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## Hexagon socket countersunk head screws

*Vis à tête fraisée 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.

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 10642 was prepared by Technical Committee ISO/TC 2, *Fasteners*.

This second edition cancels and replaces the first edition (ISO 10642:1997), which has been technically revised.

# Hexagon socket countersunk head screws

## 1 Scope

This International Standard specifies the characteristics of hexagon socket countersunk head screws with threads from M3 up to and including M20, with product grade A and property classes 8.8, 10.9 and 12.9.

NOTE Particular attention is drawn to the note in Table 2 and to Table 3, concerning the limitation on ultimate tensile load.

If, in special cases, specifications other than those listed in this International Standard are required, they should be selected from existing International Standards, e.g. ISO 261, ISO 888, ISO 898-1, ISO 965-2 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 designations of dimensions*

ISO 261, *ISO general-purpose metric screw threads — General plan*

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

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

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 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*

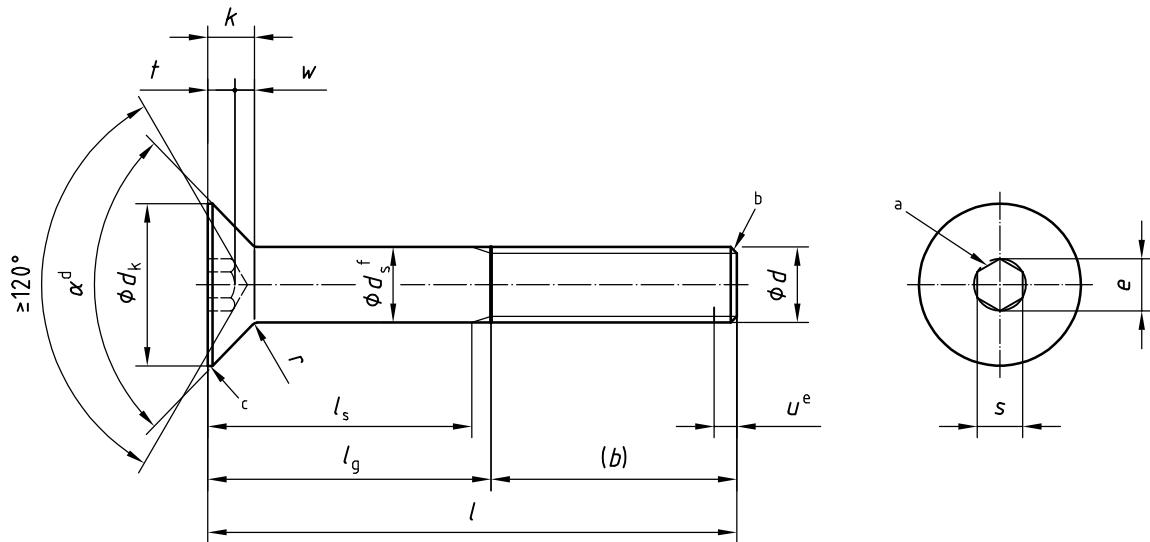
ISO 23429, *Gauging of hexagon sockets*

### 3 Dimensions and gauging of head

#### 3.1 Dimensions

See Figure 1 and Table 1.

Symbols and designations of dimensions are defined in ISO 225.



#### Permissible alternative form of socket

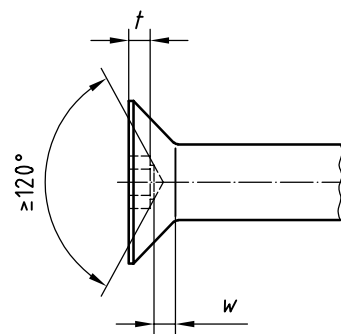
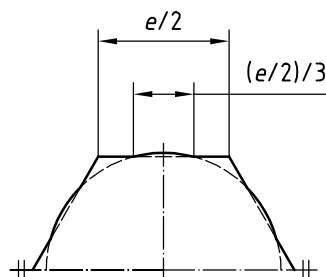


Figure 1 — Hexagon socket countersunk head screws

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  $e/2$ .



- a A slight rounding or countersink at the mouth of the socket is permissible.
- b Point to be chamfered or, for sizes M4 and below, "as rolled" in accordance with ISO 4753.
- c Edge of the head to be truncated or rounded.
- d  $\alpha = 90^\circ \text{ à } 92^\circ$ .
- e Incomplete thread  $u \leq 2 P$ .
- f  $d_s$  applies if values of  $l_{s, \min}$  are specified.

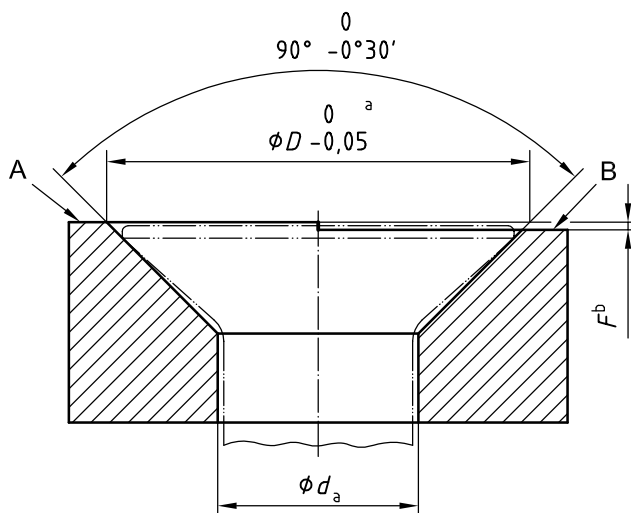
Figure 1 — Hexagon socket countersunk head screws (continued)

### 3.2 Gauging of head

See Figure 2.

The top surface of the screw shall be located between the gauge surfaces A and B.

Tolerances in millimetres



- a  $D = d_{k, \text{theor., max}}$  (see Table 1).
- b  $F$  is the Flushness tolerance of the head (see Table 1).

Figure 2 — Flushness gauge

Table 1 — Dimensions

Dimensions in millimetres

Thread (d)	M3		M4		M5		M6		M8		M10		M12		(M14) <sup>g</sup>		M16		M20	
	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.
<i>P</i> <sup>a</sup>																				
<i>b</i> <sup>b</sup>																				
<i>d</i> <sub>a</sub>																				
<i>d</i> <sub>k</sub>																				
	theor.																			
	actual																			
<i>d</i> <sub>s</sub>																				
<i>e</i> <sup>c, d</sup>																				
<i>k</i>																				
<i>F</i> <sup>e</sup>																				
<i>r</i>																				
<i>s</i> <sup>d</sup>																				
<i>t</i>																				
<i>w</i>																				
Shank length <i>l</i> <sub>s</sub> and grip length <i>l</i> <sub>g</sub>																				
<i>l</i> <sup>f</sup>																				
nom.	min.	max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.	l <sub>s</sub> min.	l <sub>g</sub> max.
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																		
30	29,58	30,42	9,5	12																
35	34,5	35,5																		
40	39,5	40,5																		
45	44,5	45,5																		
50	49,5	50,5																		
55	54,4	55,6																		



Table 1 — Dimensions (continued)

<b>60</b>	59,4	60,6							31	36	25,75	32	20,5	28								
<b>65</b>	64,4	65,6									30,75	37	25,5	33	20,25	29						
<b>70</b>	69,4	70,6									35,75	42	30,5	38	25,25	34	20	30				
<b>80</b>	79,4	80,6									45,75	52	40,5	48	35,25	44	30	40	26	36		
<b>90</b>	89,3	90,7											50,5	58	45,25	54	40	50	36	46		
<b>100</b>	99,3	100,7											60,5	68	55,25	64	50	60	46	56	35,5	48

a  $P$  is the pitch of the thread.

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

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

d Combined gauging of socket dimensions  $e$  and  $s$ , see ISO 23429.

e  $F$  is the flushness of the head, see Figure 2. The gauge dimension  $F$  has the tolerance  $0_{-0,01}$ .

f The range of commercial lengths is between the bold stepped lines. Lengths in the shaded area are threaded to the head within  $3 P$ . Lengths below the shaded area have values of  $l_g$  and  $l_s$  in accordance with the following formulae:

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

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

g The size in brackets should be avoided if possible.

#### 4 Requirements and reference International Standards

See Tables 2 and 3.

**Table 2 — Requirements and reference International Standards**

Material		Steel
<b>General requirements</b>	International Standard	ISO 8992
<b>Thread</b>	Tolerance	6g for property classes 8.8 and 10.9; 5g6g for property class 12.9
	International Standards	ISO 261, ISO 965-2, ISO 965-3
<b>Mechanical properties</b>	Property class <sup>a</sup>	8.8, 10.9, 12.9
	International Standard	ISO 898-1
<b>Tolerances</b>	Product grade	A
	International Standard	ISO 4759-1
<b>Finish</b>		As processed. Requirements for electroplating are covered in ISO 4042. Requirements for non-electrolytically applied zinc flake coatings are covered in ISO 10683.
<b>Surface discontinuities</b>		Limits for surface discontinuities are given in ISO 6157-1 and ISO 6157-3 for property class 12.9.
<b>Acceptability</b>		Acceptance procedure is covered in ISO 3269.

<sup>a</sup> Because of their head configurations, these screws may not meet the minimum ultimate tensile load for property classes 8.8, 10.9 and 12.9, specified in ISO 898-1, when tested in accordance with test programme B. They shall nevertheless meet the other material and property requirements for property classes 8.8, 10.9 and 12.9 specified in ISO 898-1. In addition, when full-size screws are loaded with the head supported on a suitable collar (conical bearing surface) using the type of testing fixture illustrated in 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.

**Table 3 — Minimum ultimate tensile loads for hexagon socket countersunk head screws**  
(80 % of the values specified in ISO 898-1)

Thread ( <i>d</i> )	Property class		
	8.8	10.9	12.9
	Minimum ultimate tensile load		
	N		
<b>M3</b>	3 220	4 180	4 190
<b>M4</b>	5 620	7 300	8 560
<b>M5</b>	9 080	11 800	13 800
<b>M6</b>	12 900	16 700	19 600
<b>M8</b>	23 400	30 500	35 700
<b>M10</b>	37 100	48 200	56 600
<b>M12</b>	53 900	70 200	82 400
<b>M14</b>	73 600	96 000	112 000
<b>M16</b>	100 000	130 000	154 000
<b>M20</b>	162 000	204 000	239 000

## 5 Designation

EXAMPLE A hexagon socket countersunk head screw with thread M12 nominal length  $l = 40$  mm and property class 12.9 is designated as follows:

**Hexagon socket countersunk head screw ISO 10642-M12×40-12.9**

