

भारतीय मानक

उत्पाद ग्रेड 'सी' के लिए षटकोणीय
शीर्ष वाले काबले, पेंच और ढिबरियाँ
भाग 2 षटकोणीय शीर्ष वाले पेंच (साइज रेंज एम 5 से एम 64 तक)
(चौथा पुनरीक्षण)

Indian Standard

HEXAGON HEAD BOLTS, SCREWS AND
NUTS OF PRODUCT GRADE 'C'

PART 2 HEXAGON HEAD SCREWS (SIZE RANGE M 5 TO M 64)

(Fourth Revision)

ICS 21.060.10

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NATIONAL FOREWORD

This Indian Standard (Part 2) (Fourth Revision) which is identical with ISO 4018 :1999 'Hexagon head screws — Product grade C' issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of the Bolts, Nuts and Fasteners Accessories Sectional Committee and approval of the Basic and Production Engineering Division Council.

IS 1363 was originally published in 1960 and first revised in 1967. Subsequent to the publication of 1967 edition, many changes had been agreed upon at international level which have been reflected in IS 1367 series of standards covering 'Technical supply conditions for threaded steel fasteners'. Accordingly, the second revision was published in 1984 splitting the standard into 3 parts covering hexagon head bolts, hexagon head screws and hexagon nuts. The third revision of this standard was published in 1992 by adoption of ISO 4018 : 1988. This fourth revision has been prepared by adoption of latest edition of ISO 4018 published in 1999. The remaining parts of the standard, that is, Part 1 and Part 3 have also been revised by adopting the corresponding latest editions of ISO Standards published in 1999.

In 1967 version of this standard, the widths across flat dimensions for M10 and M12 size fasteners were specified as 17 mm and 19 mm respectively. However, in the 1984 version these width across flat dimensions were brought in line with ISO 4018 :1979 and specified as 16 mm and 18 mm respectively for M10 and M12 size fasteners. Recognizing the difficulty of immediate changeover to new width across flat dimensions, the Committee decided to permit width across flat dimensions as per 1967 version, that is, 17 mm and 19 mm for M10 and M12 size fasteners till 31 December 1994. Now it is expected that the entire fastener industry would have switched over to new width across flat dimensions and from 1 January 1995, no old width across flat dimensions shall be permitted.

The text of ISO Standard has been approved as suitable for publication as Indian Standard without deviations. Certain terminology and conventions are, however, not identical to those used in Indian Standards. Attention is drawn especially to the following:

- a) Wherever the words 'International Standard' appear, referring to this standard, they should be read as 'Indian Standard'.
- b) Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use a full point (.) as the decimal marker.

In this adopted standard, reference appears to certain International Standards for which Indian Standards also exist. The corresponding Indian Standards which are to be substituted in their place are listed below along with their degree of equivalence for the editions indicated:

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 225 : 1983	IS 8536 : 1987 Fasteners — Bolts, screws, studs and nuts — Symbols and designation of dimensions (<i>first revision</i>)	Identical
ISO 724 : 1993	IS 4218 (Part 3) : 1999 ISO General purpose metric screw threads : Part 3 Basic dimensions (<i>second revision</i>)	do
ISO 888 : 1976	IS 4206 : 1987 Dimensions for nominal lengths and thread lengths for bolts, screws and studs (<i>first revision</i>)	do

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Indian Standard

**HEXAGON HEAD BOLTS, SCREWS AND
NUTS OF PRODUCT GRADE 'C'**

PART 2 HEXAGON HEAD SCREWS (SIZE RANGE M 5 TO M 64)

(Fourth Revision)

1 Scope

This International Standard specifies the characteristics of hexagon head screws with threads from M5 up to and including M64, of product grade C.

NOTE This type of product is the same as that covered by ISO 4016 with the exception of threading up to head.

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 724, ISO 888, ISO 898-1, ISO 965-1 and ISO 4759-1.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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

ISO 724:1993, *ISO general-purpose metric screw threads — Basic dimensions.*

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

ISO 898-1:1999, *Mechanical properties of fasteners made of carbon steel and alloy steel — Part 1: Bolts, screws and studs.*

ISO 965-1:1998, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data.*

ISO 3269:—¹⁾, *Fasteners — Acceptance inspection.*

¹⁾ To be published. (Revision of ISO 3269:1988)

ISO 4042:1999, *Fasteners — Electroplated coatings*.

ISO 4759-1:—²⁾, *Tolerances for fasteners — Part 1: Bolts, screws, studs and nuts — Product grades A, B and C*.

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

ISO 10683:—³⁾, *Fasteners — Non-electrolytically applied zinc flake coatings*.

3 Dimensions

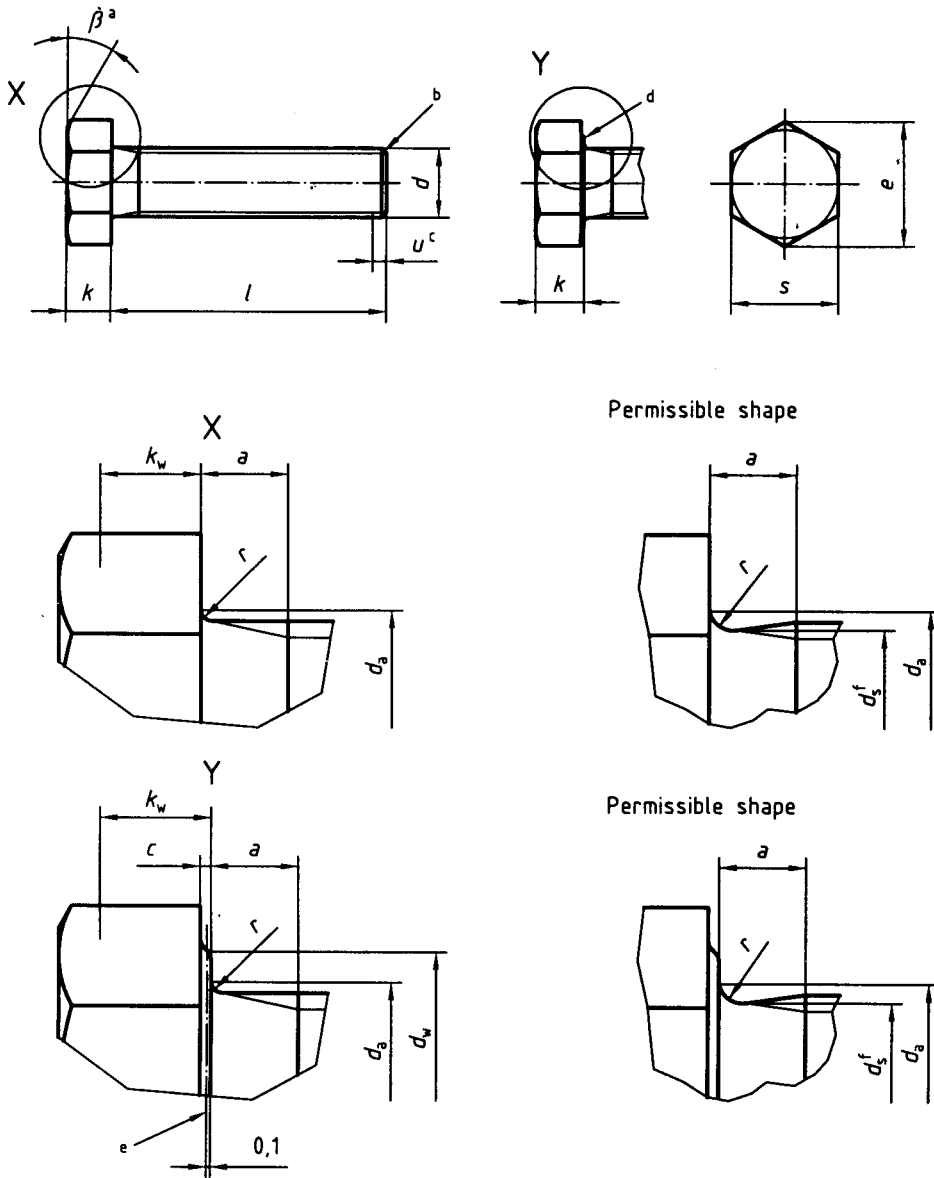
See Figure 1 and Tables 1 and 2

Symbols and description of dimensions are defined in ISO 225.

²⁾ To be published. (Revision of ISO 4759-1:1978)

³⁾ To be published.

Dimensions in millimetres



- a $\beta = 15^\circ$ to 30°
- b End without special requirements
- c Incomplete thread $u \leq 2P$
- d Washer face permissible
- e Reference datum for d_w
- f $d_s \approx$ pitch diameter

Figure 1

Table 1 — Preferred threads

Dimensions in millimetres

Thread (d)			M5	M6	M8	M10	M12	M16	M20	M24	M30	M36	M42	M48	M56	M64
p ^a			0,8	1	1,25	1,5	1,75	2	2,5	3	3,5	4	4,5	5	5,5	6
a	max.		2,4	3	4,00	4,5	5,30	6	7,5	9	10,5	12	13,5	15	16,5	18
	min.		0,8	1	1,25	1,5	1,75	2	2,5	3	3,5	4	4,5	5	5,5	6
c	max.		0,5	0,5	0,6	0,6	0,6	0,8	0,8	0,8	0,8	0,8	1	1	1	1
d _a	max.		6	7,2	10,2	12,2	14,7	18,7	24,4	28,4	35,4	42,4	48,6	56,6	67	75
d _w	min.		6,74	8,74	11,47	14,47	16,47	22	27,7	33,25	42,75	51,11	59,95	69,45	78,66	88,16
e	min.		8,63	10,89	14,2	17,59	19,85	26,17	32,95	39,55	50,85	60,79	71,3	82,6	93,56	104,86
k	nom.		3,5	4	5,3	6,4	7,5	10	12,5	15	18,7	22,5	26	30	35	40
	max.		3,875	4,375	5,675	6,85	7,95	10,75	13,4	15,9	19,75	23,55	27,05	31,05	36,25	41,25
	min.		3,125	3,625	4,925	5,95	7,05	9,25	11,6	14,1	17,65	21,45	24,95	28,95	33,75	38,75
k _w ^b	min.		2,19	2,54	3,45	4,17	4,94	6,48	8,12	9,87	12,36	15,02	17,47	20,27	23,63	27,13
r	min.		0,2	0,25	0,4	0,4	0,6	0,6	0,8	0,8	1	1	1,2	1,6	2	2
s	nom. = max.		8,00	10,00	13,00	16,00	18,00	24,00	30,00	36	46	55,0	65,0	75,0	85,0	95,0
	min.		7,64	9,64	12,57	15,57	17,57	23,16	29,16	35	45	53,8	63,1	73,1	82,8	92,8
l ^c																
nom.	min.	max.														
10	9,25	10,75														
12	11,1	12,9														
16	15,1	16,9														
20	18,95	21,05														
25	23,95	26,05														
30	28,95	31,05														
35	33,75	36,25														
40	38,75	41,25														
45	43,75	46,25														
50	48,75	51,25														
55	53,5	56,5														
60	58,5	61,5														
65	63,5	66,5														
70	68,5	71,5														
80	78,5	81,5														
90	88,25	91,75														
100	98,25	101,75														
110	108,25	111,75														

120	118,25	121,75														
130	128	132														
140	138	142														
150	148	152														
160	156	164														
180	176	184														
200	195,4	204,6														
220	215,4	224,6														
240	235,4	244,6														
260	254,8	265,2														
280	274,8	285,2														
300	294,8	305,2														
320	314,3	325,7														
340	334,3	345,7														
360	354,3	365,7														
380	374,3	385,7														
400	394,3	405,7														
420	413,7	426,3														
440	433,7	446,3														
460	453,7	466,3														
480	473,7	486,3														
500	493,7	506,3														

^a P is the pitch of the thread.

^b $k_{w, \min} = 0,7 k_{\min}$

^c Range of popular lengths between the solid, boldface, stepped lines.

Table 2 — Non-preferred threads

Dimensions in millimetres

Thread (d)			M14	M18	M22	M27	M33	M39	M45	M52	M60
p ^a			2	2,5	2,5	3	3,5	4	4,5	5	5,5
a	max.		6	7,5	7,5	9	10,5	12	13,5	15	16,5
	min.		2	2,5	2,5	3	3,5	4	4,5	5	5,5
c	max.		0,6	0,8	0,8	0,8	0,8	1	1	1	1
d _a	max.		16,7	21,2	26,4	32,4	38,4	45,4	52,6	62,6	71
d _w	min.		19,15	24,85	31,35	38	46,55	55,86	64,7	74,2	83,41
e	min.		22,78	29,56	37,29	45,2	55,37	66,44	76,95	88,25	99,21
k	nom.		8,8	11,5	14	17	21	25	28	33	38
	max.		9,25	12,4	14,9	17,9	22,05	26,05	29,05	34,25	39,25
	min.		8,35	10,6	13,1	16,1	19,95	23,95	26,95	31,75	36,75
k _w ^b	min.		5,85	7,42	9,17	11,27	13,97	16,77	18,87	22,23	25,73
r	min.		0,6	0,6	0,8	1	1	1	1,2	1,6	2
s	nom. = max.		21,00	27,00	34	41	50	60,0	70,0	80,0	90,0
	min.		20,16	26,16	33	40	49	58,8	68,1	78,1	87,8
l ^c											
nom.	min.	max.									
30	28,95	31,05									
35	33,75	36,25									
40	38,75	41,25									
45	43,75	46,25									
50	48,75	51,25									
55	53,5	56,5									
60	58,5	61,5									
65	63,5	66,5									
70	68,5	71,5									
80	78,5	81,5									
90	88,25	91,75									
100	98,25	101,75									
110	108,25	111,75									
120	118,25	121,75									
130	128	132									
140	138	142									
150	148	152									
160	156	164									
180	176	184									
200	195,4	204,6									
220	215,4	224,6									
240	235,4	244,6									
260	254,8	265,2									
280	274,8	285,2									
300	294,8	305,2									
320	314,3	325,7									
340	334,3	345,7									
360	354,3	365,7									
380	374,3	385,7									
400	394,3	405,7									
420	413,7	426,3									
440	433,7	446,3									
460	453,7	466,3									
480	473,7	486,3									
500	493,7	506,3									

^a *p* is the pitch of the thread.

^b *k_w*, min = 0,7 *k_{min}*

^c Range of popular lengths between the solid, boldface, stepped lines.

4 Specification and reference standards

See Table 3.

Table 3 — Specifications and reference standards

Material		Steel
General requirements	International Standard	ISO 8992
Thread	Tolerance	8g
	International Standards	ISO 724, ISO 965-1
Mechanical properties	Property class ^a	$d \leq 39$ mm: 3.6, 4.6, 4.8 $d > 39$ mm: as agreed
	International Standard	$d \leq 39$ mm: ISO 898-1 $d > 39$ mm: as agreed
Tolerances	Product grade	C
	International Standard	ISO 4759-1
Finish and/or coating		As processed Requirements for electroplating are covered in ISO 4042 Requirements for non-electrolytically applied zinc flake coatings are covered in ISO 10683 If different electroplating requirements are desired or if requirements are needed for other finishes, they should be agreed between the customer and the supplier.
Acceptability		For acceptance procedure see ISO 3269.
^a For other property classes see ISO 898-1.		

5 Designation

EXAMPLE

A hexagon head screw, product grade C, with thread M12, nominal length $l = 80$ mm and property class 4.6 is designated as follows:

Hexagon head screw ISO 4018 - M12 × 80 - 4.6

Bibliography

- [1] ISO 4014:1999, *Hexagon head bolts — Product grades A and B.*
- [2] ISO 4015:1979, *Hexagon head bolts — Product grade B — Reduced shank (shank diameter approximately equal to pitch diameter).*
- [3] ISO 4016:1999, *Hexagon head bolts — Product grade C.*
- [4] ISO 4017:1999, *Hexagon head screws — Product grades A and B.*
- [5] ISO 4032:1999, *Hexagon nuts, style 1 — Product grades A and B.*
- [6] ISO 4033:1999, *Hexagon nuts, style 2 — Product grades A and B.*
- [7] ISO 4034:1999, *Hexagon nuts — Product grade C.*
- [8] ISO 4035:1999, *Hexagon thin nuts (chamfered) — Product grades A and B.*
- [9] ISO 4036:1999, *Hexagon thin nuts (unchamfered) — Product grade B.*
- [10] ISO 4161:1999, *Hexagon nuts with flange — Coarse thread.*
- [11] ISO 4162:—⁴⁾, *Hexagon bolts with flange — Small series — Product grade combination A/B.*
- [12] ISO 4775:1984, *Hexagon nuts for high-strength structural bolting with large width across flats — Product grade B — Property classes 8 and 10.*
- [13] ISO 7411:1984, *Hexagon bolts for high-strength structural bolting with large width across flats (thread lengths according to ISO 888) — Product grade C — Property classes 8.8 and 10.9.*
- [14] ISO 7412:1984, *Hexagon bolts for high-strength structural bolting with large width across flats (short thread length) — Product grade C — Property classes 8.8 and 10.9.*
- [15] ISO 7413:1984, *Hexagon nuts for structural bolting, style 1, hot-dip galvanize (oversize tapped) — Product grades A and B — Property classes 5, 6 and 8.*
- [16] ISO 7414:1984, *Hexagon nuts for structural bolting with large width across flats, style 1 — Product grade B — Property class 10.*
- [17] ISO 7417:1984, *Hexagon nuts for structural bolting, style 2, hot-dip galvanize (oversize tapped) — Product grade A — Property class 9.*
- [18] ISO 8673:1999, *Hexagon nuts, style 1, with metric fine pitch thread — Product grades A and B.*
- [19] ISO 8674:1999, *Hexagon nuts, style 2, with metric fine pitch thread — Product grades A and B.*
- [20] ISO 8675:1999, *Hexagon thin nuts (chamfered) with metric fine pitch thread — Product grades A and B.*
- [21] ISO 8676:1999, *Hexagon head screws with metric fine pitch thread — Product grades A and B.*

⁴⁾ To be published. (Revision of ISO 4162:1990)

- [22] ISO 8765:1999, *Hexagon head bolts with metric fine pitch thread — Product grades A and B.*
- [23] ISO 10663:1999, *Hexagon nuts with flange — Fine pitch thread.*
- [24] ISO 15071:1999, *Hexagon bolts with flange — Small series — Product grade A.*

(Continued from second cover)

<i>International Standard</i>	<i>Corresponding Indian Standard</i>	<i>Degree of Equivalence</i>
ISO 898-1 : 1999	IS 1367 (Part 3) : 2002 Technical supply conditions for threaded steel fasteners : Part 3 Mechanical properties of fasteners made of carbon steel and alloy steel — Bolts, screws and studs (<i>fourth revision</i>)	Identical
ISO 965-1 : 1998	IS 14962 (Part 1) : 2001 ISO General purpose metric screw threads — Tolerances : Part 1 Principles and basic data	do
ISO 3269 : ¹⁾	IS 1367 (Part 17) : 1996 ²⁾ Industrial fasteners — Threaded steel fasteners — Technical supply conditions : Part 17 Inspection, sampling and acceptance procedure (<i>third revision</i>)	do
ISO 4042 : 1999	IS 1367 (Part 11) : 2002 Technical supply conditions for threaded steel fasteners : Part 11 Electroplated coatings (<i>third revision</i>)	do
ISO 4759-1 : ³⁾	IS 1367 (Part 2) : 2002 Technical supply conditions for threaded steel fasteners : Part 2 Product grades and tolerances (<i>third revision</i>)	do
ISO 8992 : 1986	IS 1367 (Part 1) : 2002 Technical supply conditions for threaded steel fasteners : Part 1 Introduction and general information (<i>third revision</i>)	do

The concerned Technical Committee has reviewed the provisions of the following ISO Standard referred in this adopted standard and has decided that it is acceptable for use in conjunction with this standard:

<i>ISO Standard</i>	<i>Title</i>
ISO 10683: — ⁴⁾	Fasteners — Non-electrolytically applied zinc flake coatings

ALTERATION

In clause 5, the designation of hexagon head screw shall be read as:

‘Hexagon head screw — IS 1363 (Part 2)/ISO 4018 – M12 × 80 – 4.6’ in place of ‘Hexagon head screw — ISO 4018 – M12 × 80 – 4.6’

PACKAGING

The packaging of hexagon head screws shall be in accordance with IS 1367(Part 18):1996 ‘Industrial fasteners — Threaded steel fasteners — Technical supply conditions : Part 18 Packaging (*third revision*)’.

BIS CERTIFICATION MARKING

Details available with the Bureau of Indian Standards.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

¹⁾ To be published (Revision of ISO 3269 : 1988).

²⁾ Identical with ISO 3269 : 1988.

³⁾ Since revised in 2000.

⁴⁾ To be published.

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Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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