
**Hexagon bolts with flange with metric
fine pitch thread — Small series —
Product grade A**

*Vis à tête hexagonale à embase cylindro-tronconique, à filetage
métrique à pas fin — Série étroite — Grade A*



Reference number
ISO 15072:2012(E)

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Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Dimensions	2
4 Requirements and reference International Standards	6
5 Designation	6
Annex A (normative) Gauging of hexagon flange heads.....	7
Bibliography.....	9

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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.

ISO 15072 was prepared by Technical Committee ISO/TC 2, *Fasteners*, Subcommittee SC 11, *Fasteners with metric external thread*.

This second edition cancels and replaces the first (ISO 15072:1999), of which it constitutes a minor revision. It also incorporates the Technical Corrigendum ISO 15072:1999/Cor.1:2006.

Hexagon bolts with flange with metric fine pitch thread — Small series — Product grade A

1 Scope

This International Standard specifies the characteristics of hexagon bolts with flange with metric fine pitch thread, small series, with product grade A, and with nominal thread diameters from 8 mm up to and including 16 mm and property classes 8.8, 9.8, 10.9, 12.9/12.9 and A2-70.

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

2 Normative references

The following referenced documents are indispensable for the application 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 261, *ISO general purpose metric screw threads — General plan*

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

ISO 3269, *Fasteners — Acceptance inspection*

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

ISO 4042, *Fasteners — Electroplated coatings*

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

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

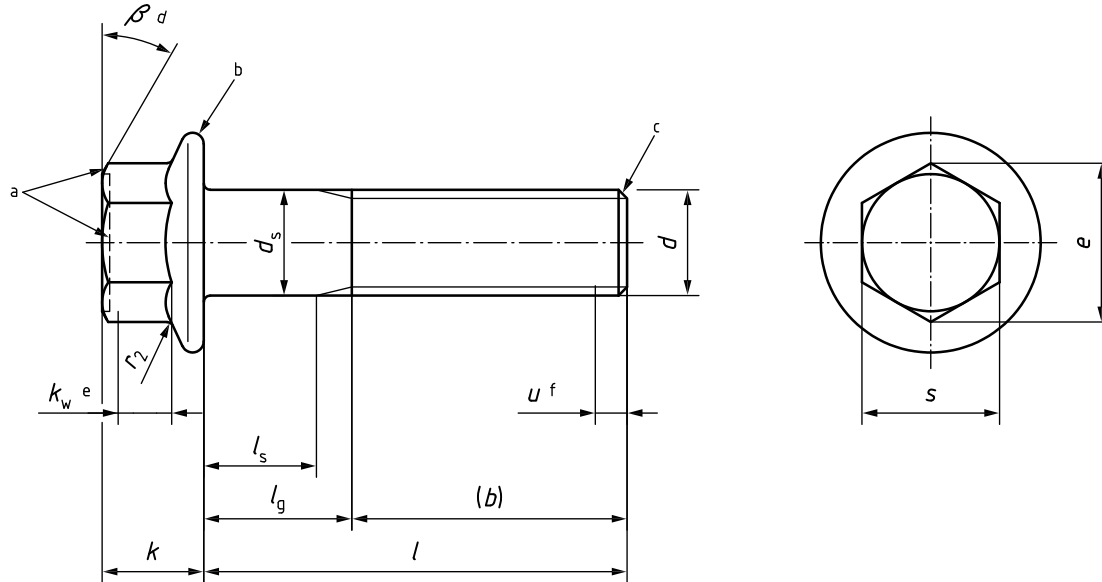
ISO 10683, *Fasteners — Non-electrolytically applied zinc flake coatings*

ISO 16048, *Passivation of corrosion-resistant stainless-steel fasteners*

3 Dimensions

See Figures 1 to 4 and Table 1.

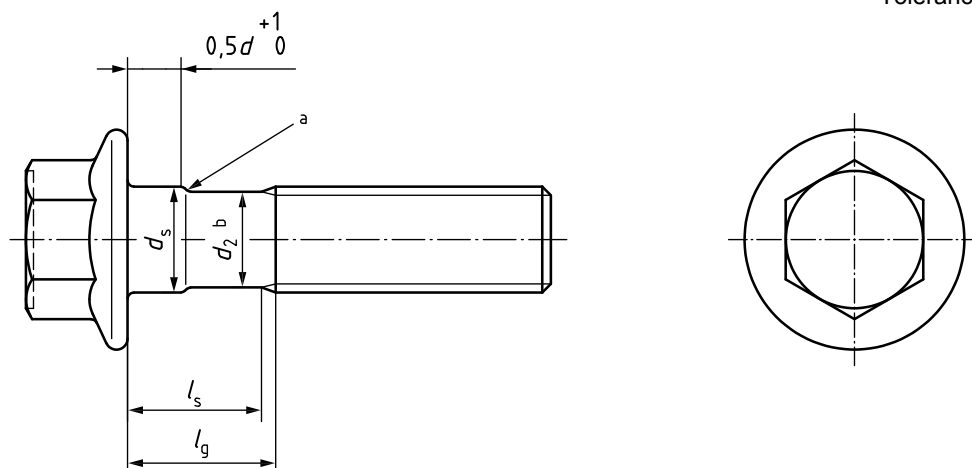
Symbols and descriptions of dimensions are specified in ISO 225.



- ^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 equal to the maximum width across flats minus 15 %. If the top of the head is indented, the periphery may be rounded.
- ^b Edge contour is at the discretion of the manufacturer (optional).
- ^c Chamfered end, as specified in ISO 4753.
- ^d $\beta = 15^\circ$ to 30° .
- ^e k_w is the wrenching height; see the note to Table 1.
- ^f Incomplete thread $u \leq 2 P$.

Figure 1 — Hexagon bolt with flange — Full shank — Standard type

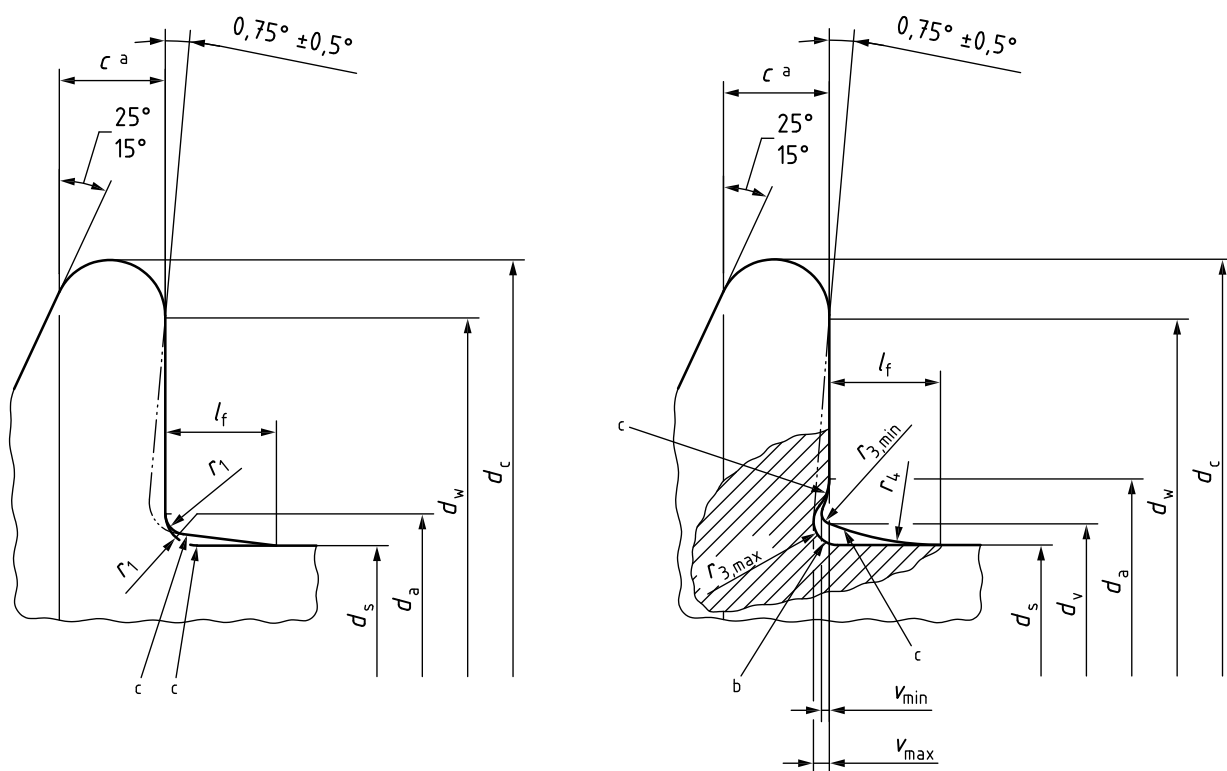
Tolerances in millimetres



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 Maximum and minimum underhead fillet.
- c Junction of fillet with bearing surface shall be a smooth blend.

Figure 3 — Hexagon bolt with flange — Underhead configuration (bearing area)

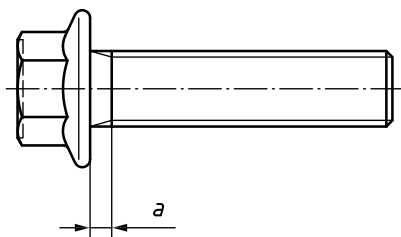


Figure 4 — Hexagon bolt with flange threaded to the head

Table 1 — Dimensions

Dimensions in millimetres

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

Table 1 (continued)

Dimensions in millimetres

Thread ($d \times P^a$)			M8 \times 1		M10 \times 1 M10 \times 1,25		M12 \times 1,25 M12 \times 1,5		(M14 \times 1,5) ^b		M16 \times 1,5	
$l_{g,h}$			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.
16	15,65	16,35	—	—								
20	19,58	20,42	—	—	—	—						
25	24,58	25,42	—	—	—	—	—	—				
30	29,58	30,42	—	—	—	—	—	—	—	—		
35	34,5	35,5	6,75	13	—	—	—	—	—	—	—	—
40	39,5	40,5	11,75	18	6,5	14	—	—	—	—	—	—
45	44,5	45,5	16,75	23	11,5	19	6,25	15	—	—	—	—
50	49,5	50,5	21,75	28	16,5	24	11,25	20	6	16	—	—
55	54,4	55,6	26,75	33	21,5	29	16,25	25	11	21	7	17
60	59,4	60,6	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 P is the pitch of the thread.
- b The size in parentheses should be avoided, if possible.
- c For $l_{nom} \leq 125$ mm.
- d For $125 \text{ mm} < l_{nom} \leq 200$ mm.
- e For $l_{nom} > 200$ mm.
- f Radius r_2 is applicable both at the corners and at the flats of the hexagon.
- g Screws with non-specified dimensions, l_s and l_g , given as "—", shown above the solid, bold, stepped line are threaded to the head.
- h Reduced shank type (type R) shown only below the dashed stepped line.
- i $l_{g,max} = l_{nom} - b$
 $l_{s,min} = l_{g,max} - 5 P$ (P is the pitch of the coarse thread, specified in ISO 261).

4 Requirements and reference International Standards

See Table 2.

Table 2 — Requirements and reference International Standards

Material		Steel	Stainless steel
General requirements	International Standard	ISO 8992	
	Tolerance class	6g	
Thread	International Standards	ISO 261, ISO 965-2	
	Property class	8.8, 9.8, 10.9, 12.9/12.9	A2-70
Mechanical property	International Standards	ISO 898-1	ISO 3506-1
	Product grade	A	
Tolerance	International Standard	ISO 4759-1	
	Finish — Coating	As processed Requirements for electroplating are specified in ISO 4042. Requirements for non-electrolytically applied zinc flake coatings are specified in ISO 10683. Additional requirements or other finishes or coatings shall be agreed between the supplier and the purchaser.	As processed A method for passivation is specified in ISO 16048.
Surface integrity		Limits for surface discontinuities are specified in ISO 6157-3.	—
Acceptability		Acceptance inspection is specified in ISO 3269.	

5 Designation

EXAMPLE 1 A hexagon bolt with flange, small series, product grade A, with metric fine pitch thread $M12 \times 1,25$, nominal length $l = 80$ mm, type F or U at the manufacturer's discretion and of property class 8.8, is designated as follows:

Hexagon bolt with flange ISO 15072 - $M12 \times 1,25 \times 80$ - 8.8

EXAMPLE 2 A hexagon bolt with flange, small series, product grade A, with metric fine pitch thread $M12 \times 1,25$, nominal length $l = 80$ mm, type F and of property class 8.8, is designated as follows:

Hexagon bolt with flange ISO 15072 - $M12 \times 1,25 \times 80$ - 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 as follows:

Hexagon bolt with flange ISO 15072 - $M12 \times 1,25 \times 80$ - R - 8.8

Annex A (normative)

Gauging of hexagon flange heads

A.1 Recommended method for gauging of hexagon

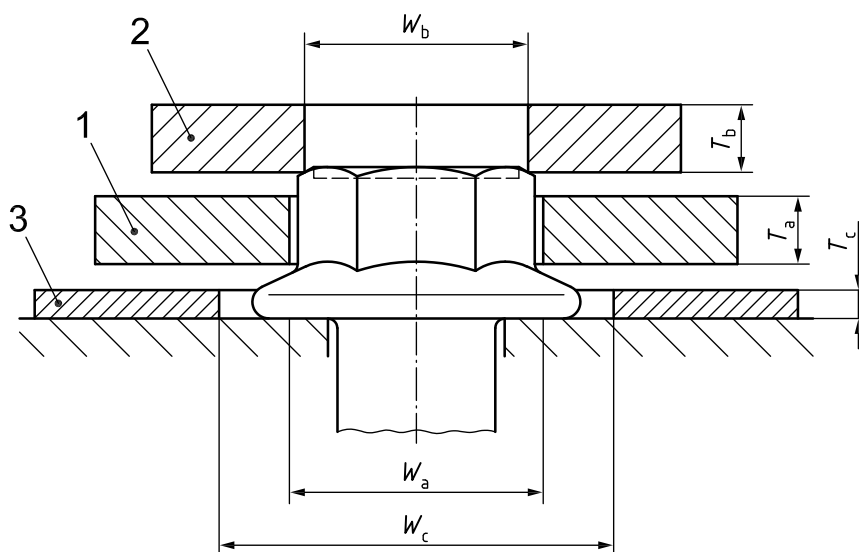
See Figure A.1 and Table A.1.

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 sit 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 shall be 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 fits under gauge A without contact whenever the bolt head is seated on a flat plate.



Key

- 1 gauge A
- 2 gauge B
- 3 gauge C

$$W_{a,\min} = e_{\text{theoretical}}$$

$$W_{b,\max} = e_{\min} - 0,01 \text{ mm}$$

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

Figure A.1

Table A.1

Dimensions in millimetres

Thread	Gauge A				Gauge B			Gauge C		
	W_a		T_a		W_b		T_b	W_c	T_c	
	max.	min.	max.	min.	max.	min.	min.	max.	max.	min.
M8	11,56	11,55	3,80	3,79	10,94	10,93	4	20,0	1,31	1,30
M10	15,02	15,01	4,30	4,29	14,25	14,24	4	24,0	1,81	1,80
M12	17,33	17,32	5,40	5,39	16,49	16,48	5	29,0	2,20	2,19
M14	20,79	20,78	5,60	5,59	19,85	19,84	5	32,5	2,55	2,54
M16	24,26	24,25	6,80	6,79	23,14	23,13	6	37,0	2,96	2,95

Bibliography

- [1] ISO 888, *Fasteners — Bolts, screws and studs — Nominal lengths and thread lengths*
- [2] ISO 4014, *Hexagon head bolts — Product grades A and B*
- [3] ISO 4015, *Hexagon head bolts — Product grade B — Reduced shank (shank diameter approximately equal to pitch diameter)*
- [4] ISO 4016, *Hexagon head bolts — Product grade C*
- [5] ISO 4017, *Hexagon head screws — Product grades A and B*
- [6] ISO 4018, *Hexagon head screws — Product grade C*
- [7] ISO 4032, *Hexagon nuts, style 1 — Product grades A and B*
- [8] ISO 4033, *Hexagon nuts, style 2 — Product grades A and B*
- [9] ISO 4034, *Hexagon nuts — Product grade C*
- [10] ISO 4035, *Hexagon thin nuts (chamfered) — Product grades A and B*
- [11] ISO 4036, *Hexagon thin nuts (unchamfered) — Product grade B*
- [12] ISO 4161, *Hexagon nuts with flange, style 2 — Coarse thread*
- [13] ISO 4162, *Hexagon bolts with flange — Small series — Product grade A with driving feature of product grade B*
- [14] ISO 7040, *Prevailing torque type hexagon nuts (with non-metallic insert), style 1 — Property classes 5, 8 and 10*
- [15] ISO 7041, *Prevailing torque type hexagon nuts (with non-metallic insert), style 2 — Property classes 9 and 12*
- [16] ISO 7042, *Prevailing torque type all-metal hexagon nuts, style 2 — Property classes 5, 8, 10 and 12*
- [17] ISO 7043, *Prevailing torque type hexagon nuts with flange (with non-metallic insert) — Product grades A and B*
- [18] ISO 7044, *Prevailing torque type all-metal hexagon nuts with flange, style 2 — Product grades A and B*
- [19] ISO 7719, *Prevailing torque type all-metal hexagon nuts, style 1 — Property classes 5, 8 and 10*
- [20] ISO 7720, *Prevailing torque type all-metal hexagon nuts, style 2 — Property class 9*
- [21] ISO 8673, *Hexagon nuts, style 1, with metric fine pitch thread — Product grades A and B*
- [22] ISO 8674, *Hexagon nuts, style 2, with metric fine pitch thread — Product grades A and B*
- [23] ISO 8675, *Hexagon thin nuts (chamfered) with metric fine pitch thread — Product grades A and B*
- [24] ISO 8676, *Hexagon head screws with metric fine pitch thread — Product grades A and B*

- [25] ISO 8765, *Hexagon head bolts with metric fine pitch thread — Product grades A and B*
- [26] ISO 10511, *Prevailing torque type hexagon thin nuts (with non-metallic insert)*
- [27] ISO 10512, *Prevailing torque type hexagon nuts (with non-metallic insert), style 1, with metric fine pitch thread — Property classes 6, 8 and 10*
- [28] ISO 10513, *Prevailing torque type all-metal hexagon nuts, style 2, with metric fine pitch thread — Property classes 8, 10 and 12*
- [29] ISO 10663, *Hexagon nuts with flange, style 2 — Fine pitch thread*
- [30] ISO 12125, *Prevailing torque type hexagon nuts with flange (with non-metallic insert) with metric fine pitch thread, style 2 — Product grades A and B*
- [31] ISO 12126, *Prevailing torque type all-metal hexagon nuts with flange with metric fine pitch thread, style 2 — Product grades A and B*
- [32] ISO 15071, *Hexagon bolts with flange — Small series — Product grade A*
- [33] ISO 21670, *Hexagon weld nuts with flange*

10
