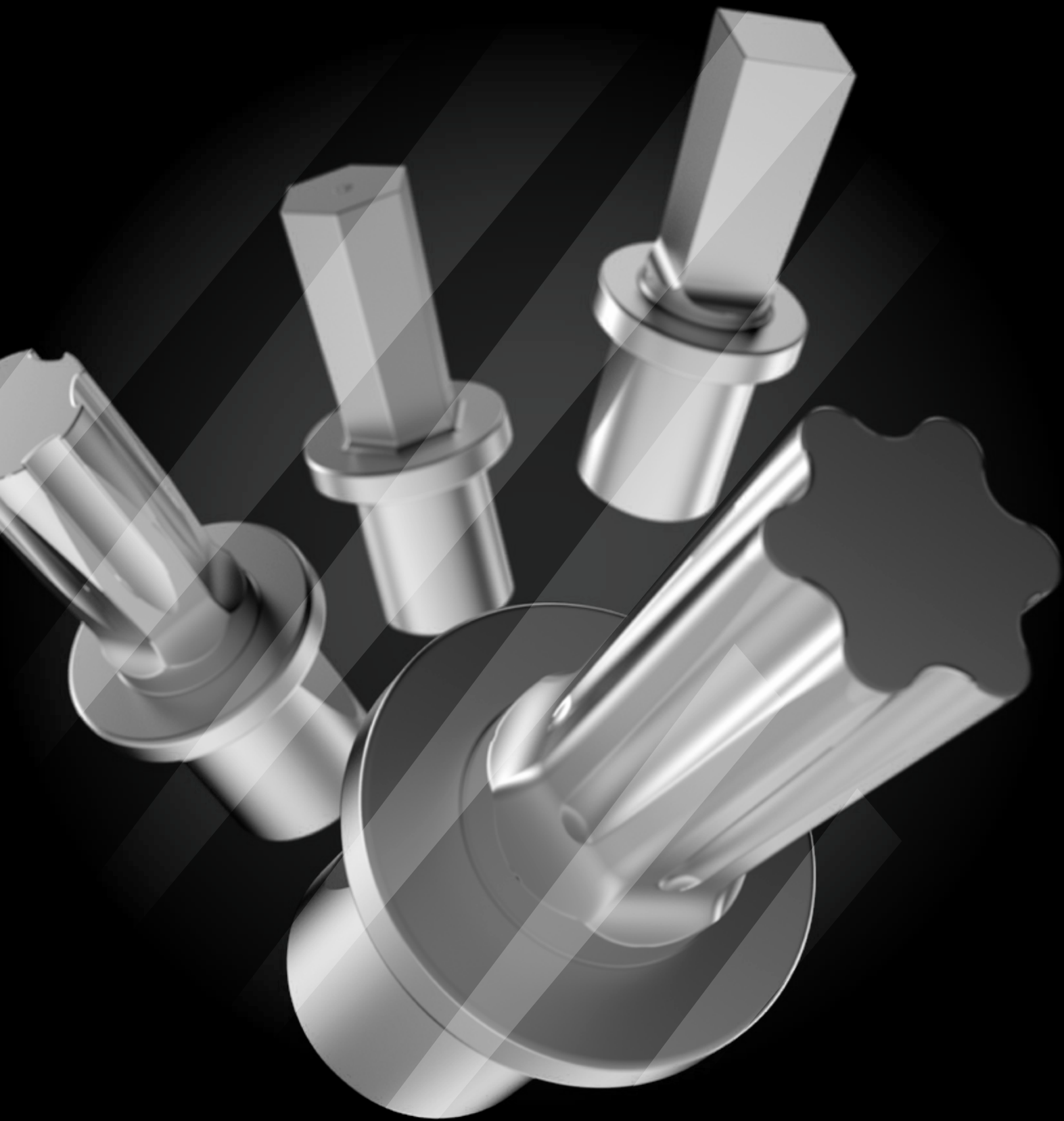




BROACHES

BROACHING HEADS AND BROACHES

TECHNICAL CHARACTERISTICS

The functioning of the broaching head is given by the combination of the inclination of the broach holder body and the rotation of the same. This allows to perform regular profiles both in through holes and in blind holes. With specific broaches it is also possible to create external profiles.

The optimal use of the broaching head derives from the correct alignment of the center of the broach with the center of the hole on which the processing will be carried out. To obtain the alignment of the centers, it is essential to use broaches with the length indicated in the table. The broaching head is adjusted in the factory, so the operator does not have to make any setting.

It can be used on lathes, machining centers and drills.

If it is mounted on lathes, its operation involves the rotation of both the workpiece and the front part of the tool holder, while the body of the broaching head remains stationary.

In the machining centers, both the piece and the front part of the tool holder will be stationary, while the body of the broaching head will rotate.

The rotation speed and advancement are determined by the hardness of the material and the size of the hole. See summary tables on page 558.

Morse Taper Shank



p. 604

VDI Shank



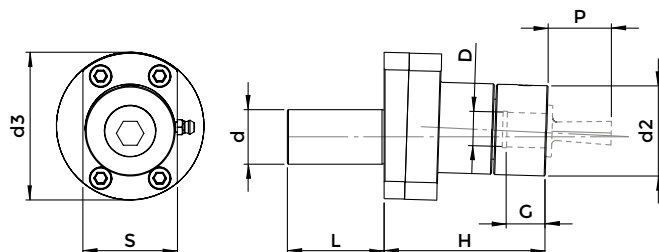
p. 524

Straight Shank



p. 557

STRAIGHT SHANK BROACHING TOOLHOLDERS



COD.	d	D	P	L	H	G	d2	d3	S
2312	16,00	8	18	35	42	10	22	50	30
2448	19,05	12	25	40	51	16	30	53	36
1680	20,00	12	25	40	51	16	30	53	36
1707	25,00	16	25	45	76	21	42	68	44
2450	25,40	16	25	45	76	21	42	68	44
2709	32,00	16	25	50	76	21	42	68	44
2712	40,00	16	25	50	76	21	42	68	44

For the right broaching toolholder working is important to respect broach P dimension

REDUCTION FOR BROACH SEAT FROM 16 TO 12 SHANK

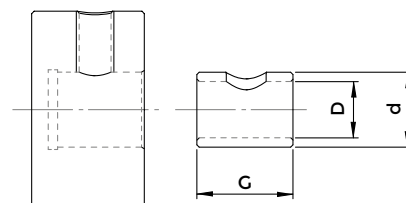


P=25

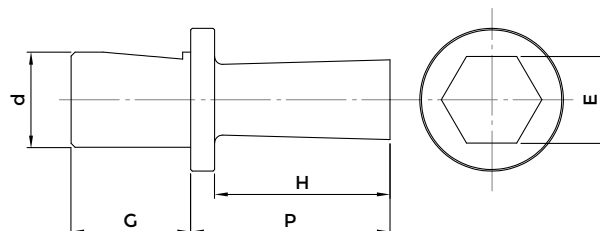
COD.	d	D	G
2351	16	12	20,5

Attention:

reduction can be used only with broach having P=25

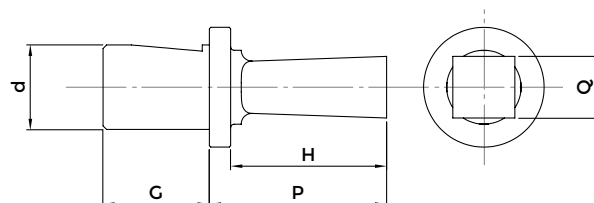


HEXAGONAL BROACHES



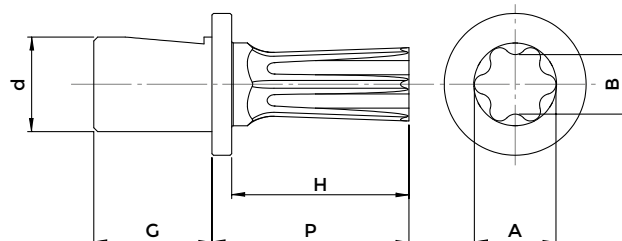
MATERIALS	SHANK D=5					SHANK D=8					SHANK D=12					SHANK D=16					SHANK D=16 EXTENDED P=40				
	COD.					COD.					COD.					COD.					COD.				
HSS	9030					9031					9032					9033					9034				
TiN steel (RM ≤ 850 N/mm ²)	9035					9036					9037					9038					9039				
TiAlN steel (RM ≤ 1400 N/mm ²)	9040					9041					9042					9043					-				
INOX-PLUS stainless steel - titanium	9045					9046					9047					9048					-				
	E	d	G	P	H	E	d	G	P	H	E	d	G	P	H	E	d	G	P	H	E	d	G	P	H
	1	5	7	10	2	1	8	9	18	2	1	12	15	25	2	1	16	19	25	2	1	16	19	40	2
	1,5	5	7	10	3	1,5	8	9	18	3	1,5	12	15	25	3	1,5	16	19	25	3	1,5	16	19	40	3
	2	5	7	10	4	2	8	9	18	5	2	12	15	25	5	2	16	19	25	5	2	16	19	40	3,5
	2,5	5	7	10	5	2,5	8	9	18	6	2,5	12	15	25	6	2,5	16	19	25	6	2,5	16	19	40	4
	3	5	7	10	6	3	8	9	18	7	3	12	15	25	7	3	16	19	25	7	3	16	19	40	5
	3,5	5	7	10	6	3,5	8	9	18	8	3,5	12	15	25	8	3,5	16	19	25	8	3,5	16	19	40	6
	4	5	7	10	7	4	8	9	18	9	4	12	15	25	9	4	16	19	25	9	4	16	19	40	6,5
	4,5	5	7	10	7	4,5	8	9	18	9	4,5	12	15	25	9	4,5	16	19	25	9	4,5	16	19	40	7
	5	5	7	10	7,5	5	8	9	18	11	5	12	15	25	11	5	16	19	25	11	5	16	19	40	8,5
	5,5	5	7	10	7,5	5,5	8	9	18	11	5,5	12	15	25	11	5,5	16	19	25	11	5,5	16	19	40	9,5
	6	5	7	10	7,5	6	8	9	18	13	6	12	15	25	13	6	16	19	25	13	6	16	19	40	10,5
						7	8	9	18	15	7	12	15	25	15	7	16	19	25	15	7	16	19	40	13
						8	8	9	18	15	8	12	15	25	17	8	16	19	25	17	8	16	19	40	15,5
						9	8	9	18	15	9	12	15	25	19	9	16	19	25	19	9	16	19	40	17,5
						10	8	9	18	15	10	12	15	25	21	10	16	19	25	21	10	16	19	40	18,5
											11	12	15	25	21	11	16	19	25	21	11	16	19	40	20
											12	12	15	25	21	12	16	19	25	21	12	16	19	40	20
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											14	12	15	25	21	14	16	19	25	21	14	16	19	40	32
											15	12	15	25	21	15	16	19	25	21	15	16	19	40	32
											16	12	15	25	21	16	16	19	25	21	16	16	19	40	32
											17	12	15	25	21	17	16	19	25	21	17	16	19	40	32
																18	16	19	25	21	18	16	19	40	32
																19	16	19	25	21	19	16	19	40	32
																20	16	19	25	21	20	16	19	40	32
																22	16	19	25	21	22	16	19	40	32
																24	16	19	25	21	24	16	19	40	32
																25	16	19	25	21	25	16	19	40	32
																26	16	19	25	21	26	16	19	40	32
																27	16	19	25	21	27	16	19	40	32
																28	16	19	25	21	28	16	19	40	32
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																30	16	19	25	21	30	16	19	40	32
																31	16	19	25	21	31	16	19	40	32
																32	16	19	25	21	32	16	19	40	32

SQUARE BROACHES

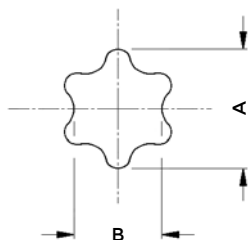


MATERIALS	SHANK D=5					SHANK D=8					SHANK D=12					SHANK D=16					SHANK D=16 EXTENDED P=40				
	COD.					COD.					COD.					COD.					COD.				
HSS	9050					9051					9052					9053					9054				
TiN steel (RM ≤ 850 N/mm ²)	9055					9056					9057					9058					9059				
TiAIN steel (RM ≤ 1400 N/mm ²)	9060					9061					9062					9063					-				
INOX-PLUS stainless steel - titanium	9065					9066					9067					9068					-				
	Q	d	G	P	H	Q	d	G	P	H	Q	d	G	P	H	Q	d	G	P	H	Q	d	G	P	H
	1	5	7	10	2	1	8	9	18	2	1	12	15	25	2	1	16	19	25	2	1	16	19	40	2
	1,5	5	7	10	3	1,5	8	9	18	3	1,5	12	15	25	3	1,5	16	19	25	3	1,5	16	19	40	3
	2	5	7	10	4	2	8	9	18	5	2	12	15	25	5	2	16	19	25	5	2	16	19	40	3,5
	2,5	5	7	10	5	2,5	8	9	18	6	2,5	12	15	25	6	2,5	16	19	25	6	2,5	16	19	40	4
	3	5	7	10	6	3	8	9	18	7	3	12	15	25	7	3	16	19	25	7	3	16	19	40	5
	3,5	5	7	10	6	3,5	8	9	18	8	3,5	12	15	25	8	3,5	16	19	25	8	3,5	16	19	40	6
	4	5	7	10	7	4	8	9	18	9	4	12	15	25	9	4	16	19	25	9	4	16	19	40	6,5
						4,5	8	9	18	9	4,5	12	15	25	9	4,5	16	19	25	9	4,5	16	19	40	7
						5	8	9	18	11	5	12	15	25	11	5	16	19	25	11	5	16	19	40	8,5
						5,5	8	9	18	11	5,5	12	15	25	11	5,5	16	19	25	11	5,5	16	19	40	9,5
						6	8	9	18	13	6	12	15	25	13	6	16	19	25	13	6	16	19	40	10,5
						7	8	9	18	15	7	12	15	25	15	7	16	19	25	15	7	16	19	40	13
						8	8	9	18	15	8	12	15	25	17	8	16	19	25	17	8	16	19	40	15,5
											9	12	15	25	19	9	16	19	25	19	9	16	19	40	17,5
											10	12	15	25	21	10	16	19	25	21	10	16	19	40	18,5
											11	12	15	25	21	11	16	19	25	21	11	16	19	40	20
											12	12	15	25	21	12	16	19	25	21	12	16	19	40	20
											13	12	15	25	21	13	16	19	25	21	13	16	19	40	28
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TORX® BROACHES

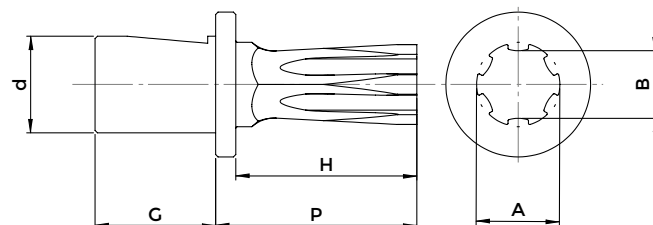


MATERIALS	SHANK D=5					SHANK D=8					SHANK D=12					SHANK D=16					SHANK D=16 EXTENDED P=40				
	COD.					COD.					COD.					COD.					COD.				
HSS	9029					9070					9071					9072					9073				
TiN steel (RM ≤ 850 N/mm²)	9074					9075					9076					9077					9078				
TiAIN steel (RM ≤ 1400 N/mm²)	9079					9080					9081					9082					-				
INOX-PLUS stainless steel - titanium	9084					9085					9086					9087					-				
	TORX	d	G	P	H	TORX	d	G	P	H	TORX	d	G	P	H	TORX	d	G	P	H	TORX	d	G	P	H
	3	5	7	10	1,2	3	8	9	18	1,2	3	12	15	25	1,2	3	16	19	25	1,2	3	16	19	40	1,2
	4	5	7	10	1,2	4	8	9	18	1,2	4	12	15	25	1,2	4	16	19	25	1,2	4	16	19	40	1,2
	5	5	7	10	1,5	5	8	9	18	1,5	5	12	15	25	1,5	5	16	19	25	1,5	5	16	19	40	1,5
	6	5	7	10	1,7	6	8	9	18	1,7	6	12	15	25	1,7	6	16	19	25	1,7	6	16	19	40	1,7
	7	5	7	10	1,7	7	8	9	18	1,7	7	12	15	25	1,7	7	16	19	25	1,7	7	16	19	40	1,7
	8	5	7	10	2	8	8	9	18	2	8	12	15	25	2	8	16	19	25	2	8	16	19	40	2
	9	5	7	10	2	9	8	9	18	2	9	12	15	25	2	9	16	19	25	2	9	16	19	40	2
	10	5	7	10	2	10	8	9	18	2	10	12	15	25	2	10	16	19	25	2	10	16	19	40	2
	15	5	7	10	3	15	8	9	18	3	15	12	15	25	3	15	16	19	25	3	15	16	19	40	3
	20	5	7	10	3,5	20	8	9	18	3,5	20	12	15	25	3,5	20	16	19	25	3,5	20	16	19	40	3,5
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						27	8	9	18	4	27	12	15	25	4	27	16	19	25	4	27	16	19	40	4
						30	8	9	18	4,5	30	12	15	25	4,5	30	16	19	25	4,5	30	16	19	40	4,5
						40	8	9	18	5	40	12	15	25	5	40	16	19	25	5	40	16	19	40	5
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											50	12	15	25	6	50	16	19	25	6	50	16	19	40	6
											55	12	15	25	7	55	16	19	25	7	55	16	19	40	7
																60	16	19	25	7,5	60	16	19	40	7,5

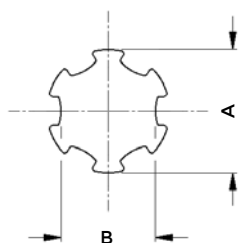


Torx®	3	4	5	6	7	8	9	10	15	20	25	27	30	40	45	50	55	60
A	1,214	1,374	1,449	1,778	2,095	2,418	2,603	2,844	3,378	3,962	4,559	5,118	5,651	6,807	7,975	8,991	11,404	13,487
B	0,884	0,996	1,097	1,293	1,521	1,755	1,889	2,057	2,438	2,857	3,226	3,672	4,065	4,889	5,689	6,502	8,009	9,677

TORX PLUS® BROACHES



MATERIALS	SHANK D=5					SHANK D=8					SHANK D=12					SHANK D=16					SHANK D=16 EXTENDED P=40				
	COD.					COD.					COD.					COD.					COD.				
HSS	9089					9090					9091					9092					9093				
TiN steel (RM ≤ 850 N/mm²)	9094					9095					9096					9097					9098				
TiAlN steel (RM ≤ 1400 N/mm²)	9776					9777					9778					9779					-				
INOX-PLUS stainless steel - titanium	9781					9782					9783					9784					-				
	TORX PLUS	d	G	P	H	TORX PLUS	d	G	P	H	TORX PLUS	d	G	P	H	TORX PLUS	d	G	P	H	TORX PLUS	d	G	P	H
	6	5	7	10	1,7	6	8	9	18	1,7	6	12	15	25	1,7	-	-	-	-	-	-	-	-	-	-
	7	5	7	10	1,7	7	8	9	18	1,7	7	12	15	25	1,7	-	-	-	-	-	-	-	-	-	-
	8	5	7	10	2	8	8	9	18	2	8	12	15	25	2	-	-	-	-	-	-	-	-	-	-
	9	5	7	10	2	9	8	9	18	2	9	12	15	25	2	-	-	-	-	-	-	-	-	-	-
	10	5	7	10	2	10	8	9	18	2	10	12	15	25	2	10	16	19	25	2	10	16	19	40	2
	15	5	7	10	3	15	8	9	18	3	15	12	15	25	3	15	16	19	25	3	15	16	19	40	3
	20	5	7	10	3,5	20	8	9	18	3,5	20	12	15	25	3,5	20	16	19	25	3,5	20	16	19	40	3,5
						25	8	9	18	4	25	12	15	25	4	25	16	19	25	4	25	16	19	40	4
						27	8	9	18	4	27	12	15	25	4	27	16	19	25	4	27	16	19	40	4
						30	8	9	18	4,5	30	12	15	25	4,5	30	16	19	25	4,5	30	16	19	40	4,5
						40	8	9	18	5	40	12	15	25	5	40	16	19	25	5	40	16	19	40	5
											45	12	15	25	5,5	45	16	19	25	5,5	45	16	19	40	5,5
											50	12	15	25	6	50	16	19	25	6	50	16	19	40	6
											55	12	15	25	7	55	16	19	25	7	55	16	19	40	7
																60	16	19	25	7,5	60	16	19	40	7,5



Torx Plus®	6	7	8	9	10	15	20	25	27	30	40	45	50	55	60
A	1,778	2,095	2,418	2,603	2,844	3,378	3,962	4,559	5,118	5,651	6,807	7,975	8,991	11,385	13,442
B	1,381	1,606	1,86	2,014	2,174	2,606	3,088	3,492	3,99	4,391	5,283	6,141	6,923	8,766	10,35

BROACHES USAGE PARAMETERS

Use cooling while broaching			FEED (rpm)								
			Hexagonal			Squadre			TORX® TORX PLUS®		
MATERIAL TO WORK (N/mm²)	Speed (RPM)		1 ÷ 12	13 ÷ 23	24 ÷ 40	1 ÷ 10	11 ÷ 20	21 ÷ 25	T3 ÷ T6	T7 ÷ T27 IP6 ÷ IP27	T30 ÷ T70 IP30 ÷ IP70
brass Rm <350	600 / 1800		0,1	0,07	0,04	0,08	0,06	0,04	0,1	0,09	0,07
copper Rm <350	700 / 1900		0,12	0,09	0,05	0,1	0,08	0,06	0,12	0,11	0,09
alluminium Rm <500	700 / 2000		0,10 - 0,14	0,07 - 0,10	0,04 - 0,06	0,08 - 0,12	0,05 - 0,08	0,02 - 0,04	0,14	0,12 - 0,13	0,09 - 0,12
steel Rm <700	650 / 1800		0,1	0,08	0,05	0,06	0,04	0,02	0,1	0,09	0,07
steel Rm 700 - 850	600 / 1600		0,08	0,06	0,04	0,05	0,03	0,02	0,08	0,07	0,05
steel Rm 850 - 1250	500 / 1400		0,05	0,02	0,01	0,02	0,02	0,01	0,05	0,04	0,03
steel Rm 1250 - 1400	400 / 1200		0,02	0,015	0,01	0,02	0,015	0,01	0,03	0,02	0,02
stainless steel Rm <900	600 / 1600		0,08	0,06	0,04	0,05	0,04	0,02	0,08	0,07	0,06
stainless steel Rm >900	500 / 1200		0,04	0,03	0,02	0,03	0,02	0,01	0,045	0,04	0,03
titanium Rm >700	450 / 1200		0,03	0,02	0,01	0,02	0,02	0,01	0,035	0,03	0,02
cast iron Rm <600	650 / 1800		0,1	0,06	0,03	0,08	0,05	0,03	0,1	0,09	0,06

HEXAGONAL Broach	PRE-HOLE	SQUARE Broach	PRE-HOLE	TORX® Broach	PRE-HOLE	TORX PLUS® Broach	PRE-HOLE
1	ø 1,05 +0,10/0	1	ø 1,15 +0,10/0	T 3	ø 0,95 +0,05/0	IP 6	ø 1,50 +0,10/0
1,5	ø 1,55 +0,10/0	2	ø 2,20 +0,10/0	T 4	ø 1,05 +0,05/0	IP 8	ø 1,95 +0,10/0
2	ø 2,10 +0,10/0	3	ø 3,30 +0,10/0	T 5	ø 1,20 +0,05/0	IP 9	ø 2,10 +0,10/0
2,5	ø 2,60 +0,10/0	4	ø 4,40 +0,10/0	T 6	ø 1,40 +0,10/0	IP 10	ø 2,30 +0,10/0
3	ø 3,10 +0,10/0	5	ø 5,50 +0,10/0	T 7	ø 1,60 +0,10/0	IP 15	ø 2,70 +0,10/0
4	ø 4,15 +0,10/0	6	ø 6,60 +0,10/0	T 8	ø 1,90 +0,10/0	IP 20	ø 3,20 +0,10/0
5	ø 5,15 +0,10/0	7	ø 7,70 +0,15/0	T 9	ø 1,95 +0,10/0	IP 25	ø 3,60 +0,10/0
6	ø 6,20 +0,10/0	8	ø 8,80 +0,15/0	T 10	ø 2,20 +0,10/0	IP 27	ø 4,10 +0,10/0
7	ø 7,20 +0,15/0	9	ø 9,90 +0,15/0	T 15	ø 2,60 +0,10/0	IP 30	ø 4,50 +0,10/0
8	ø 8,25 +0,15/0	10	ø 11,00 +0,20/0	T 20	ø 3,00 +0,10/0	IP 40	ø 5,40 +0,10/0
9	ø 9,25 +0,15/0	11	ø 12,10 +0,20/0	T 25	ø 3,40 +0,10/0	IP 45	ø 6,40 +0,10/0
10	ø 10,30 +0,15/0	12	ø 13,20 +0,20/0	T 27	ø 3,80 +0,10/0	IP 50	ø 7,10 +0,10/0
12	ø 12,35 +0,15/0	13	ø 14,30 +0,20/0	T 30	ø 4,15 +0,10/0	IP 55	ø 9,20 +0,10/0
13	ø 13,40 +0,15/0	14	ø 15,40 +0,20/0	T 40	ø 5,00 +0,15/0	IP 60	ø 10,60 +0,20/0
14	ø 14,40 +0,15/0	15	ø 16,50 +0,20/0	T 45	ø 5,80 +0,15/0		
15	ø 15,45 +0,20/0	16	ø 17,60 +0,20/0	T 50	ø 6,70 +0,20/0		
16	ø 16,45 +0,20/0	17	ø 18,70 +0,20/0	T 55	ø 8,20 +0,20/0		
17	ø 17,50 +0,20/0	18	ø 19,80 +0,20/0	T 60	ø 9,85 +0,20/0		
18	ø 18,55 +0,20/0	19	ø 20,90 +0,20/0				
19	ø 19,55 +0,20/0	20	ø 22,00 +0,20/0				
20	ø 20,60 +0,20/0	21	ø 23,10 +0,25/0				
22	ø 22,65 +0,20/0	22	ø 24,20 +0,25/0				
24	ø 24,70 +0,20/0	23	ø 25,30 +0,25/0				
27	ø 27,80 +0,25/0	24	ø 26,40 +0,25/0				
30	ø 30,90 +0,25/0	25	ø 27,50 +0,25/0				
32	ø 33,20 +0,25/0						

Pre-hole depth must be at least 20% greater than the one of the profile to execute.
To facilitate the processing it is recommended to perform an entrance chamfer.



READY, ALWAYS.