RIBE®

FASTENER SYSTEMS

Thread-forming Screws

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FASTENER SYSTEMS

Direct Fastening

Direct fastening of components without mating threads can in many cases significantly lower the overall cost of mechanical fastening. However to achieve these savings, fasteners with special characteristics are required. RIBE® offers a broad range of specially designed screws in a wide range of lengths and diameters for all of your fastening needs.

Please note that as direct fastenings require an optimal interaction between component, fastener and assembly our technical department is available for your application-specific questions and to help you with your particular project.

Thread forming fasteners create the mating threads themselves. With RIBE® products this is done by reforming the mating material.

All metals and plastics with sufficient ductility and a material strength of ca. 650 MPA are appropriate mating thread materials.

RIBE® fasteners are optimized for solid metals (cast iron for example), for sheet metal, and for plastic components.

There is a fundamental difference between direct screwing into metal and into plastic. For metals, especially steel, the screw needs to be extremely hard. This is achieved through quenching and tempering to high strength, case hardening, or through inductive hardening. The thread profile generally corresponds to that of metric thread. For plastics on the other hand, slender, tapered flanks with a coarser pitch are more suitable. Quenched and tempered steel is sufficient for these screws, and additional hardening of the surface or coating is unnecessary.

RIBE®'s years of experience have produced both a product program and corresponding application guidelines that are in use throughout the world.

When not to use thread-forming screws?

- When the difference in material strength between screw and mating material is negligible.
- With materials that are not threadable such as brittle metals, minimum elongation at rupture should be ca. 50%.
- With the highest demanded prestressing force.

Advantages

Direct fastening with thread forming screws offers the following advantages:

- ① No mating material is removed consequently no chips are produced during assembly. There is no weakening of the mating material. This is particularly advantageous when using thin-walled components.
- ②There is no need to cut threads. This means no thread cutting processes, no tool costs, and a faster turnaround time. The result is lower costs.
- ③ Faster assembly using stamped, cast or drilled holes without chip producing prep work.
- ④ When screwing takes place the mating thread is work-hardened and self-stressed, so that it is generally capable of bearing a greater load.
- ⑤ Because of the „insertion torque" and the perfect fit between the external and internal threads, there is far greater resistance to loosening, so that additional screw locking devices are usually not necessary.
- ⑥ No stripping of mating threads during assembly.

Summary:

Significant cost- savings and improved assembly procedures can be achieved with thread-forming direct fasteners.

For many applications mating threads are not cut; rather they are formed during component manufacture. However advantages ②, ③, ⑤ and ⑥ still apply in these cases.

Metal Fasteners

Direct fastening into deep mating-threads for metals

Most of these fasteners have a metric thread profile insuring interchangeability with standard metric screws. These fasteners are designed to form a metric mother thread so that if necessary a screw with metric threads can be fitted, (for example if repair is required and the original screw is not available). The following screws have crests of different specifications to produce optimal mating-threads. All these screws have sharp, trilobular crests for rapid and tight engagement during assembly.

Guidelines for the dimensions of drilled, punched, or cast holes are listed here as well as parameters for installation and tightening torques (VDI 2230). In particular the torque values should be considered only as approximate guidelines, due to the wide range of variables in material performance, surfaces and lubrications. Especially in the case of critical combinations, for example shallow holes or low ductility mating material, we strongly recommend testing to determine the optimal dimensions.

Materials and design

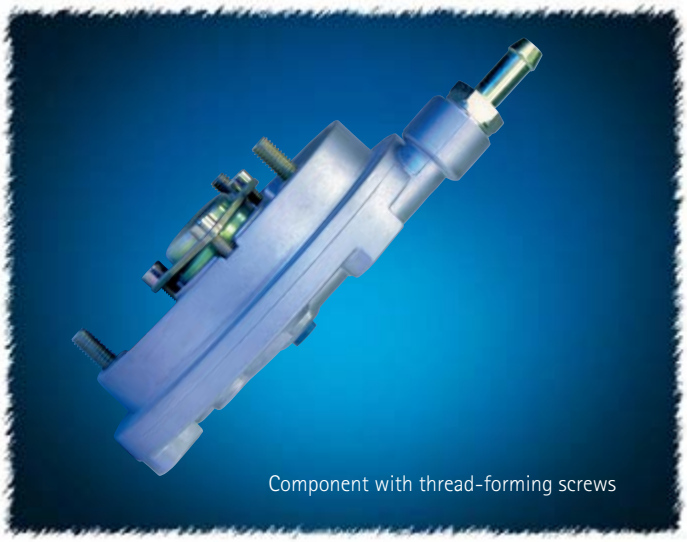
RIBE® TRIFORM™, RIBE®-TAPTITE II® and RIBE®-DUO-TAPTITE® are available in the following materials:

- Case-hardened (DIN EN ISO 7085)
- CORFLEX® N quenched and hardened with controlled recarborization - property classes 8.8, 10.9 and 12.9 (DIN EN 20898)
- CORFLEX® I with an inductively hardened thread-forming crest.

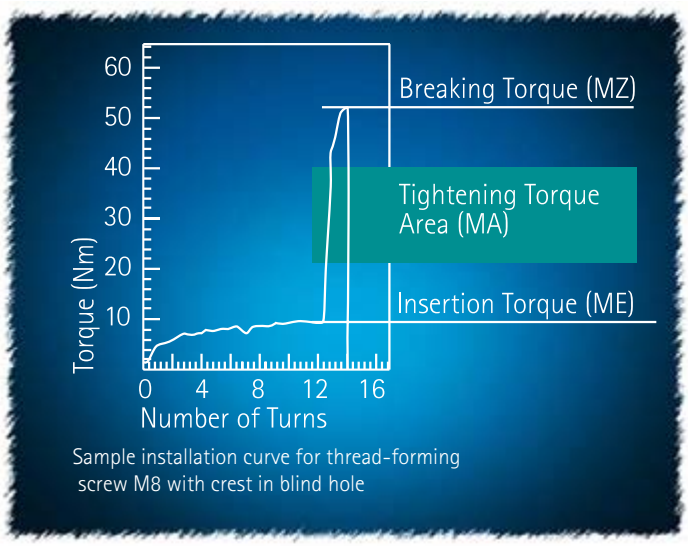
If no special demands on the dynamic strength or ductility of the screw are required, case-hardened quality is sufficient (DIN 7500). Example: mating threads with strengths of up to about 650 MPa or hardness of up to about 200 HB.

Quenched and tempered screws of property classes 8.8 or 10.9 are particularly suited for forming mating threads in light metals (CORFLEX® N, mating thread strength up to about 400 MPa or hardness 120 HB). Quenched and tempered screws with inductively hardened thread-forming crests are capable of forming mating threads in metals with strengths of up to 650 MPa, at the same time meeting the highest ductility and stress resistance requirements (CORFLEX® I, mating thread strength up to about 650 MPa or hardness 200 HB).

The CORFLEX® designs enable thread-forming screws to be used for fastenings that are subject to high static and dynamic stresses.



Component with thread-forming screws



Sample installation curve for thread-forming screw M8 with crest in blind hole

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TRIFORM™

The TRIFORM™ screw has been specially developed by RIBE® and has proven its qualities over many years. It combines low installation torque and high proof-load with a reasonable price. This is achieved through the combination of the easy-to-manufacture TRIFORM™ thread-forming crest and the round shank. It is particularly suitable for use with cost-optimized parts and mating thread materials with low malleability.

TAPTITE II®

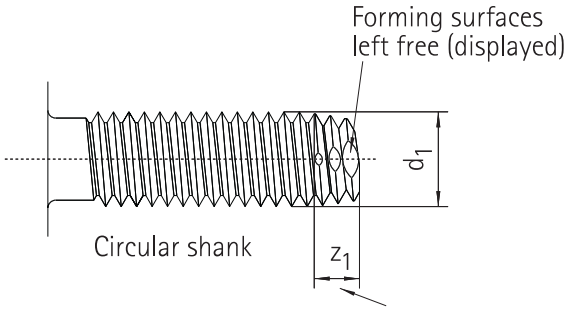
The TAPTITE II® screw is characterized by a high degree of shank lobulation (out-of-roundness, the difference between dimensions C and D). This makes for a very low insertion torque. The screw „engages" with only negligible axial contact force. In spite of this, the thread-forming crest with 2 to 3 turns exceeds the requirements DIN 7500-1. Lobulation over the entire length of the shank guarantees consistently low insertion torque, even with a large thread depth.

DUO-TAPTITE®

The DUO-TAPTITE® screw has a thread-forming crest and guide pin that facilitates correct centering in the pilot hole (good axial alignment of the screw). The lobulation of the thread-forming crest is greater than that of the shank. This produces a combination of low insertion torque and a high axial proof-load (high stripping torque, high pullout force).

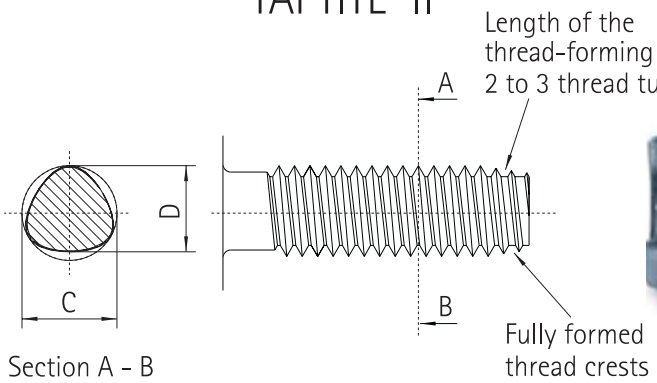
METAL FASTENERS

TRIFORM™



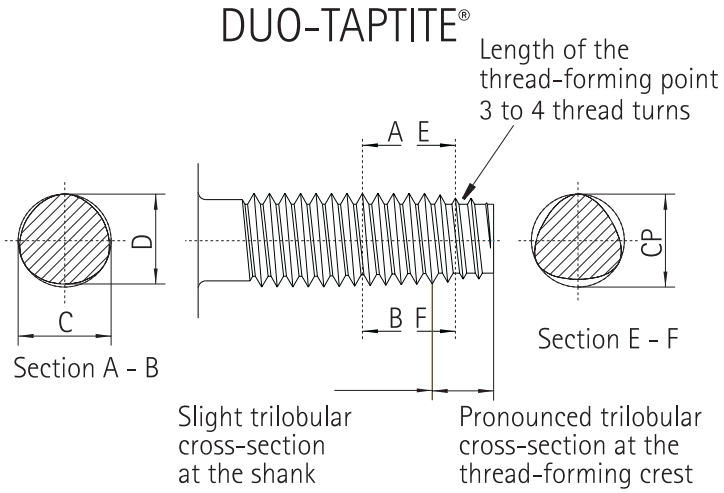
TRIFORM™ grinding pattern

TAPTITE® II



TAPTITE II® grinding pattern

DUO-TAPTITE®



DUO-TAPTITE® grinding pattern

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FASTENER SYSTEMS

Design data

These tables provide details of thread sizes, guidelines for sizing the pilot hole for drilling, punching or casting, as well as recommended values for insertion and tightening torque.

The listed values apply equally to TRIFORM™, TAPTITE II®, and DUO-TAPTITE®, as these products differ only in areas that are not relevant for these guidelines.

TRIFORM™ - thread dimensions

Thread (mm)	d_1 max	z_1 max
M 2,5	2,60	1,50
M 3,0	3,10	1,60
M 3,5	3,61	2,00
M 4,0	4,12	2,30
M 5,0	5,12	2,60
M 6,0	6,12	3,30
M 8,0	8,16	4,10
M 10,0	10,18	5,00

TAPTITE II® - thread dimensions

	C		D	
Thread (mm)	min.	max.	min.	max.
M 2,0	1,98	2,06	1,90	1,98
M 2,5	2,48	2,57	2,39	2,48
M 3,0	2,98	3,07	2,88	2,97
M 3,5	3,48	3,58	3,36	3,46
M 4,0	3,98	4,08	3,84	3,94
M 5,0	4,98	5,09	4,82	4,93
M 6,0	5,97	6,10	5,77	5,90
M 8,0	7,97	8,13	7,72	7,88
M 10,0	9,97	10,15	9,67	9,85
M 12,0	11,97	12,18	11,62	11,83

DUO-TAPTITE® - thread dimensions

Thread	C		D		cp
(mm)	min.	max.	min.	max.	max.
M 2,0	1,98	2,06	1,94	2,02	1,75
M 2,5	2,48	2,57	2,44	2,52	2,22
M 3,0	2,98	3,07	2,93	3,02	2,69
M 3,5	3,48	3,58	3,42	3,52	3,13
M 4,0	3,98	4,08	3,91	4,01	3,57
M 5,0	4,98	5,09	4,90	5,01	4,51
M 6,0	5,97	6,10	5,87	6,00	5,38
M 8,0	7,97	8,13	7,85	8,00	7,23
M 10,0	9,97	10,15	9,82	10,00	9,07
M 12,0	11,97	12,18	11,80	12,00	10,92
M 14,0	13,97	14,20	13,77	14,00	12,77
M 16,0	15,97	16,20	15,77	16,00	14,77

Guidelines for installation and tightening torque for TRIFORM™, TAPTITE II® and DUO-TAPTITE®

Torque values given in Nm	M 2,0	M 2,5	M 3,0	M 3,5	M 4,0	M 5,0	M 6,0	M 8,0	M 10,0	M 12,0	M 14,0	M 16,0
Insertion torque**	0,1...0,2	0,2...0,4	0,3...0,7	0,5...1,1	0,7...1,6	1,5...3,5	2,5...6,0	7...15	15...30	25...52	35...70	55...115
	Transit hole beyond the thread-forming crest											
Tightening torque 8.8*	0,4	0,7	1,3	1,9	2,8	5,5	9,9	23,4	45,9	78,3	130,5	198,0
Tightening torque 10.9	0,5	1,0	1,8	2,7	4,1	8,0	14,0	33,3	67,5	115,2	189,0	288,0
Tightening torque 12.9	0,7	1,2	2,1	3,2	4,7	9,4	16,2	38,7	78,3	135,0	216,0	342,0
	Blind hole											
Tightening torque 8.8*	0,4	0,8	1,5	2,2	3,3	6,4	11,6	27,3	53,6	91,4	152,3	231,0
Tightening torque 10.9	0,6	1,2	2,1	3,2	4,7	9,3	16,3	38,9	78,8	134,4	220,5	336,0
Tightening torque 12.9	0,8	1,4	2,4	3,7	5,5	10,9	18,9	45,2	91,4	157,5	252,0	399,0

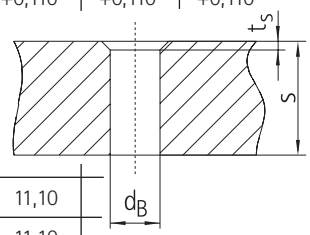
Due to the wide range of variable factors in material performance, surfaces and lubrications, these torque values should be considered as approximate guidelines only. We recommend some testing to determine the optimal dimensions, particularly in the case of critical component combinations, for example shallow holes in a low ductility mating material. Torque prerequisites are appropriate hole dimensions and adequate thread depth. Optimal assembly recommendations must be determined experimentally.

* The values given for 8.8 screws apply to DIN 7500 screws as well.

** Even the highest installation torque values are within the DIN 7500 specification.

Guidelines for the diameter of cylindrical bore-holes for TRIFORM™, TAPTITE II® and DUO-TAPTITE® in mm

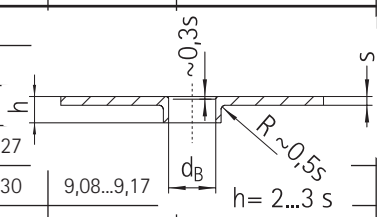
Thread depth / Material thickness s (mm)	M 2,0	M 2,5	M 3,0	M 3,5	M 4,0	M 5,0	M 6,0	M 8,0	M 10,0	M 12,0	M 14,0	M 16,0
	Allowance over nominal size for the bore-hole (mm)											
s up to 0,050		+0,050	+0,075	+0,075	+0,075	+0,075	+0,090	+0,090	+0,110	+0,110	+0,110	+0,110
s 0,05 to 1,0	1,80	2,25	2,70									
s 1,0 to 1,6	1,80	2,25	2,70	3,20								
s 1,6 to 2,5	1,85	2,25	2,75	3,20	3,65	4,50	5,40					
s 2,5 to 4,0	1,85	2,30	2,75	3,20	3,65	4,55	5,50	7,30	9,30			
s 4,0 to 6,3		2,30	2,75	3,25	3,70	4,65	5,50	7,40	9,30	11,10		
s 6,3 to 10,0					3,70	4,65	5,55	7,50	9,40	11,10		
s 10,0 to 16,0								7,50	9,40	11,20	13,20	15,20
s 16,0 to 25,0								7,60	9,50	11,30	13,20	15,20



Larger bore diameters reduce the installation torque; smaller ones increase the durability of the mating thread and resistance to loosening. For malleable materials with low strength, e.g. aluminium alloys, the diameter of the hole can be reduced by about 0.05 mm. Bore-hole tolerances: H11 in accordance with DIN ISO 286.

Guidelines for bore diameter d_B for rim holes in sheet metal for TRIFORM™, TAPTITE II® and DUO-TAPTITE® in mm

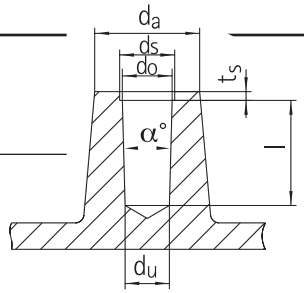
Sheet thickness s (mm)	M 2,5	M 3,0	M 3,5	M 4,0	M 5,0	M 6,0	M 8,0	M 10,0	M 12,0
0,5	2,21...2,24	2,68...2,71							
0,8	2,23...2,26	2,71...2,74	3,15...3,18						
1,0	2,25...2,28	2,74...2,77	3,16...3,21	3,57...3,62	4,48...4,54				
1,5	2,27...2,30	2,77...2,80	3,19...3,24	3,60...3,65	4,51...4,57	5,38...5,45	7,19...7,27		
2,0				3,64...3,69	4,54...4,60	5,41...5,48	7,22...7,30	9,08...9,17	
3,0					4,57...4,63	5,44...5,51	7,25...7,33	9,13...9,22	10,90...11,00
4,0							7,30...7,38	9,18...9,27	10,95...11,05
5,0								9,26...9,35	11,00...11,10



Sizing of the rim-holes as in the diagram; cf. also DIN 7952. The production of crack-free rim holes requires a material with a high elongation at rupture. Recommended size of pilot hole in sheet metal: 0.5 x nominal screw diameter.

Sizing guidelines for cast bore-holes for TRIFORM™, TAPTITE II® and DUO-TAPTITE® in mm

Values in mm	M 4	M 5	M 6	M 8	M 10	M 12	M 14	M 16
d_o	3,73	4,72	5,66	7,60	9,55	11,50	13,45	15,45
d_u	3,55	4,50	5,40	7,26	9,13	11,00	12,80	14,80
Upper gap for d_o and d_u*	+0,030	+0,030	+0,036	+0,036	+0,043	+0,043	+0,043	+0,043
d_a*	6,50	8,50	10,00	13,00	17,00	20,00	24,00	27,00
t_s	0,70	0,80	1,00	1,30	1,50	1,80	2,00	2,00
d_s	4,20	5,20	6,30	8,30	10,40	12,40	14,50	16,50
Upper gap for d_a, t_s and d_s*	+0,075	+0,075	+0,090	+0,09	+0,110	+0,110	+0,110	+0,110
l for high-strength materials, e.g. cast steel α ca. 1,5°	6,70	8,30	9,80	12,80	16,40	19,50	21,70	25,00
l for medium-strength materials, e.g. gray cast iron, aluminium, and zinc; α ca. 1,1°	8,20	10,30	12,40	16,40	20,50	24,50	28,70	33,00
l for low-strength materials, e.g. magnesium, aluminium, α ca. 0,8°*	12,40	15,40	18,50	24,50	30,70	36,80	43,00	49,00



* Where lesser load capacity is required, larger tolerances, diferent external diameters of the casting dome, or different tapers may be used.

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FASTENER SYSTEMS

TRIFORM™ DB AND EXTRUDE-TITE®

The products TRIFORM™ DB and EXTRUDE-TITE® described below are thread-forming screws with a particularly long thread-forming crest, which produces a definite axial alignment of the screw during assembly. This fastener design also produces a small diameter rim-hole in sheet metals.

In contrast to conventional sheet metal screws, the large web section facilitates substantial reforming of the mating thread material and provides a high stripping torque. Due to the plastic reforming of the mating material it is possible to create a fastening with a high proof-load, even in thin-walled materials like sheet metals.

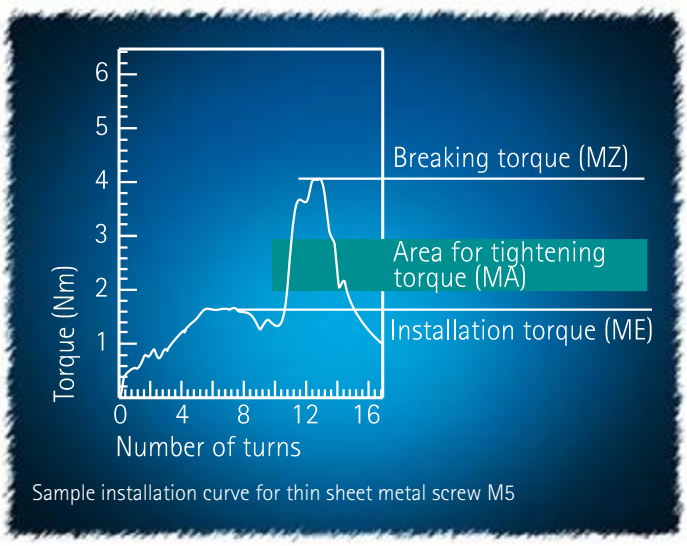
Advantages

Reduced costs because of easier assembly:

- No mating threads are necessary
- Fewer operations on the component, e.g. no rim hole in sheet metal is necessary
- No additional tools or parts needed (e.g. weld nuts or sheet metal nuts)
- Thinner component walls can be implemented

These fasteners offer:

- Easy and safe assembly
- No vibration induced loosening due to perfectly mated threads
- Relatively high locking force
- No need to clean the mating thread (e.g. after painting)



Sample installation curve for thin sheet metal screw M5

Screws for sheet metals

TRIFORM™ DB

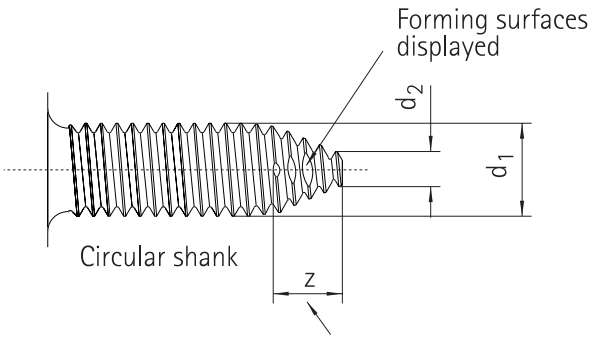
This screw is based on the tried and tested TRIFORM™ formula: a high performance fastener at a good price. The performance is achieved by the forming surfaces on the thread-forming crest and the cylindrical shank.

The flanks of the thread are fully formed to the crest.

The TRIFORM™ DB screw can be used wherever the highest operational efficiency is called for with sheet metal components.

TRIFORM™ DB grinding pattern

TRIFORM™ DB



Out-of-round thread-forming point
2 to 3 flights of thread
Thread at the thread-forming point is fully formed

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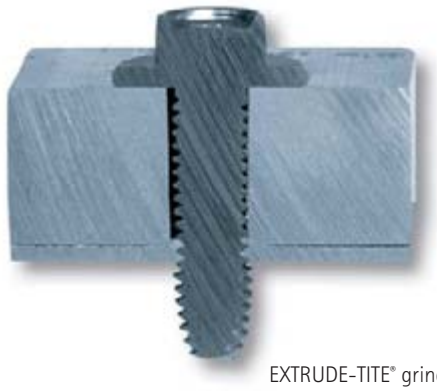
EXTRUDE-TITE®

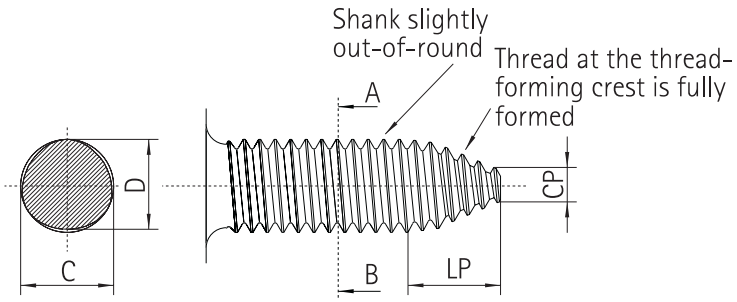
The EXTRUDE-TITE® screw is slightly out-of-round along the whole length of the shank, resulting in a very low installation torque in sheet metals. It thus provides a high level of assembly security, even under difficult circumstances.

With this model as well, the flanks of the thread are fully formed to the crest.



EXTRUDE-TITE® grinding pattern

EXTRUDE-TITE®



Section A - B

Fasteners for sheet metals

Design data

The following three factors are significant for the selection of screws for direct fastening into sheet metal:

- The bore diameter of the pilot hole in the component
- The installation torque required during assembly
- The tightening torque that can safely be applied.

These three values are specified in the tables.

For direct fastening into sheet metals, the component is usually the weak point when the fastening is overstressed. It is therefore essential to carefully plan the assembly procedure. Because of the variety of factors that can influence the process, the values given in the tables are only approximate guidelines and should be checked in each individual case.

With direct fastenings in sheet metals, modern assembly methods in conjunction with several screw levels help ensure security of installation. This means that screws with an insertion torque exceeding the tightening torque can be securely installed. In many cases the right screw combined with the correct assembly procedure can open up additional application opportunities. We would be pleased provide further information in this regard.

TRIFORM™ DB - thread dimensions

Thread (mm)	d_2 max.	z max.	d_1 max.
M 3	1,50	3,50	3,10
M 4	2,00	4,90	4,12
M 5	2,50	5,60	5,12
M 6	3,00	7,00	6,12
M 8	4,40	8,80	8,16

EXTRUDE-TITE® - thread dimensions

Thread	C		D		Cp	LP
(mm)	max.	min.	max.	min.	max.	max.
M 3	3,07	2,98	3,02	2,93	1,26	2,75
M 4	4,08	3,98	4,01	3,91	1,56	3,85
M 5	5,09	4,98	5,01	4,90	2,21	4,40
M 6	6,10	5,97	6,00	5,87	2,51	5,50
M 8	8,13	7,97	8,01	7,85	3,64	6,88

Hole diameters and torques for TRIFORM™ DB and EXTRUDE-TITE®

Sheet thickness	Bore hole diameter (mm)				Insertion torque guideline (Nm)				Tightening torque guideline (Nm)			
(mm)	M 3	M 4	M 5	M 6	M 3	M 4	M 5	M 6	M 3	M 4	M 5	M 6
0,75	1,8	2,4	3,5		0,5	1,3	2,0		0,8	2,5	4,0	
0,80	1,8	2,4	3,6	4,6	0,5	1,4	2,0	2,3	0,9	2,5	4,5	5,0
0,90	1,8	2,4	3,8	4,7	0,6	1,4	2,1	2,5	1,0	2,5	5,0	6,0
1,00	2,0	2,5	3,9	4,8	0,6	1,6	2,2	2,7	1,1	3,0	5,0	6,0
1,25	2,2	2,7	4,1	4,9	0,7	1,6	2,3	3,0	1,2	3,0	5,0	7,0
1,50		2,9	4,2	5,0		1,7	2,5	3,2		3,0	5,0	8,0
2,00		3,1	4,3	5,1		1,8	2,7	3,6		3,5	6,0	10,0
2,50			4,5	5,2			2,9	3,9			6,0	10,0

The values listed apply to cylindrical boreholes without rim holes. Because of the range of factors that may influence the fastening, such as materials, surfaces, and lubrication, the approximate values given here may vary in individual cases.

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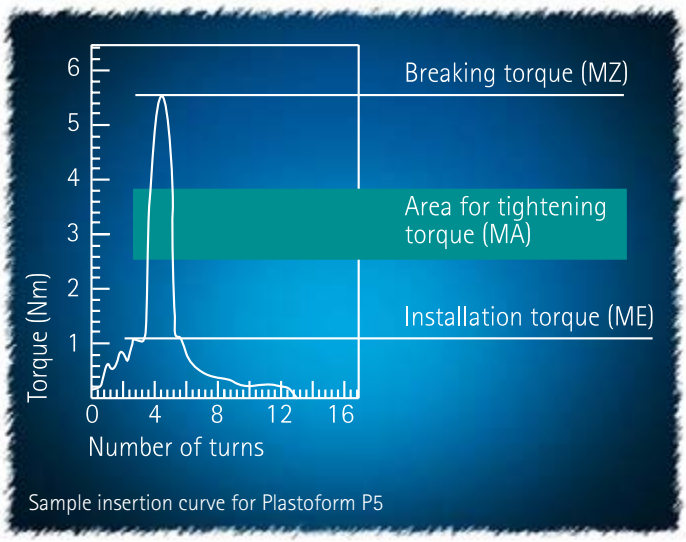
FASTENER SYSTEMS

Plastic components are lightweight and inexpensive. The most suitable fasteners for plastics are screws that can be screwed directly into the material without any mating thread.

Because of the great flexibility offered by plastics, an out-of-round screw is not necessary. In order to achieve a high proof load, these screws have a relatively coarse pitch and a small body diameter.

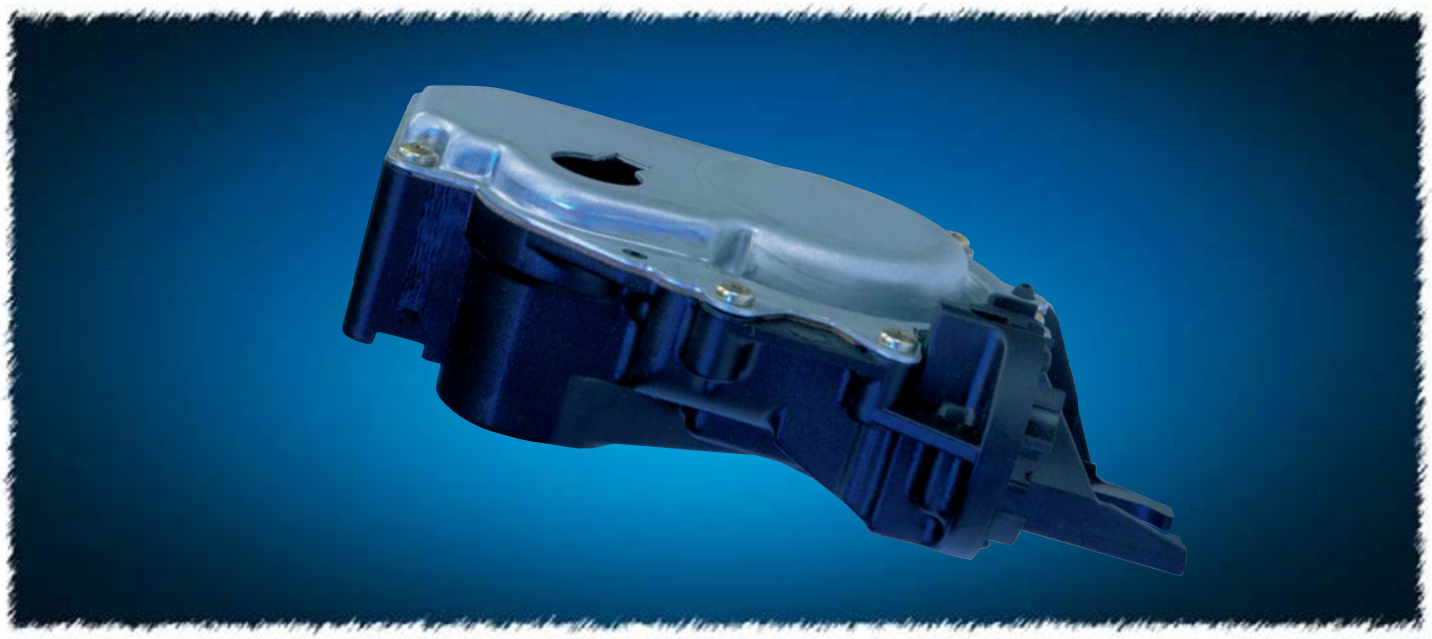
RIBE®'s PLASTOFORM and PR screws ensure a high level of reliability, which can be further increased by optimized design and assembly of the component.



Sample insertion curve for Plastoform P5

Advantages

- Cost-effective fastening
- With the correct dimensioning and the right choice of screw, a reliable and durable fastening is achieved
- Quick assembly
- Reduced component tooling (no machining, no inserts)
- Reusability



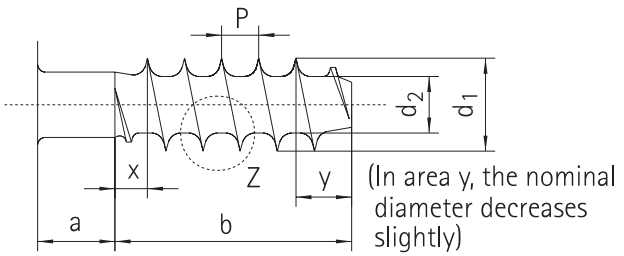
SCREWS FOR PLASTICS

PLASTOFORM

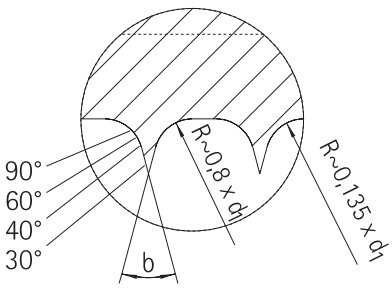
The PLASTOFORM thread profile has been constantly refined through computer modeling as well as practical research, with the result that the same screw can be used for fastening both ductile and brittle plastics. The screw is designed to produce a low insertion torque. The component material is compressed through the curves to produce a high proof load. In addition, the PLASTOFORM design reduces the radial stress in the plastic, thus reducing the risk of splitting in the screw dome. In addition the low-notch shaping makes the screw highly resistant to dynamic stress.

PLASTOFORM screws are used wherever the highest fastening requirements must be fulfilled.

PLASTOFORM



Detail of Z



RIBE®-PLASTOFORM grinding pattern

PLASTOFORM - thread dimensions (mm)

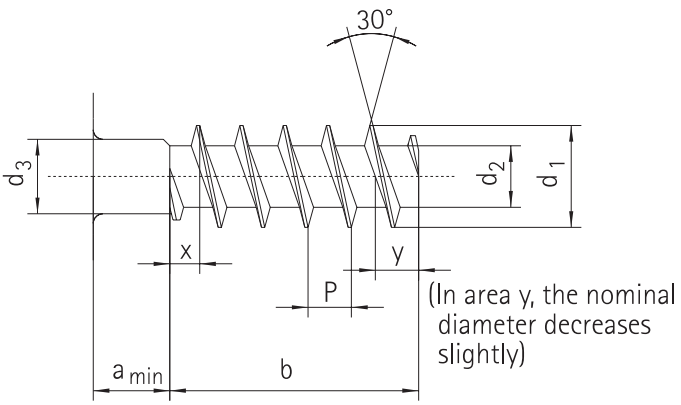
Threads	P 3,0	P 3,5	P 4,0	P 4,5	P 5,0	P 5,5	P 6,0	P 6,5
a	$1{,}30^{+0{,}50}$	$1{,}50^{+0{,}50}$	$1{,}80^{+0{,}60}$	$1{,}80^{+0{,}70}$	$2{,}20^{+0{,}80}$	$2{,}40^{+0{,}80}$	$2{,}50^{+0{,}90}$	$2{,}90^{+1{,}00}$
b	$12{,}00^{+1{,}90}$	$14{,}00^{+2{,}30}$	$16{,}00^{+2{,}70}$	$18{,}00^{+2{,}60}$	$20{,}00^{+3{,}20}$	$22{,}00^{+3{,}50}$	$24{,}00^{+3{,}80}$	$26{,}00^{+4{,}30}$
d_1	$3{,}00_{-0{,}20}$	$3{,}50_{-0{,}20}$	$4{,}00_{-0{,}25}$	$4{,}50_{-0{,}25}$	$5{,}00_{-0{,}25}$	$5{,}50_{-0{,}25}$	$6{,}00_{-0{,}25}$	$6{,}50_{-0{,}25}$
d_2	$1{,}87_{-0{,}20}$	$2{,}03_{-0{,}20}$	$2{,}50_{-0{,}20}$	$2{,}70_{-0{,}25}$	$2{,}96_{-0{,}25}$	$3{,}35_{-0{,}25}$	$3{,}64_{-0{,}25}$	$3{,}83_{-0{,}25}$
P	1,27	1,53	1,78	1,84	2,15	2,35	2,54	2,87
x max.	1,30	1,60	1,80	1,90	2,20	2,40	2,60	2,90
y max.	1,30	1,60	1,80	1,90	2,20	2,40	2,60	2,90

RIBE®
FASTENER SYSTEMS

RIBE® PR

The RIBE® PR thread profile has been developed for applications requiring mid level fastening demands at a low price. The screw has narrow 30° flanks, providing excellent engagement between the screw thread and the plastic mating material. The body diameter is designed so that the plastic generally is not compressed right to the root of the thread.

RIBE® PR



RIBE® PR grinding pattern

RIBE® PR - thread dimensions

Threads	PR 1,8	PR 2,0	PR 2,2	PR 2,5	PR 3,0	PR 3,5	PR 4,0	PR 5,0	PR 6,0	PR 7,0
a min	1,30	1,40	1,50	1,70	1,90	2,10	2,40	3,00	3,60	4,20
b	$7{,}00^{+1{,}1}$	$8{,}00^{+1{,}3}$	$9{,}00^{+1{,}4}$	$10{,}00^{+1{,}6}$	$12{,}00^{+1{,}9}$	$14{,}00^{+2{,}3}$	$16{,}00^{+2{,}7}$	$20{,}00^{+3{,}2}$	$24{,}00^{+3{,}8}$	$28{,}00^{+4{,}5}$
d_1 (h13)	1,95	2,15	2,35	2,65	3,15	3,65	4,15	5,15	6,15	7,20
d_2 (h12)	1,20	1,32	1,43	1,60	1,90	2,18	2,48	3,04	3,63	4,20
d_3	1,50	1,60	1,70	1,90	2,30	2,60	3,00	3,60	4,25	4,90
P	0,80	0,91	0,98	1,12	1,34	1,57	1,79	2,24	2,69	3,14
x max	0,80	0,90	1,00	1,20	1,40	1,60	1,80	2,20	2,70	3,20
y max	0,80	0,90	1,00	1,20	1,40	1,60	1,80	2,20	2,70	3,20

SCREWS FOR PLASTICS

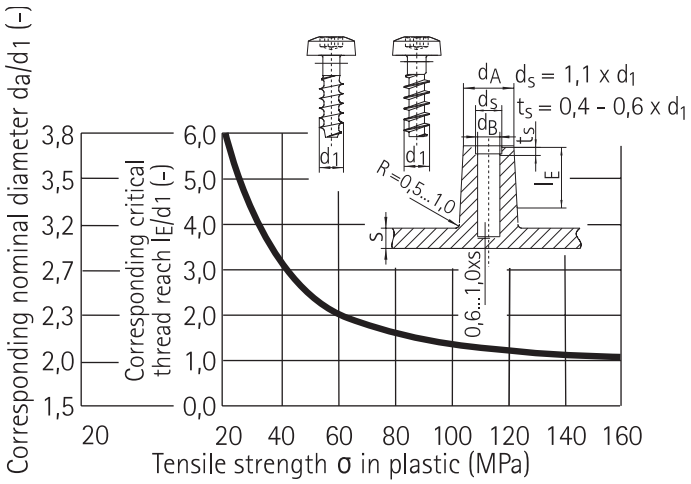
DESIGN DATA

For plastics the starting point for the correct sizing of directly screwed fastenings is the required locking force, which is limited by the maximum fracture force for the screw. The table below gives standard values for the required bore-hole diameter as well as the anticipated insertion and tightening torques for each screw size.

The tensile strength of the plastic determines the screw insertion depth.

In the adjacent table the most frequently used plastics are listed. Using the tensile strength values the corresponding insertion depth and the corresponding nominal diameter of the screw dome can be identified. This information along with suggestions for a screw enclosure allows a rapid determination of both screw dimensions and the component fastening area. Please note that for special fastening requirements these guidelines should be checked and revised through experiment if necessary.

Guidelines for the sizing of direct fasteners in plastic



Guidelines for tensile strength in plastic

Plastic	σ (MPa)
ABS	50
Epoxy resin	65...110
Polyamide PA6 dry ... air humidity 3% H_2O	85...30
Polyamide PA6 GF 30 dry ... air humidity 3% H_2O	170...100
Polyamide PA6 GF 50 dry ... air humidity 3% H_2O	190...120
Polyamide PA66 dry ... air humidity 2,5% H_2O	85...60
PC	60
PC GF 30	80
Polyethylene	30
Polymethylene oxide	65
Polypropylene	30
Polyurethane	50
Hard PVC	65
SAN	70
Unsaturated polyester	75

The tensile strength σ is based on the yield stress, 1% extension stress, or the fracture strength, depending on the characteristics of the type of plastic involved. The values given are guidelines for arriving at a quick estimate. For fastenings with little relaxation, the tensile strength should be reduced by a factor of 0,5 to 0,8.

Characteristic values for PLASTOFORM and PR screws

Type		P 3,00	P 3,50	P 4,00	P 4,50	P 5,00	P 5,50	P 6,00	P 6,50		
	PR 2,00	PR 2,50	PR 3,00	PR 3,50	PR 4,00		PR 5,00		PR 6,00		PR 7,00
Nominal diameter d_1 (mm)	2,00	2,50	3,00	3,50	4,00	4,50	5,00	5,50	6,00	6,50	7,00
Screw fracture force (N)	950,00	1400,00	1750,00	2100,00	3300,00	3800,00	4600,00	6000,00	7200,00	8100,00	9500,00
d_B ductile plastic (mm)*	1,60	2,00	2,40	2,80	3,40	3,80	4,20	4,60	5,10	5,50	5,50
d_B brittle plastic (mm)*	1,80	2,10	2,60	3,00	3,60	4,00	4,50	5,00	5,40	5,90	5,90
Approx. insertion torque (Nm)	0,10	0,20	0,50	0,70	0,80	1,20	1,50	2,00	3,00	4,00	5,00
Approx. tightening torque (Nm)	0,25	0,50	1,00	1,40	1,60	2,40	3,00	4,50	6,00	8,00	10,00

These values are for approximate guidance only, as they can be influenced by a number of parameters (e.g. materials, surfaces, geometry, assembly conditions). Optimized fastenings generally require adjustments to d_B, l_E, d_a. * Bore-hole tolerance +0.05 mm.

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