Steel hexagon head bolts for structural steel bolting, for supply with hexagon nuts

DIN 7990

ICS 21.060.10

Supersedes October 1989 edition.

Sechskantschrauben mit Sechskantmutter für Stahlkonstruktionen

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.

Foreword

This standard has been prepared by Technical Committee *Schraubenverbindungen für den Stahlbau* of the *Normenausschuß Mechanische Verbindungselemente* (Fasteners Standards Committee).

Amendments

This standard differs from the October 1989 edition in that nominal size M22 and a width across flats of 19 mm for size M12 have been dropped and references have been updated.

Previous editions

DIN 1050 Suppl 2: 1943-12; DIN 7990: 1956-10, 1963-03, 1971-01, 1989-10.

All dimensions are in millimetres.

1 Scope

This standard specifies dimensions and technical delivery conditions for M12 to M30 steel hexagon head bolts of product grade C for use in structural steel bolting. It also specifies the nuts and washers to be used.

2 Normative references

This standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the titles of the publications are listed below. For dated references, subsequent amendments to or revisions of any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

DIN 13-12	General purpose ISO metric screw threads – Coarse and fine pitch threads with diameters from 1 mm to 300 mm – Selected diameters and pitches
DIN 13-15	ISO metric screw threads – Fundamental deviations and tolerances for screw threads of 1 mm diameter and larger
DIN 267-10	Fasteners – Technical delivery conditions – Hot-dip galvanized components
DIN 4000-2	Tabular layouts of article characteristics for bolts, screws and fit bolts
DIN 7989	Plain washers for structural steelwork
DIN EN 24032	Hexagon nuts, style 1 – Product grades A and B (ISO 4032 : 1986)
DIN EN 24034	Hexagon nuts – Product grade C (ISO 4034 : 1986)

Continued on pages 2 to 6.

Translation by DIN-Sprachendienst.

In case of doubt, the German-language original should be consulted as the authoritative text.

Ref. No. DIN 7990 : 1999-12
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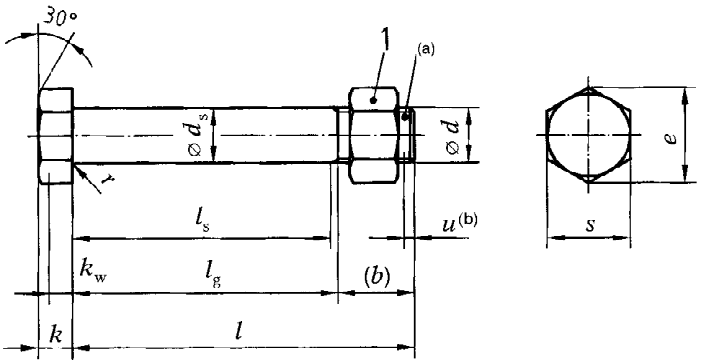
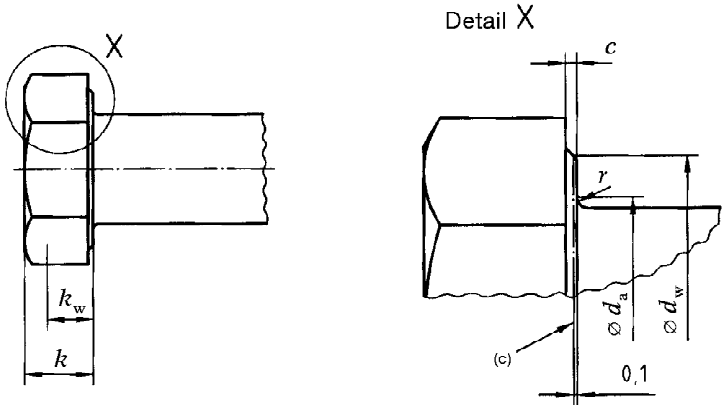
DIN EN ISO 898-1	Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs (ISO 898-1 : 1999)
DIN EN ISO 3269	Fasteners – Acceptance inspection (ISO/DIS 3269 : 1998)*)
DIN EN ISO 4042	Fasteners – Electroplated coatings (ISO 4042 : 1999)
DIN EN ISO 4753	Fasteners – Ends of parts with ISO metric screw thread (ISO/DIS 4753 : 1997)*)
DIN EN ISO 4759-1	Tolerances for fasteners – Part 1: Bolts, screws, studs and fit bolts – Product grades A, B and C (ISO/DIS 4759-1 : 1997)*)
DIN EN ISO 10683	Fasteners – Non-electrically applied zinc flake coatings (ISO/DIS 10683 : 1999)*)
ISO 8992 : 1986	Fasteners – General requirements for bolts, screws, studs and fit bolts

3 Dimensions

Bolt dimensions shall be as given in figure 1 and table 1.



Bearing face design optional.



1 DIN EN 24032 or DIN EN 24034 nut (at manufacturer's discretion)

(a) Type CH thread end to DIN EN ISO 4753

(b) $u = 2\ P$ maximum; incomplete thread.

(c) Datum line for d_w

Figure 1: Bolt dimensions (notation)

*) Currently at draft stage.

Table 1: Bolt dimensions

Thread size d		M12	M16	M20	M24	M27	M30
P[1])		1,75	2	2,5	3	3	3,5
b	(auxiliary dimension)	17,75	21	23,5	26	29	30,5
c	max.	0,6	0,8	0,8	0,8	0,8	0,8
d_a	max.	14,7	18,7	24,4	28,4	32,4	35,4
d_s	Nominal size	12	16	20	24	27	30
	min.	11,3	15,3	19,16	23,16	26,16	29,16
	max.	12,7	16,7	20,84	24,84	27,84	30,84
d_w	min.	16,4	22	27,7	33,2	38	42,7
e	min.	19,85	26,17	32,95	39,55	45,20	50,85
k	Nominal size	8	10	13	15	17	19
	min.	7,55	9,25	12,1	14,1	16,1	17,95
	max.	8,45	10,75	13,9	15,9	17,9	20,05
k_w	min.	5,28	6,47	8,47	9,87	11,27	12,56
r	min.	0,6	0,6	0,8	0,8	1	1
s	max. = nominal size	18	24	30	36	41	46
	min.	17,57	23,16	29,16	35	40	45

l			Lengths l_g[2]) and l_s[3])											
Nominal size	min.	max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.	l_s min.	l_g max.
30	28,95	31,05	7	12,25										
35	33,75	36,25	12	17,25	8	14								
40	38,75	41,25	17	22,25	13	19	9	16,5						
45	43,75	46,25	22	27,25	18	24	14	21,5	10	19				
50	48,75	51,25	27	32,25	23	29	19	26,5	15	24				
55	53,5	56,5	32	37,25	28	34	24	31,5	20	29				
60	58,5	61,5	37	42,25	33	39	29	36,5	25	34	22	31		
65	63,5	66,5	42	47,25	38	44	34	41,5	30	39	27	36		
70	68,5	71,5	47	52,25	43	49	39	46,5	35	44	32	41		
75	73,5	76,5	52	57,25	48	54	44	51,5	40	49	37	46		
80	78,5	81,5	57	62,25	53	59	49	56,5	45	54	42	51	39	49,5
85	83,25	86,75	62	67,25	58	64	54	61,5	50	59	47	56	44	54,5
90	88,25	91,75	67	72,25	63	69	59	66,5	55	64	52	61	49	59,5
95	93,25	96,75	72	77,25	68	74	64	71,5	60	69	57	66	54	64,5
100	98,25	101,75	77	82,25	73	79	69	76,5	65	74	62	71	59	69,5
105	103,25	106,75	82	87,25	78	84	74	81,5	70	79	67	76	64	74,5
110	108,25	111,75	87	92,25	83	89	79	86,5	75	84	72	81	69	79,5
115	113,25	116,75	92	97,25	88	94	84	91,5	80	89	77	86	74	84,5
120	118,25	121,75	97	102,25	93	99	89	96,5	85	94	82	91	79	89,5
125	123	127			98	104	94	101,5	90	99	87	96	84	94,5
130	128	132			103	109	99	106,5	95	104	92	101	89	99,5
135	133	137			108	114	104	111,5	100	109	97	106	94	104,5
140	138	142			113	119	109	116,5	105	114	102	111	99	109,5
145	143	147			118	124	114	121,5	110	119	107	116	104	114,5
150	148	152			123	129	119	126,5	115	124	112	121	109	119,5
155	151	159					124	131,5	120	129	117	126	114	124,5
160	156	164					129	136,5	125	134	122	131	119	129,5
165	161	169					134	141,5	130	139	127	136	124	134,5
170	166	174					139	146,5	135	144	132	141	129	139,5
175	171	179					144	151,5	140	149	137	146	134	144,5
180	176	184							145	154	142	151	139	149,5
185	180,4	189,6							150	159	147	156	144	154,5
190	185,4	194,6							155	164	152	161	149	159,5
195	190,4	199,6							160	169	157	166	154	164,5
200	195,4	204,6							165	174	163	172	159	169,5

NOTE: Commercial sizes of bolts are those for which lengths l_g and l_s have been specified.

[1]) P = pitch of thread.

[2]) $l_{g\,max} = l_{nominal\ size} - b$.

[3]) $l_{s\,min} = l_{g\,max} - 3\,P$.

4 Technical delivery conditions

Material		Steel
General requirements		As specified in ISO 8992.
Thread	Tolerance	8g
	As specified in	DIN 13-12 and DIN 13-15.
Mechancal properties	Property class	4.6, 5.6
	As specified in	DIN EN ISO 898-1.
Limit deviations and geo-metrical tolerances	Product grade	C
	As specified in	DIN EN ISO 4759-1.
Surface finish		As processed. DIN EN ISO 4042 applies with regard to electroplating. DIN EN ISO 10683 applies with regard to zinc flake coatings. DIN 267-10 applies with regard to hot-dip galvanizing.
Acceptance inspection		DIN EN ISO 3269 applies with regard to acceptance inspection.

5 Designation

Designation of an M16 steel hexagon head bolt, with a length, l, of 50 mm, of property class 4.6, with hexagon nut (Mu)[1]:

Bolt DIN 7990 – M16 × 50 – Mu – 4.6

The DIN 4000-2-1.1 tabular layout of article characteristics shall apply to bolts covered in this standard.

6 Marking

Bolts shall be marked in accordance with DIN EN ISO 898-1 and with the DIN number (DIN 7990).

[1]) Where bolts are supplied in given quantities, the nuts may accompany the consignment in bulk packaging.

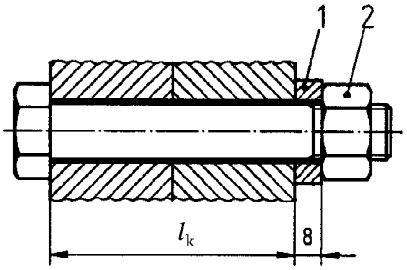
7 Mass

The values given below are for guidance only.

Table 2: Mass

Thread size	**M12**	**M16**	**M20**	**M24**	**M27**	**M30**
Length, l, in mm	Approximate mass of bolt and nut (7,85 kg/dm^3) per 1 000 units, in kg					
30	56,2					
35	60,6	125				
40	65,0	133	249			
45	69,4	141	261	393		
50	73,8	149	273	411		
55	78,2	157	285	429		
60	82,6	165	297	447	611	
65	87,0	173	309	465	633	
70	91,4	181	321	483	655	
75	95,8	189	333	501	677	
80	99,4	197	345	519	699	920
85	104	205	357	537	721	948
90	108	213	369	555	743	976
95	112	221	381	573	765	1 004
100	116	229	393	591	787	1 032
105	120	240	405	609	809	1 060
110	124	245	417	627	831	1 088
115	128	253	429	645	853	1 116
120	132	261	441	663	875	1 144
125		269	453	681	897	1 172
130		277	465	699	919	1 200
135		285	477	717	941	1 228
140		293	489	735	963	1 256
145		301	501	753	985	1 284
150		309	513	771	1 007	1 312
155			525	789	1 029	1 340
160			537	807	1 051	1 368
165			549	825	1 073	1 396
170			561	843	1 095	1 424
175			573	861	1 117	1 452
180				879	1 139	1 480
185				897	1 161	1 508
190				915	1 183	1 536
195				933	1 205	1 564
200				951	1 227	1 592
Mass of nut, in kg per 1 000 units	15,3	36,5	69,3	119	170	234

8 Grip lengths



1 DIN 7989 washer
2 DIN EN 24032 or DIN EN 24034 nut

Figure 2: Grip length

Table 3: Grip lengths

Thread size	M12	M16	M20	M24	M27	M30
Length, l		Grip length, l_k				
30	5 to 9					
35	10 to 14	6 to 10				
40	15 to 19	11 to 15	8 to 12			
45	20 to 24	16 to 20	13 to 17	9 to 13		
50	25 to 29	21 to 25	18 to 22	14 to 18		
55	30 to 34	26 to 30	23 to 27	19 to 23		
60	35 to 39	31 to 35	28 to 32	24 to 28	21 to 25	
65	40 to 44	36 to 40	33 to 37	29 to 33	26 to 30	
70	45 to 49	41 to 45	38 to 42	34 to 38	31 to 35	
75	50 to 54	46 to 50	43 to 47	39 to 43	36 to 40	
80	55 to 59	51 to 55	48 to 52	44 to 48	41 to 45	39 to 43
85	60 to 64	56 to 60	53 to 57	49 to 53	46 to 50	44 to 48
90	65 to 69	61 to 65	58 to 62	54 to 58	51 to 55	49 to 53
95	70 to 74	66 to 70	63 to 67	59 to 63	56 to 60	54 to 58
100	75 to 79	71 to 75	68 to 72	64 to 68	61 to 65	59 to 63
105	80 to 84	76 to 80	73 to 77	69 to 73	66 to 70	64 to 68
110	85 to 89	81 to 85	78 to 82	74 to 78	71 to 75	69 to 73
115	90 to 94	86 to 90	83 to 87	79 to 83	76 to 80	74 to 78
120	95 to 99	91 to 95	88 to 92	84 to 88	81 to 85	79 to 83
125		96 to 100	93 to 97	89 to 93	86 to 90	84 to 88
130		101 to 105	98 to 102	94 to 98	91 to 95	89 to 93
135		106 to 110	103 to 107	99 to 103	96 to 100	94 to 98
140		111 to 115	108 to 112	104 to 108	101 to 105	99 to 103
145		116 to 120	113 to 117	109 to 113	106 to 110	104 to 108
150		121 to 125	118 to 122	114 to 118	111 to 115	109 to 113
155			123 to 127	119 to 123	116 to 120	114 to 118
160			128 to 132	124 to 128	121 to 125	119 to 123
165			133 to 137	129 to 133	126 to 130	124 to 128
170			138 to 142	134 to 138	131 to 135	129 to 133
175			143 to 147	139 to 143	136 to 140	134 to 138
180				144 to 148	141 to 145	139 to 143
185				149 to 153	146 to 150	144 to 148
190				154 to 158	151 to 155	149 to 153
195				159 to 163	156 to 160	154 to 158
200				164 to 168	161 to 165	159 to 163