INTERNATIONAL STANDARD

ISO 4015

Second edition
2022-06

Fasteners — Hexagon head bolts with reduced shank (shank diameter ≈ pitch diameter) — Product grade B

Fixations — Vis à tête hexagonale partiellement filetées à tige réduite (diamètre de tige ≈ diamètre sur flanc de filet) — Grade B

Reference number
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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 2, *Fasteners*, Subcommittee SC 11, *Fasteners with metric external thread*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 185, *Fasteners*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 4015:1979), which has been technically revised.

The main changes are as follows:

— the indentation on the head and the washer-face under the head have been left to the choice of the manufacturer, however limits for dimensions have been added;

— tables for dimensions have been restructured;

— M3,5, M7 and M18 have been added;

— $d_{w,min}$ has been changed for sizes $d \leq$ M5 from s_{min} – IT16 to s_{min} – IT15 in order to have a larger bearing surface area and thus less contact pressure, and its values for $d >$ M5 have been recalculated in accordance with ISO 4759-1 without rounding off;

— values for $k_{w,min}$ have been recalculated in accordance with ISO 4759-1 without rounding off;

— value for e_{min} has been corrected for M3;

— addition of property class 6.8 for steel bolts and property class 50 for stainless steel bolts;

— non-ferrous metal bolts have been deleted;

— specifications for marking and labelling have been added as Clause 6.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Fasteners — Hexagon head bolts with reduced shank (shank diameter ≈ pitch diameter) — Product grade B

1 Scope

This document specifies the characteristics of hexagon head bolts with reduced shank (shank diameter approximately equal to pitch diameter), in steel and stainless steel, with metric coarse pitch threads M3 to M20, and with product grade B.

If in certain cases other specifications are requested, property classes and stainless steel grades can be selected from ISO 898-1 or ISO 3506-1, and dimensional options from ISO 888 or ISO 4753.

NOTE For hexagon head bolts with full shank, see ISO 4014.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 225, *Fasteners — Bolts, screws, studs and nuts — Symbols and descriptions of dimensions*

ISO 888, *Fasteners — Bolts, screws and studs — Nominal lengths and thread lengths*

ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs with specified property classes — Coarse thread and fine pitch thread*

ISO 965-1, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data*

ISO 1891-4, *Fasteners — Vocabulary — Part 4: Control, inspection, delivery, acceptance and quality*

ISO 3269, *Fasteners — Acceptance inspection*

ISO 3506-1, *Fasteners — Mechanical properties of corrosion-resistant stainless steel fasteners — Part 1: Bolts, screws and studs with specified grades and property classes*

ISO 4042, *Fasteners — Electroplated coating systems*

ISO 4753, *Fasteners — Ends of parts with external ISO metric thread*

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

ISO 6157-1, *Fasteners — Surface discontinuities — Part 1: Bolts, screws and studs for general requirements*

ISO 8991, *Designation system for fasteners*

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

ISO 10683, *Fasteners — Non-electrolytically applied zinc flake coating systems*

ISO 10684, *Fasteners — Hot dip galvanized coatings*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

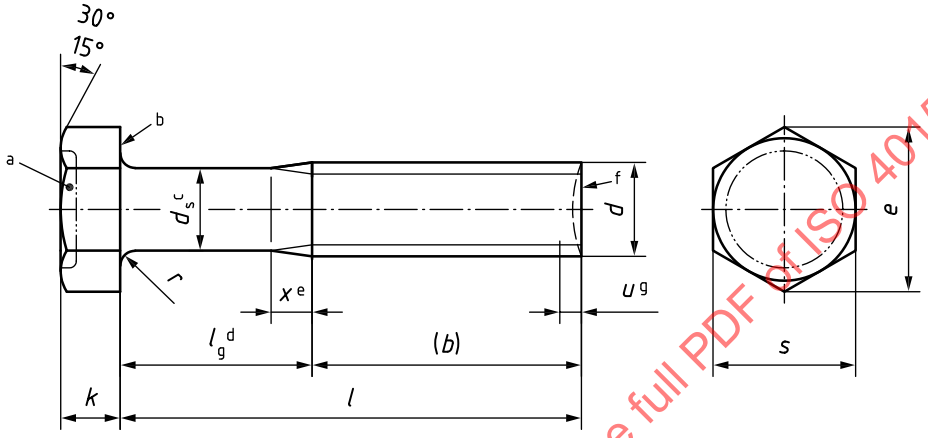
— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Dimensions

Dimensions shall be in accordance with Figures 1 and 2 and with Tables 1 and 2.

Symbols and descriptions of dimensions are defined in ISO 225.



a Indentation at the discretion of the manufacturer, in accordance with Figure 2

b Shape of the bearing face at the discretion of the manufacturer, in accordance with Figure 2.

c Increase of d_s up to d within a maximum length of 0,5d under the head, at the discretion of the manufacturer.

d $l_{g,max} = l_{nom} - b$ and $l_{g,min} = l_{g,max} - 2P$.

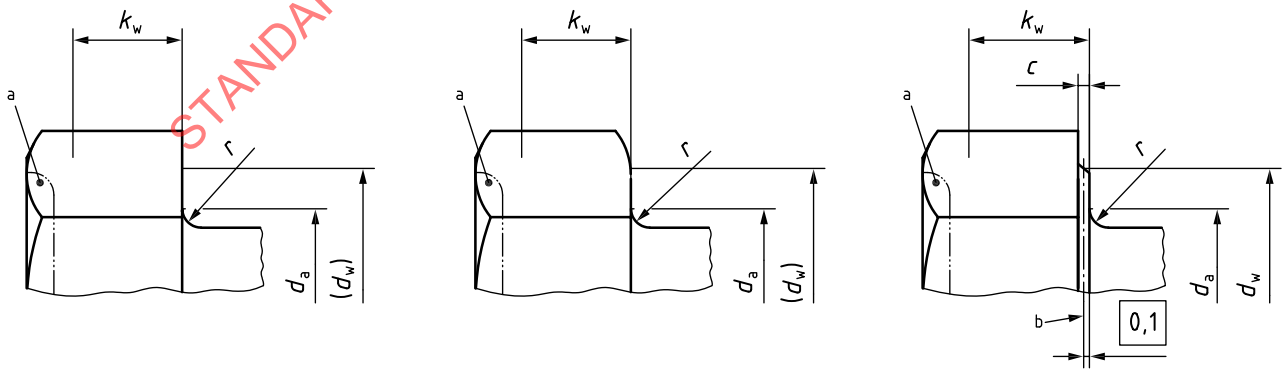
e $x_{max} \approx 2{,}5P$, as specified in ISO 3508.

f As-rolled end (RL) or at the discretion of the manufacturer, in accordance with ISO 4753.

g Incomplete thread $u \leq 2P$.

Figure 1 — Hexagon head bolt

Dimensions in millimetres



a Any shape for the optional indentation within a maximum diameter of 0,8s and a maximum depth of 0,2k.

b Reference datum for d_w.

Figure 2 — Head details and permissible shapes

Table 1 — Dimensions – M3 to M8

Dimensions in millimetres

Thread, d			M3	(M3,5)	M4	M5	M6	(M7)	M8
P [a]			0,5	0,6	0,7	0,8	1	1	1,25
b	ref.	[b]	12	13	14	16	18	20	22
c		max.	0,4	0,4	0,4	0,5	0,5	0,6	0,6
d_a		max.	3,6	4,1	4,7	5,7	6,8	7,8	9,2
d_s		≈	2,60	3,05	3,50	4,40	5,30	6,20	7,10
d_w		min.	4,72	5,22	6,06	7,06	8,74	9,47	11,47
e		min.	5,88	6,44	7,50	8,63	10,89	11,94	14,20
k		nom.	2	2,4	2,8	3,5	4	4,8	5,3
		max.	2,20	2,60	3,00	3,74	4,24	5,04	5,54
		min.	1,80	2,20	2,60	3,26	3,76	4,56	5,06
k_w		min.	1,26	1,54	1,82	2,28	2,63	3,19	3,54
r		min.	0,10	0,10	0,20	0,20	0,25	0,25	0,40
s	nom. =	max.	5,50	6,00	7,00	8,00	10,00	11,00	13,00
		min.	5,20	5,70	6,64	7,64	9,64	10,57	12,57
x		max.	1,25	1,50	1,75	2,00	2,50	2,50	3,20

l			**Range of standard lengths between the stepped bold lines**													
			l_g		l_g		l_g		l_g		l_g		l_g		l_g	
nom.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
—	—	—	**Length by agreement in accordance with ISO 888**													
20	18,95	21,05	7	8	5,8	7	4,6	6								
25	23,95	26,05	12	13	10,8	12	9,6	11	7,4	9	5	7				
30	28,95	31,05	17	18	15,8	17	14,6	16	12,4	14	10	12	8	10	5,5	8
35	33,75	36,25			20,8	22	19,6	21	17,4	19	15	17	13	15	10,5	13
40	38,75	41,25					24,6	26	22,4	24	20	22	18	20	15,5	18
45	43,75	46,25							27,4	29	25	27	23	25	20,5	23
50	48,75	51,25							32,4	34	30	32	28	30	25,5	28
55	53,5	56,5									35	37	33	35	30,5	33
60	58,5	61,5									40	42	38	40	35,5	38
65	63,5	66,5	**Length by agreement in accordance with ISO 888**										43	45	40,5	43
70	68,5	71,5											48	50	45,5	48
80	78,5	81,5													55,5	58
—	—	—														

NOTE Sizes shown in brackets are non-preferred dimensions.

[a] P is the pitch of the thread.

[b] For $l_{nom} \leq 125$ mm.

Table 2 — Dimensions – M10 to M20

Dimensions in millimetres

Thread, d			M10	M12	(M14)	M16	(M18)	M20
P [a]			1,5	1,75	2	2	2,5	2,5
b	ref.	[b]	26	30	34	38	42	46
		[c]	—	—	40	44	48	52
c		max.	0,6	0,6	0,6	0,8	0,8	0,8
d_a		max.	11,2	13,7	15,7	17,7	20,2	22,4
d_s		≈	8,9	10,7	12,5	14,5	16,3	18,2
d_w		min.	14,47	16,47	19,15	22,00	24,85	27,70
e		min.	17,59	19,85	22,78	26,17	29,56	32,95
k		nom.	6,4	7,5	8,8	10,0	11,5	12,5
		max.	6,69	7,79	9,09	10,29	11,85	12,85
		min.	6,11	7,21	8,51	9,71	11,15	12,15
k_w		min.	4,28	5,05	5,96	6,80	7,81	8,51
r		min.	0,4	0,6	0,6	0,6	0,6	0,8
s	nom. =	max.	16,00	18,00	21,00	24,00	27,00	30,00
		min.	15,57	17,57	20,16	23,16	26,16	29,16
x		max.	3,8	4,3	5,0	5,0	6,3	6,3

l			Range of standard lengths between the stepped bold lines											
			l_g		l_g		l_g		l_g		l_g		l_g	
nom.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
40	38,75	41,25	11	14										
45	43,75	46,25	16	19	11,5	15								
50	48,75	51,25	21	24	16,5	20	12	16						
55	53,5	56,5	26	29	21,5	25	17	21	13	17				
60	58,5	61,5	31	34	26,5	30	22	26	18	22	13	18		
65	63,5	66,5	36	39	31,5	35	27	31	23	27	18	23	14	19
70	68,5	71,5	41	44	36,5	40	32	36	28	32	23	28	19	24
80	78,5	81,5	51	54	46,5	50	42	46	38	42	33	38	29	34
90	88,25	91,75	61	64	56,5	60	52	56	48	52	43	48	39	44
100	98,25	101,75	71	74	66,5	70	62	66	58	62	53	58	49	54
110	108,25	111,75			76,5	80	72	76	68	72	63	68	59	64
120	118,25	121,75			86,5	90	82	86	78	82	73	78	69	74
130	128,0	132,0					86	90	82	86	77	82	73	78
140	138,0	142,0					96	100	92	96	87	92	83	88
150	148,0	152,0							102	106	97	102	93	98
—	—	—	**Length by agreement in accordance with ISO 888**											

Length by agreement in accordance with ISO 888

NOTE Sizes shown in brackets are non-preferred dimensions.

[a] P is the pitch of the thread.

[b] For $l_{nom} \leq 125$ mm.

[c] For 125 mm $< l_{nom} \leq 200$ mm.

5 Requirements and reference International Standards

The requirements specified in the International Standards listed in Table 3 shall apply.

Table 3 — Requirements and reference International Standards

Material		Steel	Stainless steel
General requirements	International Standard	ISO 8992	
Thread	Tolerance class	6g [a]	
	International Standard	ISO 965-1	
Mechanical properties	Property class Symbol	M3 ≤ d ≤ M20 5.8, 6.8, 8.8	—
	Grade [b] and property class Symbol	—	M3 ≤ d ≤ M20 A2-50, A2-70
	International Standard	ISO 898-1	ISO 3506-1
Tolerances	Product grade	B (except for sizes ≤ M5 where $d_{w,min} = s_{min} - IT15$)	
	International Standard	ISO 4759-1	
Surface condition		As processed (no coating) Electroplated coatings as specified in ISO 4042 Non-electrolytically applied zinc flake coatings as specified in ISO 10683 Hot dip galvanized coatings as specified in ISO 10684	Clean and bright and/or Passivated [c]
		Other finishes, coatings and/or additional requirements shall be agreed between the purchaser and the supplier	
Surface integrity		Limits for surface discontinuities as specified in ISO 6157-1	As agreed [d]
Acceptability		Acceptance inspection as specified in ISO 3269	

[a] Depending on the type of coating to be applied, another tolerance position of the thread may be specified for the uncoated fastener in accordance with the relevant coating standard.

[b] The most common stainless steel grades are A2 and A4; however, depending on the application, it can be necessary to select other grades in ISO 3506-1 suitable for the service corrosive environment. See also ISO 3506-6 for the selection of suitable stainless steel grades.

[c] See e.g. ISO 16048.

[d] See e.g. ISO 6157-1.