

Automotive parts - Hexagon nuts and hexagon thin nuts

1 Scope

This standard specifies hexagon steel nuts and hexagon steel thin nuts (hereinafter referred to as "nuts") for use on automobiles.

Remark 1: This standard is not applicable to nuts for which weldability, heat resistance at 300 °C or above, and cold resistance at -50 °C or below are required.

Remark 2: Nuts not based on this standard are specified in **Annex**.

2 Normative reference

The following standards contain provisions which, through reference in this standard, constitute provisions of this standard.

If the indication of the year of coming into effect is given to these referred standards, only the edition of indicated year constitutes the provision of this standard but the revision and amendment made thereafter are not applied.

JIS B 0101: 1994	Screw threads and fasteners -- Vocabulary
JIS B 0205: 1997	Metric coarse screw threads
JIS B 0207: 1997	Metric fine screw threads
JIS B 0209: 1997	Limits of sizes and tolerances for metric coarse screw threads
JIS B 0211: 1997	Limits of sizes and tolerances for metric fine screw threads
JIS B 0601: 1994	Surface roughness -- Definitions and designation
JIS B 1021: 1985	Tolerance system for threaded fasteners
JIS B 1042: 1998	Fasteners -- Surface discontinuities -- Part 2: Nuts
JIS B 1052: 1991	Mechanical properties of steel nuts
JIS B 1071: 1985	Method of verification for size and geometry of threaded fasteners
JIS B 1091: 2003	Fasteners -- Acceptance inspection
JIS B 1181: 1993	Hexagon nuts and hexagon thin nuts
JIS D 0201: 1995	Automobile parts -- General rules of electroplating

3 Definitions

Definitions of main terms used in this standard are specified in **JIS B 0101**.

4 Type of nuts

Type of nuts shall be classified depending on their shapes in accordance with **Table 1**.

Table 1 Type of nut

Type		Shape
Normal type	Type 2	Both sides chamfered nut
	Type 3	Thin nut
Small type	Type 2	Both sides chamfered nut
	Type 3	Thin nut

5 Mechanical properties

5.1 Strength division

Strength division and nominal diameters to be applied shall be in accordance with **Table 2**.

Table 2 Strength division

Type		Type 3	Type 2			
Strength division		4N	5N	6N	8N	10N
Nominal diameter mm	Normal type	3 to 24				
	Small type	8 to 24				8 to 14 ⁽¹⁾

Note:⁽¹⁾

When strength division 10N is necessary for a nut of a nominal diameter of 16 mm or more, decision shall depend on an agreement between the parties concerned.

5.2 Mechanical properties corresponding to strength division

Mechanical properties corresponding to strength division of nuts shall be in accordance with **Table 3**.

Table 3 Mechanical properties

Mechanical properties		Strength division					
		4N	5N	6N	8N		10N
					$d \leq 16$	$d > 16$	
Proof load stress		392	520	600	800	830	1040
Hardness (Max)	HV	302	302	302	302	353	353
	HRC	30	30	30	30	36	36

Remark: The symbol "d" in the table represents nominal diameter (mm) of nuts.

6 Shape, dimensions and geometrical tolerance

Shape, dimensions and geometrical tolerance of nuts shall be in accordance with **Attached Table 1**.

7 Screw threads

Screw threads of nuts shall be in accordance with **Table 4**.

Table 4 Permissible limit of dimensions of screw threads

Type of threads	Permissible limit of dimension
Coarse metric thread in JIS B 0205	6 H specified in JIS B 0209
Fine metric thread in JIS B 0207	6 H specified in JIS B 0211

8 Surface condition

Surface condition of nut shall be in accordance with the following **a)** and **b)** as well as that specified in **11**.

a) Permissible limit of surface defects shall be in accordance with **Table 5**.

b) Detrimental defect on use such as burrs and rust shall not be present.

Table 5 Permissible limit of surface defects

Type of surface defects	Permissible limits
Quench crack	Quench is impermissible in any case of depth, length and portion
Forging crack and inclusion crack	Cracks in top face or bearing surface are permissible in the following cases. a) Crack crossing the entire width of bearing surface are $0.05 d$ or below in depth and up to two in quantity. b) Cracks are not extended beyond first crest of complete thread to threads. c) Cracks at first crest of complete thread are $0.5 H_1$ or less in depth. (See Figure 1 .)
Shear bursts	a) Shear bursts caused in side face of hexagon nut are permissible if they do not reach the bearing surface of nut. If width across corners is reduced to be smaller than the minimum value of the standard by shear bursts caused in intersection of two side planes, they are not permissible. b) If shear bursts in intersection of side face and top face or bearing surface is $(0.25 + 0.02 s)$ mm or less in width, they are permissible.
Bursts	a) If bursts are produced in conjunction with seams resulting from material, seams are allowed to extend to chamfer circle, but bursts are not allowed to extend. b) If width across corners is reduced to be smaller than the minimum value of the standard by bursts caused in intersection of two side planes, they are not permissible. c) If burst in intersection of side face and top face or bearing surface is $(0.25 + 0.02 s)$ mm or less in width, they are permissible.
Seams	For all nominal threads, seams are permissible if their depth from surface is $0.05 d$ or less.
Folds	Folds are permissible.
Voids	a) Voids are permissible if their depth is $0.02 d$ (Max. 0.25 mm) or less. b) Voids are permissible if total area of them in bearing surface is 5% or less of bearing surface area.
Tool marks	Tool marks in bearing face are permissible if their surface roughness as specified in JIS B 0601 is $3.2 \mu mRa$ or less. Tool marks in other surfaces are permissible.
Damages	Damages such as dents, scraps, nicks and gouges are permissible if function or usability is not impaired.

Remark 1: Surface defects and permissible limits shall be in accordance with **JIS B 1042**.

Remark 2: The symbol " d " in the table represents nominal diameter (mm). The symbol " H_1 " represents height of crest (mm) with $H_1 = 0.541P$, where P represents a pitch of a screw thread and the symbol " s " represents width across flats (mm).

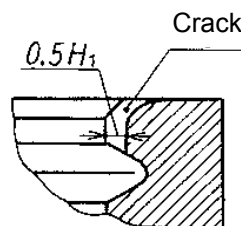


Figure 1 Depth of cracks

9 Material

Chemical compositions for each material corresponding to strength division of nuts shall be in accordance with **Table 6**, provided that nuts classified into strength divisions 8N and 10N shall be hardening and tempering when necessary.

In addition, when nuts satisfy all requirements specified in **Table 3**, chemical compositions of material may be changed based on an agreement between the parties concerned.

Table 6 Chemical compositions of material

Strength division	Chemical composition			
	C Max.	Mn Min.	P Max.	S Max.
4N	0.58	0.25	0.060	0.150
5N ⁽²⁾ , 6N ⁽²⁾	0.50	-	0.110	0.150
8N ⁽³⁾	0.58	0.25	0.060	0.150
10N ⁽³⁾	0.58	0.30	0.048	0.058

Note:⁽²⁾

With respect to these strength divisions, free-cutting steel may be used, provided that maximum content of sulphur (S), phosphorus (P), and lead (Pb) shall be as follows:

S: 0.34 %, P: 0.12 % and Pb: 0.35 %

Note:⁽³⁾

Other elements may be added to upgrade mechanical properties of nuts.

10 Surface treatment

Surface treatment of nuts shall be generally in accordance with **Table 7**. However, purchaser shall give instructions when nuts are not surface treated or when applied with the other surface treatment.

Plated nuts classified into strength division 10N shall be treated by removal of hydrogen embrittlement.

In addition, nuts classified into strength division 8N shall be treated by removal of hydrogen embrittlement as necessary. The requirements for the treatment shall be based on an agreement between the parties concerned.

Table 7 Surface treatment

Type of surface treatment		Symbol of type of plating ⁽⁴⁾	Applicable standard
Electroplated coating of zinc	Yellow chromate	Ep-Fe/Zn 5 C [MFZn 5 C] or Ep-Fe/Zn 8 C [MFZn 8 C]	As per JIS D 0201
	Green chromate	Ep-Fe/Zn 5 G or Ep-Fe/Zn 8 G	

Note:⁽⁴⁾

For symbols of type of plating, symbols as indicated in parenthesis, which have been used conventionally may be used.

11 Class of finish

Class of finish of nuts shall be in accordance with **Table 8**.

Further, thread portion shall be finished smoothly.

Table 8 Class of finish

Class of finish	Manufacturing method	Surface roughness of bearing surface	Surface roughness of side
A	Cold forging	3.2 μmRa	6.3 μmRa
	Machining		
B	Hot forging	6.3 μmRa	12.5 μmRa

Remark: Surface roughness shall be in accordance with **JIS B 0601**.