

UDC 621.882.211

September 1987

## M 5 to M 52 hexagon head bolts

Product grade C

**DIN**  
**601**

Sechskantschrauben mit Schaft, Gewinde M 5 bis M 52;  
 Produktklasse C

This standard, together with  
 DIN ISO 4016, September 1987 edition,  
 supersedes the June 1984 edition.

This standard should be used together with ISO 4016. For details, see Explanatory notes. It is intended to withdraw the present standard by 1 July 1992 at the latest.

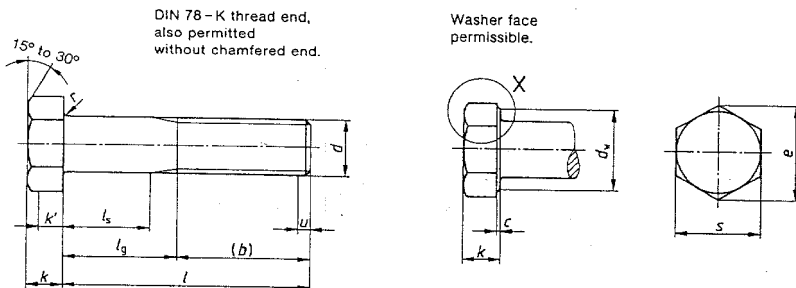
*In keeping with current practice in standards published by the International Organization for Standardization (ISO), a comma has been used throughout as the decimal marker.*

Dimensions in mm

**1 Field of application**

This standard specifies requirements for M 5 to M 52 hexagon head bolts assigned to product grade C.

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

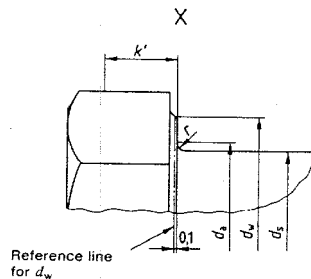
**2 Dimensions**

DIN 78 - K thread end,  
 also permitted  
 without chamfered end.

Washer face  
 permissible.

$k'$  = minimum wrenching  
 height (0,7  $R$  min.).

$u$  = maximum of 2  $P$  incomplete thread.



Continued on pages 2 to 8

Page 2 DIN 601

Table.

Thread size		M 5	M 6	M 8	M 10	M 12	M 16								
<i>P</i>	1)	0,8	1	1,25	1,5	1,75	2								
<i>b</i>	2)	16	18	22	26	30	38								
	3)	22	24	28	32	36	44								
	4)	35	37	41	45	49	57								
<i>c</i>	max.	0,5	0,5	0,6	0,6	0,6	0,8								
<i>d<sub>a</sub></i>	max.	6	7,2	10,2	12,2	14,7	18,7								
<i>d<sub>w</sub></i>	min.	6,7	8,7	11,4	15,4	17,2	22								
<i>d<sub>s</sub></i>	Nominal size	5	6	8	10	12	16								
	min.	4,52	5,52	7,42	9,42	11,3	15,3								
	max.	5,48	6,48	8,58	10,58	12,7	16,7								
<i>e</i>	min.	8,63	10,89	14,2	18,72	20,88	26,17								
<i>k</i>	Nominal size	3,5	4	5,3	6,4	7,5	10								
	min.	3,12	3,62	4,92	5,95	7,05	9,25								
	max.	3,88	4,38	5,68	6,85	7,95	10,75								
<i>k'</i>	min.	2,2	2,5	3,45	4,2	4,95	6,5								
<i>r</i>	min.	0,2	0,25	0,4	0,4	0,6	0,6								
<i>s</i>	max. = nominal size	8	10	13	17	19	24								
	min.	7,64	9,64	12,57	16,57	18,48	23,16								
<i>l</i>		Shank length, <i>l<sub>s</sub></i> , and grip length, <i>l<sub>g</sub></i> *)													
Nominal size	min.	max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	
25	23,95	26,05	5	9											
30	28,95	31,05	10	14	7	12									
35	33,75	36,25	15	19	12	17	6,75	13							
40	38,75	41,25	20	24	17	22	11,75	18	6,5	14					
45	43,75	46,25	25	29	22	27	16,75	23	11,5	19	6,25	15			
50	48,75	51,25	30	34	27	32	21,75	28	16,5	24	11,25	20			
55	53,5	56,5			32	37	26,75	33	21,5	29	16,25	25	7	17	
60	58,5	61,5			37	42	31,75	38	26,5	34	21,25	30	12	22	
65	63,5	66,5					36,75	43	31,5	39	26,25	35	17	27	
70	68,5	71,5					41,75	48	36,5	44	31,25	40	22	32	
80	78,5	81,5					51,75	58	46,5	54	41,25	50	32	42	
90	88,25	91,75							56,5	64	51,25	60	42	52	
100	98,25	101,75							66,5	74	61,25	70	52	62	
110	108,25	111,75									71,25	80	62	72	
120	118,25	121,75									81,25	90	72	82	
130	128	132											76	86	
140	138	142											86	96	
150	148	152											96	106	
160	158	164											106	116	

Up to size M36, DIN 558 shall apply with regard to bolts with lengths above the stepped line.  
As a general rule, bolts are manufactured in the sizes for which shank lengths have been specified.  
Use of values given in brackets should be avoided where possible.  
For 1) to 4), see page 4.

\*)  $l_g \text{ max} = l \text{ (nominal size)} - b$  $l_s \text{ min} = l_g \text{ max} - 5P$

Table. (continued)

Thread size		M 20	M 24	(M 27)	M 30					
<i>P</i>	1)	2,5	3	3	3,5					
<i>b</i>	Temporary size 2)	46	54	60	66					
	3)	52	60	66	72					
	4)	65	73	79	85					
<i>c</i>	max.	0,8	0,8	0,8	0,8					
<i>d<sub>n</sub></i>	max.	24,4	28,4	32,4	35,4					
<i>d<sub>w</sub></i>	min.	27,7	33,2	38	42,7					
<i>d<sub>s</sub></i>	Nominal size	20	24	27	30					
	min.	19,16	23,16	26,16	29,16					
	max.	20,84	24,84	27,84	30,84					
<i>e</i>	min.	32,95	39,55	45,2	50,85					
<i>k</i>	Nominal size	12,5	15	17	18,7					
	min.	11,6	14,1	16,1	17,65					
	max.	13,4	15,9	17,9	19,75					
<i>k'</i>	min.	8,1	9,9	11,3	12,4					
<i>r</i>	min.	0,8	0,8	1	1					
<i>s</i>	max. = nominal size	30	36	41	46					
	min.	29,16	35	40	45					
Nominal size	<i>l</i>		Shank length, <i>l<sub>s</sub></i> , and grip length, <i>l<sub>g</sub></i> *)							
	min.	max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.
65	63,5	66,5	6,5	19						
70	68,5	71,5	11,5	24						
80	78,5	81,5	21,5	34	11	26				
90	88,25	91,75	31,5	44	21	36	15	30	6,5	24
100	98,25	101,75	41,5	54	31	46	25	40	16,5	34
110	108,25	111,75	51,5	64	41	56	35	50	26,5	44
120	118,25	121,75	61,5	74	51	66	45	60	36,5	54
130	128	132	65,5	78	55	70	49	64	40,5	58
140	138	142	75,5	88	65	80	59	74	50,5	68
150	148	152	85,5	98	75	90	69	84	60,5	78
160	156	164	95,5	108	85	100	79	94	70,5	88
180	176	184	115,5	128	105	120	99	114	90,5	108
200	195,4	204,6	135,5	148	125	140	119	134	110,5	128
220	215,4	224,6			132	147	126	141	117,5	135
240	235,4	244,6			152	167	146	161	137,5	155
260	254,8	265,2					166	181	157,5	175
280	274,8	285,2					186	201	177,5	195
300	294,8	305,2					206	221	197,5	215

For 1) to 4), see page 4.

Table. (concluded)

Thread size	(M 33)	M 36	(M 39)	M 42	(M 45)	M 48	(M 52)	
<i>P</i> 1)	3,5	4	4	4,5	4,5	5	5	
<i>b</i> Temporary size	2)	72	78	84	-	-	-	
	3)	78	84	90	96	102	108	
	4)	91	97	103	109	115	121	
<i>c</i> max.	0,8	0,8	1	1	1	1	1	
<i>d<sub>a</sub></i> max.	38,4	42,4	45,4	48,6	52,6	56,6	62,6	
<i>d<sub>w</sub></i> min.	46,5	51,1	55,9	59,9	64,7	69,4	74,2	
Nominal size	33	36	39	42	45	48	52	
<i>d<sub>s</sub></i> min.	32	35	38	41	44	47	51	
	max.	34	37	40	43	46	53	
<i>e</i> min.	55,37	60,79	66,44	71,3	76,95	82,6	88,25	
Nominal size	21	22,5	25	26	28	30	33	
<i>k</i> min.	19,95	21,45	23,95	24,95	26,95	28,95	31,75	
	max.	22,05	23,53	26,05	27,05	29,05	34,25	
<i>k'</i> min.	14	15	16,8	17,5	18,9	20,2	22,2	
<i>r</i> min.	1	1	1	1,2	1,2	1,6	1,6	
<i>s</i> max. = nominal size	50	55	60	65	70	75	80	
	min.	49	53,8	58,8	63,1	68,1	73,1	
<i>l</i> Shank length, <i>l<sub>s</sub></i> , and grip length, <i>l<sub>g</sub></i> *								
Nominal size			<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.	<i>l<sub>s</sub></i> min.	<i>l<sub>g</sub></i> max.
	min.	max.						
90	88,25	91,75						
100	98,25	101,75	10,5	28				
110	108,25	111,75	20,5	38	12	32		
120	118,25	121,75	30,5	48	22	42	16	36
130	128	132	34,5	52	26	46	20	40
140	138	142	44,5	62	36	56	30	50
150	148	152	54,5	72	46	66	40	60
160	156	164	64,5	82	56	76	50	70
180	176	184	84,5	102	76	96	70	90
200	195,4	204,6	104,5	122	96	116	90	110
220	215,4	224,6	111,5	129	103	123	97	117
240	235,4	244,6	131,5	149	123	143	117	137
260	254,8	265,2	151,5	169	143	163	137	157
280	274,8	285,2	171,5	189	163	183	157	177
300	294,8	305,2	191,5	209	183	203	177	197
Lengths over 300 mm shall be graded in 20 mm steps.								
1) <i>P</i> = pitch of thread (coarse pitch thread).								
2) For <i>l</i> ≤ 125 mm.								
3) For <i>l</i> > 125 mm ≤ 200 mm.								
4) For <i>l</i> > 200 mm.								

**3 Technical delivery conditions**

Material		Steel
General requirements		As specified in DIN 267 Part 1.
Thread	Tolerance	8 g
	Standard	DIN 13 Parts 12 and 15.
Mechanical properties	Property class (material)	For sizes up M39: 3.6, 4.6 <sup>1)</sup> ; for sizes over M39: subject to agreement.
	Standard	ISO 898 Part 1.
Limit deviations, geometrical tolerances	Product grade	C (previously, design g)
	Standard	ISO 4759 Part 1.
Surface finish		As processed. DIN 267 Part 2 shall apply with regard to surface roughness. DIN 267 Part 9 shall apply with regard to electroplating. DIN 267 Part 10 shall apply with regard to hot dip galvanizing.
Acceptance inspection		DIN 267 Part 5 shall apply with regard to acceptance inspection.
<sup>1)</sup> If the property class is not given in the designation, property class 3.6 or 4.6 shall apply, at the discretion of the manufacturer.		

**4 Designation**

Designation of an M12 hexagon head bolt of nominal length,  $l = 80$  mm:

Hexagon head bolt DIN 601 – M12 × 80

DIN 962 shall apply 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.

### 5 Masses

The values of mass are given for guidance only.

L	Mass (7,85 kg/dm <sup>3</sup> ) for 1000 units, in kg, approximately																	
	M 5	M 6	M 8	M 10	M 12	M 16	M 20	M 24	M 27	M 30	M 33	M 36	M 39	M 42	M 45	M 48	M 52	
25	5,49																	
30	6,26	7,78																
35	6,93	8,88	18,08															
40	7,70	9,96	20,08	34,4														
45	8,47	11,08	22,08	37,5	52,6													
50	9,19	12,18	24,08	40,6	57,0													
55		13,28	26,08	43,7	61,4	113,2												
60		14,38	28,08	46,8	65,8	121,2												
65			30,08	49,9	70,2	129,2	203,7											
70			32,08	53,0	74,6	137,2	216,7											
80			36,08	59,2	84,1	151,2	242,7	373										
90				65,4	93,1	167,2	268,7	408	544									
100				71,5	102,1	183,2	294,7	444	589	747	949							
110					111,1	199,2	320,7	479	632	804	1009							
120					120,1	215,2	346,7	515	679	854	1079	1311	1588					
130						231,2	372,7	541	724	904	1139	1391	1688					
140						247,2	396,7	586	769	964	1209	1471	1778	2060	2410			
150						263,2	424,7	622	814	1014	1279	1551	1868	2170	2530	2936		
160						279,2	440,7	657	856	1074	1349	1631	1958	2280	2650	3076		
180						492,7	728	946	1184	1479	1791	2148	2500	2800	2900	3356	4000	
200						544,7	799	1036	1294	1603	1951	2338	2720	3150	3636	4330		
220									1404	1739	2111	2528	2940	3400	3916	4660		
240									1514	1869	2271	2718	3160	3650	4196	4990		
260									1624	1999	2431	2908	3380	3900	4476	5320		
280										2129	2591	3088	3600	4150	4756	5650		
300										2259	2751	3268	3820	4400	5036	5970		

Bolt sizes above the stepped line are threaded up to the head and are to be ordered in accordance with DIN 558

**Standards referred to**

DIN 13 Part 12	ISO metric screw threads; coarse and fine pitch threads with diameters from 1 to 300 mm; selection 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 and ends of projection of bolt ends for ISO metric 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
DIN 267 Part 9	Fasteners; technical delivery conditions; electroplated components
DIN 267 Part 10	Fasteners; technical delivery conditions; hot-dip galvanized components
DIN 558	M5 to M36 hexagon head screws threaded up to the head; product grade C
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 $\geq 1,6$ and $\leq 150$ mm and product grades A, B and C

**Previous editions**

DIN 556 Suppl.: 10.26; DIN 556: 02.23, 04.25, 04.36; DIN 601 Part 1 Suppl. 1: 11.42; DIN 601 Part 1: 01.41, 09.51, 03.63; DIN 602: 07.25, 07.36; DIN 601 07.25, 07.34, 12.67, 11.70, 12.83, 06.84.

**Amendments**

The following amendments have been made to the June 1984 edition.

- A note on the period of validity of this standard has been included.
- For sizes M10 and M12, the widths across flats specified in ISO 272 have been deleted.
- Nominal size  $d_s$  has been deleted.
- A reference line for the determination of the bearing face diameter,  $d_w$ , has been included.

### 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 nominal sizes M 10, M 12, M 14 and M 22. The table below compares the previous widths across flats with the new ones specified for the four nominal 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 5 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 of 5 years 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.

In some cases, the replacement of the previous DIN Standards by the relevant ISO Standards will have further consequences, besides the changeover to the new widths across flats, attention being drawn to this circumstance in the national foreword of the relevant DIN ISO Standards. These consequences result from the fact that the ISO Standards have not yet reached the same level of completeness as the DIN Standards. Thus a number of nominal sizes, as well as several product specifications for fine pitch threads are not found in the ISO product standards. Furthermore, ISO Standards on technical delivery conditions are still in the initial stages, so that specific requirements are still subject to separate agreement when ordering products in accordance with ISO Standards, as they are not included in the designation for order purposes.

Besides these consequences, which are of importance when applying the new ISO Standards, the amendment of the widths across flats also have a number of consequences as regards the use of the new products which the designer must take into consideration. Besides the amended assembly sizes, this applies above all to the different surface pressure for the bearing area of the nut or the heads of the bolts. These difficulties are discussed in Recommendation VDA 262\*) published by the *Verband der Automobilindustrie e.V.* (German Automobile Manufacturers Association).

### International Patent Classification

F 16 B 35/00

\*) Obtainable from: *Dokumentation Kraftfahrwesen e.V.*, Grönerstraße 5, D-7140 Ludwigsburg.