

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS S-CM-1.101-GS/PL
		Former Designation: ESP-CM-1.101-GS
TITLE:	Machine Screws – Metric Series	CURRENT REV No.: 1506
		DATE: June 2015
WRITTEN/EDITED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES: ESP-CM-1.101-GS - August 2009
PRINTED COPIES OF THIS DOCUMENT MUST BE VERIFIED FOR CURRENT REVISION		
<i>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.</i>		
Change Notice: Changed to New MPAPS format; Combined GS, GI, PP.		

1.0 GENERAL:

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

For purposes of this standard, the generic term "machine screws" has been adopted as applying to products normally threaded to the head in smaller nominal sizes and made of low carbon steel.

This specification contains the essentials of the following standards:

International Organization for Standardization:	ISO 898/1, 965/2, 4757, 7045, 7046, 7047, 7721
British Standards Institute:	BS 4183
German Institute of Standardization:	DIN 965, 966, 7985
American Society of Mechanical Engineers:	B18.6.7M

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

Inch dimensioned standard machine screws may be found in MPAPS S-C-1.101-GS/PL.

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3.0 DESIGN CONSIDERATION:

The following only will be considered as part of this standard for standardization purposes and manufacturing advantages in the case of drives.

1. Nominal Sizes

Only ISO first choice series from 3 mm to 10 mm for all head styles except Hex Washer Head which will include 12 mm size. Present Navistar usage in equivalent inch sizes less than 3 mm or more than 10 mm is extremely limited.

2. Drives - ISO Type H Recess and Hexagon Washer Heads

Cross recess is preferred over slotted by manufacturing experts because of less driver bit spin out, thus reducing costly rework. Hexagon Washer Heads, in addition to greater bearing area, have improved driving characteristics with the washer providing a shoulder for the socket plus protecting the assembly surface from socket disfigurement.

3. Head Styles - Flat and Raised (Oval) countersunk, Pan and Hexagon Washer Heads

4.0 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.

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Metric Series mm	Approximate Inch Series
3	#4, #5
4	#6, #8
5	#10
6	#12, 1/4
8	5/16
10	3/8
12	1/2

5.0 **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.

6.0 **THREAD TOLERANCES:**

The medium class of fit 6H(Int) / 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)

7.0 **PROPERTY CLASS:**

The property class designation for steel screws is equal to one-hundredth of the approximate proof load stress in megapascals (1 MPa = 1 N/mm²).

8.0 **COLOR CODING:**

This is 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 materials such as stainless steel when used for cosmetic purposes, or phosphate coating which causes a loss of color identity.

9.0 **METHOD OF DESIGNATION:**

Machine screws will be designated by size, length, general product description, material, finish and part number as follows:

M3 x 10 Pan Head Machine Screw, Class 4.8, ZN, 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."

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

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

Material: Class 4.8
Finish: Zinc Trivalent (ZN6A) and Phosphate Coating (PHC)
Nominal Sizes and Lengths: See table following.

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