
**Fasteners — Button head screws with
reduced loadability —**

Part 1:

Hexagon socket button head screws

*Fixations — Vis à tête cylindrique bombée plate à capacité de charge
réduite —*

Partie 1: Tête cylindrique bombée plate à six pans creux

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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 7380-1:2011), which has been technically revised.

The main changes are as follows:

- the whole standard (including title) has been improved to clearly point out that these hexagon socket button head screws have reduced loadability because of their head design (head dimensions and penetration of the hexagon socket);
- the reference thread length b has been increased to $3d$ for partially threaded screws M16, so that these screws can be tensile tested in accordance with ISO 3506-1 ($b \geq 3d$ is required to tensile test screws with reduced loadability);
- the reference datum for the outer diameter of the bearing face has been specified (see [Figure 1](#)), and the minimum values have been reduced to $d_{w,min} = d_{k,min} \times 0,92$ considering the manufacturing aspects for “button head” (see [Table 1](#));
- e_{min} values have been rounded to two decimal places (see [Table 1](#));
- the maximum depth of the hexagon socket t_{max} has been added (see [Table 1](#));
- symbol w has been substituted by the new symbol w_b in order to define the wall thickness between the bottom of the cylindrical broached hole and the bearing face (see [Figure 2](#) and [Table 1](#));
- the definition of r_f in [Figure 1](#) has been changed to allow the offset of the centre of the radius from the thread axis;
- the smallest and greatest standard lengths have been amended (see [Table 2](#));

- stainless steel grades A3 and A5 have been deleted from [Table 3](#);
- the minimum ultimate tensile loads were recalculated and have been changed to more precise values for steel screws with property classes 8.8 (M5, M12 and M16), 10.9 (M3, M6 and M10) and 12.9/12.9 (M4 to M8) and for stainless steel screws with property classes 70 (M3 to M10 and M16) and 80 (M5, M12 and M16); see [Table 4](#);
- specifications for marking and labelling have been added as new [Clause 6](#).

A list of all parts in the ISO 7380 series can be found on the ISO website.

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.

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Fasteners — Button head screws with reduced loadability —

Part 1: Hexagon socket button head screws

1 Scope

This document specifies the characteristics of hexagon socket button head screws with reduced loadability due to head design, in steel and stainless steel, with metric coarse pitch threads M3 to M16, and with product grade A.

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

NOTE The reduced loadability (related to the head dimensions in combination with penetration of the hexagon socket specified in this document) implies a limitation of ultimate tensile load shown by a specific marking (property class preceded by a zero). The loadability in the head is assumed to be 80 % of that in the thread for all sizes and all property classes, see [Table 4](#).

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

ISO 8991, *Designation system for fasteners*

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

3 Terms and definitions

No terms and definitions are listed in this document.

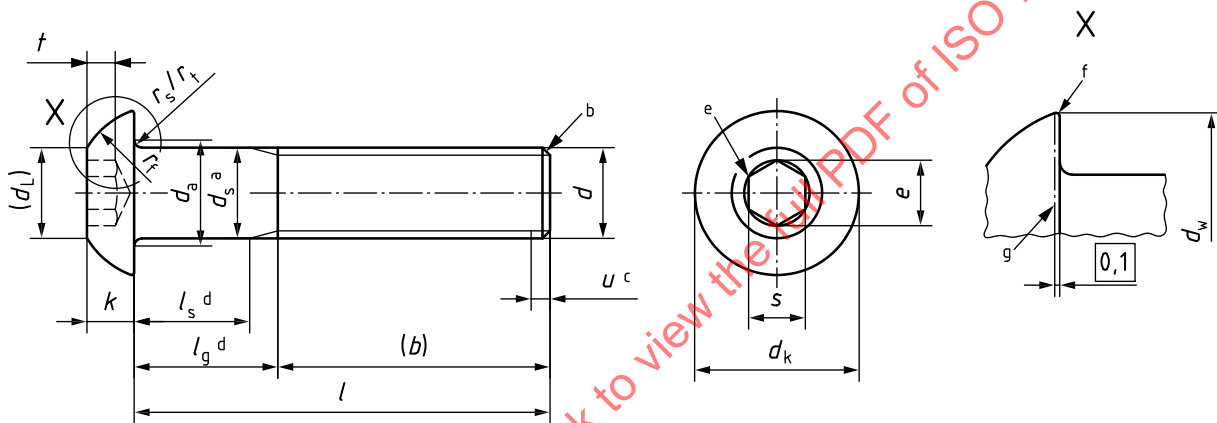
ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Dimensions

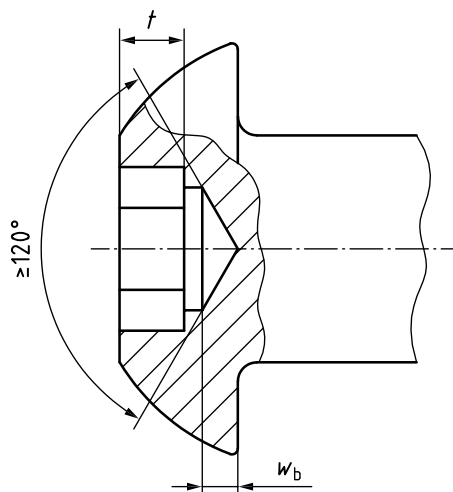
Dimensions shall be in accordance with [Figures 1](#) to [3](#) and with [Tables 1](#) and [2](#).

Symbols and descriptions of dimensions are specified in ISO 225.



- r_s underhead radius for screws with unthreaded shank
- r_t underhead radius for fully threaded screws
- a d_s specified in [Table 1](#) only applies if $r_{s,min}$ is specified in [Table 2](#).
- b In accordance with ISO 4753: chamfered end (CH), but for sizes $\leq M4$ as rolled end (RL) is also allowed.
- c Incomplete thread $u \leq 2P$.
- d $l_{g,max} = l_{nom} - b$ and $l_{s,min} = l_{g,max} - 5P$.
- e A slight rounding or countersink at the mouth of the socket is permissible.
- f Contour at the discretion of the manufacturer.
- g Reference datum for d_w .

Figure 1 — Hexagon socket button head screws



w_b wall thickness between the bottom of the cylindrical hole and the bearing face

Figure 2 — Permissible alternative form of socket (broached socket)

For broached sockets which are at the maximum limit of size, the overcut resulting from drilling shall not exceed $1/3$ of the length of any flat of the socket which is $e/2$ (see [Figure 3](#)).

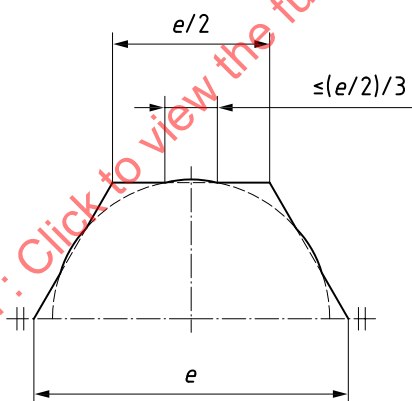


Figure 3 — Detail: Broached socket

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
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^b	max.	3,00	4,00	5,00	6,00	8,00	10,00	12,00	16,00
	min.	2,86	3,82	4,82	5,82	7,78	9,78	11,73	15,73
d_w^c	min.	4,97	6,66	8,41	9,26	12,48	15,70	18,84	25,28
e^d	min.	2,30	2,87	3,44	4,58	5,72	6,86	9,15	11,43
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	max. ^e	1,20	1,65	2,12	2,26	3,05	3,75	4,61	6,19
	min.	1,04	1,30	1,56	2,08	2,60	3,12	4,16	5,20
w_b	min.	0,20	0,30	0,38	0,74	1,05	1,45	1,63	2,25
^a	P is the pitch of the thread.								
^b	d_s only applies if $l_{s,min}$ is specified in Table 2 .								
^c	$d_{w,min} = 0,92d_{k,min}$								
^d	For combined gauging of socket dimensions, e and s , see ISO 23429.								
^e	$t_{max} = k_{min} - w_{b,min}$								

Table 2 — Lengths

Dimensions in millimetres

Thread, d			M3	M4	M5	M6	M8	M10	M12	M16																						
b^a ref.			18	20	22	24	28	32	36	48																						
l			Range of standard lengths between the stepped bold lines (white area)																													
			Shank length l_s and grip length l_g^b																													
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.	l_s min.	l_g max.														
6	5,76	6,24	Screws with too short length																													
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			Fully threaded screws ^c																											
30	29,58	30,42	4,5	7,0																												
35	34,5	35,5	9,5	12,0																	6,5	10,0	4,0	8,0								
40	39,5	40,5																			11,5	15,0	9,0	13,0	6,0	11,0						
45	44,5	45,5																			16,5	20,0	14,0	18,0	11,0	16,0	5,75	12,0				
50	49,5	50,5																					19,0	23,0	16,0	21,0	10,75	17,0	5,5	13,0		
55	54,4	55,6																					24,0	28,0	21,0	26,0	15,75	22,0	10,5	18,0		
60	59,4	60,6																							26,0	31,0	20,75	27,0	15,5	23,0	10,25	19,0
65	64,4	65,6																							31,0	36,0	25,75	32,0	20,5	28,0	15,25	24,0
70	69,4	70,6																									30,75	37,0	25,5	33,0	20,25	29,0
75	74,4	75,6									35,75	42,0	30,5	38,0	25,25	34,0	12,0	22,0														
80	79,4	80,6									45,75	52,0	40,5	48,0	35,25	44,0	22,0	32,0														
90	89,3	90,7											50,5	58,0	45,25	54,0	32,0	42,0														
100	99,3	100,7																														
^a			For partially threaded screws, b is for reference only.																													
^b			As an option, fully threaded screws can be agreed between the purchaser and the supplier.																													
^c			Fully threaded screws are threaded to the head within 3P.																													

5 Requirements and reference International Standards

The requirements specified in the International Standards listed in [Table 3](#) shall apply. The minimum ultimate tensile loads of full size fasteners shall meet the minimum values specified in [Table 4](#).

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	8.8, 10.9, 12.9/ <u>12.9</u> ^b	—
	Grade and property class	—	A2-70, A4-70 A2-80, A4-80
	International Standard	ISO 898-1 ^c	ISO 3506-1 ^c
	Symbol	08.8, 010.9, 012.9/ <u>012.9</u>	A2-070, A4-070 ^d A2-080, A4-080
Tolerances	Product grade	A, except for d_w	
	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 Additional requirements or other finishes or coatings shall be agreed between the purchaser and the supplier.	Clean and bright and/or Passivated ^e
Surface integrity		Limits for surface discontinuities as specified in ISO 6157-1, and in ISO 6157-3 for property class 12.9/ <u>12.9</u>	As agreed ^f
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 Fasteners of property class 12.9/12.9 are susceptible to hydrogen embrittlement, see ISO 898-1 and ISO/TR 20491.

^c The minimum ultimate tensile loads for these screws with reduced loadability are specified in [Table 4](#).

^d For fully threaded screws which, due to their short thread length, cannot be tensile tested in accordance with ISO 3506-1, the symbol shall not include the property class but just the stainless steel grade.

^e See e.g. ISO 16048.

^f See e.g. ISO 6157-1.