

भारतीय मानक

औद्योगिक बन्धक सामग्री — इस्पात के चूड़ीदार बन्धक  
शैली 2 की षटकोणी ढिबरियाँ —  
उत्पाद ग्रेड ए और बी — विशिष्टि

*Indian Standard*

INDUSTRIAL FASTENERS — THREADED  
STEEL FASTENERS — HEXAGON NUTS OF  
STYLE 2 — PRODUCT GRADE A AND B —  
SPECIFICATION

ICS 21.060.20

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**BUREAU OF INDIAN STANDARDS**  
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NEW DELHI 110002

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Price Group 2

## NATIONAL FOREWORD

This Indian Standard which is identical with ISO 4033 : 1979 'Hexagon nuts style 2 — Product grades A and B', issued by the International Organization for Standardization (ISO) was adopted by the Bureau of Indian Standards on the recommendation of Bolts, Nuts and Fasteners Accessories Sectional Committee, and approval of Light Mechanical Engineering Division Council.

ISO Standards for requirements of electroplating and acceptance criteria referred to in clause 4 as under preparation have now been published and accordingly, the table under clause 4 should read as follows:

<i>Material</i>		<i>Steel</i>
Thread	Tolerance	6H
	International Standards	ISO 261, ISO 965
Mechanical properties	Classes	9-12
	International Standard	ISO 898-2
Tolerances	Product grades	A for products with $d \leq M16$ B for products with $d > M16$
	International Standard	ISO 4759-1
Finish	As processed Requirements for electroplating are covered in ISO 4042 <sup>1)</sup> If different electroplating requirements are desired or if requirements are needed for other finishes, they should be negotiated between customer and supplier	
Acceptability	For acceptance procedure see ISO 3269 <sup>2)</sup>	

The manufacturing of fasteners having width across flat dimensions of 15 mm and 17 mm, 19 mm and 22 mm for sizes M10, M12 and M14 respectively as mentioned in Table 1 of the Annex have already been phased out. Therefore the width across flat dimensions for above sizes shall be valid only as per clause 3.

<sup>1)</sup> ISO standard shown as under preparation in the original ISO text has since been printed in 1989.

<sup>2)</sup> ISO standard shown as under preparation in the original ISO text has since been printed in 1988.

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*Indian Standard*

# INDUSTRIAL FASTENERS — THREADED STEEL FASTENERS — HEXAGON NUTS OF STYLE 2 — PRODUCT GRADE A AND B — SPECIFICATION

**0 INTRODUCTION**

This International Standard is part of the complete ISO product standards series on hexagon drive fasteners. The series comprises :

- a) Hexagon head bolts (ISO 4014, ISO 4015 and ISO 4016)
- b) Hexagon head screws (ISO 4017 and ISO 4018)
- c) Hexagon nuts (ISO 4032, ISO 4033, ISO 4034, ISO 4035 and ISO 4036)
- d) Hexagon flanged bolts
- e) Hexagon flanged screws
- f) Hexagon flanged nuts
- g) Structural bolting

(in preparation)

**1 SCOPE AND FIELD OF APPLICATION**

This International Standard gives specifications for hexagon

nuts, style 2, with metric dimensions and thread diameters from 5 up to and including 36 mm, with product grade A for sizes  $\leq$  M16 and product grade B for sizes  $>$  M16.

NOTE — For hexagon nuts style 1, see ISO 4032.

**2 REFERENCES**

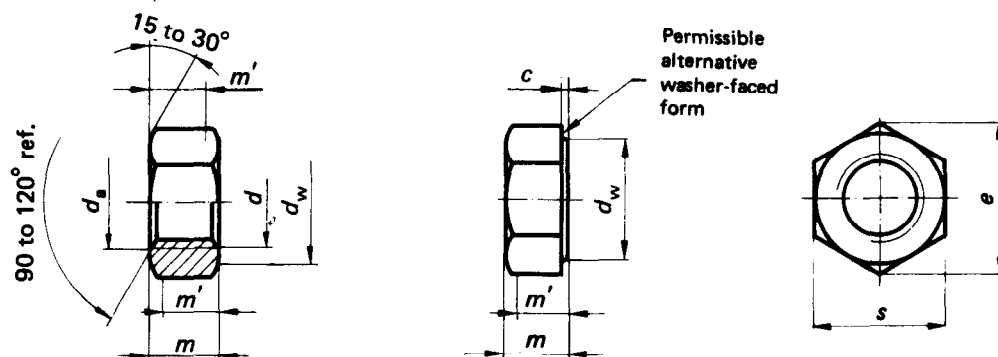
ISO 261, *ISO general purpose metric screw threads — General plan.*

ISO 898, *Mechanical properties of fasteners.*

ISO 965, *ISO general purpose metric screw threads — Tolerances.*

ISO 4759/1, *Tolerances for fasteners — Part 1 : Bolts, screws and nuts with thread diameters  $\geq$  1,6  $\leq$  150 mm and product grades A, B and C.*

## 3 DIMENSIONS



Dimensions in millimetres

Thread size $d$		M5	M6	M8	M10	M12	(M14)
$P$	1)	0,8	1	1,25	1,5	1,75	2
$c$	max.	0,5	0,5	0,6	0,6	0,6	0,6
$d_a$	min.	5	6	8	10	12	14
	max.	5,75	6,75	8,75	10,8	13	15,1
$d_w$	min.	6,9	8,9	11,6	14,6	16,6	19,6
$e$	min.	8,79	11,05	14,38	17,77	20,03	23,35
$m$	max.	5,1	5,7	7,5	9,3	12	14,1
	min.	4,8	5,4	7,14	8,94	11,57	13,4
$m'$	min.	3,84	4,32	5,71	7,15	9,26	10,7
$s$	max.	8	10	13	16	18	21
	min.	7,78	9,78	12,73	15,73	17,73	20,67

Thread size $d$		M16	M20	M24	M30	M36
$P$	1)	2	2,5	3	3,5	4
$c$	max.	0,8	0,8	0,8	0,8	0,8
$d_a$	min.	16	20	24	30	36
	max.	17,3	21,6	25,9	32,4	38,9
$d_w$	min.	22,5	27,7	33,2	42,7	51,1
$e$	min.	26,75	32,95	39,55	50,85	60,79
$m$	max.	16,4	20,3	23,9	28,6	34,7
	min.	15,7	19	22,6	27,3	33,1
$m'$	min.	12,6	15,2	18,1	21,8	26,5
$s$	max.	24	30	36	46	55
	min.	23,67	29,16	35	45	53,8

1)  $P$  = pitch of the thread.

Sizes in brackets should be avoided if possible.

## 4 SPECIFICATIONS AND REFERENCE STANDARDS

<b>Material</b>		<b>Steel</b>
<b>Thread</b>	<b>Tolerance</b>	<b>6H</b>
	<b>International Standards</b>	<b>ISO 261, ISO 965</b>
<b>Mechanical properties</b>	<b>Classes</b>	<b>9-12</b>
	<b>International Standard</b>	<b>ISO 898/2</b>
<b>Tolerances</b>	<b>Product grade</b>	A for products with $d \leq M 16$ B for products with $d > M 16$
	<b>International Standard</b>	<b>ISO 4759/1</b>
<b>Finish</b>		as processed  Requirements for electroplating are covered in ISO ... <sup>1)</sup> .  If different electroplating requirements are desired or if requirements are needed for other finishes, they should be negotiated between customer and supplier.
<b>Acceptability</b>		For acceptance procedure see ISO ... <sup>1)</sup> .

1) In preparation.

## 5 DESIGNATION

Example for the designation of a hexagon nut with metric thread  $d = M12$  and property class 9 :

Hexagon nut ISO 4033 M12-9

## ANNEX

This annex is included for explanatory and informative purposes only and is not to be considered as part of this International Standard.

This International Standard incorporates some changes, primarily in width across flats, from the previous metric practice in a number of countries. These changes were made to achieve international agreement and to improve product design and utilization of material.

At its meeting in May 1977, ISO/TC 2 studied several technical reports analysing design considerations influencing determination of the best series of widths across flats for hexagon bolts, screws and nuts. A primary technical objective was to achieve a logical ratio between underhead bearing surface area (which determines the magnitude of

the compressive stress on the bolted members) and the tensile stress area of the screw thread (which governs the clamping force which can be developed by tightening the fastener.)<sup>†</sup>

Table 1 lists the ratios for the sizes selected by ISO/TC 2 to be ISO standard (bold type) and in addition four sizes (light type) which currently are being produced and used in substantial quantities in many countries of the world.

The four sizes (widths across flats of 15, 17, 19 and 22 mm) will be phased out of production and use. During a transitional period, to assist designers and manufacturers, and in particular to give needed information for maintenance and repair requirements, the dimensions of the four sizes are given in table 2.

TABLE 1

Nominal thread diameter mm	Width across flats mm	Annular bearing area Thread stress area <sup>*</sup>
5	8	1,08
6	10	1,44
8	13	1,23
10	15	0,90
	16	1,30
	17	1,73
12	18	0,91
	19	1,16
14	21	0,96
	22	1,24
16	24	1,02
20	30	0,95
24	36	0,86
30	46	1,02
36	55	1,04

\* Calculation based on clearance holes ISO 273 (revised), medium series.

TABLE 2

Thread size <i>d</i>		M10	M12	M14
<i>P</i> 1)		1,5	1,75	2
<i>d<sub>w</sub></i>	min.	13,6	15,6	17,4
<i>e</i>	min.	16,64	18,90	21,10
<i>m</i>	max.	10	8,8	11,3
	min.	9,64	8,44	10,87
<i>m'</i>	min.	7,7	6,75	8,7
<i>s</i>	max.	15	17	19
	min.	14,73	16,73	18,67

1) *P* = pitch of the thread.

<sup>†</sup> The calculation technique is presented in TC 2/WG 4 N 43 and the ratios computed for all of the various width across flats/product size combinations examined by ISO/TC 2 are given in document TC 2 N 699.

(Continued from second Cover)

In the adopted standard, certain terminology and conventions are not identical with those used in Indian Standards; attention is particularly drawn to the following:

- a) Wherever the words 'International Standard' appear, referring to this standard, they should be read as 'Indian Standard'; and
- b) Comma (,) has been used as a decimal marker while in Indian Standards the current practice is to use a 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 261 : 1973	IS 4218 (Part 2) : 1976 ISO metric screw threads: Part 2 Diameter pitch combinations ( <i>first revision</i> )	Technically Equivalent
ISO 898-2 : 1992	IS 1367(Part 6) : 1994 Technical supply conditions for threaded steel fasteners: Part 6 Mechanical properties and test methods for nuts with specified proof loads ( <i>second revision</i> )	Identical
ISO 965 <sup>1)</sup>	ISO General purpose metric screw threads — Tolerances	
ISO 965-1 : 1980	IS 4218 (Part 4) : 1976 ISO metric screw threads: Part 4 Tolerancing system ( <i>first revision</i> )	Technically Equivalent
ISO 965-2 : 1980	IS 4218 (Part 6) : 1978 ISO metric screw threads: Part 6 Limits of sizes for commercial bolts and nuts (diameter range 1 to 52 mm) ( <i>first revision</i> )	Technically Equivalent
ISO 965-3 : 1980	IS 4218 (Part 5) : 1979 ISO metric screw threads: Part 5 Tolerances ( <i>first revision</i> )	Technically Equivalent
ISO 3269 : 1988	IS 1367 (Part 17) : 1996 Industrial fasteners — Threaded steel fasteners — Technical supply conditions: Part 17 Inspection, sampling and acceptance criteria ( <i>third revision</i> )	Identical
ISO 4042 : 1989	IS 1367 (Part 11) : 1996 Fasteners — Technical supply conditions for threaded steel fasteners: Part 11 Electroplating coatings ( <i>third revision</i> )	Identical
ISO 4759-1 : 1978	IS 1367 (Part 2) : 1979 Technical supply conditions for threaded steel fasteners: Part 2 Product grades and tolerances ( <i>second revision</i> )	Technically Equivalent

#### BIS CERTIFICATION MARKING

The product may also be marked with the Standard Mark.

The use of Standard Mark is governed by the provisions of *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the licence for the use of Standard Mark may be granted to manufacturers or producers may be obtained from 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.

#### ALTERATION

In clause 5, the designation of hexagon nut may be read as 'Hexagon Nut IS/ISO 4033 M 12-9' in place of 'Hexagon Nut ISO 4033 M 12-9'.

<sup>1)</sup> ISO 965 has since been revised into various parts. However, only relevant parts have been shown in the reference.

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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 Handbook' and 'Standards Monthly Additions'.

This Indian Standard has been developed from Doc : No. LM 14 ( 0176 ).

#### Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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