

M 42 to M 160 × 6 hexagon head bolts  
Product grade B

**DIN**  
**931**  
Part 2

Sechskantschrauben mit Schaft; Gewinde M 42 bis M 160 × 6; Produkt-  
klasse B

Supersedes July 1982 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.*

Dimensions in mm

**1 Field of application**

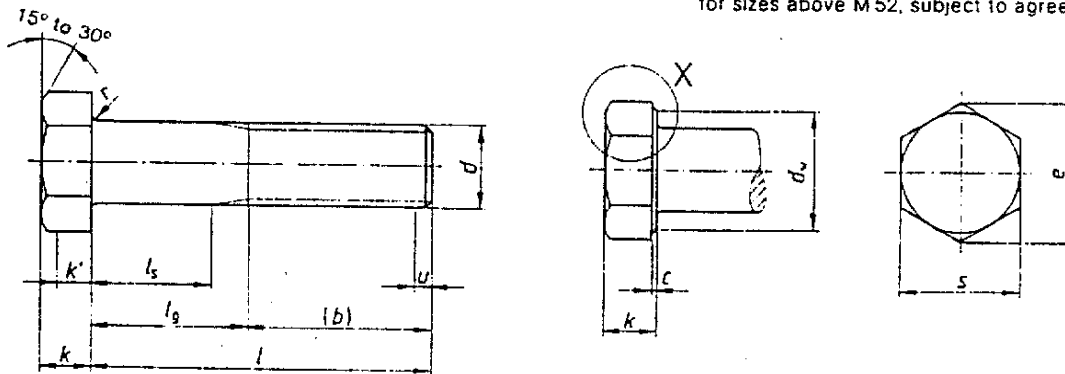
This standard, supplementing DIN 931 Part 1, specifies requirements for M 42 to M 160 × 6 hexagon head bolts assigned to product grade B.

If, in special cases, the 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 standard.

**2 Dimensions**

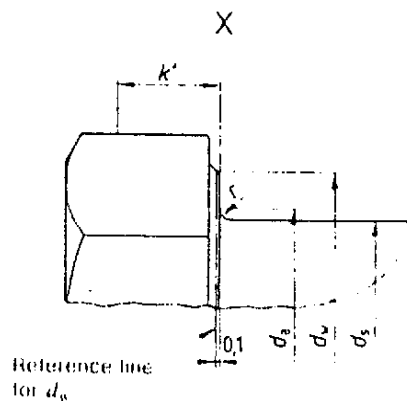
DIN 78 - K thread end.

Washer face for sizes  
up to and including M 52;  
for sizes above M 52, subject to agreement



$k'$  = minimum wrenching height (0.7  $k$  min.)

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



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Table.

Thread size	M 42		(M 45)		M 48		(M 52)		M 56		(M 60)		M 64		(M 68)		M 72 x 6	
	$l_s$ min	$l_t$ max	$l_s$ min	$l_t$ max	$l_s$ min	$l_t$ max	$l_s$ min	$l_t$ max	$l_s$ min	$l_t$ max	$l_s$ min	$l_t$ max	$l_s$ min	$l_t$ max	$l_s$ min	$l_t$ max	$l_s$ min	$l_t$ max
$P$	4,5	4,5	5	5	5,5	5,5	6	6	6	6	6	6	6	6	6	6	6	6
Temporary size	90	96	102	108	116	124	132	140	148	156	164	172	180	188	196	204	212	220
$b$	96	102	108	116	124	132	140	148	156	164	172	180	188	196	204	212	220	228
$c^5)$	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3	0,3
$d_a$	45,6	48,6	52,6	56,6	60,6	64,6	68,6	72,6	76,6	80,6	84,6	88,6	92,6	96,6	100,6	104,6	108,6	112,6
$d_s$	42	45	48	52	55,26	58,52	61,78	65,04	68,30	71,56	74,82	78,08	81,34	84,60	87,86	91,12	94,38	97,64
$d_k$	60,6	64,7	68,8	72,9	77,0	81,1	85,2	89,3	93,4	97,5	101,6	105,7	109,8	113,9	118,0	122,1	126,2	130,3
$e$	71,3	76,95	82,60	88,25	93,90	99,55	105,20	110,85	116,50	122,15	127,80	133,45	139,10	144,75	150,40	156,05	161,70	167,35
Nominal size	26	28	30	33	35	38	40	43	45	48	50	53	55	58	60	63	65	68
$k$	25,58	27,58	29,58	32,5	34,5	37,5	39,5	42,5	44,5	47,5	50,5	53,5	56,5	59,5	62,5	65,5	68,5	71,5
$k'$	26,42	28,42	30,42	33,5	35,5	38,5	40,5	43,5	45,5	48,5	51,5	54,5	57,5	60,5	63,5	66,5	69,5	72,5
$r$	1,2	1,2	1,6	1,6	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2	2,2
$s$	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150
max = nominal size	63,1	68,1	73,1	78,1	82,8	87,8	92,8	97,8	102,8	107,8	112,8	117,8	122,8	127,8	132,8	137,8	142,8	147,8
min																		

Nominal size	$l_s$		$l_t$		$l_g$		$l_s$		$l_t$		$l_g$		$l_s$		$l_t$		$l_g$	
	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
130	128	132	11,5	34	5,5	28	7	32	19	44	8,5	36	10	40	12	42	14	44
140	138	142	21,5	44	15,5	38	17	42	29	54	18,5	46	20	50	22	52	24	54
150	148	152	31,5	54	25,5	48	27	52	39	64	28,5	56	30	60	32	64	34	68
160	158	162	41,5	64	35,5	58	37	62	49	74	38,5	66	40	70	44	76	46	80
(170)	168	172	51,5	74	45,5	68	47	72	59	84	48,5	76	50	80	56	88	58	92
180	178	182	61,5	84	55,5	78	57	82	69	94	55,5	83	60	90	64	100	66	104
(190)	187,7	192,3	71,5	94	65,5	88	67	92	81	104	65,5	88	70	100	76	112	78	116
200	197,7	202,3	81,5	104	75,5	98	74	99	91	114	75,5	98	80	110	84	120	86	124
220	217,7	222,3	88,5	114	82,5	105	86	111	103	126	82,5	105	88	120	92	132	94	136
240	237,7	242,3	108,5	134	102,5	125	106	131	123	150	102,5	125	110	140	112	156	114	160
260	257,4	262,6	128,5	154	122,5	145	128	151	143	170	122,5	145	130	160	132	180	134	184
280	277,4	282,6	148,5	174	142,5	165	148	171	159	194	142,5	165	150	180	152	200	154	204
300	297,4	302,6	168,5	194	162,5	185	168	191	179	214	162,5	185	170	200	172	220	174	224
320	317,15	322,85																
340	337,15	342,85																
360	357,15	362,85																
380	377,15	382,85																
400	397,15	402,85																

Shank length,  $l_s$ , and grip length,  $l_g$ \*)

For commercial sizes, shank lengths have been specified. Use of values given in brackets should be avoided where possible.

1)  $P$  = pitch of thread. 2) For  $l \leq 125$  mm. 3) For  $l > 125 \leq 200$  mm. 4) For  $l > 200$  mm. 5) Washer face for all sizes above M 56, subject to agreement. Designation as in clause 4.

\*)  $l_s$  max. =  $l$  (nominal size) -  $b$ .  
 $l_s$  min. =  $l_s$  max. -  $5P$

Note. Values of mass have been included in Supplement 1 to DIN 931.

Table. (concluded)

Thread size	(M 76 x 6)		M 80 x 6		M 90 x 6		M 100 x 6		M 110 x 6		M 125 x 6		M 140 x 6		M 160 x 6	
	$l_s$ 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	$l_s$ min	$l_g$ max	$l_s$ min	$l_g$ max
P	1)	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
b Temporary size	2)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3)	164	172	192	185	205	225	245	275	305	345	-	-	-	-	-
c <sup>5)</sup>	4)	177	185	205	225	245	275	305	345	-	-	-	-	-	-	-
	min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
d <sub>s</sub>	max	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	max	83	87	97	107	117	132	147	167	182	202	222	242	262	282	302
d <sub>s</sub> max = nominal size	min	76	88	90	100	110	125	140	160	175	190	210	230	250	270	290
	min	75,26	79,26	89,13	99,13	109,13	124	139	159	174	194	214	234	254	274	294
d <sub>w</sub>	min	102,1	106,9	121,1	135,4	144,9	168,6	185,6	214,1	231,1	251,1	271,1	291,1	311,1	331,1	351,1
	min	121,8	127,46	144,08	161,02	172,32	200,57	220,8	254,7	274,7	304,7	334,7	364,7	394,7	424,7	454,7
e	min	48	50	57	63	69	79	88	100	110	125	140	160	175	190	210
	min	47,5	49,5	56,4	62,4	68,4	78,4	87,3	99,3	109,3	124,3	139,3	159,3	174,3	194,3	214,3
k	max	48,5	50,5	57,6	63,6	69,6	79,6	88,7	100,7	110,7	125,7	140,7	160,7	175,7	190,7	210,7
	min	33,2	34,6	40,3	43,7	47,9	54,9	61,1	69,5	77,9	86,3	94,7	103,1	111,5	119,9	128,3
A'	min	2	2	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5	2,5
	min	110	115	130	145	155	180	200	230	255	285	320	355	390	425	460
s	max = nominal size	107,8	112,8	127,5	142,5	152,5	177,5	195,4	225,4	255,4	285,4	320,4	355,4	390,4	425,4	460,4
	min	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Nominal size	l		l <sub>s</sub>		l <sub>g</sub>		l <sub>s</sub>		l <sub>g</sub>		l <sub>s</sub>		l <sub>g</sub>		l <sub>s</sub>		l <sub>g</sub>	
	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max	min	max
220	217,7	222,3	13	43	5	35	5	35	5	35	5	35	5	35	5	35	5	35
240	237,7	242,3	33	63	25	55	25	55	25	55	25	55	25	55	25	55	25	55
260	257,4	262,6	53	83	45	75	45	75	45	75	45	75	45	75	45	75	45	75
280	277,4	282,6	73	103	65	95	65	95	65	95	65	95	65	95	65	95	65	95
300	297,4	302,6	93	123	85	115	85	115	85	115	85	115	85	115	85	115	85	115
320	317,15	322,85	113	143	105	135	105	135	105	135	105	135	105	135	105	135	105	135
340	337,15	342,85	133	163	125	155	125	155	125	155	125	155	125	155	125	155	125	155
360	357,15	362,85	153	183	145	175	145	175	145	175	145	175	145	175	145	175	145	175
380	377,15	382,85	173	203	165	195	165	195	165	195	165	195	165	195	165	195	165	195
400	397,15	402,85	193	223	185	215	185	215	185	215	185	215	185	215	185	215	185	215
420	416,85	423,15	213	243	205	235	205	235	205	235	205	235	205	235	205	235	205	235
440	436,85	443,15	233	263	225	255	225	255	225	255	225	255	225	255	225	255	225	255
460	456,85	463,15	253	283	245	275	245	275	245	275	245	275	245	275	245	275	245	275
480	476,85	483,15	273	303	265	295	265	295	265	295	265	295	265	295	265	295	265	295
500	496,85	503,15	293	323	285	315	285	315	285	315	285	315	285	315	285	315	285	315

Lengths over 500 mm shall be graded in 20 mm steps

For 1) to 5), see page 2

### 3 Technical delivery conditions

Material	Steel <sup>1)</sup>
General requirements	As specified in DIN 267 Part 1
Thread Tolerance	6g
Thread Standard	DIN 13 Parts 12 and 15.
Mechanical properties <sup>2)</sup>	In accordance with the material concerned or subject to agreement.
Limit deviations, geometrical tolerances	B (previously, design mg)
Product grade 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> Steel grade or other materials shall be subject to agreement. <sup>2)</sup> The symbols denoting the property classes specified in ISO 898 Part 1 may also be used for sizes above M39, provided that all the mechanical properties related to the symbol concerned are complied with.	

### 4 Designation

Designation of an M56 hexagon head bolt of nominal length,  $l = 200$  mm, in steel St...:

Hexagon head bolt DIN 931 – M56 × 200 – St...

If product grade A (previously, design m) is required, this shall be indicated in the designation by adding 'A', e.g.:

Hexagon head bolt DIN 931 – M56 × 200 – St... – A

If a washer face beneath the bolt head is required for sizes M56 and above, then the symbol Tm shall be added to the designation, e.g.:

Hexagon head bolt DIN 931 – M72 × 6 × 240 – Tm – St... – 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 and other documents

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 931 Part 1	M1,6 to M39 hexagon head bolts; product grades A and B
Supplement 1 to DIN 931	Hexagon head bolts; masses
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 932 Part 1 and Part 2: 01.26; DIN 600: 10.26x; DIN 532: 11.29x; DIN Kr 551: 11.35, 11.36;  
DIN 931 Part 1: 01.26, 04.42, 12.52, 03.63; DIN 931: 12.67, 11.70; DIN 931 Part 2: 01.26, 04.42, 07.82

### Amendments

The following amendments have been made to the July 1982 edition.

- The specification regarding the underhead fillet has been deleted.
- A reference line for the determination of the bearing face diameter,  $d_{\text{ref}}$ , has been included.
- The values of  $c$  and  $s$  for sizes M 42, M 76  $\times$  6 and M 80  $\times$  6 have been changed.

### 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<sup>(\*)</sup> published by the *Verband der Automobilindustrie e.V.* (German Automobile Manufacturers Association).

### International Patent Classification

F 16 B 35/00

<sup>(\*)</sup> Obtainable from *Dokumentation Kraftfahrzeugwesen e.V.*, Grönerstraße 5, D 7140 Ludwigsburg