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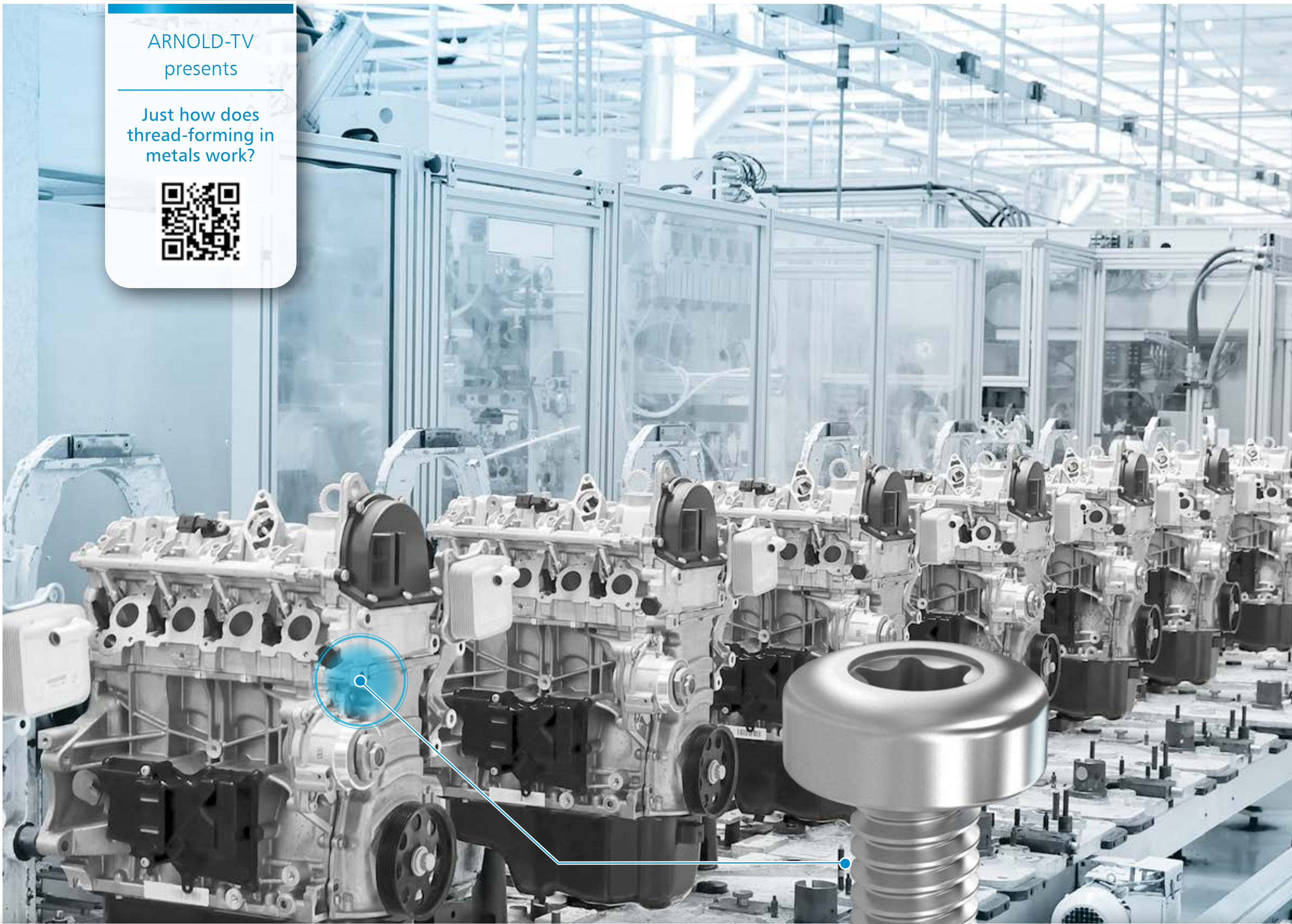
BlueFastening Systems

ARNOLD-TV
presents

Just how does thread-forming in metals work?



TAPTITE 2000®

Thread-forming in metals

- low forming torque
- high pre-load forces
- high assembly reliability
- chipless thread-forming
- total cost of fastening reduced by up to 85%

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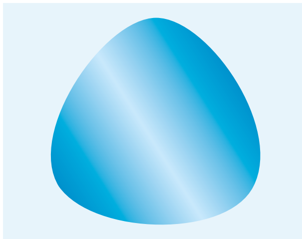
Faster production, better quality, lower costs

TAPTITE 2000® is a thread-forming screw with outstanding mechanical, fastening and ergonomic characteristics that no other technology can aspire to. Compared with conventional screws, with TAPTITE 2000® you can reduce your overall fastening costs by up to 85%, partly because the cost of manufacture is drastically reduced: Many steps of the process can simply be omitted. The fastener is screwed straight into a cast or drilled core hole. Done!

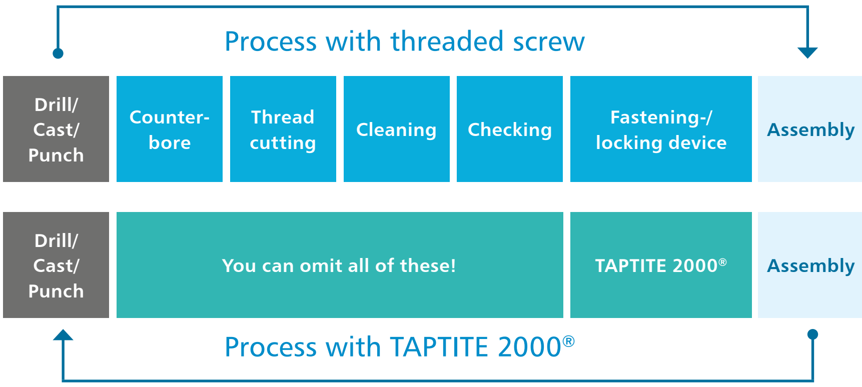
Technology in application

Using TAPTITE 2000® ensures that in metal-joining applications, you can eliminate work processes such as forming and the use of additional fastening elements.

The trilobulare™ cross-section geometry of the shaft of the screw ensures that the thread is chiplessly formed, so that if a repair is needed it can accept a conventional threaded screw. It also provides significant quality advantages: low forming torque, high vibration resistance and high pre-load forces.



Fewer steps towards the goal

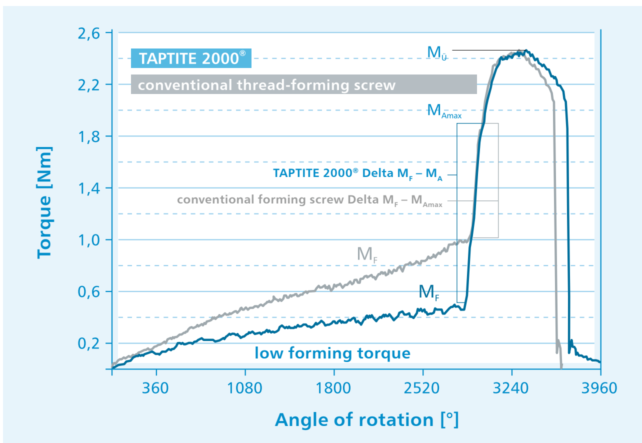


When you use TAPTITE 2000®, it's not just processing time – you also save money on tool and machine usage. For example the machining centre and the washing unit can be omitted for the screw locations, as would be necessary for threaded screws, and there's no need to purchase measuring instruments to check gauge sizes, and no additional locking elements are needed either.

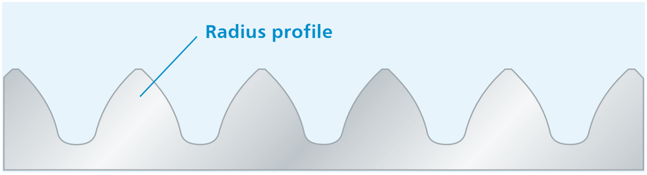
Improved security at assembly

Due to the major difference between the low forming torque (M_F) of TAPTITE 2000® and the tightening torque (M_A) (Delta M_A - M_F) you can achieve improved assembly security and higher clamping force.

Delta M_F – M_A TAPTITE 2000® M3-10.9 and Delta M_F – M_A conventional M3-10.9 forming screw



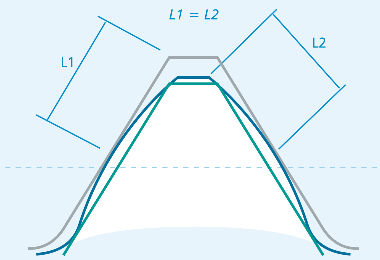
Thread profile and cross-section ensure better values



The TAPTITE 2000® thread profile is similar to the involute shape of a gearwheel. Together with the triangular (trilobularen™) cross-section geometry of the screw's shaft, it greatly improves the mechanical properties of the screw fastening:

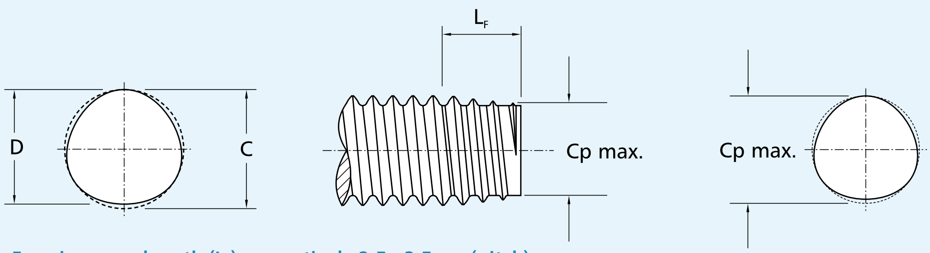
Forming torque halved

With the unique radius profile and the triangular cross-section, the TAPTITE 2000®'s driving torque is up to 50% less than that of conventional thread-forming screws compliant with DIN 267-part 30 and DIN 7500-1.



- Less forming effort is required during the thread forming process and material displacement is lower. The material can flow more easily in the direction of the thread core. The material's grain direction is maintained.
- During the strain hardening process, the mechanical values of the material can be increased by around 30%.
- chipless thread-forming (no chips are formed as is the case with forming screws)
- lower driving torque
- lower clamping force scatter
- higher pre-load forces
- greater vibration resistance

The optimised thread geometry of TAPTITE 2000® SPA™



Forming zone length (L_F) respectively 2.5 - 3.5 x p (pitch)

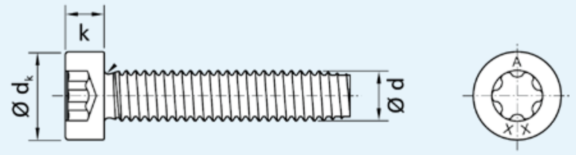
Thread cut

By optimising the length of the forming zone (L_F) and the permitted Cp-max. dimension, hole location of the screw can be improved while increasing the number of bearing thread turns.

Nominal thread Ø TAPTITE 2000®		M2.5	M3	M3.5	M4	M5	M6	M8	M10
Forming zone length L_F [mm]		1.35	1.50	1.80	2.10	2.40	3.00	3.75	4.50
Tolerance L_F [mm]		±0.225	±0.25	±0.30	±0.35	±0.40	±0.50	±0.625	±0.75
Pitch p [mm]		0.45	0.50	0.60	0.70	0.80	1.00	1.25	1.50
Circumference C	max. [mm]	2.52	3.02	3.52	4.02	5.02	6.03	8.03	10.03
	min. [mm]	2.43	2.93	3.42	3.92	4.91	5.90	7.87	9.85
Distance D	max. [mm]	2.46	2.97	3.46	3.93	4.92	5.91	7.87	9.84
	min. [mm]	2.37	2.87	3.35	3.83	4.81	5.78	7.71	9.66
Cp	max. [mm]	2.13	2.58	3.00	3.40	4.31	5.12	6.91	9.07

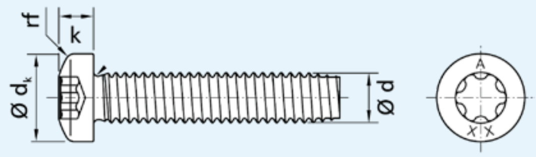
ARNOLD Factory Standards

Cylinder-head screw AWN-01-01-01



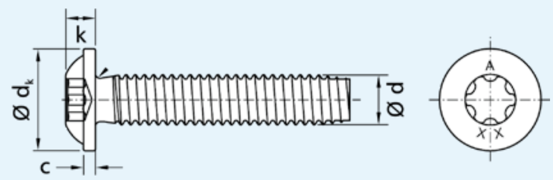
Nominal Ø		M2.5	M3	M4	M5	M6	M8	M10
d_k		$4.50^{-0.18}$	$5.50^{-0.18}$	$7.00^{-0.22}$	$8.50^{-0.22}$	$10.00^{-0.22}$	$13.00^{-0.27}$	$16.00^{-0.27}$
k		$1.85^{-0.14}$	$2.40^{-0.14}$	$3.10^{-0.18}$	$3.65^{-0.18}$	$4.40^{-0.30}$	$5.80^{-0.30}$	$6.90^{-0.36}$
TORX®	Size	T8	T10	T20	T25	T30	T45	T50
TORX PLUS AUTOSERT®	Size	IP8	IP10	IP20	IP25	IP30	IP45	IP50

Flat-head screw AWN-01-01-02



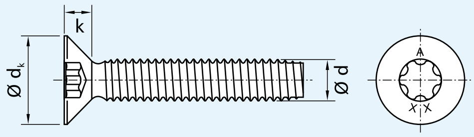
Nominal Ø		M2.5	M3	M3.5	M4	M5	M6	M8	M10
d_k		$5.00^{-0.30}$	$5.60^{-0.30}$	$7.00^{-0.36}$	$8.00^{-0.36}$	$9.50^{-0.36}$	$12.00^{-0.43}$	$16.00^{-0.43}$	$20.00^{-0.52}$
k		$2.10^{-0.14}$	$2.40^{-0.14}$	$2.60^{-0.14}$	$3.10^{-0.18}$	$3.70^{-0.18}$	$4.60^{-0.30}$	$6.00^{-0.30}$	$7.50^{-0.36}$
TORX®	Size	T8	T10	T15	T20	T25	T30	T45	T50
TORX PLUS AUTOSERT®	Size	IP8	IP10	IP15	IP20	IP25	IP30	IP45	IP50

Saucer-head screw AWN-01-01-03



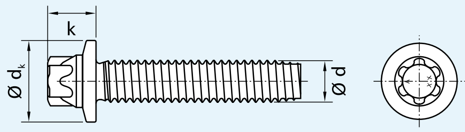
Nominal Ø		M2.5	M3	M3.5	M4	M5	M6	M8	M10
d_k		$6.00^{-0.30}$	$7.50^{-0.58}$	$9.00^{-0.58}$	$10.00^{-0.58}$	$11.50^{-0.70}$	$14.50^{-0.70}$	$19.00^{-0.84}$	$24.00^{-0.84}$
k		$2.40^{-0.25}$	$2.52^{-0.24}$	$2.80^{-0.25}$	$3.25^{-0.30}$	$3.95^{-0.30}$	$4.75^{-0.30}$	$6.15^{-0.30}$	$7.40^{-0.30}$
TORX®	Size	T8	T10	T15	T20	T25	T30	T40	T50
TORX PLUS AUTOSERT®	Size	IP8	IP10	IP15	IP20	IP25	IP30	IP40	IP50

Countersunk screw AWN-01-01-04



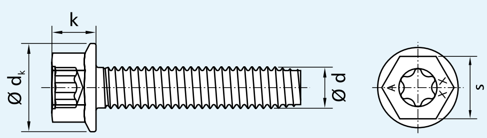
Nominal Ø		M2.5	M3	M3,5	M4	M5	M6	M8	M10
d_k		$4.70^{-0.30}$	$5.50^{-0.30}$	$7.30^{-0.40}$	$8.40^{-0.40}$	$9.30^{-0.40}$	$11.30^{-0.40}$	$15.80^{-0.40}$	$18.30^{-0.50}$
k	max.	1.50	1.65	2.35	2.70	2.70	3.30	4.65	5.00
TORX®	Size	T8	T10	T15	T20	T25	T30	T40	T50
TORX PLUS AUTOSERT®	Size	IP8	IP10	IP15	IP20	IP25	IP30	IP40	IP50

External torx screw AWN-01-01-06



Nominal Ø		M4	M5	M6	M8	M10	M12
d_k	max.	7.66	11.80	14.20	17.90	21.80	26.00
k		$4.50^{-0.25}$	$6.50^{-0.25}$	$7.50^{-0.25}$	$10.00^{-0.25}$	$12.00^{-0.25}$	$14.00^{-0.25}$
External-TORX®	Size	E5	E8	E10	E12	E14	E18

Hex head screw with flange AWN-01-01-07



Nominal Ø		M5	M6	M8	M10
d_k		$11{,}80^{-0{,}50}$	$14{,}20^{-0{,}50}$	$17{,}90^{-0{,}50}$	$21{,}80^{-0{,}50}$
k		$5.40^{-0.10}$	$6.60^{-3.60}$	$8.10^{-4.50}$	$9.20^{-5.20}$
External-TORX®	Size	IP25	IP30	IP45	IP50
s	nominal dimension max.	8	10	13	16
	min.	7.78	9.78	12.73	15.73

What length screw for which thread Ø?

Nominal thread Ø TAPTITE 2000®	M2.5	M3	M3.5	M4	M5	M6	M8	M10
Length L (mm)	**Standard length range**							
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 on request.
Lengths in brackets should be avoided as far as possible.

not for countersunk heads ▨

Important values

Strength classes

8.8 for all coloured metals and light metal alloys up to Rm = 360 MPa
10.9 for all metals up to Rm = 415 MPa
E.H. for steel up to RM ~ 600 MPa
10.9 Corflex® I for steel up to Rm ~ 600 MPa*

*) 10.9 with inductive hardened tip

Safety information

All screws with

Rm > 1000 MPa

are at risk of hydrogen-induced brittle fracture

Minimum breaking torque

Tightening torques depend on the screw's minimum breaking torques (ISO 898 part 7), on tool stability, core hole diameter, screw-in depth and friction coefficients. These are determined in laboratory trials.

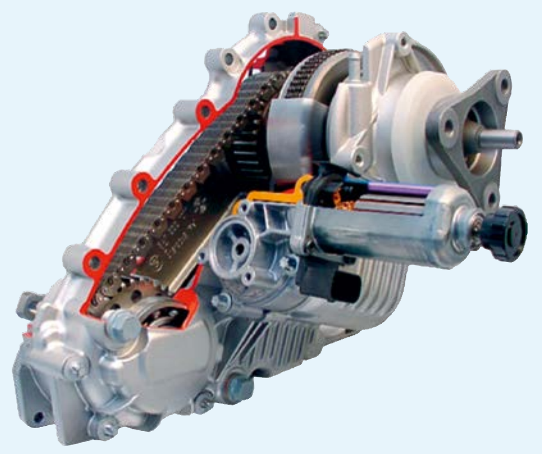
Minimum breaking torques in Nm (free torsion break)

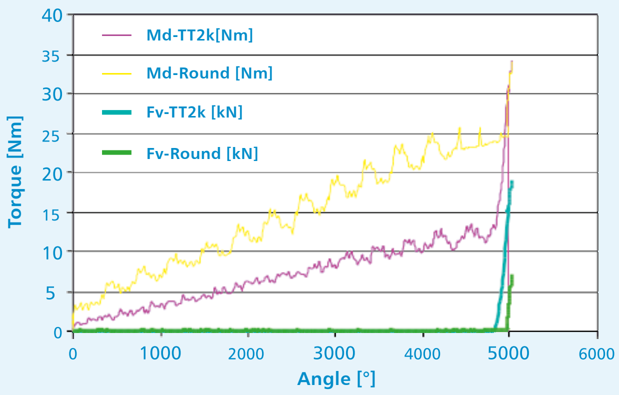
Nominal thread Ø TAPTITE 2000®	M2.5	M3	M3.5	M4	M5	M6	M8	M10
Strength class 8.8	0.82	1.50	2.40	3.60	7.60	13.00	33.00	66.00
Strength class 10.9	1.00	1.90	3.00	4.40	9.30	16.00	40.00	81.00
Strength class E.H.	1.00	1.80	2.80	4.10	8.70	15.00	37.00	75.00

Thread engagement

Nominal thread Ø TAPTITE 2000®	M2.5	M3	M3.5	M4	M5	M6	M8	M10
Pitch p	**0.45**	**0.50**	**0.60**	**0.70**	**0.80**	**1.00**	**1.25**	**1.50**
Thread engagement 100 %	2.21	2.68	3.11	3.55	4.48	5.35	7.19	9.03
Thread engagement 95 %	2.22	2.69	3.13	3.57	4.51	5.38	7.23	9.07
Thread engagement 90 %	2.24	2.71	3.15	3.59	4.53	5.42	7.27	9.12
Thread engagement 85 %	2.25	2.72	3.17	3.61	4.56	5.45	7.31	9.17
Thread engagement 80 %	2.27	2.74	3.19	3.64	4.58	5.48	7.35	9.22
Thread engagement 75 %	2.28	2.76	3.21	3.66	4.61	5.51	7.39	9.27
Thread engagement 70 %	2.30	2.77	3.23	3.68	4.64	5.55	7.43	9.32
Thread engagement 65 %	2.31	2.79	3.25	3.70	4.66	5.58	7.47	9.37
Thread engagement 60 %	2.32	2.81	3.27	3.73	4.69	5.61	7.51	9.42
Thread engagement 55 %	2.34	2.82	3.29	3.75	4.71	5.64	7.55	9.46
Thread engagement 50 %	2.35	2.84	3.31	3.77	4.74	5.68	7.59	9.51
Thread engagement 45 %	2.37	2.85	3.32	3.80	4.77	5.71	7.63	9.56
Thread engagement 40 %	2.38	2.87	3.34	3.82	4.79	5.74	7.68	9.61
Thread engagement 35 %	2.40	2.89	3.36	3.84	4.82	5.77	7.72	9.66
Thread engagement 30 %	2.41	2.90	3.38	3.86	4.84	5.81	7.76	9.71

Application in cast aluminium





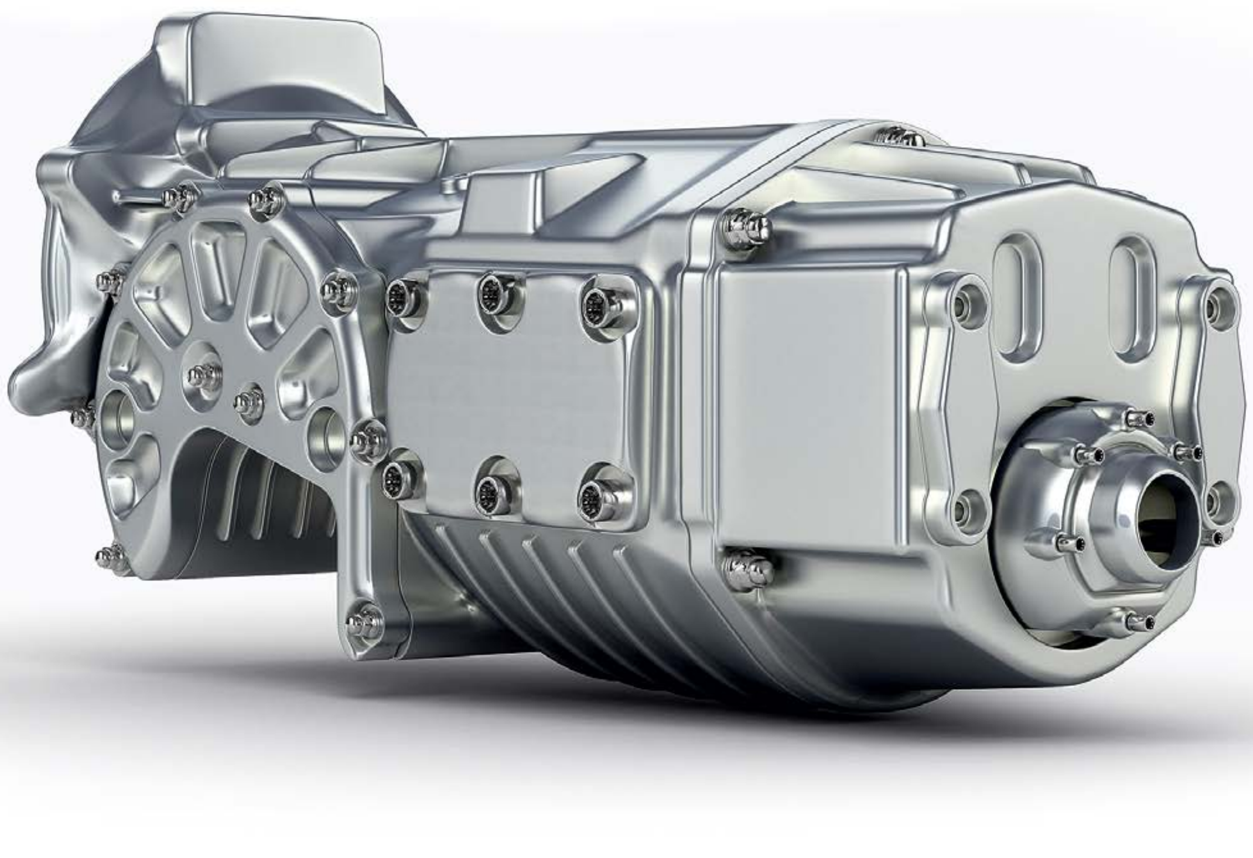
Thread-forming screws of strength class 10.9 are usually used for thread-forming in aluminium alloys.

Power take-off gears

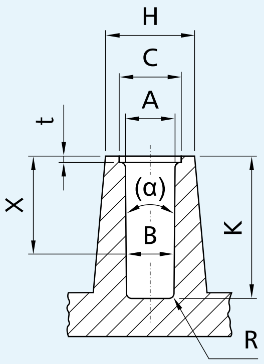
Screw fastening into precast core holes in aluminium housings made with TAPTITE 2000® M8 – 10.9

Influence of screw's cross-section on forming torque and preload force

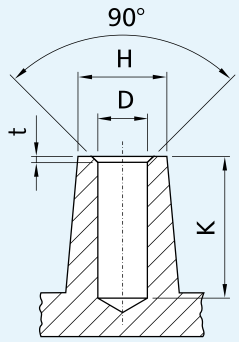
For thread-forming fastenings in GD-AlSi9Cu3 (Fe) a round screw cross-section generated a forming torque MF round of 25.7 Nm. Because of the small difference with the tightening torque MA = 34 Nm the preload force Fv-round amounted to only 7.2 kN. At 19.1 kN TAPTITE 2000® with its trilobular screw geometry, achieved a much higher FV-TT2000 preload force with a forming torque TT2000 of 13.55 Nm and the same tightening torque.
Consequently the trilobular TAPTITE 2000® SPA™ has an advantage over forming screws with a round cross-section – Due to the lower forming torques and little spread, TAPTITE 2000® generates preload forces at a higher level with very much less preload force spread.



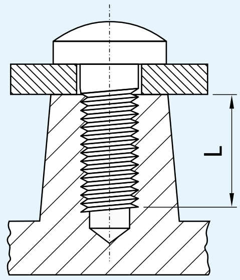
Note: The values shown are by way of example parameters. Specific values must always be determined by carrying out trials on original production parts. Our Fastener Testing Centre is always happy to answer any further questions you may have.



Cast core hole



Drilled core hole



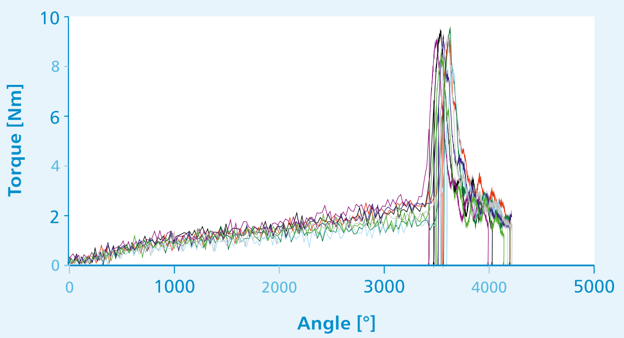
Recommendations for applications in cast aluminium

Cast aluminium core hole

Nominal Ø		M2.5	M3	M3.5	M4	M5	M6	M8	M10
cast effective screw-in depth = 2 x d	A	$2.32^{+0.08}$	$2.80^{+0.08}$	$3.25^{+0.08}$	$3.70^{+0.08}$	$4.69^{+0.08}$	$5.60^{+0.10}$	$7.55^{+0.12}$	$9.48^{+0.12}$
	B	$2.22^{+0.08}$	$2.69^{+0.08}$	$3.12^{+0.08}$	$3.55^{+0.08}$	$4.48^{+0.08}$	$5.35^{+0.10}$	$7.19^{+0.12}$	$9.03^{+0.12}$
	L	6.8	8.0	9.4	10.8	13.2	16.0	21.0	26.0
	K_{min}	7.8	9.2	10.6	12.0	14.7	17.5	22.7	27.0
	X	5.45	6.50	7.60	8.70	10.80	13.00	17.25	21.50
cast effective screw-in depth = 1.5 x d	A	$2.29^{+0.08}$	$2.78^{+0.08}$	$3.22^{+0.08}$	$3.66^{+0.08}$	$4.64^{+0.08}$	$5.54^{+0.10}$	$7.46^{+0.12}$	$9.37^{+0.12}$
	B	$2.22^{+0.08}$	$2.69^{+0.08}$	$3.12^{+0.08}$	$3.55^{+0.08}$	$4.48^{+0.08}$	$5.35^{+0.10}$	$7.19^{+0.12}$	$9.03^{+0.12}$
	L	5.6	6.5	7.7	8.8	10.7	13.0	17.0	21.0
	K_{min}	6.6	7.7	8.9	10.0	12.2	14.5	18.7	22.8
	X	4.20	5.00	5.85	6.70	8.30	10.00	13.25	16.50
cast effective screw-in depth = 1.0 x d	A	$2.27^{+0.08}$	$2.75^{+0.08}$	$3.19^{+0.08}$	$3.63^{+0.08}$	$4.59^{+0.08}$	$5.48^{+0.10}$	$7.37^{+0.12}$	$9.26^{+0.12}$
	B	$2.22^{+0.08}$	$2.69^{+0.08}$	$3.12^{+0.08}$	$3.55^{+0.08}$	$4.48^{+0.08}$	$5.35^{+0.10}$	$7.19^{+0.12}$	$9.03^{+0.12}$
	L	4.3	5	5.9	6.08	8.2	10.0	13.0	16.0
	K_{min}	5.3	6	6.9	7.8	9.2	11.0	14.0	17.0
	X	2.95	3.50	4.10	4.70	5.80	7.00	9.25	11.50
additional information for cast holes	C	$2.7^{+0.08}$	$3.2^{+0.08}$	$3.7^{+0.08}$	$4.3^{+0.08}$	$5{,}3^{+0.08}$	$6.3^{+0.08}$	$8.5^{+0.08}$	$10.5^{+0.08}$
	t	$0.55^{-0.2}$	$0.60^{-0.2}$	$0.70^{-0.2}$	$0.80^{-0.2}$	$0.90^{-0.2}$	$1.10^{-0.2}$	$1.30^{-0.2}$	$1.70^{-0.3}$
	R_{max}	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7
	H_{min}	4.2	5	5.8	6.7	8.3	10.0	13.3	16.6
	~ α [°]	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.3
Drilled	D^{H11}	2.27	2.75	3.20	3.65	4.60	5.50	7.38	9.27

*) recommended, effective penetration depth into aluminium corresponds to 2 x d.
(effective penetration depth = penetration depth - length of forming zone - relief bore depth)

Application in cast magnesium



Thread-forming screws of strength class 10.9 or 8.8 are usually used for thread-forming in magnesium alloys.

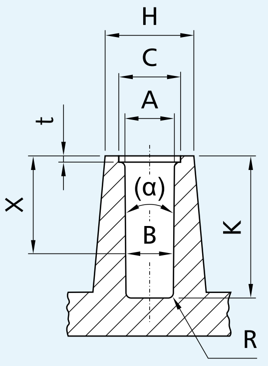
Steering column

Screw fastening into precast core holes made with TAPTITE 2000® M5.

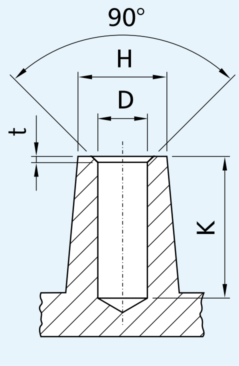
Excellent security during screw-in process.

The TAPTITE 2000® M5 fastening into precast core holes in Mg AZ91 pressure cast was made at forming torques MF < 3 Nm and overturn torque > 9 Nm. A high level of process reliability is achieved for the screw-in process because of the wide gap between forming torque and overturn torque.

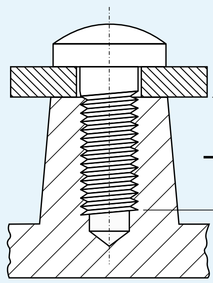
Note: The values shown are by way of example parameters. Specific values must always be determined by carrying out trials on original production parts. Our Fastener Testing Centre is always happy to answer any further questions you may have.



Cast core hole



Drilled core hole



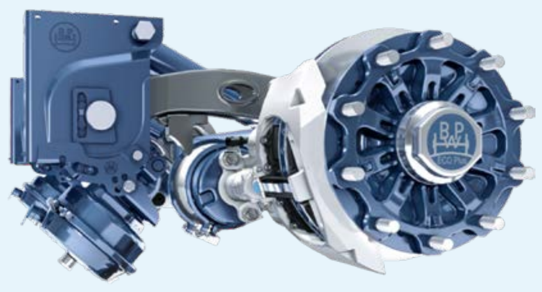
Installation recommendations for applications in cast magnesium

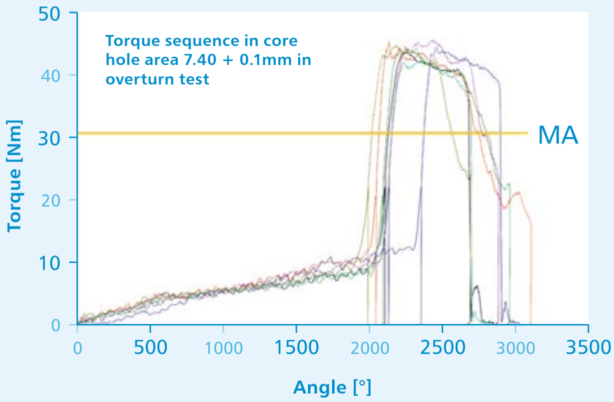
Cast aluminium core hole

Nominal Ø		M2.5	M3	M3.5	M4	M5	M6	M8	M10
cast effective screw-in depth = 2.5 x d	A	$2.31^{+0.08}$	$2.80^{+0.08}$	$3.25^{+0.08}$	$3.73^{+0.08}$	$4.71^{+0.08}$	$5.62^{+0.10}$	$7.60^{+0.12}$	$9.53^{+0.12}$
	B	$2.20^{+0.08}$	$2,67^{+0.08}$	$3.10^{+0.08}$	$3.54^{+0.08}$	$4.47^{+0.08}$	$5.33^{+0.10}$	$7.17^{+0.12}$	$9.01^{+0.12}$
	L	8.05	9.50	11.15	12.80	15.70	19.00	25.00	31.00
	K_{min}	9.05	10.70	12.40	14.00	17.20	20.50	26.70	32.80
	X	6.70	8.00	9.35	10.70	13.30	16.00	21.30	26.50
cast effective screw-in depth = 2 x d	A	$2.29^{+0.08}$	$2.77^{+0.08}$	$3.22^{+0.08}$	$3.69^{+0.08}$	$4.66^{+0.08}$	$5.56^{+0.10}$	$7.50^{+0.12}$	$9.43^{+0.12}$
	B	$2.20^{+0.08}$	$2.67^{+0.08}$	$3.10^{+0.08}$	$3.54^{+0.08}$	$4.47^{+0.08}$	$5.33^{+0.10}$	$7.17^{+0.12}$	$9.01^{+0.12}$
	L	6.8	8.0	9.4	10.8	13.2	16.0	21.0	26.0
	K_{min}	7.8	9.2	10.6	12.0	14.7	17.5	22.7	27.8
	X	5.45	6.50	7.60	8.70	10.80	13.00	17.25	21.50
cast effective screw-in depth = 1.5 x d	A	$2.27^{+0.08}$	$2.74^{+0.08}$	$3.19^{+0.08}$	$3.65^{+0.08}$	$4.61^{+0.08}$	$5.50^{+0.10}$	$7.40^{+0.12}$	$9.33^{+0.12}$
	B	$2.20^{+0.08}$	$2.67^{+0.08}$	$3.10^{+0.08}$	$3.54^{+0.08}$	$4.47^{+0.08}$	$5.33^{+0.10}$	$7.17^{+0.12}$	$9.01^{+0.12}$
	L	5.55	6.50	7.65	8.80	10.70	13.00	17.00	21.00
	K_{min}	6.55	7.50	8.65	9.80	11.70	14.00	18.00	22.00
	X	4.20	5.00	5.85	6.70	8.30	10.00	13.25	16.50
additional EMC requirements Information: for cast holes	C	$2.7^{+0.08}$	$3.2^{+0.08}$	$3.7^{+0.08}$	$4.3^{+0.08}$	$5.3^{+0.08}$	$6.3^{+0.08}$	$8.5^{+0.08}$	$10.5^{+0.08}$
	t	$0.55^{-0.2}$	$0.60^{-0.2}$	$0.70^{-0.2}$	$0.80^{-0.2}$	$0.90^{-0.2}$	$1.10^{-0.2}$	$1.30^{-0.2}$	$1.70^{-0.3}$
	R_{max}	0.4	0.4	0.4	0.4	0.5	0.5	0.6	0.7
	H_{min}	4.2	5.0	5.8	6.7	8.3	10.0	13.3	16.6
	α	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.3
Drilled	D^{H11}	2.25	2.74	3.19	3.64	4.58	5.48	7.35	9.22

*) recommended, effective penetration depth into magnesium corresponds to 2.5 x d.
(effective penetration depth = penetration depth - length of forming zone - relief bore depth)

Application in solid steel





Thread-forming screws of strength class 10.9 with additional inductive hardening of the forming zone or in a case-hardened and tempered version are usually used for thread-forming in steel. TAPTITE 2000® in these versions can generally be used in steel materials up to Rm ~ 600 MPa.

ECO Air COMPACT axis with disc brakes.

Screw fastening for ABS sensor made with TAPTITE 2000® M8 10.9 Corflex® I. In this individual case, by using hardening technology to customise the forming zone, it is still possible to use the TAPTITE 2000® M8-10.9-Corflex® I in a steering knuckle hardened and tempered to Rm ~ 900 MPa, showing good suitability of the TAPTITE 2000® for thread-forming in relatively hard materials.

Torque sequence in core hole area 7.40 $^{+ 0.1mm}$ in overturn test.

It is possible to make a screw fastening with a typical tightening torque of ~ 30 Nm, while the forming torques were at a low level.

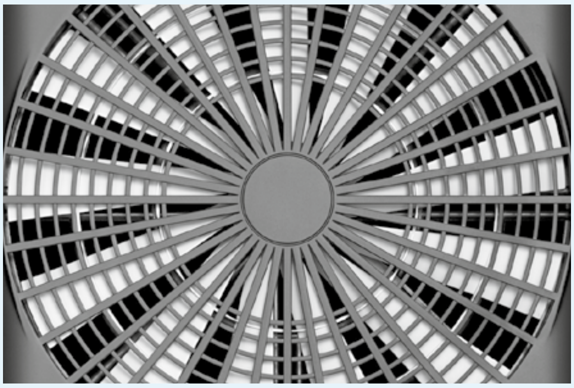
Installation recommendations for applications in solid steel

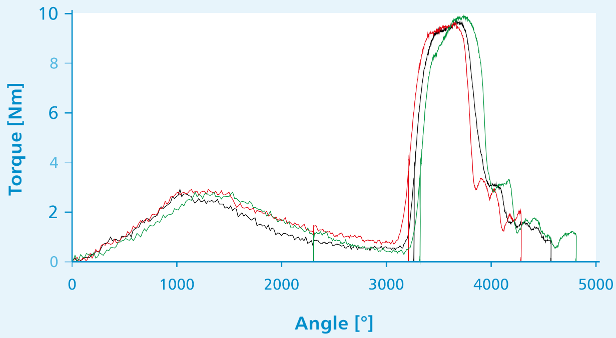
Effective screw-in depth ET	Thread en-gage-ment in %	Nomi-nal Ø [mm]	M2.5	M3	M3.5	M4	M5	M6	M8	M10
0.3 x d	90 %	ET [mm]	0.5 – 0.9	0.5 – 1.1	0.6 – 1.4	0.8 – 1.4	1.0 – 2.1	1.2 – 2.4	1.6 – 3.1	1.9 – 3.9
		Hole	2.24	2.71	3.15	3.59	4.53	5.42	7.27	9.12
0.5 x d	80 %	ET [mm]	0.9 – 1.5	1.1 – 1.7	1.4 – 2.0	1.4 – 2.4	2.1 – 2.9	2.4 – 3.6	3.1 – 4.9	3.9 – 5.9
		Hole	2.27	2.74	3.19	3.64	4.58	5.48	7.35	9.22
0.75 x d	70 %	ET [mm]	1.5 – 2.1	1.7 – 2.7	2.0 – 2.9	2.4 – 3.3	2.9 – 4.4	3.6 – 4.9	4.9 – 6.9	5.9 – 8.3
		Hole	2.30	2.77	3.23	3.68	4.64	5.55	7.43	9.32
1.0 x d	65 %	ET [mm]	2.1 – 2.7	2.7 – 3.3	2.9 – 3.8	3.3 – 4.4	4.4 – 5.9	4.9 – 6.9	6.9 – 8.9	8.3 – 10.9
		Hole	2.31	2.79	3.25	3.70	4.66	5.58	7.47	9.37
1.20 x d	60 %	ET [mm]	2.7 – 3.5	3.3 – 4.0	3.8 – 4.5	4.4 – 5.5	5.9 – 7.1	6.9 – 8.1	8.9 – 10.9	10.9 – 12.9
		Hole	2.32	2.81	3.27	3.73	4.69	5.61	7.51	9.42

Note: The values shown are by way of example parameters. Specific values must always be determined by carrying out trials on original production parts. Our Fastener Testing Centre is always happy to answer any further questions you may have.

ARNOLD® BlueFastening Systems

Application in sheet steel through-holes





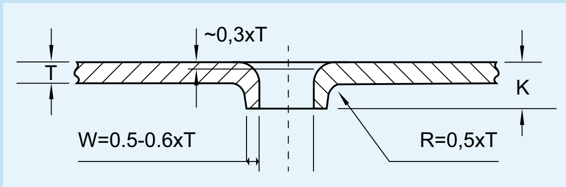
Thread-forming screws in a case-hardened and tempered version or screws of strength class 10.9 with additional inductive hardening of the forming zone are usually used for thread-forming in sheet steel through-holes. TAPTITE 2000® in these versions can generally be used in steel materials up to Rm ~ 600 MPa.

Industrial fan

Screw fastening for fan modules into through-holes in sheet steel using TAPTITE 2000® M5.

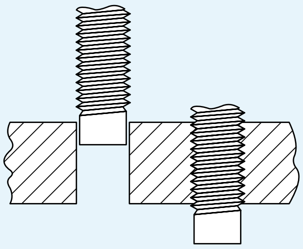
Secure screw fastenings into sheet steel

Low forming torques and high tightening torques and overturn torques ensure secure processing for the screw fastening. A higher level of component security when fastening low-strength steels with Rm ~ 400 MPa was achieved by using TAPTITE 2000® strength class 10.9.



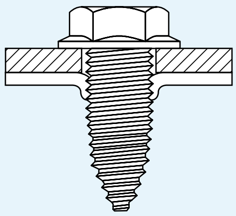
Sheet thickness T (mm)	Hole diameter (mm)										
	K/T	M2.0	M2.2	M2.5	M3.0	M3.5	M4.0	M5.0	M6.0	M8.0	M10.0
0.50	2.00	1.74									
0.60	1.60	1.74									
0.60	1.80	1.74	1.94								
0.60	2.00	1.74	1.94	2.21							
0.80	1.60	1.74	1.94	2.21							
0.80	1.80	1.75	1.94	2.21							
0.80	2.00	1.75	1.95	2.21	2.68						
1.00	1.60	1.75	1.95	2.21	2.68						
1.00	1.80	1.75	1.95	2.20	2.68	3.11					
1.00	2.00			2.20	2.68	3.11	3.55				
1.20	1.60			2.20	2.68	3.11	3.55				
1.20	1.80			2.20	2.69	3.11	3.55				
1.20	2.00				2.69	3.13	3.55	4.48			
1.50	1.60				2.69	3.13	3.55	4.48			
1.50	1.80				2.69	3.13	3.57	4.48			
1.50	2.00						3.57	4.48	5.35		
2.00	1.60						3.57	4.48	5.35		
2.00	1.80						3.57	4.51	5.35		
2.00	2.00							4.51	5.35	7.19	
2.50	1.60							4.51	5.35	7.19	
2.50	1.80							4.51	5.38	7.19	
2.50	2.00								5.38	7.19	9.03
3.00	1.60								5.38	7.19	9.03
3.00	1.80								5.38	7.23	9.03
3.00	2.00									7.23	9.03
4.00	1.60									7.23	9.03
4.00	1.80									7.23	9.07
4.00	2.00										9.07

TAPTITE 2000® with special designs



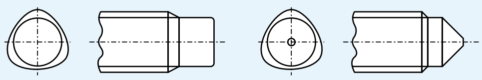
TAPTITE 2000® Captive Point

- mechanical securing device
- pin < core hole diameter
- cannot detach after forming



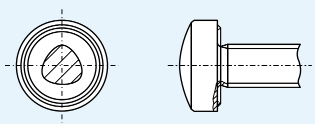
TAPTITE 2000® CA tip/Extrude-Tite®

- for fastening thin sheets
- forms a metal through-hole

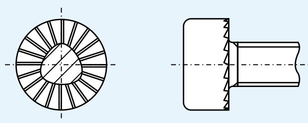


TAPTITE 2000® Assembly aids

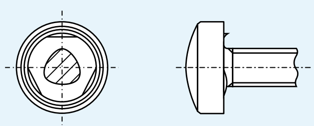
- can generally be dispensed with due to the conical section
- can be supplied if needed



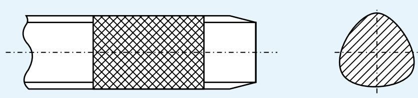
Cup point



Locking toothing



Locking burls



Micro-encapsulation

TAPTITE 2000® non-removable fastenings

- can generally be dispensed with
- the triangular (trilobulare™) shape of TAPTITE creates its own safety lock
- if required, mechanical or chemical locking devices can be applied

Notes

ARNOLD® BlueFastening Systems

www.arnold-fastening.com

The ARNOLD GROUP

Wherever customers need us.

The ARNOLD GROUP

ARNOLD – this name is internationally renowned for efficient and sustainable fastening systems on the highest level. With a foundation of many years of expertise in the production of intelligent fastening systems and very complex extruded parts, the ARNOLD GROUP has developed over a number of years into a comprehensive supplier and development partner for complex fastening systems. With our positioning of "BlueFastening Systems" this development process will continue under a united and harmonized structure. Engineering, fasteners, and functional parts, together with feeding and processing systems, all from a single source – efficient, sustainable and international.

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