INTERNATIONAL STANDARD

ISO 10642

First edition
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Hexagon socket countersunk head screws

Vis à tête fraisée à six pans creux

Reference number
ISO 10642:1997(E)

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.

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.

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

Annex A forms an integral part of this International Standard.

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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, of 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.

Gauging of hexagon sockets is specified in annex A.

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

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 225:1983, *Fasteners – Bolts, screws, studs and nuts – Symbols and designations of dimensions.*

ISO 261:–[1], *ISO general-purpose metric screw threads – General plan.*

ISO 888:1976, *Bolts, screws and studs – Nominal lengths, and thread lengths for general purpose bolts.*

ISO 898-1:–[2], *Mechanical properties of fasteners made of carbon steel and alloy steel – Part 1: Bolts, screws and studs.*

ISO 965-2:–[3], *ISO general purpose metric screw threads – Tolerances - Part 2: Limits of sizes for general purpose bolt and nut threads – Medium quality.*

ISO 965-3:–[4], *ISO general purpose metric screw threads – Tolerances - Part 3: Deviations for constructional threads.*

ISO 3269:1988, *Fasteners – Acceptance inspection.*

ISO 4042:–[5], *Fasteners – Electroplated coatings.*

ISO 4759-1:–[6], *Tolerances for fasteners – Part 1: Bolts, screws, studs and nuts – Product grades A, B and C.*

ISO 6157-1:1988, *Fasteners – Surface discontinuites – Part 1: Bolts, screws and studs for general requirements.*

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1) To be published. (Revision of ISO 261:1973)
2) To be published. (Revision of ISO 898-1:1988)
3) To be published. (Revision of ISO 965-2:1980)
4) To be published. (Revision of ISO 965-3:1980)
5) To be published. (Revision of ISO 4042:1989)
6) To be published. (Revision of ISO 4759-1:1978)

ISO 6157-3:1988, *Fasteners – Surface discontinuites – Part 3: Bolts, screws and studs for special requirements.*

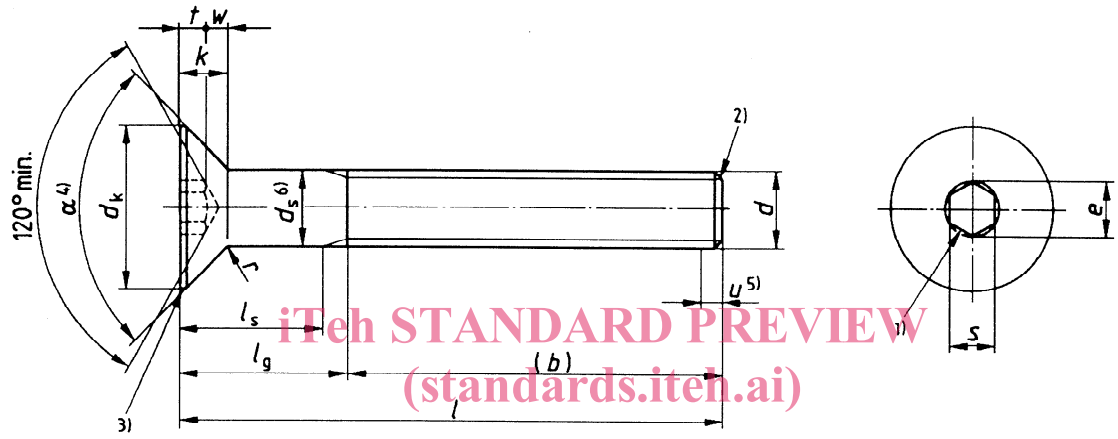
ISO 8992:1986, *Fasteners – General requirements for bolts, screws, studs and nuts.*

3 Dimensions and gauging of head

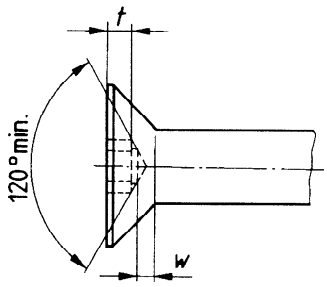
3.1 Dimensions

See figure 1 and table 1.

Symbols and designations of symbols are defined in ISO 225.



Permissible alternative form of socket



NOTE — For broached sockets which are at the maximum limit of size the overcut resulting from drilling shall not exceed 20 % of the length of any flat of the socket.

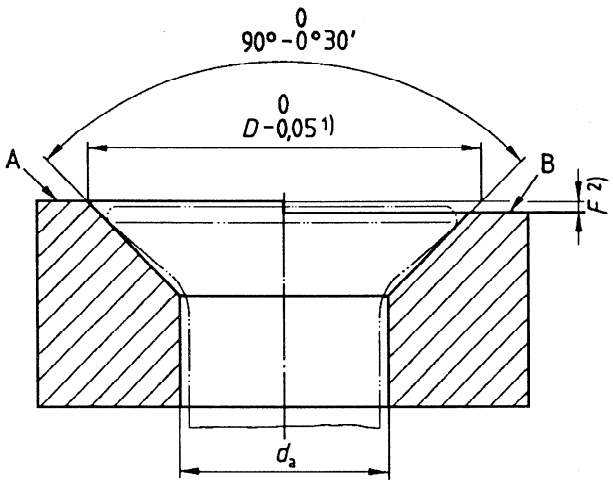
1) A slight rounding or countersink at the mouth of the socket is permissible.
2) Point to be chamfered or, for sizes M4 and below "as rolled".
3) Edge of the head to be truncated or rounded.
4) $\alpha = 90°$ to $92°$
5) Incomplete thread $u \leqslant 2P$
6) d_s applies if values of $l_{s\,min}$ are specified.

Figure 1 — Hexagon socket countersunk head screws

3.2 Gauging of head

See figure 2.

Tolerances in millimetres



1) $D = d_{k\ theor.\ max}$ (see table 1).

2) F is the flushness tolerance of the head (see table 1).

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

Figure 2 — Flushness gauge

Table 1 — Dimensions

Dimensions in millimetres

Thread (d)			M3	M4	M5	M6	M8	M10	M12	(M14)[1]	M16	M20
P[2]			0,5	0,7	0,8	1	1,25	1,5	1,75	2	2	2,5
b		ref.	18	20	22	24	28	32	36	40	44	52
d_a		max.	3,3	4,4	5,5	6,6	8,54	10,62	13,5	15,5	17,5	22
d_k	theor.	max.	6,72	8,96	11,20	13,44	17,92	22,40	26,88	30,80	33,60	40,32
	actual	min.	5,54	7,53	9,43	11,34	15,24	19,22	23,12	26,52	29,01	36,05
d_s		max.	3,00	4,00	5,00	6,00	8,00	10,00	12,00	14,00	16,00	20,00
		min.	2,86	3,82	4,82	5,82	7,78	9,78	11,73	13,73	15,73	19,67
e[3]		min.	2,3	2,87	3,44	4,58	5,72	6,86	9,15	11,43	11,43	13,72
k		max.	1,86	2,48	3,1	3,72	4,96	6,2	7,44	8,4	8,8	10,16
F[4]		max.	0,25	0,25	0,3	0,35	0,4	0,4	0,45	0,5	0,6	0,75
r		min.	0,1	0,2	0,2	0,25	0,4	0,4	0,6	0,6	0,6	0,8
s[5]		nom.	2	2,5	3	4	5	6	8	10	10	12
		max.[6]	2,045	2,56	3,071	4,084	5,084	6,095	8,115	10,115	10,115	12,142
		max.[7]	2,060	2,58	3,080	4,095	5,140	6,140	8,175	10,175	10,175	12,212
		min.	2,020	2,52	3,020	4,020	5,020	6,020	8,025	10,025	10,025	12,032
t		min.	1,1	1,5	1,9	2,2	3	3,6	4,3	4,5	4,8	5,6
w		min.	0,25	0,45	0,66	0,7	1,16	1,62	1,8	1,62	2,2	2,2

Table 1 *(concluded)*

Thread (d)			**M3**		**M4**		**M5**		**M6**		**M8**		**M10**		**M12**		**(M14)**[1]		**M16**		**M20**	
	l [8) 9)]		Shank length l_s and grip length 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	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.	min.	max.	min.	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	6,5	10																
35	34,5	35,5			11,5	15	9	13														
40	39,5	40,5			16,5	20	14	18	11	16												
45	44,5	45,5					19	23	16	21												
50	49,5	50,5					24	28	21	26	15,75	22										
55	54,4	55,6							26	31	20,75	27	15,5	23								
60	59,4	60,6							31	36	25,75	32	20,5	28								
65	64,4	65,6									30,75	37	25,5	33	20,25	29						
70	69,4	70,6									35,75	42	30,5	38	25,25	34	20	30				
80	79,4	80,6									45,75	52	40,5	48	35,25	44	30	40	26	36		
90	89,3	90,7											50,5	58	45,25	54	40	50	36	46		
100	99,3	100,7											60,5	68	55,25	64	50	60	46	56	35,5	48

1) Non preferred thread.

2) P is the pitch of the thread.

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

4) F is the flushness of the head, see figure 2. The gauge dimension F has the tolerance $^{0}_{-0{,}01}$.

5) s shall be gauged by attribute methods, see annex A for gauges.

6) For property class 12.9.

7) For all other property classes.

8) Lengths above the dashed stepped line are threaded to head within $3P$. Lengths below the dashed stepped line have values of l_s and l_g according to the following formulae:

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

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

9) Commercial lengths between the thick stepped lines.

4 Requirements and reference International Standards

See tables 2 and 3.

Table 2 — Requirements and reference International Standards

Material		Steel
General requirements	International Standard	ISO 8992
Thread	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
Mechanical properties	Property class[1)]	8.8, 10.9, 12.9
	International Standard	ISO 898-1
Tolerances	Product grade	A
	International Standard	ISO 4759-1
Finish		Black oxide (thermal or chemical) Requirements for electroplating are covered in ISO 4042. If different electroplating requirements are desired or if requirements are needed for other finishes they should be negotiated between customer and supplier. Limits for surface discontinuities are covered in ISO 6157-1 and ISO 6157-3.
Acceptability		Acceptance procedure is dealt with in ISO 3269.

1) 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 the test programme B. They shall nevertheless meet the other material and property requirements for property classes 8.8, 10.9 and 12.9 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 the test loads specified in table 3 without fracture.

If tested to failure, the fracture may occur in the threaded section, the shank, the head 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 (d)	Property class		
	8.8	10.9	12.9
	Minimum ultimate tensile load N		
M3	3 220	4 180	4 910
M4	5 620	7 300	8 560
M5	9 080	11 800	13 800
M6	12 900	16 700	19 600
M8	23 400	30 500	35 700
M10	37 100	48 200	56 600
M12	53 900	70 200	82 400
M14	73 600	96 000	112 000
M16	100 000	130 000	154 000
M20	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