NAVISTAR, INC.			
Material, Parts, and Process Specifications (MPAPS)		*NUMBER:* **MPAPS S-CM-29.101-GS/PL**	
		Former Designation: **ESP-CM-29.101-GS**	
TITLE: **Flanged 12-Point Screws – Metric Series**		*CURRENT REV No.:* **1506**	*DATE:* **June 2015**
WRITTEN/EDITED BY: **Materials Engineering**	*APPROVED BY:* **Materials Engineering**	*SUPERSEDES:* **ESP-CM-29.101-GS - March 2011**	

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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.

As of this printing, there is no metric Navistar or National standard on this product. The specifications are based upon supplier information and user requirements.

The inclusion of dimensional data is not intended to imply that all the screws described are stock production sizes.

Inch dimensioned screws may be found in MPAPS S-C-29.101-GS/PL.

2.0 RESTRICTED CHEMICAL SUBSTANCES: Effective January 1, 2007, all product supplied to the requirements of this specification must comply with the requirements of the MPAPS B-50 specification.

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

- Less tendency to cross thread.
- Resists nicking and has less stress concentration at the thread roots.
- Less likely to be seriously affected by decarburization and oversize minor diameter of internal threads.

Flanged 12-point screws are interchangeable with hex socket head capscrews. Because of larger gripping surface which permits better wrenching, 12-point screws from 12 mm size and up are preferred over hex socket head capscrews.

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
6	1/ 4
8	5/16
10	3/8, 7/16
12	1/ 2
16	9/16, 5/8
20	¾

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 6g.

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

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

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8.0 THREAD LENGTH FORMULA: The thread lengths shown in Table 1 are based on the formulas shown below:

Millimeters				
Nominal Length		Formula for Thread Length		
Over	To			
---	125	2d	+	6
125	200	2d	+	12
200	---	2d	+	25
D = Nominal Diameter of the Screw				

9.0 PROPERTY CLASS: The property class designation for flanged 12-point screws is equal to one-hundredth of the approximate proof load stress in megapascals (1 MPa = 1 N/mm^2).

10.0 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 material such as stainless steel which is specified for cosmetic purposes, or phosphate coating which may cause a loss of color identity

11.0 METHOD OF DESIGNATION: 12-point screws will be designated by size, length, word description, material, special feature, if any, finish, and part number as shown in the following examples:

M10 x 50, 12-Point Screw, Class 12.9, 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.”

12.0 POLICY FOR SELECTING PARTS FOR NEW DESIGN: Approved parts are so designated to reduce the variety of parts and to assure maximum availability, interchangeability, and cost savings.

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

Nominal Sizes: M6, M8, M10, M12, M16, M20, and M24
Material: Class 10.9 and 12.9.
Finish: Plain (PLN), Phosphate Coating (PHC) per MPAPS G-1, Zinc Aluminum Clear (ZACLR) per MPAPS G-4518, Type I.

Lengths:

Dimensions in millimeters:

First Length	12	12	20	25	30	35
Diameter	M6	M8	M10	M12	M16	M20

All diameters - 2 mm increments up to 20 mm
5 mm increments over 20 thru 90 mm
10 mm increments over 90 thru 200 mm
20 mm increments over 200 mm

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