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|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------|
| <b>NAVISTAR, INC.</b>                                                                                                                                                                                                                                                                                                                   |                                                     |                                                           |
| <b>Material, Parts, and Process Specifications<br/>(MPAPS)</b>                                                                                                                                                                                                                                                                          |                                                     | <b>NUMBER:</b><br><b>MPAPS S-J-15.101-GS/PL</b>           |
|                                                                                                                                                                                                                                                                                                                                         |                                                     | <b>Former Designation:</b> ESP-J-15.101-GS                |
| <b>TITLE:</b><br><b>Cup Plugs – English Series<br/>Not Recommended for New Design (Noun Code 6400)</b>                                                                                                                                                                                                                                  | <b>CURRENT REV No.:</b><br><b>1506</b>              | <b>DATE:</b><br><b>June 2015</b>                          |
| <b>WRITTEN/EDITED BY:</b><br><b>Materials Engineering</b>                                                                                                                                                                                                                                                                               | <b>APPROVED BY:</b><br><b>Materials Engineering</b> | <b>SUPERSEDES:</b><br><b>ESP-J-15.101-GS - March 2011</b> |
| <b>PRINTED COPIES OF THIS DOCUMENT MUST BE VERIFIED FOR CURRENT REVISION</b>                                                                                                                                                                                                                                                            |                                                     |                                                           |
| <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> |                                                     |                                                           |
| <b>Change Notice: Changed to New MPAPS format; Combined GS, PP, NPP, NR.</b>                                                                                                                                                                                                                                                            |                                                     |                                                           |

**1.0 GENERAL:** The Cup Plugs listed in section 9.0 are intended for general production applications. Stainless Steel plugs shown in section 9.0 are considered special application parts because of cost and limited availability.

Salvage Plugs shown in section 10.0 are for use in salvage operations only and should not be designed into products.

**2.0 MATERIAL:**

Steel, Grade 1, per MPAPS A-6, Part I.

Austenitic stainless steel, Types 200 or 300 series, per MPAPS A-37.

**3.0 FINISH:** As designated by part number, plugs will be furnished plain, plated or coated in accordance with MPAPS and class listed below.

Zinc Trivalent (ZN6A) on steel – MPAPS G-20, Class 6A.

Note: May be made from galvanized steel, GR 1 GALV, 60G60G U/E or 90G90G U/E, per MPAPS A-6, Part II.

**4.0 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.

**5.0 ASSEMBLY CONSIDERATIONS:** The recommended hole diameter limits specified will provide suitable assembly under average conditions. However, deviations from these recommendations may be desirable to provide optimum assembly and performance to suit special conditions.

A suitable lubricating oil is recommended wherever possible during installation of plugs to facilitate insertion and prevent galling.

To facilitate assembly and prevent scoring of plugs at insertion, it is recommended that entering edge of hole be relieved with as large a tangential radius as the wall thickness will permit. An alternative, although not preferred, is a countersink of 30° maximum included angle; to a minimum

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|-------------------------------------------------|-----------------------------------|---------------------------------|
| <b>NUMBER:</b><br><b>MPAPS S-J-15.101-GS/PL</b> | <b>TITLE:</b><br><b>Cup Plugs</b> | <b>REVISION:</b><br><b>1506</b> |
|-------------------------------------------------|-----------------------------------|---------------------------------|

diameter .012 to .016 inch larger than the plug in its free state. The depth of the relief will be such as to permit open end of plugs to be inserted .010 inch minimum beyond the point of tangency or intersection of countersink on wall of hole.

- 6.0 INSTALLATION:** Plugs should be driven from the inside bottom and not from the outer edge, or rim of the cup. This can best be accomplished by use of a round arbor .020 to .025 inch smaller in diameter than the inside diameter of plug (A min - 2C max), the driving end is flat and perpendicular to axis of arbor with edge rounded to .06 inch radius.

Where plugs are used in counterbored holes, care should be exercised in insertion to prevent the plug from bottoming on the shoulder of counterbore which could result in distortion of plug and loss of seal.

- 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.

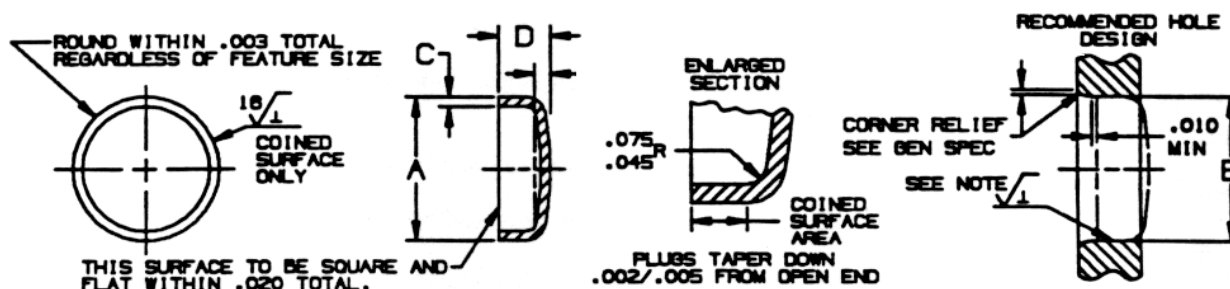
For new design, parts shall be selected from "Approved" part list only.

Sizes: 3/8 to 1 inch - 1/16 inch increments.  
Over 1 inch - 1/8 inch increments.  
Material: Steel  
Finishes: Plain

- 8.0 WORKMANSHIP:** Cup plugs must be free from burrs, loose scale and all other defects that affect their serviceability.

## 9.0 PART LIST:

### 9.1 Approved:



| STANDARD PLUGS - STEEL |                     |       |                |      |              |      |                 |            |                                  |       |              |             |
|------------------------|---------------------|-------|----------------|------|--------------|------|-----------------|------------|----------------------------------|-------|--------------|-------------|
| Nominal Plug Size      | Outside Diameter ** |       | Overall Height |      | Crown Height |      | Stock Thickness |            | Recommended Hole Diameter $\phi$ |       | Part Number  |             |
|                        | Max                 | Min   | Max            | Min  | Max          | Min  | Nominal         | Tolerance  | Min                              | Max   | Plain Finish | Zinc Finish |
| * 5/16                 | .318                | .316  | .208           | .168 | .075         | .049 | .042            | $\pm .003$ | .310                             | .312  | 28010R1      |             |
| 1/2                    | .512                | .510  | .270           | .230 | .075         | .049 | .042            | $\pm .003$ | .504                             | .506  | 21050R1      | 40064R1     |
| 5/8                    | .637                | .635  | .270           | .230 | .075         | .049 | .042            | $\pm .003$ | .629                             | .631  | 327411R1     |             |
| 13/16                  | .825                | .823  | .270           | .230 | .083         | .057 | .048            | $\pm .004$ | .817                             | .819  | 327412R1     |             |
| 7/8                    | .887                | .885  | .270           | .230 | .083         | .057 | .048            | $\pm .004$ | .879                             | .881  | 373553R1     |             |
| 1                      | 1.012               | 1.010 | .330           | .290 | .103         | .067 | .048            | $\pm .004$ | 1.002                            | 1.005 | 318300R1     |             |
| 1-1/4                  | 1.262               | 1.260 | .330           | .290 | .103         | .067 | .048            | $\pm .004$ | 1.252                            | 1.255 | 349373R1     |             |

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