NAVISTAR, INC.			
Material, Parts, and Process Specifications (MPAPS)		*NUMBER:* **MPAPS S-F-1.301-GS/PL**	
		Former Designation: **ESP-F-1.301-GS**	
TITLE: **Tooth Lock 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-1.301-GS - August 2006**	

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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, PP, NPP.**

1.0 GENERAL: This standard covers the dimensions, physical properties, and methods of testing Tooth Lock Washers which are available in two distinct types, A and B, as indicated. They are specified under a single series of part numbers and are procurable from separate sources. Exercise of purchaser's option as to type is thereby controlled by selection of source. The tooth lock washers described herein are in conformance with American National Standard B-18.21.1.

It should be noted that the word "Lock" appearing in the names of the products in this standard is a generic term historically associated with their identification and is not intended to imply an indefinite permanency of fixity in attachments where they are used.

2.0 MANUFACTURING DETAIL: The number of teeth, the length of teeth, the width of the rim and the thickness of the washer over the teeth (free height) will be optional with the manufacturer, with the provision, however, that the projection of the teeth on both sides of the washer will be uniform within a tolerance equal to one half of the projection on one side. Washers will be symmetrical in shape and free from defects that might affect their serviceability.

3.0 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.

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

Type:	Internal-External
Finishes:	Zinc Trivalent (ZN6A)
Materials:	SAE 1050 or 1066 Steel (STL) Heat Treated
Sizes:	#4, #6, #8, #10, #12, 1/4, 5/16, 3/8, 1/2, and 5/8

4.0 SERVICE PARTS SUBSTITUTION POLICY: In the event that engineering does not indicate a "Do not substitute" in engineering specifications, the following substitutions may be implemented in service. This policy is the result of a proposal circulated April 20, 1981 and subsequently approved by engineering departments worldwide.

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5.0 Tooth Lock Washers

To Be Replaced	Service Replacement
Internal Tooth with Plain (PLN) Finish	Internal tooth with zinc trivalent (ZN6A) finish or phosphate coated (PHC) (if ZN6A equivalent is not set up for service).
External Tooth with Plain (PLN) Finish	External tooth with zinc trivalent (ZN6A) finish or phosphate coated (PHC) (if ZN6A equivalent is not set up for service).
Internal-External tooth with Plain (PLN) Finish	Internal-External tooth with zinc trivalent (ZN6A) finish or phosphate coated (PHC) (if ZN6A equivalent is not set up for service).
Countersunk External tooth with Plain (PLN) Finish	Countersunk External tooth with zinc trivalent (ZN6A) finish or phosphate coated (PHC) (if ZN6A equivalent is not set up for service).

6.0 MATERIAL: Steel (STL) SAE 1050 or 1066 heat treated to Rc 40-50. It is recommended that the lighter, more sensitive Rockwell A scale be used when testing washers of thin section. Decarburization will be removed before hardness test.

Stainless Steel (SST) Type 302 per MPAPS A-37.

Note: Stainless steel washers will be *passivated per International Engineering Standard Parts MPAPS A-37.

7.0 FINISH: Washers will be furnished in accordance with MPAPS and class listed below:

Plain (PLN)
Zinc Trivalent (ZN6A) – MPAPS G-20, Class 6A
Phosphate Coating (PHC) – MPAPS G-1, Class B2
Chromium Bright (CRB) – CEMS G-19, Part III, Class 13 CRB

Note: Chromium plating on carbon steel tooth lock washers is generally unsatisfactory and should be avoided.

8.0 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.

9.0 CLAMPING TEST: Plated washers will be clamped to a height equal to the actual material thickness plus .005 inch for a period of 24 hours without breaking. The clamping will be accomplished between parallel flat surfaces for flat varieties of tooth washers and between mating countersunk holes and cones for countersunk tooth washers.

10.0 TWIST TEST: The rim of the lock washer will be cut or severed with a cold chisel or cutting pliers and the severed ends will be gripped by pliers or vise and pliers. Separation of the ends in the form of a helix, to a distance equal to the inside diameter of the washer, will not result in fracture. When the ends are separated a greater distance and the washer does fracture, the structure at the point of fracture will show a fine grain, and the washer up to the instant of fracture will deliver a tough springy reaction.

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