BS EN ISO 7380-1:2011

Incorporating corrigendum October 2011

BSI Standards Publication

Button head screws

Part 1: Hexagon socket button head screws (ISO 7380-1:2011)

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National foreword

This British Standard is the UK implementation of EN ISO 7380-1:2011. It supersedes BS EN ISO 7380:2004, which is withdrawn.
The UK participation in its preparation was entrusted to Technical Committee FME/9/3, Fasteners - Product Standards.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN ISO 7380-1

August 2011

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Supersedes EN ISO 7380:2004

English Version

Button head screws - Part 1: Hexagon socket button head screws (ISO 7380-1:2011)

Vis à tête cylindrique bombée plate - Partie 1: Vis à tête cylindrique bombée plate à six pans creux (ISO 7380-1:2011)

Halbrundkopfschrauben (abgeflacht) - Teil 1: Abgeflachter Halbrundkopf mit Innensechskant (ISO 7380-1:2011)

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Foreword

This document (EN ISO 7380-1:2011) has been prepared by Technical Committee ISO/TC 2 "Fasteners" in collaboration with Technical Committee CEN/TC 185 “Fasteners” the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2012, and conflicting national standards shall be withdrawn at the latest by February 2012.

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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.

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ISO 7380-1 was prepared by Technical Committee ISO/TC 2, *Fasteners*, Subcommittee SC 11, *Fasteners with metric external thread*.

This first edition of ISO 7380-1, together with ISO 7380-2, cancels and replaces ISO 7380:2004, which has been technically revised.

ISO 7380 consists of the following parts, under the general title *Button head screws*:

— *Part 1: Hexagon socket button head screws*

— *Part 2: Hexagon socket button head screws with collar*

Button head screws —

Part 1:
Hexagon socket button head screws

1 Scope

This International Standard specifies the characteristics of hexagon socket button head screws with threads from M3 up to and including M16, with product grade A and with reduced loadability according to Table 3.

If, in special cases, specifications other than those listed in this International Standard are required, they can be selected from existing International Standards, e.g. ISO 261, ISO 888, ISO 898-1, ISO 965-2, ISO 3506-1 and ISO 4759-1.

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 965-3, *ISO general purpose metric screw threads — Tolerances — Part 3: Deviations for constructional screw threads*

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

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*

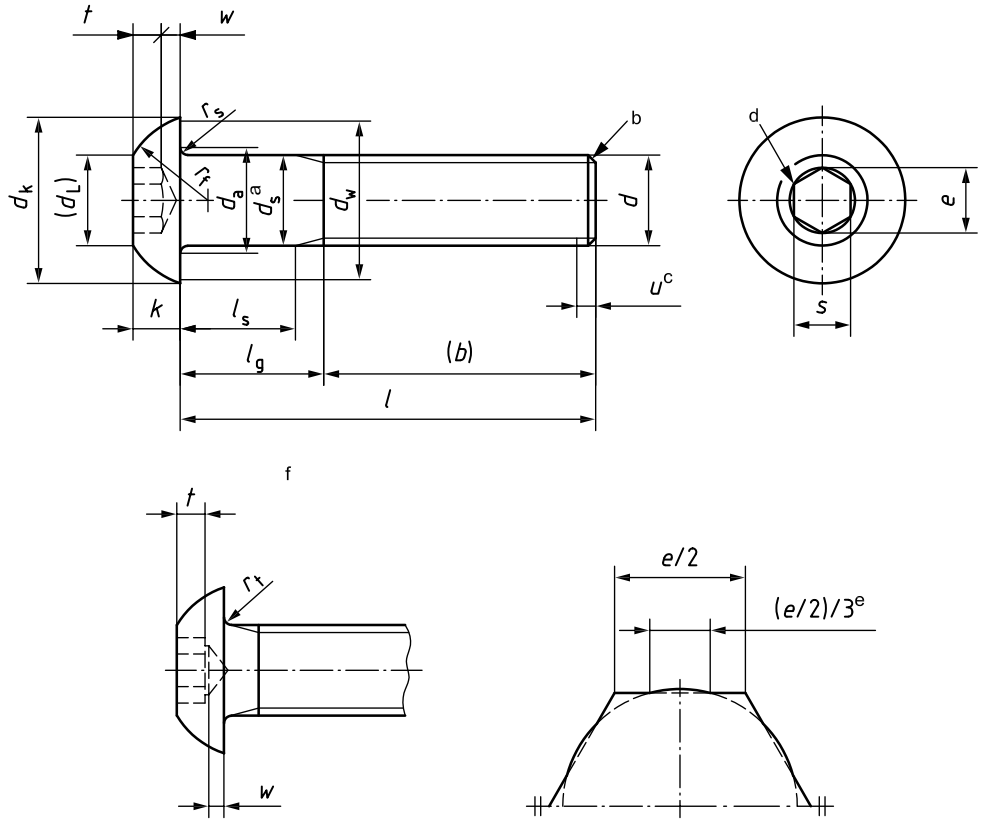
ISO 10683, *Fasteners — Non-electrolytically applied zinc flake coatings*

ISO 23429, *Gauging of hexagon sockets*

3 Dimensions

See Figure 1 and Table 1.

Symbols and descriptions of dimensions are specified in ISO 225.



Key

r_s underhead radius for a screw with unthreaded shank

r_t underhead radius for a fully threaded screw

a d_s applies if values of $l_{s,min}$ are specified.

b In accordance with ISO 4753, point chamfered or for sizes ≤ M4 “as rolled”.

c Incomplete thread $u \leq 2P$.

d A slight rounding or countersink at the mouth of the socket is permissible.

e For broached sockets which are at the maximum limit of size, the overcut resulting from drilling shall not exceed one third of the length of any flat of the socket which is $e/2$.

f Permissible alternative form of socket.

Figure 1 — Hexagon socket button head screw

Table 1 — Dimensions of hexagon socket button head screws

Dimensions in millimetres

Thread, d		M3	M4	M5	M6	M8	M10	M12	M16
P[a]		0,5	0,7	0,8	1	1,25	1,5	1,75	2
b[b]	ref.	18	20	22	24	28	32	36	44
d_a	max.	3,6	4,7	5,7	6,8	9,2	11,2	13,7	17,7
d_k	max.	5,70	7,60	9,50	10,50	14,00	17,50	21,00	28,00
	min.	5,40	7,24	9,14	10,07	13,57	17,07	20,48	27,48
d_L	ref.	2,6	3,8	5,0	6,0	7,7	10,0	12,0	16,0
d_s	max.	3	4	5	6	8	10	12	16
	min.	2,86	3,82	4,82	5,82	7,78	9,78	11,73	15,73
d_w	min.	5,00	6,84	8,74	9,57	13,07	16,57	19,68	26,68
e[cd]	min.	2,303	2,873	3,443	4,583	5,723	6,863	9,149	11,429
k	max.	1,65	2,20	2,75	3,30	4,40	5,50	6,60	8,80
	min.	1,40	1,95	2,50	3,00	4,10	5,20	6,24	8,44
r_f	max.	3,70	4,60	5,75	6,15	7,95	9,80	11,20	15,30
	min.	3,30	4,20	5,25	5,65	7,45	9,20	10,50	14,50
r_s	min.	0,10	0,20	0,20	0,25	0,40	0,40	0,60	0,60
r_t	min.	0,30	0,40	0,45	0,50	0,70	0,70	1,10	1,10
s[d]	nom.	2	2,5	3	4	5	6	8	10
	max.	2,080	2,580	3,080	4,095	5,140	6,140	8,175	10,175
	min.	2,020	2,520	3,020	4,020	5,020	6,020	8,025	10,025
t	min.	1,04	1,30	1,56	2,08	2,60	3,12	4,16	5,20
w	min.	0,20	0,30	0,38	0,74	1,05	1,45	1,63	2,25

Table 1 (*continued*)

Dimensions in millimetres

Thread, d			**M3**		**M4**		**M5**		**M6**		**M8**		**M10**	**M12**			**M16**	
l^{e}			l_s and l_g^{f}															
			l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g	l_s	l_g
nom.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.	min.	max.
6	5,76	6,24																
8	7,71	8,29																
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	4,5	7														
30	29,58	30,42	9,5	12	6,5	10	4	8										
35	34,5	35,5			11,5	15	9	13	6	11								
40	39,5	40,5			16,5	20	14	18	11	16	5,75	12						
45	44,5	45,5					19	23	16	21	10,75	17	5,5	13				
50	49,5	50,5					24	28	21	26	15,75	22	10,5	18				
55	54,4	55,6							26	31	20,75	27	15,5	23	10,25	19		
60	59,4	60,6							31	36	25,75	32	20,5	28	15,25	24		
65	64,4	65,6									30,75	37	25,5	33	20,25	29	11	21
70	69,4	70,6									35,75	42	30,5	38	25,25	34	16	26
80	79,4	80,6									45,75	52	40,5	48	35,25	44	26	36
90	89,4	90,6											50,5	58	45,25	54	36	46

a P is the pitch of the thread.

b For lengths between the bold, stepped lines in the unshaded area.

c $e_{min} = 1{,}14\ s_{min}$.

d Combined gauging of socket dimensions, e and s, as specified in ISO 23429.

e The range of preferred lengths is between the bold, stepped lines.

f Lengths in the shaded area are threaded to the head within $3P$. Lengths below the shaded area have values of l_g and l_s in accordance with the following equations:

$l_{g,max} = l_{nom} - b$

$l_{s,min} = l_{g,max} - 5P$

4 Requirements and reference International Standards

See Tables 2 and 3.

Table 2 — Requirements and reference International Standards

Material		Steel	Stainless steel
General requirements	International Standard	ISO 8992	
Thread	Tolerance class	5g6g for property class 12.9/12.9 6g for other property classes	
	International Standard	ISO 261, ISO 965-2, ISO 965-3	
Mechanical property	Property class/steel grade	8.8, 10.9, 12.9/12.9[a]	A2-70, A3-70, A4-70, A5-70 A2-80, A3-80, A4-80, A5-80
	Marking symbol	08.8, 010.9, 012.9/012.9	A2-070, A3-070, A4-070, A5-070 A2-080, A3-080, A4-080, A5-080[b]
	International Standard	ISO 898-1[c]	ISO 3506-1[d]
Tolerance	Product grade	A	
	International Standard	ISO 4759-1	
Finish — Coating		As processed. Requirements for electro-plating[e] are specified in ISO 4042. Requirements for non-electrolytically applied zinc flake coatings are specified in ISO 10683.	As processed.
		Additional requirements or other finishes or coatings shall be agreed between the supplier and the purchaser.	
Surface integrity		Limits for surface discontinuities are specified in ISO 6157-1 and for property class 12.9/12.9 in ISO 6157-3.	—
Acceptability		The acceptance inspection is specified in ISO 3269.	

[a] Caution is advised when the use of property class 12.9/12.9 is considered. The capability of the fastener manufacturer, the service conditions and the wrenching methods should be considered. Environments can cause stress corrosion cracking of as processed fasteners as well as coated fasteners.

[b] The marking symbols for stainless steel fasteners with reduced loadability are intended to be included in the next revision of ISO 3506-1.

[c] Because of their head configurations, it is possible for these screws to not meet the minimum ultimate tensile loads specified in ISO 898-1. They shall nevertheless meet the other material and property requirements for the respective property class specified in ISO 898-1. In addition, when full-size screws are tensile tested in accordance with ISO 898-1, they shall withstand, without fracture, the minimum ultimate tensile loads given in Table 3. If tested to failure, the fracture may occur in the threaded section, the head, the shank or at the head/shank junction.

[d] Because of their head configurations, it is possible for these screws to not meet the minimum ultimate tensile loads specified in ISO 3506-1. They shall nevertheless meet the other material and property requirements for the respective steel grade specified in ISO 3506-1. In addition, when full-size screws are tensile tested in accordance with ISO 3506-1, they shall withstand, without fracture, the minimum ultimate tensile loads given in Table 3. If tested to failure, the fracture may occur in the threaded section, the head, the shank or at the head/shank junction. For reduced minimum ultimate tensile load values determined on the basis of $R_{m,min}$ and $A_{s,nom}$ in accordance with property classes 70 and 80 of ISO 3506-1, see Table 3.

[e] Electroplating should be avoided for screws of property class 12.9/12.9; see ISO 4042 for more information.

Table 3 — Reduced minimum ultimate tensile loads for hexagon socket button head screws

Thread, d	Property class				
	8.8[a]	10.9[a]	12.9/12.9[a]	70[b]	80[b]
	Reduced minimum ultimate tensile load N				
M3	3 220	4 180	4 910	2 810	3 220
M4	5 620	7 300	8 560	4 910	5 620
M5	9 080	11 800	13 800	7 950	9 080
M6	12 900	16 700	19 600	11 200	12 900
M8	23 400	30 500	35 700	20 400	23 400
M10	37 100	48 200	56 600	32 400	37 100
M12	53 900	70 200	82 400	47 200	53 900
M16	100 000	130 000	154 000	87 900	100 000

[a] 80 % of the values for $F_{m,min}$ specified in ISO 898-1.

[b] 80 % of the values for $F_{m,min}$ ($R_{m,min} \times A_{s,nom}$). $R_{m,min}$ and $A_{s,nom}$ are specified in ISO 3506-1.

5 Designation

The designation and marking requirements for steel fasteners with reduced loadability shall apply as specified in ISO 898-1.

EXAMPLE 1 A hexagon socket button head screw, thread M12, of nominal length l = 40 mm and property class 10.9 in accordance with ISO 898-1, is designated as follows:

Hexagon socket button head screw ISO 7380-1 - M12 × 40 - 010.9

EXAMPLE 2 A hexagon socket button head screw, thread M12, of nominal length l = 40 mm, steel grade A2 and property class 70 in accordance with ISO 3506-1, is designated as follows:

Hexagon socket button head screw ISO 7380-1 - M12 × 40 - A2-070

Bibliography

[1] ISO 888, *Bolts, screws and studs — Nominal lengths, and thread lengths for general purpose bolts*

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