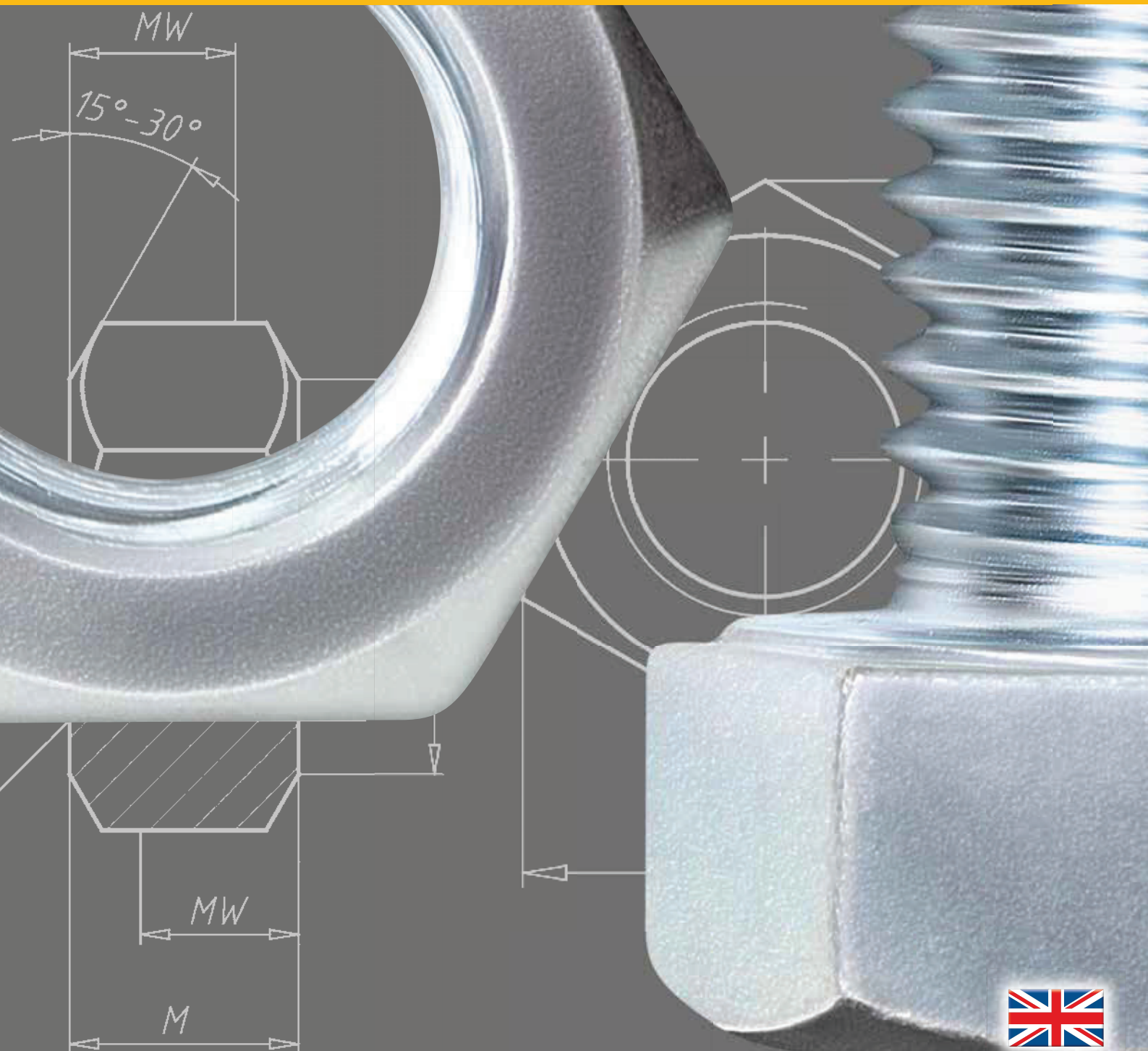




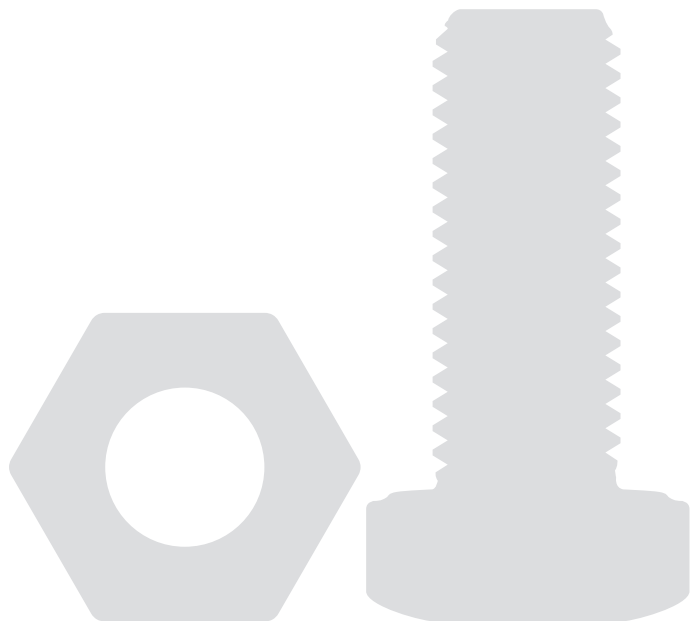
FASTENERS AND FIXING TECHNOLOGY

FASTENER GUIDE



*„It is the screw
that holds the world together
at its core!“*

(Eugen Roth)



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Selection aid for corrosion protection – Coatings for steel fasteners

Coatings that are suitable in general for fasteners and which have significant market penetration are listed below for the protection of steel surfaces against corrosion. The coating options are not listed in any order in the product overview on the following pages as they are generally applicable.

Standard commercial corrosion protection coatings

• Bronze plated	• Zinc flake coating (with and without set friction coefficient, colour variants possible)
• Browned	
• Copper plated	• Zinc-iron plated (transparent/black, with and without sealing)
• Hot-dip galvanized	
• Mechanically zinc plated (mechZn)	• Zinc-nickel plated (transparent/black, with and without sealing)
• Nickel plated	• Zinc plated (blue/transparent/yellow*/olive*/black*)
• Phosphated	• Zinc plated thick layer passivated (optional with sealing)
• Teflon coating (PTFE, Xylan)	

*contains chrome (VI)

Some coating variants are not recommended for certain product characteristics and should be taken into consideration when selecting a corrosion protection coating.

Product/ Product characteristic	Note
Property class 12.9, case-hardened and spring strength fasteners	Electroplated coatings should not be used. There is a high risk of hydrogen-induced stress cracking corrosion (hydrogen embrittlement). Also see page 83. Alternatively, the following coatings are available: <ul style="list-style-type: none"> • Zinc flake coating (flZn) • Mechanically plated (mechZn)
Screws with internal drives	If dip coating, which includes hot dip galvanizing and even zinc flake coating, is used on internal drives such as hexagon sockets, hexalobular sockets and even cross slots, it is possible that scooping occurs which could "clog" the internal drive. The coating material flows into the recess and remains there. Smaller dimensions in particular are affected by this. In individual cases, it is possible to check whether production can be made feasible by using cleverly designed spinning mechanisms.
Thread tolerances/ thread mating	A high layer thickness (over 50 µm) is usually applied in the case of hot dipped fasteners and this must be taken into account for the functionality of the thread mating. Other thread tolerances must therefore be necessary when producing the uncoated screws and nuts. Hot dipping of uncoated existing stocks is not possible for this reason. This may also apply to zinc flake coating and electroplated applied coatings if the required layer thickness is greater than 10 µm. A test is necessary here, dependent on the nominal thread diameter.
Tapping screws, self-drilling screws, self-threading screws, thread-forming screws	Tapping screws are those screws that form their own counter threads. The thread area is therefore highly stressed mechanically. The relatively soft coatings are damaged more or less severely during installation which in turn can affect the required corrosion protection in the thread area

Further information and technical notes regarding corrosion can be found on pages 79–83.

Briefly explained...

The following pages indicate the **standardised fasteners listed in order of increasing standard number**.
The **non-standardised fasteners** are sorted by category.

The coloured bars facilitate the selection of the materials:

gray	=	Fasteners made of steel/steel with coating
blue	=	Fasteners made of stainless steels
yellow	=	Fasteners made of non-ferrous materials
orange	=	Fastening technology

A whole series of the listed DIN standards have now been replaced by the Deutschen Institut für Normung with ISO standards (DIN ISO or DIN EN ISO*) or EN standards (DIN EN*). The replacement standards are listed under the DIN standards and also included in the chronological listing.

Other DIN standards were withdrawn without replacements as they are seen as technically outdated; these standards are marked with ①.

As products remain in demand for some time and are therefore kept in stock even after the standards have been withdrawn, they have been kept in the list.

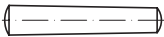
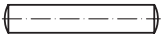


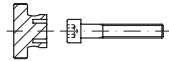


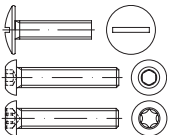




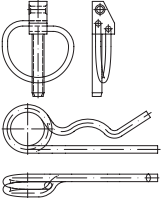


* See the Technical information - Changes in standards, pages 77/78.

Materials glossary

4.6 - 12.9	Property classes for screws	CuSn/CuNiSi	Bronze
5-12 / 04, 05	Property classes for nuts	GG, GT, GTW	Grey cast iron, malleable cast iron
11 H - 45 H	Hardness classes	MCI	Malleable cast iron
A 1-A 5 / (-70, -80)	Stainless steels / (property class)	Ni	Nickel
Al	Aluminium	P	Plastic
Br	Brass	SSt	Spring steel
Cr	Chromium	St	Steel
Cu	Copper	Ti	Titanium
Cu alloys/CuNiSi	Copper alloys		

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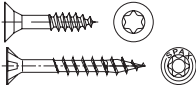
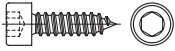
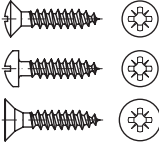

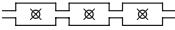

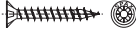
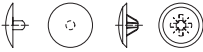

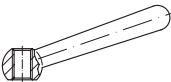
Images and descriptions in this brochure do not in any case represent agreed properties. Understandably, the use of the products listed in this brochure presumes technical knowledge of their use, installation and the applicable standards.

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 1 (ISO 2339**)		Taper pins	St	A 1-A 5	Br
DIN 7 (ISO 2338**)		Parallel pins	St	A 1-A 5	Br
DIN 39		Fixed ball handles	St		Al plastic
		Plastic knobs for hexagon socket screws			plastic
					
DIN 84 (ISO 1207**)		Slotted cheese head screws	4.8 5.8 8.8	A 1-A 5	Br bronze Al plastic
DIN 85 (ISO 1580**)		Slotted pan head screws	4.8 5.8 8.8	A 1-A 5	Br bronze Al plastic
(ISO 7380) (ISO 14583)		Mushroom head screws with slot - "slotted cup head bolts" art. 88107 - with hexagon socket - with hexalobular socket	4.6 5.8 8.8 10.9 12.9	A 1-A 5	Br
		Cap bolts (article 88981/88003), bolts for number plates and balcony with caps	4.8 St hard.	A 2	Br
DIN 93 ①		Tap washers with a long tap	St	A 2 A 4	Br Cu Al
DIN 94 (ISO 1234*)		Split pins	St	A 2 A 4	Br Cu Al
DIN 94		Article 82094 Split pins assortment	St		
		Linch pins, spring cotter pins (→ DIN 11023/11024)	St	A 2 A 4	
DIN 95		Slotted raised countersunk head wood screws	St	A 2 A 4	Br bronze Cu Al
DIN 96		Slotted round head wood screws	St	A 2 A 4	Br bronze Cu Al

* DIN: ISO/EN identical = interchangeable
 ** DIN: ISO/EN mostly interchangeable
 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

① DIN standard withdrawn
 without replacement
 (see note on page 13)

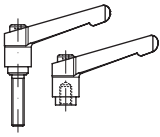
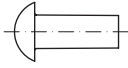
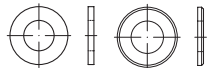


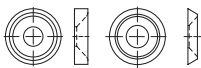

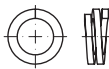
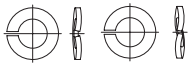





Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 97		Slotted countersunk head wood screws	St	A 2 A 4	Br bronze Cu Al
		Article 88110 Theft resistant screws = half round wood screws with hexagon socket and rivet pin	St		
"ISR"		Countersunk wood screws, countersunk head wood screws up to 12 x 600 with hexalobular drive/head - chipboard screws (article 88098) - SPAX screws (article 88091) - SPAX special screws (article 88192-88197)	St hard. waxed	A 2 A 4	
		Article 88312 Cheese head screws with hexagon socket or hexalobular drive , wood screws/taper screws thread	St hard.	A 2 A 4	
		Article 88091-88099 Chipboard screws/SPAX screws with cross recess Z - raised countersunk head - round head - countersunk head	St hard. waxed	A 2	Br
		Article 88478/88479 SPAX screws assortment	St hard. waxed		
		Chipboard screws/SPAX screws, magazined (banded)			
DIN 97		Slotted countersunk head wood screws with inner hole	St	A 2 A 4	Br
		Article 88099 Chipboard screws/SPAX screws, countersunk head with cross recess Z and inner hole	St hard. waxed		
		Article 88000-88003 Caps for wood screws and chipboard screws with inner hole or with cross recess, flat, flat round, rustic			plastic
DIN 98		Rotatable ball handles	St		Al plastic
DIN 99		Tapered handles	St	A 2	

* DIN: ISO/EN identical = interchangeable
 ** DIN: ISO/EN mostly interchangeable
 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

① DIN standard withdrawn
 without replacement
 (see note on page 13)



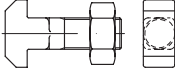
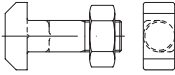
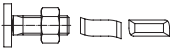
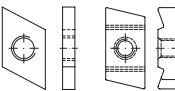

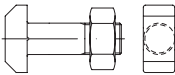

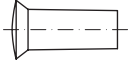
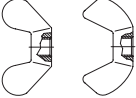


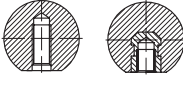

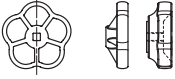
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
		Clamping lever and tension lever	St		ZP/plastic plastic
DIN 123 DIN 124 (ISO 1051)		Round rivets, nominal diameter 10–36 mm	St		
DIN 125 (ISO 7089**/7090**)		Plain washers, type A = no chamfer, type B = with chamfer plain washers, hardened (ISO 7089/7090) plain washers (article 83125/ANSI B18.22.1)	St hard.	A 2 A 4	Br Cu Al plastic
DIN 125 DIN 125/127		Article 82125/82127 Washers assortment, washers/spring lock washers assortment	St hard.		
DIN 126 (ISO 7091*)		Plain washers ("type 1") (article 88100)	St		
		Article 88499/88965 Collar washers	St	A 2 A 4	Br Al
DIN 127 ①		Spring lock washers	SSt	1.4310 A 4	bronze
		Spring lock washers, double	SSt		
DIN 128 ①		Spring washers (mandrel spring washers)	SSt	1.4310 A 4	bronze
DIN 137 ①		Spring washers, type A = convex, type B = corrugated	SSt	1.4310	bronze
		Article 88123–88129 TECKENTRUP lock washers for hexagon head screws and hexagon socket head cap screws	SSt	1.4568	
		Article 88130/88131 Lock rings	SSt	1.4310	bronze
		Article 88120, 88121 SCHNORR locking washers, serrated both side, S, VS	St hard.	A 2 A 4	
		Article 88132 NORD-LOCK washers, standard = normal outer diameter SP = enlarged outer diameter SC = for HV-connections X-series = wedge lock washers	St hard.	A 4	

* DIN: ISO/EN identical = interchangeable
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 *** standard conversion DIN : ISO
 (Technical Information page 77–78)

① DIN standard withdrawn
 without replacement
 (see note on page 13)












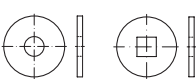

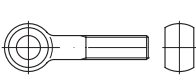




Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
		Article 88032 HEICO-LOCK wedge lock washers	St	A 4	
		Article 88119 LOCKTIX-washers	St		
DIN 186		T-head bolts with square neck	St	A 2 A 4	
DIN 188		T-head bolts with double nip	St	A 2 A 4	
		Article 88928-88950 T-head bolts/hook bolts for profile	4.6	A 2 A 4	
		Article 88951-88955 T-head/hook head threaded plates (slide nuts) for profiles	St	A 2 A 4	
DIN 258 (ISO 8737**)		Taper pins with external thread, constant taper length	St	A 1 A 2	
DIN 261		T-head bolts	St	A 2 A 4	
DIN 268 DIN 271		Tangential keys	St		
DIN 302 (ISO 1051)		Countersunk rivets, nominal diameter 10-36 mm	St		
DIN 314 DIN 315		Wing nuts, rounded or edged wings	St MCI	A 2 A 4	Br plastic
		Article 88215 Wing nuts, small "American" version	St MCI	A 2 A 4	Br plastic
DIN 316 DIN 318		Wing screws, rounded or edged wings	St MCI	A 2	Br plastic
DIN 319		Ball knobs	St		plastic
DIN 338 DIN 340		Twist drills with straight shank	St hard.		
DIN 388 DIN 390		Hand wheels	MCI		Al plastic

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 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

① DIN standard withdrawn
 without replacement
 (see note on page 13)


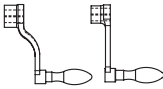



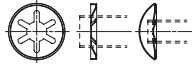


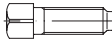
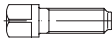
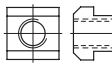
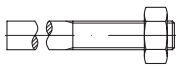
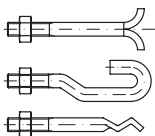
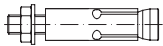
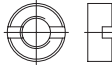
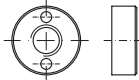
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 404		Slotted capstan screws	St	A 1-A 5	Br
DIN 417 (ISO 7435*)		Slotted grub screws with full dog point	14 H	A 1-A 5	Br
DIN 427 (ISO 2342*)		Slotted headless screws with chamfered end	14 H	A 1-A 5	Br
DIN 431		Pipe nuts	14 H	A 1-A 5	Br
DIN 432 ①		Washers with external tap	St	A 2 A 4	Br Cu
DIN 433 (ISO 7092**)		Washers for cheese head screws	St hard.	A 2 A 4	Br
DIN 434		Square taper washers for U-sections (taper 8%)	St	A 2 A 4	
DIN 435		Square taper washers for double-T-sections (taper 14%)	St	A 2 A 4	
DIN 436		Square washers	St	A 2 A 4	
DIN 438 (ISO 7436*)		Slotted grub screws with cup point	14 H	A 1-A 5	Br
DIN 439 (ISO 4035/8675***)		Hexagon thin nuts, type A = without chamfer, type B = with chamfer	04, 11 H 05, 14 H	A 1-A 5	Br
DIN 440 (ISO 7094**)		Washers for wood constructions, type R = round hole, type V = square hole	St		
DIN 442 DIN 443		Sealing push-in type caps	St		
DIN 444		Eye bolts	St	A 1-A 5	Br
DIN 462		Internal tab washers (for slotted nuts DIN 1804)	St	A 2 A 4	Br Cu
DIN 463 ①		Washers with 2 taps	St	A 2 A 4	Br Cu
DIN 464		Knurled thumb screws	St	A 1-A 5	Br Al plastic
DIN 466		Knurled nuts, high type	5	A 1-A 5	Br Al plastic

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 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

① DIN standard withdrawn
 without replacement
 (see note on page 13)

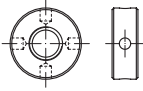
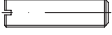

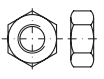
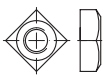

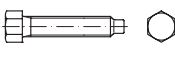
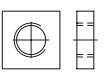


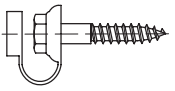
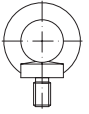
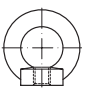
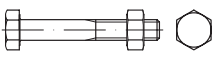
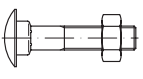
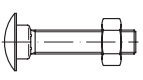
Driving features:
 H = cross recess Phillips
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 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 467		Knurled nuts, low type	5	A 1-A 5	Br Al
DIN 468 DIN 469		Crank handles	MCI St		
DIN 470		Sealing discs	St		
DIN 471		Retaining rings for shafts, normal type/heavy type	SSt	1.4034 1.4122 1.4310 1.4568	bronze
DIN 471		Article 82471 Assortment of retaining rings for shafts	SSt		
		Article 88122 Axle clamping rings, quick fastener-springs/caps (QUICKLOCK/STARLOCK)	SSt		
DIN 472		Retaining rings for bores, normal type/heavy type	SSt	1.4034 1.4122 1.4310 1.4568	
DIN 478		Square head bolts with collar	5.8 8.8 10.9		
DIN 479		Square head bolts with dog point	5.8 8.8 10.9		
DIN 480		Square head bolts with collar, short dog point and rounded end	5.8 8.8 10.9		
DIN 508		T-slot nuts	St-QT		
DIN 525		Studs for welding	3.6	A 2 A 4	
DIN 529		Masonry bolts (anchor bolts)	3.6	A 2 A 4	
		Masonry bolts (anchor bolts) → Fixing systems			
DIN 546		Slotted round nuts	St	A 1-A 5	Br Al
DIN 547		Double-pin nuts	St	A 1-A 5	Br Al

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 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

① DIN standard withdrawn
 without replacement
 (see note on page 13)



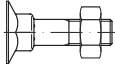

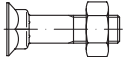
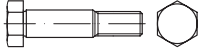
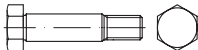


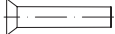

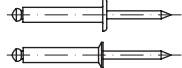
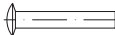
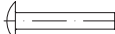
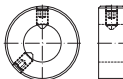

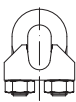
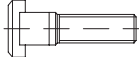
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 548		Capstan nuts	St	A 1-A 5	Br Al
DIN 551 (ISO 4766*)		Slotted grub screws with flat point	14 H	A 1-A 5	Br plastic
DIN 553 (ISO 7434*)		Slotted grub screws with cone point	14 H	A 1-A 5	Br plastic
DIN 555 (ISO 4034***)		Hexagon nuts, product grade C - with metric thread M - with inch thread WW	5 5-2		plastic
DIN 557		Square nuts	5		
DIN 558 (ISO 4018***)		Hexagon head screws, thread up to head, product grade C	4.6		plastic
DIN 561		Hexagon head set screws with dog point	14 H 22 H	A 1-A 5	
DIN 562		Square thin nuts, low type	04 11 H	A 2 A 4	Br Al
DIN 564		Hexagon head set screws with short dog point and flat cone end	14 H 22 H	A 1-A 5	
DIN 571		Hexagon head wood screws	St	A 2 A 4	Br
		Article 88005 Plastic sealings/caps for hexagon head wood screws for corrugated roof panels			plastic
DIN 580		Lifting eye bolts	C 15 E	A 2-A 5	
DIN 582		Lifting eye nuts	C 15 E	A 2-A 5	
DIN 601 (ISO 4016***)		Hexagon head bolts with shank, product grade	4.6		
DIN 603		Cup head square neck bolts	3.6 4.6 8.8	A 2 A 4	Br plastic
~DIN 603		Cup head square neck bolts, thread up to square neck	St		

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 (Technical Information page 77-78)

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 without replacement
 (see note on page 13)

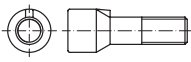

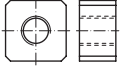
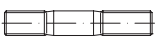

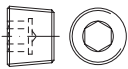

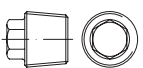
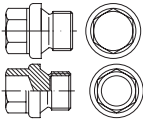
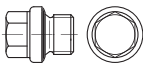
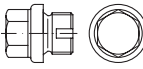
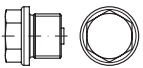
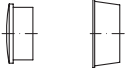

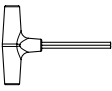
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
		Article 88107 Slotted mushroom head screws	4.6 5.8	A 1-A 5	Br
DIN 604		Flat countersunk nib bolts	4.6 8.8		
DIN 605		Flat countersunk square neck bolts	4.6		
DIN 607		Cup head nib bolts	4.6		
DIN 608		Flat countersunk square neck bolts with short square	4.6 8.8		
DIN 609		Hexagon fit bolts with long threaded pin	5.6 8.8 10.9	A 2 A 4	
DIN 610 ①		Hexagon fit bolts with short threaded pin	5.6 8.8 10.9	A 2 A 4	
DIN 653		Knurled thumb screws, low type	St	A 1-A 5	Br
DIN 660		Round head rivets	St	A 2 A 4	Br Cu
DIN 661		Countersunk head rivets	St	A 2 A 4	Br Cu
		Mower knife rivets, half-round or countersunk	St		
		Blind rivets → DIN 7337 → Fixing systems	St	A 2 A 4	Cu Al-alloy plastic
DIN 662 (ISO 1051*)		Mushroom head rivets (sheet metal rivets)	St	A 2	Br Cu
DIN 674 DIN 675 (ISO 1051*)		Flat round head rivets, flat countersunk rivets	St		Br Cu Al
DIN 703 ①		Adjusting rings, heavy range	St	A 1-A 5	
DIN 705		Adjusting rings, light range	St	A 1-A 5	
~DIN 741 (EN 13411***)		U-bolt wire rope grips	St		
DIN 787		T-slot screws	St-QT 12.9		

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 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

① DIN standard withdrawn
 without replacement
 (see note on page 13)






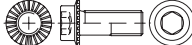
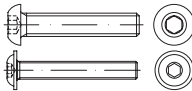
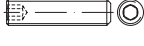
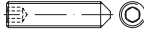


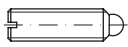


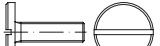

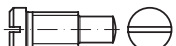
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 792		Countersunk cheese head screws	4.6 5.6		
DIN 797		Anchor bolts	St		
DIN 798		Anchor nuts	5		
DIN 835		Studs, metal end $\approx 2 d$	5.6 5.8 8.8 10.9	A 1-A 5	Br
DIN 906		Hexagon socket pipe plugs with taper thread	St	A 1-A 5	Br bronze
		Hexagon socket pipe plugs, taper thread acc. to USA-/BS-Standard, types: NPTF, PTF, BSPT	St hard.	A 1-A 5	Br
DIN 908		Hexagon socket screw plugs with cylindrical thread	St	A 1-A 5	Br bronze
DIN 909		Hexagon head pipe plugs with taper thread	St	A 1-A 5	Br bronze
DIN 910		Hexagon head screw plugs with cylindrical thread, regular type or light type	St	A 1-A 5	Br bronze
		Screw plugs with sealing ring - with hexagon (DIN 910/DIN 5586), - with hexagon socket (DIN 908)	St		
		Hexagon head pipe plugs with collar and ventilation, with melted sealing (~DIN 5586)	St	A 1-A 5	Br bronze
		Hexagon head pipe plugs with magnet "PM"	St		
		Protective plugs, sleeves, caps for pipe end and workpiece orifice			plastic
DIN 911 (ISO 2936*)		Hexagon socket screw keys (socket wrench) for hexagon socket (also with ball head)	St-QT		
		Hexagon screw driver with handle	St-QT		handle = plastic

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 (Technical Information page 77-78)

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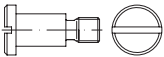

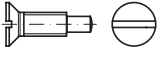
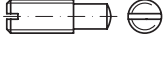
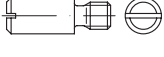
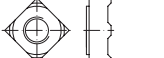

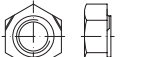
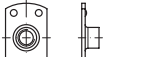
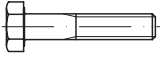
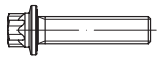

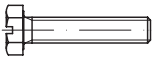
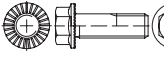
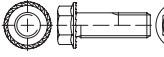
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
"ISR"		Hexalobular socket screw keys (socket wrench) for hexalobular socket screws	St-QT		
		Wrench keys assortment	St-QT		
DIN 912 (ISO 4762*/12474*)		Hexagon socket head cap screws - with metric thread M - with metric fine pitch thread M - with inch thread UNC/UNF (article 83912/ASME B18.3)	8.8 10.9 12.9 A 574	A 2-A 5	Br
~DIN 912		Hexagon socket head cap screws with thread up to head	8.8 10.9 12.9	A 2 A 4	
~DIN 912 ISR (ISO 14579)		Hexalobular socket head cap screws	8.8 12.9	A 2 A 4	
		Article 88912 Hexagon socket cap screws with flange, lock ribs under the flange	100 12.9		
"ISR" (ISO 7380/14583)		Pan head/mushroom head screws - with hexagon socket - with hexalobular socket	4.6 8.8 10.9	A 2-A 5	Br
DIN 913 (ISO 4026*)		Hexagon socket set screws with flat point	45 H	A 1-A 5	
DIN 914 (ISO 4027*)		Hexagon socket set screws with cone point	45 H	A 1-A 5	
DIN 915 (ISO 4028*)		Hexagon socket set screws with full dog point	45 H	A 1-A 5	
DIN 916 (ISO 4029*)		Hexagon socket set screws with cup point	45 H	A 1-A 5	
		Spring thrust pads with hexagon socket	5.8	A 2	
DIN 917		Hexagon cap nuts, low type	6 AU 8	A 1-A 5	Br Al
DIN 920		Slotted small cheese head screws	5.8	A 1-A 5	Br
DIN 921		Slotted large cheese head screws	5.8	A 1-A 5	Br
		Article 88107 Slotted mushroom head screws	4.6 5.8	A 1-A 5	Br
DIN 922		Slotted mushroom head screws, small head and pin	5.8	A 1-A 5	Br

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 (Technical Information page 77-78)

① DIN standard withdrawn without replacement (see note on page 13)


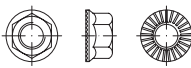





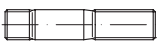



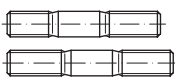
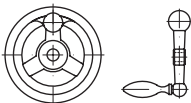

Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 923		Slotted cheese head shoulder screws	5.8	A 1-A 5	Br
DIN 924		Slotted raised countersunk head screws with cone	5.8	A 1-A 5	Br
DIN 925		Slotted countersunk head screws with cone	5.8	A 1-A 5	Br
DIN 926		Slotted set screws with dog point	14 H	A 1-A 5	Br
DIN 927		Slotted shoulder screws	14 H	A 1-A 5	Br
DIN 928		Square weld nuts	St	A 1 A 2	
		Article 88109 Square caged nuts	St		
DIN 929		Hexagon weld nuts	St	A 1-A 5	
		Weld nuts	St		
DIN 931 (ISO 4014*/***)		Hexagon head bolts with shank - with metric thread M - with inch thread UNC/UNF (article 83931/ASME B18.2.1) - for container construction as per AD regulations	5.6 8.8 10.9 12.9 Grade 5/8 1.7709 1.7218	A 2-A 5 A 2/A 4-70 A 2/A 4-80	Br bronze Al plastic
		Hexalobular head screws/bolts (→ DIN 34800, 34801)	8.8 10.9		
DIN 933 (ISO 4017*/***)		Hexagon head screws with thread up to head - with metric thread M - with inch thread UNC/UNF (article 83933/ASME B18.2.1) - for container construction as per AD regulations	5.6 8.8 10.9 12.9 Grade 5/8 1.7709 1.7218	A 2-A 5 A 2/A 4-70 A 2/A 4-80	Br bronze Al plastic
DIN 933		Slotted hexagon head screws	5.6 8.8 10.9	A 2-A 5	Br bronze Al plastic
		Article 88913 Hexagon head screws with flange and lock ribs	90/100		
		Article 88933 Hexagon head locking screws with flange	90/100		

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 (Technical Information page 77-78)

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 without replacement
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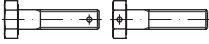

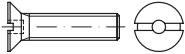
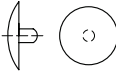

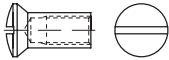
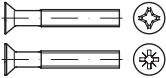

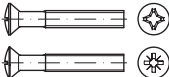
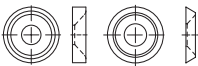
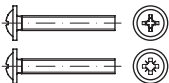
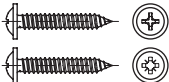
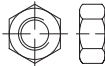
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 934 (ISO 4032/4033*** ISO 8673/8674***)		Hexagon nuts, product grade A - with metric thread M - with inch thread UNC/UNF (article 83934/ASME B18.2.2) - for container construction as per AD regulations	5 5-2 6 8 10 12 C 35 Grade 5/8 1.7258	A 1-A 5 A 2/A 4-70 A 2/A 4-80	Br bronze Al plastic
		Article 88914 Hexagon nuts with flange and lock ribs	10		
		Article 88934 Hexagon locking nuts	8 10		
DIN 934		Article 82934, 82935 Hexagon nuts assortments	6 8		
DIN 935		Hexagon slotted and castle nuts	6 AU 8 10	A 1-A 5	Br
DIN 936 (ISO 4035/8675***)		Hexagon thin nuts - with metric thread M - with metric fine thread M - with inch thread UNC/UNF (article 83936/ASME B18.2.2)	04 05 17 H 22 H Grade 5	A 1-A 5	Br Al
DIN 937 (DIN 979)		Hexagon thin slotted and castle nuts	14 H 17 H 22 H	A 1-A 5	Br
DIN 938		Studs, metal end $\approx 1 d$ - also for container construction as per AD regulations	5.6 5.8 8.8 10.9	A 1-A 5 A 2/A 4-70	Br
DIN 939		Studs, metal end $\approx 1,25 d$ - also for container construction as per AD regulations	5.6 5.8 8.8 10.9	A 1-A 5 A 2/A 4-70	Br
ANSI		Threaded bolts (\rightarrow DIN 976)	5.6 8.8 ASTM AISI BS	A 1-A 5 ASTM AISI BS	
DIN 940		Studs, metal end $\approx 2,5 d$	5.8 8.8 10.9	A 1-A 5	
DIN 949-1 DIN 949-2		Studs with metric thread for interference MFS, metal end: -1 = 2 d, -2 = 2,5 d	5.8 8.8 10.9	A 1-A 5	Br
DIN 950 DIN 951 DIN 959		Hand wheels and ball cranks acc. to standard and special form	Cl		Al
DIN 960 (ISO 8765***)		Hexagon head bolts with shank, fine pitch thread	5.6 8.8 10.9 12.9	A 1-A 5	Br

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 (Technical Information page 77-78)

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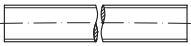


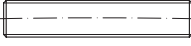

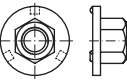

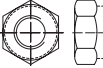
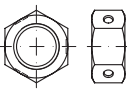
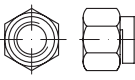

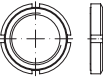
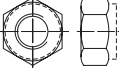
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 961 (ISO 8676***)		Hexagon head screws with thread up to head, fine pitch thread	5.6 8.8 10.9 12.9	A 2 A 4	
DIN 962 (ISO 7378/8991)		Additional types and finishes for screws/bolts (→ Technical Information)			
DIN 963 (ISO 2009**)		Slotted countersunk head screws	4.8 5.8 8.8	A 1-A 5	Br bronze Al plastic
		Slotted countersunk screws with inner hole	4.8	A 2 A 4	Br
		Article 88000-88003 Caps for countersunk screws with inner hole			plastic
DIN 964 (ISO 2010**)		Slotted raised countersunk head screws	4.8 5.8 8.8	A 1-A 5	Br Al plastic
		Article 88964 Sleeve nuts with internal thread, with slot/without slot	St	A 2 A 4	Br Al
DIN 965 (ISO 7046***)		Countersunk head screws with cross recess H or Z	4.8 5.8 8.8	A 2 A 4	Br plastic
„ISR“ (ISO 14581)		Countersunk head screws with hexalobular socket	4.8 8.8	A 2 A 4	
DIN 966 (ISO 7047**)		Raised countersunk head screws with cross recess H or Z	4.8 5.8 8.8	A 2 A 4	Br plastic
		Article 88499, 88965 Collar washers	St	A 2 A 4	Br Al
DIN 967		Pan head screws with collar, with cross recess H or Z	4.8 5.8 8.8	A 2 A 4	Br
DIN 968		Pan head taper screws with collar, with cross recess H or Z	4.8 5.8 8.8	A 2 A 4	Br
DIN 970 (ISO 4032*)		Hexagon nuts, ISO type 1, ISO type 2, - with coarse pitch thread - with fine pitch thread	4 5 6 8 10 12	A 1-A 5	Br bronze Al Ti plastic
DIN 971 (ISO 8673/8674*)					
DIN 972 (ISO 4034*)					

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 (Technical Information page 77-78)

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
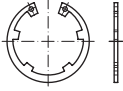
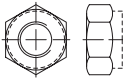

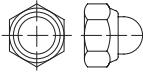
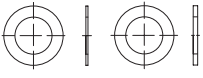
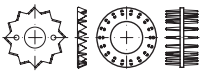







Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 975 (DIN 976*)		Threaded rods - with metric thread M - with inch thread WW, UNC/UNF - lengths: 1000, 2000 and 3000 mm	4.6 4.8 5.6 5.8 8.8 10.9 12.9 ASTM	A 1-A 5 ASTM	Br plastic
DIN 975	 	Threaded rods with trapezoidal thread Article 88089, 88090 Nuts with trapezoidal thread, round/hexagon	5.8 8.8	A 2 A 4	
DIN 976-1 DIN 976-2		Stud bolts/threaded rod - with metric thread M, - with metric thread for interference MFS	4.6 4.8 5.6 5.8 8.8 10.9 12.9 ASTM	A 1-A 5 ASTM	Br plastic
ANSI		Stud bolts with hexagon nuts	5.6 8.8 ASTM AISI BS	A 1-A 5 ASTM AISI BS	
DIN 977 (ISO 21670)		Hexagon weld nuts with flange	St		
DIN 979 (ISO 7038**)		Hexagon thin slotted and castle nuts	04 05	A 1-A 5	Br
DIN 980 (DIN 6925***) (ISO 7042/7719/10513)		Prevailing torque type hexagon nuts, all metal, type M = two parts (SPRING-STOP/VARGAL/DAX), type V = single component (STOVER/CLEVELOC/UNI-STOP)	5 8 10 12	A 1 A 2 A 4	Br Al
		Article 84032 Biloc nuts/prevailing torque type hexagon nuts	8 10	A 2 A 4	
		Article 88105 THERMAG nuts, all metal, single component	8 10		
DIN 981 KM		Locknuts	St	A 1-A 5	
		Locknuts with non metallic-insert GUA/GUK/GUP, FINE-U-Nut	St		
DIN 982 (DIN 6924***) (ISO 7040/7041/10512)		Prevailing torque type hexagon nuts with non-metallic insert (plastic), high type	5 6 8 10 12	A 1-A 5	

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 (Technical Information page 77-78)

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Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 983		Retaining rings with lugs for shafts	SSt		
DIN 984		Retaining rings with lugs for bores	SSt		
DIN 985 (DIN 6924***) (ISO 10511/10512***)		Prevailing torque type hexagon nuts with non-metallic insert (plastic), low type, (e.g. type NYLOX/POLY-STOP/ELASTIC-STOP)	5 6 8 10	A 1-A 5	Br Al
DIN 985		Article 82985 Assortment of prevailing torque type hexagon nuts	8		
DIN 986		Prevailing torque type hexagon domed cap nuts with non-metallic insert (plastic)	5 6 8 10	A 1-A 5	
DIN 988		Shim rings/supporting rings	St SSt	A 1-A 5	
DIN 1052		Article 88050-88053 Timber connectors, spikes one sided or two sided, metal sheet/malleable cast iron	MCI St		
DIN 1052		Washers for timber connectors	St	A 2 A 4	
DIN 1052		Article 88052 SPAX-threaded rods with wood screw thread for lateral pass and lateral pressure, reinforcement for large timber components	St		
DIN 1142 (EN 13411***)		Clamps for wire ropes for end joints	MCI stirrup 6.8	A 2 A 4	
ISO 1207 (DIN 84**)		Slotted cheese head screws	4.8 5.8	A 1-A 5	Br bronze Al plastic
ISO 1234 (DIN 94*)		Split pins	St	A 2	Br Cu Al
DIN 1433- DIN 1436		Bolts with or without head (→ DIN 1443/1444)	St	A 1-A 5	Br Al
DIN 1440 (ISO 8738**)		Washers for clevis pins	St	A 1-A 5	Br

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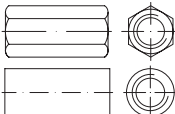

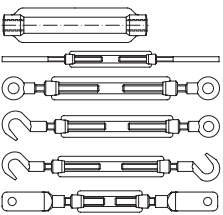

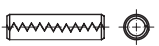

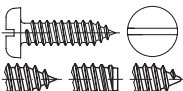
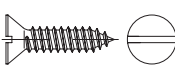
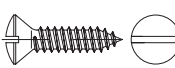

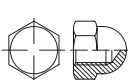
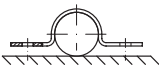
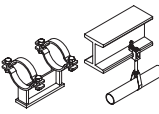
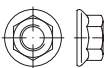
Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 1441		Washers for clevis pins	St	A 1-A 5	Br
DIN 1443 (ISO 2340**)		Clevis pins without head, type A = without pin holes, type B = with pin holes	St	A 1-A 5	Br Al
		Quick assembly elements for axles, shafts, bolts and pins; axle clamping rings, Duo-Clips, spring pins, KL-/SL-safety, U-Clips, Bajonett-Clips, PALNUT-Clips	SSt	1.4310	
DIN 1444 (ISO 2341**)		Clevis pins with head, type A = without pin hole, type B = with pin hole	St	A 1-A 5	
DIN 1445		Clevis pins with head and cone end	St	A 1-A 5	Br Al
DIN 1469		Grooved pins with neck	St	A 1 A 2 1.4104	Br Al plastic
DIN 1470		Straight grooved pins with pilot end	St	A 1 A 2 1.4104	Br Al plastic
DIN 1471 (ISO 8744**)		Grooved pins, full length taper grooved	St	A 1 A 2 1.4104	Br Al plastic
DIN 1472 (ISO 8745**)		Grooved pins, half length taper grooved	St	A 1 A 2 1.4104	Br Al plastic
DIN 1473 (ISO 8740**)		Grooved pins, full length parallel grooved	St	A 1 A 2 1.4104	Br Al plastic
DIN 1474 (ISO 8741**)		Grooved pins, half length reverse grooved	St	A 1 A 2 1.4104	Br Al plastic
DIN 1475 (ISO 8742/8743**)		Grooved pins, third length centre grooved	St	A 1 A 2 1.4104	Br Al plastic
DIN 1476 (ISO 8746*)		Grooved pins with round head	St	A 1 A 2 1.4104	Br Al plastic
DIN 1477 (ISO 8747*)		Grooved pins with countersunk head	St	A 1 A 2 1.4104	Br Al plastic
DIN 1478		Turnbuckles made from tubes SP = turnbuckles without accessories SP-AE = with 2 welding studs possible with conformity mark (ÜZ)	St 35 St 50-2	A 2 A 4	
		Shroud turnbuckles	St	A 4	

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Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 1479		Hexagon turnbuckles, possible with conformity mark (ÜZ)	St 6 AU	A 1-A 5	Br
		Coupling sleeves - hexagonal (article 88087) - round (article 88088)	St	A 1-A 5	Br
ISO 1479 (DIN 7976*)		Hexagon head tapping screws	St case-hard.	A 2 A 4	
DIN 1480		Turnbuckles, forged, SP = turnbuckles without accessories SP-AE ¹ = with 2 welding studs SP-RR = with 2 eye bolts SP-RH = with eye bolt and hook bolt SP-HH = with 2 hook bolts SP-BS ¹ = with 2 flat leaf screws ¹ possible with conformity mark (ÜZ)	3.6	A 4	
DIN 1481 (ISO 8752**)		Spring type straight pins, heavy duty	SSt	1.4310	
		Spring type straight pins , tooth slotted ("CONNEX")	SSt	1.4310	
DIN 1481		Article 82481 Spring type straight pins assortment	SSt		
ISO 1481 (DIN 7971**)		Slotted cheese head taper screws, type C = cone end, type F = full dog point, type R = round cone end	St case-hard.	A 2 A 4	
ISO 1482 (DIN 7972***)		Slotted countersunk taper screws	St case-hard.	A 2 A 4	
ISO 1483 (DIN 7973***)		Slotted raised countersunk taper screws	St case-hard.	A 2 A 4	
ISO 1580 (DIN 85**)		Slotted pan head screws	4.8 5.8	A 1-A 5	Br bronze Al plastic
DIN 1587		Hexagon domed cap nuts, high type	6 AU 8	A 1-A 5	Br Al plastic
DIN 1592 DIN 1593 DIN 1596 DIN 1597		Pipe clips	St	A 2-A 5	
		Pipe clamps, pipe rack → LINDAPTER	St	A 2-A 5	
EN 1661 (DIN 6923****)		Hexagon nuts with flange	8 10 12	A 2 A 4	

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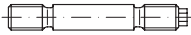
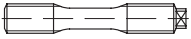
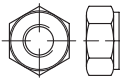
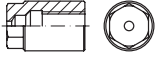
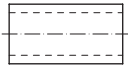


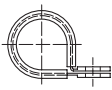
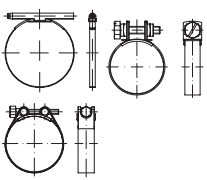




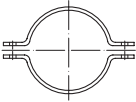
Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
		Article 88914, 88934 Locking-/RIPP nuts with flange (TENSILOCK/DURLOCK)	8 10		
EN 1662 EN 1665 (DIN 6921***) (DIN 6922***)		Hexagon screws with flange, light type, heavy type	8.8 10.9	A 2 A 4	
		Article 10105 Hexagon head bolts with flange acc. to MBN 10105	10.9		
EN 1663 EN 1666 (DIN 6926***)		Prevailing torque type hexagon nuts with flange and non-metallic insert, coarse thread, fine pitch thread	8 10 12	A 2 A 4	
EN 1664 EN 1667 (DIN 6927***)		Prevailing torque type hexagon nuts with flange, all metal, coarse thread, fine pitch thread	8 10 12	A 2 A 4	
		Article 13023 Prevailing torque type hexagon nuts with flange acc. to MBN 13023	10		
DIN 1804		Slotted round nuts for hook spanner	St	A 2-A 5	
		Locknuts with non-metallic insert GUA/GUK/GUP, FINE-U-Nut	St		
DIN 1816		Round nuts with set pin holes inside	St	A 1-A 5	Br
ISO 2009 (DIN 963**)		Slotted countersunk flat head screws	4.8 5.8	A 1-A 5	Br bronze Al plastic
ISO 2010 (DIN 964**)		Slotted raised countersunk head screws	4.8 5.8	A 1-A 5	Br bronze Al plastic
DIN 2093		Disc springs	SSt	1.4122 1.4310 1.4568	bronze
		TECKENTRUP conical spring washers	SSt	1.4568	
ISO 2338 (DIN 7**)		Parallel pins	St	A 1-A 5	Br
ISO 2339 (DIN 1**)		Taper pins	St	A 1-A 5	Br
ISO 2341 (DIN 1444*)		Clevis pins with head	St	A 1-A 5	Br Al

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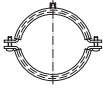
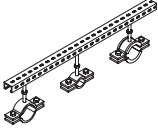

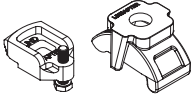
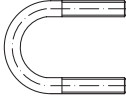

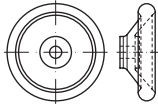
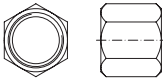

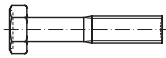
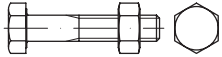
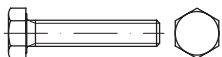



Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
ISO 2342 (DIN 427*)		Slotted headless screws with shank	14 H	A 1-A 5	Br
DIN 2509		Double end studs	5.6		
DIN 2510		Bolts with waisted shank, with certificate EN 10204/3.2/3.1	material → DIN 267-13	material → DIN 267-13	
DIN 2510		Hexagon nuts for bolts with waisted shank, with certificate EN 10204/3.1	material → DIN 267-13	material → DIN 267-13	
DIN 2510		Cap nuts for bolts, with certificate EN 10204/3.1	material → DIN 267-13	material → DIN 267-13	
DIN 2510		Clamping sleeves for bolts, with certificate EN 10204/3.1	material → DIN 267-13	material → DIN 267-13	
ANSI		Threaded bolts with hexagon nuts	5.6 8.8 ASTM AISI BS	A 2 A 4 ASTM AISI BS	
ISO 2936 (DIN 911*)		Hexagon socket screw keys (socket wrench) for hexagon socket (also with ball head)	St-QT		
DIN 3015 DIN 3016		Fastening clamps with rubber profile	St MCI	1.4016 A 2 A 4	Al plastic
DIN 3017		Hose clamps, type A = with worm gear drive type B = with fastening lugs type C = with hinge bolts	St	1.4301 1.4436	
DIN 3090 (DIN 6899*)		Thimbles	St	A 4	
DIN 3220 DIN 3319		Hand wheels, flat and cranked	St	1.4016 1.4301 1.4401 1.4436 1.4571	
DIN 3404		Lubricating nipples, button head	St	A 2 A 4	Br
DIN 3405		Lubricating nipples, cupped type	St	A 2 A 4	Br
DIN 3567		Pipe clamps	St	A 2 A 4	

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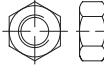
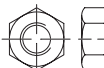



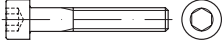

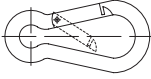
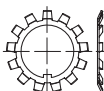

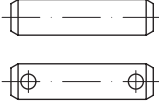
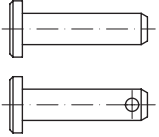
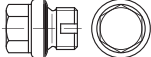
Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
		Tubular clamps with noise protection inlays (DIN 4109)	St	A 2 A 4	
		Pipe support, pipe hangers	St	A 2 A 4	
DIN 3568		Clamping plates for pipe fixings	St 37		
		LINDAPTER-clamping elements → Fixing Systems	MCI		
DIN 3570		Stirrup bolts	St	A 2 A 4	Br
DIN 3575		Anchors with welding ends for pipe suspension	St 37	A 2 A 4	
DIN 3670		Disc hand wheels			Al
DIN 3870 DIN 3872		Cap nuts	St	A 1-A 5	Br
ISO 4014 (DIN 931*/***)		Hexagon head bolts with shank - with metric thread M - with inch thread UNC/UNF (article 83931/ASME B18.2.1) - for container construction as per AD regulations	5.6 8.8 10.9 12.9 Grade 5/8 1.7709 1.7218	A 2-A 5 A 2/A 4-70 A 2/A 4-80	Br bronze Al Ti plastic
ISO 4015		Hexagon bolts with shank-Ø ~ pitch-Ø	5.8 8.8	A 2 A 4	
ISO 4016 (DIN 601)		Hexagon head bolts with shank, product grade C	3.6 4.6 4.8		
ISO 4017 (DIN 933*/***)		Hexagon head screws with thread up to head - with metric thread M - with inch thread UNC/UNF (article 83933/ASME B18.2.1) - for container construction as per AD regulations	5.6 8.8 10.9 12.9 Grade 5/8 1.7709 1.7218	A 2-A 5 A 2/A 4-70 A 2/A 4-80	Br bronze Al Ti plastic
ISO 4018 (DIN 558)		Hexagon head screws with thread up to head, product grade C	3.6 4.6 4.8		
ISO 4026 (DIN 913*)		Hexagon socket set screws with flat point	45 H	A 1-A 5	
ISO 4027 (DIN 914*)		Hexagon socket set screws with cone point	45 H	A 1-A 5	

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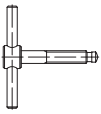
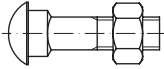
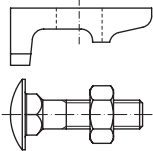
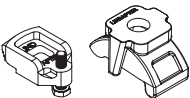

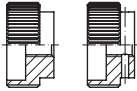
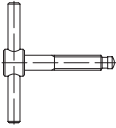
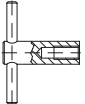
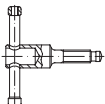
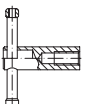


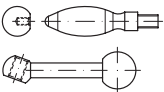
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
ISO 4028 (DIN 915*)		Hexagon socket set screws with full dog point	45 H	A 1-A 5	
ISO 4029 (DIN 916*)		Hexagon socket set screws with cup point	45 H	A 1-A 5	
ISO 4032 (DIN 934***)		Hexagon nuts, ISO type 1, product grade A, B - with metric thread M - with inch thread UNC/UNF (article 83934/ASME B18.2.2) - for container construction as per AD regulations	5 5-2 6 8 10	A 1-A 5 A 2/A 4-70 A 2/A 4-80	Br bronze Al Ti plastic
ISO 4033 (DIN 934***)		Hexagon nuts, ISO type 2	12		
ISO 4034 (DIN 555)		Hexagon nuts, ISO type 1, product grade C	4 5		
ISO 4035***/ ISO 4036***/ (DIN 439/936***)		Hexagon thin nuts (with/without chamfers)	04 05 110 HV	A 1-A 5	Br
~DIN 4109		Screwed tubular clamps with noise protection inlay	St	A 2 A 4	
ISO 4762 (DIN 912*)		Hexagon socket head cap screws - with metric thread M - with metric fine pitch thread M - with inch thread UNC/UNF (article 83912/ASME B18.3)	8.8 10.9 12.9 A 574	A 2-A 5	Br bronze
ISO 4766 (DIN 551*)		Slotted grub screws with flat point	14 H	A 1-A 5	Br plastic
DIN 5299		Snap hooks type C	St		
DIN 5406 MB/MBL		Lock washers/safety plates for locknuts acc. to DIN 981	St		
DIN 5417		Retaining rings, type A = for shafts, type B = for bores	SSt		
DIN 5525		Bolts without head for railway vehicles	St	A 1-A 5	Br Al
DIN 5526		Bolts with head for railway vehicles	St	A 1-A 5	Br Al
DIN 5586		Hexagon head screw plugs with collar and ventilation, with melted sealing (type B)	St	A 1-A 5	

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 (Technical Information page 77-78)

① DIN standard withdrawn
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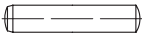



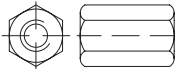
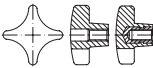
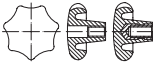
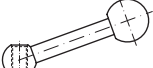

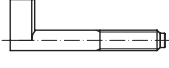





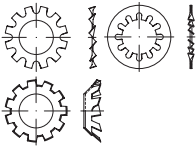
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 6304		Tommy screws with fixed clamping bolt	5.8		
DIN 5903		Fish bolts - with round head and oval neck - with square head	4.6		
DIN 5906		Bolts for clamping plates, clamping plates for rails	St		
		LINDAPTER-clamping parts for rails → Fixing Systems	MCI		
DIN 5914		Baseplate screws with square head	St		
DIN 6303		Knurled nuts	5	A 1 A 2 A 4	Br Al
DIN 6304		Tommy screws with fixed clamping bolt	5.8		
DIN 6305		Tommy nuts with fixed clamping bolt	5		
DIN 6306		Tommy screws with movable clamping bolt	5.8		
DIN 6307		Tommy nuts with movable clamping bolt	5		
DIN 6311		Thrust pads for grub screws with thrust point acc. to DIN 6332	St hard.		
DIN 6319		Spherical washers type C, conical seats type D and G	St hard.		
DIN 6324		Operating elements for clamping devices: star/palm grips, ball knobs, tommy screws/nuts, crank handles	St		plastic

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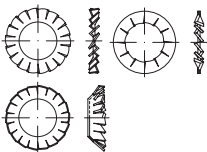




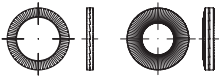


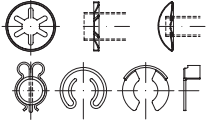

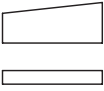

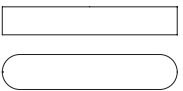
Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 6325 (ISO 8734*)		Parallel pins	St hard.		
DIN 6330		Hexagon nuts with a height of 1,5 d, type B = one spherical bearing face	6 AU 8 10	A 1-A 5	Br
DIN 6331		Hexagon nuts with collar, with a height of 1,5 d	6 AU 8 10	A 1-A 5	
DIN 6332		Grub screws with thrust point	5.8 8.8		
~DIN 6334		Hexagon nuts with a height of 3 d	6 AU 8 10	A 1-A 5	Br
DIN 6335		Palm grips	St		plastic
DIN 6336		Star grips	St		plastic
DIN 6337		Ball handles	St		plastic
DIN 6340		Washers for clamping devices	St-QT		
DIN 6378		Hook bolts	8.8		
DIN 6379		Studs for use with t-nuts	8.8		
DIN 6791		Semi-tubular pan head rivets	St		Br Cu Al
DIN 6792		Semi-tubular countersunk head rivets	St		Br Cu Al
DIN 6796		Conical spring washers	SSt	1.4310	
		TECKENTRUP conical spring washers	SSt	1.4568	
DIN 6797 ①		Toothed lock washers, type A = external teeth type I = internal teeth type V = countersunk	SSt	1.4310	bronze

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Driving features:
 H = cross recess Phillips
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 6798 ①		Serrated lock washers, type A = external teeth type I = internal teeth type V = countersunk	SSt	1.4310 A 4	bronze
		Article 88123-88126 TECKENTRUP lock washers for hexagon head screws and hexagon socket cap screws	SSt	1.4568	
		Article 88129 TECKENTRUP lock washers with contact serrations	SSt	A 4	
		Article 88120, 88121 SCHNORR safety washers with serration on both sides, S, VS	St hard.	A 2 A 4	
		Article 88130, 88131 Lock rings	SSt	1.4310	
		Article 88132 NORD-LOCK washers, standard = normal outer diameter SP = enlarged outer diameter SC = for HV-connections X-series = wedge lock washer	St hard.	A 4	
		Article 88032 HEICO-LOCK wedge lock washers	St	A 4	
DIN 6799		Retaining rings for shafts	SSt	1.4034 1.4122	bronze
		Quick assembly elements for axles, shafts, bolts and pins; axle clamping rings, Duo-clips, spring cotter pins, KL-/SL-backups, U-clips, Bajonett-clips, PALNUT-clips	SSt	1.4310	
DIN 6880		Key steel	St	A 2 A 4	
DIN 6881 DIN 6883 (ISO 2492)		Saddle keys, parallel keys	St	A 2 A 4	
DIN 6884 (ISO 2492)		Parallel keys with gib head	St	A 2 A 4	
DIN 6885 (ISO 773/2491**)		Parallel keys	St	A 2 A 4	

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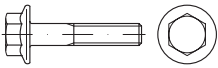

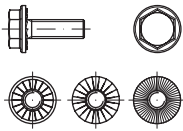
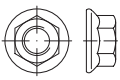
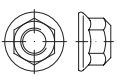
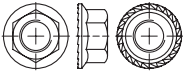
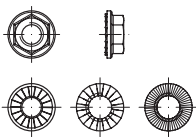
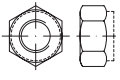
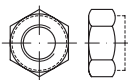

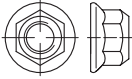
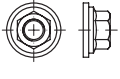
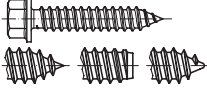
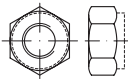
Driving features:
 H = cross recess Phillips
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 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 6887 (ISO 774**)		Taper keys with gib head	St	A 2 A 4	
DIN 6888 (ISO 3912**)		Woodruff keys	St	A 2 A 4	
DIN 6899 (EN 13411***)		Thimbles for fibre ropes	St	A 2 A 4	
DIN 6900 DIN 6901 (ISO 10644/10510)		Screw and washer assemblies - with metric thread - with taper screw thread = ready to install fasteners with captive washers	4.8 5.8 8.8 10.9 St case-hard.	A 2 A 4	Br
		Nuts with captive washers	6 8 10	A 2 A 4	
DIN 6902- DIN 6908 (ISO 10669/10673)		Washers for screw and washer assemblies	St SSt	A 2 A 4 1.4310	Br bronze plastic
DIN 6911		Hexagon socket screw keys (pin wrenches) with pilot for hexagon socket cap screws acc. to DIN 6912	St-QT		
DIN 6912		Hexagon socket head cap screws with low head and centre	8.8 10.9	A 2 A 4	Br bronze
DIN 6914 (EN 14399-4)		Hexagon bolts with large head for high-strength structural bolting, system HV	10.9		
HVP (EN 14399-8)		Hexagon fit bolts with large head for high strength structural bolting, system HV	10.9		
HRC (HVA) (EN 14399-10)		Bolts with calibrated preload for high strength structural bolting (HVA bolts)	10.9		
DIN 6915 (EN 14399-4)		Hexagon nuts with large wrench size for high-strength structural bolting, system HV	10		
DIN 6916 (EN 14399-6)		Plain chamfered washers for high-strength structural bolting, system HV	C 45 -QT		
DIN 6917		Square taper washers for friction grip bolts on double-T sections in steel constructions	C 45 -QT		
DIN 6918		Square taper washers for friction grip bolts on U-sections in steel constructions	C 45 -QT		

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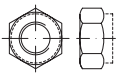
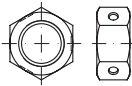
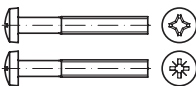
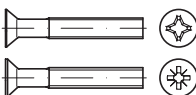
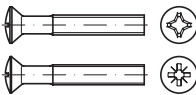
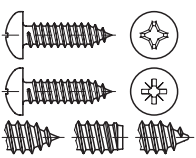
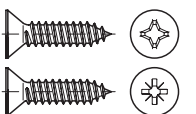
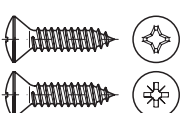
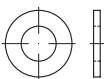
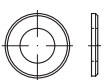


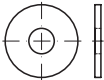

Driving features:
 H = cross recess Phillips
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 6921 DIN 6922 (ISO 4162/8100-04) (EN 1665***)		Hexagon flange bolts	8.8 10.9 12.9		
		Article 10105 Hexagon flange bolts acc. to MBN 10105	10.9		
		Article 88913, 88933 Locking screws, RIPP screws (TENSILOCK/DURLOK)	90/100 10.9 12.9		
DIN 6923 (EN 1661***)		Hexagon flange nuts	8 10 12	A 2 A 4	
		Article 13023 Hexagon flange nuts acc. to MBN 13023	10		
~DIN 6923		Hexagon locking nuts with flange	8 10 12	A 2 A 4	
		Article 88914, 88934 Locking nuts, RIPP nuts (TENSILOCK/DURLOK)	10 12	A 2 A 4	
DIN 6924 (ISO 7040***/10512***)		Prevailing torque type hexagon nuts with non-metallic insert (plastic)	5 8 10 12		
DIN 6925 (ISO 7042***/10513***)		Prevailing torque type hexagon nuts, all metal	5 8 10 12		
DIN 6926 (ISO 7043/12125) (EN 1663**/1666)		Prevailing torque type hexagon nuts with flange, with non-metallic insert (plastic)	8 10 12		
DIN 6927 (ISO 7044/12126) (EN 1664**/1667)		Prevailing torque type hexagon nuts with flange, all metal	8 10 12		
		Nuts with cavity washers	6 8 10	A 2 A 4	
DIN 6928 (ISO 7053/10509)		Hexagon taper screws with collar, type C = cone end, type F = full dog point, type R = round cone end	St case-hard.	A 2 A 4	
ISO 7040 (DIN 6924**)		Prevailing torque type hexagon nuts with non-metallic insert (plastic)	5 8 10	A 2 A 4	

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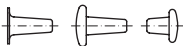
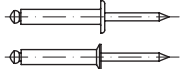
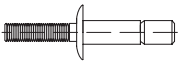
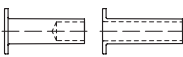

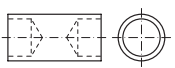
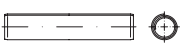

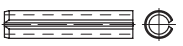
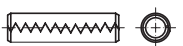

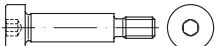
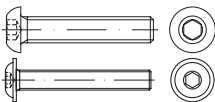




Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
ISO 7042 (DIN 6925**)		Prevailing torque type hexagon nuts, all metal	5 8 10 12		
		Article 84032 Biloc nuts/prevailing torque type hexagon nuts	8 10	A 2 A 4	
ISO 7045 (DIN 7985*)		Pan head screws with cross recess H or Z	4.8	A 2 A 4	Br plastic
ISO 7046-1 ISO 7046-2 (DIN 965**)		Countersunk head screws with cross recess H or Z	4.8 8.8	A 2 A 4	Br plastic
ISO 7047 (DIN 966**)		Raised countersunk head screws with cross recess H or Z	4.8 8.8	A 2 A 4	Br plastic
ISO 7049 (DIN 7981*)		Pan head tapping screws with cross recess H or Z	St case-hard.	A 2 A 4	
ISO 7050 (DIN 7982***)		Countersunk head tapping screws, countersunk $\sphericalangle = 90^\circ$, with cross recess H or Z	St case-hard.	A 2 A 4	
ISO 7051 (DIN 7983***)		Raised countersunk head tapping screws, countersunk $\sphericalangle = 90^\circ$, with cross recess H or Z	St case-hard.	A 2 A 4	
ISO 7089 (DIN 125**)		Plain washers, normal series, without chamfer, product grade A	200 HV 300 HV	A 1-A 5	Br Cu Al plastic
ISO 7090 (DIN 125**)		Plain washers, normal series, with chamfer, product grade A	200 HV 300 HV	A 1-A 5	Br Cu Al plastic
ISO 7091 (DIN 126*)		Plain washers, normal series, product grade C	100 HV	A 2 A 4	
ISO 7092 (DIN 433**)		Plain washers, small series, product grade A	200 HV 300 HV	A 1-A 5	Br
ISO 7093-1 ISO 7093-2 (DIN 9021**)		Plain washers, large series, product grade A/C	200 HV 300 HV	A 1-A 5	Br Al
ISO 7094 (DIN 440**)		Plain washers, extra large series, product grade C	100 HV	A 2 A 4	

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 (Technical Information page 77-78)

① DIN standard withdrawn
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 (see note on page 13)

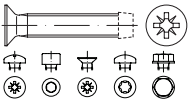
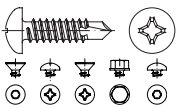
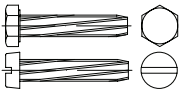
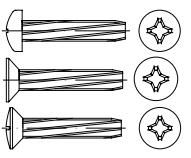
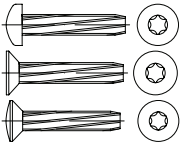
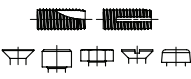
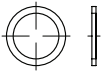
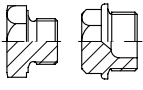
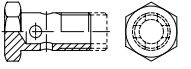
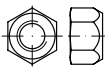
Driving features:
 H = cross recess Phillips
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 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 7331		Compression rivets	St		Br
DIN 7337 (ISO 15973-16585)		Blind rivets → Article 88401-88488 → Fixing systems	St	A 2 A 4	Br bronze Cu Al plastic
		Special blind rivets, blind rivet nuts, setting tools and assortment boxes	St	A 2 A 4	Cu Al
DIN 7338		Rivets for brake linings and clutch linings, type B = with bored shank, type C = tubular rivet	St		Cu Al
DIN 7339 DIN 7340		Hollow rivets, tubular rivets	St		Br Cu Al
DIN 7341 (ISO 1051)		Rivet pins	St	A 1-A 5	Br
DIN 7343 (ISO 8750*/8751)		Spring type straight pins, coiled, standard duty	SSt	1.4310	
DIN 7344 (ISO 8748**)		Spring type straight pins, coiled, heavy duty	SSt	1.4310	
DIN 7346 (ISO 13337*)		Spring type straight pins, slotted, light duty	SSt	1.4310	
		Spring type straight pins with tooth slot, ("CONNEX coiled spring pins")	SSt	1.4310	
DIN 7349		Washers for screws with heavy spring type straight pins	St	A 2	
ISO 7379 (DIN 9841)		Hexagon socket head shoulder screws	10.9 12.9		
ISO 7380-1 ISO 7380-2		Hexagon socket button head screws, hexagon socket button head screws and flange	4.6 8.8 10.9 12.9	A 2 A 4	Br
~ISO 7380-1 ISR		Hexalobular socket button head screws	8.8 10.9 12.9	A 2 A 4	
ISO 7434 (DIN 553*)		Slotted grub screws with cone point	14 H	A 1-A 5	Br
ISO 7435 (DIN 417*)		Slotted grub screws with full dog point	14 H	A 1-A 5	Br
ISO 7436 (DIN 438*)		Slotted grub screws with cup point	14 H	A 1-A 5	Br

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 (Technical Information page 77-78)

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Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 7500		Thread rolling screws for ISO metric thread, type A/AE = head acc. to DIN 84/ISO 1207 type B/BE = head acc. to DIN 85/ISO 1580 type C/CE = head acc. to DIN 7985/ISO 7045 type D/DE = head acc. to DIN 933/ISO 4017 type ~D = hexagon head with collar type E/EE = head acc. to DIN 912/ISO 4762 type K/KE = head acc. to DIN 963/ISO 2009 type L/LE = head acc. to DIN 964/ISO: 2009 type M/ME = head acc. to DIN 965/ISO 7046-2 type N/NE = head acc. to DIN 966/ISO 7047 type OE = head acc. to ISO 14579 type PE = head acc. to ISO 14583 type QE = head acc. to ISO 14584	St case-hard.		
DIN 7504 (ISO 15480*-81* ISO 15482***-83***)		Drilling screws with tapping screw thread, type K = head acc. to DIN 6928 type L = head acc. to DIN 6928 (slot acc. DIN 962) type M = head acc. to ISO 7049/type N acc. DIN 7981 type O = head acc. to ISO 7050/type P acc. DIN 7982 type Q = head acc. to DIN 7983/type R acc. ISO 7051	St case-hard.	Bimetall A 2 A 4	
DIN 7513		Thread cutting screws, type A = head acc. to DIN 933/ISO 4017 type B/BE = head acc. to DIN 84/ISO 1207 type F/FE = head acc. to DIN 963/ISO 2009 type G/GE = head acc. to DIN 964/ ISO 2010	St case-hard.		
DIN 7516		Thread cutting screws with cross recess H or Z, type A/AE = head acc. to DIN 7985/ISO 7045 type D/DE = head acc. to DIN 965/ISO 7046-1 type E/EE = head acc. to DIN 966/ISO 7047	St case-hard.		
~ DIN 7516		Thread cutting screws with hexalobular socket , type AE = head acc. to ISO 14583 type DE = head acc. to ISO 7046-1 type EE = head acc. to ISO 7047	St case-hard.		
		Cut/scrapper groove threaded bolts, self tapping screws (→ DIN 7500)	St case-hard.		
DIN 7603		Sealing rings			Cu Al fibre
DIN 7604		Hexagon head screw plugs with collar	St	A 1-A 5	Br Al plastic
DIN 7642 DIN 7643		Hollow screws for ring type banjos	St	A 1-A 5	
ISO 7719		Prevailing torque type hexagon nuts, ISO type 1, all metal	5 8 10		

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Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 7964		Screws with waisted shank, type A = head acc. to DIN 84 type B = head acc. to DIN 85 type C = head acc. to DIN 7985 type D1/D2 = head acc. to ISO 4014/DIN 931 type E = head acc. to DIN 912 (ISO 4762)	5.6 5.8 8.8	A 1-A 5	Br
DIN 7965		Screwed inserts "RAMPA"	St	A 2 A 4	Br Al plastic
		Article 88108 Tee nuts with prong	St		
		Furniture assembly elements	St		
		Adjusting elements for furniture	St		plastic
DIN 7967 ①		Self locking counter nuts	SSt	1.4310	
		PAL-hatclips-nuts	SSt		
DIN 7968 (EN 15048)		Hexagon fit bolts for steel structures	5.6 8.8		
DIN 7969 (EN 15048)		Slotted countersunk head bolts for steel structures	4.6 5.6		
DIN 7971 (ISO 1481**)		Slotted pan head tapping screws, type C = cone end, type F = flat end, type R = rounded end	St case-hard.	A 2 A 4	
DIN 7972 (ISO 1482***)		Slotted countersunk head tapping screws	St case-hard.	A 2 A 4	
DIN 7973 (ISO 1483***)		Slotted raised countersunk head tapping screws	St case-hard.	A 2 A 4	
		Clip/spring nuts for taper screw threads (→ DIN 34818)	St case-hard.		
DIN 7971 DIN 7973		Article 82971, 82973 Tapping screws assortment	St case-hard.		
DIN 7976 (ISO 1479**)		Hexagon head tapping screws, type C = cone end, type F = flat end, type R = round cone end	St case-hard.	A 2 A 4	

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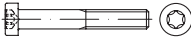
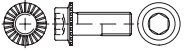



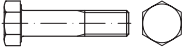
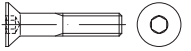


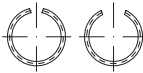
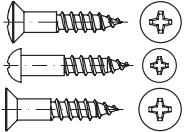
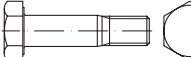
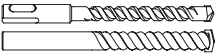

Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
		Article 88176, 88276 Tapping screws for facing with assembled sealing washer, type A = with cone end, type BZ = with full dog point	St case-hard.	A 2	
		Article 88312 Cylindrical head tapping screws with hexagon socket	St case-hard.	A 2 A 4	
DIN 7977 (ISO 8737*)		Taper pins with external thread, constant threaded part	St	A 1-A 5	
DIN 7978 (ISO 8736*)		Taper pins with internal thread	St	A 1-A 5	
DIN 7979 (ISO 8733****/8735****)		Parallel pins with internal thread	St	A 1-A 5	
DIN 7980 ①		Spring lock washer for cheese head screws	SSt	1.4310 A 4	
		Article 88126 TECKENTRUP lock washers "Z" for hexagon head screws and hexagon socket head cap screws	SSt	1.4568	
		Article 88131 Lock rings "VSK-Z"	SSt		
DIN 7981 (ISO 7049**)		Pan head tapping screws with cross recess H or Z, type C = cone end, type F = flat end	St case-hard.	A 2 A 4	
~DIN 7981 ISR (ISO 14585)		Pan head tapping screws with hexalobular socket	St case-hard.	A 2 A 4	
DIN 7982 (ISO 7050***)		Countersunk head tapping screws with cross recess H or Z	St case-hard.	A 2 A 4	
~DIN 7982 ISR (ISO 14586)		Countersunk head tapping screws with hexalobular socket	St case-hard.	A 2 A 4	
DIN 7983 (ISO 7051***)		Raised countersunk head tapping screws with cross recess H or Z	St case-hard.	A 2 A 4	
		Tapping screws with scrape point	St case-hard.	A 2 A 4	
		Article 88981/88003 Cap-head tapping screws	St case-hard.	A 2 A 4	

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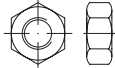
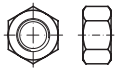
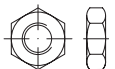

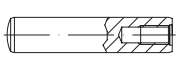
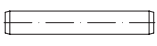
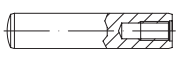
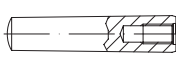
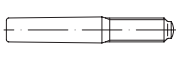



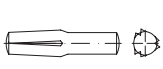
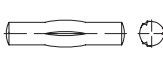
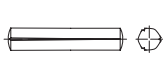
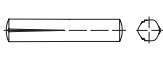
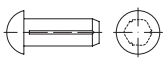
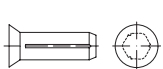
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 7984		Hexagon socket head cap screws with low head	8.8 10.9	A 2 A 4	
~DIN 7984 ISR (ISO 14580)		Hexalobular socket head cap screws with low head	4.8 5.8 8.8 10.9	A 2 A 4	
		Article 88912 Hexagon socket head cap screws with flange and lock ribs	100 12.9		
DIN 7985 (ISO 7045**)		Pan head screws with cross recess H or Z	4.8 5.8 8.8	A 2 A 4	Br
~DIN 7985 ISR (ISO 14583)		Pan head screws with hexalobular socket	4.8 8.8	A 2 A 4	
DIN 7989-1 DIN 7989-2		Washers for steel structures, product grade C/product grade A	St 100 HV	A 2 A 4	
DIN 7990 (EN 15048)		Hexagon head bolts for steel structures	4.6 5.6		
DIN 7991 (ISO 10642**)		Hexagon socket countersunk head screws	8.8 10.9 12.9	A 2 A 4	Br
~DIN 7991 ISR (ISO 14581/10642 ISR)		Hexalobular socket countersunk head screws	8.8 10.9 12.9	A 2 A 4	
DIN 7992		Tee head bolts with large head	3.6 4.6		
DIN 7993		Snap rings, type A = for shafts, type B = for bores	SSt		
DIN 7995 DIN 7996 DIN 7997		Wood screws with cross recess H - raised countersunk head - round head - countersunk head	St	A 2 A 4	Br Cu Al
DIN 7999 (EN 14399-8)		Hexagon fit bolts with large head for high-strength structural bolting, system HV	10.9 (12.9)		
DIN 8035 DIN 8039		Hammer drills (article 88997), masonry drills (article 88990)	St hard.		
DIN 8140		Article 88330-88346 Wire thread inserts, coarse thread, fine pitch thread, with locking		A 2 Nimonic Inconel	bronze

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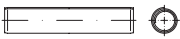
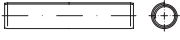


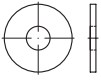

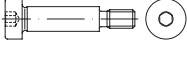
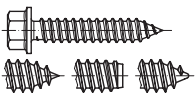
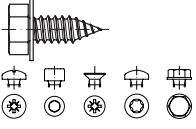
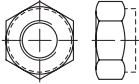
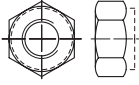
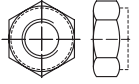
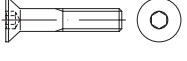
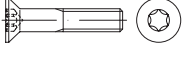
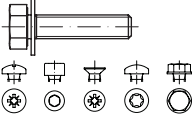
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
		Article 88340, 88342 Assortment thread inserts		A 2	
ISO 8673 (DIN 934***)		Hexagon nuts, ISO type 1, metric fine pitch thread	6 8 10	A 1-A 5	Br bronze
ISO 8674		Hexagon nuts, ISO type 2, metric fine pitch thread	8 10 12	A 1-A 5	Br bronze
ISO 8675 (DIN 439***)		Hexagon thin nuts with chamfers, metric fine pitch thread	04 05	A 1-A 5	Br bronze
ISO 8676 (DIN 961*/***)		Hexagon head screws with thread up to head, metric fine pitch thread	5.6 8.8 10.9	A 1-A 5	
ISO 8733 (DIN 7979****)		Parallel pins with internal thread	St untemp.	A 1-A 5	
ISO 8734 (DIN 6325*)		Parallel pins	St hard.	C1	
ISO 8735 (DIN 7979****)		Parallel pins with internal thread	St hard.	C1	
ISO 8736 (DIN 7978*)		Taper pins with internal thread	St		
ISO 8737 (DIN 7977*)		Taper pins with external thread, constant threaded part	St		
ISO 8738 (DIN 1440*)		Washers for clevis pins	St	A 1-A 5	Br
ISO 8739 (DIN 1470)		Parallel grooved pins with pilot	St	A 1 A 2 1.4104	Br Al plastic
ISO 8740 (DIN 1473**)		Grooved pins, full length parallel grooved	St	A 1 A 2 1.4104	Br Al plastic
ISO 8741 (DIN 1474**)		Grooved pins, half length reverse grooved	St	A 1 A 2 1.4104	Br Al plastic
ISO 8742 ISO 8743 (DIN 1475**)		Grooved pins, third length centre grooved	St	A 1 A 2 1.4104	Br Al plastic
ISO 8744 (DIN 1471**)		Grooved pins, full length taper grooved	St	A 1 A 2 1.4104	Br Al plastic
ISO 8745 (DIN 1472**)		Grooved pins, half length taper grooved	St	A 1 A 2 1.4104	Br Al plastic
ISO 8746 (DIN 1476*)		Grooved pins with round head	St	A 1 A 2 1.4104	Br Al plastic
ISO 8747 (DIN 1477*)		Grooved pins with countersunk head	St	A 1 A 2 1.4104	Br Al plastic

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 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

① DIN standard withdrawn
 without replacement
 (see note on page 13)


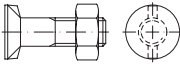
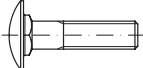
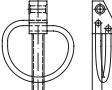

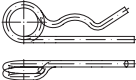

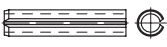

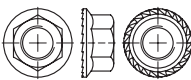

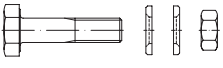
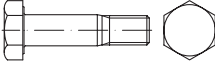

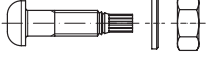
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
ISO 8748 (DIN 7344**)		Spring type straight pins, coiled, heavy duty	SSt	1.4310	
ISO 8750 ISO 8751 (DIN 7343**)		Spring type straight pins, coiled, standard duty	SSt	1.4310	
ISO 8752 (DIN 1481**)		Spring type straight pins, heavy duty	SSt	1.4310	
ISO 8765 (DIN 960*/***)		Hexagon head bolts with shank, metric fine pitch thread	10.9 12.9	A 1-A 5	
DIN 9021 (ISO 7093**)		Plain washers, outside diameter ≈ 3 d	100 HV	A 2 A 4	Br plastic
DIN 9045		Retaining rings	SSt		
DIN 9841		Cheese head screws with hexagon socket and beginning shank (shoulder screws)	10.9 12.9		
ISO 10509 (DIN 6928**)		Hexagon flange head tapping screws	St hard.	A 2 A 4	
ISO 10510 (DIN 6901**)		Tapping screw and washer assemblies with plain washers	St case-hard.	A 2 A 4	
ISO 10511 (DIN 985***)		Prevailing torque type hexagon nuts with non-metallic insert, low type	04 05	A 2 A 4	
ISO 10512 (DIN 982***)		Prevailing torque type hexagon nuts with non-metallic insert, high type, with metric fine pitch thread	6 8 10	A 2 A 4	
ISO 10513 (DIN 980***)		Prevailing torque type hexagon nuts with metric fine pitch thread, all metal	8 10 12	A 2 A 4	
ISO 10642 (DIN 7991**)		Hexagon socket countersunk head screws	8.8 10.9 12.9	A 2 A 4	Br
"ISR" (ISO 14581)		Countersunk head screws with hexalobular socket	8.8 10.9 12.9	A 2 A 4	
ISO 10644 (DIN 6900*)		Screw and washer assemblies with plain washers	4.8 10.9 12.9	A 2 A 4	Br

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 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

① DIN standard withdrawn without replacement
 (see note on page 13)

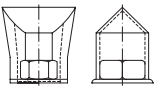


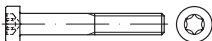


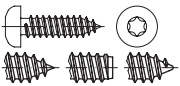


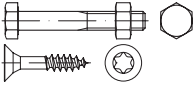

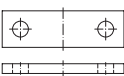
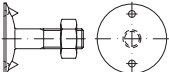
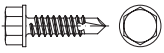
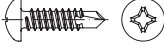
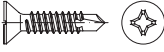
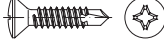
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
ISO 10669 ISO 10673 (DIN 6903/6902**)		Plain washers for tapping screw and washer assemblies, plain washers for screw and washer assemblies	St	A 2 A 4	Br
DIN 11014		Flat countersunk head bolts with two nibs	3.6 4.6		
DIN 11015		Cup head square neck bolts for agricultural machines	8.8 10.9		
DIN 11023		Linch pins	St		
		Article 88023 Linch pins for tubes	St		
DIN 11024		Spring cotters for a bolt	St		
ISO 12474 (DIN 912*)		Hexagon socket head cap screws with metric fine pitch thread	8.8 10.9 12.9	A 2-A 5	Br
ISO 13337 (DIN 7346**)		Spring type straight pins, slotted, light duty	SSt	1.4310	
EN 14218 (ISO 10663) (DIN 6923)		Hexagon flange nuts, metric fine pitch thread	8 10 12	A 2 A 4	
		Hexagon locking nuts with flange	8 10 12	A 2 A 4	
EN 14219 (ISO 15072) (DIN 6921)		Hexagon nuts with flange, metric fine pitch thread	8.8 10.9 12.9	A 2 A 4	
EN 14399 -3/-4/-5/-6 (DIN 6914-6916)		Assemblies of hexagon bolts, nuts and washers for high-strength structural bolting (CE)	8.8 10.9 8/10		
EN 14399-8 (DIN 7999)		Hexagon fit bolts with large head for HV-connections for high-strength structural bolting (CE)	10.9		
EN 14399-9		Direct tension indicators for bolt and nut assemblies for high-strength structural bolting assemblies (CE)	St hard.		
EN 14399-10		Bolt and nut assemblies with calibrated preload, system HRC (CE)	10.9		

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 ** DIN: ISO/EN mostly interchangeable
 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

① DIN standard withdrawn
 without replacement
 (see note on page 13)

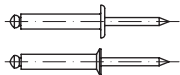

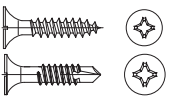
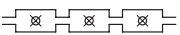

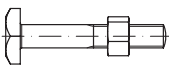
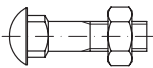
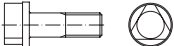
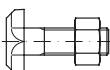
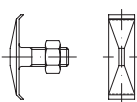

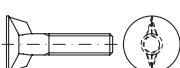
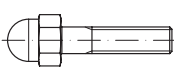
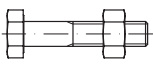

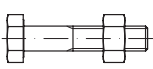
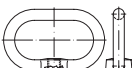
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
		Article 88916 Safety sockets for high-strength structural bolting assemblies	St		
		Article 88132 NORD-LOCK washers SC for HV assemblies	St hard.	A 4	
ISO 14579		Hexalobular socket head cap screws	8.8 10.9 12.9	A 2 A 4	
ISO 14580		Hexalobular socket head cap screws with low head	4.8 5.8	A 2 A 4	
ISO 14581		Hexalobular socket countersunk head screws	4.8 8.8	A 2 A 4	
ISO 14583		Cheese head screws with hexalobular socket	4.8 5.8	A 2 A 4	
ISO 14585		Pan head tapping screws with hexalobular socket	St case-hard.	A 2 A 4	
ISO 14586		Hexalobular socket countersunk head tapping screws	St case-hard.	A 2 A 4	
ISO 14587		Hexalobular socket raised countersunk head tapping screws	St case-hard.	A 2 A 4	
EN 14592		Screws for the load-bearing timber (CE)	St hard. 4.6		
EN 15048		Non-preloaded structural bolting assemblies (CE)	8.8	A 2 A 4	
DIN 15058		Axle holders (for lifting appliances)	St		
DIN 15237		Seating screws with cupped washer, for attachment of components to belts	3.6	A 2 A 4	
ISO 15480 (DIN 7504*)		Hexagon washers head drilling screws with tapping screw thread	St case-hard.		
ISO 15481 (DIN 7504*)		Pan head drilling screws with tapping screw thread	St case-hard.		
ISO 15482 (DIN 7504***)		Countersunk head drilling screws (countersunk $\sphericalangle = 90^\circ$) with tapping screw thread	St case-hard.		
ISO 15483 (DIN 7504***)		Raised countersunk head drilling screws with tapping screw thread	St case-hard.		

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 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

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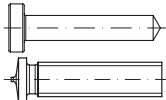

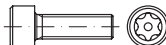

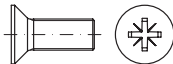
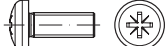

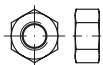


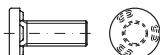

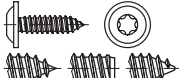


Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
ISO 15975- ISO 16858 (DIN 7337)		Blind rivets → Article 88401-88488 → Fixing Systems	St	A 2 A 4	Br bronze Cu Al plastic
DIN 16903		Insert nuts for plastic mouldings	St		Br Al
DIN 18182		Dry wall screws for gypsum plasterboards with cross recess H	St case-hard.		
		Dry wall screws, magazined			
ISO 21269 (DIN 912)		Hexagon socket head cap screws with metric fine pitch thread	8.8 10.9 12.9	A 2	
DIN 21346		Square head bolts for wooden shaft guides	3.6		
DIN 21530 DIN 21547		Round head bolts with oval shoulders	4.6		
DIN 22424 DIN 22425		Triangle head bolts	5.8	A 1 A 2	Br
DIN 25192		T-head bolts for railway vehicles	3.6 4.6		
DIN 25193		Mushroom head anchor screws	3.6 4.6		
		Article 88102 Joint shims for bolts DIN 603	St		
DIN 25195		Countersunk bolts with double nib	4.6		
DIN 25197		Cap bolts for railway vehicles	4.6 5.8		
DIN 25200 DIN 25201 DIN 25203		Bolts, nuts and safety elements for railway vehicles	4.6 8.8 10.9 St/SSt	A 1-A 5	
DIN 26020		Tommy nuts for domes at tank wagons	5		
DIN 28030		Bolts and nuts for flange joints for vessels and process apparatuses, for the use acc. to AD regulations	material acc. to DIN 267-13,29		
DIN 28129		Clamp nuts (lifting nuts)	St		

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 (Technical Information page 77-78)

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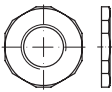
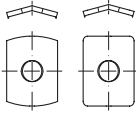
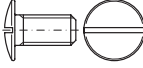
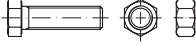


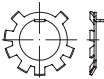
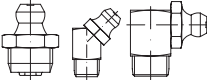
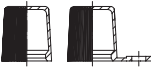
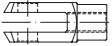
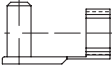
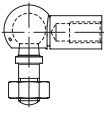
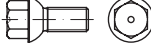
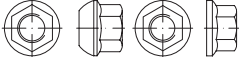
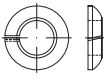
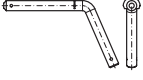
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 28152		Clamps for vessels	St	A 4 1.7709	
DIN 32500 DIN 32501		Studs for drawn arc stud welding threaded bolts, concrete anchors, shear connectors	St 4.8	A 2	CuZP Al AlMg AISI
DIN 34800 DIN 34801		Hexalobular head screws/bolts with small or large flange	8.8 10.9	A 2 A 4	
DIN 34802		Hexalobular socket head cap screws with large driving feature	8.8 10.9		
DIN 34810		Hexagon head plastic screws			plastic
DIN 34811		Countersunk plastic screws with cross recess Z			plastic
DIN 34812		Pan head plastic screws with cross recess Z			plastic
DIN 34813		Cheese head plastic screws with cross recess Z			plastic
DIN 34814		Hexagon plastic nuts			plastic
DIN 34815		Plastic washers, normal series			plastic
DIN 34816		Plastic washers, large series			plastic
DIN 34817		Welding screws with metric thread	8.8		
DIN 34818		Spring nuts with tapping screw thread	SSt		
DIN 34819		Hexalobular socket raised head tapping screws with collar	St case-hard.	A 2 A 4	
DIN 34820		Plain washers for steel structures acc. to DIN 18800	300 HV		
DIN 34821 DIN 34822 DIN 34824		Screws with 12 point socket - with cheese head - with flange head - with raised countersunk head	8.8 10.9	A 2 A 4	

* DIN: ISO/EN identical = interchangeable
 ** DIN: ISO/EN mostly interchangeable
 *** standard conversion DIN : ISO
 (Technical Information page 77-78)

① DIN standard withdrawn
 without replacement
 (see note on page 13)

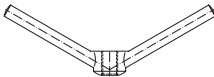
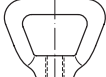
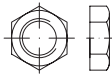

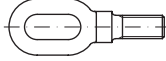
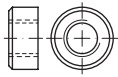

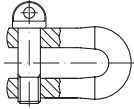

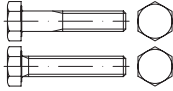
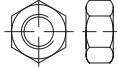
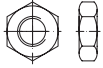


Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 46258 DIN 46320		Hexagon counter nuts, standard and heavy type	St		Br
DIN 46288		Connection washers for electrical contact	SSt		
DIN 58450		Slotted pan head screws, scale screws	St	A 1	Br
DIN 70613- DIN 70618		Hexagon screws, hexagon nuts, with small wrench sizes	8.8 10.9 8		
DIN 70851 DIN 70852		Locknuts for hook spanners	St		
DIN 70951		Retaining rings (for hooks) for lock nuts acc. to DIN 70851	SSt-wire		
DIN 70952		Lockwashers/safety plates for locknuts acc. to DIN 70852	St		
DIN 71412		Lubricating nipples	5.8	A 2 A 4	
		Lubricating nipple caps			plastic
DIN 71752		Fork joints	St		
		Article 88752 Spring flap bolts ("ES bolts") for fork joints	St		
DIN 71802 DIN 71803 DIN 71805		Angle joints (ball joints)	St		
DIN 74361		Bolts with spherical collar (type G)	8.8 10.9		
DIN 74361		Nuts with spherical collar (type A), flat collar nuts (type B)	8 10		
DIN 74361		Spherical spring washers (type C)	SSt St		
DIN 80403		Socket pins	St	A 2 A 4	Br

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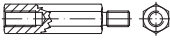
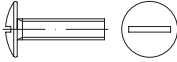

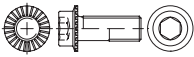
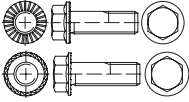
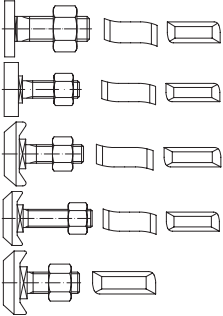
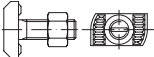
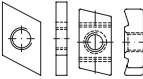

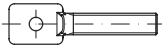
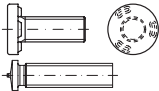
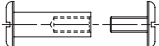
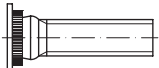
Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
DIN 80701		Butterfly nuts	St	A 2 A 4	Br
DIN 80704		Bow nuts		A 2 A 4	Br Al
DIN 80705		Thin hexagonal nuts with small wrench size	14 H		Br
DIN 81698		Eye bolts with small eye			Br Al
DIN 82006 DIN 82008 DIN 82010		Oval eyes, double lug head fittings, stud eye head fittings for swivels and turnbuckles	St C 15 C 22		
DIN 82013		Round nuts	6 AU 8	1.3952	
DIN 82024 DIN 82025 (ISO 8146)		Round eye plate, oval eye plate	St		
DIN 82101 DIN 82102 DIN 82103		D-shackles, forged	St	A 2 A 4	
DIN 87721		Drain screws (docking plugs), welding plates	St 52-3	1.4436 1.4571	
Fasteners acc. to ASME/ANSI standards					
ASME B18.2.1		Article 83931, 83933 Hex cap screws with shank/full thread, with UNC/UNF thread	Grade 5/8		
ASME B18.2.2		Article 83934 Hex nuts with UNC/UNF thread	Grade 5/8	A 4	
ASME B18.2.2		Artikel 83936 Hex jam nuts with UNC/UNF thread	Grade 5		
ANSI B18.22.1		Article 83125 Plain washers, N = narrow, W = wide	St		
ASME B18.3		Article 83912 Hexagon socket head cap screws with UNC/UNF thread	A 574		

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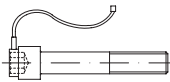
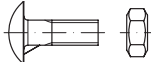

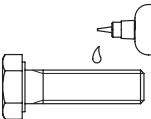

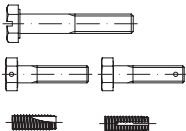
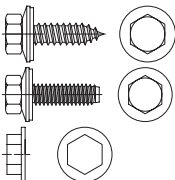


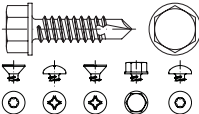
Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
Non Standardized Machine Screws					
88086		Spacers with thread and with hexagon	St	A 1-A 5	Br Al plastic
88107		Slotted mushroom head screws	4.6 5.6	A 1 A 2	Br
10105		Hexagon head bolts with flange acc. to MBN 10105 (ACTROS screws)	10.9		
88912		Hexagon socket head cap screws with flange and lock ribs	100		
88913 88933		Hexagon head screws with flange and lock ribs, hexagon head screws with flange and serration	90/100 10.9 12.9		
88928 88938 88940 88950 88972		T-head bolts/Halfen bolts HS	4.6 8.8	A 2 A 4	
88941 88943 88944		T-head bolts/Halfen bolts HZS	8.8	A 4	
88951- 88955		T-head thread plates/slide nuts for (Halfen-) profiles	St		
88981		Cap-head tapping screws - with metric thread - with tapping screw thread	St	A 2	
		Eye screws, thumb screws	St		
		Welding screws, NELSON head bolts (→ DIN 32500, 32501, 34817)	St		
		Binder posts (book screws)	5.8		Br
		Rivet screws	St		

*with approval



Driving features:
H = cross recess Phillips
Z = cross recess pozidriv
ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
		Force measurement bolts, sensor screws for monitoring of preloads and operation loads (AMG Intellifast, ConSenses PiezoBolts)			
		Screws with hexagon nuts for crash barriers	4.6		
		Screws with old fashioned head	4.6	A 2	
85000		Chemical adhesives/threadlockers			
		Adhesive/clamping coatings for screws			
		Additional types/versions → DIN 962/(ISO 7378, 8991)			
Non Standardized Tapping Screws					
88176 88276		Tapping screws for facing with assembled sealing washer, type A = with cone end, type B = with pin, caps for building screws (article 88008)		A 2	
88312		Cylindrical head tapping screws with hexagon socket	St	A 2 A 4	
88981		Cap-head tapping screws - with metric thread - with tapping screw thread	St	A 2	
		Self drilling tapping screws with cone end (e.g. TEKS-, SUPER-TEKS-, Wing-TEKS-, DRIL-KWIK-screws) (→ DIN 7504/ISO 15480-15483)	St case-hard.		

*with approval



Driving features:
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Non Standardized Screws for Thermoplastic

88200		Thread rolling screws for thermoplastics
88202		- pan head or pan head with pressed washer
88203		- cross recess Z or hexalobular socket
88204		

Non Standardized Wood and Chipboard Screws




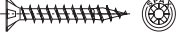

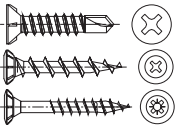








88010- 88018		Drilling window screws with spiral tip, window frame anchorage	St		
88025		Chipboard screws with washer head	St hard. lubricated	A 2	
88052		SPAX-threaded rods with wood screw thread for lateral pass and lateral pressure reinforcement for large timber	St		
88095 88096 88097		Chipboard screws with cross recess Z - hexalobular socket - pan head - countersunk head	St hard. lubricated	A 2	Br
88098		Chipboard screws with partial thread, countersunk head, hexalobular socket	St hard. lubricated		
88295 88296		Spengler screws, raised countersunk head wood screws with cross recess or hexalobular socket, with rosettes and sealing washer		A 2	
88149		Hanger bolts	St	A 2 A 4	
		Hanger bolts, ready for use for solar engineering		A 2	
		Tapping screws for roofs with washers	St		
		Spacer screws for framework/bars, sleeves, caps	St		
SPAX-Screws					
88099		SPAX chipboard screws with countersunk head, with cross recess Z and center hole	St hard. lubricated		

Steel
Stainless Steel
Brass
Cu / Al / Ti
Plastic

*with approval






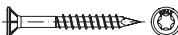
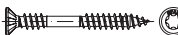
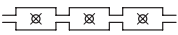







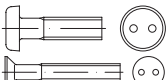

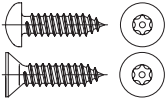
Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
88091*		SPAX chipboard screws with countersunk head, with hexalobular socket	St hard. lubricated	A 2	
88092*		SPAX chipboard screws with raised countersunk head, with cross recess Z or hexalobular socket	St hard. lubricated	A 2	
88093*		SPAX chipboard screws with pan head, with cross recess Z or hexalobular socket	St hard. lubricated	A 2	
88094*		SPAX chipboard screws with countersunk head, with cross recess Z	St hard. lubricated	A 2	
88094		SPAX chipboard screws with small countersunk head, with cross recess Z	St hard. lubricated		
88187 88188 88189		SPAX window fair screws FEX, type A = for fastening metal reinforcements for simple-wall profiles type KS = fitting screws for plastic profiles type H = screws for wooden window frames	St hard. lubricated		
88190		SPAX glass strip screws with cross recess Z	St hard. lubricated	A 2	
88191		SPAX post screws with CUT cone end, star socket		A 2	
88192		SPAX screws with fixing thread for terraces planks		A 2 A 4	
88193*		SPAX screws with flange head	St hard. lubricated	A 2	
88195		SPAX screws with milling head for solid timber floors	St hard. lubricated		
88196*		SPAX screws fully threaded and MULTI countersunk head	St hard. lubricated		
88197*		SPAX screws with flange head for back boards	St hard. lubricated		
88198*		SPAX screws for MDF-boards	St hard. lubricated		

*with approval



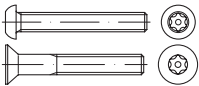

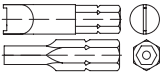
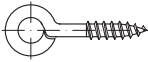

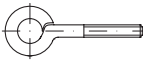
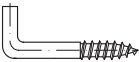

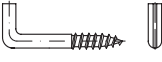
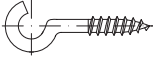
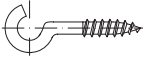
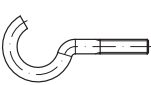

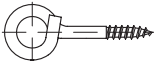
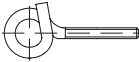
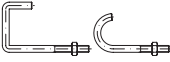
Driving features:
H = cross recess Phillips
Z = cross recess pozidriv
ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
89015		SPAX flooring screws with fixing thread	St hard. lubricated		
89010 89011		SPAX frame anchors RA with star socket, with countersunk head, with cheese head	St hard. lubricated		
89014*		SPAX screws for wood, glass and frames	St hard. lubricated		
89018*		SPAX facade screws with raised countersunk head		A 2	
89019		SPAX facade screws with raised countersunk head and fixing thread		A 2	
		SPAX screws belted			
88001		Caps with pin			plastic
89012		Caps for SPAX frame anchors RA			plastic
89013		SPAX caps with pin			plastic
88478 88479		SPAX screws assortment	St hard. lubricated		
88654 88663		SPAX BITcheck assortment, SPAX CUT-CASE	St hard.		
89017		SPAX assembly tools for SPAX threaded rods without head			
Fasteners with Theft Resistant Drives					
88110		Wood screws thread with hexagon socket and rivet pin	St		
88111 88112		Pan head/countersunk head screws with snake eyes drive, metric thread		A 2	
88113		Button head screws with hexagon socket and pin, metric thread		A 2	
88114 88115		Pan head/countersunk head screws with hexalobular socket and pin, tapping screw thread		A 2	

*with approval




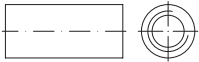
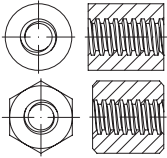

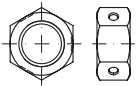


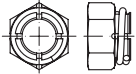
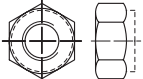
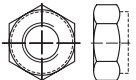
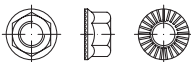
Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

Article			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
88116 88117		Button head/countersunk head screws with hexalobular socket and pin, metric thread		A 2	
88118		Theft resistant nuts/pull-off nuts for one-way assembly		A 1	
		Articles 88665-88667 Special bits	St hard.		
Non Standardized Hooks and Eyes					
88133		Screw eyes with wood screw thread	St	A 2 A 4	Br
88135		S-hooks	St	A 2 A 4	Br
88136		Screw eyes with metric thread	St	A 2 A 4	Br
88137		Square bend screw hooks with wood screw thread	St	A 2 A 4	Br
88138		Straight screw hooks with metric thread	St	A 2 A 4	Br
88139		Square bend slotted screw hooks with wood screw thread	St	A 2 A 4	Br
88140		Cup hooks with wood screw thread	St	A 2 A 4	Br
88141		Cup hooks with wood screw thread, white painted	St	A 2 A 4	Br
88142		Cup hooks with metric thread	St	A 2 A 4	Br
88143		Right angle screw hooks with wood screw thread with hexalobular socket	St	A 2 A 4	Br
88144		Heavy duty screw eyes, spiral type with wood screw thread	St	A 2 A 4	Br
88145		Heavy duty screw eyes, spiral type with metric thread	St	A 2 A 4	Br
		L hooks, stirrup bolts	St	A 2 A 4	

*with approval



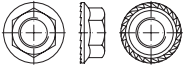
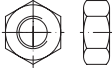
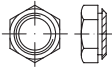
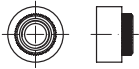

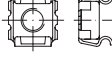








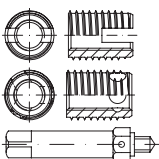
Driving features:
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Article			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
88087		Hexagon couplings	St	A 1-A 5	Br
88088		Round couplings	St	A 1-A 5	Br
88089 88090		Round and hexagon nuts with trapezoidal thread	St	A 1-A 5	Br bronze
13023		Prevailing torque type hexagon nuts with flange acc. to MBN 13023 (ACTROS nuts)	10		
84032		Biloc nuts/prevailing torque type hexagon nuts	8 10	A 2 A 4	
88081		Locknuts with non-metallic insert GUK	St		
		Locknuts with non-metallic insert GUA/GUP (Elastic-Stop-locknuts/FINE-U-NUT)	St		
88105		THERMAG nuts, all metal, single component	St		
		Prevailing torque type hexagon nuts, all metal, two parts (SPRING-STOP/VARGAL/DAX)	5 6 8 10 12	A 1-A 4	Br Al
		Non-metallic insert (plastic) (→ DIN 982, 985, 986, 6924/ISO 7040, 10511, 10512) (e.g.: NYLOC/POLY-STOP-ELASTIC-STOP)			
		Single component (→ DIN 980, 6925/ISO 7042, 10513) (e.g.: STOVER/CLEVELOC/UNI-STOP)			
88914		Hexagon locking nuts with lock ribs	10		

*with approval







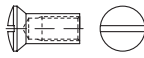





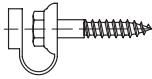



Driving features:
 H = cross recess Phillips
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 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
88934		Hexagon locking nuts, surface hardened	8 10 12		
		Hexagon nuts AMELOCK® with self-locking threaded insert	8	A 2 A 4	
88106		Rivet nuts	St		
		Anchor rivet nuts	St hard.	A 1-A 4	
88108		Tee nuts with prong	St		
88109		Square caged nuts	St		
88118		Theft resistant nuts/pull-off nuts for one-way assembly		A 1 A 2	
88153		RUV-captivity nuts for usage acc. to EC machinery directive		A 2	
88215		Wing nuts, small "American" type	St	A 2	Br
		Nuts with captive washers	6 8 10	A 2 A 4	
		Spot-weld nuts	St		
		Speed nuts, spring nuts for tapping screw threads (→ DIN 34818)	SSt		
		Insert nuts (→ DIN 16903) - to force fit/engage - to push in/break in	St		Br Al
		PAL cap nuts for metric thread	SSt		
88301 88302 88305 88307 88308		ENSAT threaded inserts, short, long, setting tools for ENSAT threaded inserts	St hard.	A 1	

*with approval



Driving features:
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			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
88330 88331- 88346		AMECOIL wire thread inserts, coarse thread, fine pitch thread, self locking, setting tools		A 2 Nimonic	bronze
88342 88344		AMECOIL assortment box with threaded inserts		A 2	
		RAMPA inserts/sleeves (→ DIN 7965)	St		
88951- 88955		T-head thread plates/slide nuts for (Halfen-) profiles	St		
88964		Sleeve nuts with internal thread		A 1	Br
Non Standardized Accessories					
85000		LOCTITE threadlockers			glue
88001		Caps with pin for chipboard screws, for SPAX screws with inner hole			plastic
88002		Caps with pin for chipboard screws with cross recess Z			plastic
88003		Article 88981 Ø 3.9 Decorative caps for cap screws			plastic
88004		Caps with pin for chipboard screws, for cross recess H			plastic
88005		Plastic sealings and caps for hexagon wood screws, 7 mm Ø for corrugated roof panels			plastic
88006		Caps for countersunk head screws with hexalobular/star socket			plastic
88008		Caps for tapping screws with hexagon for facing			plastic
88251		Ribe caps for hexagon socket head screws			plastic


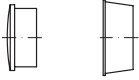



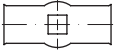


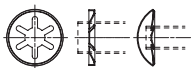






*with approval



Driving features:
H = cross recess Phillips
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ISR = hexalobular socket

Article



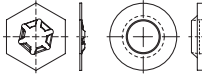






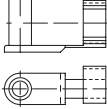
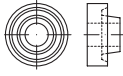
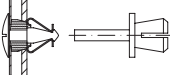
Non Standardized Accessories

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
88497		KORREX protection caps			plastic
		Protection and sealing plugs, caps and sleeves for tube ends and workpieces			plastic
88023		Linch pins for tubes	St		
88100		Washers "Article 1"	St		
88101		"Cupal" washers			Cu Al
88102		Joint washers to use with cup head square neck bolts acc. to DIN 603	St		
88104		Washers with large outside diameter	St	A 2	
88184		Machine washers with sink hole for fixing control units	St		
88122		Quick fastening elements for axles, bolts and shafts; axle clamping rings, Duo-Clips, spring cotter pins, KL-/SL-locking, devices, U-Clips, shaft locking clips	SSt	1.4310	
88119		LOCKTIX washers	St hard.		
88120 88121		SCHNORR locking washers, serrated both side, S, VS	SSt	A 2 A 4	
88123 88124 88125 88126		TECKENTRUP lock washers for hexagon head screws and hexagon socket head cap screws	SSt	1.4568	
88129		TECKENTRUP lock washers with contact serrations	SSt	1.4568	
		TECKENTRUP disc springs	SSt	1.4568	
88130 88131		Lock rings	SSt	1.4310 A 4	

*with approval








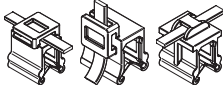
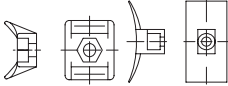
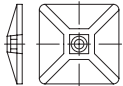
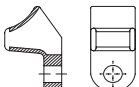
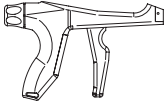


Driving features:
 H = cross recess Phillips
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 ISR = hexalobular socket

			Steel	Stainless Steel	Brass Cu / Al / Ti Plastic
88132		NORD-LOCK washers, standard = normal outer diameter SP = enlarged outer diameter SC = for HV fastenings X-series = wedge lock washers	St hard.	A 4	
88032		HEICO-LOCK wedge lock washers	St	A 4	
88151 88152		RUV-captivity washers	St	A 2	plastic
88277		Sealing washers (convex metal washers with vulcanised sealing)	St	A 2 Neoprene	Al Neoprene
88494 88495		DUBO profile washers	St		plastic
88496		DUBO lock washers	St		plastic
88498		KORREX insulating tubes			plastic
88499		KORREX rosettes	St	A 2 A 4	Br Al
88965 88966		Rosettes/finishing washers	St	A 2 A 4	Br Al
88752		Spring flap bolts ("ES bolts") for yokes acc. to DIN 71752	St		
88917		Sealings type EPDM for solar engineering			plastic
		Quick opening device, quick fastening elements	St	A 2 A 4	Br plastic

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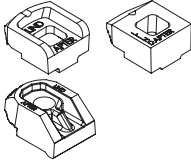
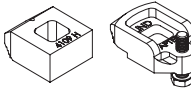
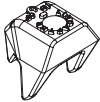
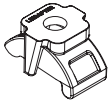

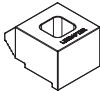
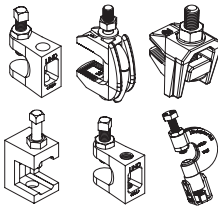


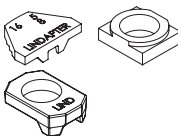
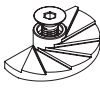
Driving features:
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ISR = hexalobular socket

			Material	Coating
Cable Ties				
82500 82505 82510 82515		Cable ties, inside serrations, T series = standard	plastic	
82520		Cable ties, internal serrations, LK series = higher tensile strength	plastic	
88516		Cable ties, outside serrated, Robusto series = with flat head	plastic	
82517		Cable ties, inside serrated, Q-tie = with open head and pre-locking functionality	plastic	
82518		2-piece fixing ties, Coupler = for parallel separation	plastic	
82521 82522 82523		Fixing ties für edges - EdgeClip-Family	plastic	
82543 82546		Cable tie mounts, screwable	plastic	
82540 82550 82553 82554		Cable tie mounts, self adhesive	plastic	
82560		Cable tie mounts	plastic	
82535		Manual application tools for cable ties		
82580		Cable conduits	plastic	
82565		Assortment boxes with cable tie mounts	plastic	

*with approval




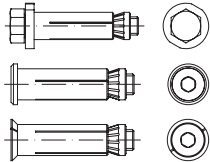


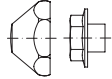




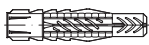

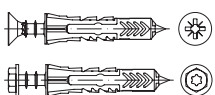


Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

			Material	Coating
LINDAPTER clamps				
82001* 82002* 82040		Type A, B Type AF-K	malleable iron	ZP HDG
82003 82007		Type BS, D2, (D3)	malleable iron	ZP HDG
82045		Type CF	malleable iron	ZP HDG
82010		Type LR	malleable iron	ZP HDG
82016		Type LS	1.4408	
82048		Type BR	malleable iron	ZP HDG
82008 82009 82022 82025 82058 82068		Type FL-D, FL-M, FL-S, F9, LC, F3	malleable iron	ZP HDG
LINDAPTER Accessories				
82011 82012- 82016 82042- 82044		Type CW, P, Type AF-CW, AF-P	steel malleable iron	ZP HDG
82047		Type LS-P2	stainless steel A 4	
82018 82021 82041		Type T, W Type AFW	steel malleable iron	ZP HDG
82019		LINDAPTER-FLOOR-FAST-FF for floor plate fixings	malleable iron (Screw DIN 7991/ ISO 10642)	ZP

*with approval




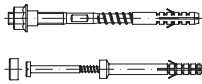


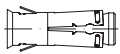
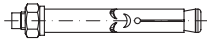

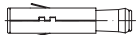



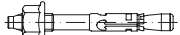


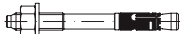
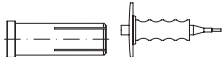

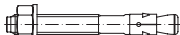





Driving features:
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Article			Material	Coating
82024		LINDAPTER toggle clamps TC with internal thread for decking fixing	steel	ZP
82031*		LINDAPTER HOLLO-BOLT for fixing onto hollow steel sections, Type HB = with hexagon head Typ HBCSK = with countersunk head Typ HBFF = FlushFit	steel stainless steel A 4	ZP
83030		LINDAPTER clamp for gratings GF	spring steel	ZP + thin lacquer
		LINDAPTER V-nuts	malleable iron	ZP
Plugs and Anchors				
General Fixings				
		FISCHER caps AKM, FISCHER collar nuts BUM	plastic plastic	Cr
88500		FISCHER plugs S	plastic	
88506		FISCHER plugs MS	plastic	
88507*		FISCHER twist lock anchors GB	plastic	
88510		FISCHER plugs M	plastic/ cone: brass	
88520		FISCHER universal plugs UX, UX-R	plastic	
88690		FISCHER universal plugs DUOPOWER	plastic	
88690		FISCHER universal plugs DUOPOWER - countersunk screw with cross recess Z - hexagon screw with hexalobular socket	plastic/ screw: steel	ZP
88521		FISCHER anchors PA 4	brass	
88545		FISCHER steel expansion plugs FMD	steel	ZP

*with approval




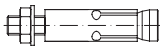
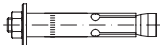
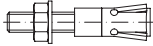
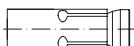
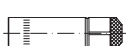
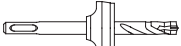
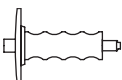
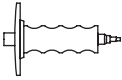

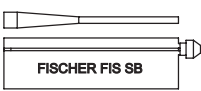





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			Material	Coating
88554		FISCHER expansion plugs SX	plastic	
		FISCHER sanitary fixing set WD, WDP, WST, UST, BO, WCN, S8 RD, KM	plastic/ screw: steel brass	ZP Cr
		FISCHER special fixings for stairs TB, TBB	plastic/ screw: brass	
		FISCHER door stopper TS8	plastic/ screw: steel	ZP
High Performance Steel Anchors				
88513*		FISCHER hollow ceiling anchors FHY	steel stainless steel A 4	ZP
		FISCHER bolt anchors FSA	steel	ZP
88688*		FISCHER aircrete anchors FPX-I	steel	ZP
88530		FISCHER heavy duty anchors SL, TA-M	steel	ZP
88683*		FISCHER heavy duty anchors SL, TA-M	stainless steel A 4	ZP
88531		FISCHER wall screws MR	steel	ZP
88546*		FISCHER nail anchors FNA, FNAM, FNA OE, FNA-H	steel	ZP
88548*		FISCHER nail anchors FNA, FNAM, FNA OE, FNA-H		
88547*		FISCHER nail anchors FNA, FNAM, FNA OE, FNA-H		
88549*		FISCHER nail anchors FNA, FNAM, FNA OE, FNA-H		
88561*		FISCHER anchor bolts FAZ II	steel stainless steel A 4 stainless steel 1.4529	ZP
88567*		FISCHER hammerset anchors EA and setting tools EAWH	steel	ZP
88568		FISCHER hammerset anchors EA and setting tools EAWH	stainless steel A 4	ZP
88582*		FISCHER bolt anchors FB-N	steel stainless steel A 4	ZP
88593*		FISCHER high performance anchors FH II-S	steel stainless steel A 4	ZP
88594*		FISCHER high performance anchors FH II-SK	steel stainless steel A 4	ZP
88590*		FISCHER high performance anchors FH II-H	steel	ZP
88592*		FISCHER high performance anchors FH II-B	steel	ZP
88689*		FISCHER high performance anchors FH II-I with internal thread	steel stainless steel A 4	ZP

*with approval



Driving features:
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			Material	Coating
88715*		FISCHER bolt anchors EXA	steel	ZP
88583*		FISCHER ZYKON bolt anchors FZA	steel stainless steel A 4	ZP
88584*		FISCHER ZYKON through anchors FZA-D	steel stainless steel A 4	ZP
88589		FISCHER ZYKON anchors for fixing step irons FZA ST	stainless steel A 4	
88585*		FISCHER ZYKON internally threaded anchors FZA-I	steel stainless steel A 4	ZP
88597*		FISCHER ZYKON hammer-set anchors FZEA II	steel stainless steel A 4	ZP
88587		FISCHER drill bits FZUB	steel	
88588		FISCHER setting tools FZE plus	steel	
88595		FISCHER setting tools FZED plus	steel	
Chemical Fixings				
88579*		FISCHER resin capsules FHB II, RSB, RM, UMV-P	glass capsule	
88687*				
88533*				
88757*				
88578*		FISCHER injection mortar FIS HB, FIS V, FIS EM, FIS SB	mortar	
88522*				
88686*				
88527*				
88525		FISCHER accessories for chemical fixings, static mixer, blow-out pumps, brushes, dispenser, extension tubes		
88579				
88685				
88524				
88684				
88579*		FISCHER anchors FHB II-A, FHB-A dyn, RGM, FIS-A, FIS-E	steel stainless steel A 4	ZP
88534*				
88523*				
88529*				
88758*		FISCHER multicone dynamic anchors UMV-A dyn	steel	ZP
88562*		FISCHER anchor sleeves FIS H K, FIS H N, FIS H L	steel plastic	
88526*				
Cavity Fixings				
88512		FISCHER cavity metal fixings HM	steel	ZP

*with approval



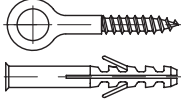
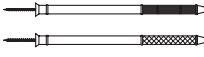
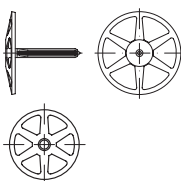


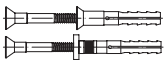

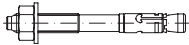
Driving features:
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			Material	Coating
88511		FISCHER professional tools HM-Z 1 for cavity fixing plugs HM-S	steel	
88509		FISCHER toggle fixings K	plastic	
88518		FISCHER toggles KD	steel	ZP
88519		FISCHER toggles KDH	steel	ZP
88598		FISCHER plasterboard fixings GK/GK-M	steel plastic	ZP
Long Shaft Anchors, Frame Fixings, Adjustment Fixings				
88503		FISCHER nail plugs N	plastic/ screw: steel stainl. steel A 2	ZP
		FISCHER nail sleeves FNH	spring steel	ZP
88504*		FISCHER universal long shaft anchors SXS-T, SXS-F US	plastic/ screw: steel stainl. steel A 4	ZP
88542*		FISCHER frame fixings SRX-T, SRX-FUS	plastic screw: steel stainl. steel A 4	ZP
88551*		FISCHER frame fixings SXRL-FUS, SXRL-T	plastic/ screw: steel stainl. steel A 4	ZP
88515		FISCHER adjustment screws JUSS, FISCHER adjustable fixing S10J	plastic/ screw: steel	ZP
88516		FISCHER frame fixings F-S	plastic/ screw: steel	ZP
88540		FISCHER frame fixings S-H-R	plastic	
88563*		FISCHER frame fixings FUR-T/-TS/-SS	plastic/ screw: steel stainl. steel A 4	ZP
88564*		FISCHER frame fixings FUR-T/-TS/-SS	plastic/ screw: steel stainl. steel A 4	ZP
88680		FISCHER metal frame fixings F-M	steel/ screw: steel	ZP
88565		FISCHER rapid installation foam PU 500	polyurethane	
88596		FISCHER safety screws SHT, countersunk head with hexalobular socket or hexagon head	steel stainl. steel A 4	ZP
88599		FISCHER safety screws SHT, countersunk head with hexalobular socket or hexagon head	steel stainl. steel A 4	ZP
88528		FISCHER caps ADT, ADF, ADM, ASM for FISCHER frame fixings	plastic	
88556		FISCHER caps ADT, ADF, ADM, ASM for FISCHER frame fixings	plastic	
88681		FISCHER caps ADT, ADF, ADM, ASM for FISCHER frame fixings	plastic	
88682		FISCHER caps ADT, ADF, ADM, ASM for FISCHER frame fixings	plastic	

*with approval



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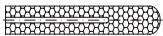
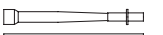
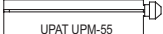

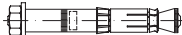
			Material	Coating
Scaffold Fixings				
88536		FISCHER scaffold fixings S 14 ROE, GS 12	steel plastic	ZP
		FISCHER wall-ties VBS 8, assembly tools	stainless steel A 4	
Insulation Supports				
88514 88580		FISCHER insulation supports DHK, DT	plastic steel	Al-Zn-coating
Electrical Fixings				
88558 88559		FISCHER pipe clips FC and saddles SCH	plastic	
General Fixings				
		UPAT plugs Ultra U	plastic	
		UPAT universal plugs UVD	plastic	
		UPAT nail plugs UN	plastic/ screw: steel	ZP
88781*		UPAT frame fixings URD	plastic/ screw: steel	ZP
Anchors - Heavy Duty Fixings				
88741*		UPAT express anchors MAX	steel stainless steel A 4	ZP
88764*		UPAT express anchors IMC	steel stainless steel A 4	ZP
88716*		UPAT impact anchors USA	steel	ZP
88717		UPAT setting tools for USA hammer-set anchors	steel	

*with approval



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			Material	Coating
Chemical Fixings				
88722*		UPAT threaded rods UKA 3-ASTA	steel stainless steel A 4	ZP HDG
88714		UPAT internal thread bushes UKA 3-IST	steel stainless steel A 4	ZP
88734		UPAT threaded rods UPM-A	steel stainless steel A 4	ZP
88770		UPAT internal thread anchors UPM-I	steel	ZP
88735		UPAT mesh bushes UPM-SH-K	plastic	
88720*		UPAT resin capsules UKA 3	glass capsule	
88733*		UPAT injection mortar	mortar	
88772*		UPM 55, UPM 44, UPM 33, UPM 11		
88774*				
88775*				
88718		UPAT accessories for chemical fixings, static mixers, cleaning brushes, blow-out pumps, application guns, setting tools		
88738				
88760				
88765				
88766				
88769				
88771				
88776				
88777		UPAT side rail anchors	steel	HDG
*		SORMAT expansion anchors - through bolts - PFG® shield anchors - LIEBIG® anchors - LIEBIG® safety bolts		
*		SORMAT undercut anchors - LIEBIG® SUPERPLUS		
		SORMAT metal anchors - hammer drive rivets - express nails - drop in anchors - concrete nails - brass anchors		
*		SORMAT chemical anchors - glass capsules/hammer glass capsules - injection resins - sieve sleeves/internal threaded anchors - chemical anchor studs		

*with approval




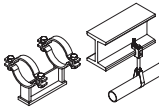
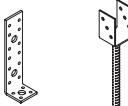
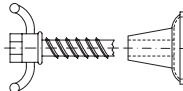
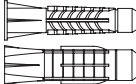
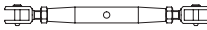
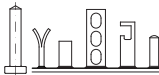

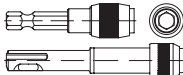
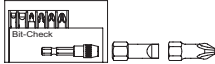
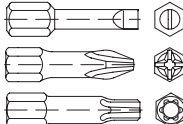
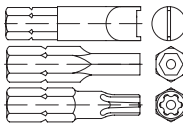

Driving features:
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			Material	Coating
Other Fixing Elements				
88060 88061		Adjusting washers for cam segments and cam segments for tension anchors for diagonal pull tensioning	malleable iron	
		Anchor bolts, tie anchors, tractive anchors	steel stainless steel A 4	ZP HDG
		Anchor sheets, heavy duty washers	steel stainless steel A 2, A 4	ZP HDG fZn
		Anchor sleeves	steel stainless steel A 4	ZP HDG
		Anchor systems for steel construction: clevis, right hand/left hand thread, bolts, tension rods	cast iron steel	ZP HDG
88910		Brass expanding plugs	brass	
		Concrete anchor sleeves	steel stainless steel A 4	ZP
		Concrete anchors	steel stainless steel A 4	ZP HDG fZn
		Drive-in plugs/mushroom plugs with expanding pins	plastic	
		Eye screws, thumb screws, eye nuts, hanger nuts	steel C 22.8 forged	ZP fZn
		Facing anchors	stainless steel A 4	
		KORO scaffolding systems, caps (concrete anchor sleeves with ring pads)	steel stainless steel A 4 plastic	ZP
		KUNKEL ceiling fixings, KUNKEL pipe fixings, KUNKEL special drills and setting tools	steel	ZP
		Lifting ball head anchors for concrete construction	steel 52-3	
88902* 88903* 88905* 88908*		MULTI-MONTI HMS/MMS screw anchors, wall screws	Steel hard.	ZP

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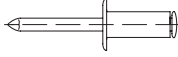
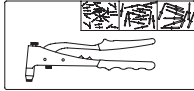
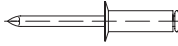
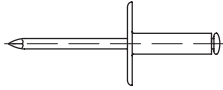
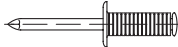
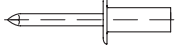

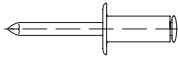
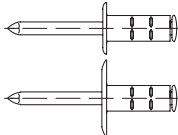
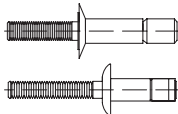
		Material	Coating
		steel	ZP
		steel MCI stainless steel A 2, A 4	ZP HDG fZn
		steel stainless steel A 4	ZP HDG fZn
		steel	ZP fZn
88381- 88383		plastic	
		steel stainless steel A 4	ZP
		steel stainless steel A 2, A 4	ZP
Assembly Tools - Drills, Bits, Wrench Keys			
88265		steel hardened	
88279 88280		steel hardened	
88281- 88286		steel hardened	
88654- 88663		steel hardened	
88665 88666 88667		steel hardened	
88988 88990 88997		steel hardened	

*with approval



Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

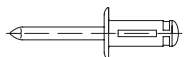
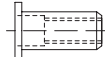
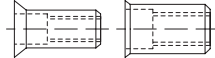
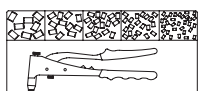
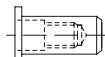
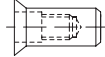
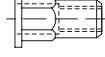
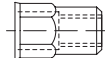
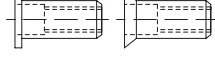
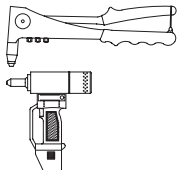
Blind Rivets Tools

			Material	Coating
88401- 88408		Open-end blind rivets with break pull mandrel DIN 7337, type A = protruding head	steel/steel Al-alloy/steel Al-alloy/stainless steel A 2 stainless steel A 2/ stainless steel A 2 stainless steel A 2/steel	ZP ZP ZP ZP
88410 88415			Al-alloy/Al-alloy stainless steel A 4/ stainless steel A 4	
88493 88417			Monel/stainless steel A 4 Al-alloy/steel	ZP
88470 88471 88472		Blind rivets assortment/tool box		
		Open-end blind rivets with break pull mandrel DIN 7337, type B = countersunk head		
88411 88412			steel/steel Al-alloy/steel	ZP ZP
88409 88413 88414 88416		Open-end blind rivets with break pull mandrel DIN 7337, type C = large protruding head	Al-alloy/steel steel/steel Al-alloy/Al-alloy Al-alloy/stainless steel A 2	ZP ZP
88419		Open-end blind rivets with grooved rivet body for blind hole rivetting	Al-alloy/steel	ZP
88420		Closed-end blind rivets for air- and water-tight rivetting	Al-alloy/steel Al-alloy/stainless steel A 2 copper/steel copper/stainless steel A 2	phosphated
88421		Open-end blind rivets with break pull mandrel, type M = with connection thread	steel/steel	ZP
88422		Open-end blind rivet with break pull mandrel, type SS-A = protruding head, with peel rivet body, for soft building material	Al-alloy/steel	ZP
88474 88475		Open-end blind rivets with multigrip rivet body „PolyGrip“, type A = protruding head, type C = large protruding head	Al-alloy/steel Al-alloy/stainless steel A 2 Al-alloy/Al-alloy	ZP
88476 88477		Open-end blind rivets with break pull mandrel, „MEGA G-LOCK“ = for high strength rivet assembly, type F = protruding head type S = countersunk head	steel/steel	ZP

*with approval



Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

		Material	Coating
88488	 <p>Open-end blind rivets with break pull mandrel, „TRIFOLD“ = recessed crown for soft material, type F = protruding head</p>	Al-alloy	
Blind Rivet Nuts			
88423	 <p>Blind rivet nuts, round, open-end, type F = protruding head</p>	steel Al-alloy stainless steel A 2	ZP
88424 88418	 <p>Blind rivet nuts, round, open-end, type S = countersunk head, type Sk = small countersunk head</p>	steel Al-alloy stainless steel A 2	ZP
88473	 <p>Blind rivet nuts assortment/tool box</p>		
88480	 <p>Blind rivet nuts, round, closed, for air- and water-tight rivetting, type F = protruding head</p>	steel Al-alloy	ZP
88481	 <p>Blind rivet nuts, closed-end for air- and water-tight rivetting, type S = countersunk head</p>	steel Al-alloy	ZP
88483	 <p>Blind rivet nuts, hexagon, open-end, type F = protruding head</p>	steel stainless steel A 2	ZP
88484	 <p>Blind rivet nuts, hexagon, open-end, type Sk = small countersunk head</p>	steel stainless steel A 2	ZP
88490 88491	 <p>Blind rivet nuts, round, open-end, with multigrip rivet body, type F = protruding head, type S = countersunk head</p>	steel Al-alloy stainless steel A 2	ZP
	<p>GESIPA-Accessories</p> <ul style="list-style-type: none"> - Hand tools, rivetting power tools for blind rivets and blind rivet nuts - Tool assortment, power accu, chargers - Spare parts 		

*with approval



Driving features:
 H = cross recess Phillips
 Z = cross recess pozidriv
 ISR = hexalobular socket

Standards conversion DIN → ISO/EN

The conversion of some national DIN standards to ISO or EN standards is (was) done with the aim of deconstructing trade barriers in international goods exchange and harmonising the technical rules in the common single European market.

Table 1 shows the ISO/EN standards for product standards and the most important thread and basic standards according to the corresponding DIN in ascending order (as of: 01.2016).

Table 2 (next page) shows the EN and DIN standards according to the corresponding ISO in ascending order. The tables also include draft standards and withdrawn standards.

Table 1

Product standards		Product standards		Product standards		Product standards		Product standards		Basic/Functional standards		
DIN	ISO DIN ISO DIN EN ISO	DIN	ISO DIN ISO DIN EN ISO	DIN	ISO DIN ISO DIN EN ISO	DIN	ISO DIN ISO DIN EN ISO	DIN	ISO DIN ISO DIN EN ISO	DIN	ISO DIN ISO DIN EN ISO	
1	2339	911	2936	2509*	-	7337	15973-16585	58450	-	267-1	8992	
7	2338	912 (RG)	4762	2510-1...8	-	7338-7340	-	70613-70618	-	267-2	4759-1	
39	-	912 (FG)	12474	3015-3016	-	7341	1051	70851*	-	267-3	898-1	
84	1207	913	4026	3017	-	7343	8750	70852	-	267-4	898-2	
85	1580	914	4027	3220	-	7344	8748	70951*	-	267-5	3269 (16426)	
93*	-	915	4028	3319	-	7346	13337	70952	-	267-6	4759-1	
94	1234	916	4029	3404, 3405	-	7349	-	71412	-	267-7	898-1	
95, 96, 97	-	917	-	3567	-	7500-1	-	71752	-	267-8	898-2	
98, 99	-	920-927	-	3568*	-	7504	15480-15483	71802-71805	-	267-9	4042	
123, 124	1051	928, 929	-	3570	-	7513	-	74361	-	267-10	10684	
125-1.2	7089, 7090	931-1	4014	3575	-	7516	-	80403	-	267-11	3506-1-4	
126	7091	931-2	-	3670	-	7603	-	80701	-	267-12	2702	
127*, 128*	-	933	4017	3870, 3872	-	7604	-	80704	-	267-13	-	
134*, 137*	-	934 RG	4032, 4033	4109	-	7642, 7643	-	80705	-	267-15	2320	
186, 188	-	934 FG	8673, 8674	5299	-	7964	-	81698	-	267-18	8839	
258	ISO 8737	935-1	-	5406	-	7965	-	82006-82010	-	267-19	6157-1, 3	
261	-	935-3	-	5417	-	7967*	-	82013	-	267-20	6157-2	
302	1051	936 RG/FG	(4035/8675)	5525, 5526	-	7968	-	82101	-	267-21	10484	
314-318	-	937	-	5586	-	7969	-	Thread standards			267-23	898-6
319	-	938-940	-	5903, 5906	-	7971	1481	13-1...11	724	267-24	-	
338, 340	-	949-1.2	-	5914	-	7972	1482	13-12	261	267-25	898-7	
388, 390	-	950-959	-	6303	-	7973	1483	13-13	262, 965-2	267-26-30	-	
404	-	960	8765	6304-6307	-	7976	1479	13-14, 15	965-1, 2	475**	272 (EN 1660)	
417	7435	961	8676	6311	-	7977	8737	13-16...18	1502	522	4759-3	
427	2342	963	2009	6319	-	7978	8736	13-19	68-1	918	1891	
431	-	964	2010	6324	-	7979	8733, 8735	13-20...26	-	946	16047	
432*	-	965	7046-1, 2	6325	8734	7980*	-	13-27	965-3	962 (34803)	7378, 8991	
433-1.2	7092	966	7047	6330, 6331	-	7981	7049	13-28	-	969	-	
434-436	-	967, 968	-	6332	-	7982	7050	13-50...52	-	974	-	
438	7436	(970)	4032	6334*	-	7983	7051	14	-	2510-2, 8	-	
439-1	4036	(971-1.2)	8673, 8674	6335-6337	-	7984	-	103-1	2901	7150-7152	286	
439-2 RG/FG	4035, 8675	(972)	4034	6340	-	7985	7045	103-2	2902	7154-7157	-	
440	7094	975	DIN 976	6378	-	7987*, 7988*	-	103-3	2903	7160, 7161	286	
442, 443	-	976-1.2	-	6379	-	7989-1.2	-	103-4	2904	7168	2768, 8015	
444	-	977	-	6791, 6792	1051	7990	-	103-5...9	-	7172, 7182	286	
462, 463*	-	979	-	6796	-	7991	10642	202	-	7184	1101	
464, 465*	-	980 RG	7042 (7719)	6797*	-	7992	-	2244	5408	7337	14588-589	
466, 467	-	981	-	6798*	-	7993	-	2510-2	-	7500-2/7504	-/10666	
468, 469	-	980 FG	10513	6799	-	7995-7997	-	7952	-	7962	4757	
470	-	982 RG	7040	6880	-	7999	EN 14399-8	7970	1478	7970	1478	
471, 472	-	982 FG	10512	6881	-	8140	-	7978	-	7998	-	
478-480	-	983	-	6883, 6884	2492	9021	7093-1,-2	7998	-	8140-1-3	-	
508	299	985	10511	6885-1, 2	-	9045*	-	8140, 8141	-	9830	-	
525, 529	-	986	-	6885-3	-	9841	7379	66	15065	18800	-	
546-548	-	987*	-	6886, 6887	-	11014	-	69	273	34803, 34804	-	
551	4766	988	-	6888	3912	11023, 11024	-	74	-	40080	2859-1-3	
553	7434	1052	-	6899	-	15058	-	76-1	3508, 4755	50049	EN 10204	
555	4034	1433-1436	-	6900	10644	15237	-	76-2	228-1	-	-	
557	-	1440	8738	6901	10510	16903	-	78	4753	-	-	
558	4018	1441	-	6902-6908	10669, 10673	18182	-	101	1051	-	-	
561	-	1443	2340	6911	-	21346	-	Table of Contents, TI Extracts				
562	-	1444	2341	6912	-	21547	-	Page 77 - 78	Standards conversion			
564	-	1445	-	6913*	-	22424, 22425	-	Page 79 - 83	Corrosion protection			
571	-	1469	-	6914-6915	EN 14399-4	25192	-	Page 84	Head shapes, drive features and ends of externally threaded fasteners			
580, 582	-	1470	8739	6916	EN 14399-6	25193	-	Page 85 - 86	Inspections, acceptance testings and certificates			
601	4016	1471	8744	6917-6918	-	25195	-	Page 87 - 88	Directives and legislation			
603	-	1472	8745	6921	EN 1665	25197*	-					
604-608	-	1473	8740	6922	EN 1665	25200-25203	-					
609, 610*	-	1474	8741	6923	EN 1661	26020	-					
653	-	1475	8742/8743	6924 (RG)	7040	28030	-					
660-662	1051	1476	8746	6924 (FG)	10512	28129	-					
674, 675	1051	1477	8747	6925 (RG)	7042	28152	-					
703*, 705	-	1478-1480	-	6925 (FG)	10513	32500, 32501	13918					
741	-	1481	8752	6926 (RG)	EN 1663	34800-34802	-					
787	299	1587	-	6926 (FG)	EN 1666	34803, 34804	-					
792	-	1592-1597	-	6927 (RG)	EN 1664	34810-34816	-					
797, 798*	-	1804	-	6927 (FG)	EN 1667	34817-34819	-					
830*	-	1816	-	6928 (RG)	7053	34820	-					
835	-	2093	-	6928 (FG)	10509	46258, 46320	-					
906-910	-	2507	(EN 1515)	7331	-	46288	-					

- ISO/EN standard not yet known (as of 01.2016)

() Transitional standards (dimensions identical with ISO)

* withdrawn DIN standard without replacement, because, for example, technically reworked
(On issue of DIN EN-/DIN EN ISO standards the corresponding DIN/DIN ISO are/were withdrawn)

Legend for table 2

HV high strength steel
Csk. countersunk
Rcsk. raised countersunk
CT/FT coarse pitch thread/fine pitch thread
CH/TC/CD/CP with flat point/with cone point/with dog point/with cup point

Hex. hexagon
CR cross recess
MP Mechanical Properties
S/H/L standard/heavy/light version
Ww Withworth
TDC technical delivery conditions



Table 2

Product standards				Product standards				Product standards			
ISO	EN	DIN	Title keyword	ISO	EN	DIN	Title keyword	ISO	EN	DIN	Title keyword
DIN	DIN	EN		DIN	DIN	EN		DIN	DIN	EN	
DIN	EN	ISO		DIN	EN	ISO		DIN	EN	ISO	
-	1515	2507	Flange joints	7379	-	9841	Hex. socket head shoulder screws	225	20225	-	Fasteners: Dimensions
-	1661	6923	Hexagon nuts with flange	7380	-	-	Hex. socket button head screws	272	1660	475 - 1	Hexagon wrench sizes
-	(1662), 1665	6921, 6922	Hexagon bolts with flange	7434	27434	553	Slotted set screws TC	273	20273	69	Clearance holes for bolts
-	1663, 1664	6926, 6927	Hexagon nuts with flange	7435	27435	417	Slotted set screws CD	286 -1, 2	20286	7150-7182	ISO System of limits and fits
-	1666, 1667FG	6926, 6927FG	and prevailing torque type	7436	27436	438	Slotted set screws CP	885	-	-	Radii under screw head
-	14218.14219	-	Hex. bolts/nuts with flange FT	7719, 7720	-	980, 6925	Prevailing torque type hex. nuts	887	-	-	Plain washers - general plan
-	14399-4	6914-6915	Hexagon bolts/nuts (HV)	8100, 8102	1665	6921	Hexagon bolts with flange	888	-	-	Nominal lengths screws/threads
-	14399-6	6916	Plain chamfered washers (HV)	8104	1662	6922	Hexagon bolts with flange	898 -1	-	267 - 3, 7	TDC fasteners: bolts
-	14399-8	7999	Hexagon fit bolts (HV)	8673	-	934, 971 -1	Hexagon nuts FT	898 -2	-	267 - 4, 8	TDC fasteners: nuts CT
299	-	508/787	Screws/Nuts for T-slots	8674	-	934, 972 -2	Hexagon nuts FT	898 -5	-	267 - 3	TDC fasteners: set screws
773	-	6885 -1, 2	Parallel keys	8675	-	439 -2, 936	Hexagon thin nuts (chamfered) FT	898 -6	-	267 - 23	Torsional nut M 1-M 10
774	-	6886, 6887	Taper keys with gib head	8676	-	961	Hexagon head screws FT	1051	-	101	Rivets: technical specifications
1051	-	660	Rivet, rivet pins	8733	-	7979	Parallel pins, internal thread	1101	-	7184	Tolerances of form/position
1207	-	84	Slotted cheese head screws	8734	-	6325	Parallel pins, hardened	1891	-	918	Fasteners - terminology
1234	-	94	Split pins	8735	-	7979	Parallel pins, internal thread	2320	-	267 - 15	TDC fasteners: locking nuts
1479	-	7976	Hexagon head tapping screws	8736	28736	7978	Taper pins, internal thread	2702	-	267 - 12	TDC fasteners: tapping screws
1481	-	7971	Pan head tapping screws	8737	28737	7977, 258	Taper pins CD thread	2768 -1...2	-	7168 - 1, 2	General tolerances
1482	-	7972	Csk. head tapping screws	8738	28738	1440	Washers for clevis pins	2859	-	40080	Sampling plans
1483	-	7973	Rcstk. head tapping screws	8739	-	1470	Grooved pins	3269	-	267 - 5	TDC fasteners: acceptance inspection
1580	-	85	Pan head screws	8740	-	1473	Grooved pins with chamfer	3506 -1...4	-	267 - 11	TDC fasteners: stainless steel
2009	-	963	Countersunk head screws	8741	-	1474	Grooved pins	3508	-	16 - 1	Thread runouts/undercuts
2010	-	964	Rcstk. head screws	8742	-	1475	Grooved pins	4042	-	267 - 9	TDC fasteners: electroplated coatings
2338	-	7	Parallel pins	8743	28743	1475	Grooved pins	4753	-	78	Thread ends/protrusions
2339	22339	1	Taper pins	8744	-	1471	Grooved pins	4755	-	76 - 1	Thread runouts/undercuts
2340	22340	1443	Clevis pins without head	8745	-	1472	Grooved pins	4757	-	7962	Cross recess for screws
2341	22341	1444	Clevis pins with head	8746	-	1476	Round head grooved pins	4759 -1...3	-	267 - 2, 6, 522	Tolerances for fasteners
2342	-	427	Headless screws	8747	-	1477	Grooved pins with csk. head	6157 -1...3	-	267 - 19	Surface discontinuities, bolts
2491	-	6885 -3	Parallel keys	8748	-	7344	Spring type straight pins H	6157 -2	(493)	267 - 20, 21	Surface discontinuities, nuts
2492	-	6883, 6884	Gib head/parallel keys	8750	-	7343	Spring type straight pins S	7085/7500-1	-	-	Thread rolling screws
2936	-	911	Hexagon socket screw keys	8751	-	7343	Spring type straight pins L	7378	-	962	Split pin holes/wire holes
3912	-	6888	Woodruff keys	8752	-	1481	Spring pins H	7721	-	-	Csk. head screws: configuration
4014	-	931 -1	Hexagon head bolts	8755	-	960	Hexagon head bolts FT	8749	-	-	Determ. of shear strength of pins
4016	-	601	Hexagon head bolts	10509	-	6928	Hex. flange head tapping screws	8839	28839	267 - 18	Designation system for fasteners
4017	-	933	Hexagon head screws	10510	-	6901	Tapping screws	8991	-	962	TDC fasteners: general requirements
4018	-	558	Hexagon head screws	10511	-	985	Hexagon, thin locking nuts	-	10204	50049	Certificates
4026	-	913	Hexagon socket set screws CH	10512	-	982, 6924	Hexagon locking nuts	10484	(493)	267 - 21	Widening test on nuts
4027	-	914	Hexagon socket set screws TC	10513	-	980, 6925	Hexagon locking nuts	10644	-	6900 -1	Screw/washer ass. hardness cl.
4028	-	915	Hexagon socket set screws CD	10642	-	7991	Hex. socket csk. head screws	10664	-	-	Hexalobular socket
4029	-	916	Hexagon socket set screws CP	10644	-	6900	Screw and washer assemblies	10666	-	7504	MP drilling screws
4032	-	934	Hexagon nuts CT	10663	1661	6923	Hexagon nuts with flange FT	10683	-	-	Zinc flake coatings
4033	-	934	Hexagon nuts II CT	10666	-	7504	Drilling screws with tapping screw thread	10684	-	267-10	Hot dip galvanized coatings
4034	-	555	Hexagon nuts	10669/10673	-	6903/6902	Washers for assemblies	12683	-	-	Mechanical zinc coatings
4035	-	439 -2, 936	Hexagon thin nuts (chamfered)	12125	-	6926	Hexagon locking nuts with flange	-	13811	-	Sherardizing
4036	-	439 -1	Hexagon thin nuts (unchamfered)	12126	-	6927	Hexagon locking nuts with flange	15065	-	66	Countersinking
4161	1661	6923	Hexagon nuts with flange	12474	-	912 (FG)	Hex. socket head cap screws FT	15330	-	-	Hydrogen embrittlement
4162	1662, 1665	6922	Hexagon bolts with flange	13337	-	7346	Spring-type straight pins L	16047	-	946	Torque/clamp force testing
4762	-	912	Hexagon socket head cap screws	13918	-	32500	Welding studs for stud welding	16048	-	-	Passivation of stainless-steel
4766	24766	551	Set screws CR	14579...587	-	-	Hex. socket head cap screws	16426	-	-	Fasteners QA system
4775	780, 783	6915	Hexagon nuts (HV)	14588, 14589	-	7337	Blind rivets, terms	-	-	-	-
7040, 7041	-	982, 6924	Prevailing torque type hex. nuts	15071...073	-	-	Hex. bolts with flange, small S	-	-	-	-
7042	-	980, 6925	Prevailing torque type hex. nuts	15480...483	-	7504	Drilling screws	-	-	-	-
7043	1663/1666	6926	Hexagon locking nuts with flange	15973...986	-	7337	Blind rivets	-	-	-	-
7044	1664/1667	6927	Hexagon locking nuts with flange	16582 - 585	-	7337	Blind rivets	-	-	-	-
7045	-	7985	Raised cheese head screws CR	21269	-	-	Hex. socket head cap screws FT	-	-	-	-
7046 -1, 2	-	965	Countersunk head screws CR	21670	-	977	Hexagon weld nuts with flange	-	-	-	-
7047	-	966	Rcstk. head screws CR	228 -1...3	-	13 T 19	Metric screw threads - profile	-	-	-	-
7048	-	-	Cheese head screws CR	259 -1...3	-	259-1...3	Ww head cap pipe thread G	-	-	-	-
7049	-	7981	Pan head tapping screws CR	261	-	13 -12	Selection of pitch threads CT/FT	-	-	-	-
7050	-	7982	Csk. head tapping screws CR	262	-	13-13	Thread selection series	-	-	-	-
7051	-	7983	Raised countersunk head	724	-	13	ISO thread: Basic dimensions	-	-	-	-
7053	-	6928	Hex. washer head tapping screws	965 -1...5	-	13-13...15.27	Metric threads, data/principles	-	-	-	-
7089	-	125 -1,2	Washers, grade A	1478	-	7970	Tapping screws thread	-	-	-	-
7090	-	125 -1, 2	Washers, grade B	1502	-	13-16...18	Thread gauges	-	-	-	-
7091	-	126	Washers, standard design	2901-2904	-	103-1...4	Trapezoidal thread	-	-	-	-
7092	-	433 -1, 2	Washers, small series	5408	-	2244	Thread: Terms	-	-	-	-
7093 -1, 2	-	9021	Washers, large series	6410 -1...3	-	27	Threads description in drawing	-	-	-	-
7094	-	440	Washers, extra large	-	-	-	-	-	-	-	-

Standard types, relations, publishers:

- DIN** National German standard (Deutsches Institut für Normung). DIN standards shall still be given for the products/services for which there are no ISO/EN standards and no standardisation necessity.
- ISO** International Standardization Organisation
- DIN ISO** National German issue of an unmodified, adopted ISO standard
- EN** European Norm (CEN = Comité Européen de Normalisation). In general, existing ISO standards should be adopted as EN standards with the ISO standard number → EN ISO. If this does not happen at European standards levels, independent EN standards shall be generated with EN standard numbers which are different to those of the ISO.
- DIN EN** National German issue of an unmodified, adopted EN standard. According to the resolution of the European Council, EN standards are to be adopted unmodified and immediately by the EU member states and the corresponding national standards are to be withdrawn.
- EN ISO** European standard issue which was adopted unmodified by ISO (EN and ISO standard numbers are identical – the earlier practice of "ISO number + 20,000" has not been in use since Jan. 95. Standards still in use according to this mode are to be converted accordingly). **The description is carried out according to ISO.**
- DIN EN ISO** National German issue of an unchanged EN standard adopted by ISO. The article naming is done according to ISO.

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Corrosion protection: General information



General information

Corrosion is the reaction of a metallic material with its environment which causes a measurable change in the material and can negatively influence the function of a metallic component or an entire system. In most cases, this reaction is of an electrochemical nature, but, in some cases, it can be of a chemical or a metal-physical nature. (Definition: Basic principle of "Corrosion" according to ISO 8044)

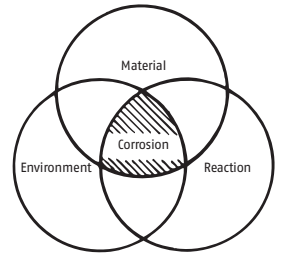


Table 1 shows the most important corrosion types from a selection of different corruptions which need to be considered with "mechanical fasteners".

Table 1: Corrosion types

Surface corrosion, e.g. rust Pitting corrosion	Crevice corrosion	Electrochemical corrosion (Contact corrosion) (see Table 2)	intergranular/ transgranular corrosion	Stress corrosion cracking

Corrosion is unavoidable, but damage due to corrosion is avoidable, provided the proper planning of suitable corrosion protection measures is in place. The corrosion protection of screw fastenings needs to be at least as corrosion-resistant as the components to be connected.

The task of constructive planning is to determine the necessary corrosion protection measures. Here the resilience of the corrosion protection in known operating conditions is to be taken into account until maintenance is due or until the limitation of damages has been reached. Surface or material specifications are to be listed in the article order text according to standards.

The next page provides a rough overview of the corrosion protection options for fasteners.

Inspection standards for corrosion protection procedures, compiled in DIN pocketbook 175, stipulate uniform conditions for the type and setup of equipment and methods for checking adherence to the specified coating type, layer thickness and optical appearance. The inspections according to these standards do not provide any information on the effect or fatigue strength of the corrosion protection under practical operating conditions.

An overview of the friction coefficients for various surface combinations → TI assembly. The friction ratios in the screw fastenings are vital when determining the correct tightening torque (→ VDI 2230)

Electrochemical corrosion

The combination of electrochemical noble and ignoble metals in humid conditions (= electrolyte) generates corrosion currents which spread from ignoble (anodic) metal to more noble metal (cathode). This means that less noble metal will be more eroded or corroded. The corrosion current thicknesses are also vital. If the ignoble, anodic part is small in comparison with the surrounding cathodic area (screw head on sheet surface), a very high anodic current thickness will generate which will carry off a lot of material.

Example 1:

Zinc plated screws for fastening a copper sheet:

Zinc is considerably less noble compared to copper. In humid conditions, a very high corrosion current thickness occurs on the small, ignoble, anodic screw head (left column zinc - small) in the direction of the noble, cathodic copper sheet (upper row - copper). The galvanized surface of the screw erodes in a short space of time and red rust appears on the steel.

Remedy:

In relation to the metallic building component, the fasteners should be as similar as possible if not more noble.

Screw	Component
zinc plated	zinc plated
nickel plated	steel, copper, brass
stainless	steel, zinc plated, aluminium, copper, brass

Example 2:

Copper or stainless steel screws which work in a similar way for fastening a zinc plated metal sheet:

This time, the ignoble, anodal, galvanized section is very large in relation to the small, noble, cathodic screw head. The corrosion current which stretches over the entire surface has very low tightness in the anode. The material degradation occurs across the entire surface and shows hardly any corrosion. This process actually additionally protects the nobler screw head against corrosion.

If unfavourable metal pairings cannot be avoided, they should be isolated from each other, e.g. using intermediate layers or coatings. Here, it must be made sure that the full strength of the connection remains intact.

Table 2: Electrochemical corrosion with metal pairings

In regard to contact corrosion of observed material ▼	Area ratio*	Magnesium alloy	Zinc	Hot-dip galvanized steel	Aluminium alloy	Cadmium coating	Construction steel	Low-alloy steel	Cast steel	Chrome steel	Lead	Tin	Copper	Stainless steel
		Magnesium alloy	small large		S M	S M	S M	S M	S S	S S	S S	S S	S S	S S
Zinc	small large	M G		G G	M G	M G	S G	S G	S G	S G	S G	S G	S G	S G
Hot dip galvanized steel	small large	M G	G G		M G	M G	S G	S G	S G	S G	S G	S G	S G	S G
Aluminium alloy	small large	M G	G M	G M		G G	M G	G M	S M	M S	S S	S S	S S	S M
Cadmium coating	small large	G M	G G	G M	G G		S G	S G	S G	S G	S G	S G	S G	S G
Construction steel	small large	G G	G G	G G	G G	G G		M G	S G	S G	S G	S G	S G	S G
Low-alloy steel	small large	G G	G G	G G	G G	G G	G G		G G	S G	S G	S G	S G	S G
Cast steel	small large	G G	G G	G G	G G	G G	G G	M G		S G	S G	S G	S G	S G
Chrome steel	small large	G G	G G	G G	G G	G G	G G	G G		M G	M G	S G	S G	S G
Lead	small large	G G	G G	G G	G G	G G	G G	G G	G M	G G		G G	G G	G G
Tin	small large	G G	G G	G G	G G	G G	G G	G G	G M	G G				
Copper	small large	G G	G G	G G	G G	G G	G G	G G	G M	M G	M G	S M		G G
Stainless steel	small large	G G	G G	G M	G G	G G	G G	G G	G M	M M	M M	M M	G G	G G

S = strong corrosion of the observed material

M = moderate corrosion of the observed material (in very humid environments)

G = negligible or zero corrosion of the observed material

* ratio of the surface of the "observed" material to the surface of the "pairing material" (Source: "FEUERVERZINKEN" (HOT DIP GALVANIZATION) information centre)



Corrosion protection: General information

Corrosion protection measures

Constructive measures e.g. isolation, avoidance of crevices...

Electrochemical measures e.g. cathodic protection, ventilation

Table 3: Surface measures

Measures	Procedures	Coatings	Coat-thicknesses μm	Standards Brand names
• Non-metallic coatings (inorganic/ organic coatings)	Lubrication	Oil	–	
	Browning, oxidising	Iron oxide coat	0,5 – 2	DIN 50938
	Phosphate-coating	Phosphate coat	–	EN 12476 (DIN 50942)
	Thin-layer coats of lacquer*	Lacquer/Plastic / Resin (Fluoropolymer/TEFLON)	3 – 20	IRCO-SEAL, KLEVER-COL, XYLAN, PTFE, STAND-COTE
	Dip coating*	Epoxide resin/Polyester/ Phenolic resin	10 – 20	KTL-KATAPHORESE, ECO 2000
• Metallic coatings (inorganic coatings)	Powder coatings*	Polyester powder	60 – 90	PULVER-COLOR, WEMA-KOR-EX
	Electroplated coatings: (electrolytic/chemical/acidic/ alkaline/cyanidic)	Zinc Cadmium Copper	3 – 25	ISO 4042
	+ Conversion layers (e.g. thicklayer passivation, thinlayer passivation, chromating – ISO 4520)	Copper-zinc Nickel Nickel-chrome Copper-nickel Copper-nickel-chrome Tin Copper-tin Silver Copper-silver Zinc-nickel Zinc-cobalt Zinc-iron		
	Hot dip galvanization tZn	Zinc	min. 40	ISO 10684 (DIN 267-10) for fasteners ISO 1461
	Mechanical plating (plated coatings)	Zinc powder on sub-layer copper- plating (chromating possible)	6 – 107	ISO 12683
• Zinc flake coating	Diffusion coatings	Zinc powder burned in/on	15 – 45	EN 13811: SHERARD-galvanising ISO 14713-3
	Basecoat (dispersions coatings = inorganic)	Zn-/Al lamellas (silver)	5 – 20	ISO 10683, DACROMET/GEOMET, DELTA-TONE, ZINCTECH
	Topcoat (thin-layer lacquering = organic)	Thin layer argentine or coloured, lubrication integration possible	8 – 15	DELTA-SEAL, DELTA-PROTEKT KL + VH, GEOMET PLUS VL

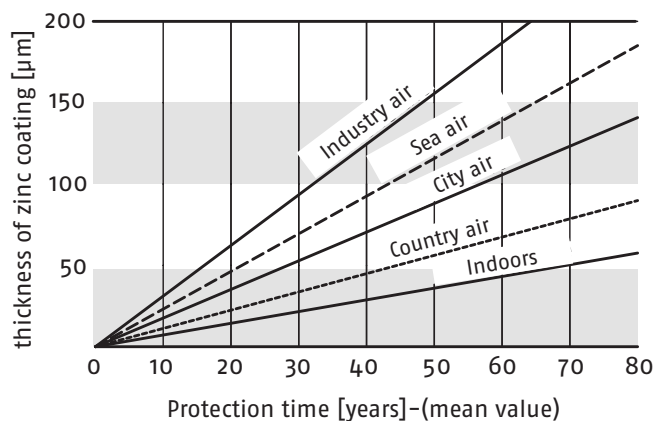
Table 4: Material measures

Measures	Procedure	Coatings	Standards	Brand names
• Non-ferrous metals (NE)	Copper (Cu) Brass (CuZn) Bronze (CuNiSi, CuSn)	– Ni plated, Cr plated, browned –	ISO 8839 (DIN 267-18) (galv. coatings ISO 4042 [DIN 267-9])	KURBUS Special brass 59 KUPRODUR
	Aluminium (Al) Titanium/Titanium alloys	anodised –	– ISO 8839 (DIN 267-18)	– –
• Non-metallic materials (K)	Plastics PA, POM, PP, PVDF, Nylon	–	VDI 2544 DIN 34810 – 34816	ULTRAMID, DELRIN, HOSTALEN...
• Stainless steels	Ferritic steels (F) 1.4016, 1.4568	clean and metallic, bright-polished	ISO 3506 (DIN 267-11) EN 10088 (DIN 17224)	–
	Martensite steels (C) 1.4016, 1.4057, 1.4122...		ISO 3506 (DIN 267-11) EN 10088 (DIN 17442)	–
	Austenitic steels (A) A 1 = 1.4305 A 2 = 1.4301, 1.4303 A 4 = 1.4401 A 3 = 1.4541 A 5 = 1.4571 FSt = 1.4310		ISO 3506 (DIN 267-11) EN 10088 (DIN 17440, 17244)	NIRO, NIROSTA, INOX, CRONIFER, REMANIT, UNOX, SINOX ...
• Special materials	Nickel, nickel alloys	metallic, bright-polished	DIN 17740, 17742-44	INCONEL, HASTELLOY, MONEL...
	Special copper alloys Multi-component bronzes		DIN 17662-17665	Sn-/Al-Bronze, NEUSILBER, RESISTIN, CUNIFER...
	Special steels		EN 10269 (DIN 17240), SEW 390	URANUS, SICROMAL, MANOX...

Corrosion protection: General information



Table 5: Yearly erosion values for zinc
(for flat surface corrosion)



Service condition	µm/year
Indoors	1,0 – 2,0
Country air*	1,3 – 2,5
City air*	1,9 – 5,6
Industry air*	6,4 – 19
Sea air*	2,2 – 7,2

* In practice, a mixed climate is to be reckoned with.

Table 6: Service conditions/Layer thicknesses for zinc plated steel

Service condition (areas of application)	Allocation of zinc layer thickness in µm	Description examples
0 "very mild" (Decorative use without strain)	3 - 5 ①	„zinc plated“ A 1 A/B/F A 2 A/B/F Fe/Zn 3/5
1 "mild" (Indoor conditions in warm, dry atmosphere)	5 - 8 ①	„zinc plated“ A 2 C/D A 3 A/B/F Fe/Zn 5/8
2 "moderate" (Indoor conditions in rooms in which condensation may occur)	8 - 12 ②	A 3 C/D Fe/Zn 12 A/F Fe/Zn 8/12
3 "strong" (Outdoor weathering under moderate conditions)	12 - 25 ②	A 4 C/D A 5-6/B-G A 7 A/F Fe/Zn 12-25
4 "very strong" (Outdoor weathering under difficult corrosive conditions – e.g. sea/industry environment)	25 ③	A 7 C/D Fe/Zn 25 c 2 C/D

- ① Corresponds to general standard stock type
 ② Observe maximum layer thicknesses according to Table 8.
 ③ Thread size/oversize required, choose hot dip galvanization if necessary
 – Extract from EN 1403, ISO 2081 (protective effects differ in practice)

Table 7: Reference values for corrosion and temperature resistance of galvanizing on steel

Coating	Cr(VI)- free	Coat thickness [µm]	Saltspray test according to ISO 9227		Temperature resistance Coating up to approx. ... °C
			White rust [h] ⑤	Red rust [h] ⑤	
zinc plated colourless/blue passivated ①	yes	3	2	12	60
		5	12	36	
		8	24	72	
zinc plated yellow chromated ①	no	5	48	72	60
		8	72	120	
zinc plated olive chromated ①	no	5	72	96	60
		8	96	144	
zinc plated black chromated ①	no	5	12	–	60
		8	24	72	
zinc plated colourless/blue passivated with sealing ②	yes	5	72	96	60
		8	72	120	
zinc plated thicklayer passivated (TLP) without sealing ②	yes	5	48	72	120
		8	72	120	
zinc plated thicklayer passivated with sealing ②	yes	5	96	168	120
		8	96	240	
zinc plated black passivated with sealing ②	yes	5	24	72	60
		8	24	96	
ZnFe black without sealing ②③	yes	5	24	48	100
		8	24	72	
ZnFe black with sealing ②	yes	5	120	196	180
		8	120	240	
ZnNi black without sealing ②③	yes	5	24	360	180
		8	24	480	
ZnNi black with sealing ②	yes	5	120	600	180
		8	120	720	
ZnNi transparent without sealing ②	yes	5	120	360	180
		8	120	600	
ZnNi transparent with sealing ②	yes	5	144	480	180
		8	144	720	
Zinc flake coating with chromate (Cr-(VI))	no	5	–	480	150/180 ④
		8	–	720	
Zinc flake coating without chromate	yes	6	–	240	150/180 ④
		8	–	480	

- ① Resistance according to ISO 4042 attachment B (informative)
 ② Typical values for drum goods, before first assembly and without thermal processing. All surfaces with sealant are only electrically conductive to a limited extent. The friction coefficients vary and need to be inspected when undertaking actual installation work.
 ③ Limited abrasion resistance of the black surface
 ④ Temperature dependent on the product used
 ⑤ Reference values apply only for homogeneous surfaces without mistakes



Corrosion protection: Electroplated coatings

The technical conditions of delivery ISO 4042 apply to electroplated coatings on standard and non-standard fasteners.

Example for a short description of the desired electroplated coatings:

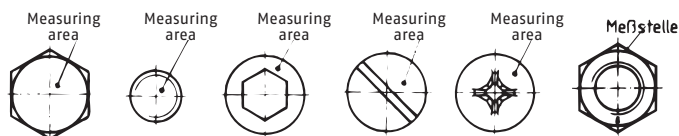
Description according to ISO 4042 – attachment B
(e.g. ISO 4014 – M 16 x 60 – 8.8 Fe/Zn5c Bk)

Fe/Zn	5	c	Bk
			Type of chromation Bk = Black
			Chromation
			Minimum coat thickness of the coating metal 5 = 5 µm (eff. detail!)
Type of application of the coating material, whereby Fe = iron/steel describes the basic material and Zn = Zinc, the coating material			

Description according to ISO 4042 – attachment E
(e.g. ISO 4014 – M 16 x 60 – 8.8 A2S)

A	2	S
		Degree of gloss and post-processing of the chromation S = black
		Code number for the minimum layer thickness and layer composition 2 = 5 µm (encrypted detail)
Code letter for coating metal A = zinc		

When testing, the layer thickness at the measuring point applies.



Normal storage:

„galZn“ Layer thickness = Type (≥ M 5)
approx. 5 µm = A2A/A2B/A2E/A2F
„galZnCr“ gelb chromat. approx. 5 µm = A2C/A2G/A2L
„galZn 8 DiSP“ approx. 8 µm with thick layer passivation

a) Coating metal

A = Zn	= Zinc
B = Cd	= Cadmium
C = Cu	= Copper
D = CuZn	= Brass
E = Ni	= Nickel
F = NiCr	= Nickel-Chrome
G = CuNi	= Copper-Nickel
H = CuNiCr	= Copper-Nickel-Chrome
J = Sn	= Tin
P = ZnNi	= Zinc-Nickel Alloy
R = ZnFe	= Zinc-Iron Alloy

b) Layer thickness/µm (2 coating metals)

1 = 3	–
2 = 5	(2 + 3)
3 = 8	(3 + 5)
9 = 10	(4 + 6)
4 = 12	(4 + 8)
5 = 15	(5 + 10)
6 = 20	(8 + 12)
7 = 25	(10 + 15)
8 = 30	(12 + 18)

c) Postprocessing (passivation/chromation)

	Degree of gloss	Types of process	Colour
A =		A	colourless
B =	mt	B	bluish
C =	(matt)	C	yellowish*
D =		D	olive*
E =		A	colourless
F =	bk	B	bluish
G =	(blank)	C	yellowish*
H =		D	olive*
J =		A	colourless
K =	gl	B	bluish
L =	(glossy)	C	yellowish*
M =		D	olive*
P/U =	any	wie B, C oder D	
R =	mt (matt)	F/Bk	} black*
S =	bk (blank)	F/Bk	
T =	gl (glossy)	F/Bk	

* Attention: Contains mostly chrome (VI)

The thread tolerances apply before the coatings are plated (when coating, the zero line may not be exceeded with screw threads or come up short with nut threads). Thus the screw thread with coating can be positioned between the upper size of the tolerance field and the zero line.

In the interest of threadability, the layer thickness for thread parts with a normal degree of tolerance of 6g/6H is logically limited. The empirically recommended limit values possible according to ISO 4042 can be found in Table 8. Thicker coatings require different tolerance zones with larger sizes according to DIN 13-14 (custom-made).

When inspecting the threadability, ISO 6157-1/-3 (DIN 267-19, Section 2.7) needs to be observed.

Table 8: Maximum layer thicknesses for outer threads with thread tolerance group g

Thread Ø M	Pitch	Max. coat thickness [µm]				
		according to ISO 4042 ①			Practice values ②	
		Screw length			Screw length	
		< 5d	5d – 10d	10d – 15d	< 5d	5d – 15d
1 – 2	0.2 – 0.4	3	3	3	–	–
2.5 – 7	0.45 – 1	5	3	3	3	(3)
8	1.25	5	5	3	5	3
10 – 16	1.5 – 2	8	5	5	5	3
18 – 22	2.5	10	8	5	(8)	5
24 – 27	3	12	8	8	8	5
30 – 33	3.5	12	10	8	8	8
36 – 52	4 – 5	15	12	10	10	8
56 – 60	5.5	15	15	12	12	10
64	6	20	15	12	12	10

① mathematical limiting value according to ISO 4042, Tab. 2

② recommended limiting value from practice in due consideration of manufacturing and procedural faults according to ISO 6157-1, -3

For electroplated coatings on high-strength fasteners with tensile strengths from approx. 1000 N/mm² (e.g. 10.9 ... 12.9) and hardened fasteners with hardnesses of approx. 320 HV or more, the danger of hydrogen embrittlement cannot be ruled out with any certainty, even with well-known methods. (ISO 4042 Abs.6/attachment A/ISO 15330).

(Alternative coatings → Tab. 3)

Corrosion protection: Hot dip galvanized fasteners



For hot dip galvanized fasteners, the technical conditions of delivery apply according to ISO 10684.

The minimum layer thickness of at least 40 µm at the point of measurement stipulated by this standard requires that the thread dimensions be adjusted (see Table 9).

The undersize is usually to be found in the screw thread with the tolerance group 6az so that the hot dip galvanized screw thread does not exceed the (ISO-compatible) zero line (h tolerance). These screws are also identified with a "U". Rethreading the screw is not permitted.

For high-strength structural bolting assemblies-system HV-according to EN 14399-4, a non-rethreaded screw (g tolerance) is coated which means that the screw thread with hot dip galvanization is above the zero line. In this case the necessary oversize is in the nut thread (= 6 AZ).

The nut thread is later cut into the hot dip galvanized castings. The corrosion protection of the bare nut thread comes from the zinc coating of the screw thread with remote cathodic protection.

Table 9: Basic measurements of the screw thread before hot dip galvanization – tolerance group 6az according to ISO 10684/ISO 965-4

Thread	M 6*	M 8	M 10	M 12	M 14 M 16	M 18 M 22	M 24 M 27	M 30 M 33	M 36 M 39	M 42 M 45	M 48 M 52	M 56 M 60	M 64
Upper limit dimensions [µm]	-290	-295	-330	-335	-340	-350	-360	-370	-380	-390	-400	-410	-420

* not regulated by standards

After hot dip galvanization, the requirements of ISO 898-1 and ISO 898-2 apply to hot dip galvanized screws and nuts ≥ M 12. For thread sizes M 8 and M 10, reduced resilience applies according to ISO 10684.

Table 10: Min. tensile strength [N] for screws of the 6az tolerance

Property class Marking	4.6 4.6 U	5.6 5.6 U	8.8 8.8 U	10.9 10.9 U
M 6*	7 075	8 844	14 150	17 687
M 8	13 300	16 600	26 600	34 500
M 10	21 400	26 800	42 900	55 700
M 12	33 700	42 200	67 400	87 700
M 16	62 800	78 500	125 000	163 000
M 20	98 000	122 000	203 000	255 000
M 24	141 000	176 000	293 000	367 000
M 30	224 000	280 000	466 000	583 000
M 36	327 000	408 000	678 000	850 000

* not regulated by standards, reference values

Table 11: Proof loads [N] for nuts of the tolerance class 6AZ

Property class Marking	5 5 Z	6 6 Z	8 8 Z	10 10 Z
M 6*	7 969	9 962	15 934	19 923
M 8	17 300	20 000	25 500	30 600
M 10	28 600	33 000	42 200	50 400
M 12	51 400	59 000	74 200	88 500
M 16	95 800	109 900	138 200	164 900
M 20	154 400	176 400	225 400	259 700
M 24	222 400	254 200	324 800	374 200
M 30	353 400	403 900	516 100	594 700
M 36	514 700	588 200	751 600	866 000

* not regulated by standards, reference values

When assembly hot dip galvanized screws and nuts, especially with additional lubrication of the threading, different friction coefficients and tightening torques need to be reckoned with. EN 1993-1-8/NA need to be considered for hot dip galvanized high-strength structural bolting assemblies!

The zinc coating may give a small excess to the outer measurements (head, shaft).

Articles with hollow sections (e.g. keys for hexagon socket screws, cap nuts, etc.) are not suitable for hot dip galvanizing.

The grey appearance of the hot dip galvanizing is dependent on the material and not characteristic for the quality of the corrosion protection. White rust and/or whitish to dark corrosion points (zinc-oxide) which can occur after hot dip galvanization, e.g. through dampness, do not usually impair the corrosion protection and no reason for rejection (→ ISO 1461, Section 6.1).

A certain surface rawness and small dents in the thread tips are dependent on the procedure. For this reason, an assembly tool may be required for initial screwing.

Table 1: Drive features

Slot		Hexalobular socket		Triangle	
Phillips cross recess H		Triple square socket		Hexalobular	
Pozidriv cross recess Z		12 point socket		Triple square	
Supradriv cross recess		Torque set		Hexagon with slot	
Cross recess combi H+		Tri - Wing		Theft resistant drives	
Cross recess combi Z+		Hi torque			
Square socket		Hexagon			
Hexagon socket		Square			

Table 2: Ends of externally threaded fasteners

Description	New name	Old name	Picture (example)	Description example	Description	New name	Old name	Picture (example)	Description example
Short dog point with rounded end (DIN 962)	Ak	Ak		ISO* - M 12 x 50 - Ak - 8.8	Pilot point, flat (ISO 4753)	PF	PF		ISO* - M 12 x 50 - PF - 8.8
Chamfered end (ISO 4753)	CH	K		ISO* - M 12 x 50 - CH - 8.8	Thread undercut (DIN 76-1)	Ri	Ri		ISO* - M 12 x 50 - Ri - 8.8
Cone point (ISO 4753)	CN	-		ISO* - M 12 x 50 - CN - 8.8	as-rolled end (ISO 4753)	RL	Ko		ISO* - M 12 x 50 - RL - 8.8
Cup point (ISO 4753)	CP	Rs		ISO* - M 12 x 50 - CP - 8.8	rounded end (ISO 4753)	RN	L		ISO* - M 12 x 50 - RN - 8.8
Flat point (ISO 4753)	FL	Ks		ISO* - M 12 x 50 - FL - 8.8	Split pin hole (DIN 962/34803)	S	S		ISO* - M 12 x 50 - S - 8.8
Long dog point (ISO 4753)	LD	Za		ISO* - M 12 x 50 - LD - 8.8	Scrape point (ISO 4753)	SC	Sb		ISO* - M 12 x 50 - SC - 8.8
Pilot point with truncated cone (ISO 4753)	PC	PC		ISO* - M 12 x 50 - PC - 8.8	Short dog point (ISO 4753)	SD	Ka		ISO* - M 12 x 50 - SD - 8.8
Short dog point with truncated cone (DIN 962)	Asp	Asp		ISO* - M 12 x 50 - Asp - 8.8	Wire hole (DIN 962/34803)	SK	SK		ISO* - M 12 x 50 - SK - 8.8
					Truncated cone point (ISO 4753)	TC	Sp		ISO* - M 12 x 50 - TC - 8.8

* product standard

Table 3: Dimensions for split pin holes (S) and wire holes (SK)

Gewinde-Ø M		3	4	5	6	7	8	10	12	14	16	18	20	22	24	27	30	33	36
Pin holes S* (DIN 962/34803)	d ₁	0.8	1	1.2	1.6	1.6	2	2.5	3.2	3.2	4	4	4	5	5	5	6.3	6.3	6.3
	l _e	2	2.2	2.6	3.3	3.3	4	5	6	6.5	7	7.7	7.7	8.7	10	10	11.3	11.3	12.5
Wire holes SK* (DIN 962/34803)	d ₁	-	1.2	1.2	1.6	1.6	2	2	2	2	3	3	3	3	3	3	3	4	4
	* Position tolerance t = 2 IT13 (PK A), 2 IT14 (PK B), 2 IT15 (PK C)																		
Dimensions for slots**	~	0.8	1	1.2	1.6	1.6	2	2.5	3	3	4	** The position of the slot at the corners of the hexagon or square is optional							



For "Mechanical fasteners" (screws, nuts and accessory parts), all function-relevant external and internal characteristics are regulated in detail in DIN, ISO or EN standards, these include:

- **Product standards** (e.g. DIN 931/ISO 4014)
Specifications on the figure of the product, assigned version and product grade (tolerance group), usual strength classes and/or materials and nominal sizes. Furthermore, each product standard contains "normative references" to relevantly applicable basic function standards.

Basic/Function standards (e.g. DIN 13, 267/ISO 898, 4759, 3269...)
Regulations for joint characteristics of the various products like, for example, thread, tolerances, surface versions, corrosion protection, mechanical properties and corresponding factory test programme as well as acceptance testing conditions.

By naming an article with a product standard number, all referred basic standards are automatically included and applicable as "Technical Delivery Conditions". This also applies for non-standardised thread and form parts when no particular arrangements have been made between the orderer and the supplier.

Standards always can only regulate just one general standard for products "for general use", this also applies for "Mechanical fasteners" (→ ISO 3269/8992). For higher requirements for specific cases exceeding these normative regulations, it is the job of the user to define these requirements and specify necessary additional inspection requirements.

1. Quality checks during manufacture:

For basic/functional standards, testing programmes and procedures are given within which the manufacturer has to ensure the compliance with the proper standards quality of its products by carrying out constant sample checks. Alongside the obligatory checks for dimensional accuracy and surface condition, the following checks are also listed, among others:

- for screws and similar thread parts (→ ISO 898-1)
 - hardness testing, proof load testing
 - bolt head impact/diagonal pull testing
 - surface decarburisation testing
- for nuts (→ ISO 898-2)
 - hardness test, proof load test
 - expansion test

The procedure to be used in arbitration is specified in the standards. All standardised mechanical properties are generally valid at room temperature (approx. +20 °C).

2. Additional tests – Certificates according to EN 10204

For particular requirements and/or safety-related use-cases, additional articles or use-specific tests can be carried out either in the factory or by a commissioned factory independent technical expert or testing institute. The results of these extra tests shall be documented in a Certificate (inspection document), which the orderer shall receive as either an original or an unmodified copy.

The type and scope of these additional tests and who is to carry out and document them is to be determined by the user due to his knowledge on the use and particular requirements, and specified accordingly on ordering.

Inspection contents – according to DIN 11204

If there are no specifications on the scope of the test contents agreed in the order, DIN 11204 shall apply. This standard regulates the test contents of certificates according to EN 10204 for fasteners.

Table 1: Test contents for screws according to DIN 11204

Section designation	Details
Tensile test: shape of test pieces	Tensile test of the entire screw: For the screws M 6 to M 39 according to ISO 898-1, ISO 3506-1, ISO 8839 or DIN 267-13, as long as the geometry of the screws is suited for the tensile test on the entire screw. In case a tensile test should be carried out on the cylindrical sample, this needs to be arranged at the time of ordering.
Tensile test: tensile strength	-
Hardness testing: test method	Symbol denoting test method
Hardness testing: individual values	Does not apply for ISO 8839 and austenitic steels of the types A1 to A5 according to ISO 3506-1 or ISO 3506-2
Torsion test: breaking torque	For screws ≤ M 5. For all property classes according to ISO 898-1, for austenitic steels of the types A1 to A5 according to ISO 3506-1 and for non-ferrous metals according to ISO 8839 as long as the geometry of the screw is suited to the torsion test according to ISO 898-7
Chemical composition	Cast analysis/product analysis according to the product specifications

Tab. 2: Test contents for nuts according to DIN 11204

Section designation	Details
Proof load test	For nuts M 6 to M 39 according to ISO 898-2, ISO 898-6, ISO 3506-2, ISO 8839 and DIN 267-13, if specified.
Hardness test: test method	Code of the hardness testing procedure
Hardness testing: individual values	Does not apply for ISO 8839 and austenitic steels of the types A1 to A5 according to ISO 3506-1 or ISO 3506-2.
Chemical composition	Cast analysis/product analysis according to the product specifications

Costs for additional testing are not contained in the product price.

Table 3 provides information on types of test certificates which have proven themselves as requirements for screws, nuts and other form and accessory parts.

General information:

- The values determined by additional testing and documented in certificates are not "committed properties" or "guarantees of quality" according to Section 267 of the German Civil Code (BGB) and do not mean that the user does not have to perform the proper inspection of incoming goods (Section 377 of the German Commercial Code (HGB)).
- All tests named in 1 and 2 are carried out in general on samples. While their results are representative for the most part of the delivery batch of a load, a 100% guarantee for each part of the batch can be derived from this just as little as its suitability for a specific purpose can be.



Inspections, acceptance testings and certificates

Table 3: Overview of the usual inspection documents for screws, bolts, studs, nuts and accessory parts
Extract from EN 10204 – Jan 2005 (previously DIN 50049)

Standard marking	2.1 ^①	2.2 ^①	3.1	3.2
Certification	Declaration of compliance with the order	Test report	Inspection certificate	
Type of inspection	Not specific no testing/evaluation of testing results of the delivery batch/ parts of the delivery itself		Specific ^② = Testing is done on the delivery batch/parts of the delivery itself	
Content of the certification	No test results (= informal manufacturer confir- mation, that the delivered prod- ucts correspond to the agreements made on ordering)	Test result on the basis of non-specific tests (= from current series manufacturing records and not from tests on parts of the delivery batch	Test results on the basis of specific tests ^② = Evaluation and documentation of actual values from testing of parts of the delivery batch itself ^②	
Terms of delivery	According to the terms of the order		According to the delivery terms of the order c = specified testing requirements of the orderer (also according to the technical regulations AD/TRD)	
Confirmation/ Certification by	The manufacturer		The acceptance-testing officer independent of the processing depart- ment of the manufacturer	As 3.1 + the technical expert commissioned (prescribed) by the orderer ^④
Order example: Addendum to article text: "... with test certification according to EN 10204-3.1"				

- ① not recommended since there is no specific statement on the delivered product
- ② the sample quantities required for destructive inspections are to be taken into account when deciding the order quantity
- ③ e.g. specification of the yield strength/impact testing with specified high and low temperatures, particular crack testing procedures, etc.
- ④ according to the specifications of the orderer, e.g. TÜV, GL, DB...

3. Acceptance testing for "Mechanical fasteners"

Extract from ISO 3269 (previously DIN 267-5)

This standard is always included as applicable when "Mechanical fasteners" are ordered according to standard or similar form parts, if not expressly agreed otherwise beforehand.

It does not apply to fasteners which

- are intended for automatic screw-in,
- are supposed to fulfil particularly high requirements,
- require particular processing procedures/testing measures
- require specific traceability.

Here, special corresponding arrangements always need to be made on request, on ordering at the latest (.e.g. according to ISO 16426). In general, standard commercial stock is not suitable for these specific requirements.

Since the mass production of standard parts for general use cannot be assumed to be free of individual errors or defective parts for economic reasons, the expectation of zero-error deliveries is fundamentally not standard-compliant (→ ISO 3269, „Introduction“).

For sample test instructions during incoming goods inspections, ISO 3269 prescribes values for an "Acceptable Quality Level (AQL)" to which an acceptance number (Ac) is assigned. Ac is the highest count of defective parts in a sample test for which the test batch can still be accepted.

The assignment of AQL values is determined according to the following:

- Product type, e.g. screws, nuts, washers, bolts, pins, rivets
- Product (tolerance) classes: A, B or C
- Function-relevant characteristics = AQL value 1.5-1.0
- Other characteristics = AQL value 4.0-2.5
- Mechanical properties = AQL value 1.5-0.65

Details important for the functional compliance of the parts include, for example drive, thread. Other characteristics include, for example, minor measurement/type deviations which do not negatively affect the usability.

Table 4 shows the ratio of AQL value to the acceptance number for the same sample test extent as an example as well as the mathematical limit value (%) for the number of defective parts in the delivery batch (deliverer's risk max. 5%).

Table 4: Ratio AQL values : Acceptance numbers

Sample test scope Item	AQL value	= Acceptance number Ac Item	Limit value non-conforming fasteners %
125	0.65	2	1.6
125	1.0	3	2.4
125	1.5	4	3.2
125	2.5	6	4.8
125	4.0	8	6.4

EC Directive 2000/53/EC on end-of-life vehicles (ELV Directive)

(End-of-Live-Vehicles)

The aim of this European directive is to avoid having materials which are dangerous to health in vehicles or to prevent this from happening as much as possible.

All cars and utility vehicles up to 3.5 tonnes, which were put into operation from 1st July 2007 onwards are affected by this.

The following are banned from this date Lead, Cadmium, Chromium (VI), Mercury.

Exceptional approval was granted until 1st July 2008 for hexavalent chromium in corrosion protection layers for screws and nuts to fasten parts of chassis frames.

The EU directive was adopted into German law through the end-of-life vehicles directive. The automotive industry implemented the requirements of the EU directive in the form of VDA data sheet 232-101 (list of materials which must be declared) International material data system (IMDS).

→ These products comply with this directive

All products made from steel, stainless steel and non-ferrous metals, uncoated or zinc plated with blue/transparent thick layer passivation, with zinc flake coatings without hexavalent chromates (fIZnnc) and hot dip galvanization

EC Directive 2002/95/EC on electrical and electronic equipment (ROHS directive)

(Restriction of Hazardous Substances)

Through EU Directive 2011/65/EU (colloquially referred to as RoHS II) on the restriction of use of certain hazardous substances in electrical and electronic equipment, from 8th June 2011 the previous RoHS Directive 2002/95/EC is repealed.

It is implemented by the Hazardous Substances in Electrical and Electronic Equipment Ordinance (ElektroStoffV) in Germany. Accordingly, waste electrical and electronic equipment, including cables and spare parts that contain more than 0.1 percent by weight of lead, mercury, hexavalent chromium, polybrominated biphenyls or polybrominated diphenyl ethers or more than 0.01 percent by weight of cadmium per homogeneous material may not be placed on the market.

The directive provides for a gradual extension to all electrical and electronic equipment by 22nd July 2019. Thus, in addition to the products already affected previously, it covers, among other things, medical devices and monitoring and control instruments after 22nd July 2014 and industrial monitoring and control instruments after 22nd July 2017.

→ These products comply with this directive

All products made from steel, stainless steel and non-ferrous metals, uncoated or zinc plated with blue/transparent thick layer passivation, with zinc flake coatings without hexavalent chromates (fIZnnc) and hot dip galvanization

EC Regulation 1907/2006 – Chemicals regulation (REACH)

(Registration, Evaluation, Authorisation of Chemicals)

This EC regulation centralises and simplifies Europe-wide chemical laws through registration, evaluation and authorisation and came into effect on 1st June 2007. It is the declared objective to increase the level of knowledge of the dangers and risks which arise from chemicals. Here, companies are given more responsibility for the safe handling of their products. Although fasteners are in principle included as articles by the REACH regulation, most fall under exemptions and are thus exempt from the registration requirement.

According to Article 3 of the REACH regulation fasteners are articles. Articles are objects whose function is defined not by its chemical composition (e.g. by the metal components in the alloy), but by their external shape.

However, according to Article 7, Section 1 of the REACH regulation articles are only subject to registration if they also contain substances that are intended to be released. This is however, not the case for fasteners.

Even fasteners with corrosion protection coatings, which thus have a sacrificial coating, i.e. a coating which is sacrificed to protect the component part, is not subject to having to be registered. This is because the protective layer is not released as such, but only certain reaction products. What is relevant is the exemption under Article 2, Paragraph 7 (b) REACH regulation in conjunction with Annex V, Section 3 of the REACH regulation. According to this, substances which result from a chemical reaction occurring upon end use of other substances, mixtures or articles and which are not themselves manufactured, imported or placed on the market, are exempted from the obligation to register.

However, this does not affect provisions regarding substances of very high concern (Article 57, Article 59, Annex 14 REACH regulation) in articles under Article 7, paragraph 2 REACH regulation. These substances are not subject to registration, but must be reported, provided

- a) The substance is present in those articles in quantities totalling over one tonne per year per producer or importer
- b) The substance in these articles contain a concentration of more than 0.1% (by mass)

Which substances are subject to such a reporting requirement still needs to be determined by the European authorities. Substances such as cadmium, mercury, lead, chromium VI, as contained in corrosion protection coverings and alloying elements, are expected to be included.

For fasteners, however, this reporting requirement is unlikely to come into play in the provision, since the share by mass of the dangerous substance is likely to be much smaller than 0.1%. This must be checked accordingly in each individual case.

The statements above do not apply to chemical/technical products (e.g. aerosols, adhesives and sealants). These are preparations, not articles. For preparations it is not the preparations themselves, but the ingredients that are subject to registration. For products manufactured in the EU this obligation to register affects the manufacturer and the importer for imports from non-EU countries.

Construction Products Regulation 305/2011/EU

(Construction products directive)

On 1st July 2013 this regulation repealed Construction Products Directive 89/106/EEC.

This regulation lays down the conditions for the marketing and provision of construction as well as their CE marking.

For more detailed information, please refer to the special publication "Fasteners Metal and Steel Construction".

EC Directive 2006/42/EG

(Machinery Directive)

The directive regulates a unified protection level for accident prevention when bringing machinery into circulation inside the European Economic Area (EEA).

This Machinery Directive is supposed to reduce non-tariff barriers in the Union. Like all directives decreed on the basis of the EC Treaty, the Machinery Directive does not have any direct effect. It needs to be adopted into national law. In Germany, this has been done by the Equipment and Product Safety Act (Geräte- und Produktsicherheitsgesetz (GPSG)) and the Machinery Directive based thereon (9th GPSGV).

From 29th December 2009 the new Machinery Directive is to be applied in a binding fashion.

Essentially, the following changes were made:

- Clearer restriction of the scope of application for the low-voltage directive and for the lift directive
- Incomplete machinery are included in the scope of application. Which directive requirements were satisfied can be found in the related documents. Included in the scope of delivery are a declaration of installation and assembly instructions written in the language of the country.
- The basic health and safety requirements were modified to meet technical advances made
- Selection options for conformity assessment procedures for machinery with inherently dangerous machines (see Annex 4 of the directive)
- Safety components receive the CE marking
- Inclusion of household appliances also commercially used, provided they fulfil the machine definition

→ These products can be used to implement this directive

DIN 580, DIN 582, DIN 7964 and article numbers 88151, 88152 and 88153

EU Directive 97/23/EC

(Pressure equipment directive)

The EU Directive is implemented by the 6th ProdSV – Regulation relating to making available on the market simple pressure vessels

The regulation is reflected in the Technical Regulations (standards), which include instructions on computation and construction, on approved materials (including materials and strength classes for bolts and nuts), on acceptance test provisions (factory inspection documents) and on selected and correspondingly recognised manufacturers.

In addition or if not otherwise specified, the Technical Regulations apply to bolts and nuts among others:

AD 2000 data sheet W0	= General principles for materials
AD 2000 data sheet W2	= For austenitic steel parts
AD 2000 data sheet W7	= For ferritic steel parts
AD 2000 data sheet W10	= For ferrous material parts for low temperatures

The recognised manufacturer of bolts and nuts made from permitted materials must prove to the responsible authority that the requirements have been satisfied according to AD 2000 data sheet W0. Manufacturers who fulfil these requirements are listed in the VdTÜV data sheet for materials 1253/1. These manufacturers are subject to constant inspection.

FASTENERS AND FIXING TECHNOLOGY

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