	56	9	2,5	2,1	3,15	M 10	x 0,75	90	18	7	5,5	9,20
M 4	x 0,35	63	10	2,8	2,1	3,65	M 10	x 1	90	18	7	5,5	9,00
M 4	x 0,5	63	10	2,8	2,1	3,50	M 10	x 1,25	100	18	7	5,5	8,80
M 4,5	x 0,5	70	12	3,5	2,7	4,00	M 11	x 1	90	18	8	6,2	10,00
M 5	x 0,5	70	12	3,5	2,7	4,50	M 12	x 0,5	100	18	9	7	11,50
M 6	x 0,5	80	12	4,5	3,4	5,50	M 12	x 0,75	100	18	9	7	11,20
M 6	x 0,75	80	12	4,5	3,4	5,20	M 12	x 1	100	18	9	7	11,00
M 7	x 0,75	80	12	5,5	4,3	6,20	M 12	x 1,25	100	18	9	7	10,80
M 8	x 0,5	80	15	6	4,9	7,50	M 12	x 1,5	100	18	9	7	10,50
M 8	x 0,75	80	15	6	4,9	7,20	M 13	x 1	100	18	11	9	12,00
M 8	x 1	90	15	6	4,9	7,00	M 14	x 0,75	100	18	11	9	13,20
M 9	x 0,75	80	18	7	5,5	8,20	M 14	x 1	100	18	11	9	13,00
M 9	x 1	90	18	7	5,5	8,00	M 14	x 1,25	100	18	11	9	12,80



<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>			
<b>Catalogue-No.</b>	<b>7011</b>	<b>6040</b>	<b>6040</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 3-6G
	Rapid	Grulo	Grulo
			
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min		


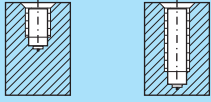
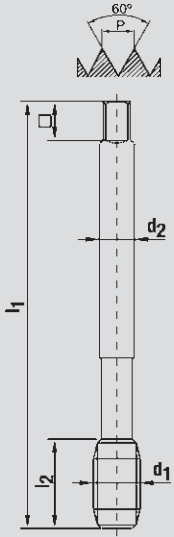


d1	P (mm)	l1	l2	d2	□		d1	P (mm)	l1	l2	d2	□	
M 14	x 1,5	100	18	11	9	12,50	M 22	x 2	140	24	18	14,5	20,00
M 15	x 1	100	18	12	9	14,00	M 24	x 1	140	24	18	14,5	23,00
M 15	x 1,5	100	18	12	9	13,50	M 24	x 1,5	140	24	18	14,5	22,50
M 16	x 1	100	18	12	9	15,00	M 24	x 2	140	24	18	14,5	22,00
M 16	x 1,5	100	18	12	9	14,50	M 25	x 1,5	140	24	18	14,5	23,50
M 17	x 1	100	18	12	9	16,00	M 26	x 1,5	140	24	18	14,5	24,50
M 18	x 1	110	20	14	11	17,00	M 27	x 1,5	140	28	20	16	25,50
M 18	x 1,5	110	20	14	11	16,50	M 27	x 2	140	28	20	16	25,00
M 18	x 2	125	20	14	11	16,00	M 28	x 1,5	140	28	20	16	26,50
M 20	x 1	125	24	16	12	19,00	M 30	x 1	150	28	22	18	29,00
M 20	x 1,5	125	24	16	12	18,50	M 30	x 1,5	150	28	22	18	28,50
M 20	x 2	140	24	16	12	18,00	M 30	x 2	150	28	22	18	28,00
M 22	x 1	125	24	18	14,5	21,00	M 32	x 1,5	150	28	22	18	30,50
M 22	x 1,5	125	24	18	14,5	20,50	M 33	x 1,5	160	28	25	20	31,50


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>7011</b>	
<b>Tolerance</b>	ISO 2-6H	
	Rapid 	
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min	

d1	P (mm)	l1	l2	d2	□		d1	P (mm)	l1	l2	d2	□	
M 33	x 2	160	28	25	20	31,00							
M 34	x 1,5	170	28	28	22	32,50							
M 35	x 1,5	170	28	28	22	33,50							
M 36	x 1,5	170	28	28	22	34,50							
M 36	x 2	170	28	28	22	34,00							
M 36	x 3	200	36	28	22	33,00							

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>			
<b>Catalogue-No.</b>	<b>7275</b>	<b>6345</b>	<b>6055</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 2-6H
	Rapid-VA-G	Grulo-Spez.-G	Rsp-Spez.-G
			
<b>Application</b>	Aluminium Alloys, Copper Alloys		
add. see Page 12, 13			
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed <math>v_c</math></b>	10 - 30 m/min		

d1	P (mm)	l1	l2	d2	□		d1	P (mm)	l1	l2	d2	□	
M 5	x 0,5	70	12	3,5	2,7	4,50	M 12	x 1	100	18	9	7	11,00
M 6	x 0,5	80	12	4,5	3,4	5,50	M 12	x 1,25	100	18	9	7	10,80
M 6	x 0,75	80	12	4,5	3,4	5,20	M 12	x 1,5	100	18	9	7	10,50
M 7	x 0,75	80	12	5,5	4,3	6,20	M 14	x 1,5	100	18	11	9	12,50
M 8	x 0,75	80	15	6	4,9	7,20	M 16	x 1,5	100	18	12	9	14,50
M 8	x 1	90	15	6	4,9	7,00	M 18	x 1,5	110	20	14	11	16,50
M 10	x 0,75	90	18	7	5,5	9,20	M 20	x 1,5	125	24	16	12	18,50
M 10	x 1	90	18	7	5,5	9,00	M 22	x 1,5	125	24	18	14,5	20,50
M 10	x 1,25	100	18	7	5,5	8,80	M 24	x 1,5	140	24	18	14,5	22,50

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	Nitrided	
<b>Catalogue-No.</b>	<b>7055/06</b>	<b>6045</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	Rapid-Spez.	Grulo-Spez.
		
<b>Application</b> add. see Page 14, 15	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1000 \text{ N/mm}^2$	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min	

$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
M 6	x 0,75	80	12	4,5	3,4	5,20
M 8	x 1	90	15	6	4,9	7,00
M 10	x 1	90	18	7	5,5	9,00
M 10	x 1,25	100	18	7	5,5	8,80
M 12	x 1	100	18	9	7	11,00
M 12	x 1,5	100	18	9	7	10,50
M 14	x 1,5	100	18	11	9	12,50
M 16	x 1,5	100	18	12	9	14,50
M 18	x 1,5	110	20	14	11	16,50
M 20	x 1,5	125	24	16	12	18,50
M 22	x 1,5	125	24	18	14,5	20,50
M 24	x 1,5	140	24	18	14,5	22,50

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Nitrided		TiCN-Coating	TiCN-Coating
<b>Catalogue-No.</b>	<b>7255/06</b>	<b>6245</b>	<b>7255/81</b>	<b>6245/81</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H	ISO 2-6H	ISO 2-6H
	Rapid-Spez.-R	Grulo-Spez.-R	Rapid-Spez.-R TiCN	Grulo-Spez.-R TiCN
<b>Application</b> add. see Page 12, 13	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1200 \text{ N/mm}^2$		Unalloyed and Alloyed Steels; Tensile Strength $\leq 1400 \text{ N/mm}^2$	
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Special Cutting Oil	
<b>Cutting Speed <math>v_c</math></b>	3 - 10 m/min		3 - 10 m/min	

$d_1$		P (mm)	$l_1$	$l_2$	$d_2$	□	
M 8	x	1	90	15	6	4,9	7,00
M 10	x	1	90	18	7	5,5	9,00
M 10	x	1,25	100	18	7	5,5	8,80
M 12	x	1	100	18	9	7	11,00
M 12	x	1,25	100	18	9	7	10,80
M 12	x	1,5	100	18	9	7	10,50
M 14	x	1,5	100	18	11	9	12,50
M 16	x	1,5	100	18	12	9	14,50
M 18	x	1,5	110	20	14	11	16,50
M 20	x	1,5	125	24	16	12	18,50
M 22	x	1,5	125	24	18	14,5	20,50
M 24	x	1,5	140	24	18	14,5	22,50

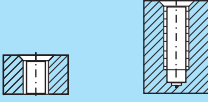
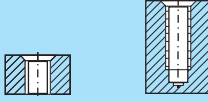
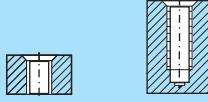
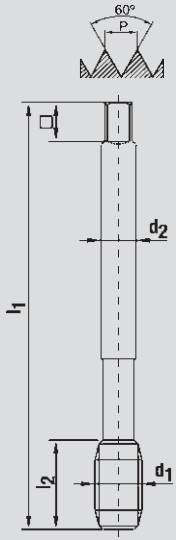



<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Steam Tempered	TiCN-Coating	Steam Tempered	TiCN-Coating
<b>Catalogue-No.</b>	<b>7235/78</b>	<b>7235/81</b>	<b>6365/78</b>	<b>6365/81</b>
<b>Tolerance</b>	6HX	6HX	6HX	6HX
	Rapid-V4A	Rapid-V4A TiCN	Grulo-V4A	Grulo-V4A TiCN
<b>Application</b> add. see Page 12, 13	Stainless Steels with High Chromium-Nickel-Content (VA-Steels)			
<b>Coolant</b>	Cutting Oil or Emulsion	Cutting Oil or Emulsion	Cutting Oil or Emulsion	Cutting Oil or Emulsion
<b>Cutting Speed <math>v_c</math></b>	6 - 10 m/min	10 - 20 m/min	6 - 10 m/min	10 - 20 m/min

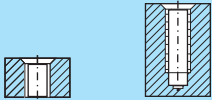
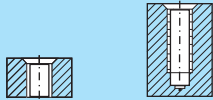
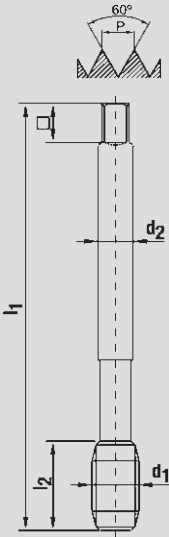


$d_1$	$P$ (mm)	$l_1$	$l_2$	$d_2$	□	
M 8	x 1	90	15	6	4,9	7,00
M 10	x 1	90	18	7	5,5	9,00
M 12	x 1,5	100	18	9	7	10,50
M 14	x 1,5	100	18	11	9	12,50
M 16	x 1,5	100	18	12	9	14,50
M 18	x 1,5	110	20	14	11	16,50
M 20	x 1,5	125	24	16	12	18,50


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Steam Tempered	TiCN-Coating	Steam Tempered	TiCN-Coating
<b>Catalogue-No.</b>	<b>7375/78</b>	<b>7375/81</b>	<b>6445/78</b>	<b>6445/81</b>
<b>Tolerance</b>	6HX	6HX	6HX	6HX
	Rapid-VA-G	Rapid-VA-G TiCN	Grulo-Spez.-G	Grulo-Spez.-G TiCN
<b>Application</b> add. see Page 12, 13	Stainless Steels (V2A-Steels); High Temperature Stainless Steels (V2A- and V4A-Steels)			
<b>Coolant</b>	Cutting Oil or Emulsion	Cutting Oil or Emulsion	Cutting Oil or Emulsion	Cutting Oil or Emulsion
<b>Cutting Speed v<sub>c</sub></b>	6 - 10 m/min	10 - 20 m/min	6 - 10 m/min	10 - 20 m/min


d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 8	x 1	90	15	6	4,9	7,00
M 10	x 1	90	18	7	5,5	9,00
M 12	x 1,5	100	18	9	7	10,50
M 14	x 1,5	100	18	11	9	12,50
M 16	x 1,5	100	18	12	9	14,50
M 18	x 1,5	110	20	14	11	16,50
M 20	x 1,5	125	24	16	12	18,50

<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer, KA = Axial Internal Cooling Size M8 and up
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Nitrided	TiAlN-Coating	TiAlN-Coating
<b>Catalogue-No.</b>	<b>6008/06</b>	<b>6308/70</b>	<b>B6308/70</b>
<b>Tolerance</b>	6HX	6HX	6HX
	C-GG	C-GG TM	C-GG TM with KA
<b>Application</b> add. see Page 10, 11	Grey Cast Iron	Grey Cast Iron; Nodular Cast Iron; Malleable Cast Iron; Vermicular Cast Iron	
<b>Coolant</b>	Cutting Oil	Dry, Air or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min	20 - 50 m/min	

$d_1$	$P$ (mm)	$l_1$	$l_2$	$d_2$	□	
M 6	x 0,75	80	12	4,5	3,4	5,20
M 8	x 1	90	15	6	4,9	7,00
M 10	x 1	90	18	7	5,5	9,00
M 10	x 1,25	100	18	7	5,5	8,80
M 12	x 1	100	18	9	7	11,00
M 12	x 1,5	100	18	9	7	10,50
M 14	x 1,5	100	18	11	9	12,50
M 16	x 1,5	100	18	12	9	14,50
M 18	x 1,5	110	20	14	11	16,50
M 20	x 1,5	125	24	16	12	18,50
M 22	x 1,5	125	24	18	14,5	20,50
M 24	x 1,5	140	24	18	14,5	22,50

<b>Version</b> ▶	Form C, 2- 3 Threads Chamfer, with Oil Flutes	Form C, 2 - 3 Threads Chamfer, with Oil Flutes
<b>Type of Hole</b> ▶		
<b>Surface Treatment</b> ▶	TiN-Coating	CrN-Coating
<b>Catalogue-No.</b> ▶	<b>6060/80</b>	<b>6064/79</b>
<b>Tolerance</b> ▶	6HX	6HX
	Formex TiN	Formex CrN
		
<b>Application</b> ▶	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	Aluminium Alloys, Copper Alloys
add. see Page 16, 17		
<b>Coolant</b> ▶	Cutting Oil or Emulsion	Cutting Oil or Emulsion
<b>Cutting Speed v<sub>c</sub></b> ▶	20 - 30 m/min	30 - 40 m/min

d <sub>1</sub>	P (mm)		l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 8	x	1	90	15	6	4,9	7,50
M 10	x	1	90	18	7	5,5	9,50
M 10	x	1,25	100	18	7	5,5	9,40
M 12	x	1	100	18	9	7	11,50
M 12	x	1,5	100	18	9	7	11,25
M 14	x	1,5	100	18	11	9	13,25
M 16	x	1,5	100	18	12	9	15,25
* The recommended core hole diameters are for reference purpose only.							

<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer, MKS and Dry
<b>Type of Hole</b>	
<b>Surface Treatment</b>	TiAlN-Coating
<b>Catalogue-No.</b>	<b>6308/70</b>
<b>Tolerance</b>	6HX




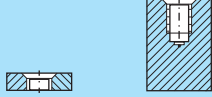
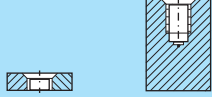

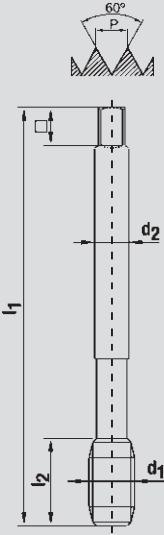
C-GG TM




#### Application and Cutting Speed in Dry Cutting / MKS

<b>Dry Cutting / MKS:</b>  <b>For further details refer to Page 158</b>		Dry	MKS = Minim. Lubrication Syst.
	Grey, Nodular, Malleable and Vermicular Cast Iron	$v_c = 15 - 30 \text{ m/min}$	$v_c = 20 - 40 \text{ m/min}$
	add. see Page 10, 11		

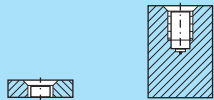
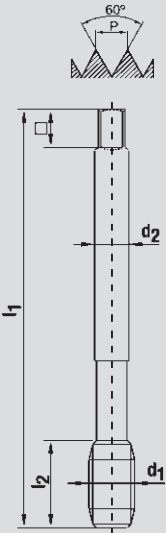


$d_1$		$P$ (mm)	$l_1$	$l_2$	$d_2$	□	
M 8	x	1	90	15	6	4,9	7,00
M 10	x	1	90	18	7	5,5	9,00
M 10	x	1,25	100	18	7	5,5	8,80
M 12	x	1	100	18	9	7	11,00
M 12	x	1,5	100	18	9	7	10,50
M 14	x	1,5	100	18	11	9	12,50
M 16	x	1,5	100	18	12	9	14,50



<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer (only up to M36)
<b>Type of Hole</b>			
<b>Surface Treatment</b>			
<b>Catalogue-No.</b>	<b>6002</b>	<b>6002</b>	<b>6030</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G	ISO 2-6H
	C	C	Rsp
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed v<sub>c</sub></b>	15 - 20 m/min		

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 3	x 0,35	56	8	2,2		2,65	M 10	x 0,5	90	18	7	5,5	9,50
M 3,5	x 0,35	56	9	2,5	2,1	3,15	M 10	x 0,75	90	18	7	5,5	9,20
M 4	x 0,35	63	10	2,8	2,1	3,65	M 10	x 1	90	18	7	5,5	9,00
M 4	x 0,5	63	10	2,8	2,1	3,50	M 10	x 1,25	100	18	7	5,5	8,80
M 4,5	x 0,5	70	12	3,5	2,7	4,00	M 11	x 1	90	18	8	6,2	10,00
M 5	x 0,5	70	12	3,5	2,7	4,50	M 12	x 0,5	100	18	9	7	11,50
M 6	x 0,5	80	12	4,5	3,4	5,50	M 12	x 0,75	100	18	9	7	11,20
M 6	x 0,75	80	12	4,5	3,4	5,20	M 12	x 1	100	18	9	7	11,00
M 7	x 0,75	80	12	5,5	4,3	6,20	M 12	x 1,25	100	18	9	7	10,80
M 8	x 0,5	80	15	6	4,9	7,50	M 12	x 1,5	100	18	9	7	10,50
M 8	x 0,75	80	15	6	4,9	7,20	M 13	x 1	100	18	11	9	12,00
M 8	x 1	90	15	6	4,9	7,00	M 14	x 0,75	100	18	11	9	13,20
M 9	x 0,75	80	15	7	5,5	8,20	M 14	x 1	100	18	11	9	13,00
M 9	x 1	90	15	7	5,5	8,00	M 14	x 1,25	100	18	11	9	12,80


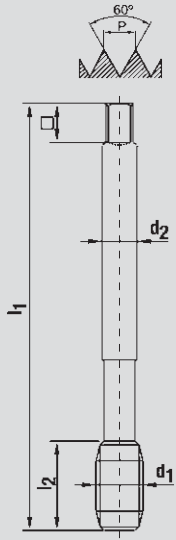

<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer (only up to M36)
<b>Type of Hole</b>			
<b>Surface Treatment</b>			
<b>Catalogue-No.</b>	<b>6002</b>	<b>6002</b>	<b>6030</b>
<b>Tolerance</b>	ISO 2-6H	ISO 3-6G	ISO 2-6H
	C	C	Rsp
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed <math>v_c</math></b>	15 - 20 m/min		



d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
M 14	x 1,5	100	18	11	9	12,50	M 22	x 2	140	24	18	14,5	20,00
M 15	x 1	100	18	12	9	14,00	M 24	x 1	140	24	18	14,5	23,00
M 15	x 1,5	100	18	12	9	13,50	M 24	x 1,5	140	24	18	14,5	22,50
M 16	x 1	100	18	12	9	15,00	M 24	x 2	140	24	18	14,5	22,00
M 16	x 1,5	100	18	12	9	14,50	M 25	x 1,5	140	24	18	14,5	23,50
M 17	x 1	100	18	12	9	16,00	M 26	x 1,5	140	24	18	14,5	24,50
M 18	x 1	110	20	14	11	17,00	M 27	x 1,5	140	28	20	16	25,50
M 18	x 1,5	110	20	14	11	16,50	M 27	x 2	140	28	20	16	25,00
M 18	x 2	125	20	14	11	16,00	M 28	x 1,5	140	28	20	16	26,50
M 20	x 1	125	24	16	12	19,00	M 30	x 1	150	28	22	18	29,00
M 20	x 1,5	125	24	16	12	18,50	M 30	x 1,5	150	28	22	18	28,50
M 20	x 2	140	24	16	12	18,00	M 30	x 2	150	28	22	18	28,00
M 22	x 1	125	24	18	14,5	21,00	M 32	x 1,5	150	28	22	18	30,50
M 22	x 1,5	125	24	18	14,5	20,50	M 32	x 2	150	28	22	18	30,00

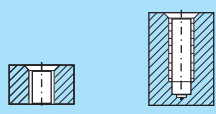
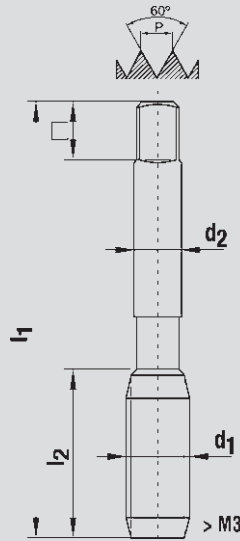

<b>Version</b>	Straight Flute, Form C, 2- 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer (only up to M36)
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>6002</b>	<b>6030</b>
<b>Tolerance</b>	ISO 2-6H	ISO 2-6H
	C	Rsp
		
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	15 - 20 m/min	



d1	P (mm)	l1	l2	d2	□		d1	P (mm)	l1	l2	d2	□	
M 33	x 1,5	160	28	25	20	31,50	M 42	x 1,5	170	30	32	24	40,50
M 33	x 2	160	28	25	20	31,00	M 42	x 2	170	30	32	24	40,00
M 34	x 1,5	170	28	28	22	32,50	M 42	x 3	200	40	32	24	39,00
M 35	x 1,5	170	28	28	22	33,50	M 45	x 1,5	180	30	36	29	43,50
M 36	x 1,5	170	28	28	22	34,50	M 45	x 2	180	30	36	29	43,00
M 36	x 2	170	28	28	22	34,00	M 45	x 3	200	40	36	29	42,00
M 36	x 3	200	36	28	22	33,00	M 48	x 1,5	190	32	36	29	46,50
M 38	x 1,5	170	30	28	22	36,50	M 48	x 2	190	32	36	29	45,00
M 39	x 2	170	30	32	24	37,00	M 48	x 3	225	40	36	29	45,00
M 39	x 3	200	36	32	26	36,00	M 50	x 1,5	190	32	36	29	48,50
M 40	x 1,5	170	30	32	24	38,50	M 52	x 1,5	190	32	40	32	50,50

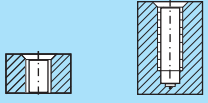
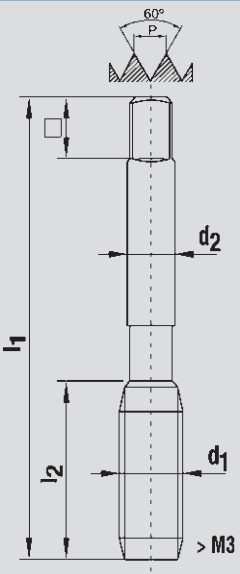






<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer, Left Hand Version
<b>Type of Hole</b>	
<b>Surface Treatment</b>	
<b>Catalogue-No.</b>	<b>6002/LH Left</b>
<b>Tolerance</b>	ISO 2-6H-LH
	C-LH 
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$
<b>Coolant</b>	Cutting Oil or Emulsion
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min


d1	P (mm)	l1	l2	d2	□		d1	P (mm)	l1	l2	d2	□	
M 6	x 0,5	80	12	4,5	3,4	5,50	M 14	x 1	100	18	11	9	13,00
M 6	x 0,75	80	12	4,5	3,4	5,20	M 14	x 1,5	100	18	11	9	12,50
M 8	x 0,75	80	15	6	4,9	7,20	M 16	x 1	100	18	12	9	15,00
M 8	x 1	90	15	6	4,9	7,00	M 16	x 1,5	100	18	12	9	14,50
M 10	x 1	90	18	7	5,5	9,00	M 18	x 1,5	110	20	14	11	16,50
M 10	x 1,25	100	18	7	5,5	8,80	M 20	x 1	125	24	16	12	19,00
M 12	x 1	100	18	9	7	11,00	M 20	x 1,5	125	24	16	12	18,50
M 12	x 1,25	100	18	9	7	10,80	M 22	x 1,5	125	24	18	14,5	20,50
M 12	x 1,5	100	18	9	7	10,50	M 24	x 1,5	140	24	18	14,5	22,50

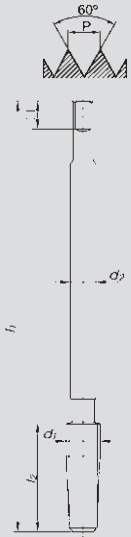
<b>Version</b>	Neoboss Graduation *No. 3 in ISO 2-6H	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	2000	2000
<b>Tolerance</b>	ISO 2-6H	
	Complete Set	Và2 Fa2*
		
<b>Application</b>	Unalloyed Steels; Zugfestigkeit ≤ 800 N/mm <sup>2</sup>	

d1	P (mm)	l1	l2	d2	□		d1	P (mm)	l1	l2	d2	□	
M 2,5	x 0,35	40	9	2,8	2,1	2,15	M 12	x 0,5	70	16	9	7	11,50
(M 2,6)	x 0,35	40	8	2,8	2,1	2,25	M 12	x 0,75	70	16	9	7	11,20
M 3	x 0,35	41,5	9	3,5	2,7	2,65	M 12	x 1	70	20	9	7	11,00
M 3,5	x 0,35	45	10	4	3	3,15	M 12	x 1,25	70	20	9	7	10,80
M 4	x 0,35	46,4	10	4,5	3,4	3,65	M 12	x 1,5	70	20	9	7	10,50
M 4	x 0,5	46,4	10	4,5	3,4	3,50	M 13	x 1	70	20	11	9	12,00
M 4,5	x 0,5	50	12	6	4,9	4,00	M 13	x 1,5	70	20	11	9	11,50
M 5	x 0,5	50	12	6	4,9	4,50	M 14	x 0,75	70	16	11	9	13,20
M 6	x 0,5	52,5	12	6	4,9	5,50	M 14	x 1	70	20	11	9	13,00
M 6	x 0,75	52,5	12	6	4,9	5,20	M 14	x 1,25	70	20	11	9	12,80
M 7	x 0,75	50	12	6	4,9	6,20	M 14	x 1,5	70	20	11	9	12,50
M 8	x 0,5	50	12	6	4,9	7,50	M 15	x 1	80	20	12	9	14,00
M 8	x 0,75	50	12	6	4,9	7,20	M 15	x 1,5	80	20	12	9	13,50
M 8	x 1	56	18	6	4,9	7,00	M 16	x 1	80	20	12	9	15,00
M 9	x 0,75	56	16	7	5,5	8,20	M 16	x 1,5	80	20	12	9	14,50
M 9	x 1	63	18	7	5,5	8,00	M 17	x 1	80	20	12	9	16,00
M 10	x 0,5	63	16	7	5,5	9,50	M 18	x 1	80	22	14	11	17,00
M 10	x 0,75	63	16	7	5,5	9,20	M 18	x 1,5	80	22	14	11	16,50
M 10	x 1	63	18	7	5,5	9,00	M 18	x 2	80	22	14	11	16,00
M 10	x 1	70	18	7	5,5	8,80	M 20	x 1	80	22	16	12	19,00
M 11	x 1	63	18	8	6,2	10,00	M 20	x 1,5	80	22	16	12	18,50


<b>Version</b>	Neoboss Graduation *No. 3 in ISO 2-6H	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	2000	2000
<b>Tolerance</b>	ISO 2-6H	
	Complete Set	Va2 Fa2*
		
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$	

d1	P (mm)	l1	l2	d2	□		d1	P (mm)	l1	l2	d2	□	
M 20	x 2	80	22	16	12	18,00	M 36	x 1,5	100	25	28	22	34,50
M 22	x 1	80	22	18	14,5	21,00	M 36	x 2	125	30	28	22	34,00
M 22	x 1,5	80	22	18	14,5	20,50	M 36	x 3	125	36	28	22	33,00
M 24	x 1	90	22	18	14,5	23,00	M 38	x 1,5	100	25	28	22	36,50
M 24	x 1,5	90	22	18	14,5	22,50	M 39	x 2	125	30	32	24	37,00
M 24	x 2	90	22	18	14,5	22,00	M 39	x 3	125	36	32	24	36,00
M 25	x 1,5	90	22	18	14,5	23,50	M 40	x 1,5	110	25	32	24	38,50
M 26	x 1,5	90	22	18	14,5	24,50	M 42	x 1,5	110	25	32	24	40,50
M 27	x 1,5	90	22	20	16	25,50	M 42	x 2	125	30	32	24	40,00
M 27	x 2	90	22	20	16	25,00	M 42	x 3	125	36	32	24	39,00
M 28	x 1,5	90	22	20	16	26,50	M 45	x 1,5	110	25	36	29	43,50
M 30	x 1	90	22	22	18	29,00	M 45	x 2	125	30	36	29	43,00
M 30	x 1,5	90	22	22	18	28,50	M 45	x 3	125	36	36	29	42,00
M 30	x 2	90	22	22	18	28,00	M 48	x 1,5	140	25	36	29	46,50
M 32	x 1,5	90	22	22	18	30,50	M 48	x 2	140	30	36	29	45,00
M 32	x 2	90	22	22	18	30,00	M 48	x 3	140	36	36	29	45,00
M 33	x 1,5	100	25	25	20	31,50	M 50	x 1,5	140	25	36	29	48,50
M 33	x 2	100	25	25	20	31,00	M 52	x 1,5	140	25	40	32	50,50
M 34	x 1,5	100	25	28	22	32,50							
M 35	x 1,5	100	25	28	22	33,50							
							( )	DIN Profile not ISO					

<b>Version</b>	Straight Flute, Long Chamfer = 2/3 of Thread Length
<b>Type of Hole</b>	
<b>Surface Treatment</b>	
<b>Catalogue-No.</b>	8000
<b>Tolerance</b>	ISO 2-6H



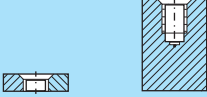

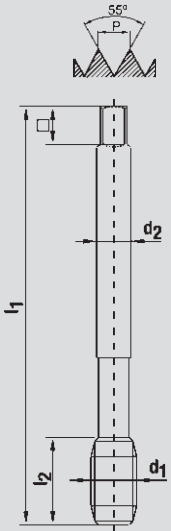







<b>Application</b>	Unalloyed and Alloyed Steels; Tensile Strength ≤ 900 N/mm <sup>2</sup>
--------------------	---



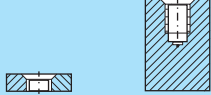
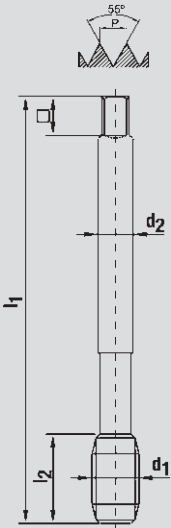



d1	P (mm)	l1	l2	d2	□	
M 8	x 1	125	35	6	4,9	7,00
M 10	x 1	140	35	7	5,5	9,00
M 12	x 1,5	170	42	9	7	10,50
M 14	x 1,5	190	42	11	9	12,50
M 16	x 1,5	200	45	12	9	14,50


Contents	Page
<b>Whitworth Thread BSW</b>	
Machine Taps DIN 371/376	100 - 101
Hand Taps HSS DIN 351	102
<b>Whitworth Pipe Thread G DIN ISO 228</b>	
Machine Taps DIN 5156	103 - 109
Roll Taps DIN 5156	108
Hand Taps HSS DIN 5157	110
<b>Cylindrical Pipe Thread Rp ISO 7/1 and DIN 2999</b>	
Machine Taps DIN 5156	111
<b>Whitworth Taper Pipe Thread Rc (formerly BSPT) according to BS 21 and ISO 7/1, Taper 1:16</b>	
Machine Taps	112

BSW/G/Rp/Rc

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>				
<b>Catalogue-No.</b>	<b>7010</b>	<b>4040</b>	<b>4052</b>	<b>4230</b>
<b>Tolerance</b>				
	Rapid	Grulo	C	Rsp
				
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>			
<b>Coolant</b>	Cutting Oil or Emulsion			
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min			

d <sub>1</sub>	P (Gg/1 <sup>st</sup> )	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
W 1/16	60	45	8		2,8	2,1	1,55
W 3/32	48	50	9		2,8	2,1	2,10
W 1/8	40	56	10	18	3,5	2,7	2,35
W 5/32	32	56	10	20	4	3	2,85
W 3/16	24	70	14	25	6	4,9	3,90
W 7/32	24	80	16	30	6	4,9	4,50
W 1/4	20	80	16	30	7	5,5	5,10
W 5/16	18	90	18	35	8	6,2	6,60
W 3/8	16	100	20	39	10	8	8,00

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>			
<b>Catalogue-No.</b>	<b>7011</b>	<b>6040</b>	<b>6002</b>
<b>Tolerance</b>			
	Rapid	Gruło	C
			
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min		


d <sub>1</sub>	P (Gg/1 <sup>4</sup> )	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
W 7/16	14	100	20	8	6,2	9,40
W 1/2	12	110	22	9	7	10,60
W 9/16	12	110	24	11	9	12,20
W 5/8	11	110	26	12	9	13,50
W 3/4	10	125	30	14	11	16,50
W 7/8	9	140	30	18	14,5	19,50
W 1	8	160	36	18	14,5	22,25




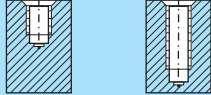
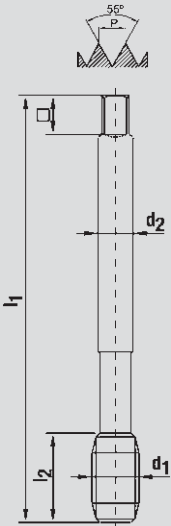




<b>Version</b>	Neoboss Graduation	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	2000	2000
<b>Tolerance</b>		
	Complete Set	Và3 Mà3 Fà3
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	


d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
W 1/16	60	36	8	2,8	2,1	1,55	W 5/8	11	90	30	12	9	13,50
W 3/32	48	40	9	2,8	2,1	2,10	W 3/4	10	105	35	14	11	16,50
W 1/8	40	41,5	11	3,5	2,7	2,35	W 7/8	9	110	35	18	14,5	19,50
W 5/32	32	46,4	12	4	3	2,85	W 1	8	110	38	20	14,5	22,25
W 3/16	24	50	16	6	4,9	3,90	W 1 1/8	7	132	43	22	18	25,00
W 7/32	24	52,2	16	6	4,9	4,50	W 1 1/4	7	132	43	22	18	28,00
W 1/4	20	57	22	6	4,9	5,10	W 1 3/8	6	132	43	28	22	30,75
W 5/16	18	63	20	6	4,9	6,60	W 1 1/2	6	150	50	32	22	34,00
W 3/8	16	70	20	6	5,5	8,00	W 1 5/8	5	150	50	32	24	36,25
W 7/16	14	75	25	8	6,2	9,40	W 1 3/4	5	150	50	36	29	39,50
W 1/2	12	80	28	9	7	10,60	W 1 7/8	4 1/2	190	50	36	29	42,00
W 9/16	12	80	30	11	9	12,20	W 2	4 1/2	150	50	40	32	45,00


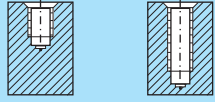
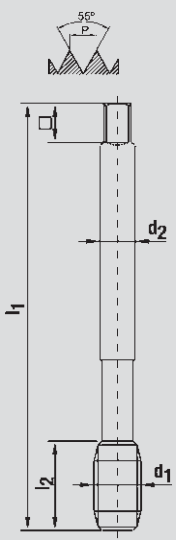





<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>7275/80</b>	<b>6345/80</b>
<b>Tolerance</b>		
	Rapid-UNI	Grulo-UNI
		
<b>Application</b>	UNiversal Use in a Broad Material Range	
add. see Page 10, 11		
<b>Coolant</b>	see Page 10	
<b>Cutting Speed <math>v_c</math></b>	see Page 10	

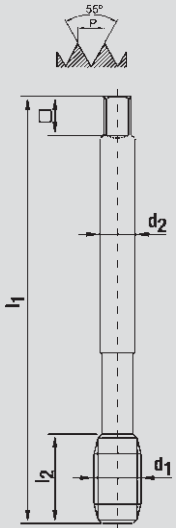
$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
G 1/8	28	90	16	7	5,5	8,80
G 1/4	19	100	18	11	9	11,80
G 3/8	19	100	18	12	9	15,25
G 1/2	14	125	24	16	12	19,00
G 5/8	14	125	24	18	14,5	21,00
G 3/4	14	140	28	20	16	24,50
G 7/8	14	150	28	22	18	28,25
G 1	11	160	28	25	20	30,75


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Therads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Steam Tempered		Steam Tempered	
<b>Catalogue-No.</b>	7011/78	7011	6040/78	6040
<b>Tolerance</b>				
	Rapid Vap.	Rapid	Grulo Vap.	Grulo
				
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$			
add. see Page 10, 11				
<b>Coolant</b>	Cutting Oil or Emulsion			
<b>Cutting Speed <math>v_c</math></b>	10 -20 m/min			

d1	P (mm)	l1	l2	d2	□	
G 1/8	28	90	16	7	5,5	8,80
G 1/4	19	100	18	11	9	11,80
G 3/8	19	100	18	12	9	15,25
G 1/2	14	125	24	16	12	19,00
G 5/8	14	125	24	18	14,5	21,00
G 3/4	14	140	28	20	16	24,50
G 7/8	14	150	28	22	18	28,25
G 1	11	160	28	25	20	30,75


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>7275</b>	<b>6345</b>
<b>Tolerance</b>		
	Rapid-VA-G	Grulo-Spez.-G
		
<b>Application</b>	Aluminium Alloys, Copper Alloys	
add. see Page 12, 13		
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 30 m/min	

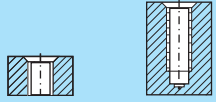
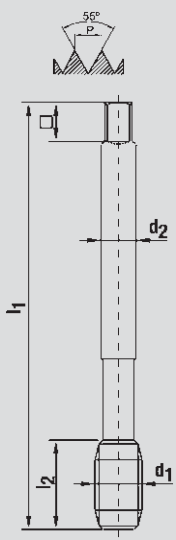

$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
G 1/8	28	90	16	7	5,5	8,80
G 1/4	19	100	18	11	9	11,80
G 3/8	19	100	18	12	9	15,25
G 1/2	14	125	24	16	12	19,00
G 5/8	14	125	24	18	14,5	21,00
G 3/4	14	140	28	20	16	24,50
G 7/8	14	150	28	22	18	28,25
G 1	11	160	28	25	20	30,75


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Nitrided		Steam Tempered	Steam Tempered
<b>Catalogue-No.</b>	<b>7055/06</b>	<b>6045</b>	<b>7235/78</b>	<b>6365/78</b>
<b>Tolerance</b>				
	Rapid-Spez.	Grulo-Spez.	Rapid-V4A	Grulo-V4A
<b>Application</b> add. see Page 12-15	Unalloyed and Alloyed Steels; Tensile Strength $\leq 1000 \text{ N/mm}^2$		Stainless Steels with High Chromium-Nickel-Content (VA-Steels)	
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min		6 - 10 m/min	

$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
G 1/8	28	90	16	7	5,5	8,80
G 1/4	19	100	18	11	9	11,80
G 3/8	19	100	18	12	9	15,25
G 1/2	14	125	24	16	12	19,00
G 3/4	14	140	28	20	16	24,50
G 1	11	160	28	25	20	30,75

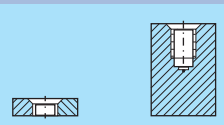
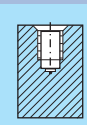
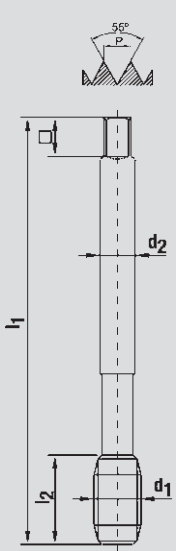


<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	Nitrided	TiAlN-Coating
<b>Catalogue-No.</b>	<b>6008/06</b>	<b>6308/70</b>
<b>Tolerance</b>		
	C-GG 	C-GG TM 
<b>Application</b> add. see Page 10,11	Grey Cast Iron	Grey Cast Iron; Nodular Cast Iron; Malleable Cast Iron; Vermicular Cast Iron
<b>Coolant</b>	Cutting Oil	Dry, Air or Emulsion
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min	20 - 50 m/min


$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
G 1/8	28	90	16	7	5,5	8,80
G 1/4	19	100	18	11	9	11,80
G 3/8	19	100	18	12	9	15,25
G 1/2	14	125	24	16	12	19,00
G 3/4	14	140	28	20	16	24,50
G 7/8	14	150	28	22	18	28,25
G 1	11	160	28	25	20	30,75

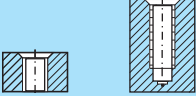
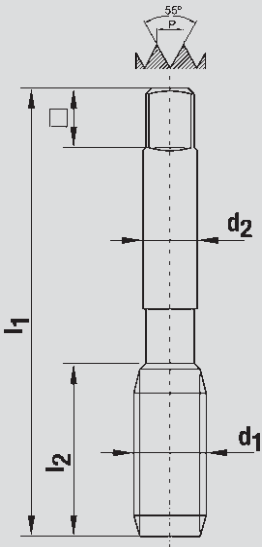

<b>Version</b>	Form C, 2 - 3 Threads Chamfer, with Oil Flutes
<b>Type of Hole</b>	
<b>Surface Treatment</b>	TiN-Coating
<b>Catalogue-No.</b>	<b>6060/80</b>
<b>Tolerance</b>	
	Formex TiN 
<b>Application</b> add. see Page 16,17	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$
<b>Coolant</b>	Cutting Oil or Emulsion
<b>Cutting Speed <math>v_c</math></b>	20 - 30 m/min


$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	 *
G 1/8	28	90	16	7	5,5	9,30
G 1/4	19	100	18	11	9	12,50
G 3/8	19	100	18	12	9	16,00
G 1/2	14	125	24	16	12	20,00
G 3/4	14	140	28	20	16	25,50
G 1	11	160	28	25	20	32,00

\* The recommended core hole diameters are for reference purpose only.


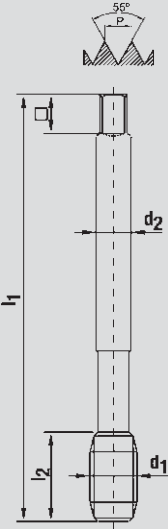

<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer (up to G1")
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>6002</b>	<b>6030</b>
<b>Tolerance</b>		
	C	Rsp
		
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min	


$d_1$	P (mm)	$l_1$	$l_2$	$d_2$	□	
G 1/8	28	90	16	7	5,5	8,80
G 1/4	19	100	18	11	9	11,80
G 3/8	19	100	18	12	9	15,25
G 1/2	14	125	24	16	12	19,00
G 5/8	14	125	24	18	14,5	21,00
G 3/4	14	140	28	20	16	24,50
G 7/8	14	150	28	22	18	28,25
G 1	11	160	28	25	20	30,75
G 1 1/8	11	170	30	28	22	35,50
G 1 1/4	11	170	30	32	24	39,50
G 1 3/8	11	180	32	36	29	41,50
G 1 1/2	11	190	32	36	29	45,25

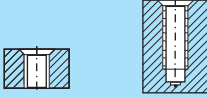
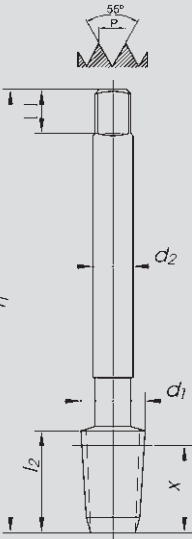

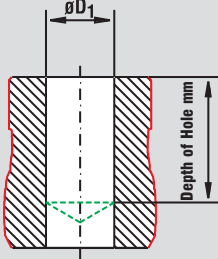
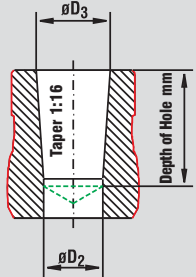
<b>Version</b>	Neoboss Graduation	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	2000	2000
<b>Tolerance</b>		
	Complete Set	V à2 F à2
		
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$	

d1	P (Gg/1")	l1	l2	d2	□	
G 1/8	28	63	18	7	5,5	8,80
G 1/4	19	70	20	11	9	11,80
G 3/8	19	70	20	12	9	15,25
G 1/2	14	80	22	16	12	19,00
G 5/8	14	80	22	18	14,5	21,00
G 3/4	14	90	22	20	16	24,50
G 7/8	14	90	22	22	18	28,25
G 1	11	100	25	25	20	30,75
G 1 1/8	11	125	30	28	22	35,50
G 1 1/4	11	125	30	32	24	39,50
G 1 3/8	11	125	30	36	29	41,50
G 1 1/2	11	140	30	36	29	45,25



<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>6002</b>	
<b>Tolerance</b>		
	C 	
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed <math>v_c</math></b>	15 - 20 m/min	

d1	P (Gg/1")	l1	l2	d2	□	
Rp 1/8	28	90	16	7	5,5	8,55
Rp 1/4	19	100	18	11	9	11,40
Rp 3/8	19	100	18	12	9	14,90
Rp 1/2	14	125	24	16	12	18,60
Rp 3/4	14	140	28	20	16	24,10
Rp 1	11	160	28	25	20	30,25
Rp 1 1/2	11	190	32	36	29	44,75


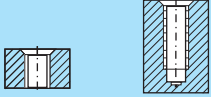

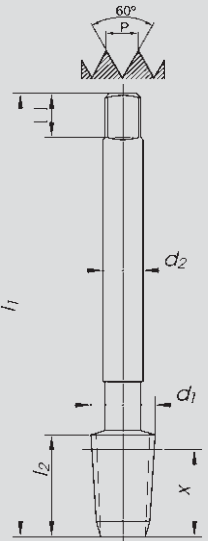



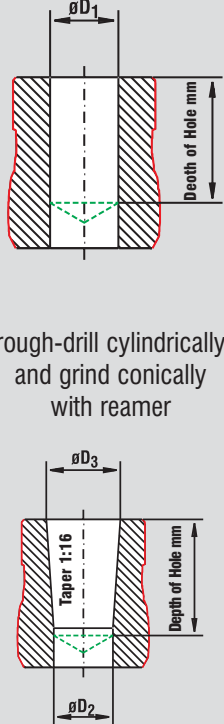
<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer						Core Hole Diameter for American Taper Pipe Thread NPT, Taper 1 : 16 acc. to ANSI B 1.20.1		
<b>Type of Hole</b>									
<b>Surface Treatment</b>	Steam Tempered								
<b>Catalogue-No.</b>	6700/78								
<b>Tolerance</b>									
	 						rough-drill cylindrically		
									
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>						rough-drill cylindrically and grind conically with reamer		
add. see Page 16,17									
<b>Coolant</b>	Cutting Oil or Emulsion								
<b>Cutting Speed v<sub>c</sub></b>	5 - 10 m/min								

d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	X-Dim*	rough-drill cylindrically		rough-drill cylindrically and grind conically with reamer		
							Ø D <sub>1</sub> mm	Depth of Hole mm	Ø D <sub>2</sub> mm	Ø D <sub>3</sub> mm	Depth of Hole mm
Rc 1/8	28	90	12	7	5,5	8,9	8,20	11,90	8,10	8,57	11,90
Rc 1/4	19	100	20	11	9	13,3	11,00	17,70	10,75	11,45	17,70
Rc 3/8	19	100	12	12	9	13,7	14,50	18,10	14,25	14,95	18,10
Rc 1/2	14	125	22	16	12	18,1	18,00	24,00	17,75	18,63	24,00
Rc 3/4	14	140	22	20	16	19,5	23,50	25,30	23,00	24,12	25,30
Rc 1	11	160	32	25	20	23,1	29,50	30,60	29,00	30,29	30,60

\* The recommended X-dimensions are for reference purpose only.

<b>Contents</b>	<b>Page</b>
<b>American Taper Pipe Thread NPT, Taper 1 : 16 acc. to ANSI B 1.20.1, for Threads with Sealing Compound</b>	
Machine Taps	114
Short Machine Taps	115
<b>American Taper Pipe Thread NPTF, Taper 1 : 16 acc. to ANSI B 1.20.4, for Threads without Sealing Compound</b>	
Machine Taps	116
Short Machine Taps	117
<b>American Cylindrical Pipe Thread NPSM acc. to ANSI B 1.20.1</b>	
Machine Taps ≈ DIN 5156	118

NPT/NPTF/NPSM

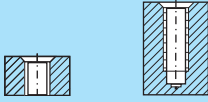
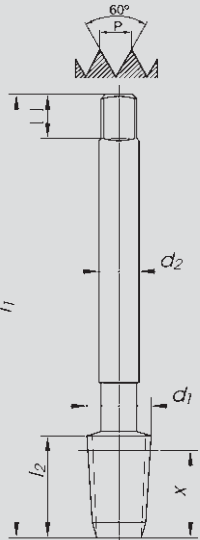

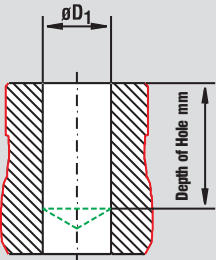
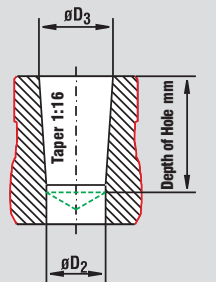
Version	Straight Flute, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer (up to d1 1")	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer (up to d1 1")	Core Hole Diameter for American Taper Pipe Thread NPT, Taper 1 : 16 acc. to ANSI B 1.20.1							
Type of Hole											
Surface Treatment	Steam Tempered	TiN-Coating	Steam Tempered								
Catalogue-No.	6700/78	6750/80	6750/78								
Tolerance											
				rough-drill cylindrically							
<b>Application</b> add. see Page 16, 17	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	Nodular Cast Iron and Malleable Cast Iron	Stainless Steels (V2A-Steels)	rough-drill cylindrically and grind conically with reamer							
<b>Coolant</b>	Cutting Oil or Emulsion	Dry, Air or Emulsion	Cutting Oil or Emulsion								
<b>Cutting Speed v<sub>c</sub></b>	5 - 10 m/min	15 - 20 m/min	3 - 6 m/min								
			rough-drill cylindrically	rough-drill cylindrically and grind conically with reamer							
d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	X-Dim*	Ø D <sub>1</sub> mm	Depth of Hole mm	Ø D <sub>2</sub> mm	Ø D <sub>3</sub> mm	Depth of Hole mm
1/16	27	90	12	6	4,9	9,7	6,25	12,00	6,00	6,39	12,00
1/8	27	90	12	7	5,5	9,7	8,50	12,00	8,25	8,74	12,00
1/4	18	100	20	11	9	14,2	11,10	17,50	10,70	11,36	17,50
3/8	18	100	22	12	9	14,5	14,70	17,60	14,10	14,80	17,60
1/2	14	125	22	16	12	19,0	18,00	22,90	17,40	18,32	22,90
3/4	14	140	22	20	16	19,5	23,25	23,00	22,60	23,67	23,00
1	11 1/2	160	32	25	20	23,4	29,25	27,40	28,50	29,69	27,40
1 1/4	11 1/2	170	32	32	24	23,9	38,00	28,10	37,00	38,45	28,10
1 1/2	11 1/2	190	36	36	29	23,9	44,25	28,40	43,50	44,52	28,40
2	11 1/2	220	36	45	35	24,3	56,25	28,40	55,00	56,56	28,40

\* The recommended X-dimensions are for reference purpose only.

<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer (up to d1 1")		<b>Core Hole Diameter for American Taper Pipe Thread NPT, Taper 1 : 16 acc. to ANSI B 1.20.1</b>
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Steam Tempered	Steam Tempered		
<b>Catalogue-No.</b>	<b>2700/78</b>	<b>2750/78</b>		
<b>Tolerance</b>				
				rough-drill cylindrically
<b>Application</b> add. see Page 16, 17	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	Stainless Steels (V2A-Steels)		rough-drill cylindrically and grind conically with reamer
<b>Coolant</b>	Cutting Oil or Emulsion	Cutting Oil or Emulsion		
<b>Cutting Speed v<sub>c</sub></b>	5 - 10 m/min	3 - 6 m/min		

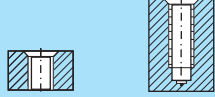
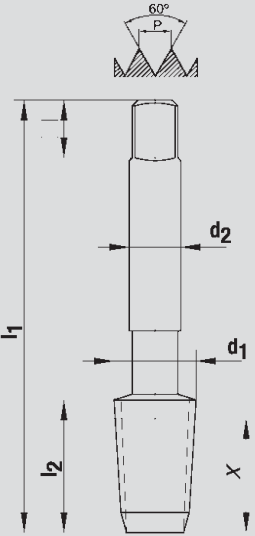

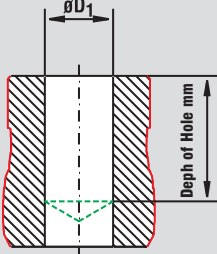
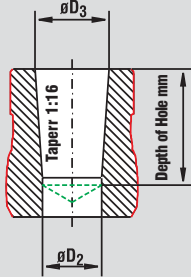
d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	X-Dim*	rough-drill cylindrically		rough-drill cylindrically and grind conically with reamer		
							Ø D <sub>1</sub> mm	Depth of Hole mm	Ø D <sub>2</sub> mm	Ø D <sub>3</sub> mm	Depth of Hole mm
1/16	27	56	12	6	4,9	9,7	6,25	12,00	6,00	6,39	12,00
1/8	27	63	12	7	5,5	9,7	8,50	12,00	8,25	8,74	12,00
1/4	18	63	20	11	9	14,2	11,10	17,50	10,70	11,36	17,50
3/8	18	70	22	12	9	14,5	14,70	17,60	14,10	14,80	17,60
1/2	14	80	22	16	12	19,0	18,00	22,90	17,40	18,32	22,90
3/4	14	100	22	20	16	19,5	23,25	23,00	22,60	23,67	23,00
1	11 1/2	110	32	25	20	23,4	29,25	27,40	28,50	29,69	27,40
1 1/4	11 1/2	125	32	32	24	23,9	38,00	28,10	37,00	38,45	28,10
1 1/2	11 1/2	140	36	36	29	23,9	44,25	28,40	43,50	44,52	28,40
2	11 1/2	160	36	45	35	24,3	56,25	28,40	55,00	56,56	28,40

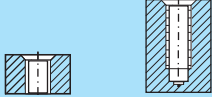
\* The recommended X-dimensions are for reference purpose only.

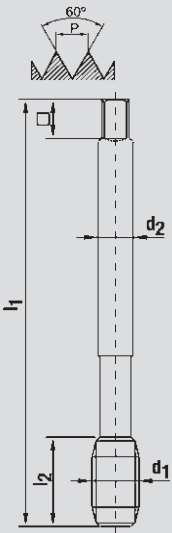
<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer		<b>Core Hole Diameter for American Taper Pipe Thread NPTF, Taper 1 : 16 acc. to ANSI B 1.20.4</b>
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Steam Tempered		
<b>Catalogue-No.</b>	<b>6700/78</b>		
<b>Tolerance</b>			
			rough-drill cylindrically
<b>Application</b> add. see Page 16,17	Tensile Strength $\leq 800 \text{ N/mm}^2$		
<b>Coolant</b>	Cutting Oil or Emulsion		rough-drill cylindrically and grind conically with reamer
<b>Cutting Speed <math>v_c</math></b>	5 - 10 m/min		

$d_1$	P	$l_1$	$l_2$	$d_2$	□	X-Dim*	rough-drill cylindrically		rough-drill cylindrically and grind conically with reamer		
							$\varnothing D_1$ mm	Depth of Hole mm	$\varnothing D_2$ mm	$\varnothing D_3$ mm	Depth of Hole mm
1/16	27	90	12	6	4,9	9,7	6,15	12,00	6,00	6,41	12,00
1/8	27	90	12	7	5,5	9,7	8,40	12,00	8,25	8,76	12,00
1/4	18	100	20	11	9	14,2	11,00	17,50	10,70	11,40	17,50
3/8	18	100	22	12	9	14,5	14,50	17,60	14,10	14,84	17,60
1/2	14	125	22	16	12	19,0	17,75	22,90	17,40	18,33	22,90
3/4	14	140	22	20	16	19,5	23,00	23,00	22,60	23,68	23,00
1	11 1/2	160	32	25	20	23,4	29,00	27,40	28,50	29,72	27,40
1 1/4	11 1/2	170	32	32	24	23,9	37,50	28,10	37,00	38,48	28,10
1 1/2	11 1/2	190	36	36	29	23,9	44,00	28,40	43,50	44,55	28,40
2	11 1/2	220	36	45	35	24,3	56,00	28,40	55,00	56,59	28,40

\* The recommended X-dimensions are for reference purpose only.

<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer							<b>Core Hole Diameter for American Taper Pipe Thread NPTF, Taper 1 : 16 acc. to ANSI B 1.20.4</b>			
<b>Type of Hole</b>											
<b>Surface Treatment</b>	Steam Tempered										
<b>Catalogue-No.</b>	2700/78										
<b>Tolerance</b>											
								rough-drill cylindrically			
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$										
add. see Page 16,17								rough-drill cylindrically and grind conically with reamer			
<b>Coolant</b>	Cutting Oil or Emulsion										
<b>Cutting Speed v<sub>c</sub></b>	5 - 10 m/min										
								rough-drill cylindrically			
								rough-drill cylindrically and grind conically with reamer			
<b>d<sub>1</sub></b>	<b>P (Gg/1")</b>	<b>l<sub>1</sub></b>	<b>l<sub>2</sub></b>	<b>d<sub>2</sub></b>	<b>□</b>	<b>X-Dim*</b>	<b>Ø D<sub>1</sub></b>	<b>Depth of Hole</b>	<b>Ø D<sub>2</sub></b>	<b>Ø D<sub>3</sub></b>	<b>Depth of Hole</b>
							<b>mm</b>	<b>mm</b>	<b>mm</b>	<b>mm</b>	<b>mm</b>
1/16	27	56	12	6	4,9	9,7	6,15	12,00	6,00	6,41	12,00
1/8	27	63	12	7	5,5	9,7	8,40	12,00	8,25	8,76	12,00
1/4	18	63	20	11	9	14,2	11,00	17,50	10,70	11,40	17,50
3/8	18	70	22	12	9	14,5	14,50	17,60	14,10	14,84	17,60
1/2	14	80	22	16	12	19,0	17,75	22,90	17,40	18,33	22,90
3/4	14	100	22	20	16	19,5	23,00	23,00	22,60	23,68	23,00
1	11 1/2	110	32	25	20	23,4	29,00	27,40	28,50	29,72	27,40
* The recommended X-dimensions are for reference purpose only.											


<b>Version</b>	Straight Flute, Form C, 2 -3 Threads Chamfer
<b>Type of Hole</b>	
<b>Surface Treatment</b>	
<b>Catalogue-No.</b>	<b>6002</b>
<b>Tolerance</b>	



C





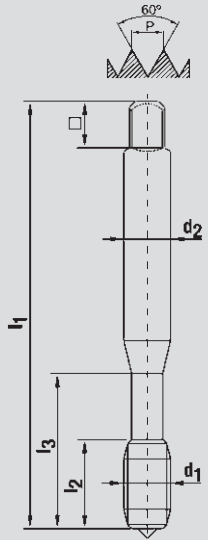


<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq$ 800 N/mm <sup>2</sup>
add. see Page 16,17	
<b>Coolant</b>	Cutting Oil or Emulsion
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min


d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
1/8	27	90	16	7	5,5	9,10
1/4	18	100	18	11	9	12,00
3/8	18	100	18	12	9	15,50
1/2	14	125	24	16	12	19,00
3/4	14	140	28	20	16	24,50
1	11 1/2	160	28	25	20	30,50


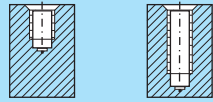
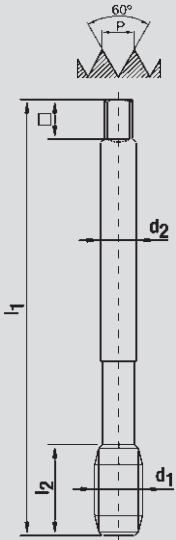





<b>Contents</b>	<b>Page</b>
<b>Unified-Coarse-Threads UNC ANSI B 1.1</b>	
Machine Taps DIN 371 / 376	120 - 129
Hand Taps HSS DIN 351	130
<b>Unified-Fine-Threads UNF ANSI B 1.1</b>	
Machine Taps DIN 371 / 374	131 - 140
Hand Taps HSS DIN 2181	141
<b>Unified-Extra-Fine-Thread UNEF ANSI B 1.1</b>	
Machine Taps DIN 374	142
<b>Unified-Thread UN, 8- and 12-Thread ANSI B 1.1</b>	
Machine Taps DIN 374	143


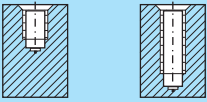

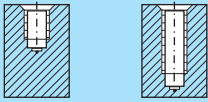




UNC/UNF/  
UNEF/UN

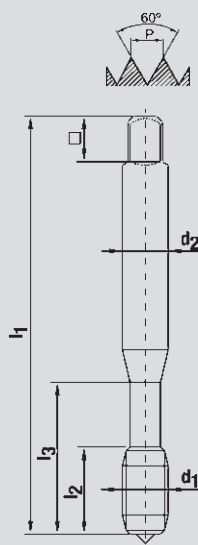
<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>7265/80</b>	<b>4345/80</b>
<b>Tolerance</b>	2B	2B
	Rapid-UNI	Grulo-UNI
		
<b>Application</b>	UNiversal Use in an Broad Material Range	
add. see Page 10,11		
<b>Coolant</b>	see Page 10	
<b>Cutting Speed v<sub>c</sub></b>	see Page 10	


d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
Nr. 4	- 40	56	10	18	3,5	2,7	2,35
Nr. 5	- 40	56	10	18	3,5	2,7	2,65
Nr. 6	- 32	56	10	20	4	3	2,85
Nr. 8	- 32	63	12	21	4,5	3,4	3,50
Nr. 10	- 24	70	14	25	6	4,9	3,90
Nr. 12	- 24	80	16	30	6	4,9	4,50
1/4	- 20	80	16	30	7	5,5	5,10
5/16	- 18	90	18	35	8	6,2	6,60
3/8	- 16	100	20	39	10	8	8,00


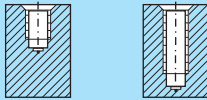

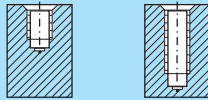




<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>7275/80</b>	<b>6345/80</b>
<b>Tolerance</b>	2B	2B
	Rapid-UNI	GruLo-UNI
		
<b>Application</b>	UNiversal Use in a Broad Material Range	
add. see Page 10,11		
<b>Coolant</b>	see Page 10	
<b>Cutting Speed v<sub>c</sub></b>	see Page 10	

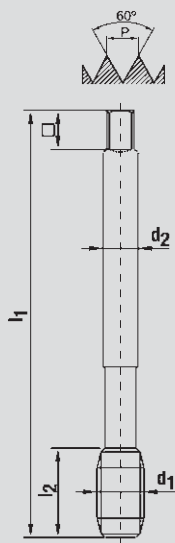
d <sub>1</sub>	P (Gg/1 <sup>st</sup> )	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
5/16	- 18	90	18	6	4,9	6,60
3/8	- 16	100	20	7	5,5	8,00
1/2	- 13	110	22	9	7	10,80
5/8	- 11	110	26	12	9	13,50
3/4	- 10	125	30	14	11	16,50


Version	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
Type of Hole				
Surface Treatment				
Catalogue-No.	<b>7010</b>	<b>4040</b>	<b>7265</b>	<b>4345</b>
Tolerance	2B	2B	2B	2B
	Rapid	Grulo	Rapid-VA-G	Grulo-Spez.-G
				
Application	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>		Aluminium Alloys, Copper Alloys	
add. see Page 10-13				
Coolant	Cutting Oil or Emulsion		Cutting Oil or Emulsion	
Cutting Speed v <sub>c</sub>	10 - 20 m/min		10 - 30 m/min	



d <sub>1</sub>	P (Gg/1 <sup>''</sup> )	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
Nr. 2	- 56	45	9		2,8	2,1	1,85
Nr. 3	- 48	50	9		2,8	2,1	2,10
Nr. 4	- 40	56	10	18	3,5	2,7	2,35
Nr. 5	- 40	56	10	18	3,5	2,7	2,65
Nr. 6	- 32	56	10	20	4	3	2,85
Nr. 8	- 32	63	12	21	4,5	3,4	3,50
Nr. 10	- 24	70	14	25	6	4,9	3,90
Nr. 12	- 24	80	16	30	6	4,9	4,50
1/4	- 20	80	16	30	7	5,5	5,10
5/16	- 18	90	18	35	8	6,2	6,60
3/8	- 16	100	20	39	10	8	8,00


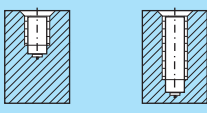

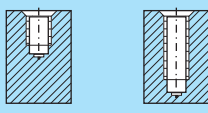
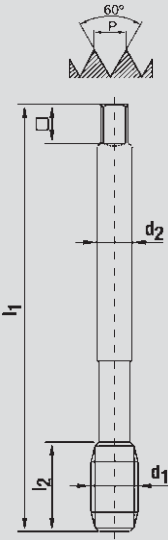




Version	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
Type of Hole				
Surface Treatment				
Catalogue-No.	<b>7011</b>	<b>6040</b>	<b>7275</b>	<b>6345</b>
Tolerance	2B	2B	2B	2B
	Rapid	Grulo	Rapid-VA-G	Grulo-Spez.-G
				
Application	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>		Aluminium Alloys, Copper Alloys	
add. see Page 10-13				
Coolant	Cutting Oil or Emulsion		Cutting Oil or Emulsion	
Cutting Speed v <sub>c</sub>	10 - 20 m/min		10 - 30 m/min	




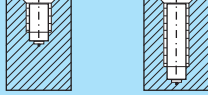
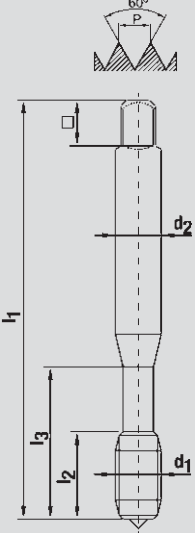
d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
1/4	- 20	80	16	4,5	3,4	5,10
5/16	- 18	90	18	6	4,9	6,60
3/8	- 16	100	20	7	5,5	8,00
7/16	- 14	100	20	8	6,2	9,40
1/2	- 13	110	22	9	7	10,80
9/16	- 12	110	24	11	9	12,20
5/8	- 11	110	26	12	9	13,50
3/4	- 10	125	30	14	11	16,50
7/8	- 9	140	30	18	14,5	19,50
1	- 8	160	36	18	14,5	22,25


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Therads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Nitrided		Nitrided	
<b>Catalogue-No.</b>	<b>7045/06</b>	<b>4045</b>	<b>7245/06</b>	<b>4245</b>
<b>Tolerance</b>	2B	2B	2B	2B
 	Rapid-Spez.	Grulo-Spez.	Rapid-Spez.-R	Grulo-Spez.-R
<b>Application</b> add. see page 12-15	Unalloyed and Alloyed Steels; Tensile Strength ≤ 1000 N/m <sup>2</sup>		Unalloyed and Alloyed Steels; Tensile Strength ≤ 1200 N/m <sup>2</sup>	
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min		5 - 10 m/min	

d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
Nr. 4	- 40	56	10	18	3,5	2,7	2,35
Nr. 5	- 40	56	10	18	3,5	2,7	2,65
Nr. 6	- 32	56	10	20	4	3	2,85
Nr. 8	- 32	63	12	21	4,5	3,4	3,50
Nr. 10	- 24	70	14	25	6	4,9	3,90
Nr. 12	- 24	80	16	30	6	4,9	4,50
1/4	- 20	80	16	30	7	5,5	5,10
5/16	- 18	90	18	35	8	6,2	6,60
3/8	- 16	100	20	39	10	8	8,00

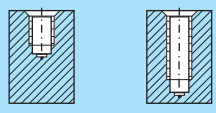
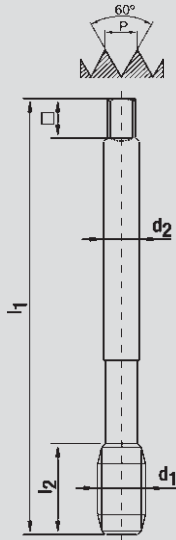
<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Nitrided		Nitrided	
<b>Catalogue-No.</b>	<b>7055/06</b>	<b>6045</b>	<b>7255/06</b>	<b>6245</b>
<b>Tolerance</b>	2B	2B	2B	2B
	Rapid-Spez.	Grulo-Spez.	Rapid-Spez.-R	Grulo-Spez.-R
				
<b>Application</b> add. see Page 12-15	Unalloyed and Alloyed Steels; Tensile Strength ≤ 1000 N/m <sup>2</sup>		Unalloyed and Alloyed Steels; Tensile Strength ≤ 1200 N/mm <sup>2</sup>	
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min		5 - 10 m/min	


d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
3/8	- 16	100	20	7	5,5	8,00
7/16	- 14	100	20	8	6,2	9,40
1/2	- 13	110	22	9	7	10,80
9/16	- 12	110	24	11	9	12,20
5/8	- 11	110	26	12	9	13,50
3/4	- 10	125	30	14	11	16,50
7/8	- 9	140	30	18	14,5	19,50
1	- 8	160	36	18	14,5	22,25


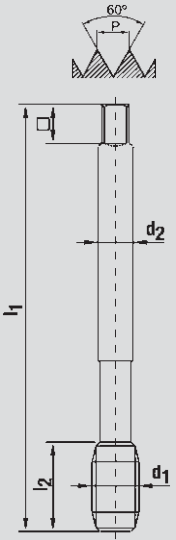

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Steam Tempered	Steam Tempered	Nitrided
<b>Catalogue-No.</b>	<b>7225/78</b>	<b>4365/78</b>	<b>4058/06</b>
<b>Tolerance</b>	2BX	2BX	2BX
	Rapid-V4A	GruLo-V4A	C-GG
<b>Application</b> add. see Page 10-13	Stainless Steels with High Chromium-Nickel-Content (VA-Steels)		Grey Cast Iron
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil
<b>Cutting Speed v<sub>c</sub></b>	6 - 10 m/min		10 - 20 m/min


d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
Nr. 4	- 40	56	10	18	3,5	2,7	2,35
Nr. 5	- 40	56	10	18	3,5	2,7	2,65
Nr. 6	- 32	56	10	20	4	3	2,85
Nr. 8	- 32	63	12	21	4,5	3,4	3,50
Nr. 10	- 24	70	14	25	6	4,9	3,90
Nr. 12	- 24	80	16	30	6	4,9	4,50
1/4	- 20	80	16	30	7	5,5	5,10
5/16	- 18	90	18	35	8	6,2	6,60
3/8	- 16	100	20	39	10	8	8,00


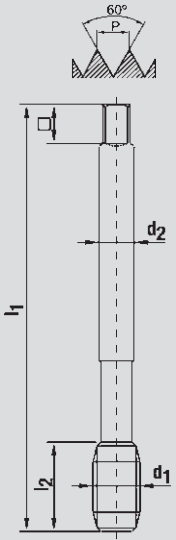




<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Steam Tempered	Steam Tempered	Nitrided
<b>Catalogue-No.</b>	<b>7235/78</b>	<b>6365/78</b>	<b>6008/06</b>
<b>Tolerance</b>	2BX	2BX	2BX
	Rapid-V4A	Grulo-V4A	C-GG
<b>Application</b> add. see Page 10-13	Stainless Steels with High Chromium-Nickel-Content (VA-Steels)		Grey Cast Iron
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil
<b>Cutting Speed v<sub>c</sub></b>	6 - 10 m/min		10 - 20 m/min

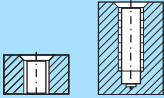
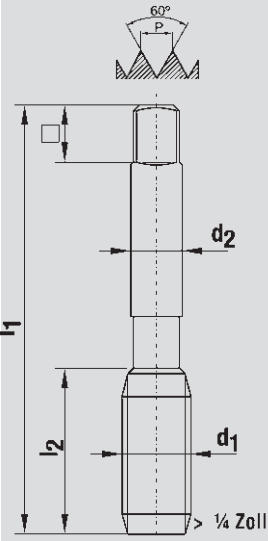


d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
5/16	- 18	90	18	6	4,9	6,60
3/8	- 16	100	20	7	5,5	8,00
7/16	- 14	100	20	8	6,2	9,40
1/2	- 13	110	22	9	7	10,80
9/16	- 12	110	24	11	9	12,20
5/8	- 11	110	26	12	9	13,50
3/4	- 10	125	30	14	11	16,50
7/8	- 9	140	30	18	14,5	19,50
1	- 8	160	36	18	14,5	22,25
1 1/8	- 7	180	40	22	18	25,00
1 1/4	- 7	180	40	22	18	28,00
1 3/8	- 6	200	45	28	22	30,75
1 1/2	- 6	200	45	32	24	34,00



<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>4052</b>	
<b>Tolerance</b>	2B	
	C	
		
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min	

d <sub>1</sub>	P (Gg/1 <sup>st</sup> )	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
Nr. 1	- 64	45	8		2,8	2,1	1,55
Nr. 2	- 56	45	9		2,8	2,1	1,85
Nr. 3	- 48	50	9		2,8	2,1	2,10
Nr. 4	- 40	56	10	18	3,5	2,7	2,35
Nr. 5	- 40	56	10	18	3,5	2,7	2,65
Nr. 6	- 32	56	10	20	4	3	2,85
Nr. 8	- 32	63	12	21	4,5	3,4	3,50
Nr. 10	- 24	70	14	25	6	4,9	3,90
Nr. 12	- 24	80	16	30	6	4,9	4,50
1/4	- 20	80	16	30	7	5,5	5,10
5/16	- 18	90	18	35	8	6,2	6,60
3/8	- 16	100	20	39	10	8	8,00


<b>Version</b>	Straight Flute, Form C, 2 - 3 Thread Chamfer	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>6002</b>	
<b>Tolerance</b>	2B	
	C	
		
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min	

d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
1/4	- 20	80	16	4,5	3,4	5,10
5/16	- 18	90	18	6	4,9	6,60
3/8	- 16	100	20	7	5,5	8,00
7/16	- 14	100	20	8	6,2	9,40
1/2	- 13	110	22	9	7	10,80
9/16	- 12	110	24	11	9	12,20
5/8	- 11	110	26	12	9	13,50
3/4	- 10	125	30	14	11	16,50
7/8	- 9	140	30	18	14,5	19,50
1	- 8	160	36	18	14,5	22,25

<b>Version</b>	Neoboss Graduation, *No. 3 in Tolerance 2B	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	2000	2000
<b>Tolerance</b>	2B	
	Complete Set	V à3 M à3 F à3*
		
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	


d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
Nr. 1	- 64	36	8	2,8	2,1	1,55	1/2	- 13	80	28	9	7	10,80
Nr. 2	- 56	36	9	2,8	2,1	1,85	9/16	- 12	80	30	11	9	12,20
Nr. 3	- 48	40	9	2,8	2,1	2,10	5/8	- 11	90	30	12	9	13,50
Nr. 4	- 40	41,5	11	3,5	2,7	2,35	3/4	- 10	105	35	14	11	16,50
Nr. 5	- 40	41,5	11	3,5	2,7	2,65	7/8	- 9	110	35	18	14,5	19,50
Nr. 6	- 32	45	9	4	3	2,85	1	- 8	110	38	20	14,5	22,25
Nr. 8	- 32	46,4	12	4,5	3,4	3,50	1 1/8	- 7	132	43	22	18	25,00
Nr. 10	- 24	50	16	6	4,9	3,90	1 1/4	- 7	132	43	22	18	28,00
Nr. 12	- 24	52,2	16	6	4,9	4,50	1 3/8	- 6	132	45	28	22	30,75
1/4	- 20	57	22	6	4,9	5,10	1 1/2	- 6	150	50	32	22	34,00
5/16	- 18	63	20	6	4,9	6,60	1 3/4	- 5	160	58	36	29	39,50
3/8	- 16	70	23	7	5,5	8,00	2	- 4 1/2	140	63	40	32	45,00
7/16	- 14	75	25	8	6,2	9,40							





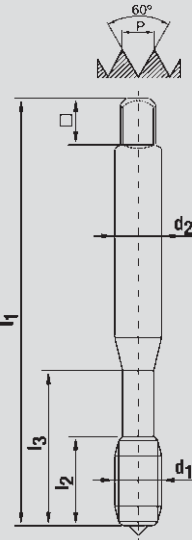




<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>7265/80</b>	<b>4345/80</b>
<b>Tolerance</b>	2B	2B
	Rapid-UNI	Grulo-UNI
		
<b>Application</b>	UNIversal Use in a Broad Material Range	
add. see Page 10,11		
<b>Coolant</b>	see Page 10	
<b>Cutting Speed v<sub>c</sub></b>	see Page 10	


d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
Nr. 4	- 48	56	8	18	3,5	2,7	2,40
Nr. 5	- 44	56	9	18	3,5	2,7	2,70
Nr. 6	- 40	56	10	20	4	3	2,95
Nr. 8	- 36	63	12	21	4,5	3,4	3,50
Nr. 10	- 32	70	12	25	6	4,9	4,10
Nr. 12	- 28	80	12	30	6	4,9	4,60
1/4	- 28	80	12	30	7	5,5	5,50
5/16	- 24	90	15	35	8	6,2	6,90
3/8	- 24	90	18	39	10	8	8,50


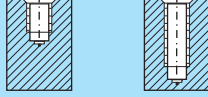

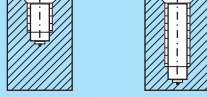
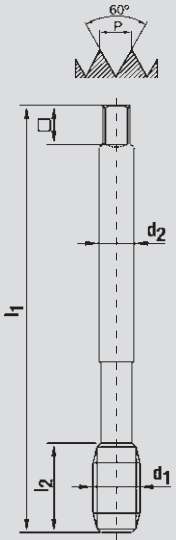




<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating
<b>Catalogue-No.</b>	<b>7275/80</b>	<b>6345/80</b>
<b>Tolerance</b>	2B	2B
	Rapid-UNI	Grulo-UNI
<b>Application</b>	UNiversal Use in a Broad Material Range	
add. see Page 10,11		
<b>Coolant</b>	see Page 10	
<b>Cutting Speed v<sub>c</sub></b>	see Page 10	




d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
5/16	- 24	90	15	6	4,9	6,90
3/8	- 24	90	18	7	5,5	8,50
1/2	- 20	100	18	9	7	11,50
5/8	- 18	100	18	12	9	14,50
3/4	- 16	110	24	14	11	17,50


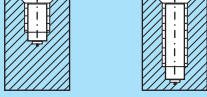


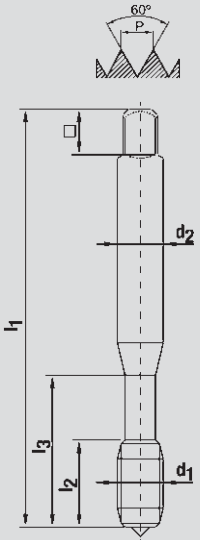




<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>				
<b>Catalogue-No.</b>	<b>7010</b>	<b>4040</b>	<b>7265</b>	<b>4345</b>
<b>Tolerance</b>	2B	2B	2B	2B
	Rapid	Grulo	Rapid-VA-G	Grulo-Spez.-G
				
<b>Application</b> add. see Page 10-13	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>		Aluminium Alloys, Copper Alloys	
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min		10 - 30 m/min	


d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
Nr. 2	- 64	45	8		2,8	2,1	1,85
Nr. 3	- 56	50	8		2,8	2,1	2,15
Nr. 4	- 48	56	8	18	3,5	2,7	2,40
Nr. 5	- 44	56	9	18	3,5	2,7	2,70
Nr. 6	- 40	56	10	20	4	3	2,95
Nr. 8	- 36	63	12	21	4,5	3,4	3,50
Nr. 10	- 32	70	12	25	6	4,9	4,10
Nr. 12	- 28	80	12	30	6	4,9	4,60
1/4	- 28	80	12	30	7	5,5	5,50
5/16	- 24	90	15	35	8	6,2	6,90
3/8	- 24	90	18	39	10	8	8,50

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>				
<b>Catalogue-No.</b>	<b>7011</b>	<b>6040</b>	<b>7275</b>	<b>6345</b>
<b>Tolerance</b>	2B	2B	2B	2B
	Rapid	Grulo	Rapid-VA-G	Grulo-Spez.-G
				
<b>Application</b> add. see Page 10-13	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>		Aluminium Alloys, Copper Alloys	
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min		10 - 30 m/min	

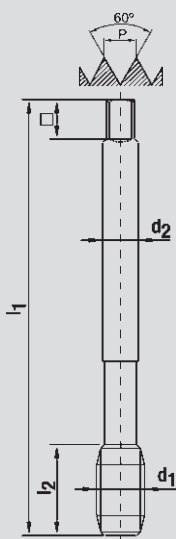
d <sub>1</sub>	P (Gg/1 <sup>“</sup> )	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
1/4	- 28	80	12	4,5	3,4	5,50
5/16	- 24	90	15	6	4,9	6,90
3/8	- 24	90	18	7	5,5	8,50
7/16	- 20	100	18	8	6,2	9,90
1/2	- 20	100	18	9	7	11,50
9/16	- 18	100	18	11	9	12,90
5/8	- 18	100	18	12	9	14,50
3/4	- 16	110	24	14	11	17,50
7/8	- 14	125	24	18	14,5	20,50
1	- 12	140	28	18	14,5	23,25



<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	Nitrided		Nitrided	
<b>Catalogue-No.</b>	<b>7045/06</b>	<b>4045</b>	<b>7245/06</b>	<b>4245</b>
<b>Tolerance</b>	2B	2B	2B	2B
	Rapid-Spez.	Grulo-Spez.	Rapid-Spez.-R	Grulo-Spez.-R
				
<b>Application</b> add. see Page 12-15	Unalloyed and Alloyed Steels; Tensile Strength ≤ 1000 N/mm <sup>2</sup>		Unalloyed and Alloyed Steels; Tensile Strength ≤ 1200 N/mm <sup>2</sup>	
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min		5 - 10 m/min	

d <sub>1</sub>	P (Gg/1“)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
Nr. 4	- 48	56	8	18	3,5	2,7	2,40
Nr. 5	- 44	56	9	18	3,5	2,7	2,70
Nr. 6	- 40	56	10	20	4	3	2,95
Nr. 8	- 36	63	12	21	4,5	3,4	3,50
Nr. 10	- 32	70	12	25	6	4,9	4,10
Nr. 12	- 28	80	12	30	6	4,9	4,60
1/4	- 28	80	12	30	7	5,5	5,50
5/16	- 24	90	15	35	8	6,2	6,90
3/8	- 24	90	18	39	10	8	8,50

Version	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
Type of Hole				
Surface Treatment	Nitrided		Nitrided	
Catalogue-No.	<b>7055/06</b>	<b>6045</b>	<b>7255/06</b>	<b>6245</b>
Tolerance	2B	2B	2B	2B
	Rapid-Spez.	Grulo-Spez.	Rapid-Spez.-R	Grulo-Spez.-R
Application	Unalloyed and Alloyed Steels; Tensile Strength ≤ 1000 N/mm <sup>2</sup>		Unalloyed and Alloyed Steels; Tensile Strength ≤ 1200 N/mm <sup>2</sup>	
Coolant	Cutting Oil or Emulsion		Cutting Oil or Emulsion	
Cutting Speed v <sub>c</sub>	10 - 20 m/min		5 - 10 m/min	




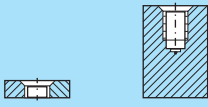
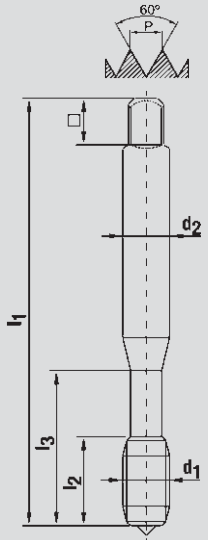

d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
7/16 -	20	100	18	8	6,2	9,90
1/2 -	20	100	18	9	7	11,50
9/16 -	18	100	18	11	9	12,90
5/8 -	18	100	18	12	9	14,50
3/4 -	16	110	24	14	11	17,50
7/8 -	14	125	24	18	14,5	20,50
1 -	12	140	28	18	14,5	23,25


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Steam Tempered	Steam Tempered	Nitrided
<b>Catalogue-No.</b>	<b>7225/78</b>	<b>4365/78</b>	<b>4058/06</b>
<b>Tolerance</b>	2BX	2BX	2BX
	Rapid-V4A	Grulo-V4A	C-GG
<b>Application</b> add. see Page 10-13	Stainless Steels with High Chromium-Nickel-Content (VA-Steels)		Grey Cast Iron
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil
<b>Cutting Speed v<sub>c</sub></b>	6 - 10 m/min		10 - 20 m/min


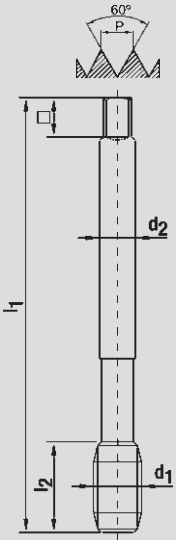

d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
Nr. 4	- 48	56	8	18	3,5	2,7	2,40
Nr. 5	- 44	56	9	18	3,5	2,7	2,70
Nr. 6	- 40	56	10	20	4	3	2,95
Nr. 8	- 36	63	12	21	4,5	3,4	3,50
Nr. 10	- 32	70	12	25	6	4,9	4,10
Nr. 12	- 28	80	12	30	6	4,9	4,60
1/4	- 28	80	12	30	7	5,5	5,50
5/16	- 24	90	15	35	8	6,2	6,90
3/8	- 24	90	18	39	10	8	8,50


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>			
<b>Surface Treatment</b>	Steam Tempered	Steam Tempered	Nitrided
<b>Catalogue-No.</b>	<b>7235/78</b>	<b>6365/78</b>	<b>6008/06</b>
<b>Tolerance</b>	2BX	2BX	2BX
	Rapid-V4A	Grulo-V4A	C-GG
<b>Application</b> add. see Page 10-13	Stainless Steels with High Chromium-Nickel-Content (VA-Steels)		Grey Cast Iron
<b>Coolant</b>	Cutting Oil or Emulsion		Cutting Oil
<b>Cutting Speed v<sub>c</sub></b>	6 - 10 m/min		10 - 20 m/min

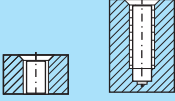
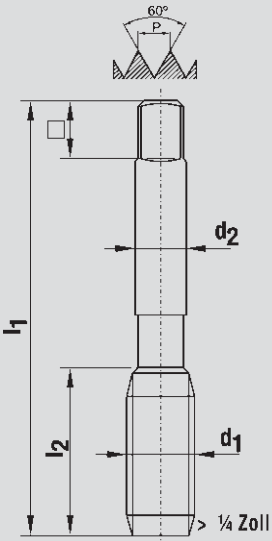

d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
5/16	- 24	90	15	6	4,9	6,90
3/8	- 24	90	18	7	5,5	8,50
7/16	- 20	100	18	8	6,2	9,90
1/2	- 20	100	18	9	7	11,50
9/16	- 18	100	18	11	9	12,90
5/8	- 18	100	18	12	9	14,50
3/4	- 16	110	24	14	11	17,50
7/8	- 14	125	24	18	14,5	20,50
1	- 12	140	24	18	14,5	23,25
1 1/8	- 12	150	36	22	18	26,50
1 1/4	- 12	150	36	22	18	29,50
1 3/8	- 12	170	36	28	22	32,75
1 1/2	- 12	170	36	28	22	36,00



<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>4052</b>	
<b>Tolerance</b>		
	C 	
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min	


d <sub>1</sub>	P (Gg/1 <sup>4</sup> )	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
Nr. 1	- 72	45	8		2,8	2,1	1,55
Nr. 2	- 64	45	8		2,8	2,1	1,85
Nr. 3	- 56	50	8		2,8	2,1	2,15
Nr. 4	- 48	56	8	18	3,5	2,7	2,40
Nr. 5	- 44	56	9	18	3,5	2,7	2,70
Nr. 6	- 40	56	10	20	4	3	2,95
Nr. 8	- 36	63	12	21	4,5	3,4	3,50
Nr. 10	- 32	70	12	25	6	4,9	4,10
Nr. 12	- 28	80	12	30	6	4,9	4,60
1/4	- 28	80	12	30	7	5,5	5,50
5/16	- 24	90	15	35	8	6,2	6,90
3/8	- 24	90	18	39	10	8	8,50


<b>Version</b>	Straight Flute, Form C, 2 - 3 Threads Chamfer	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>6002</b>	
<b>Tolerance</b>	2B	
	C	
		
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed. v<sub>c</sub></b>	10 - 20 m/min	

d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
1/4	- 28	80	12	4,5	3,4	5,50
5/16	- 24	90	15	6	4,9	6,90
3/8	- 24	90	18	7	5,5	8,50
7/16	- 20	100	18	8	6,2	9,90
1/2	- 20	100	18	9	7	11,50
9/16	- 18	100	18	11	9	12,90
5/8	- 18	100	18	12	9	14,50
3/4	- 16	110	24	14	11	17,50
7/8	- 14	125	24	18	14,5	20,50
1	- 12	140	24	18	14,5	23,25

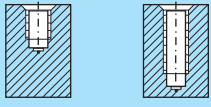
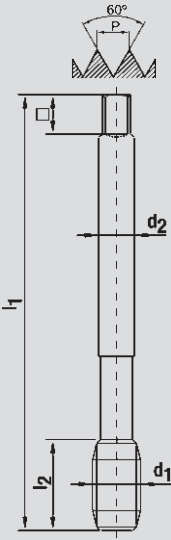

<b>Version</b>	Neoboss Graduation, *No. 3 in Tolerance 2B	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	2000	2000
<b>Tolerance</b>	2B	
	Complete Set	V à 2 F à 2*
		
<b>Application</b>	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	


d <sub>1</sub>	P (Gg/1 <sup>st</sup> )	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□		d <sub>1</sub>	P (Gg/1 <sup>st</sup> )	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
Nr. 1	- 72	36	8	2,8	2,1	1,55	3/8	- 24	63	18	7	5,5	8,50
Nr. 2	- 64	36	9	2,8	2,1	1,85	7/16	- 20	63	18	8	6,2	9,90
Nr. 3	- 56	40	9	2,8	2,1	2,15	1/2	- 20	70	20	9	7	11,50
Nr. 4	- 48	41,5	8	3,5	2,7	2,40	9/16	- 18	70	20	11	9	12,90
Nr. 5	- 44	41,5	8	3,5	2,7	2,70	5/8	- 18	70	20	12	9	14,50
Nr. 6	- 40	45	9	4	3	2,95	3/4	- 16	80	22	14	11	17,50
Nr. 8	- 36	46,4	10	4,5	3,4	3,50	7/8	- 14	90	22	18	14,5	20,50
Nr. 10	- 32	50	12	6	4,9	4,10	1	- 12	90	22	18	14,5	23,25
Nr. 12	- 28	52,2	12	6	4,9	4,60	1 1/8	- 12	90	22	22	18	26,50
1/4	- 28	51,1	12	6	4,9	5,50	1 1/4	- 12	90	22	22	18	29,50
5/16	- 24	56	18	6	4,9	6,90	1 3/8	- 12	125	30	28	22	32,75
							1 1/2	- 12	125	30	32	22	36,00

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>		
<b>Surface Treatment</b>	Steam Tempered	Steam Tempered
<b>Catalogue-No.</b>	<b>7055/78</b>	<b>6045/78</b>
<b>Tolerance</b>	2B	2B
	Rapid-Spez. Vap.	Grulo-Spez. Vap.
		
<b>Application</b> add. see Page 14, 15	Unalloyed Steels; Tensile Strength ≤ 1000 N/mm <sup>2</sup>	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	10 - 20 m/min	

d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
1/4	- 32	80	12	4,5	3,4	5,60
5/16	- 32	90	15	6	4,9	7,20
3/8	- 32	90	18	7	5,5	8,80
7/16	- 28	90	18	8	6,2	10,25
1/2	- 28	100	18	9	7	11,80
9/16	- 24	100	18	11	9	13,30
5/8	- 24	100	18	12	9	14,75
3/4	- 20	110	24	14	11	17,75
7/8	- 20	125	24	18	14,5	21,00
1	- 20	140	24	18	14,5	24,25


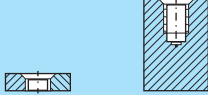

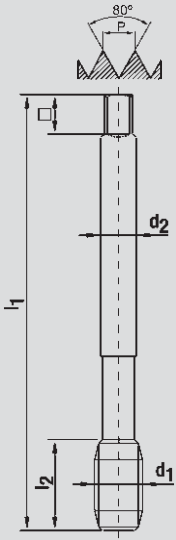






<b>Version</b>	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	
<b>Type of Hole</b>		
<b>Surface Treatment</b>	Steam Tempered	
<b>Catalogue-No.</b>	<b>6365/78</b>	
<b>Tolerance</b>	2BX	
	Grulo-V4A 	
<b>Application</b> add. see Page 12, 13	Stainless Steels with High Chromium-Nickel-Content (VA-Steels)	
<b>Coolant</b>	Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	6 - 10 m/min	

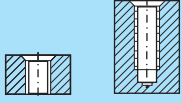
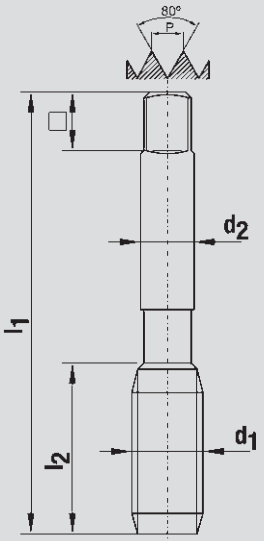


d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
<b>UN 8-Thread</b>						
1 1/8	- 8	180	35	22	18	25,50
1 1/4	- 8	180	40	22	18	28,75
1 1/2	- 8	200	36	28	22	35,00





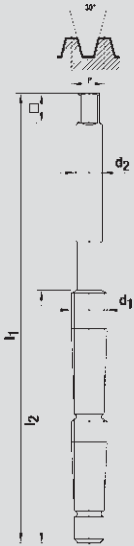

<b>Contents</b>		<b>Page</b>
<b>Steel Conduit Pipe Thread Pg DIN 40 430</b>		
Machine Tap DIN 40 430		146
Hand Tap HSS DIN 40432		147
<b>Metric ISO Trapezoidal Thread DIN 103</b>		
Single Cut Taps		148
Trapezoidal Sets		149


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer (only up to Pg 29)	Straight Flute, Form C, 2 - 3 Threads Chamfer	Ca. 15° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer (only up to Pg 29)
<b>Type of Hole</b>			
<b>Surface Treatment</b>			
<b>Catalogue-No.</b>	<b>7011</b>	<b>6002</b>	<b>6030</b>
<b>Tolerance</b>	Neoboss Specs.	Neoboss Specs.	Neoboss Specs.
	Rapid	C	Rsp
			
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$		
<b>Coolant</b>	Cutting Oil or Emulsion		
<b>Cutting Speed <math>v_c</math></b>	10 - 20 m/min		


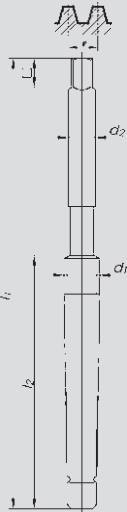


d1	P (Gg/1")	l1	l2	d2	□	
Pg 7	20	100	20	9	7	11,35
Pg 9	18	100	20	12	9	13,95
Pg 11	18	110	20	14	11	17,35
Pg 13,5	18	125	24	16	12	19,15
Pg 16	18	125	24	18	14,5	21,25
Pg 21	16	150	28	22	18	26,95
Pg 29	16	170	30	28	22	35,60
Pg 36	16	190	32	36	29	45,60
Pg 42	16	190	32	40	32	52,60
Pg 48	16	220	40	45	35	57,90


<b>Version</b>	Neoboss Graduation	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	2000	2000
<b>Tolerance</b>	Neoboss specs.	Neoboss specs.
	Complete Set	V à2 F à2
		
<b>Application</b>	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$	

d <sub>1</sub>	P (Gg/1'')	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
Pg 7	20	70	20	9	7	11,35
Pg 9	18	70	20	12	9	13,95
Pg 11	18	80	22	14	11	17,35
Pg 13,5	18	80	22	16	12	19,15
Pg 16	18	80	22	18	14,5	21,25
Pg 21	16	90	22	22	18	26,95
Pg 29	16	100	25	28	22	35,60
Pg 36	16	140	25	36	29	45,60
Pg 42	16	140	32	40	32	52,60
Pg 48	16	160	32	45	35	57,90

<b>Version</b>	▶	Ca. 6° Left Hand Spiral, with Taper Stage, for Nuts up to ca. 2 x d <sub>1</sub>  Available upon request
<b>Type of Hole</b>	▶	
<b>Surface Treatment</b>	▶	
<b>Catalogue-No.</b>	▶	<b>3010</b>
<b>Tolerance</b>	▶	7H
		
<b>Application</b>	▶	Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>
add. see Page 16, 17		
<b>Coolant</b>	▶	Cutting Oil or Emulsion
<b>Cutting Speed v<sub>c</sub></b>	▶	3 - 6 m/min

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
Tr 10	x 2	110	65	7	5,5	8,20
Tr 12	x 3	160	110	8	6,2	9,25
Tr 14	x 3	160	110	10	8	11,25
Tr 16	x 4	200	130	11	9	12,25
Tr 18	x 4	200	130	12	9	14,25
Tr 20	x 4	200	130	15	12	16,25
Tr 22	x 5	240	155	16	12	17,25
Tr 24	x 5	240	155	18	14,5	19,25
Tr 26	x 5	260	165	20	16	21,25
Tr 28	x 5	270	170	22	18	23,25
Tr 30	x 6	290	190	22	18	24,25

<b>Version</b>	Neoboss Graduation, for Nuts up to ca. $3 \times d_1$ , *No. 3 in Tolerance 7H  Available upon request	
<b>Type of Hole</b>		
<b>Surface Treatment</b>		
<b>Catalogue-No.</b>	<b>3000</b>	<b>3000</b>
<b>Tolerance</b>	7H	
	Complete Set	V à3 M à3 F à3*
		
<b>Application</b> add. see Page 16, 17	Unalloyed Steels; Tensile Strength $\leq 800 \text{ N/mm}^2$	

$d_1$	$P$ (mm)	$l_1$	$l_2$	$d_2$	□	
Tr 10	x 2	90	35	7	5,5	8,20
Tr 12	x 3	110	45	8	6,2	9,25
Tr 14	x 3	130	45	10	8	11,25
Tr 16	x 4	140	55	11	9	12,25
Tr 18	x 4	150	55	12	9	14,25
Tr 20	x 4	160	55	15	12	16,25
Tr 22	x 5	180	70	16	12	17,25
Tr 24	x 5	190	70	18	14,5	19,25
Tr 26	x 5	210	70	20	16	21,25
Tr 28	x 5	220	70	22	18	23,25
Tr 30	x 6	240	85	22	18	24,25




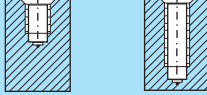
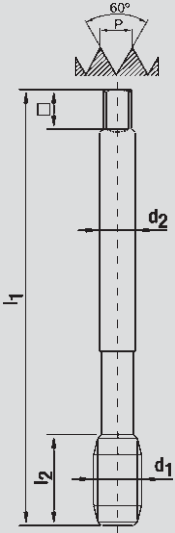









<b>Contents</b>		<b>Page</b>
<b>EG-Metric ISO-Standard-Thread EG-M DIN ISO Part 2 for Thread Inserts</b>		
Machine Taps DIN 371/376		152 - 153
<b>EG-Unified-Coarse-Thread EG-UNC for Thread Inserts</b>		
Machine Taps DIN 371/376		154 - 155

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating		
<b>Catalogue-No.</b>	<b>7265/54/80</b>	<b>4345/54/80</b>	<b>7010/54</b>	<b>4040/54</b>
<b>Tolerance</b>	6H mod	6H mod	6H mod	6H mod
	Rapid-UNI	Grulo-UNI	Rapid	Grulo
<b>Application</b> add. see Page 10, 11	UNiversal Use in a Broad Material Range		Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	
<b>Coolant</b>	see Page 10		Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	see Page 10		10 - 20 m/min	


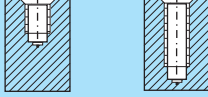

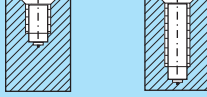
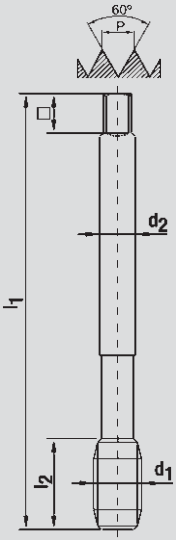
d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	l <sub>3</sub>	d <sub>2</sub>	□	
EG M 2,5	0,45	56	10	18	3,5	2,7	2,65
EG M 3	0,5	63	12	21	4,5	3,4	3,15
EG M 3,5	0,6	70	14	25	6	4,9	3,70
EG M 4	0,7	70	14	25	6	4,9	4,20
EG M 5	0,8	80	16	30	6	4,9	5,25
EG M 6	1	90	18	35	8	6,2	6,30
EG M 8	1,25	100	20	39	10	8	8,40


<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating		
<b>Catalogue-No.</b>	<b>7275/54/80</b>	<b>6345/54/80</b>	<b>7011/54</b>	<b>6040/54</b>
<b>Tolerance</b>	6H mod	6H mod	6H mod	6H mod
	Rapid-UNI	Grulo-UNI	Rapid	Grulo
				
<b>Application</b> add. see Page 10, 11	UNiversal Use in a Broad Material Range		Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	
<b>Coolant</b>	see Page 10		Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	see Page 10		10 - 20 m/min	

d <sub>1</sub>	P (mm)	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
EG M 10	1,5	110	22	9	7	10,40
EG M 12	1,75	110	24	11	9	12,50
EG M 14	2	110	26	12	9	14,50
EG M 16	2	125	30	14	11	16,50

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating		
<b>Catalogue-No.</b>	<b>7265/54/80</b>	<b>4345/54/80</b>	<b>7010/54</b>	<b>4040/54</b>
<b>Tolerance</b>	2B mod	2B mod	2B mod	2B mod
	Rapid-UNI	Grulo-UNI	Rapid	Grulo
<b>Application</b> add. see Page 10, 11	UNiversal Use in a Broad Material Range		Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	
<b>Coolant</b>	see Page 10		Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	see Page 10		10 - 20 m/min	

d1	P (mm)	l1	l2	l3	d2	□	
EG Nr. 4	- 40	63	12	21	4,5	3,4	3,10
EG Nr. 5	- 40	63	12	21	4,5	3,4	3,40
EG Nr. 6	- 32	70	14	25	6	4,9	3,80
EG Nr. 8	- 32	80	16	30	6	4,9	4,40
EG Nr. 10	- 24	80	16	30	7	5,5	5,20
EG Nr. 12	- 24	80	16	30	7	5,5	5,80
EG 1/4	- 20	90	18	35	8	6,2	6,70
EG 5/16	- 18	100	20	39	10	8	8,40

<b>Version</b>	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer	Straight Flute, Form B, with Spiral Point, 4 - 5 Threads Chamfer	Ca. 40° Right Hand Spiral, Form C, 2 - 3 Threads Chamfer
<b>Type of Hole</b>				
<b>Surface Treatment</b>	TiN-Coating	TiN-Coating		
<b>Catalogue-No.</b>	<b>7275/54/80</b>	<b>6345/54/80</b>	<b>7011/54</b>	<b>6040/54</b>
<b>Tolerance</b>	2B mod	2B mod	2B mod	2B mod
	Rapid-UNI	Grulo-UNI	Rapid	Grulo
<b>Application</b> add. see Page 10, 11	UNiversal Use in a Broad Material Range		Unalloyed Steels; Tensile Strength ≤ 800 N/mm <sup>2</sup>	
<b>Coolant</b>	see Page 10		Cutting Oil or Emulsion	
<b>Cutting Speed v<sub>c</sub></b>	see Page 10		10 - 20 m/min	

d <sub>1</sub>	P (Gg/1")	l <sub>1</sub>	l <sub>2</sub>	d <sub>2</sub>	□	
EG 3/8	- 16	110	22	9	7	10,00
EG 7/16	- 14	110	24	11	9	11,60
EG 1/2	- 13	110	26	12	9	13,30
EG 9/16	- 12	125	30	14	11	15,00
EG 5/8	- 11	125	30	14	11	16,50
EG 3/4	- 10	140	30	18	14,5	19,75



## Technical Part

<b>Contents</b>		<b>Page</b>
Dry Cutting / MKS = Minimal Lubrication System		158
PVD-Coatings		159
Recommended Core Hole Diameters	for Taps	160 - 162
	for Roll Taps	163
Recommended Cutting Speeds and RPMs		164
Taps - Technical Vocabulary		165
Tolerances (Thread Portion of Taps)		166
Tool Squares		167
General Terms and Conditions of Business		168
How to choose the right tool		169

## MKS = Minimum Lubrication System via 2-Phase-Technology

Maximum productivity in cutting technology stands for working up to high speeds. The resulting temperatures have to be absorbed, tool and material need to be cooled and lubricated to achieve high tool life.

The newly developed nozzle technology ensures the deep penetration of the finely-dosed coolant/lubricant into the cutting area and thus results in a high cooling and lubrication effect. The coolant/lubricant is applied via a 2-phase-nozzle. The coolant/lubricant jet is enveloped by an "air cushion" so that an unwanted mixture of liquid particles with the surrounding air is excluded.

The coolant/lubricant dismantled into microscopic particles cannot even be hurled away by high centrifugal forces (the disadvantage of full lubrication). The cooling and lubricating effect can thus be used to its full extent.

**Proven Use in:**

- Tapping
- Thread Rolling
- Thread Milling
- Drilling
- Reaming



Tool cooling and lubrication in an air cushion

### Criteria: Cost

- Volume reduction of coolants and lubricants
- Increased tool life
- Reduced disposal and cleaning costs
- Maintenance-free

### Criteria: Cooling

- Increased cooling effect
- Coolant/lubricant dismantled into microscopic particles
- Best cooling and lubrication results

### Criteria: Environmental

- Machining without tailings
- Saves costs of disposal
- Reduction of environmental load
- Eliminates health problems

### Criteria: Efficiency

- Simple, clean and safe operation
- Well-dosed coolant and lubricant
- Reduced consumption due to independent regulation of air and liquid volumes
- Increased tool life



## Neoboss Coatings

### Advantages:

- improved thread quality
- precise accuracy to gauge
- increased cutting speed
- extended tool life

	<b>TiN</b> TiN-coated Neoboss taps can be used universally.	<b>TiCN</b> Due to its high hardness and favourable viscosity TiCN-coating is recommended for difficult chipping and hard materials.	<b>TiAlN</b> Its extreme hardness and gliding quality guarantees high wear resistance against abrasive materials such as cast iron and Aluminium alloys. Its high ductility as well as thermal and chemical stability is extremely well suited for dry cutting and high speed cutting.	<b>CrN</b> This chrome nitride-coating with its high adhesive strength and excellent chemical durability is extremely well suited for thread rolling in Aluminium.	<b>DLC</b> With its highwear resistance and slight adhesion on nonferrous metals DLC-coating is perfectly recommended for cutting Aluminium and Aluminium alloys.
<b>Micro Hard. (HV 0,05)</b>	<b>2300</b>	<b>3000</b>	<b>3300</b>	<b>1750</b>	<b>2800</b>
<b>Colour of Coating</b>	<b>gold</b>	<b>blue-grey</b>	<b>purple - dark grey</b>	<b>silver-grey</b>	<b>black</b>
<b>max. Working Temperature</b>	<b>600 ° C</b>	<b>400 ° C</b>	<b>900 ° C</b>	<b>700 ° C</b>	<b>900 ° C</b>
<b>Application</b>	universal	difficult chipping materials	abrasive material, dry cutting / MKS	Rolling of Aluminium	Aluminium, Aluminium alloys

# Recommended Core Hole Diameters for Taps

<b>M</b> Metric ISO Standard Thread DIN 13				<b>MF</b> Metric ISO Fine Thread DIN 13				<b>BSW</b> Whitworth-Thread			
Nom.-Ø mm		Pitch mm	Core Hole-Ø mm	Nom.-Ø mm		Pitch mm	Core Hole-Ø mm	Nom.-Ø inch		Pitch ( Gg/1" )	Core Hole-Ø mm
M 1	x	0,25	0,75	M 10	x	1,00	9,00	W 1/16	-	60	1,55
M 1,1	x	0,25	0,85	M 10	x	1,25	8,80	W 3/32	-	48	2,10
M 1,2	x	0,25	0,95	M 11	x	1,00	10,00	W 1/8	-	40	2,35
M 1,4	x	0,30	1,10	M 12	x	0,50	11,50	W 9/32	-	32	2,85
M 1,6	x	0,35	1,25	M 12	x	0,75	11,20	W 3/16	-	24	3,90
M 1,7	x	0,35	1,35	M 12	x	1,00	11,00	W 7/32	-	24	4,50
M 1,8	x	0,35	1,45	M 12	x	1,25	10,80	W 1/4	-	20	5,10
M 2	x	0,40	1,60	M 12	x	1,50	10,50	W 5/16	-	18	6,60
M 2,2	x	0,45	1,75	M 13	x	1,00	12,00	W 3/8	-	16	8,00
M 2,3	x	0,40	1,90	M 13	x	1,50	11,50	W 7/16	-	14	9,40
M 2,5	x	0,45	2,05	M 14	x	0,75	13,20	W 1/2	-	12	10,60
M 2,6	x	0,45	2,15	M 14	x	1,00	13,00	W 9/16	-	12	12,20
M 3	x	0,50	2,50	M 14	x	1,25	12,80	W 5/8	-	11	13,50
M 3,5	x	0,60	2,90	M 14	x	1,50	12,50	W 3/4	-	10	16,50
M 4	x	0,70	3,30	M 15	x	1,00	14,00	W 7/8	-	9	19,50
M 4,5	x	0,75	3,70	M 15	x	1,50	13,50	W 1	-	8	22,25
M 5	x	0,80	4,20	M 16	x	1,00	15,00	W 1 1/8	-	7	25,00
M 5,5	x	0,90	4,60	M 16	x	1,50	14,50	W 1 1/4	-	7	28,00
M 6	x	1,00	5,00	M 17	x	1,00	16,00	W 1 3/8	-	6	30,75
M 7	x	1,00	6,00	M 18	x	1,00	17,00	W 1 1/2	-	6	34,00
M 8	x	1,25	6,80	M 18	x	1,50	16,50	W 1 5/8	-	5	36,25
M 9	x	1,25	7,80	M 18	x	2,00	16,00	W 1 3/4	-	5	39,50
M 10	x	1,50	8,50	M 20	x	1,00	19,00	W 1 7/8	-	4 1/2	42,00
M 11	x	1,50	9,50	M 20	x	1,50	18,50	W 2	-	4 1/2	45,00
M 12	x	1,75	10,20	M 20	x	2,00	18,00				
M 14	x	2,00	12,00	M 22	x	1,00	21,00				
M 16	x	2,00	14,00	M 22	x	1,50	20,50				
M 18	x	2,50	15,50	M 22	x	2,00	20,00				
M 20	x	2,50	17,50	M 24	x	1,00	23,00				
M 22	x	2,50	19,50	M 24	x	1,50	22,50				
M 24	x	3,00	21,00	M 24	x	2,00	22,00				
M 27	x	3,00	24,00	M 25	x	1,50	23,50				
M 30	x	3,50	26,50	M 26	x	1,50	24,50				
M 33	x	3,50	29,50	M 27	x	1,50	25,50				
M 36	x	4,00	32,00	M 27	x	2,00	25,00				
M 39	x	4,00	35,00	M 28	x	1,50	26,50				
M 42	x	4,50	37,50	M 30	x	1,00	29,00				
M 45	x	4,50	40,50	M 30	x	1,50	28,50				
M 48	x	5,00	43,00	M 30	x	2,00	28,00				
M 52	x	5,00	47,00	M 32	x	1,50	30,50				
				M 32	x	2,00	30,00				
				M 33	x	1,50	31,50				
				M 33	x	2,00	31,00				
				M 34	x	1,50	32,50				
				M 35	x	1,50	33,50				
				M 36	x	1,50	34,50				
				M 36	x	2,00	34,00				
				M 36	x	3,00	33,00				
				M 38	x	1,50	36,50				
				M 39	x	2,00	37,00				
				M 39	x	3,00	36,00				
				M 40	x	1,50	38,50				
				M 42	x	1,50	40,50				
				M 42	x	2,00	40,00				
				M 42	x	3,00	39,00				
				M 45	x	1,50	43,50				
				M 45	x	2,00	43,00				
				M 45	x	3,00	42,00				
				M 48	x	1,50	46,50				
				M 48	x	2,00	45,00				
				M 48	x	3,00	45,00				
				M 50	x	1,50	48,50				
				M 52	x	1,50	50,50				

<b>G</b> Whitworth Pipe Thread DIN ISO 228			
Nom.-Ø inch		Pitch ( Gg/1" )	Core Hole-Ø mm
G 1/8	-	28	8,80
G 1/4	-	19	11,80
G 3/8	-	19	15,25
G 1/2	-	14	19,00
G 5/8	-	14	21,00
G 3/4	-	14	24,50
G 7/8	-	14	28,25
G 1	-	11	30,75
G 1 1/8	-	11	35,50
G 1 1/4	-	11	39,50
G 1 3/8	-	11	41,50
G 1 1/2	-	11	45,25
G 1 3/4	-	11	51,00
G 2	-	11	57,00

<b>Rp</b> Whitworth Pipe Thread ISO 7/1 and DIN 2999			
Nom.-Ø inch		Pitch ( Gg/1" )	Core Hole-Ø mm
Rp 1/8	-	28	8,55
Rp 1/4	-	19	11,40
Rp 3/8	-	19	14,90
Rp 1/2	-	14	18,60
Rp 3/4	-	14	24,10
Rp 1	-	11	30,25
Rp 1 1/2	-	11	44,75
Rp 2	-	11	56,75

<b>MF</b> Metric ISO Fine Thread DIN 13			
Nom.-Ø mm		Pitch mm	Core Hole-Ø mm
M 2,5	x	0,35	2,15
M 2,6	x	0,35	2,25
M 3	x	0,35	2,65
M 3,5	x	0,35	3,15
M 4	x	0,35	3,65
M 4	x	0,50	3,50
M 4,5	x	0,50	4,00
M 5	x	0,50	4,50
M 6	x	0,50	5,50
M 6	x	0,75	5,20
M 7	x	0,75	6,20
M 8	x	0,50	7,50
M 8	x	0,75	7,20
M 8	x	1,00	7,00
M 9	x	0,75	8,20
M 9	x	1,00	8,00
M 10	x	0,50	9,50
M 10	x	0,75	9,20

# Recommended Core Hole Diameters for Taps

<b>UNC</b> Unified-Coarse-Thread ANSI B1.1		
Nom.-Ø inch	Pitch ( Gg/1" )	Core Hole-Ø mm
Nr. 1	- 64	1,55
Nr. 2	- 56	1,85
Nr. 3	- 48	2,10
Nr. 4	- 40	2,35
Nr. 5	- 40	2,65
Nr. 6	- 32	2,85
Nr. 8	- 32	3,50
Nr. 10	- 24	3,90
Nr. 12	- 24	4,50
1/4	- 20	5,10
5/16	- 18	6,60
3/8	- 16	8,00
7/16	- 14	9,40
1/2	- 13	10,80
9/16	- 12	12,20
5/8	- 11	13,50
3/4	- 10	16,50
7/8	- 9	19,50
1	- 8	22,25
1 1/8	- 7	25,00
1 1/4	- 7	28,00
1 3/8	- 6	30,75
1 1/2	- 6	34,00
1 3/4	- 5	39,50
2	- 4 1/2	45,00

<b>UNF</b> Unified-Fine-Thread ANSI B 1.1		
Nom.-Ø inch	Pitch mm	Core Hole-Ø mm
Nr. 0	- 80	1,25
Nr. 1	- 72	1,55
Nr. 2	- 64	1,85
Nr. 3	- 56	2,15
Nr. 4	- 48	2,40
Nr. 5	- 44	2,70
Nr. 6	- 40	2,95
Nr. 8	- 36	3,50
Nr. 10	- 32	4,10
Nr. 12	- 28	4,60
1/4	- 28	5,50
5/16	- 24	6,90
3/8	- 24	8,50
7/16	- 20	9,90
1/2	- 20	11,50
9/16	- 18	12,90
5/8	- 18	14,50
3/4	- 16	17,50
7/8	- 14	20,50
1	- 12	23,25
1 1/8	- 12	26,50
1 1/4	- 12	29,50
1 3/8	- 12	32,75
1 1/2	- 12	36,00

<b>UNEF</b> Unified-Extra-Fine-Thread ANSI B 1.1		
Nom.-Ø inch	Pitch ( Gg/1" )	Core Hole-Ø mm
1/4	- 32	5,60
5/16	- 32	7,20
3/8	- 32	8,80
7/16	- 28	10,25
1/2	- 28	11,80
9/16	- 24	13,30
5/8	- 24	14,75
3/4	- 20	17,75
7/8	- 20	21,00
1	- 20	24,25

<b>UN</b> Unified-Thread, 8- and 12-Threads ANSI B 1.1		
Nom.-Ø inch	Pitch ( Gg/1" )	Core Hole-Ø mm
1 1/8	- 8	25,50
1 1/4	- 8	28,75
1 1/2	- 8	35,00
1 3/4	- 8	41,50
2	- 8	47,75
1 3/4	- 12	42,50
2	- 12	48,75

<b>Pg</b> Steel Conduit Pipe Thread DIN 40430		
Nom.-Ø	Pitch ( Gg/1" )	Core Hole-Ø mm
Pg 7	- 20	11,35
Pg 9	- 18	13,95
Pg 11	- 18	17,35
Pg 13,5	- 18	19,15
Pg 16	- 18	21,25
Pg 21	- 16	26,95
Pg 29	- 16	35,60
Pg 36	- 16	45,60
Pg 42	- 16	52,60
Pg 48	- 16	57,90

<b>NPSM</b> American Cylindrical Pipe Thread NPSM acc. to ANSI B 1.20.1		
Nom.-Ø inch	Pitch ( Gg/1" )	Core Hole-Ø mm
1/8	- 27	9,10
1/4	- 18	12,00
3/8	- 18	15,50
1/2	- 14	19,00
3/4	- 14	24,50
1	- 11 1/2	30,50

<b>Rd</b> Round Thread DIN 405		
Nom.-Ø mm	Pitch ( Gg/1" )	Core Hole-Ø mm
Rd 8	x 10	5,90
Rd 10	x 10	7,90
Rd 12	x 10	9,90
Rd 14	x 8	11,40
Rd 16	x 8	13,50
Rd 18	x 8	15,50
Rd 20	x 8	17,50
Rd 24	x 8	21,50
Rd 28	x 8	25,50

<b>Tr</b> Trapezoidal DIN 103		
Nom.-Ø mm	Pitch mm	Core Hole-Ø mm
Tr 10	x 2	8,20
Tr 12	x 3	9,25
Tr 14	x 3	11,25
Tr 16	x 4	12,25
Tr 18	x 4	14,25
Tr 20	x 4	16,25
Tr 22	x 5	17,25
Tr 24	x 5	19,25
Tr 26	x 5	21,25
Tr 28	x 5	23,25
Tr 30	x 6	24,25

<b>EG-M</b> EG-Metric ISO Standard Thread DIN 8140 Part 2 for Thread Inserts		
Nom.-Ø mm	Pitch mm	Core Hole-Ø mm
EG M 2	x 0,45	2,65
EG M 3	x 0,50	3,15
EG M 3,5	x 0,60	3,70
EG M 4	x 0,70	4,20
EG M 5	x 0,80	5,25
EG M 6	x 1,00	6,30
EG M 8	x 1,25	8,40
EG M 10	x 1,50	10,40
EG M 12	x 1,75	12,50
EG M 14	x 2,00	14,50
EG M 16	x 2,00	16,50

<b>EG-UNC</b> EG-Unified-Coarse-Thread for Thread Inserts		
Nenn-Ø inch	Pitch ( Gg/1" )	Core Hole-Ø mm
EG Nr. 4	- 40	3,10
EG Nr. 5	- 40	3,40
EG Nr. 6	- 32	3,80
EG Nr. 8	- 32	4,40
EG Nr. 10	- 24	5,20
EG Nr. 12	- 24	5,80
EG 1/4	- 20	6,70
EG 5/16	- 18	8,40
EG 3/8	- 16	10,00
EG 7/16	- 14	11,60
EG 1/2	- 13	13,30
EG 9/16	- 12	15,00
EG 5/8	- 11	16,50
EG 3/4	- 10	19,75

## Recommended Core Hole Diameters for Taps

### RC

#### Whitworth Cylindrical Pipe Thread (BSPT), acc. BS 21 and ISO 7/1, Taper 1 : 16

##### rough-drill cylindrically

Nom-Ø inch	Pitch ( Gg/1" )	Ø D <sub>1</sub> mm	Hole Depth mm
Rc 1/16	-	28	6,20
Rc 1/8	-	28	8,20
Rc 1/4	-	19	11,00
Rc 3/8	-	19	14,50
Rc 1/2	-	14	18,00
Rc 3/4	-	14	23,50
Rc 1	-	11	29,50

##### rough-drill cylindrically and grind conically with reamer

Nom-Ø inch	Pitch ( Gg/1" )	Ø D <sub>2</sub> mm	Ø D <sub>3</sub> mm	Hole Depth mm
Rc 1/16	-	28	6,20	6,56
Rc 1/8	-	28	8,10	8,57
Rc 1/4	-	19	10,75	11,45
Rc 3/8	-	19	14,25	14,95
Rc 1/2	-	14	17,75	18,63
Rc 3/4	-	14	23,00	24,12
Rc 1	-	11	29,00	30,29

### NPT

#### American Taper Pipe Thread, Taper 1 : 16 acc. to ANSI B 1.20.1

##### rough-drill cylindrically

Nom-Ø inch	Pitch ( Gg/1" )	Ø D <sub>1</sub> mm	Hole Depth mm
1/16 -	27	6,25	12,00
1/8 -	27	8,50	12,00
1/4 -	18	11,10	17,50
3/8 -	18	14,70	17,60
1/2 -	14	18,00	22,90
3/4 -	14	23,25	23,00
1 -	11 1/2	29,25	27,40
1 1/4 -	11 1/2	38,00	28,10
1 1/2 -	11 1/2	44,25	28,40
2 -	11 1/2	56,25	28,40

##### rough-drill cylindrically and grind conically with reamer

Nom-Ø inch	Pitch ( Gg/1" )	Ø D <sub>2</sub> mm	Ø D <sub>3</sub> mm	Hole Depth mm
1/16 -	27	6,00	6,41	11,90
1/8 -	27	8,25	8,76	12,00
1/4 -	18	10,70	11,40	17,50
3/8 -	18	14,10	14,84	17,60
1/2 -	14	17,40	18,33	22,90
3/4 -	14	22,60	23,68	23,00
1 -	11 1/2	28,50	29,72	27,40
1 1/4 -	11 1/2	37,00	38,48	28,10
1 1/2 -	11 1/2	43,50	44,55	28,40
2 -	11 1/2	55,00	56,59	28,40

### NPT

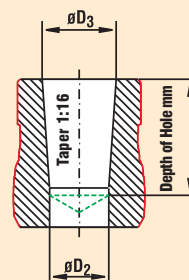
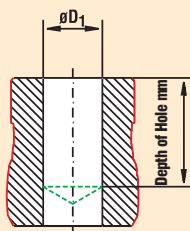
#### American Taper Pipe Thread, Taper 1 : 16 acc. to ANSI B 1.20.4

##### rough-drill cylindrically

Nom.-Ø inch	Pitch ( Gg/1" )	Ø D <sub>1</sub> mm	Hole Depth mm
1/16 -	27	6,15	12,00
1/8 -	27	8,40	12,00
1/4 -	18	11,00	17,50
3/8 -	18	14,50	17,60
1/2 -	14	17,75	22,90
3/4 -	14	23,00	23,00
1 -	11 1/2	29,00	27,40
1 1/4 -	11 1/2	37,50	28,10
1 1/2 -	11 1/2	44,00	28,40
2 -	11 1/2	56,00	28,40

##### rough-drill cylindrically and grind conically with reamer

Nom.-Ø inch	Pitch ( Gg/1" )	Ø D <sub>2</sub> mm	Ø D <sub>3</sub> mm	Hole Depth mm
1/16 -	27	6,00	6,41	12,00
1/8 -	27	8,25	8,76	12,00
1/4 -	18	10,70	11,40	17,50
3/8 -	18	14,10	14,84	17,60
1/2 -	14	17,40	18,33	22,90
3/4 -	14	22,60	23,68	23,00
1 -	11 1/2	28,50	29,72	27,40
1 1/4 -	11 1/2	37,00	38,48	28,10
1 1/2 -	11 1/2	43,50	44,55	28,40
2 -	11 1/2	55,00	56,59	28,40



# Core Hole Diameters for Roll Taps

**Please, note!**

The core hole diameter has an impact on the quality of the thread.

**Core hole too small:**

Thread will be squeezed, danger of breaking the tool.

**Core hole too wide:**

No clean thread surface.

<b>M Metric ISO Standard Thread DIN 13</b>			
Nom.-Ø mm		Pitch mm	Core Hole-Ø mm
M 1	x	0,25	0,88
M 1,2	x	0,25	1,08
M 1,4	x	0,30	1,25
M 1,6	x	0,35	1,45
M 1,7	x	0,35	1,55
M 1,8	x	0,35	1,65
M 2	x	0,40	1,80
M 2,2	x	0,45	2,00
M 2,3	x	0,40	2,10
M 2,5	x	0,45	2,30
M 2,6	x	0,45	2,40
M 3	x	0,50	2,80
M 3,5	x	0,60	3,25
M 4	x	0,70	3,70
M 5	x	0,80	4,65
M 6	x	1,00	5,55
M 8	x	1,25	7,40
M 10	x	1,50	9,30
M 12	x	1,75	11,20
M 14	x	2,00	13,10
M 16	x	2,00	15,10
M 18	x	2,50	16,90
M 20	x	2,50	18,90
M 22	x	2,50	20,90
M 24	x	3,00	22,65

<b>MF Metric ISO Fine Thread DIN 13</b>			
Nom.-Ø mm		Pitch mm	Core Hole-Ø mm
M 4	x	0,50	3,75
M 5	x	0,50	4,75
M 6	x	0,50	5,75
M 6	x	0,75	5,65
M 8	x	0,50	7,75
M 8	x	0,75	7,65
M 8	x	1,00	7,55
M 10	x	0,75	9,65
M 10	x	1,00	9,55
M 12	x	1,00	11,55
M 12	x	1,50	11,30
M 14	x	1,00	13,55
M 14	x	1,50	13,30
M 16	x	1,00	15,55
M 16	x	1,50	15,30
M 18	x	1,00	17,55
M 18	x	1,50	17,30
M 20	x	1,50	19,30
M 20	x	2,00	19,10
M 22	x	1,50	21,30
M 22	x	2,00	21,10
M 24	x	1,50	23,30
M 24	x	2,00	23,10

<b>UNC Unified-Coarse-Thread ANSI B1.1</b>		
Nom.-Ø inch	Pitch mm	Core Hole-Ø mm
Nr. 2 - 56	0,454	1,95
Nr. 3 - 48	0,529	2,25
Nr. 4 - 40	0,635	2,55
Nr. 5 - 40	0,635	2,90
Nr. 6 - 32	0,794	3,15
Nr. 8 - 32	0,794	3,80
Nr. 10 - 24	1,058	4,35
Nr. 12 - 24	1,058	5,00
1/4 - 20	1,270	5,75
5/16 - 18	1,411	7,30
3/8 - 16	1,588	8,80
7/16 - 14	1,814	10,30
1/2 - 13	1,954	11,80
9/16 - 12	2,117	13,30
5/8 - 11	2,309	14,80
3/4 - 10	2,540	17,90
7/8 - 9	2,822	20,95
1 - 8	3,175	24,00

<b>UNF Unified-Fine-Thread ANSI B 1.1</b>		
Nom.-Ø inch	Pitch mm	Core Hole-Ø mm
Nr. 2 - 64	0,397	2,00
Nr. 3 - 56	0,454	2,30
Nr. 4 - 48	0,529	2,60
Nr. 5 - 44	0,577	2,90
Nr. 6 - 40	0,635	3,20
Nr. 8 - 36	0,706	3,85
Nr. 10 - 32	0,794	4,45
Nr. 12 - 28	0,907	5,10
1/4 - 28	0,907	5,95
5/16 - 24	1,058	7,45
3/8 - 24	1,058	9,00
7/16 - 20	1,270	10,50
1/2 - 20	1,270	12,10
9/16 - 18	1,411	13,65
5/8 - 18	1,411	15,25
3/4 - 18	1,588	18,30
7/8 - 14	1,814	21,40
1 - 12	2,117	24,45

<b>G Whitworth Pipe Thread DIN ISO 228</b>		
Nom.-Ø inch	Pitch mm	Core Hole-Ø mm
G 1/8 - 28	0,907	9,25
G 1/4 - 19	1,337	12,50
G 3/8 - 19	1,337	16,00
G 1/2 - 14	1,814	20,00
G 5/8 - 14	1,814	22,00
G 3/4 - 14	1,814	25,50
G 7/8 - 14	1,814	29,25
G 1 - 11	2,309	32,00

## Recommended Cutting Speeds and RPM for Taping

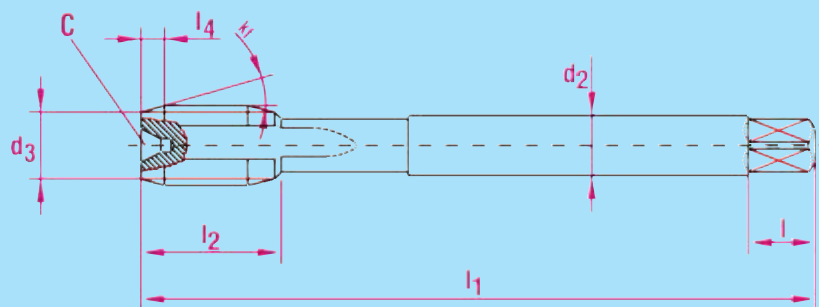
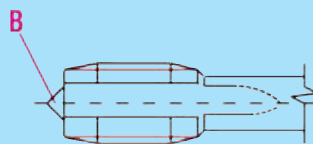
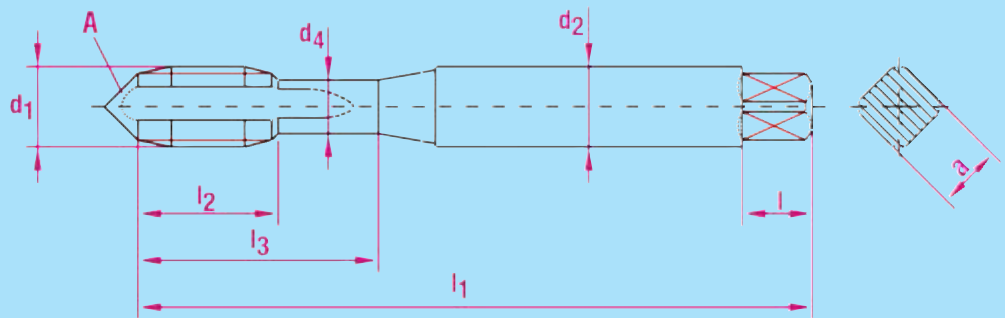
Thread Ø mm	Cutting Speed $v_c$ in m/min															RPM
	1	2	3	4	5	6	8	10	12	15	20	25	30	40	50	
M 1	318	637	955	1274	1592	1910	2548	3185	3822	4777	6396	7962	9554	12739	15924	19108
M 2	159	318	478	637	796	955	1274	1592	1911	2388	3185	3981	4777	6396	7962	9554
M 3	106	212	318	425	531	637	849	1062	1274	1592	2123	2654	3185	4246	5308	6369
M 4	80	159	239	318	398	478	637	796	955	1194	1592	1990	2389	3185	3981	4777
M 5	64	127	191	255	318	382	510	637	764	955	1274	1592	1911	2548	3185	3821
M 6	53	106	159	212	265	318	425	513	637	796	1062	1327	1592	2123	2653	3185
M 8	40	80	119	159	199	239	318	398	478	597	796	955	1194	1592	1990	2388
M 10	31	64	96	127	159	191	255	318	382	478	637	796	955	1274	1592	1911
M 12	26	53	80	106	133	159	212	265	318	398	531	663	796	1062	1327	1592
M 14	23	45	68	91	114	136	182	227	273	341	455	569	682	910	1137	1365
M 16	20	40	60	80	100	119	159	199	239	299	398	498	597	796	995	1194
M 18	18	35	53	71	88	106	142	177	212	265	354	442	531	708	885	1062
M 20	16	32	48	64	80	96	127	159	191	239	318	398	478	637	796	955
M 25	13	25	38	51	64	76	102	127	153	191	255	318	382	510	637	764
M 30	11	21	32	42	53	64	85	106	127	159	212	205	318	425	531	637
M 35	9	18	27	36	45	55	73	91	109	136	182	227	273	364	455	546
M 40	8	16	24	32	40	48	64	80	96	119	159	199	239	318	398	478
M 45	7	14	21	28	35	42	57	71	85	106	142	177	212	283	354	425
M 50	6	13	19	25	32	38	51	64	76	96	127	159	191	255	318	382

**Formula: RPM =  $\frac{\text{Cutting Speed} \times 1000}{\text{Diameter} \times 3,14}$**      
  **$n = \frac{v_c \times 1000}{d \times \pi} = \text{RPM}$**      
 **oder  $v_c = \frac{d \times \pi \times n}{1000} = \text{m/min}$**

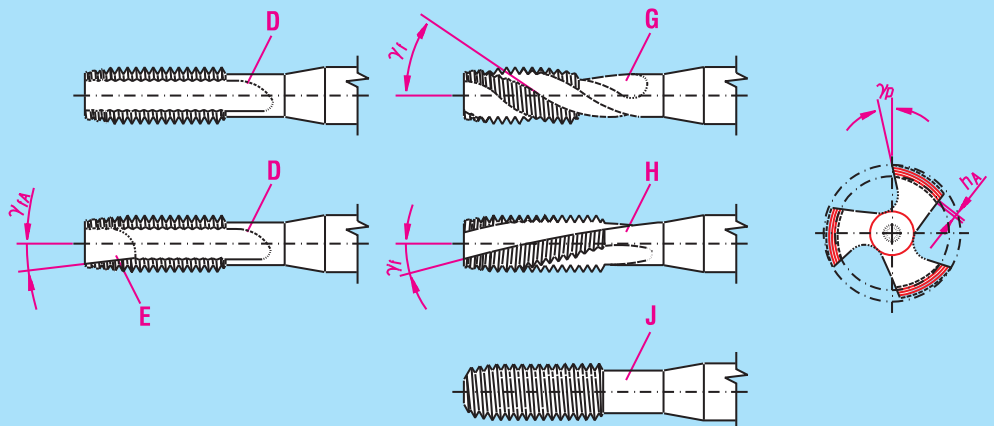
## Taps - Technical Vocabulary

### Letters of Dimensions Abbreviations

- A = External Center
- B = Reduced External Center
- C = Internal Center
- $d_1$  = Major Diameter of Tap
- $d_2$  = Shank Diameter of Tap
- $d_3$  = Chamfer Diameter
- $d_4$  = Neck Diameter
- $l_1$  = Total Length
- $l_2$  = Thread Length
- $l_3$  = Usable Length
- $l_4$  = Square Size
- $a$  = Square Size
- $l$  = Square Length
- $K_f$  = Chamfer Angle



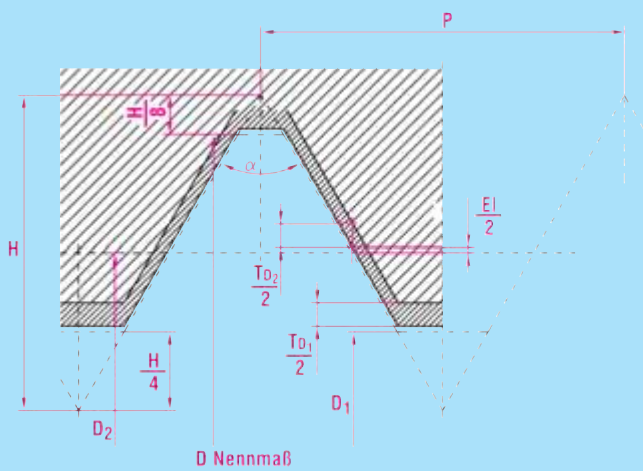
- D = Straight Flutes
- E = Spiral Point
- G = Right Hand Spiral
- H = Left Hand Spiral
- J = Roll Tap
- $\gamma$  = Chip Angle, Side
- $\gamma_{fA}$  = Angle of Spiral Point
- $\gamma_p$  = Chip Angle
- $h_a$  = Chamfer Relief



## Tap Tolerances (Thread Portion of Taps)

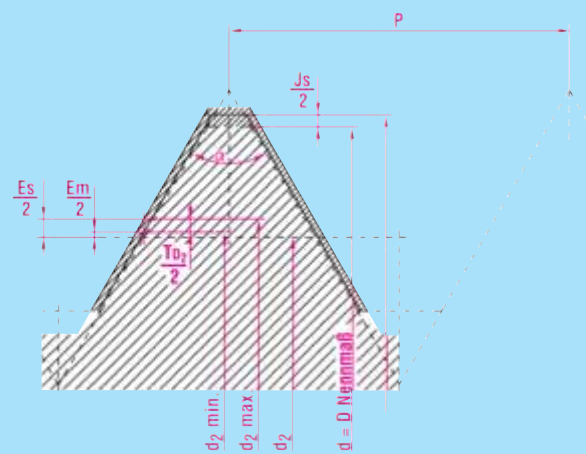
Extracted from DIN EN 22 857

### Female Thread Profile



- E1 = Theoretical Size
- D = Nominal Diameter
- D<sub>1</sub> = Nominal Core Diameter
- D<sub>2</sub> = Flank Diameter
- H = Triangular Height
- P = Pitch
- T<sub>D1</sub> = Tolerance of Core Hole Diameter
- T<sub>D2</sub> = Tolerance of Flank Diameter
- T<sub>D2</sub> = Tolerance Class 5 of Female Thread
- Tolerance of Flank Diameter acc. to Class 5
- a = Thread Angle

### Profile of Tap



- d-D = Nominal Diameter
- d<sub>min</sub> = Minimum Outside Diameter
- d<sub>2</sub> = D<sub>2</sub> = Flank Diameter
- d<sub>2</sub> max. = Maximum Flank Diameter
- d<sub>2</sub> min. = Minimum Flank Diameter
- Em = Minimum Flank Diameter
- Es = Maximum Flank Diameter
- Js = Minimum Outside Diameter
- P = Pitch
- t-T<sub>D2</sub> = Tolerance Class 5 of Female Thread
- Unit of Tolerance
- T<sub>d2</sub> = Tolerance of the Flank Diameter

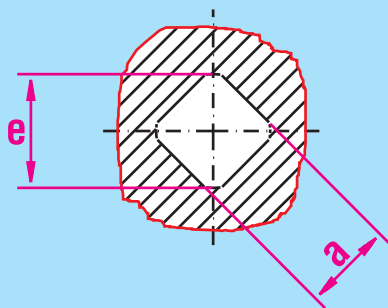
Female Thread Tol. Position H	Tap Tolerance Class	Female Thread Tol. Position G	Tolerance Class of Tap				Area of Tolerance of Thread to be Cut			
			According to							
			DIN	ISO						
4H	ISO 1	4H	5H	–	–	–				
6H	ISO 2	4G	5G	6H	–	–				
6G	ISO 3	–	–	6G	7H	8H				
7G	–	–	–	–	7G	8G				



## Squares

DIN 10 - 6.97 Tab. 1

### Inner Squares



### Outer Squares

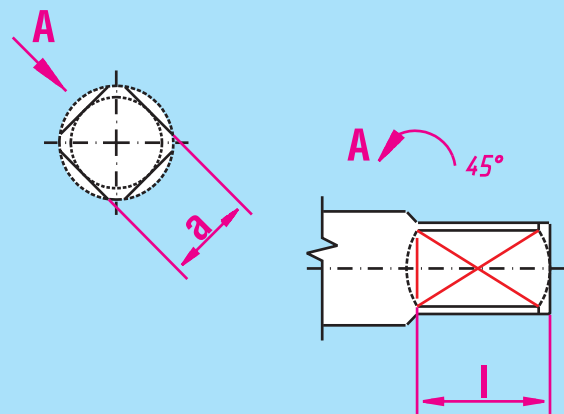


Chart 1

Nom. Dim. a	Square							Cylindrical Shaft		
	Inner Square			Outer Square				Diameters		Preferred Diameter d
	max.	a min.	e min.	max.	a min.	l js 16 <sup>1)</sup>	from d	to		
2,1	2,260	2,120	2,89	2,100	2,010	5	2,47	2,83	2,5; 2,8	
2,4	2,560	2,420	3,27	2,400	2,310	5	2,83	3,20	–	
2,7	2,860	2,720	3,67	2,700	2,610	6	3,20	3,60	3,5	
3,0	3,160	3,020	4,08	3,000	2,910	6	3,60	4,01	4	
3,4	3,610	3,430	4,60	3,400	3,280	6	4,01	4,53	4,5	
3,8	4,010	3,830	5,15	3,800	3,680	7	4,53	5,08	5	
4,3	4,510	4,330	5,86	4,300	4,180	7	5,08	5,79	5,5	
4,9	5,110	4,930	6,61	4,900	4,780	8	5,79	6,53	6	
5,5	5,710	5,530	7,41	5,500	5,380	8	6,53	7,33	7	
6,2	6,460	6,240	8,35	6,200	6,050	9	7,33	8,27	8	
7	7,260	7,040	9,54	7,000	6,850	10	8,27	9,46	9	
8	8,260	8,040	10,77	8,000	7,850	11	9,46	10,67	10	
9	9,260	9,040	12,10	9,000	8,850	12	10,67	12,00	11; 12	
10	10,260	10,040	13,43	10,000	9,850	13	12,00	13,33	–	
11	11,320	11,050	14,77	11,000	10,820	14	13,33	14,67	14	
12	12,320	12,050	16,10	12,000	11,820	15	14,67	16,00	16	
13	13,320	13,050	17,43	13,000	12,820	16	16,00	17,33	–	
14,5	14,820	14,550	19,44	14,500	14,320	17	17,33	19,33	18	
16	16,320	16,050	21,44	16,000	15,820	19	19,33	21,33	20	
18	18,320	18,050	24,11	18,000	17,820	21	21,33	24,00	22	
20	20,395	20,065	26,78	20,000	19,790	23	24,00	26,67	25	
22	22,395	22,065	29,44	22,000	21,790	25	26,67	29,33	28	
24	24,395	24,065	32,12	24,000	23,790	27	29,33	32,00	32	
26	26,395	26,065	34,79	26,000	25,790	29	32,00	34,67	–	
29	29,395	29,065	38,79	29,000	28,790	32	34,67	38,67	36	
32	32,470	32,080	42,80	32,000	31,750	35	38,67	42,67	40	
35	35,470	35,080	46,80	35,000	34,750	38	42,67	46,67	45	
39	39,470	39,080	52,20	39,000	38,750	42	46,67	52,06	50	
44	44,470	44,080	58,81	44,000	43,750	47	52,06	58,67	56	
49	49,470	49,080	65,48	49,000	48,750	52	58,67	65,33	63	
55	55,560	55,100	73,48	55,000	54,700	58	65,33	73,33	70	
61	61,560	61,100	81,50	61,000	60,700	64	73,33	81,33	80	
68	68,560	68,100	90,83	68,000	67,700	71	81,33	90,66	90	
76	76,560	76,100	101,51	76,000	75,700	79	90,66	101,33	100	

<sup>1)</sup> does not apply to tools activated by hand

# Terms of Sales, Delivery and Payment

## 1. General

All orders hereunder are accepted subject to the following terms. Any other conditions mentioned by the customers unless expressly accepted in writing are not binding. This also applies to those cases when we did not explicitly contradict. Our terms only apply to business people and legal representatives of public law and property under public law.

## 2. Purchases

Purchases effected with us have to be accepted as agreed. Upon refusal of delivery we reserve the right to claim damages. In case the delivery of samples or trials preceded the purchase in which the purchaser had the chance to convince himself of the kind of goods, quality, design and execution the purchaser cannot object to the kind of goods, quality, design and execution in any way. We reserve the right to adjust or improve our goods compared with samples sent previously or previous deliveries.

## 3. Cost estimates and offers

We retain the unlimited property and copyright of the use of our cost estimates, drawings and other documents; they shall not be disclosed to third parties. If the order is not placed drawings and documents have to be returned immediately.

## 4. Terms of Delivery

The beginning of the period of delivery set by us requires the final solution of all technical questions. Periods of delivery will be extended appropriately in case of labour disputes especially strike and lockout as well as in case of unforeseen events. This also applies when the corresponding circumstances happen to sub-suppliers. The event of such obstacles shall be reported to the customer immediately. The right to claim damages due to delay or non-compliance only applies to the customer when our delayed delivery is based on intent or gross negligence.

## 5. Passing of Risk and Dispatch

Incoterms apply in their latest version. If the acknowledgement does not explicitly mention another clause of the Incoterms, clause EXW (the works acknowledging the order) shall apply.

## 6. Complaints

Complaints and other objections regarding obvious defects have to be raised in writing immediately, 10 days after receipt of the goods at the latest, hidden defects immediately as well, however, 10 days after their discovery at the latest and no later than 6 months after receipt of the goods. Upon expiration of the a. m. deadline warranty claims of any kind are not possible.

## 7. Warranty

In general the obligation to examine and reproach according to §§377, 378 HGB (German Commercial Law) applies. As far as a defect of the purchased goods appears we have the right and it is our choice either to repair or exchange the goods. If we are not willing or not in the position to repair/exchange, or if this exceeds an appropriate timeframe based on reasons which we have to justify, or if we fail to repair/exchange in any other way, the customer has the right to decide whether to withdraw from the contract or ask for a corresponding reduction of the purchase price. We have the option to try a repair twice before the customer may use the a.m. rights. As far as there is no contradiction in the subsequent paragraphs, further claims no matter of which legal base are excluded. We are therefore not liable for damages which we did not

occur on the purchased goods themselves, especially we are not liable for missed profit or any other damage to the property of the customer. The a.m. exclusion of liability does not apply if the cause of damage is intent or gross negligence. Furthermore it does not apply if the customer enforces damage claims based on §§ 463, 480 section 2 BGB (German Civil Law) for non-performance due to lack of a confirmed feature. As far as we negligently fail to meet an essential duty of the contract our liability to pay damages on goods or people is limited to the amount covered by our product liability insurance. We are prepared to show our policy to the customer on request. The warranty period is 6 months effective with the transfer of risk except if we have agreed to longer warranty periods in the individual contract. Our warranty periods are prescription periods and also apply to claims for damages as a result of defects if no claims based on tortious act are put forward.

## 8. Delivery and Price

We generally dispatch from our respective works according to Incoterms "EXW", ex works, including packing if no other agreement has been made. The value added tax with its official value at the time invoicing shall be added to the price. Partial shipments are permitted. In case of special manufacture we have the right to ship plus/minus 10% of the ordered volume.

## 9. Terms of payment

Upon cash payment as well as cash payment in advance we grant a 2% cash discount. Cash discounts do not apply to payments by drafts. Drafts and cheques are only accepted if especially agreed to and for payment purposes including all collecting and discount expenses. We do not guarantee the timely presentation and submission of the protest of a bill. If a customer is delayed interest payments for delay used in banking will be charged, however, at least 4% above the discount rate of Deutsche Bundesbank (German Federal Bank). This does not exclude the additional claim for damages due to delay. Payments have to be effected directly to us; our commercial representatives are not authorized to receive payments. Invoices concerning partial deliveries are individually due according to their date of issue. If no terms of payment have been agreed to payment within 8 days with 2% discount, 30 days net of date of invoice shall apply.

## 10. Compensation/Right of Retention

The retention of payments or the compensation with possible counter-claims of the customer is only allowed if the counter-claims have been accepted by us or are legally confirmed.

## 11. Reservation of Title

We reserve the title of the purchased goods until the final payment of all payments resulting from the business relationship with the customer. If the customer acts against the sense of the contract, especially in case of delayed payment, we have the right to take the goods back. This does not constitute our resignation from the contract unless we explicitly confirm this in writing. After taking the goods back we are free to utilize them. The proceeds from the utilization shall be credited against the customer's liability reduced by appropriate utilization costs. A distress or other interventions of a third party shall be immediately reported in writing by the customer. If the third party is not able to reimburse our legal and extra-legal costs of a claim concerning a release of our property (intervention claim according to §771 ZPO) the customer is liable for the loss. The cus-

tomers has the right to resell the goods in an ordinary business relationship; he already transfers all claims amounting to the final value of the invoice (incl. Value added tax) resulting from the resale to his customers or third parties independent of the fact whether the delivered goods were resold without or after processing. The customer has the right to collect the debt after the transfer of this debt to us. This does not affect our right to collect the debt ourselves. We are obliged, though, not to collect as long as the customer meets his payment obligations, have no delayed payments, and an application for bankruptcy or settlement proceedings is not pending. If this is the case we can ask the customer to present the transferred claims and their debtors, make the necessary statements, hand over the corresponding documents and advise the debtors (third parties) of the transfer. If the goods delivered are processed to another mobile item this processing is done with us. The acquisition of property by the customer is excluded in accordance with § 950 BGB (German Civil Law). If the goods delivered are processed or mixed together with other items not belonging to us we acquire the property of the newly produced goods in relation to the value of the remaining goods at the time of manufacture. For these new goods created by the process the same applies as for goods supplied with reservations. Reservations and all other securing rights applying to us remain in existence up to the complete payment of all debts resulting from the business relationship. If these securities exceed all debts resulting from this business relationship by more than 20% we are obliged to release upon request by the customer.

## 12. Cession

We have the right to transfer our debts against our customers to third parties without the approval of our customers.

## 13. Liability

Our liability is exclusively based on these regulations. The claim for damages raised by the purchaser against us and our agents and executors for whatever legal reason, especially in case of fault when signing the contract, violation of contractual side duties and tortious act, is excluded unless they are in result of the intent or gross negligence. The a.m. limitations of liability do not apply to claims according to §§ 1,4 of the Product Liability Law.

## 14. Place of Performance and Place of Jurisdiction

Place of performance are the premises of the seller. Jurisdiction is also the premises of the seller as long as the customer is a business man or legal representatives of public law and property under public law. We have the right to sue the purchaser at the court of his residence.

## 15. Jurisdiction

German legislation only shall apply.

## 16. Legality

If any of the aforementioned regulations of the contract do not become part of the contract in part or in total or if they have become or are invalid the rest of the contract shall remain in full force.

## HOW TO CHOOSE THE RIGHT TAP

Company:

Person:

Date:

Consumption / Year (in Pieces):

### Type

Dimension:

Tolerance:

Right Hand

Left Hand

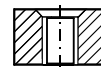
Depth of Core Hole: mm

Depth of Thread: mm

### Through Hole



Short Thread

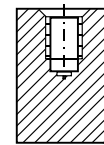


Depth of Thread  
up to 2-3 x d,

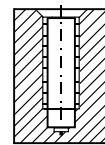


Please, mark

### Blind Hole



Depth of Thread  
1,5 x d,



Depth of Thread  
bis 3 x d,



Please, mark



### Workpiece / Material

Material Designation:

Material Number:

Hardness / Tensile Strength:

### Tool Presently Used

### Application

Required / Limits to Cutting Speed:

Further Details / Problems:

Coolant:

Emulsion  
 Cutting Oil

Dry  
 MKS

Machine:

Tool Holder / Compensation Chuck:

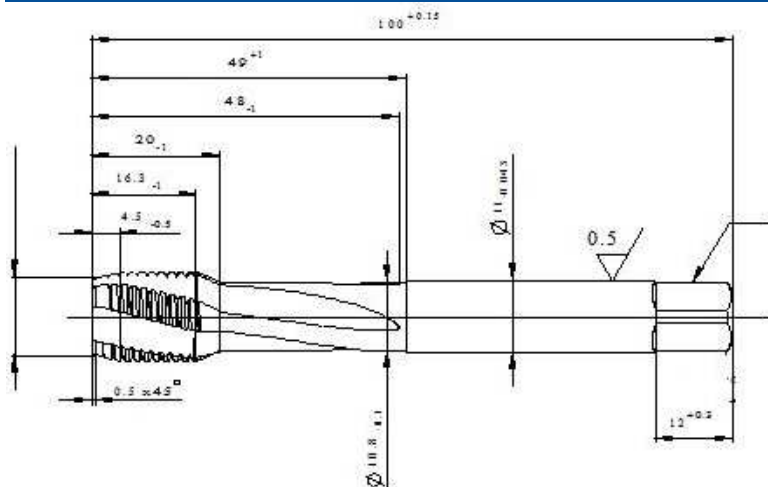
### Neoboss-Tool Recommendation

Art.-No.:

Coating:

## Story of success

Customer : Audi  
 Workpiece : Wheel-hub  
 Material : 38MnCr5



Machine Condition	
Kind of hole	: 5 x Through hole
Depth of thread	: 12 mm
Kind of machine	: CNC Transfer
Kind of tool holder	: Compensation chuck
Kind of coolant	: Dry cutting

Tap Design	
Tap No.	: 14341B
Size	: M14x1.50 6HX
Tap material	: PM
Coating	: TIALN-GLT
Cutting speed	: 13 m/min

Results			
Tool life of Neoboss	: 2000 Threads	Demand	: 8000/year
Tool life of competitor	: 1000 Threads	Competitor	: BASS / FETTE

## Story of success - Automotive

Workpiece : Caliper  
Material : GGG55



Machine Condition		Tap Design	
Kind of hole	: 2 x Through hole	Tap No.	: 11338B
Depth of thread	: 20 mm	Size	: M9x1.25 7H
Kind of machine	: CNC	Tap material	: PM
Kind of tool holder	: Synchro	Coating	: TIALN
Kind of coolant	: MQL	Cutting speed	: 50 m/min

Results			
Tool life of Neoboss	: 8500 Threads	Demand	: 600 pcs /year
Tool life of competitor	: New project	Competitor	: New project

## Story of success - Automotive

Workpiece : Turbocharger  
 Material : 1.4848 (19-22% Ni; 24-27% Cr)



Machine Condition		Tap Design	
Kind of hole	: 1 x Blind hole	Tap No.	: 4890
Depth of thread	: 24 mm	Size	: EG-M8 5H
Kind of machine	: CNC	Tap material	: PM
Kind of tool holder	: ER, Stiff chuck	Coating	: TIN
Kind of coolant	: Emulsion	Cutting speed	: 6 m/min

Results			
Tool life of Neoboss	: 1000 Threads	Demand	: 1500 pcs /year
Tool life of competitor	: 250 Threads	Competitor	: Böllhoff

## Story of success - Automotive

Workpiece : Connecting rod  
 Material : C70S6 (900-1050 N/mm<sup>2</sup>)



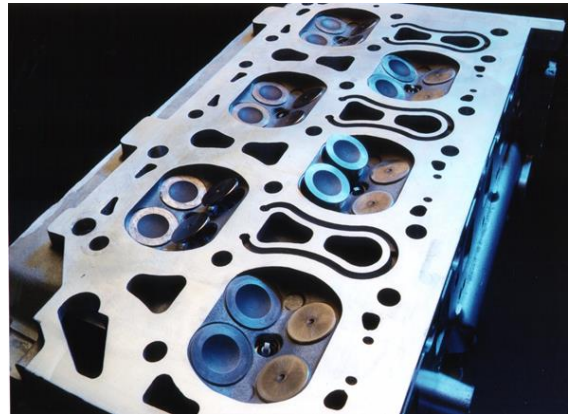
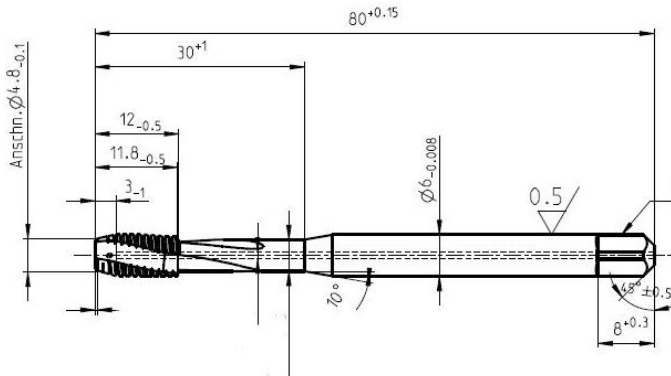
Machine Condition	
Kind of hole	: 2 x Through hole
Depth of thread	: 20 mm
Kind of machine	: CNC
Kind of tool holder	: ER Collet
Kind of coolant	: Emulsion

Tap Design	
Tap No.	: 13033F (Formex)
Size	: M11x1.25 RH7
Tap material	: HSSE
Coating	: TiCN
Cutting speed	: 8 m/min

Results			
Tool life of Neoboss	: 3000 Threads	Demand	: 1000 pcs /year
Tool life of competitor	: 2000 Threads	Competitor	: OSG

## Story of success - Automotive

Workpiece : Cylinder head  
 Material : AlSi8-9



### Machine Condition

Kind of hole : Through hole  
 Depth of thread : 13 mm  
 Kind of machine : CNC Transfer  
 Kind of tool holder : ER, Stiff chuck  
 Kind of coolant : Emulsion

### Tap Design

Tap No. : 4555  
 Size : M6 7H  
 Tap material : Solid Carbide  
 Coating : -  
 Cutting speed : 55 m/min

### Results

Tool life of Neoboss : 60000 Threads (40000 Threads safety-change)

Tool life of competitor : 30000 Threads

Competitor : Gühring

Cost reduction : New project

Demand : 200 pcs /year



Handed over by:

**日易暉機械**

上海市天鑰橋路325號嘉匯國際廣場A棟  
2101-2102室 郵編: 200030  
Tel: 86-21-3363-2088

台北市(106)大安區敦化南路二段40號二樓  
Tel: 886-2-2705-8448

website: [www.goldencarbide.com](http://www.goldencarbide.com)  
e-mail: [info@goldencarbide.com](mailto:info@goldencarbide.com)



**Neoboss**

Neoboss GmbH  
Im Brühl 12  
D-72406 Bisingen / Germany

Phone +49 (0)7476 9451-0  
Fax +49 (0)7476 9451-45

E-Mail [sales@neoboss.de](mailto:sales@neoboss.de)  
[www.neoboss.de](http://www.neoboss.de)