

Prevailing Torque Type Self Locking Hexagon Nut

KES E-B014

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1. Scope of Application

This standard specifies the prevailing torque type self-locking hexagon nut for automobiles (hereinafter referred to as the "nut").

2. Purpose

This standard aims at giving commonness to the nut and securing the proper quality.

3. Definition of Terminology

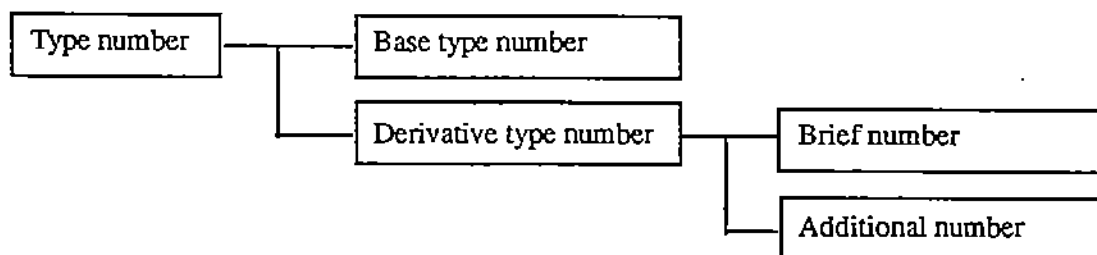
Definition of main terminology used in this standard shall conform to the following in addition to JIS B 0101 (Glossary of Terms Relating to Fasteners).

- (1) Prevailing torque type self-locking hexagon nut: The nut with a prevailing torque generating portion, as a self-locking factor of nut, to prevent relative rotation to the mating external thread part with the friction resistance by prevailing torque generating portion.
- (2) Prevailing torque generating portion: The portion generating a function as a self-locking factor of the nut to increase the torque in the thread.

4. Type Number

4.1 Structure of type number: The structure of the type number of the nut shall conform to Fig. 1.

Fig. 1 Structure of type number



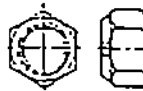
4.2 Base type number: The base type number shall be as in Table 1 according to the strength division and the shape.

4.3 Derivative type number: The derivative type number consists of a brief number and an additional number. Its structure shall be in accordance with KES A-A006. (Refer to 16. Structure of Part Number.)

4.3.1 Brief number: The brief number is a number made by shortening the base type number to three digits. The combination of brief number and base type number is shown in Table 1.

4.3.2 Additional number: The additional number shall be used when other surface treatment than the standard surface treatment specified in 10.1 is required, and its structure shall be in accordance with KES A-A006

Table 1

Type	Strength Division	Width Across Flat	Base Type Number (Brief Number)	Applicable Size of Thread					Shape	Self-locking Mechanism	Using Condition	Attached Table	
				M5	M6	M8	M10	M12					
Type N self-lock nut	8	Small size	99942 (9WC)			○	○	○		Use polyamide resin (66 nylon).	Use at a temperature range of -50°C to 80°C.	1	
		Medium size	99947 (9WJ)	○	○	○	○	○				2	
			99948 (9WJ)					○					
Type M self-lock nut		10	Small size	99949 (9WK)			○	○			Deformed thread of nut	Use at a temperature range of -50°C to 300°C.	3
Type M flanged self-lock nut				99946 (9WG)		○	○	○	○				
	90946 (9WX)						○	○	5				

- Remarks
1. The nuts marked with a circle in the column of applicable size of thread have been specified.
 2. The thread of M8 or less shall be a metric coarse screw thread and the thread of M10 or more shall be a metric fine screw thread.
 3. M6 nut with the type number 99946 (9WG) shall be of medium size width across flat.
 4. The nut with the type number 99948 (9WJ) shall be a jam nut.

5. Mechanical Properties and Performance

5.1 Mechanical properties: The mechanical properties corresponding to the strength division shall conform to the following.

- (1) Proof load: The nut shall bear the load generated by the stress in Table 2 without braking of the thread ridge or crack of the nut at the test of 11.1.1. After removing the proof load, the torque to loosen the nut completely shall not exceed the maximum torque in screwing the nut at first.
- (2) Hardness: The hardness of the nut shall satisfy the requirements in Table 2 at the test of 11.1.2.

Table 2

Strength Division	Proof Load Stress kgf/mm ² {N/mm ² }	Hardness	
		Min.	Max.
8	80 {785}	HB 170	HB 302
10	100 {980}	HRC 21	HRC 32

5.2 Self-locking performance: The self-locking performance of the nut shall satisfy the requirements in Table 3 at the test of 11.2.

Table 3

Nominal Designation of Thread	Tightening Axial Tension kgf {KN}		Screwing/Loosening Torque kgf · m {N · m}					
			Screwing torque at 1st time (Max.)		Loosening torque at 1st time (Min.)		Loosening torque at 5th time (Min.)	
	Strength division		Strength division		Strength division		Strength division	
	8	10	8	10	8	10	8	10
M5 x 0.8	629 {6.17}	902 {8.85}	16.3 {1.6}	21.4 {2.1}	2.96 {0.29}	3.57 {0.35}	2.04 {0.2}	2.45 {0.24}
M6 x 1	887 {8.7}	1270 {12.5}	30.6 {3.0}	40.8 {4.0}	4.59 {0.45}	5.61 {0.55}	3.06 {0.3}	4.08 {0.4}
M8 x 1.25	1620 {15.9}	2320 {22.8}	61.2 {6.0}	81.6 {8.0}	8.67 {0.85}	11.7 {1.15}	6.12 {0.6}	8.16 {0.8}
M10 x 1.25	2710 {26.6}	3885 {38.1}	107 {10.5}	143 {14}	15.3 {1.5}	20.4 {2.0}	10.2 {1.0}	14.3 {1.4}
M12 x 1.25	4080 {40.0}	5842 {57.3}	158 {15.5}	214 {21}	23.5 {2.3}	31.6 {3.1}	16.3 {1.6}	21.4 {2.1}
M12 x 1.5	3915 {38.36}	5598 {54.9}						

Reference: The tightening axial tensions in this table have been calculated by the following method:

In case strength division is 8: It is 75% of the proof load for the bolt in strength division of 8.8.

In case strength division is 10: It is 75% of the proof load for the bolt in strength division of 10.9.

6. Shape, Dimensions and Geometric Tolerance

The shape, dimensions and geometric tolerances of the nut shall conform to Attached Tables 1 to 5.

7. Thread

The thread of the nut shall conform to Table 4.

Table 4

Nominal Designation of Thread	Type of Thread	Limits of Sizes
M8 max.	JIS B 0205 (Metric Coarse Screw Threads)	6H of JIS B 0209 (Limits of Sizes and Tolerances for Metric Coarse Screw Threads)
M10 min.	JIS B 0207 (Metric Fine Screw Threads)	6H of JIS B 0211 (Limits of Sizes and Tolerances for Metric Fine Screw Threads)

Remark: Table 4 shall not be applied to the prevailing torque generating portion.

8. Appearance and Surface Roughness

The appearance of the nut shall conform to the following (1) and (2), as well as the surface roughness shall conform to the requirements in Table 6.

(1) Allowable limits of the surface discontinuity shall conform to Table 5.

(2) The surface of the nut shall have no defects harmful to use, such as flush, burr, rust, etc.

Table 5

Surface Discontinuity	Criteria									
Quench crack	Quench cracks of any depth and any length, or in any location, are impermissible.									
Forging crack	(a) Cracks on the outer circumference of the prevailing torque generating portion are impermissible. (b) Cracks on the threaded portion within 2 ridges max., the depth of which does not reach the bottom of the thread, are permissible, provided that its width is as follows: <table><tr><td>Nominal Size of Thread</td><td>M5</td><td>M6 to M12</td></tr><tr><td>Width</td><td>0.1 mm max.</td><td>0.2 mm max.</td></tr></table> (c) When cracks on the bearing surface do not extend from the side to the threaded portion and are 0.2 mm + 0.01d max. in width, cracks of 2 or less are permissible. (d) When a crack on the threaded portion extends from the bearing surface to the first ridge and is 0.2mm + 0.01d max. in width, only 1 crack is permissible. (e) Cracks on the intersection of the bearing surface and the side surface is 0.3mm + 0.02d max. in width are permissible.	Nominal Size of Thread	M5	M6 to M12	Width	0.1 mm max.	0.2 mm max.			
Nominal Size of Thread	M5	M6 to M12								
Width	0.1 mm max.	0.2 mm max.								
Seam	Seams on side surface shown as follows are permissible. <table><tr><td>Nominal Designation</td><td>M5</td><td>M6 to M12</td></tr><tr><td>Width</td><td>0.1 mm max.</td><td>0.15 mm max.</td></tr><tr><td>Depth</td><td>0.1 mm max.</td><td>0.1 mm + 0.015d max.</td></tr></table>	Nominal Designation	M5	M6 to M12	Width	0.1 mm max.	0.15 mm max.	Depth	0.1 mm max.	0.1 mm + 0.015d max.
Nominal Designation	M5	M6 to M12								
Width	0.1 mm max.	0.15 mm max.								
Depth	0.1 mm max.	0.1 mm + 0.015d max.								
Nick or gouge	(a) Nick or gouge in portions other than the threaded portion are permissible. (b) Nick or gouge in the threaded portions except for the prevailing torque generating portion, which can pass through GO thread plug gauge at 0.8dkgf • m {7.85d N • cm} or less are permissible. (Example) When the nut is M10 in size, the test torque is 0.8 x 10 = 8.0 kgf • cm {78.5 N • cm}.									

- Remarks 1. The definition of surface discontinuity shall conform to JIS B 0101 (Glossary of Terms Relating to Fasteners).
2. The "d" in the table means the nominal diameter (mm) of the nut.

Table 6

Applicable Place	Surface Roughness
Bearing surface	3.2a
Other places	6.3a

Remark: The surface roughness of the nut shall conform to JIS B 0601 (Definitions and Designation of Surface Roughness).

9. Materials and Heat Treatment

9.1 Materials of nut proper: The materials of nut proper shall be as shown in Table 7, and their mechanical properties shall satisfy the requirements in 5.

Table 7

Strength Division	Material	Pertinent Standard
8	SWCH10R to 15R SWCH20K	JIS G 3539
10	S45C, S50C	JIS G 4051

9.2 Material of insert: The material of the insert used for the prevailing torque generating portion of the type N nut shall be polyamide resin.

9.3 Heat treatment: The nut of strength division 10 shall be hardened and tempered.

10. Surface Treatment

The surface treatment of the nut consists of the standard surface treatment (hereinafter referred to as standard treatment) and the derivative surface treatment (hereinafter referred to as derivative treatment). They shall be in accordance with the following.

10.1 Standard treatment: The standard treatment is applied to the nut conforming with the base type number, and this treatment shall be in accordance with Table 8.

Table 8

Standard Treatment		Description of Part	Pertinent Standard
MFZnT ₁ - C	Colored chromate	9 digits part number (Example: 99946 0600)	KES C-F002 (Plating)

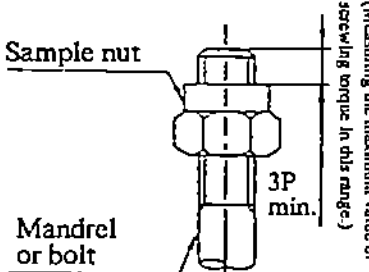
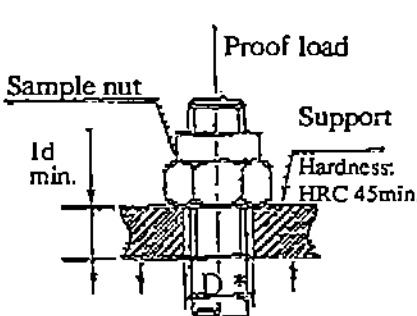
10.2 Derivative treatment: The derivative treatment is applied to the nut conforming with the derivative type number, and this treatment shall be in accordance with KES A-A006

11. Testing and Measuring Methods

11.1 Test for Mechanical Properties

11.1.1 Proof load test: The proof load test shall conform to Table 9. A mandrel or a bolt used for the test shall conform to 4.2.1 of JIS B 1052.

Table 9

Testing Procedure	Testing Method	
	Figure of state	Procedure and measurement
1. Screwing nut		Attach a sample nut to a mandrel or a bolt and screw it gently until the end of the mandrel or the bolt comes up from upper surface of the sample nut by 3P length or more. (P is the pitch of the thread.) Measure the maximum screwing torque in this operation.
2. Application of proof load	 * D shall be the sum of the nominal diameter of the thread and the tolerance of D11 of JIS B 0401 (System of Limits and Fits).	Attach the mandrel or bolt with the nut screwed according to the test procedure 1 into the support tool and apply the axial proof load * to it for 15 seconds. Test whether the nut can bear this load without destruction of the nut or shearing of the ridges in this test. * The proof load is calculated by multiplying the proof load stress in Table 2 by the stress area of the thread [Refer to JIS B 1082 (Stress Area and Bearing Area for Threaded Fasteners)] of the mandrel or the bolt. The proof load for the nut is specified in the Attached Tables 2 and 3 of the Appendix in JIS B 1052.