NAVISTAR, INC.			
Material, Parts, and Process Specifications (MPAPS)		*NUMBER:* **MPAPS S- F-16.101-GS/PL**	
		Former Designation: **ESP-F-16.101-GS**	
TITLE: **Hardened Washers – English Series (Noun Code 9720)**		*CURRENT REV No.:* **1506**	*DATE:* **June 2015**
WRITTEN/EDITED BY: **Materials Engineering**	*APPROVED BY:* **Materials Engineering**	*SUPERSEDES:* **ESP-F-16.101-GS - August 2006**	

PRINTED COPIES OF THIS DOCUMENT MUST BE VERIFIED FOR CURRENT REVISION

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, PP, NPP.**

1.0 GENERAL: The product covered by this standard is normally referred to as "thru hardened" washers as contrasted to the case hardened variety. It has been determined by divisional survey that the range of sizes and thicknesses included should cover most company requirements.

Type A conforms essentially with ANSI Type A (Narrow) latest designation. Type B is thicker than Type A throughout all sizes and conforms in ID and OD to ANSI Type A (Narrow). Type C is thicker than Type B throughout all sizes and conforms in ID and OD to ANSI B 18.22.1. Type A (Narrow) from sizes 1/4 to 7/16, and to ASTM 325 (Structural Steel Washers) from sizes 1/2 to 2 inches. In all sizes shown, Type D is the same as Type C with the exception that the OD is proportionally larger throughout all sizes.

Dimensions are shown in decimal inch except for nominal shaft size where the industry practice of using fractional sizes is followed.

These washers are intended for use in high clamping loads, to minimize embedding, and to aid torquing. Usage limitations for each washer type are shown in the following table:

Washer Type	Maximum Oversized Hole To Be Used With	Maximum Oversize in Width of Slot To Be Used With
A	Thru .062	Not To Be Used Over Slots
B	Over .062 thru .156	Thru .062
C	Over .062 thru .156	Thru .062
D	Over .156	Over .062

This document is restricted and may not be sent outside Navistar, Inc. or reproduced without permission from Corporate Technical Standards. Suppliers are required to assume all patent liability. ©2015 by Navistar, Inc.

Documents Document Sharing Hub

Copyright Navistar International Corporation
Provided by IHS Markit under license with INTERN
No reproduction or networking permitted without license from IHS
Licensee=/, User=,
Not for Resale,
Full document details: NAVISTAR MPAPS S- F-16.101-GS/PL 2015

2.0 CONTENTS:

	Page
General	1
Miscellaneous Dimensions	2
Material	2
Finishes	2
Restricted Chemical Substances	2
Policy for Selecting Parts for New Design	2
Workmanship	3
Hardened Washers Types	3
Part List	5
Technical Information	6

3.0 MISCELLANEOUS DIMENSIONS: The inside and outside diameters will be concentric within a total indicator reading equivalent to the tolerance permitted on the inside diameter. The tabulated inside dimensions and tolerances apply only to the smallest hole size and not to the tapered breakout area. The tapered breakout area and permissible breakout tolerance will be as shown:



Breakout ID will not exceed 10% of thickness.

All washers will be flat within a total indicator reading of: .010 thru 1.75 OD
.015 over 1.75 OD thru 2.50 OD
.020 over 2.50 OD

4.0 MATERIAL: Steel, 1040 to 1065 per MPAPS A-0, Part 1, quenched and tempered to Rc 36 to 42.

5.0 FINISHES: Washers will be furnished plain, plated or coated in accordance with the MPAPS and class listed below:

Zinc Trivalent (ZN6A) – MPAPS G-20, Class 6A.
Phosphate Coating (PHC) – MPAPS G-1, Class B2.

The determinant of plating thickness will be the thickness of plating on the flat surface of the washer approximately midway between the inside and outside diameters.

Plated washers are subject to hydrogen embrittlement, and will be suitably treated or baked in such a manner as to obviate such embrittlement.

6.0 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.

7.0 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 in volume buying.

This document is restricted and may not be sent outside Navistar, Inc. or reproduced without permission from Corporate Technical Standards. Suppliers are required to assume all patent liability. ©2015 by Navistar, Inc.

Documents Document Sharing Hub
Copyright Navistar International Corporation
Provided by IHS Markit under license with INTERN
No reproduction or networking permitted without license from IHS
Licensee=/, User=,
Not for Resale,
Full document details: NAVISTAR MPAPS S- F-16.101-GS/PL 2015