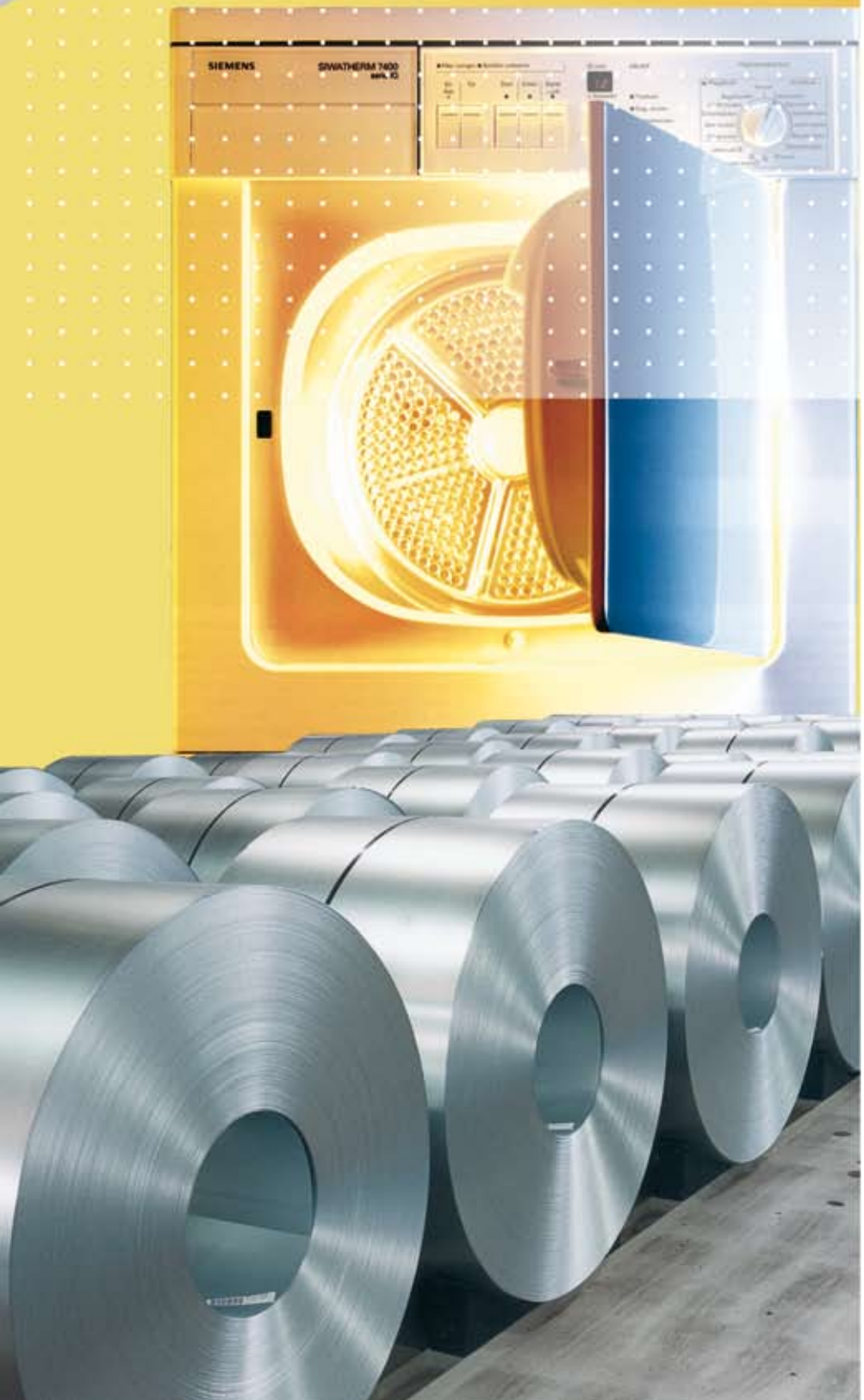
EJOT®



EJOT SHEETtracs®

Secure screw joint for thin sheets with pilot holes

EJOT® The Quality Connection

Imprint
Editor:
EJOT GmbH & Co. KG
Industrial Fasteners Division
D-57334 Bad Laasphe

Layout and Realisation:
EJOT GmbH & Co. KG
Industrial Fasteners Division
D-57334 Bad Laasphe

Print:

The EJOT SHEETtracs® is a self tapping screw designed for a safe joint in thin sheet metals with pilot holes.

Benefits:

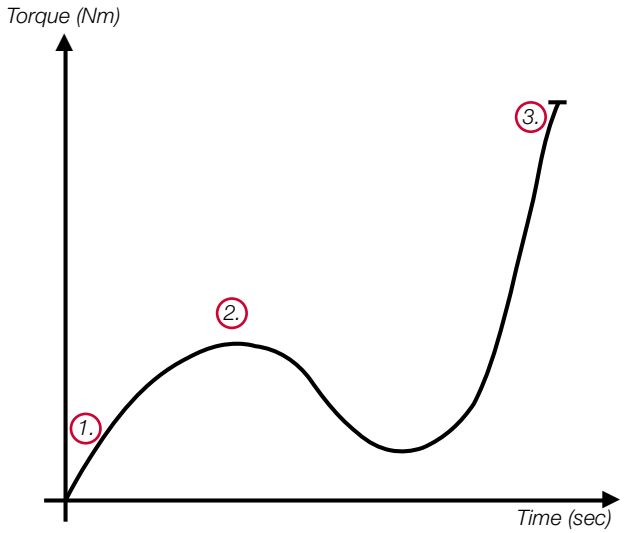
- high strength of the joints
- high vibration resistance
- simple and safe assembly due to good alignment and low installation torque
- high stripping torque due to a robust female thread
- metric compatible

Summary:

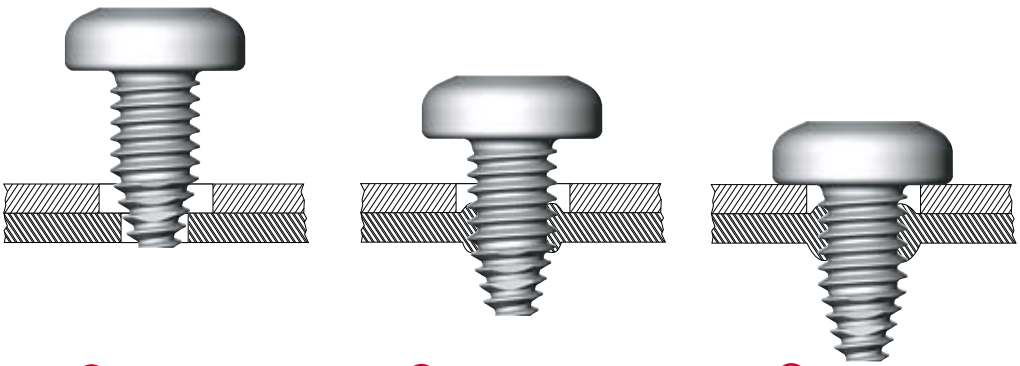
The reduced screw flank angle of 45° creates a more stable female thread compared to common 60° threads.

This results in higher stripping torques and pull-out forces. The circular cross section is designed to maximise the thread engagement area compared to non-circular thread geometries. The thread flank of 45° is designed asymetrically, 30° on the load flank and 15° on the back flank. In the conical part the thread forming zone has reversed flank angles. This enables the screw to displace the sheet metal material manly into installation direction.

The non-circular thread-forming zone enables simple and concentric insertion resulting in easy fastening of the screw with reduced installation torque.



Steps of joining:



1. Applying
2. Thread forming
3. Tightening

The product

Appliances Applications

Automotive Applications

The process-safe assembly of thin sheets with pilot holes has always been a problem. While sheet thicknesses of 1 mm were often available years ago, the range of thicknesses has been constantly reduced for cost saving reasons.

Until then, the requirements placed on the joints could still be met partially with commercially available sheet-metal screws, in many cases with spring nuts or hole embossments. When considering these sheet-thickness reductions and compliance with DIN 7975 for sheet-metal screw joints, the problem arises that the thickness of the components to be connected must at least match the pitch of the sheet metal screws. Despite that, a multiple repeat assembly is only possible in a few cases because quiet often only one thread pitch engaged is being found in the sheets.

For that reason, socalled light-gauge sheet-metal screws have increasingly asserted themselves in the market in recent years. These screws have a metric 60° thread and are often made with conical shaped points. The advantage of the metric threading is the smaller thread pitch in comparison with sheet-metal screws, whereby more screw threads are engaged in in the sheet metal.

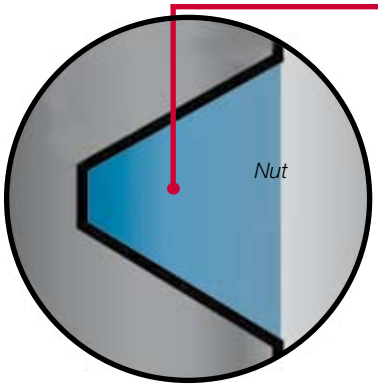
But, as the shaped female thread usually represents the weak point of the joints and not the screw, EJOT has challenged this matter and developed a thin sheet-metal screw for process-reliable installation in pre-punched thin sheet metal.

The EJOT SHEETtracs® has a 45° (30°/15°) asymmetric flank angle to create a stronger female thread in the sheet, due to less sheet metal material displacement. This increases the achievable torque level and facilitates multiple repeat assemblies. In the lower, conical area of the screw, the flank angle is reversed, meaning the arising rim hole is created predominantly in the fastening direction of assembly. The non-circular thread forming zone ensures simple, concentric insertion; the increased thread area portions ensures a secure penetration into the sheet material. The circular cross section in the upper, load bearing thread achieves a higher thread engagement in the sheet metal compared to out-of-round thread geometries.

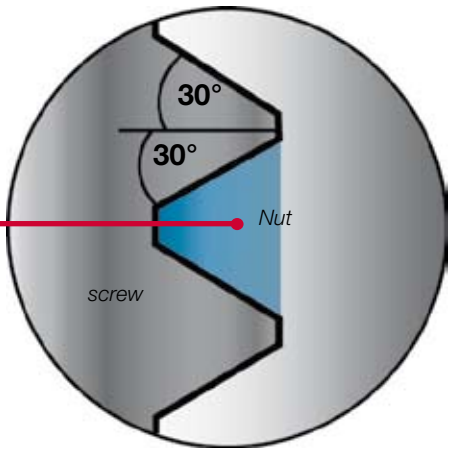
The metric pitch of the EJOT SHEETtracs® facilitates interchangeability with standard metric screws, e.g. for repairs.

Geometry of the thread flanks

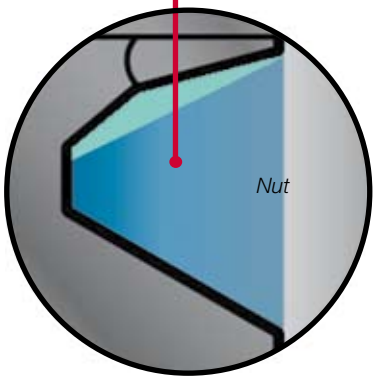
The asymmetric flank causes smaller displacement volume compared to 60° threads with the resultant effect of a stronger female thread and a higher thread engagement.



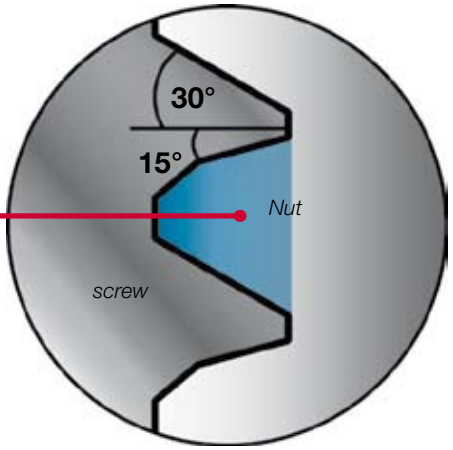
60° female thread



60° thread



Female thread EJOT SHEETtracs®
with advanced load carrying capability

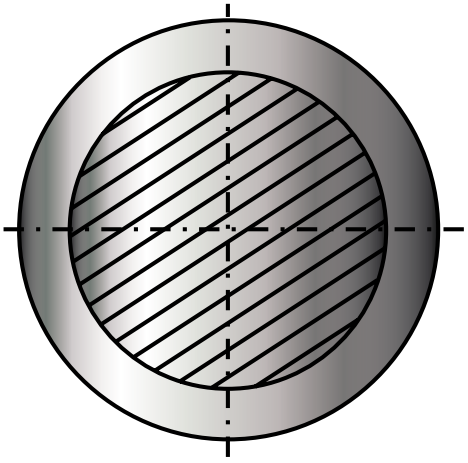


EJOT SHEETtracs® 45°

Thread geometry

The circular cross section is designed to maximise the thread engagement area compared to non-circular thread geometries.

The thread pitch is comparable to a metric screw that makes both the EJOT SHEETtracs® and the metric screw interchangeable.



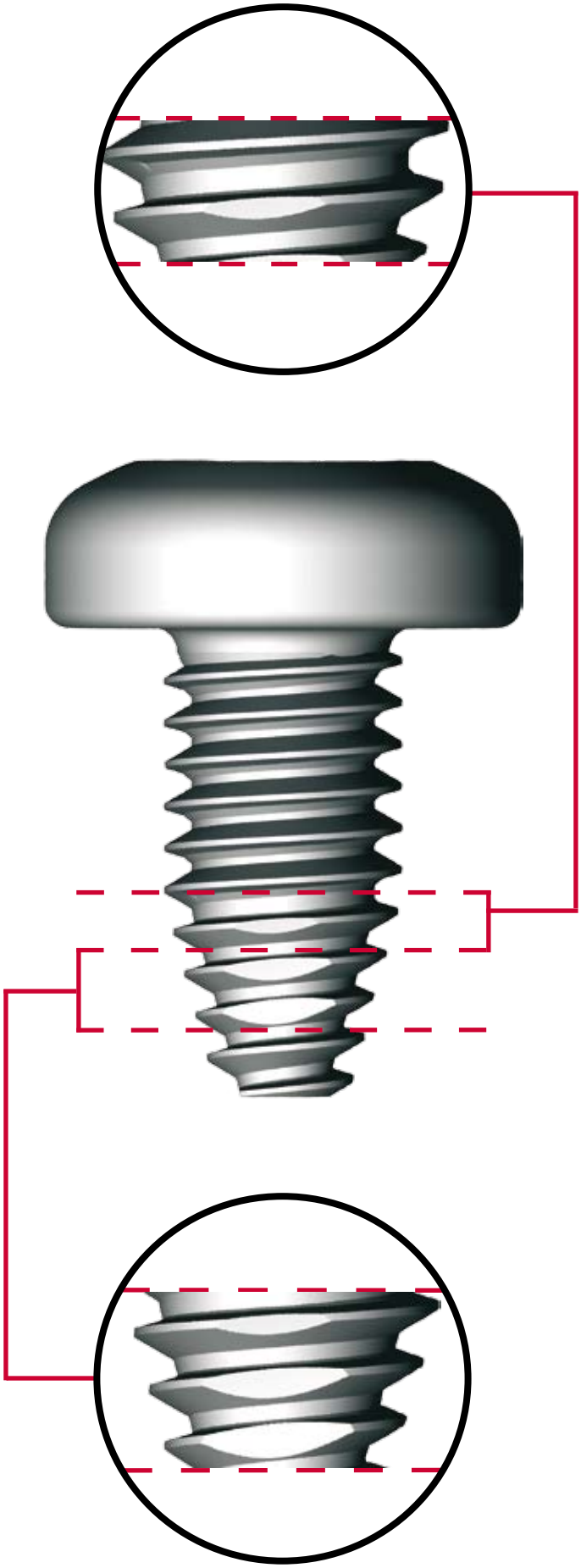
circular cross section

Features

Reversed flank angle

The thread forming zone‘s flank angle has been specifically designed. Since the through draft‘s direction is in the same direction as the fastening direction an additional increase in thread penetration depth can be expected.

The thread-forming zone only affects the lead threads of the screw and ends before reaching the nominal diameter of the thread.

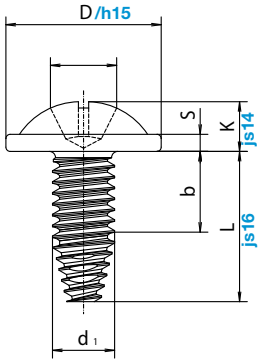
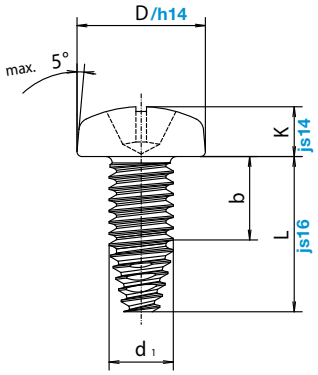
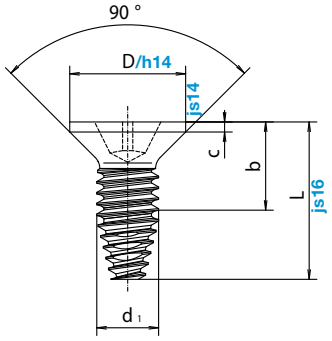
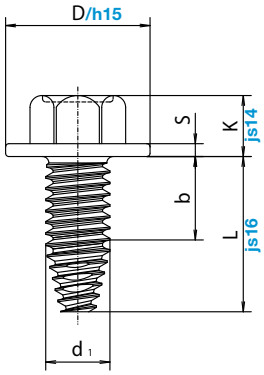


Non-circular thread forming zone

The non-circular thread-forming zone enables simple and concentric insertion resulting in easy fastening of the screw.

The raised thread areas enable a safe pentration sheet into the metal.

Designs

WN 5211	WN 5212	WN 5213	WN 5247
			

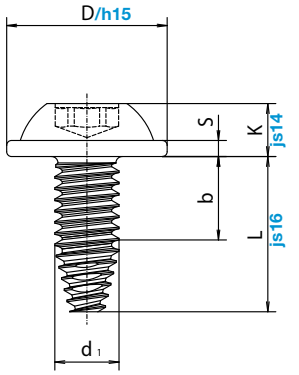
H-cross recess **Z-cross recess** **TORX®** **TORXplus® / AUTOSERT®**

All cross recess and TORX® drives are also available as combi drives. (Except WN 5213 & WN 5254)

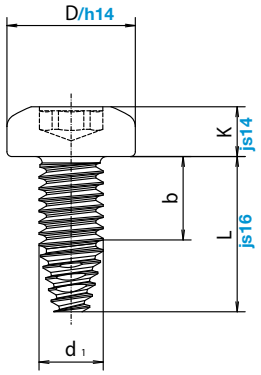
SHEETtracs®				25	30	35	40	50	60
	External-Ø		d_1	2,50	3,00	3,50	4,00	5,00	6,00
	External-Ø tolerance			+0,10	+0,10	+0,10	+0,12	+0,12	+0,14
	Thread pitch		P	0,45	0,50	0,60	0,70	0,80	1,00
WN 5211	Head-Ø		D		7,50	9,00	10,00	11,50	14,50
	Head height		K		2,00	2,80	3,40	3,50	4,50
	Washer thickness		s +0,2		0,60	1,00	1,30	1,30	2,00
	H-cross-recess	Penetration depth	t min.		1,19	1,23	1,98	2,26	2,44
			t max.		1,65	1,86	2,61	2,87	3,10
	Z-cross-recess	Penetration depth	t min.		1,36	1,26	2,01	2,28	2,57
			t max.		1,61	1,72	2,47	2,74	3,03
	Cross size H/Z				1	2	2	2	3
WN 5212	Head-Ø		D	5,00	6,00	7,00	8,00	10,00	12,00
	Head height		K	2,20	2,40	3,10	3,30	3,90	4,90
	H-cross-recess	Penetration depth	t min.	1,30	1,70	1,74	2,04	2,77	3,03
			t max.	1,60	2,00	2,24	2,54	3,27	3,53
	Z-cross-recess	Penetration depth	t min.	1,27	1,68	1,65	1,90	2,64	3,02
			t max.	1,52	1,93	2,11	2,36	3,10	3,48
	Cross size H/Z			1	1	2	2	2	3
WN 5213	Head-Ø		D	5,00	6,00	7,00	8,40	10,00	12,50
	cyl. head height		c_{max}	0,55	0,60	0,65	0,70	0,75	0,85
	H-cross-recess	Penetration depth	t min.	1,25	1,50	1,40	1,62	2,10	2,80
			t max.	1,55	1,80	1,70	2,12	2,60	3,30
	Z-cross-recess	Penetration depth	t min.	1,22	1,48	1,34	1,60	2,05	2,46
			t max.	1,47	1,73	1,80	2,06	2,51	2,92
	Cross size H/Z			1	1	2	2	2	3
WN 5247	Washer-Ø		D		7,50	8,30	9,00	11,00	13,00
	Head height		K		3,00	3,40	3,80	4,30	5,00
	Width across flats		SW		5,00	5,50	5,50	7,00	8,00
	Washer thickness		s +0,2		0,60	0,80	0,80	1,00	1,20

Designs

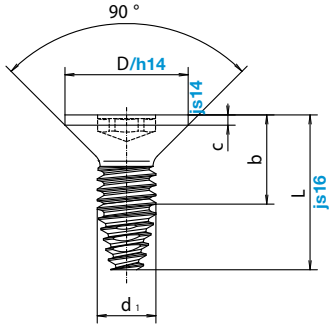
WN 5251



WN 5252



WN 5254



Example of ordering:
Description of EJOT SHEETtracs® screw with TORX® -recess, -Ø 4,0 mm and length L = 20 mm

EJOT SHEETtracs® screw WN 5252 40 x 20

b = useful theard length
see page 10

For more information:
EJOT Hotline
phone +49 2752 109-123
fax +49 2752 109-268
e-mail: hotline@ejot.de

SHEETtracs®			25	30	35	40	50	60
	External-Ø	d_1	2,50	3,00	3,50	4,00	5,00	6,00
	External-Ø tolerance		+0,10	+0,10	+0,10	+0,12	+0,12	+0,14
	Thread pitch	P	0,45	0,50	0,60	0,70	0,80	1,00
WN 5251	Head-Ø	D	6,00	7,50	9,00	10,00	11,50	14,50
	Head height	K	2,00	2,25	2,50	3,00	3,60	4,40
	Washerthickness	s $^{+0,2}$	0,50	0,60	0,70	1,00	1,30	1,40
	TORX®		T8	T10	T15	T20	T25	T30
		$A_{Ref.}$	2,40	2,80	3,35	3,95	4,50	5,60
	Eindringtiefe	t min.	0,95	1,00	1,10	1,25	1,60	2,00
		t max.	1,15	1,30	1,40	1,70	2,00	2,40
WN 5252	Head-Ø	D	5,00	6,00	7,00	8,00	10,00	12,00
	Head height	K	2,00	2,25	2,50	3,00	3,60	4,40
	TORX®		T8	T10	T15	T20	T25	T30
		$A_{Ref.}$	2,40	2,80	3,35	3,95	4,50	5,60
	penetration depth	t min.	0,95	1,00	1,10	1,25	1,60	2,00
		t max.	1,15	1,30	1,40	1,70	2,00	2,40
WN 5254	Head-Ø	D	5,00	6,00	7,00	8,40	10,00	12,50
	cyl. head heigh	c_{max}	0,55	0,60	0,65	0,70	0,75	0,85
	TORX®		T8	T10	T15	T20	T25	T30
		$A_{Ref.}$	2,40	2,80	3,35	3,95	4,50	5,60
	penetration depth	t min.	0,70	0,75	0,85	1,10	1,15	1,40
		t max.	0,90	1,10	1,15	1,55	1,55	1,80

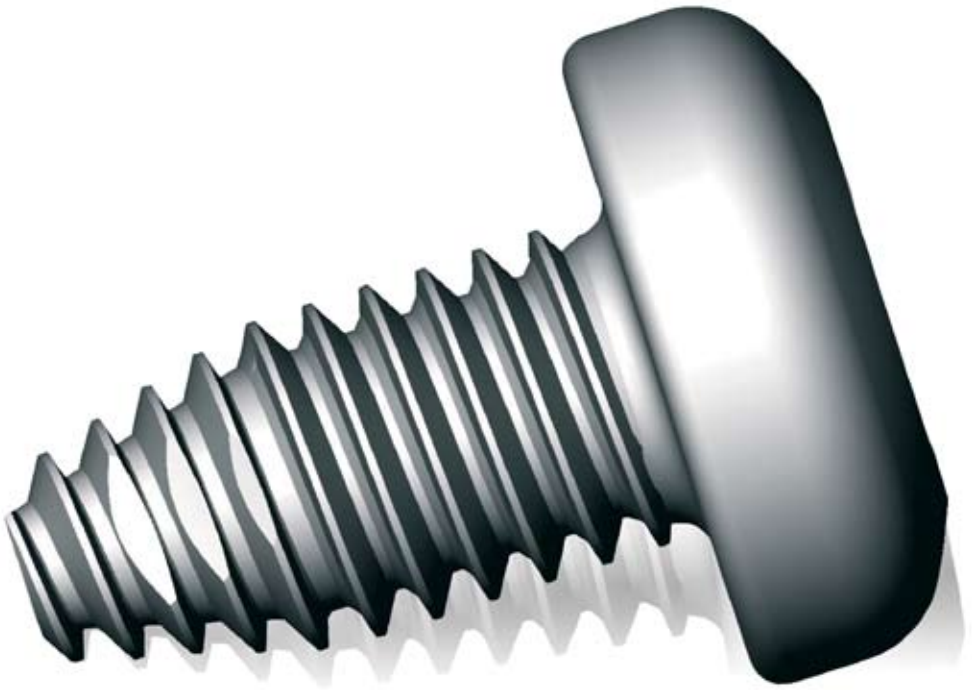
Special variations are available.
Please contact the EJOT application engineers to achieve your multifunctional designs.

Designs

Material:
Case hardened steel

Chrom VI free platings:
- zinc clear / blue passivated
- zinc clear / blue passivated + EJOSEAL (240h resistance to Zn-corrosion)
- zinc / thick film passivation
- ZnFe or ZnNi, transparent passivated (with or without black top coats)
- ZnNi / black passivated
- Zinc flake coatings (example Delta Protekt)

Different materials and platings are available upon request.



Nominal value [mm]						
Tolerance		**over 3**	**over 6**	**over 10**	**over 18**	**over 30**
	to 3	**to 6**	**to 10**	**to 18**	**to 30**	**to 50**
h 14	0 -0,25	0 -0,30	0 -0,36	0 -0,43	0 -0,52	
h 15	0 -0,40	0 -0,48	0 -0,58	0 -0,70	0 -0,84	
js 14	± 0,12	± 0,15	± 0,18			
js 16	± 0,30	± 0,38	± 0,45	± 0,55	± 0,65	± 0,80

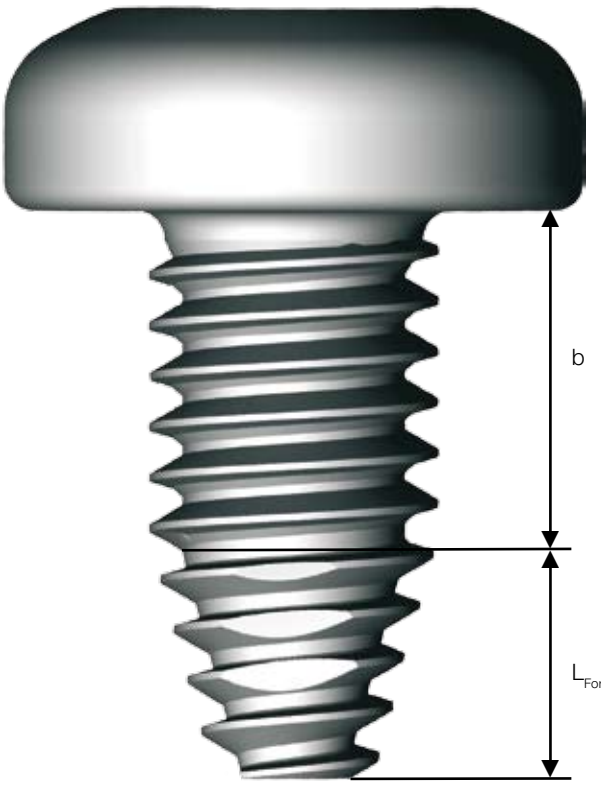
Manufacturing range of EJOT SHEETtracs® screws

EJOT SHEETtracs®	25	30	35	40	50	60
d_1 [mm]	2,5	3,0	3,5	4,0	5,0	6,0
Length L [mm]	usable thread length [mm]					
6 ± 0,38	2,5	2,1				
8 ± 0,45	4,5	4,1	3,4	3,0		
10 ± 0,45	6,5	6,1	5,4	5,0	4,1	
12 ± 0,45	8,5	8,1	7,4	7,0	6,1	4,9
14 ± 0,55	10,5	10,1	9,4	9,0	8,1	6,9
16 ± 0,55	12,5	12,1	11,4	11,0	10,1	8,9
18 ± 0,55	14,5	14,1	13,4	13,0	12,1	10,9
20 ± 0,65		16,1	15,4	15,0	14,1	12,9
25 ± 0,65			20,4	20,0	19,1	17,9
30 ± 0,65				25,0	24,1	22,9
35 ± 0,80					29,1	27,9
40 ± 0,80						32,9
50 ± 0,80						42,9
60 ± 0,95						52,9
Partial thread length	10	10	12	14	16	18
Special length upon request!						

Minimal length with counter-sunk-headstyle

Full thread length

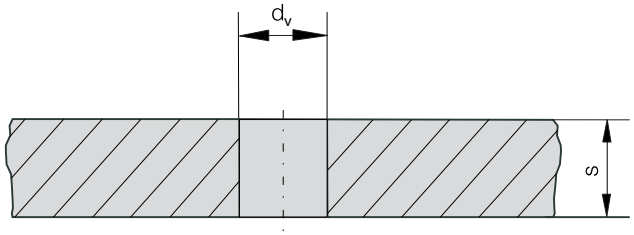
Production with partial thread



SHEETtracs®	25	30	35	40	50	60
Nominal-Ø [mm]	2,5	3,0	3,5	4,0	5,0	6,0
max. length of forming zone (mm)	3,5	3,9	4,6	5,0	5,9	7,1

Design recommendations

Hole dimensionning for sheet metal



pilot-hole diamenter d_v for screw-in sheet

The level of installation torque depends on several parameters. The most important are type of material and its strength, required insertion depth (material thickness), kind of surface treatment for screw and work material, perhaps lubricant and the pre-hole diameter. Below you will find general recommendations for hole sizes and tightening torques. For the precise design of your application we offer the service of our state of the art EJOT APPLITEC laboratory. For more details please contact your responsible application engineer or the EJOT HOTLINE.

When using the EJOT SHEETtracs® in stamped extrusions please see table on page 13.

For applications in light weight alloys and die cast materials we advise using the EJOT ALtracs® screw.

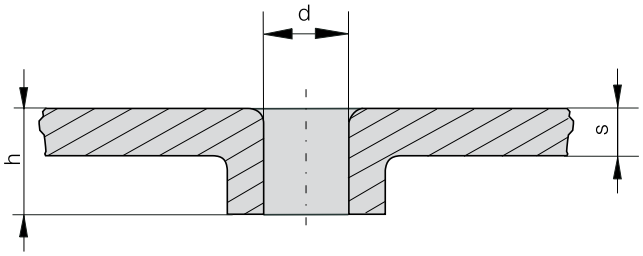
In high-strength sheets with sheet thicknesses of 0.4 mm to appr. 2.0 mm, the EJOT FDS®, which can also be assembled without pilot holes, is to be preferred.

pilot-hole diameter and tightning torque *

SHEETtracs®	External-Ø d_1 [mm]	sheet thickness s [mm]	pilot-hole-Ø d_v [mm] (Tolerance: +0,1)	tightening torque M_A [Nm]
30	**3**	0,50 - 0,63	Ø 2,0	1,0
		0,63 - 0,88	Ø 2,1	1,2
35	**3,5**	0,63 - 0,88	Ø 2,2	1,3
		0,88 - 1,00	Ø 2,4	1,5
		1,00 - 1,25	Ø 2,6	1,5
40	**4**	0,63 - 0,88	Ø 2,4	2,0
		0,88 - 1,00	Ø 2,6	2,5
		1,00 - 1,25	Ø 3,0	2,5
50	**5**	0,63 - 0,75	Ø 3,8	2,5
		0,75 - 0,88	Ø 4,1	3,0
		0,88 - 1,00	Ø 4,2	3,5
		1,00 - 1,25	Ø 4,3	3,5
		1,25 - 1,50	Ø 4,4	4,0
60	**6**	0,88 - 1,00	Ø 4,8	4,0
		1,00 - 1,25	Ø 4,9	5,0
		1,25 - 1,50	Ø 5,1	6,0

***All data valid for thin sheets made of cold rolled soft steel acc. to DIN EN 10130 (DC 01 – DC 04)**

The EJOT SHEETtracs® screw is as well suited for the fastening into prefabricated trough draughts. Hole dimensioning for sheet metal through draught (stamped extrusion)



Picture: Prefabricated trough draught

Core hole diameter for sheet metal through draughts in steel according to DIN EN 10130						
SHEETtracs®	**25**	**30**	**35**	**40**	**50**	**60**
External diameter [mm]	**2,5**	**3**	**3,5**	**4**	**5**	**6**
Core hole diameter d [mm]	2,25 2,30	2,70 2,75	3,20 3,30	3,65 3,75	4,60 4,70	5,50 5,60
Through draught depth	h = (1,5 - 2) s					

Note:
It is recommended to check the values and the determination of the Ti (installation torque) and Ts (stripping torque) based on component trials. Our EJOT APPLITEC testing laboratory is available for this.

More informationes about design and assembly recommendations:
EJOT Hotline:
phone +49 2752 109-123
fax +49 2752 109-268
e-mail: hotline@ejot.de

Your system partner

Test rack at APPLITEC

Internal seminar

Design Consultation

A major consideration of today's product manufacture is the basic need to be cost competitive. Significant in achieving this objective is the design process. No other part of the cost structure is influenced more than by design.

Generally speaking, the development of a product, which represents about 10% of the overall costs, determines about 70% of the costs for the final product.

Often the design of the fixing is considered to be of low importance; however, it is the fastener that holds the components together to make the finished product. With this in mind the design engineer should consider which fastening method to use during the design conception stage to avoid expensive design changes late on in the design process or even when the product goes into production.

To assist our customers in this process EJOT offers support during the design stage through comprehensive application engineering services. These services provide accurate information on product performance and result in design recommendations that can be used safely on the production line.

Application Engineering Consequent

By continuously working with our customers and their application problems, EJOT has amassed a comprehensive understanding of fastener techniques that has lead to a number of significant innovations. It is our goal to continually improve our products to meet the ever increasing demands of our customers.

In addition to our highly qualified Engineers and application-engineering advisers, we offer the service of our application laboratory known as the EJOT APPLITEC. In the APPLITEC we carry out test procedures on our customer's applications that enables us to thoroughly analyse the strength and capability of their parts. It is here that new fastening techniques are also developed.

The knowledge EJOT has gained over the years is passed on to our customers finding the most effective solution supporting their efforts in establishing rational fastening and assembly techniques. Detailed test reports, on site technical advice, acknowledged seminars and technical publications demonstrate our continued commitment to impart our knowledge.

Test report

Logistic and Data Exchange

It is our aim to keep procurement and warehousing costs as low as possible by simultaneously offering product availability and quality.

With respect to simplified procuring processes, EJOT offers a variety of cost reducing procedures and services. The continued analysis of our customer's demands and advanced logistics procedures are leading to high availability of our products. Skeleton contracts and delivery schedules via electronic data interchange facilitate and accelerate the processing times of our products.

Quality for Automated Assembly

Successful automated assembly means high availability of the assembly machine. A significant impact on this can be expected from the fasteners grade of purity. Historically, the standard quality in commercial fastener manufacture is not sufficient for today's high quality requirements since originally it has been designed for mainly manual assembly.

EJOT introduced the EJOMAT® Quality to ensure the most costly effective usage of our customer's automated assembly machines.

The grade of purity offered by EJOMAT® quality is 10 times higher than the usual standard quality which means increased availability of assembly machine and decreased assembly down time costs.
EJOMAT®, quality that pays for itself.

EJOT Sales Organization

In addition to EJOT companies throughout Europe a growing number of Licensees in North & South America and Asia ensures that product availability and local support is Global.

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EJOT GmbH & Co. KG
Industrial Fasteners Division
Untere Bienhecke
D-57334 Bad Laasphe
P.O. Box 11 63
D-57323 Bad Laasphe
phone +49 2752 109-0
fax +49 2752 109-141
e-mail: industrie@ejot.de
Internet: www.ejot.de

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