INTERNATIONAL STANDARD

ISO 15071

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1999-03-15

Hexagon bolts with flange — Small series — Product grade A

Vis à tête hexagonale à embase cylindro-tronconique — Série étroite — Grade A

Reference number
ISO 15071:1999(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 15071 was prepared by Technical Committee ISO/TC 2, *Fasteners.*

Annex A forms an integral part of this International Standard.

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Hexagon bolts with flange — Small series — Product grade A

1 Scope

This International Standard specifies the characteristics of hexagon bolts with flange, small series, with product grade A, with threads from M5 up to and including M16 and property classes 8.8, 9.8, 10.9 and A2-70.

If, in special cases, specifications other than those listed in this International Standard are required, they should be selected from existing International Standards, for example ISO 261, ISO 888, ISO 898-1, ISO 965-2, ISO 3506-1.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 225:1983, *Fasteners — Bolts, screws, studs and nuts — Symbols and designations of dimensions.*

ISO 261:1998, *ISO general purpose metric screw threads — General plan.*

ISO 888:1976, *Bolts, screws and studs — Nominal lengths and thread lengths for general purpose bolts.*

ISO 898-1:1999, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs.*

ISO 965-2:1998, *ISO general purpose metric screw threads — Tolerances — Part 2: Limits of sizes for general purpose external and internal screw threads — Medium quality.*

ISO 3269:—[1], *Fasteners — Acceptance inspection.*

ISO 3506-1:1997, *Mechanical properties of corrosion-resistant stainless steel fasteners — Part 1: Bolts, screws and studs.*

ISO 4042:—[2], *Fasteners — Electroplated coatings.*

ISO 4753:—[3], *Fasteners — Ends of parts with external metric ISO thread.*

ISO 4759-1:—[4], *Tolerances for fasteners — Part 1: Bolts, screws, studs and nuts — Product grades A, B and C.*

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1) To be published. (Revision of ISO 3269:1988)

2) To be published. (Revision of ISO 4042:1989)

3) To be published. (Revision of ISO 4753:1983)

4) To be published. (Revision of ISO 4759:1978)

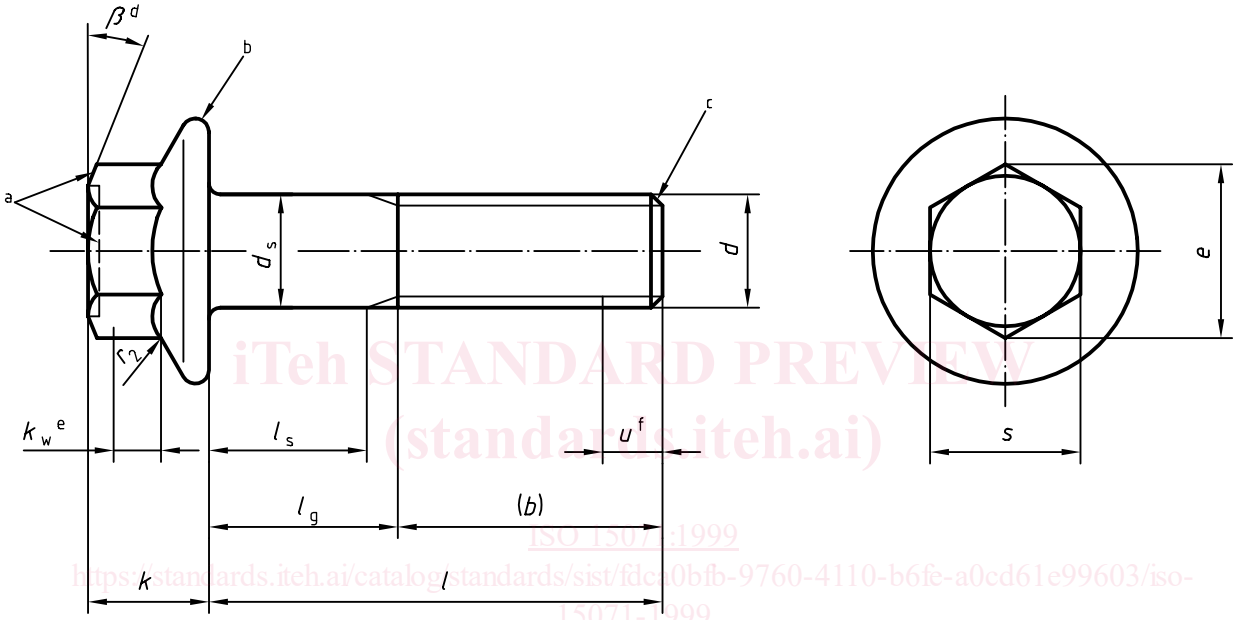
ISO 6157-3:1988, *Fasteners — Surface discontinuities — Part 3: Bolts, screws and studs for special requirements*.

ISO 8992:1986, *Fasteners — General requirements for bolts, screws, studs and nuts.*

3 Dimensions

See Figures 1 to 3 and Table 1.

Symbols and designation of dimensions are specified in ISO 225.



a The top of the head shall be either full form or indented at the manufacturer's discretion and shall be either chamfered or rounded. The minimum diameter of the chamfer circle or start of rounding shall be the maximum width across flats minus 15 %. If the top of the head is indented, the periphery may be rounded.

b Edge contour optional.

c Chamfered end (see ISO 4753).

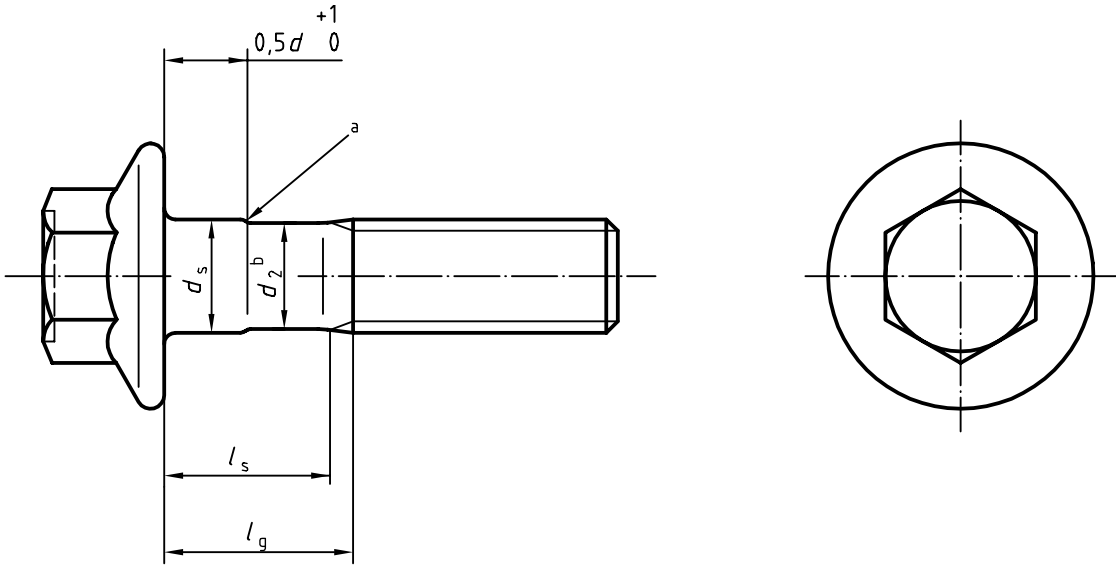
d β = 15 ° to 30 °

e k_w is the wrenching height; see the note to table 1.

f Incomplete thread $u \leqslant 2\ P$.

Figure 1 — Hexagon bolt with flange – full shank (standard type)

Tolerances in millimetres

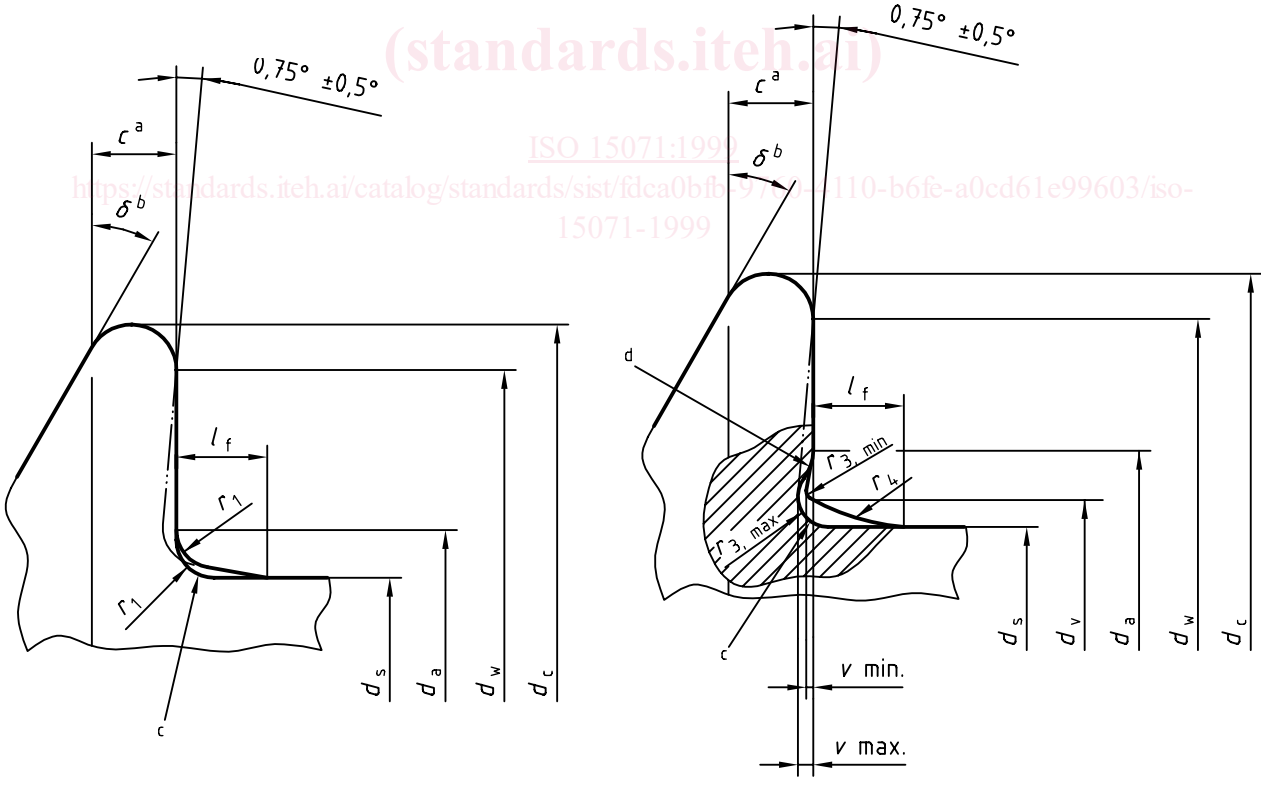


NOTE For other dimensions, see figure 1.

a Rounded, chamfered or conical.

b d_2 is approximately equal to the pitch diameter (rolling diameter).

Figure 2 — Hexagon bolt with flange — reduced shank, type R (upon request)



Type F without undercut (standard type)

Type U with undercut (upon request or optional)

a c is measured at $d_{w,\,min}$

b δ = 15 ° to 25 °.

c Maximum and minimum underhead fillet.

d Junction of fillet with bearing surface to be a smooth blend.

Figure 3 — Hexagon bolt with flange — undercut profiles

Table 1 — Dimensions

Dimensions in millimetres

Thread (d)		**M5**	**M6**	**M8**	**M10**	**M12**	(**M14**)[a]	**M16**
P [b]		0,8	1	1,25	1,5	1,75	2	2
b ref.	c	16	18	22	26	30	34	38
	d	—	—	28	32	36	40	44
	e	—	—	—	—	—	—	57
c	min.	1	1,1	1,2	1,5	1,8	2,1	2,4
d_a Types F	max.	5,7	6,8	9,2	11,2	13,7	15,7	17,7
d_a Types U	max.	6,2	7,5	10	12,5	15,2	17,7	20,5
d_c	max.	11,4	13,6	17	20,8	24,7	28,6	32,8
d_s	max.	5,00	6,00	8,00	10,00	12,00	14,00	16,00
	min.	4,82	5,82	7,78	9,78	11,73	13,73	15,73
d_v	max.	5,5	6,6	8,8	10,8	12,8	14,8	17,2
d_w	min.	9,4	11,6	14,9	18,7	22,5	26,4	30,6
e	min.	7,59	8,71	10,95	14,26	16,5	19,86	23,15
k	max.	5,6	6,9	8,5	9,7	12,1	12,9	15,2
k_w	min.	2,3	2,9	3,8	4,3	5,4	5,6	6,8
l_f	max.	1,4	1,6	2,1	2,1	2,1	2,1	3,2
r_1	min.	0,2	0,25	0,4	0,4	0,6	0,6	0,6
r_2 [f]	max.	0,3	0,4	0,5	0,6	0,7	0,9	1
r_3	max.	0,25	0,26	0,36	0,45	0,54	0,63	0,72
	min.	0,10	0,11	0,16	0,20	0,24	0,28	0,32
r_4	ref.	4	4,4	5,7	5,7	5,7	5,7	8,8
s	max.	7,00	8,00	10,00	13,00	15,00	18,00	21,00
	min.	6,78	7,78	9,78	12,73	14,73	17,73	20,67
v	max.	0,15	0,20	0,25	0,30	0,35	0,45	0,50
	min.	0,05	0,05	0,10	0,15	0,15	0,20	0,25

Table 1 (*concluded*)

Dimensions in millimetres

Thread (d)			**M5**		**M6**		**M8**		**M10**		**M12**		(**M14**)[a]		**M16**	
l [g h]			l_s and l_g [i]													
nom.	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.	l_s min.	l_g max.
10	9,71	10,29	–	–												
12	11,65	12,35	–	–	–	–										
16	15,65	16,35	–	–	–	–	–	–								
20	19,58	20,42	–	–	–	–	–	–	–	–						
25	24,58	25,42	5	9	–	–	–	–	–	–	–	–				
30	29,58	30,42	10	14	7	12	–	–	–	–	–	–	–	–		
35	34,5	35,5	15	19	12	17	6,75	13	–	–	–	–	–	–	–	–
40	39,5	40,5	20	24	17	22	11,75	18	6,5	14	–	–	–	–	–	–
45	44,5	45,5	25	29	22	27	16,75	23	11,5	19	6,25	15	–	–	–	–
50	49,5	50,5	30	34	27	32	21,75	28	16,5	24	11,25	20	6	16	–	–
55	54,4	55,6			32	37	26,75	33	21,5	29	16,25	25	11	21	7	17
60	59,4	60,6			37	42	31,75	38	26,5	34	21,25	30	16	26	12	22
65	64,4	65,6					36,75	43	31,5	39	26,25	35	21	31	17	27
70	69,4	70,6					41,75	48	36,5	44	31,25	40	26	36	22	32
80	79,4	80,6					51,75	58	46,5	54	41,25	50	36	46	32	42
90	89,3	90,7							56,5	64	51,25	60	46	56	42	52
100	99,3	100,7							66,5	74	61,25	70	56	66	52	62
110	109,3	110,7									71,25	80	66	76	62	72
120	119,3	120,7									81,25	90	76	86	72	82
130	129,2	130,8											80	90	76	86
140	139,2	140,8											90	100	86	96
150	149,2	150,8													96	106
160	159,2	160,8													106	116

NOTE If the product passes the gauging in annex A, the requirements for dimensions c, e and k_w are satisfied.

[a] The size in parentheses should be avoided if possible.

[b] P is the pitch of the thread.

[c] For lengths $l_{nom} \leqslant 125$ mm.

[d] For lengths 125 mm $< l_{nom} \leqslant 200$ mm

[e] For lengths $l_{nom} > 200$ mm

[f] Radius r_2 applies both at the corners and at the flats of the hexagon.

[g] Screws with lengths shown above the thick stepped line are threaded to head.

[h] Reduced shank type (type R) only below the dashed stepped line.

[i] l_g is the minimum grip length.

4 Requirements and reference International Standards

See Table 2.

Table 2 — Requirements and reference International Standards

<table>
<tr><td colspan="2">Material</td><td>Steel</td><td>Stainless steel</td></tr>
<tr><td>General requirements</td><td>International Standard</td><td colspan="2">ISO 8992</td></tr>
<tr><td rowspan="2">Thread</td><td>Tolerance</td><td colspan="2">6g</td></tr>
<tr><td>International Standards</td><td colspan="2">ISO 261, ISO 965-2</td></tr>
<tr><td rowspan="2">Mechanical properties</td><td>Class</td><td>8.8, 9.8, 10.9</td><td>A2-70</td></tr>
<tr><td>International Standards</td><td>ISO 898-1</td><td>ISO 3506-1</td></tr>
<tr><td rowspan="2">Tolerances</td><td>Product grade</td><td colspan="2">A</td></tr>
<tr><td>International Standard</td><td colspan="2">ISO 4759-1</td></tr>
<tr><td colspan="2" rowspan="3">Finish</td><td>Black oxide
(thermic or chemical)
Requirements for electroplating are covered in ISO 4042</td><td>Plain</td></tr>
<tr><td colspan="2">If different electroplating requirements are desired or if requirements are needed for other finishes, they should be negotiated between customer and supplier.</td></tr>
<tr><td>Limits for surface discontinuities are covered in ISO 6157-3.</td><td></td></tr>
<tr><td colspan="2">Acceptability</td><td colspan="2">For acceptance procedure, see ISO 3269.</td></tr>
</table>

5 Designation

EXAMPLE 1

A hexagon bolt with flange, small series, product grade A, with thread M12, nominal length l = 80 mm, type F or U at the option of the manufacturer, and property class 8.8 is designated as follows:

Hexagon bolt with flange ISO 15071 – M12×80 – 8.8

EXAMPLE 2

A hexagon bolt with flange, small series, product grade A, with thread M12, nominal length l = 80 mm, type F, and property class 8.8 is designated as follows:

Hexagon bolt with flange ISO 15071 – M12×80 – F – 8.8

EXAMPLE 3

If, in special cases, a hexagon bolt with flange with reduced shank is required, the letter R shall be included in the designation:

Hexagon bolt with flange ISO 15071 – M12×80 – R – 8.8

Annex A
(normative)

Gauging of hexagon flange heads

A.1 Recommended method for gauging of hexagon

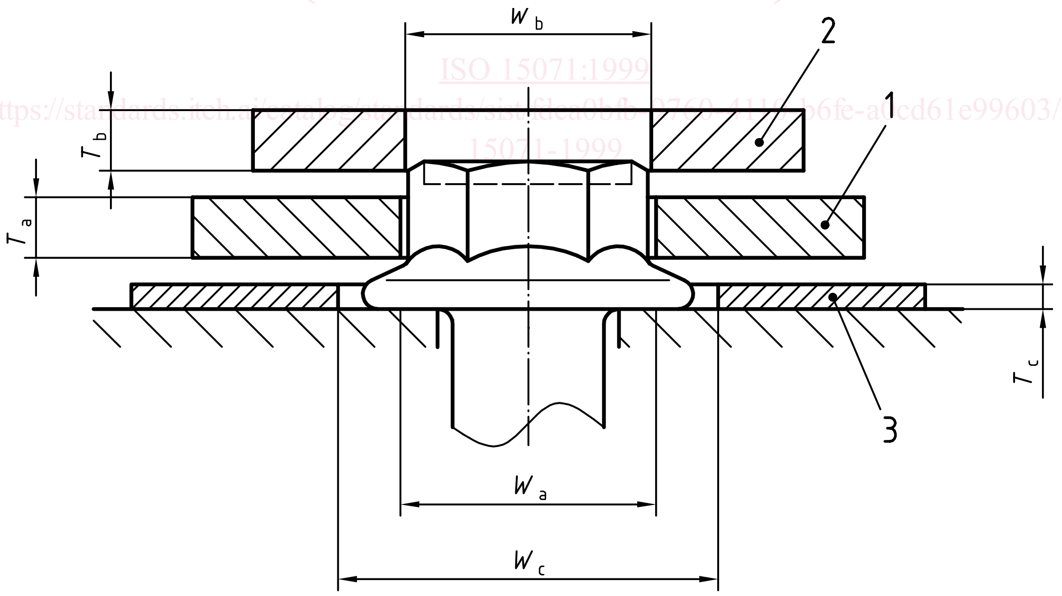
See Figure A.1 and Table A.1.

The head shall be gauged using two ring gauges, A and B, to demonstrate the coincidental acceptability of hexagon height, wrenching height, corner fill and width across corners. Gauge A shall be placed over the hexagon and shall seat on the flange. Gauge B shall be placed on the top of the head normal to the bolt axis. The two gauges shall not be in contact.

A.2 Recommended method for gauging of flange thickness

See Figure A.1 and Table A.1.

Gauge C is a flat feeler or ring gauge. It is used to prove that the flange thickness at the junction of the gauge with the hexagon portion is equal to or greater than specified values. The acceptance criterion is that gauge C will fit under gauge A without contact when the bolt head is seated on a flat plate.



NOTE $W_{a, min} = e_{theoretical}$

$W_{b, max} = e_{min} – 0,01$ mm

$T_{a, max} = k_{w, min}$

Key

1 Gauge A

2 Gauge B

3 Gauge C

Figure A.1