| NAVISTAR, INC. | | | |
|---|---|---|---|
| **Material, Parts, and Process Specifications (MPAPS)** | | *NUMBER:* **MPAPS S-EM-56.101-GS/PL** | |
| | | *Former Designation:* **ESP-EM-56.101-GS** | |
| *TITLE:* **Prevailing Torque Hex Nuts – All Metal – Metric Series (Noun Code 5780)** | | *CURRENT REV No.:* **1506** | *DATE:* **June 2015** |
| *WRITTEN/EDITED BY:* **Materials Engineering** | *APPROVED BY:* **Materials Engineering** | *SUPERSEDES:* **ESP-EM-56.101-GS - August 2012** | |
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| ***This specification may involve hazardous materials, equipment, and procedures. This specification does not purport to address all of the safety issues associated with its use. The user is responsible to consult appropriate safety and health practices and to determine the applicability of regulatory limits prior to use.*** | | | |
| *Change Notice:* **Changed to New MPAPS format; Combined GS, GI, PP.** | | | |

**1.0 GENERAL:** Implementation of this standard must be in accordance with the policies and procedures outlined in MPAPS S-A-0.101. There may also be supplemental group instructions in regard to use of metric standards that should be taken into account.

This standard may differ in some respects with certain segments of ISO and national standards. In recognition of these possible differences, the sizes and tolerance ranges used were established in an effort to enable the use of commercially available items, dimensionally interchangeable worldwide.

This specification contains elements of the following standards:

American National Standards Institute: 18.16.3M
International Organization for Standardization: ISO 2320, 7042, 7719

Prevailing torque type is a nut which is frictionally resistant to rotation due to a self-contained prevailing torque feature, and not because of a compressive load developed against the bearing surface of the nut.

Prevailing torque is the torque necessary to rotate the nut on its mating externally threaded component, with the torque being measured while the nut is in motion, and with no axial load in the mating component.

Inch series prevailing torque hex nuts - all metal, may be found in MPAPS S-E-56.101-GS/PL.

Letter symbols designating dimensional characteristics are in accord with those used in ANSI and ISO standards.

**2.0 APPLICATION GUIDE:** To ensure full benefit of the prevailing torque feature, two fully formed threads must be visible beyond the top surface of the nut.

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**4.0 DESIGN CONSIDERATION:** The use of thru hardened washers is recommended in high strength bolted connections and in Class 8.8 applications involving oversized or slotted holes.

Optimum uses for prevailing torque nuts are with short length bolts, joints where the pre-load may be less than the service load, soft materials, and joints subjected to severe vibration.

Coarse thread series only will be considered as part of this standard, because of the following advantages:

Less tendency to cross thread.
Less likely to be seriously affected by manufacturing errors such as decarburization and oversized minor diameter of internal threads.
In the event of a failure of matched class bolt/nut combination, the tendency will be toward bolt fracture rather than undetectable strip.

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**5.0 METRIC INCH RELATED SIZES:** During the inch to metric design transition period, the following chart of related sizes can be used for reference. This information is not to be considered as a recommendation for substitutions but only as a means of determining approximate dimensional equivalents.

| Metric Series mm | Approximate Inch Series | Metric Series mm | Approximate Inch Series |
|---|---|---|---|
| 6 | 1/4 | 16 | 5/8 |
| 8 | 5/16 | 20 | 3/4 |
| 10 | 3/8, 7/16 | 24 | 7/8, 1 |
| 12 | 1/2 | 30 | 1-1/8, 1-1/4 |
| 14 | 9/16 | 36 | 1-1/2 |

**6.0 THREADS:** The ISO basic profile is essentially the same geometric configuration as the unified screw thread basic form. The threads will be coarse series, tolerance class 6H.

**7.0 THREAD TOLERANCES:** The medium ISO class of fit 6H/6g is approximately the same as the 2A/2B allowance in the U.S. unified thread series for comparable size. For example:

| Thread | Allowance |
|---|---|
| M10 x 1.5 - 6H/6g | 0.032 mm (.00126 in) |
| 3/8-16 UNC 2A/2B | .0013 in (0.033 mm) |

**8.0 PERFORMANCE REQUIREMENTS:** Proof, clamp loads, and prevailing torques are listed in section 25.0.

Nuts will not be used for special applications such as those requiring weldability, corrosion resistance, or ability to withstand temperatures above 230°C or below minus 50°C for plated nuts and above 300°C to below minus 50°C for unplated nuts.

**9.0 PROPERTY CLASS:** The property class designation for steel nuts is equal to one hundredth of the approximate proof load stress in megapascals (1 MPa = $N/mm^2$).

**10.0 MECHANICAL PROPERTIES:** The property class designation system for prevailing torque steel nuts will be a number which is one-hundredth to the approximate proof load stress in megapascals (MPa). The proof load stress corresponds to the minimum tensile strength of the highest class of bolt or screw with which the nut can be used.

Property Class Designation for Prevailing Torque Nuts

| | |
|---|---|
| Property class designation | 10 |
| Proof load stress, MPa | 1040 |

It is recommended that the class of nut be used with each class of bolt as indicated in the following:

Recommended Bolt and Nut Combination

| | |
|---|---|
| Class of Bolt | All |
| Class of Nut | 10 |

**Caution!** If it is necessary to combine a class 10 nut with a bolt of a lower class than 10.9, the prevailing torque characteristics will be significantly altered.

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**11.0 COLOR CODING:** Not recommended, except in cases where adequate insurance is needed to prevent mixing of "metric parts" with look-alike "inch parts." The color blue is standard identifier used in some industries. This must be handled internally at individual plants where needed and is meant to be supplemental to the normal finish and easily deleted when the need for supplemental identification no longer exists. The supplemental blue color should not be used on finishes such as chromium bright which are specified for cosmetic purposes or phosphate coating which may cause a loss of color identity.

**12.0 METHOD OF DESIGNATION:** Prevailing torque nuts will be designated on purchase orders by size, word description, material class, finish and part number as follows:

M10, Prevailing Torque Nut, All Metal, Class 10, PHC, Part Number

The absence of a specification for pitch indicates that coarse thread is required; e.g., a coarse thread of the dimensions M10 x 1.5 is designated as "M10."

**13.0 POLICY FOR SELECTING PARTS FOR NEW DESIGN:** Approved parts are so designated to reduce variety of parts and assure maximum availability and cost savings:

For new design, parts shall be selected from "Approved" part list only.

| | |
|---|---|
| Nominal Sizes: | M6, M8, M10, M12, M16, M20, M24, M30, and M36 |
| Material: | Class 10 |
| Finish: | Phosphate Coating (PHC) |

**14.0 WIDTH ACROSS FLATS:** The width across flats will be distance, measured perpendicular to the axis of the nut, between two opposite wrenching flats. The maximum width across flats may be exceeded by 0.05 mm to allow for nut deformation caused by introduction of the prevailing-torque feature. The width across flats may be less than the specified minimum in the deformed portion of the nut containing the prevailing-torque feature.

**15.0 THICKNESS:** The nut thickness will be the overall distance, measured parallel to the axis of the nut, from the top of the nut to the bearing surface of hex nuts. Raised identification markings, if present, will be excluded.

**16.0 WRENCHING HEIGHT:** The wrenching height is the distance, measured at a corner of the hex, from the bearing surface of hex nuts, to the last plane of full formed hex, i.e., the plane perpendicular to the nut axis which is closest to the top of the nut and at which the width across corners is within its specified limits. Wrenching height for hex nuts is dimension M, in Table 1, and is subject to measurement.

**17.0 BEARING SURFACE:** Hex nuts will have a chamfered bearing surface. The diameter of the bearing surface will not exceed the width across flats nor be less than the bearing face diameter specified on the page. The bearing surface will be flat and perpendicular to the axis of the thread within the total runout limit specified on the last page.

**18.0 TRUE POSITION OF TAPPED HOLE:** The axis of tapped hole will be located at true position with respect to the axis of nut body within a tolerance zone having a diameter equivalent to 3 percent of the maximum width across flats, regardless of feature size.

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