

3. ISO INFORMATION ON TECHNICAL STANDARDISATION – CHANGEOVER TO ISO

3.1 Code

Technical standardisation is work of harmonisation in the technical field that is carried out jointly by all interested parties. Its aim is to stipulate, arrange and harmonise terms, products, procedures, etc., in the area of engineering. In this way, optimum solutions are found for all types of constructions, for example, whereby ordering the necessary components is considerably simplified.

This work of harmonisation in Germany was previously carried out by the Deutsches Institut für Normung e.V. (DIN) on the national level. In addition, there are European standards (EN standards), and on an international level there are the ISO standards, which are issued by the International Organisation for Standardisation.

National standards (DIN) are being or have already been largely replaced by international/European standards. There will be DIN standards only for products for which there are no ISO or EN standards.

International standards (ISO). According to the task and goal of the ISO, which was established in 1946, these are intended to serve the global harmonisation of technical rules, and thus to simplify the exchange of goods and to break down barriers to trade.

European standards (EN) aim at harmonising technical regulations and statutes in the internal European market, which was realised on 1.1.1995 (EU/EEC). In principle, existing ISO standards are to be taken over as far as possible unchanged as EN standards. The difference between ISO and EN standards is that, according to a decision of the European Council, EN standards are to be transposed and introduced without delay and without amendment as national standards in the Member States – and the corresponding national standards are to be withdrawn in the same step.

3.1.1 Product names and product changes

In many cases the introduction of the European standards is described as intransparent or even chaotic. However,

a closer look reveals that this is not the case. Many DIN standards were the foundation for ISO standards. The old DIN standards were changed into new ISO standards.

If an ISO standard is taken over into national standards codes without change, the national standard is given the same title as the corresponding ISO standard. An ISO nut is thus known as an ISO 4032-M12-8 all over the world.

In many cases, a changeover from “DIN to ISO” is, strictly speaking, not correct, because in the past many DIN standards had already been taken over by ISO standards. During the harmonisation of the individual standards codes some titles are in fact being changed, but there are not many changes to the products themselves. For an interim period the number 20000 was added to the ISO number on the takeover of ISO standards into the European code (EN) (e.g. DIN EN ISO 24034). However, this naming system was abandoned some years ago and replaced by the now common form “DIN EN ISO ...”.

It is certain that the changes to names are very annoying with regard to production documents or order data, because these have to be changed in the short or long term. But we have to be clear about one thing: the sooner we realise conformity to European standards, the sooner we will profit from overcoming barriers to trade or procurement within Europe.

As already stated, the contents of many DIN standards already conform to the ISO standard, because they were introduced at a time at which the “changeover to ISO” was not yet current.

Following Europeanisation there are absolutely no changes to what is certainly the most important standard for screws and nuts, ISO 898-1 “Mechanical properties of fasteners”, because this standard was taken over into the German standards code from the start without any changes to the contents.

One of the most significant product changes on the harmonisation of the codes was without doubt the change of the width across flats of all hexagonal products. Screws and nuts with dimensions M10, M12 and M14 are affected (here the width across flats is reduced by 1 mm) and M22 (width across the flats is 2 mm larger).

Apart from these four dimensions, all other screw dimensions are already perfectly identical to ISO. This means, for example, that a DIN 933 M16 x 50-8.8 is dimensionally, and with regard to the technical properties, completely identical to ISO 4017 M16 x 50-8.8. All that is

necessary here is a change to the name in the production documents or order files.

In contrast, following more recent technical findings the ISO has changed the height of hexagonal nuts because it was recognised that the stripping resistance can no longer be guaranteed, particularly when modern tightening methods are used. In this case, the connection would no longer be safe against failure. For this reason alone the use of nuts in accordance with ISO standards is highly recommended.

3.2 DIN-ISO successor standards

ISO-DIN previous standards ISO

DIN	ISO	DIN	ISO	DIN	ISO	ISO	DIN	ISO	DIN	ISO	DIN
1	2339	931	4014	6914	7412	1051	660/661	4036	439	8673	934
7	2338	933	4017	6915	7414	1207	84	4161	6923	8673	971
84	1207	934	4032	6916	7416	1234	94	4762	912	8674	971-2
85	1580	934	8673	6921	8102	1479	7976	4766	551	8676	961
94	1234	960	8765	6923	4161	1481	7971	7040	982	8677	603
125	7089	961	8676	6924	7040	1482	7972	7040	6924	8733	7979
125	7090	963	2009	6925	7042	1483	7973	7042	980	8734	6325
126	7091	964	2010	7343	8750	1580	85	7042	6925	8735	7979
417	7435	965	7046	7343	8751	2009	963	7045	7985	8736	7978
427	2342	966	7047	7344	8748	2010	964	7046	965	8737	7977
433	7092	971-1	8673	7346	13337	2338	7	7047	966	8738	1440
438	7436	971-2	8674	7971	1481	2339	1	7049	7981	8740	1473
439	4035	980	7042	7972	1482	2341	1434	7050	7982	8741	1474
439	4036	980	10513	7973	1483	2342	427	7051	7983	8742	1475
440	7094	982	7040	7976	1479	2936	911	7072	11024	8744	1471
551	4766	982	10512	7977	8737	4014	931	7089	125	8745	1472
553	7434	985	10511	7978	8736	4016	601	7090	125	8746	1476
555	4034	1440	8738	7979	8733	4017	933	7091	126	8747	1477
558	4018	1444	2341	7979	8735	4018	558	7092	433	8748	7344
601	4016	1471	8744	7981	7049	4026	913	7093	9021	13337	7346
603	8677	1472	8745	7982	7050	4027	914	7094	440	8750	7343
660	1051	1473	8740	7983	7051	4028	915	7412	6914	8751	7343
661	1051	1474	8741	7985	7045	4029	916	7414	6915	8752	1481
911	2936	1475	8742	7991	10642	4032	934	7416	6916	8765	960
912	4762	1476	8746	9021	7093	4034	555	7434	553	10642	7991
913	4026	1477	8747	11024	7072	4035	439	7435	417	10511	985
914	4027	1481	8752					7436	438	10512	982
915	4028	6325	8734					8102	6921	10513	980
916	4029										

3.3 DIN-ISO changes to widths across flats

Hexagonal widths across flats	DIN	ISO
M10	17 mm	16 mm
M12	19 mm	18 mm
M14	22 mm	21 mm
M22	32 mm	34 mm

3.4 Standard changeover DIN/ISO, general changes, classified in accordance with special fields.

Currently valid standards collections

3.4.1 Technical terms of delivery and basic standards

DIN (old)	ISO	DIN (new) or DIN EN	Title	Changes
267 Part 20	-	DIN EN ISO 6157-2	Fasteners, surface discontinuities, nuts	Nothing noteworthy
267 Part 21	-	DIN EN ISO 10484	Widening test on nuts	Nothing noteworthy
DIN ISO 225	225	DIN EN 20225	Fasteners; bolts, screws, studs and nuts; symbols and designations of dimensioning (ISO 225:1991)	Nothing noteworthy
DIN ISO 273	273	DIN EN 20273	Mech. fasteners; clearance holes for bolts and screws (ISO 273: 1991)	Nothing noteworthy
DIN ISO 898 Part 1	898-1	DIN EN ISO 898 Part 1	Mech. properties of fasteners made of carbon steel and alloy steel (ISO 898-1: 1988)	Nothing noteworthy
267 Part 4	898-2	DIN EN 20898-2	Mech. properties of fasteners, part 2; nuts with specified proof load (ISO 898-2: 1992)	Nothing noteworthy
DIN ISO 898 Part 6	898-6	DIN EN ISO 898 Part 6	Mech. properties of fasteners, part 6; nuts with specified proof load values, fine thread (ISO 898-6: 1988)	Nothing noteworthy
267 Part 19	6157-1	DIN EN 26157 Part 1	Fasteners – Surface discontinuities – Part 1: Bolts, screws and studs for general requirements (ISO 6157-1: 1988)	Nothing noteworthy
267 Part 19	6157-3	DIN EN 26157 Part 3	Fasteners – Surface discontinuities – Part 3: Bolts, screws and studs for special requirements (ISO 6157-3: 1988)	Nothing noteworthy
DIN ISO 7721	7721	DIN EN 27721	Countersunk head screws – Head configuration and gauging (ISO 7721: 1983)	Nothing noteworthy
267 Part 9	-	DIN ISO 4042	Fasteners – Electroplated coatings	Nothing noteworthy
267 Part 1	-	DIN ISO 8992	Fasteners – General requirements for bolts, screws, studs and nuts	Nothing noteworthy
267 Part 5	-	DIN EN ISO 3269	Fasteners – acceptance inspection	Nothing noteworthy
267 Part 11	-	DIN EN ISO 3506, Part 1, 2, 3	Mechanical properties of corrosion-resistant steel fasteners – technical terms of delivery	Nothing noteworthy
267 Part 12	-	DIN EN ISO 2702	Heat-treated steel tapping screws – mechanical properties	Nothing noteworthy
267 Part 18	8839	DIN EN 28839	Mechanical properties of fasteners; nonferrous metal bolts, screws, studs and nuts (ISO 8839: 1986)	Nothing noteworthy

3.4.2 Small metric screws

DIN (old)	ISO	DIN (new) or DIN EN	Title	Changes
84	1207	DIN EN 21207	Slotted cheese head screws – product grade A (ISO 1207: 1992)	Head height and diameter in places
85	1580	DIN EN 21580	Flat-headed screws with slot; product grade A	Head height and diameter in places
963	2009	DIN EN 22009	Countersunk screws with slot, shape A	Head height and diameter in places
964	2010	DIN EN 22010	Countersunk oval head screws with slot, shape A	Head height and diameter in places
965	7046-1	DIN EN 27046-1	Countersunk screws with cross recess (common head): product class A, strength class 4.8	Head height and diameter in places
965	7046-2	DIN EN 27046-2	Countersunk screws with cross recess (common head): product grade A, strength class 4.8	Head height and diameter in places
966	7047	DIN EN 27047	Countersunk oval head screws with cross recess (common head): product grade A	Head height and diameter in places
7985	7045	DIN EN 27045	Flat-headed screws with cross recess; product grade A	Head height and diameter in places

3.4.3 Pins and screws

DIN (old)	ISO	DIN (new) or DIN EN	Title	Changes
1	2339	DIN EN 22339	Taper pins; unhardened (ISO 2339:1986)	Length l incl. round ends
7	2338	DIN EN 22338	Parallel pins, of unhardened steel and austenitic stainless steel (ISO 2338:1986)	Length l incl. round ends
1440	8738	DIN EN 28738	Plain washers for clevis pins – Product grade A (ISO 8738: 1986)	Outer diameter in places
1443	2340	DIN EN 22340	Clevis pins without head (ISO 2340:1986)	Nothing noteworthy
1444	2341	DIN EN 22341	Clevis pins with head (ISO 2341:1986)	Nothing noteworthy
1470	8739	DIN EN 8739	Grooved pins, full length parallel grooved pins with pilot (ISO 8739:1997)	Nothing noteworthy
1471	8744	DIN EN 8744	Grooved pins – Full-length taper grooved (ISO 8744:1997)	Nothing noteworthy
1472	8745	DIN EN 8745	Grooved pins – Half length taper grooved (ISO 8745:1997)	Nothing noteworthy
1473	8740	DIN EN 8740	Gooved pins – Full-length parallel grooved, with chamfer (ISO 8740:1997)	Nothing noteworthy
1474	8741	DIN EN 8741	Grooved pins – Half-length reverse-taper grooved (ISO 8741:1997)	Nothing noteworthy
1475	8742	DIN EN 8742	Grooved pins - one-third-length centre grooved (ISO 8742:1997)	Increased shearing forces
1476	8746	DIN EN 8746	Grooved pins with round head (ISO 8746:1997)	Nothing noteworthy
1477	8747	DIN EN 8747	Grooved pins with countersunk head (ISO 8747:1997)	Nothing noteworthy
1481	8752	DIN EN 8752	Spring-type straight pins – Slotted, heavy duty (ISO 8752:1997)	Bevel angle cancelled
6325	8734	DIN EN 8734	Parallel pins, of hardened steel and martensitic stainless steel (Dowel pins) (ISO 8734:1997)	Shape A/B cancelled

DIN (old)	ISO	DIN (new) or DIN EN	Title	Changes
7977	8737	DIN EN 28737	Tapered pins with external thread; unhardened (ISO 8737:1986)	Nothing noteworthy
7978	8736	DIN EN 28736	Tapered pins with internal thread; unhardened (ISO 8736:1986)	Nothing noteworthy
7979	8733	DIN EN 8733	Parallel pins with internal thread, of unhardened steel and austenitic stainless steel (ISO 8733:1997)	Nothing noteworthy
7979	8735	DIN EN 8735	Parallel pins with internal thread, of hardened steel and martensitic stainless steel (ISO 8735:1997)	Nothing noteworthy

3.4.4 Tapping screws

DIN (old)	ISO	DIN (new) or DIN EN	Title	Changes
7971	1481	DIN ISO 1481	Slotted pan head tapping screws (ISO 1481: 1983)	Head height and diameter in places
7972	1482	DIN ISO 1482	Slotted countersunk (flat) head tapping screws (common head style)	Head height and diameter in places
7973	1483	DIN ISO 1483	Slotted raised countersunk (oval) head tapping screws (common head style)	Head height and diameter in places
7976	1479	DIN ISO 1479	Hexagon head tapping screws	Head height in places
7981	7049	DIN ISO 7049	Cross recessed pan head tapping screws	Head height and diameter in places
7982	7050	DIN ISO 7050	Cross recessed countersunk (flat) head tapping screws (common head style)	Head height and diameter in places
7983	7051	DIN ISO 7051	Cross recessed raised countersunk (oval) head tapping screws	Head height and diameter in places

3.4.5 Hexagon head screws and nuts

DIN (old)	ISO	DIN (new) or DIN EN	Title	Changes
439 T1	4036	DIN EN 24036	Hexagon thin nuts, unchamfered (ISO 4036: 1979)	4 widths across flats
439 T2	4035	DIN EN 24035	Hexagon thin nuts, unchamfered (ISO 4035: 1986)	4 widths across flats
555	4034	DIN EN 24034	Hexagon nuts, product grade C	Nut height and 4 widths across flats
558	4018	DIN EN 24018	Hexagon head screws, product grade C	4 widths across flats
601	4016	DIN EN 24016	Hexagon head bolts, product grade C, DIN 555	4 widths across flats
931	4014	DIN EN 24014	Hexagon head bolt with shank	4 widths across flats
933	4017	DIN EN 24017	Hexagon head screw	4 widths across flats
934 ISO type 1	4032	DIN EN 24032	Hexagonal nuts, style 1	Nut height and 4 widths across flats
934 ISO type 1	8673	DIN EN 28673	Hexagon nuts, style 1, with metric fine pitch thread	Nut height and 4 widths across flats
960	8765	DIN EN 28765	Hexagon head bolts with shaft and metric fine pitch thread	4 widths across flats
961	8676	DIN EN 28676	Hexagon head screws 10.9, thread to head	4 widths across flats

3.4.6 Threaded pins

DIN (old)	ISO	DIN (new) or DIN EN	Title	Changes
417	7435	DIN EN 27435	Slotted set screws with long dog point (ISO 7431: 1983)	Head height and diameter in places
438	7436	DIN EN 27436	Slotted set screws with cup point (ISO 7436: 1983)	Head height and diameter in places
551	4766	DIN EN 24766	Slotted set screws with flat point (ISO 4766: 1983)	Head height and diameter in places
553	7434	DIN EN 27434	Slotted set screws with cone point (ISO 7431: 1983)	Head height and diameter in places
913	4026	DIN 913	Socket set screws with flat point	Head height and diameter in places
914	4027	DIN 914	Slotted set screws with cone point	Head height and diameter in places
915	4028	DIN 915	Slotted set screws with dog point	Head height and diameter in places
916	4029	DIN 916	Slotted set screws with cup point	Head height and diameter in places

3.5 Dimensional changes to hexagonal screws and nuts

Nominal size d	Width across flat s		Nut height m min. – max.			
	DIN	ISO	DIN 555	ISO 4034 ISO type 1	DIN 934	ISO 4032 (RG) 8673 (FG) ISO type 1
Sizes to be avoided						
M1	2.5	-	-	0.55-0.8	0.55-0.8	-
M1,2	3	-	-	-	0.75-1	-
M1,4	3	-	-	-	0.95-1.2	-
M1,6	3.2		-	-	1.05-1.3	1.05-1.3
M2	4		-	-	1.35-1.6	1.35-1.6
M2,5	5		-	-	1.75-2	1.75-2
M3	5.5		-	-	2.15-2.4	2.15-2.4
(M3,5)	6		-	-	2.55-2.8	2.55-2.8
M4	7		-	-	2.9-3.2	2.9-3.2
M5	8		3.4-4.6	4.9-5.6	3.7-4	4.4-4.7
M6	10		4.4-5.6	4.6-6.1	4.7-5	4.9-5.2
(M7)	11	-	-	-	5.2-5.5	-
M8	13		5.75-7.25	6.4-7.9	6.14-6.5	6.44-6.8
M10	17	16	7.25-8.75	8-9.5	7.64-8	8.04-8.4
M12	19	18	9.25-10.75	10.4-12.2	9.64-10	10.37-10.8
(M14)	22	21	-	12.1-13.9	10.3-11	12.1-12.8
M16	24		12.1-13.1	14.1-15.9	12.3-13	14.1-14.8
(M18)	27		-	15.1-16.9	14.3-15	15.1-15.8
M20	30		15.1-16.9	16.9-19	14.9-16	16.9-18
(M22)	32	34	17.1-18.9	18.1-20.2	16.9-18	18.1-19.4
M24	36		17.95-20.05	20.2-22.3	17.7-19	20.2-21.5
(M27)	41		20.95-23.05	22.6-24.7	20.7-22	22.5-23.8
M30	46		22.95-25.05	24.3-26.4	22.7-24	24.3-25.6

Nominal size d	Width across flat s	Nut height m min. – max.			
(M33)	50	24.95-27.05	27.4-29.5	24.7-26	27.4-28.7
M36	55	27.95-30.05	29.4-31.9	27.4-29	29.4-31
(M39)	60	29.75-32.25	31.8-34.3	29.4-31	31.8-33.4
M42	65	32.75-35.25	32.4-34.9	32.4-34	32.4-34
(M45)	70	34.75-37.25	34.4-36.9	34.4-36	34.4-36
M48	75	36.75-39.25	36.4-38.9	36.4-38	36.4-38
(M52)	80	40.75-43.25	40.4-42.9	40.4-42	40.4-42
M56	85	43.75-46.25	43.4-45.9	43.4-45	43.4-45
(M60)	90	46.75-49.25	46.4-48.9	46.4-48	46.4-48
M64	95	49.5-52.5	49.4-52.4	49.1-51	49.1-51
>M64	-	to M100*6	-	to M100*6	-/-
Nut height factor m/d approx.	≤ M4	-	-	0.8	0.8
	M5-M39	0.8	0.83-1.12		0.84-0.93
	≥ M42		~0.8		0.8
Product class		C (average)		≤ M16 = A (average) >M16 = B (average roughness)	
Thread tolerance		7 H		6 H	
Strength class Steel	Core range ~M5-39	5 M16 < d ≤ M39 = 4.5		6.8,10 (ISO 8673 = strength class 10 ≤ M16)	
	>M39	Following agreement		Following agreement	
Mechanical properties according to standard		DIN 267 Part 4	ISO 898 Part 2 (ST) d ≤ M39	DIN 267 Part 4	ISO 898 Part 2 (ST) Part 6 (FT)

ST - standard thread, FT - fine thread