BRITISH STANDARD

BS 4168-8: 1982

(Reprinted, incorporating Amendment No. 1)

Hexagon socket screws and wrench keys: metric series —

Part 8: Specification for hexagon socket countersunk head screws

UDC 621.882.215.6.091.6

Cooperating organizations

The Mechanical Engineering Standards Committee, under whose direction this British Standard was prepared, consists of representatives from the following:

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British Railways Board
British Steel Industry (Wire Section)
Electronic Engineering Association
Federation of British Hand Tool Manufacturers
Gauge and Tool Makers' Association
Washer Manufacturers' Association of Great Britain

This British Standard, having been prepared under the direction of the Mechanical Engineering Standards Committee, was published under the authority of the Board of BSI and comes into effect on 31 August 1982

The following BSI references relate to the work on this standard:
Committee reference GME/9 (formerly MEE/60)
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Amendments issued since publication

Amd. No.	Date of issue	Comments
5659	August 1987	Indicated by a sideline in the margin

Contents

Foreword

This British Standard has been prepared under the direction of the Mechanical Engineering Standards Committee and forms part of the revision of BS 4168:1967. It is one of a series of specifications, of which the full list is as follows:

— *Part 1: Specification for hexagon socket head cap screws*;

— *Part 2: Specification for hexagon socket set screws with flat point*;

— *Part 3: Specification for hexagon socket set screws with cone point*;

— *Part 4: Specification for hexagon socket set screws with dog point*;

— *Part 5: Specification for hexagon socket set screws with cup point*;

— *Part 6: Specification for hexagon socket button head screws*;

— *Part 7: Specification for hexagon socket shoulder screws*;

— *Part 8: Specification for hexagon socket countersunk head screws*;

— *Part 9: Wrench keys*[1)].

This Part of this standard is based on the work in progress in ISO/TC 2 "*Fasteners*" and it also formed the United Kingdom proposal to ISO/TC 2.

If, in special cases, requirements other than those listed in this standard are necessary, it is recommended that they should be selected from the standards referred to in clause **4**.

Although the tolerances on some features specified in this standard differ from those specified in BS 4168:1967, screws complying with this standard are generally inter-changeable with screws complying with BS 4168:1967.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 4, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

[1)] In course of preparation.

1 Scope

This Part of BS 4168 specifies requirements for hexagon socket countersunk head screws with ISO metric threads and diameters from 3 mm up to and including 20 mm.

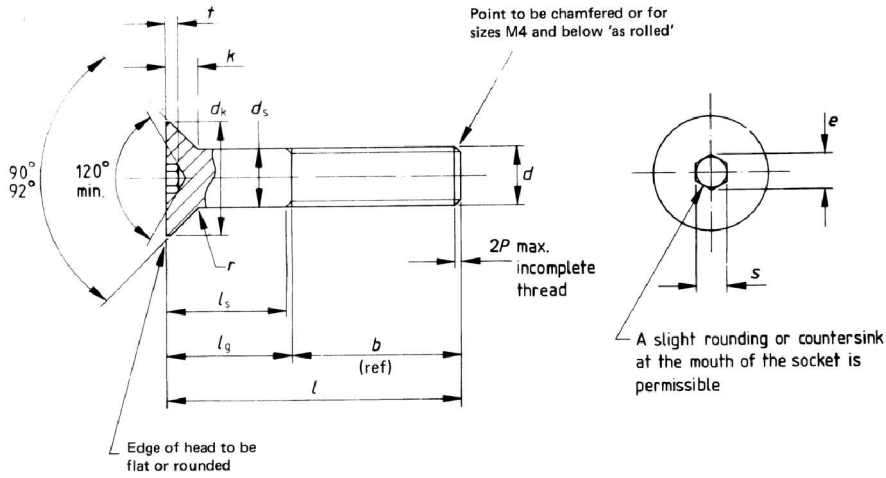
NOTE Particular attention is drawn to the note in clause **4**, concerning the limitation on ultimate tensile strength.

2 References

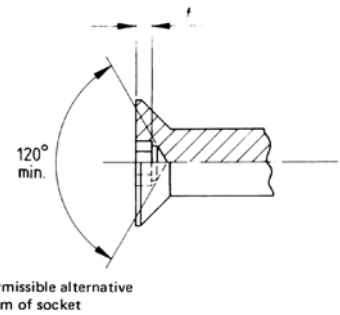
The titles of the publications referred to in this standard are listed on the inside back cover.

3 Dimensions and surface detail

The dimensions and surface detail of the countersunk head screws shall be in accordance with Figure 1 and Table 1. Figure 2 illustrates a suitable gauge for the control of the flushness tolerance.



NOTE l_s and l_g are the shank length and the grip length respectively.



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.

Figure 1 — Countersunk screws

Table 1 — Dimensions

Dimensions in millimetres.

Thread size d		M3	M4	M5	M6	M8	M10	M12	(M14)	M16	M20
P	pitch	0.5	0.7	0.8	1.0	1.25	1.5	1.75	2.0	2.0	2.5
b	ref.	18	20	22	24	28	32	36	40	44	52
d_a	max.	3.4	4.5	5.5	6.6	9.0	11.0	13.5	15.5	17.5	22.0
d_k	theoretical sharp max.	6.72	8.96	11.20	13.44	17.92	22.40	26.88	30.24	33.60	40.32
	actual max.	6	8	10	12	16	20	24	27	30	36
	actual min.	5.82	7.78	9.78	11.73	15.73	19.67	23.67	26.67	29.67	35.61
d_s	max.	3	4	5	6	8	10	12	14	16	20
	min.	2.86	3.82	4.82	5.82	7.78	9.78	11.73	13.73	15.73	19.67
e[a]	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	3.10	3.72	4.96	6.20	7.44	8.12	8.80	10.16
	flushness tolerance	0.18	0.24	0.30	0.36	0.48	0.60	0.72	0.81	0.90	1.08
r	min.	0.1	0.2	0.2	0.25	0.4	0.4	0.6	0.6	0.6	0.8
s	nominal	2	2.5	3	4	5	6	8	10	10	12
	min.	2.02	2.52	3.02	4.02	5.02	6.02	8.025	10.025	10.025	12.032
	max.	2.045	2.56	3.08	4.095	5.095	6.095	8.115	10.115	10.115	12.142
t	min.	1.05	1.49	1.86	2.16	2.85	3.60	4.35	4.65	4.89	5.45

l			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
Nominal	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**	**min.**	**max.**
16	15.65	16.35																				
20	19.58	20.42																				
25	24.58	25.42																				
30	29.58	30.42	9.5	12.0	6.5	10.0																
35	34.5	35.5			11.5	15.0	9.0	13.0														
40	39.5	40.5			16.5	20.0	14.0	18.0	11.0	16.0												
45	44.5	45.5					19.0	23.0	16.0	21.0												
50	49.5	50.5					24.0	28.0	21.0	26.0	15.75	22.0										
55	54.4	55.6							26.0	31.0	20.75	27.0	15.5	23.0								
60	59.4	60.6							31.0	36.0	25.75	32.0	20.5	28.0								
65	64.4	65.6									30.75	37.0	25.5	33.0	20.25	29.0						
70	69.4	70.6									35.75	42.0	30.5	38.0	25.25	34.0	20.0	30.0				
80	79.4	80.6									45.75	52.0	40.5	48.0	35.25	44.0	30.0	40.0	26.0	36.0		
90	89.3	90.7											50.5	58.0	45.25	54.0	40.0	50.0	36.0	46.0		
100	99.3	100.7											60.5	68.0	55.25	64.0	50.0	60.0	46.0	56.0	35.5	48.0

NOTE Lengths above the bold line are threaded to head within $3P$.

[a] e min. = $1.14s$ min.

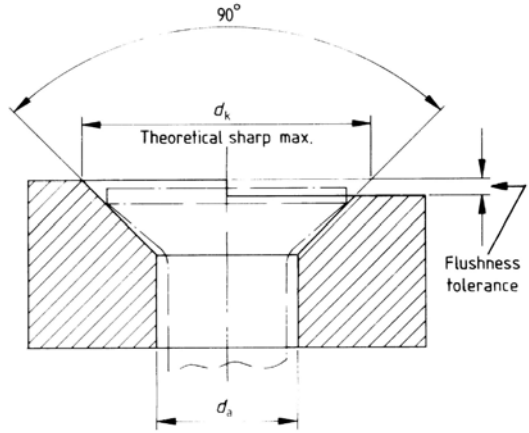


Figure 2 — Flushness gauge

4 Specifications and reference standards

4.1 The countersunk head screws shall be manufactured in accordance with the specifications in Table 2 and **4.2** and the relevant reference standards as noted.

4.2 When full size screws are loaded with the head supported on a suitable collar using the type of testing fixture illustrated in Figure 2 of BS 6104-1:1981 they shall withstand the loads given below without fracture.

Thread size, d	Test load
	N
M3	5 200
M4	9 100
M5	14 800
M6	20 900
M8	38 100
M10	60 300
M12	87 700
(M14)	120 000
M16	163 000
M20	255 000

NOTE If tested to failure, the fracture may occur in the threaded section, the head or at the head shank junction.

5 Designation

When designating countersunk head screws, for the purpose of an enquiry or order, the information as the following example shall be given.

Hexagon socket countersunk head screw with thread size d = M12 and nominal length l = 40 mm:

Hexagon socket countersunk head screw
BS 4168 M12 × 40

Table 2 — Specifications and reference standards

Material		Steel
Thread	Tolerance	5g6g
	Standard	BS 3643
Mechanical properties	Class	12.9[a]
	Standard	BS 6104-1
Tolerances	Product grade	A
	British Standard	BS 6322-1
Discontinuities		BS ....[b]
Finish		Black oxide (thermal or chemical). Requirements for electroplating are covered in BS 3382. If different electroplating requirements are needed for other finishes they should be negotiated between customer and supplier.
Acceptability		For acceptance precedure see BS 6587

[a] Because of their head configurations, countersunk head screws may not meet the minimum ultimate tensile load for property class 12.9, specified in Table 6 of BS 6104-1:1981, when tested in accordance with test programme B. They are nevertheless required to meet the other material and property requirements for property class 12.9 in BS 6104-1.
[b] Waiting the publication of ISO 6157-3.

Publications referred to

BS 3382, *Electroplated coatings on threaded components.*

BS 3643, *ISO metric screw threads.*

BS 6104, *Mechanical properties of fasteners.*

BS 6104-1, *Specification for bolts, screws and studs.*

BS 6322, *Tolerances for fasteners.*

BS 6322-1, *Specification for tolerances of bolts, screws and nuts with thread diameters* $\geqslant$ *1.6 mm and* $\leqslant$ *150 mm and product grades A, B and C.*

BS 6587, *Method of acceptance inspection for fasteners.*

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