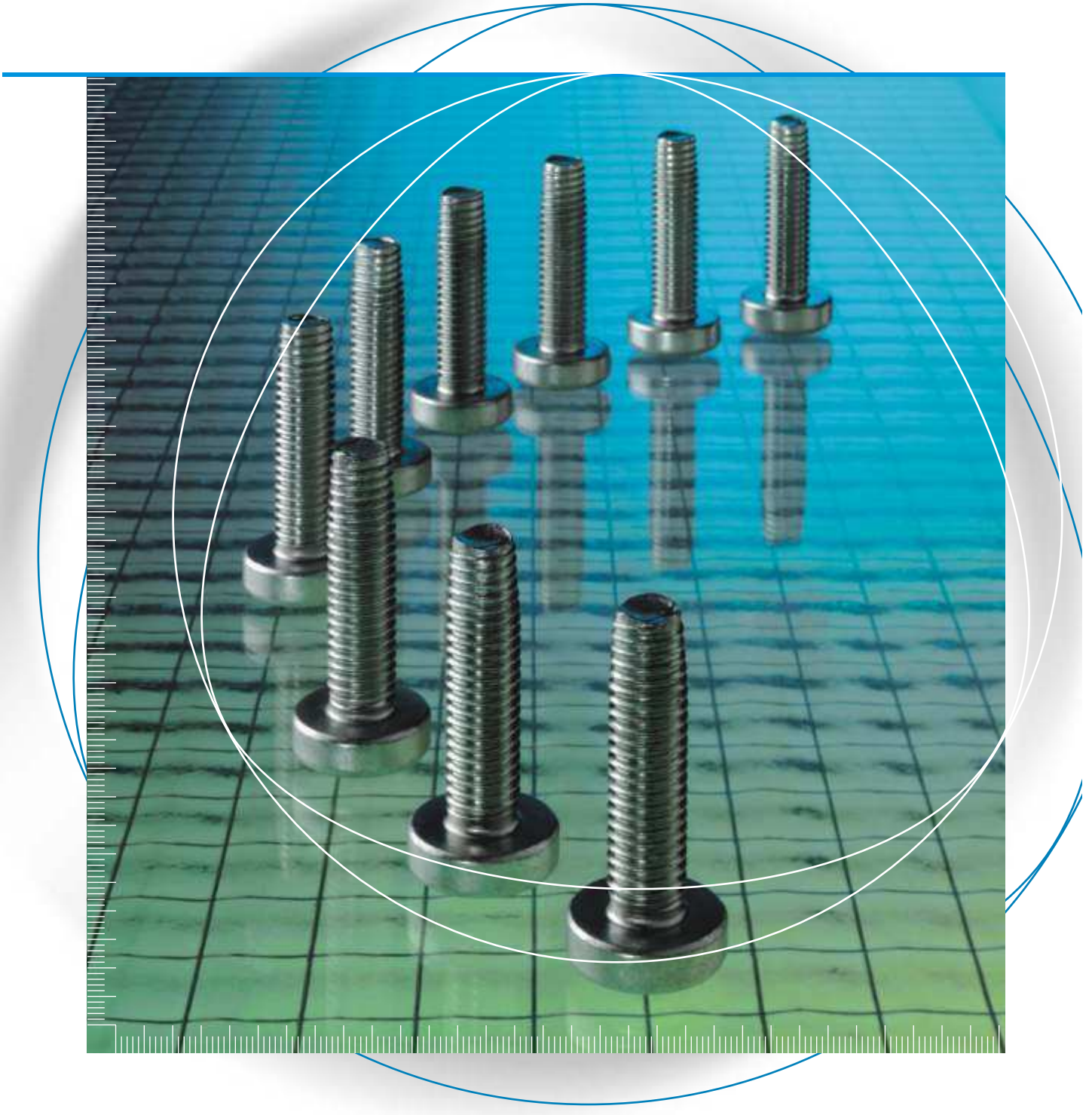
ARNOLD®
Solutions which connect.

TAPTITE 2000®



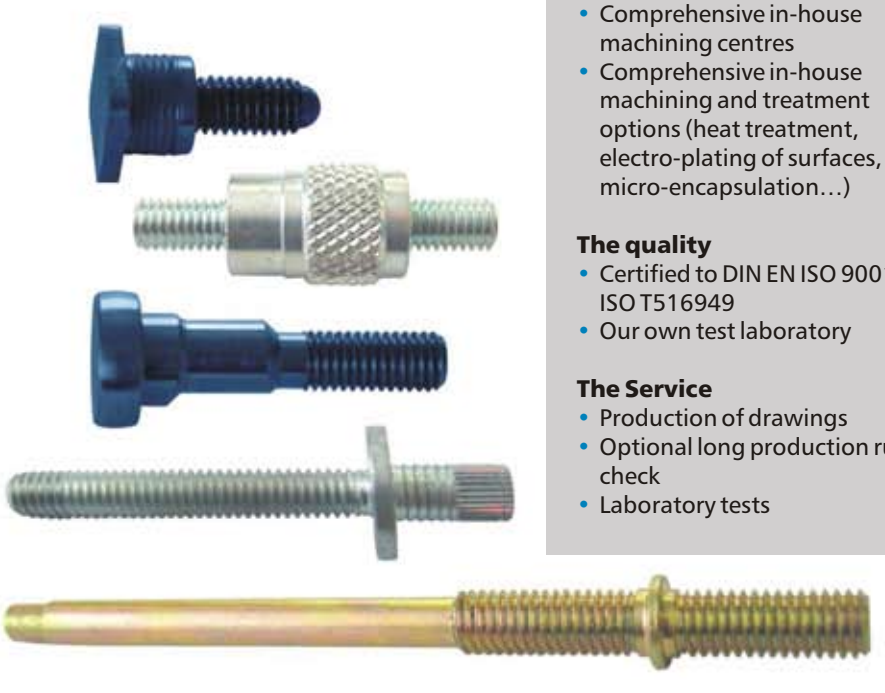
ARNOLD®
Solutions which connect.

ARNOLD Fastener Express – Prototypes and Operational models in record time

What we offer
With "Arnold Fastener Express" you now have a comprehensive range of turned and precision parts available within a very short period of time. Whether you need individual parts to build a prototype, or small and micro-runs of up to 3,000 items, we can manufacture your functional components up to 40 mm in diameter and 100 mm long, technically perfect, and ready for immediate use. You receive your components within a very short time:

- 4 weeks standard lead time
- 10 day service / 5 day service / 24 hours on request

Because the new "Arnold Fastener Express" reduces the order handling process to a minimum. Every order received is immediately evaluated for technical feasibility, and the required functional components can be produced as fast as possible. In addition, with its departments such as heat treatment, electroplating etc, Arnold has significant processing options, so that the time-consuming interfaces – for example with external service-providers – are omitted. And of course we can also produce larger quantities for you. All functional components are ready for immediate use. We are happy to carry out a bulk production test to check out the suitability for long production runs of your part.



The products
- Screws
- Turned parts
- Precision parts
- Parts with internal and external threads
- Hollow parts
- Licensed products (Torx…)

The batch sizes
- Single parts
- Small and micro production runs
- Maximum batch size 3,000 (larger quantities possible on request)
- Large production runs possible at a later stage

The delivery lead times
- 4 weeks (standard lead time)
- 10 days service / 5 day service / 24 hours on request

The materials
- Stainless steel
- Machining steel
- Quenched and tempered steel
- Copper
- Aluminium
- Brass
- Special alloys on request

The technology
- Modern lathes
- Comprehensive in-house machining centres
- Comprehensive in-house machining and treatment options (heat treatment, electro-plating of surfaces, micro-encapsulation…)

The quality
- Certified to DIN EN ISO 9001 + ISO T516949
- Our own test laboratory

The Service
- Production of drawings
- Optional long production run check
- Laboratory tests

The benefits for you
- Single parts, small and micro production runs
- Economical large-scale production
- Ready-to-use functional parts
- Comprehensive machining and treatment centres
- Short standard delivery lead times (4 weeks)
- 10 day service / 5 day service / 24 hour service on request
- ISO T516949-certified supplier
- Comprehensive service options
- **Express line: + 49 7947 821 444**

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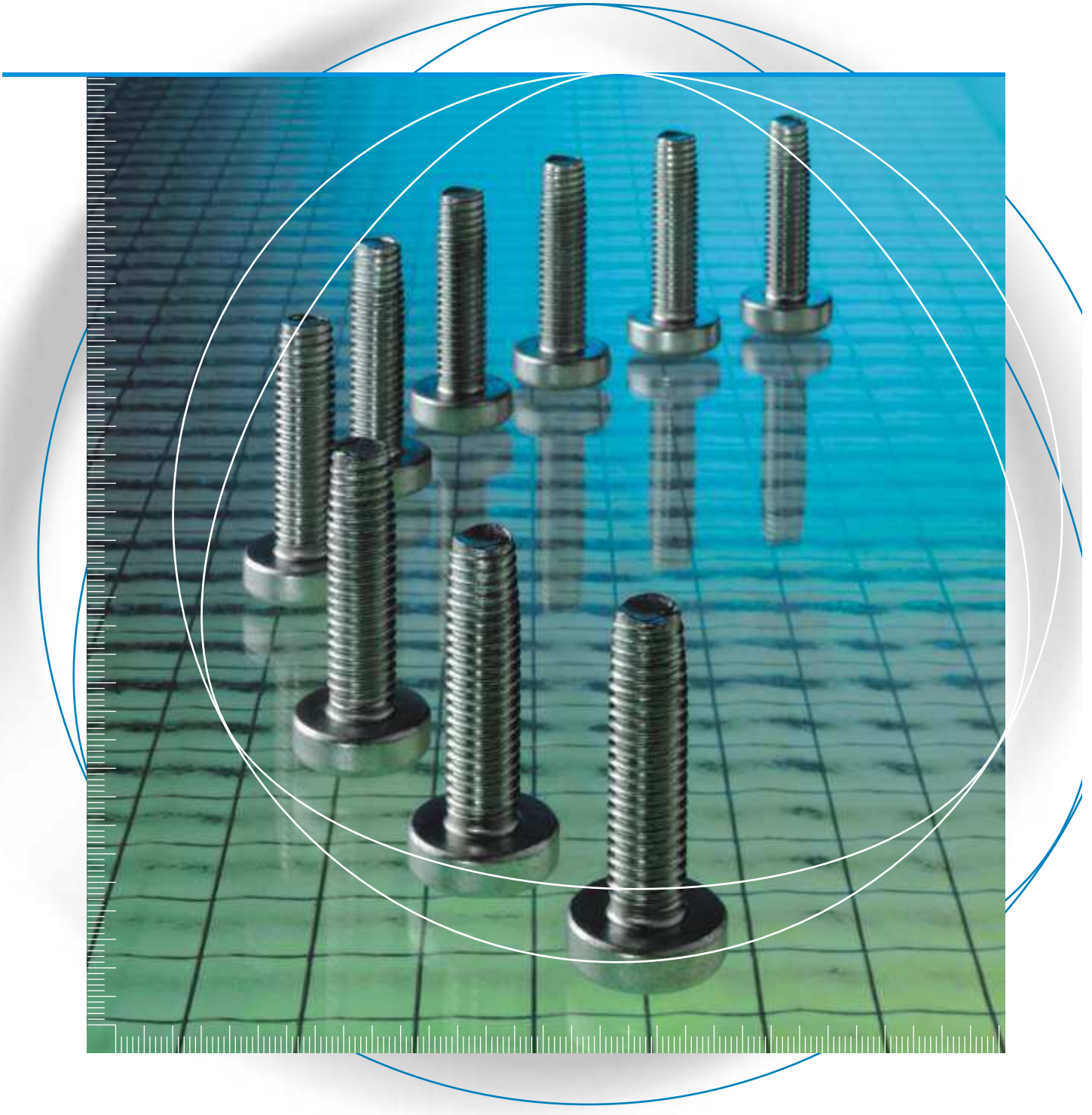
TAPTITE 2000®



The principle

Thread-forming screws are connecting elements that form their own internal thread when being screwed into core holes drilled in ductile metals.

The trilobular geometry

The trilobular (triangular) geometry of the screw shaft for the past three decades has proven its worth for non-cutting thread forming of internal threads.

Advantages

- Easy positioning
- Low thread forming moment
- High vibration resistance
- Non-cutting thread forming

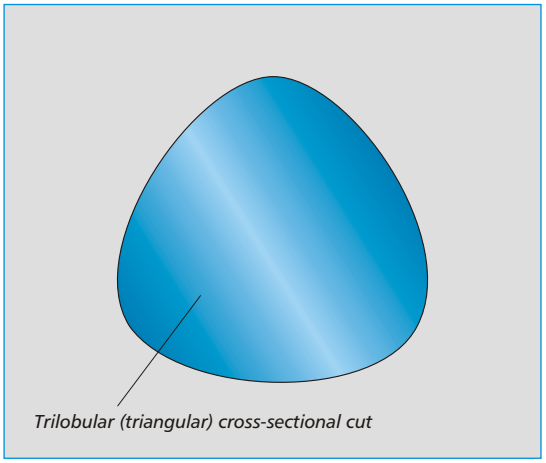


Fig. 1

The costs

The use of thread-forming screws - **Taptite 2000®** will reduce assembly costs by up to 85%.
Thread-cutting and additional security features are no longer required.

Economic assembly

- No pre thread-cutting needed
- No securing feature
- High degree of process stability
- High clamping force

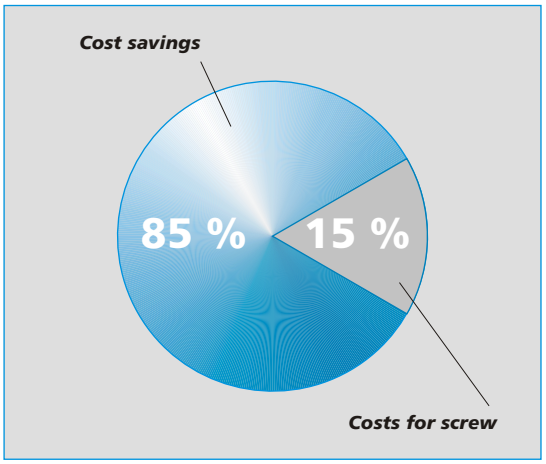


Fig. 2

Head types and dimensions Taptite 2000 acc. to ARNOLD works standards (WN)

ARNOLD works standards				
Head type	Washer head (DIN 967)	Head cylindrical	Hexagon insert bit with collar	Outside-Torx Outside-Torx-Plus
ARNOLD plant standards	WN-180-11	WN-180-8 WN-180-8-1	WN-78-4	WN-180-12

Chart 4

For maximum transmission of torques with inside application of force we recommend TORXplus®

	thread	M2,5	M3	M3,5	M4	M5	M6	M8	M10	M12
WN-180-11	head-ø	$6{,}25^{-0{,}58}$	$7{,}5_{-0{,}58}$	$9_{,0\text{-}0{,}58}$	$10{,}0_{-0{,}58}$	$11{,}5_{-0{,}7}$	$14{,}5_{-0{,}7}$	$19_{-0{,}84}$	$24{,}0_{-0{,}84}$	-
	head height	$2{,}10_{-0{,}25}$	$2{,}36_{-0{,}26}$	$2{,}60_{-0{,}25}$	$3{,}05_{-0{,}30}$	$3{,}55_{-0{,}30}$	$4{,}55_{-0{,}30}$	$5{,}9_{-0{,}3}$	$7{,}5_{-0{,}36}$	-
	Torx-Plus size	8IP	15IP	20IP	20IP	25IP	30IP	40IP	50IP	-
	Torx size	T8	T15	T20	T20	T25	T30	T40	T50	-
	cross recess size	1	1	2	2	2	3	4	-	-
WN-180-8	head-ø	$4{,}5_{-0{,}18}$	$5{,}5_{-0{,}18}$	-	$7{,}0_{-0{,}22}$	$8{,}5_{-0{,}22}$	$10{,}0_{-0{,}22}$	$13{,}0_{-0{,}27}$	$16{,}0_{-0{,}27}$	$18{,}0_{-0{,}27}$
	head height $_{max.}$	$1{,}6_{-0{,}14}$	$2{,}0_{-0{,}14}$	-	$2{,}8_{-0{,}14}$	$3{,}5_{-0{,}18}$	$4{,}0_{-0{,}18}$	$5{,}0_{-0{,}18}$	$6{,}0_{-0{,}18}$	$7{,}0_{-0{,}22}$
	Torx-Plus size	8IP	10IP	-	20IP	25IP	30IP	40IP	50IP	60IP
	Torx size	T8	T10	-	T20	T25	T30	T40	T50	T60
	hexag. socket screw key size	-	2	-	2,5	3	4	5	-	-
WN-78-4	collar-ø	-	$6{,}7_{-0{,}4}$	-	$8{,}45_{-0{,}5}$	$10{,}25_{-0{,}5}$	$13{,}25_{-0{,}5}$	$17{,}25_{-0{,}5}$	$17{,}25_{-0{,}5}$	-
	head height	-	$2{,}9_{-0{,}2}$	-	$4{,}15_{-0{,}3}$	$4{,}6_{5\text{-}0{,}3}$	$5{,}65_{-0{,}3}$	$6{,}98_{-0{,}36}$	$6{,}98_{-0{,}36}$	-
	collar height	-	$0{,}4_{-0{,}15}$	-	$0{,}80_{-0{,}20}$	$0{,}80_{-0{,}20}$	$0{,}80_{-0{,}20}$	$1{,}0_{-0{,}20}$	$1{,}0_{-0{,}20}$	-
	wrench size	-	$5{,}5_{-0{,}12}$	-	$7{,}0_{-0{,}15}$	$8{,}0_{-0{,}15}$	$10{,}0_{-0{,}22}$	$13{,}0_{-0{,}27}$	$13{,}0_{-0{,}27}$	-
WN-180-12	collar-ø $_{max.}$ [2)]	-	-	-	-	11,80	14,20	17,90	21,80	26,0
	c. bearing-ø $_{min.}$	-	-	-	-	9,80	12,20	15,80	19,60	23,80
	head height	-	-	-	-	$6{,}5_{-0{,}25}$	$7{,}50_{-0{,}25}$	$10{,}0_{-0{,}25}$	$12{,}0_{-0{,}25}$	$14{,}0_{-0{,}25}$
	collar height	-	-	-	-	$1{,}70_{-0{,}25}$	$2{,}0_{-0{,}25}$	$2{,}90_{-0{,}25}$	$3{,}90_{-0{,}30}$	$4{,}40_{-0{,}30}$
	Torx size[2)]	-	-	-	-	E8	E10	E12	E14	E18
	Torx-Plus size[2)]	-	-	-	-	EP8	EP10	EP12	EP14	EP18

Chart 5

[2)] Outside Torx with large flange. Upon request, the outside Torx is supplied with small flange.

Standard lengths

Threads	M2,5	M3	M3,5	M4	M5	M6	M8	M10	M12
l	Standard lengths								
3 ±0,375									
4 ±0,375	*)	*)							
5 ±0,375		*)	*)						
6 ±0,375			*)	*)					
8 ±0,45					*)	*)			
10 ±0,45							*)		
12 ±0,55							*)		
(14) ±0,55									
16 ±0,55									
18 ±0,55									
20 ±0,65								*)	
(22) ±0,65									
25 ±0,65									
(28) ±0,65									
30 ±0,65									
35 ±0,80									
40 ±0,80									
45 ±0,80									
50 ±0,80									
55 ±0,95									
60 ±0,95									
70 ±0,95									
80 ±0,95									

Intermediate lengths upon request
Example for order: CM 6 x 20 DIN 7500
Lengths in brackets should be avoided if possible.

**) Not for countersunk heads*

Chart 3

Advice for application

Property classes

8.8 for all nonferrous heavy metals and light-metal alloys up to Rm = 360 N/mm²

10.9 for all metals up to Rm = 460 N/mm²

Case hardened
for steel up to Rm = 520 N/mm²

Safety advice
All materials with Rm > 1000 N/mm² carry a risk to suffer from hydrogen brittleness.

Fracture and tightening moment

Tightening moments are dependent upon the screw's minimum fracture moments (ISO 898 part 7), properties of the workpiece, hole diameter, screwing-in depth and friction coefficient. Tightening moments will be determined in lab tests.

Minimum fracture moments in Nm

Threads	Property classes			Case hardened
	8.8	9.8	10.9	
M2,5	0,82	0,90	1,00	1,00
M3	1,50	1,70	1,90	1,50
M3,5	2,40	2,70	3,00	2,30
M4	3,60	3,90	4,40	3,40
M5	7,60	8,30	9,30	7,10
M6	13,00	14,00	16,00	12,00
M8	33,00	36,00	40,00	29,00
M10	66,00	72,00	81,00	59,00
M12	116,00	127,50	142,00	-

Chart 10

Thread engagement

nom.-ø	gradu-ation	thread overlap														
		100%	95%	90%	85%	80%	75%	70%	65%	60%	55%	50%	45%	40%	35%	30%
M2,5	0,45	2,21	2,22	2,24	2,25	2,27	2,28	2,30	2,31	2,33	2,34	2,35	2,37	2,38	2,40	2,41
M3	0,5	2,68	2,69	2,71	2,72	2,74	2,76	2,77	2,79	2,81	2,82	2,84	2,85	2,87	2,89	2,90
M3,5	0,6	3,11	3,13	3,15	3,17	3,19	3,21	3,23	3,25	3,27	3,29	3,31	3,33	3,34	3,36	3,38
M4	0,7	3,55	3,57	3,59	3,61	3,64	3,66	3,68	3,70	3,73	3,75	3,77	3,80	3,82	3,84	3,86
M5	0,8	4,48	4,51	4,53	4,56	4,58	4,61	4,64	4,66	4,69	4,71	4,74	4,77	4,79	4,82	4,84
M6	1,0	5,35	5,38	5,42	5,45	5,48	5,51	5,55	5,58	5,61	5,64	5,68	5,71	5,74	5,77	5,81
M8	1,25	7,19	7,23	7,27	7,31	7,35	7,39	7,43	7,47	7,51	7,55	7,59	7,63	7,68	7,72	7,76
M10	1,50	9,03	9,07	9,12	9,17	9,22	9,27	9,32	9,37	9,42	9,46	9,51	9,56	9,61	9,66	9,71
M12	1,75	10,86	10,92	10,98	11,03	11,09	11,15	11,20	11,26	11,31	11,37	11,43	11,49	11,55	11,60	11,66

Chart 11

Assembly recommendations for light-metal screwings

Recommendations for core hole diameters in aluminum or zinc alloys[1)]

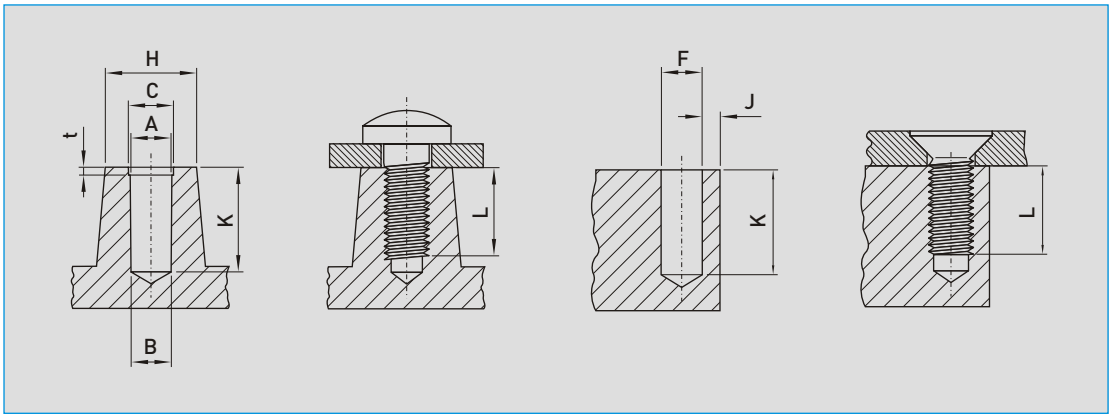


Fig 6

nom.-	core hole cast							core hole drilled			
∅	A	B	C	L	K_{min}	t	H_{min}	F^{H11}	L	K_{min}	J_{min}
M2,5	$2,35^{+0,05}$	$2,17^{+0,05}$	$2,7^{+0,8}$	7,70	8,7	$0,9_{-0,4}$	4,2	2,25	6,8	7,8	1,2
M3	$2,85^{+0,05}$	$2,65^{+0,05}$	$3,2^{+0,8}$	9,00	10,00	$1,0_{-0,5}$	5,0	2,75	8,0	9,0	1,3
M3,5	$3,30^{+0,05}$	$3,05^{+0,05}$	$3,7^{+0,8}$	10,60	11,6	$1,2_{-0,6}$	5,8	3,20	9,4	10,5	1,6
M4	$3,75^{+0,05}$	$3,50^{+0,05}$	$4,3^{+0,8}$	12,20	13,3	$1,4_{-0,7}$	6,7	3,65	10,8	12,0	1,8
M5	$4,70^{+0,08}$	$4,40^{+0,08}$	$5,3^{+0,8}$	14,80	16,0	$1,6_{-0,8}$	8,3	4,60	13,20	14,5	2,1
M6	$5,65^{+0,08}$	$5,30^{+0,08}$	$6,3^{+0,8}$	16,50	18,0	$2,0_{-1,0}$	10,0	5,50	14,5	16,0	2,6
M8	$7,60^{+0,08}$	$7,15^{+0,08}$	$8,5^{+0,8}$	21,60	23,3	$2,5_{-1,2}$	13,3	7,40	19,2	21,0	3,3
M10	$9,60^{+0,08}$	$9,05^{+0,08}$	$10,5^{+0,8}$	26,75	28,5	$3,0_{-1,5}$	16,6	9,30	23,7	25,5	3,9
M12	$11,5^{+0,08}$	$10,9^{+0,08}$	$12,5^{+0,8}$	29,87	32,0	$3,5_{-1,7}$	19,9	11,20	28,4	30,5	4,6

Chart 6

Assembly recommendations for steel screwings

Recommended core holes for thread forming in steel[1)]

Eff. screwing-in depth ET	0,3 x d		0,5 x d		0,75 x d		1,0 x d		1,25 x d	
Thread over lapping in %	90 %		80 %		70 %		65%		60 %	
nom.-Ø	ET	hole-Ø	ET	hole-Ø	ET	hole-Ø	ET	hole-Ø	ET	hole-Ø
M2,5 x 0,45	0,5 - 0,9	2,22	0,9 - 1,5	2,25	1,5 - 2,1	2,28	2,1 - 2,7	2,30	2,7 - 3,5	2,30
M3 x 0,5	0,5 - 1,1	2,70	1,1 - 1,7	2,75	1,7 - 2,7	2,75	2,7 - 3,3	2,80	3,3 - 4,0	2,8
M3,5 x 0,6	0,6 - 1,4	3,15	1,4 - 2,0	3,20	2,0 - 2,9	3,20	2,9 - 3,8	3,25	3,8 - 4,5	3,25
M4 x 0,7	0,8 - 1,4	3,60	1,4 - 2,4	3,65	2,4 - 3,3	3,65	3,3 - 4,4	3,70	4,4 - 5,5	3,70
M5 x0,8	1,0 - 2,1	4,50	2,1 - 2,9	4,60	2,9 - 4,4	4,60	4,4 - 5,9	4,65	5,9 - 7,1	4,65
M6 x 1	1,2 - 2,4	5,40	2,4 - 3,6	5,45	3,6 - 4,9	5,50	4,9 - 6,9	5,50	6,9 - 8,1	5,55
M8x1,25	1,6 - 3,1	7,30	3,1 - 4,9	7,35	4,9 - 6,9	7,40	6,9 - 8,9	7,45	8,9 - 10,9	7,50
M10x1,5	1,9 - 3,9	9,15	3,9 - 5,9	9,20	5,9 - 8,3	9,30	8,3 - 10,9	9,35	10,9 - 12,9	9.40
M12x1,75	2,4 - 4,9	11,00	4,9 - 7,4	11,10	7,4 - 10,5	11,2	10,5 - 14,5	11,25	14,5 - 17,0	11,30

[1)] We recommend to perform lab tests in order to determine the best core hole geometry as well as the screwing parameters.

Chart 7

Recommended hole diameter when using sheet metal rim holes.

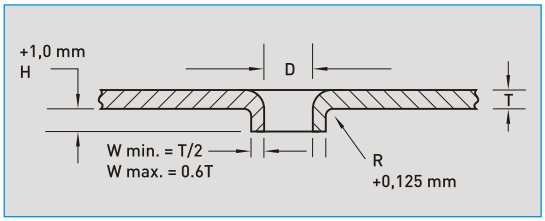


Fig. 7

TAPTITE 2000® achieve almost twice the holding power in sheet metal rim holes that they achieve in punched or drilled holes in identical applications.

sheet thickness	0,5 - 0,69	0,7 - 0,99	1,0 - 1,49	1,5 - 2,49	2,5 - 3,0
nom.-Ø	nominal-Ø hole diameter (dimension D fig. 7)				
M2,5	2,22	2,23	2,24	-	-
M3	2,70	2,71	2,72	-	-
M4	3,57	3,59	3,61	3,64	-
M5	-	4,53	4,56	4,59	-
M6	-	5,42	5,45	5,48	5,51
M8	-	-	7,27	7,31	7,35
M10	-	-	9,12	9,17	9,22

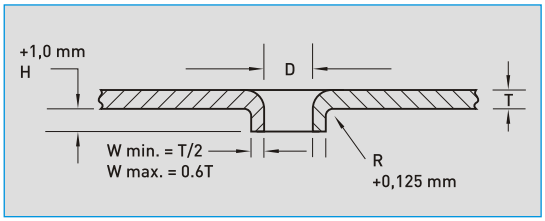
Chart 8

nom.-Ø	hole-Ø (Dim. D; Fig..7)	sheet thickness (dimension T fig. 7)									
		0,6 - 1,0		1,0 - 1,2		1,2 - 2,0		2,0 - 2,5		2,5 - 3,0	
		H	R	H	R	H	R	H	R	H	R
M2,5	2,22 - 2,24	1,00	0,13	1,00	0,13	1,00	0,15	1,10	0,25	-	-
M3	2,70 - 2,72	1,20	0,13	1,20	0,13	1,20	0,15	1,30	0,25	1,35	0,25
M4	3,57 - 3,64	1,35	0,13	1,35	0,13	1,35	0,15	1,50	0,25	1,60	0,25
M5	4,53 - 4,59	-	-	1,50	0,13	1,55	0,15	1,80	0,25	1,90	0,25
M6	5,42 - 5,51	-	-	1,80	0,13	1,80	0,15	2,30	0,25	2,40	0,25
M8	7,27 - 7,35	-	-	-	-	2,10	0,15	2,95	0,25	3,20	0,25
M10	9,12 - 9,22	-	-	-	-	2,40	0,15	3,20	0,25	3,40	0,25

Chart 9

[1] We recommend to perform lab tests in order to determine the best core hole geometry as well as the screwing parameters.

Recommended hole diameter when using sheet metal rim holes.



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TAPTITE 2000® achieve almost twice the holding power in sheet metal rim holes that they achieve in punched or drilled holes in identical applications.

sheet thickness	0,5 - 0,69	0,7 - 0,99	1,0 - 1,49	1,5 - 2,49	2,5 - 3,0
nom.-Ø	nominal-Ø hole diameter (dimension D fig. 7)				
M2,5	2,22	2,23	2,24	-	-
M3	2,70	2,71	2,72	-	-
M4	3,57	3,59	3,61	3,64	-
M5	-	4,53	4,56	4,59	-
M6	-	5,42	5,45	5,48	5,51
M8	-	-	7,27	7,31	7,35
M10	-	-	9,12	9,17	9,22

Chart 8

nom.-Ø	hole-Ø (Dim. D; Fig..7)	sheet thickness (dimension T fig. 7)									
		0,6 - 1,0		1,0 - 1,2		1,2 - 2,0		2,0 - 2,5		2,5 - 3,0	
		H	R	H	R	H	R	H	R	H	R
M2,5	2,22 - 2,24	1,00	0,13	1,00	0,13	1,00	0,15	1,10	0,25	-	-
M3	2,70 - 2,72	1,20	0,13	1,20	0,13	1,20	0,15	1,30	0,25	1,35	0,25
M4	3,57 - 3,64	1,35	0,13	1,35	0,13	1,35	0,15	1,50	0,25	1,60	0,25
M5	4,53 - 4,59	-	-	1,50	0,13	1,55	0,15	1,80	0,25	1,90	0,25
M6	5,42 - 5,51	-	-	1,80	0,13	1,80	0,15	2,30	0,25	2,40	0,25
M8	7,27 - 7,35	-	-	-	-	2,10	0,15	2,95	0,25	3,20	0,25
M10	9,12 - 9,22	-	-	-	-	2,40	0,15	3,20	0,25	3,40	0,25

Chart 9

[1] We recommend to perform lab tests in order to determine the best core hole geometry as well as the screwing parameters.

Advice for application Thread moments of Taptite 2000®

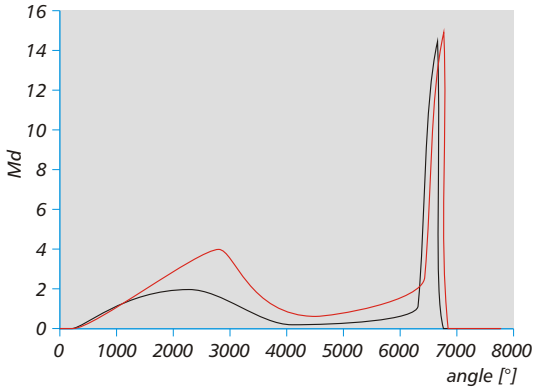

Fig. 8:
Thread and failure moments Taptite 2000® CM5x16-E.H
— Max. thread moment — Min. thread moment

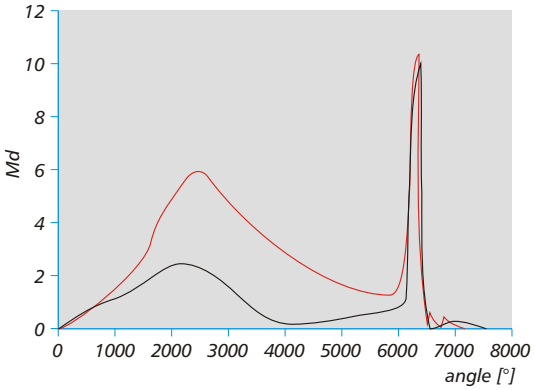

Fig. 9:
Thread and failure moments DIN 7500 CM 5x16-E.H.
— Max. thread moment — Min. thread moment

Installations in steel plates: 5.9 mm thick, hardness 120 HB, core hole diameter 4.50 mm

Taptite 2000® screws reduce the threading moments of conventional tapping screws by up to 50 % at the same level of minimum failure moments.

Higher pre-stressing loads and higher assembly security

Dispersion of prestressing loads with Taptite 2000 (20 installations):

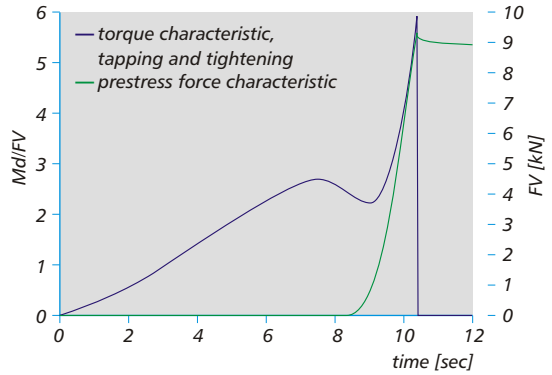

Fig. 10:
MA = 6 Nm Taptite 2000 CM5x50-E.H at Fv-max

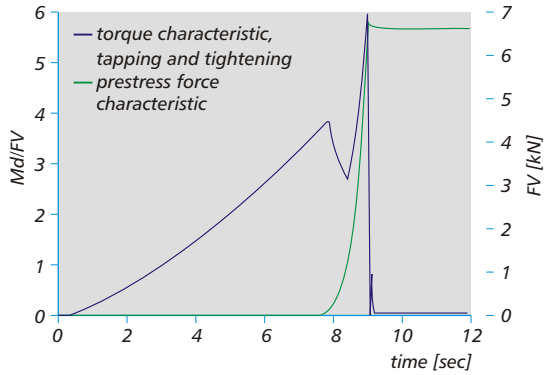

Fig. 11:
MA = 6 Nm Taptite 2000 CM5x50-E.H. at Fv-min

Installations in steel plates: 5.9 mm thick, hardness 120 HB, core hole diameter 4.50 mm

Dispersion of prestressing loads with conventional tapping screws:

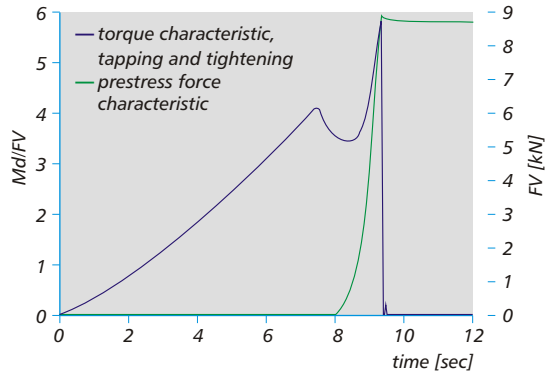

Fig. 12:
MA = 6 Nm DIN 7500 CM5x55-E.H at Fv-max

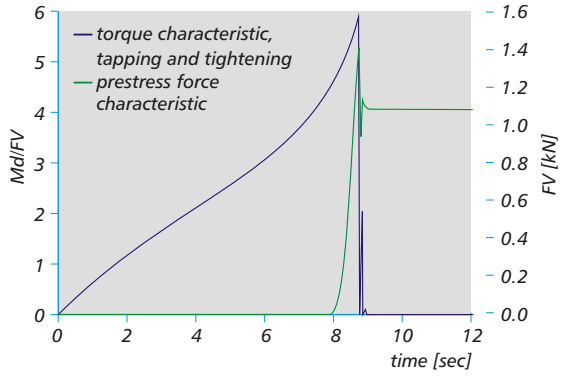

Fig. 13:
MA = 6 Nm DIN 7500 CM5x55-E.H. at Fv-min

Installations in steel plates: 5.9 mm thick, hardness 120 HB, core hole diameter 4.50 mm

Variations

Taptite 2000 Captive Point®

- Mechanical securing feature
- Pegging small core hole diameters
- No loss possible after thread forming

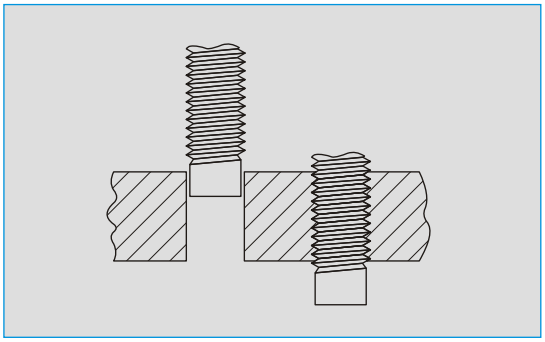

Fig. 14

Taptite 2000 CA-tip®/ Extrude-Tite®

- For screwing thin metal sheets
- Forms a sheet metal rim hole

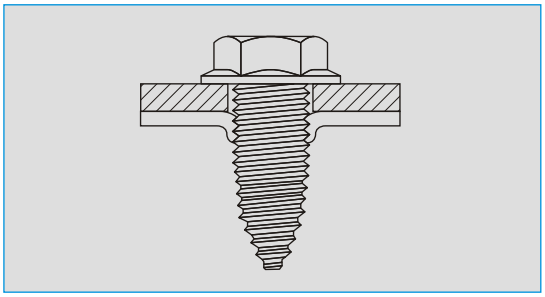

Fig. 15

Taptite 2000® Assembly aids

- Assembly aids are usually not required due to the conic point
- Possible if so required

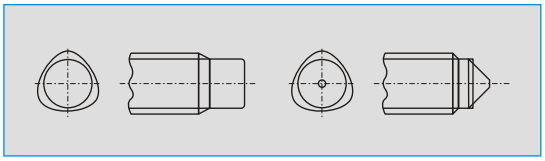

Fig. 16

Taptite 2000® Screw retention systems

- The trilobular shape generates a high degree of self-securing capability.
- If so requested, mechanical or chemical screw retention features may be added.

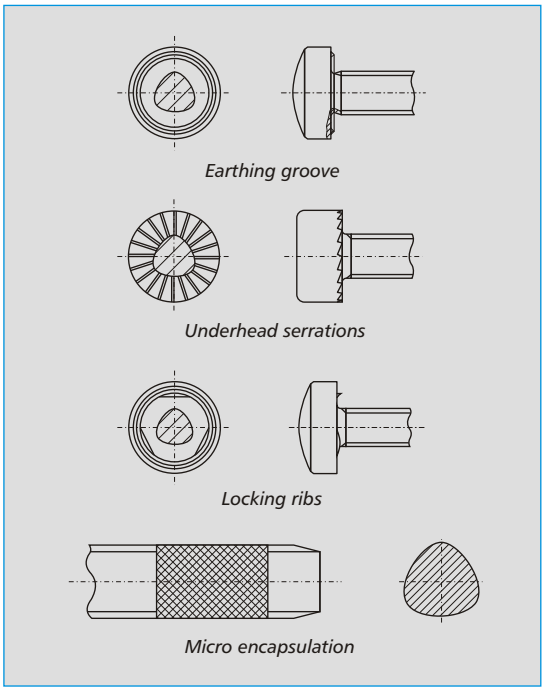

Fig. 17