UDC 621.882.211 : 621.88.082.15

January 1990

M8 × 1 to M52 × 3 hexagon head bolts with fine pitch thread

Product grades A and B

DIN 961

Sechskantschrauben mit Gewinde bis Kopf; Feingewinde M8 × 1 bis M52 × 3; Produktklassen A und B

Supersedes December 1983 edition.

In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.

This standard should be used together with ISO 8676. For details, see Explanatory notes. It is intended to withdraw the present standard by 1 July 1992 at the latest.

Dimensions in mm

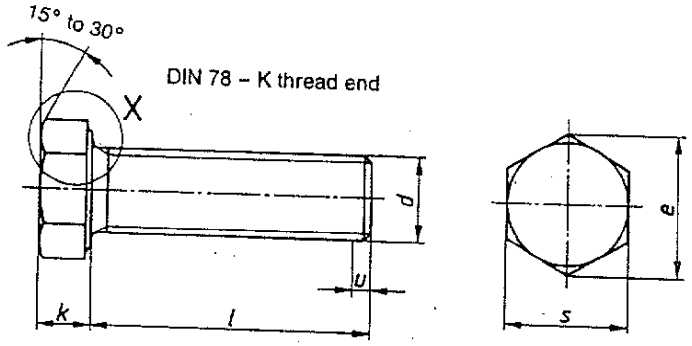
1 Field of application

This standard specifies requirements for M8 to M52 hexagon head bolts threaded up to the head, with metric fine pitch thread, assigned to product grade A for sizes up to M24 and lengths not exceeding 10 d or 150 mm, whichever is shorter, and product grade B for sizes larger than M24 or lengths exceeding 10 d or 150 mm, whichever is shorter. The bolts are identical in design with those specified in DIN 933, except that they have a fine pitch thread.

For special bolt types or designs, see DIN 962.

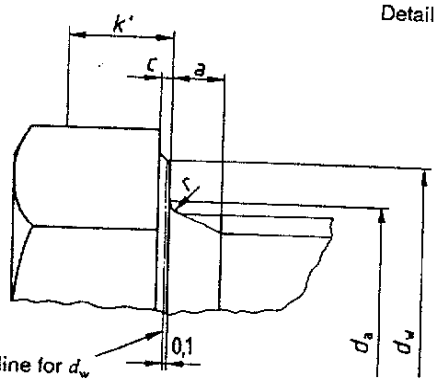
If, in special cases, bolts are to comply with specifications other than those given in this standard, e.g. regarding materials or property classes, these shall be selected in accordance with the appropriate standards.

2 Dimensions



u = maximum of 2 P (incomplete thread).

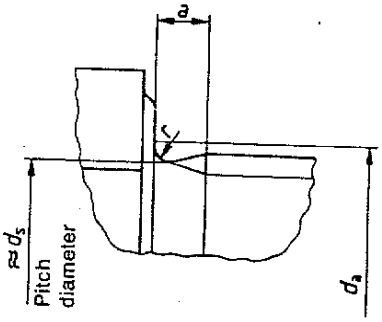
Detail X



Datum line for d_w

k' = minimum wrenching height (0,7 k_{min}).

Permissible alternative design



Continued on pages 2 to 6

Table.

Thread size (d)				M8 × 1	M10 × 1	M12 × 1,5	(M14 × 1,5)	M16 × 1,5	(M18 × 2)	M20 × 1,5	(M22 × 2)	M24 × 2
				–	M10 × 1,25	M12 × 1,25	–	–	(M18 × 1,5)	M20 × 2	(M22 × 1,5)	M24 × 1,5
a [1]			max.	3	3,75	4,5	4,5	4,5	6	6	6	6
c			min.	0,15	0,15	0,15	0,15	0,2	0,2	0,2	0,2	0,2
			max.	0,6	0,6	0,6	0,6	0,8	0,8	0,8	0,8	0,8
d_a			max.	9,2	11,2	13,7	15,7	17,7	20,2	22,4	24,4	26,4
d_w	min.	Product grade	A	11,6	15,6	17,4	20,5	22,5	25,3	28,2	30	33,6
			B	11,4	15,4	17,2	20,1	22	24,8	27,7	29,5	33,2
e	min.	Product grade	A	14,38	18,9	21,1	24,49	26,75	30,14	33,53	35,72	39,98
			B	14,2	18,72	20,88	23,91	26,17	29,56	32,95	35,03	39,55
k	Nominal size			5,3	6,4	7,5	8,8	10	11,5	12,5	14	15
	Product grade	A	min.	5,15	6,22	7,32	8,62	9,82	11,28	12,28	13,78	14,78
			max.	5,45	6,58	7,68	8,98	10,18	11,72	12,72	14,22	15,22
		B	min.	5,06	6,11	7,21	8,51	9,71	11,15	12,15	13,65	14,65
			max.	5,54	6,69	7,79	9,09	10,29	11,85	12,85	14,35	15,35
k'			min.	3,54	4,28	5,05	5,96	6,8	7,8	8,5	9,6	10,3
r			min.	0,4	0,4	0,6	0,6	0,6	0,6	0,8	0,8	0,8
s	max. = nominal size			13	17	19	22	24	27	30	32	36
	min.	Product grade	A	12,73	16,73	18,67	21,67	23,67	26,67	29,67	31,61	35,38
			B	12,57	16,57	18,48	21,16	23,16	26,16	29,16	31	35

Nominal size	l Product grade A min.	A max.	B min.	B max.	Mass (7,85 kg/dm³) per 1000 units, in kg, approximately								
8	7,71	8,29	–	–	8,6	16,7							
10	9,71	10,29	–	–	9,3	17,8	25,5	38,8					
12	11,65	12,35	–	–	9,9	18,9	27,0	40,9	55,1				
(14)	13,65	14,35	–	–	10,6	19,9	28,5	43,0	57,9				
16	15,65	16,35	–	–	11,3	21,0	30,0	45,1	60,7				
(18)	17,65	18,35	–	–	11,9	22,1	31,5	47,2	63,4	86,6	115	143	
20	19,58	20,42	–	–	12,6	23,2	33,0	49,3	66,2	90,0	119	148	193
(22)	21,58	22,42	–	–	13,2	24,2	34,5	51,3	69,0	93,4	124	154	199
25	24,58	25,42	–	–	14,2	25,8	36,7	54,4	73,2	98,6	131	162	209
(28)	27,58	28,42	–	–	15,2	27,4	39,0	57,6	77,3	104	137	170	218
30	29,58	30,42	–	–	15,9	28,5	40,5	59,7	80,1	107	141	175	224
35	34,5	35,5	–	–	17,6	31,2	44,2	64,9	87,1	116	152	188	240
40	39,5	40,5	–	–	19,2	33,9	48,0	70,2	94,0	124	163	201	256
45	44,5	45,5	–	–	20,9	36,6	51,7	75,4	101	133	174	215	272
50	49,5	50,5	–	–	22,6	39,3	55,5	80,6	108	141	186	228	288
55	54,4	55,6	–	–	24,2	42,0	59,2	85,8	115	150	197	241	303
60	59,4	60,6	–	–	25,9	44,7	63,0	91,1	122	159	208	254	319
65	64,4	65,6	–	–	27,6	47,4	66,7	96,3	129	167	219	267	335
70	69,4	70,6	–	–	29,2	50,0	70,5	102	136	176	230	281	351
(75)	74,4	75,6	–	–	30,9	52,7	74,2	107	143	184	241	294	367
80	79,4	80,6	–	–	32,5	55,4	78,0	112	150	193	253	307	383
(85)	84,3	85,7	83,25	86,75	34,2	58,1	81,7	117	157	202	264	320	399
90	89,3	90,7	88,25	91,75	35,9	60,8	85,4	122	164	210	275	333	415
(95)	94,3	95,7	93,25	96,75	37,5	63,5	89,2	128	171	219	286	347	430
100	99,3	100,7	98,25	101,75	39,2	66,2	92,9	133	177	227	297	360	446
110	109,3	110,7	108,25	111,75	42,5	71,6	100	143	191	244	319	386	478
120	119,3	120,7	118,25	121,75	45,9	77,0	108	154	205	261	342	413	510
130	129,2	130,8	128	132		82,4	115	164	219	279	364	439	541
140	139,2	140,8	138	142		87,7	123	175	233	296	386	466	573
150	149,2	150,8	148	152		93,1	130	185	247	313	409	492	605
160	159,2	160,8	158	162			138	196	260	330	431	518	637
(170)	169,2	170,8	168	172			145	206	274	347	453	545	668
180	179,2	180,8	178	182			153	217	288	365	475	571	700
(190)	189,08	190,92	187,7	192,3				227	302	382	498	598	732
200	199,08	200,92	197,7	202,3				236	316	399	520	624	764

As a rule, bolts are manufactured in the sizes for which values of mass (guideline values) have been given. Use of sizes given in brackets should be avoided where possible.

Product grade A has been given above, product grade B below the stepped line.

[1] The values specified for a apply for the coarser pitch ($a = 3\,P$).

Table (concluded).

Thread size (d)		(M27 × 2)	M30 × 2	(M33 × 2)	M36 × 3	(M39 × 3)	M42 × 3	(M45 × 3)	M48 × 3	(M52 × 3)
a	max.	6	6	6	9	9	9	9	9	9
c	min.	0,2	0,2	0,2	0,2	0,3	0,3	0,3	0,3	0,3
	max.	0,8	0,8	0,8	0,8	1	1	1	1	1
d_a	max.	30,4	33,4	36,4	39,4	42,4	45,6	48,6	52,6	56,6
d_w	min.	38	42,7	46,6	51,1	55,9	59,9	64,7	69,4	74,2
e	min.	45,2	50,85	55,37	60,79	66,44	71,3	76,95	82,6	88,25
k	Nominal size	17	18,7	21	22,5	25	26	28	30	33
	min.	16,65	18,28	20,58	22,08	24,58	25,58	27,58	29,58	32,5
	max.	17,35	19,12	21,42	22,92	25,42	26,42	28,42	30,42	33,5
k'	min.	11,7	12,8	14,4	15,5	17,2	17,9	19,3	20,9	22,8
r	min.	1	1	1	1	1	1,2	1,2	1,6	1,6
s	max. = nominal size	41	46	50	55	60	65	70	75	80
	min.	40	45	49	53,8	58,8	63,1	68,1	73,1	78,1

l			Mass (7,85 kg/dm³) per 1000 units, in kg, approximately								
Nominal size	min.	max.									
20	18,95	21,05	273								
(22)	20,95	23,05	281								
25	23,95	26,05	293								
(28)	26,95	29,05	305								
30	28,95	31,05	313	417							
35	33,75	36,25	333	442	569	705	898				
40	38,75	41,25	354	468	600	741	940	1131	1377		
45	43,75	46,25	374	493	631	776	983	1180	1434	1721	
50	48,75	51,25	394	519	662	812	1025	1230	1491	1786	2190
55	53,5	56,5	415	544	693	848	1067	1279	1548	1852	2267
60	58,5	61,5	435	569	724	884	1109	1329	1605	1917	2344
65	63,5	66,5	455	595	755	919	1158	1378	1663	1982	2422
70	68,5	71,5	476	620	786	955	1194	1428	1720	2048	2499
(75)	73,5	76,5	496	645	817	991	1236	1477	1777	2113	2576
80	78,5	81,5	517	671	848	1027	1279	1526	1834	2178	2653
(85)	83,25	86,75	537	696	879	1062	1321	1576	1891	2244	2730
90	88,25	91,75	557	722	910	1098	1363	1625	1948	2309	2807
(95)	93,25	96,75	578	747	941	1134	1406	1675	2005	2374	2885
100	98,25	101,75	598	772	972	1169	1448	1724	2062	2440	2962
110	108,25	111,75	639	823	1034	1240	1533	1823	2176	2571	3116
120	118,25	121,75	679	874	1096	1312	1617	1922	2290	2701	3271
130	128	132	720	924	1158	1383	1702	2021	2405	2832	3425
140	138	142	761	975	1220	1455	1786	2119	2519	2963	3579
150	148	152	802	1026	1282	1526	1871	2218	2633	3093	3734
160	158	162	842	1077	1344	1598	1956	2317	2747	3224	3888
(170)	168	172	883	1127	1405	1669	2040	2416	2861	3355	4043
180	178	182	924	1178	1467	1741	2125	2515	2976	3485	4197
(190)	187,7	192,3	964	1229	1529	1812	2209	2614	3090	3616	4351
200	197,7	202,3	1005	1280	1591	1883	2294	2712	3204	3747	4506

Lengths exceeding 200 mm shall be graded in 20 mm steps.

3 Technical delivery conditions

Material		Steel	Stainless steel	Non-ferrous metal
General requirements		As specified in DIN 267 Part 1.		
Thread	Tolerance	6g [3]		
	Standard	DIN 13 Parts 12 and 15		
Mechanical properties	Property class (material)	For sizes up to M39: 5.6, 8.8 or 10.9. For larger sizes: subject to agreement.[2]	For sizes up to M20: A2-70 or A4-70. For sizes larger than M20 up to M39: A2-50 or A4-50. For sizes larger than M39: subject to agreement.[2]	Subject to agreement.
	Standard	ISO 898 Part 1	DIN 267 Part 11	DIN 267 Part 18
Limit deviations, geometrical tolerances	Product grade	A, up to size M24 and l up to 10 d or 150 mm.[1] B, for sizes above M24 or l exceeding 10 d or 150 mm.[1]		
	Standard	ISO 4759 Part 1		
Surface finish		As processed.	Bright.	Bright.
		Property class 8.8 and above: (thermally or chemically) blackened. DIN 267 Part 2 shall apply with regard to surface roughness. DIN 267 Part 19 shall apply with regard to permissible surface discontinuities. DIN 267 Part 9 shall apply with regard to electroplating.		
Acceptance inspection		DIN 267 Part 5 shall apply with regard to acceptance inspection.		

[1] Whichever is shorter (see stepped line in the dimension table).

[2] The symbols used to denote the property class as specified in ISO 898 Part 1 and DIN 267 Part 11 may also be used for sizes above M39 provided that the finished product has all the properties assigned to the particular symbol.

[3] Only for screws without surface protection. 6g makes it possible for normal coating thicknesses to be applied in accordance with DIN 267 Part 9, the reference line not being exceeded. Depending on the coating thickness required, a larger fundamental deviation shall be selected than that for the g position. This might, however, impair the resistance to stripping of the bolt/nut assembly.

4 Designation

Designation of an M8 × 1 hexagon head bolt of nominal length, l = 50 mm, with the material assigned to property class 8.8:

Hexagon head bolt DIN 961 – M8 × 1 × 50 – 8.8

If product grade A is required for sizes up to M24 with lengths over 150 mm or with l greater than 10 d, or for sizes above M24, this shall be indicated in the designation by adding 'A', e.g.

Hexagon head bolt DIN 961 – M30 × 2 × 100 – 8.8 – A

DIN 962 shall apply with regard to the designation of designs and types, with additional details to be given when ordering.

The DIN 4000-2-1 tabular layout of article characteristics shall apply to bolts covered in this standard.

Standards referred to

DIN 13 Part 12	ISO metric screw threads; coarse and fine pitch threads with diameters from 1 to 300 mm; selected for diameters and pitches
DIN 13 Part 15	ISO metric screw threads; fundamental deviations and tolerances for screw threads of 1 mm diameter and larger
DIN 78	Thread ends for ISO metric screw threads in accordance with DIN 13
DIN 267 Part 1	Fasteners; technical delivery conditions; general requirements
DIN 267 Part 2	Fasteners; technical delivery conditions; finish and dimensional accuracy
DIN 267 Part 5	Fasteners; technical delivery conditions; acceptance inspection (modified version of ISO 3269, 1984 edition)
DIN 267 Part 9	Fasteners; technical delivery conditions; electroplated components
DIN 267 Part 11	Fasteners; technical delivery conditions, with addenda to ISO 3506; corrosion-resistant stainless steel components
DIN 267 Part 18	Fasteners; technical delivery conditions; non-ferrous metal components
DIN 267 Part 19	Fasteners; technical delivery conditions; surface discontinuities on bolts
DIN 933	M1,6 to M52 hexagon head bolts threaded up to the head; product grades A and B
DIN 962	Bolts, screws, studs and nuts; designations, types and finishes
DIN 4000 Part 2	Tabular layout of article characteristics for bolts, screws and nuts
ISO 898 Part 1	Mechanical properties of fasteners; bolts, screws and studs
ISO 4759 Part 1	Tolerances for fasteners; bolts, screws, and nuts with thread diameters between 1,6 (inclusive) and 150 mm and product grades A, B and C

Previous editions

DIN 961: 12.52, 03.63, 11.67, 11.70, 12.83.

Amendments

The following amendments have been made to the December 1983 edition.

a) A note on the period of validity of this standard has been included.

b) For sizes M10, M12, M14 and M22, the ISO 272 widths across flats are no longer specified.

c) A datum line for determination of the bearing face diameter, d_w, has been included.

d) The standard has been editorially revised.

Explanatory notes

For more than 20 years efforts have been directed towards the achievement of the international interchangeability of fasteners by preparing international standards for the product concerned. ISO Standards have now been published for the most important types of fasteners (see ISO Standards Handbook 18).

However, international efforts only serve a useful purpose if national standards are adapted as far as possible to international standards, or, ideally, replaced by them. Current DIN Standards already agree in substance with the relevant ISO Standards, but still differ in some respects, as for instance in the widths across flats for hexagon products.

The Federal Republic of Germany adopted International Standard ISO 272 on widths across flats as national standard DIN ISO 272 in October 1979. Nevertheless, widths across flats deviating from DIN ISO 272 are still being used in Germany for thread sizes M10, M12, M14 and M22. The table below compares the previous widths across flats with the new ones specified for the four thread sizes referred to.

Thread size	M 10	M 12	M 14	M 22
Previous width across flats, in mm	17	19	22	32
New width across flats as in ISO 272, in mm	16	18	21	34

The manufacturers and users of hexagon products participating in the work of the *Normenausschuß Mechanische Verbindungselemente* (Fasteners Standards Committee), together with representatives of the dealers in fasteners, have decided to introduce the new widths across flats in all relevant product standards. Since experience has shown that the introduction of the new widths across flats has not been advanced by their inclusion in DIN Standards merely as preferred alternatives to the previous widths across flats, the following decisions have been reached to accelerate the changeover procedure.

Supplementary to current DIN Standards specifying the previous widths across flats, DIN ISO Standards dealing with the same products will, wherever ISO Standards are available, be published which, besides introducing a number of other minor amendments, will specify the new widths across flats conforming to ISO 272. In both DIN and DIN ISO Standards attention will be drawn to the fact that the relevant ISO Standards are to be preferred and that the DIN Standard is to be replaced after a transition period of 3 to 4 years. If no relevant ISO Standard is available, the DIN Standard will contain a foreword stating that the previous width across flats specifications are to be withdrawn after a transition period and replaced by those specified in ISO 272.

This sets a time limit for both manufacturer and user of hexagon products by which the changeover to the new widths across flats must be effected. The responsible committee is of the opinion that it will still be possible after this period to obtain fasteners complying with the superseded specifications as spare parts.

When using products having the new widths across flats, attention shall be paid to the fact that not only the overall dimensions have changed but also the surface pressure for the underhead bearing area (cf. ISO 272).

In some cases, the replacement of previous DIN Standards by relevant ISO Standards may involve that some nominal sizes or particular technical delivery conditions are no longer specified, the reason being that either ISO standardization has not yet reached a certain level of completeness or no standardization has as yet been intended by ISO.

Finally, it should be noted that the date for withdrawal given on page 1 may be irrelevant as this standard will be superseded upon the publication of an EN Standard.

International Patent Classification

F 16 B 35/00