

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)	NUMBER: MPAPS S-NM-5.101-GS/PL	
	Former Designation: ESP-NM-5.101-GS	
TITLE: Tapered and Reduced Cross Section (Circlip) Retaining Rings – Metric Series (Noun Code –7175)	CURRENT REV No.: 1501	DATE: Jan. 2015
WRITTEN/EDITED BY: Materials Engineering	APPROVED BY: Materials Engineering	SUPERSEDES: ESP-NM-5.101-GS - August 2006
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, PP.		

1.0 GENERAL: This standard contains the essentials of the following standards:

British Standards Institute: BS 3673

German Institute of Standardization: DIN 471, 472 and 6799

Inch series rings may be found on MPAPS S-N-5.101-GS/PL.

2.0 CONTENTS:

	Page
General	1
Ring Types	1
Miscellaneous Dimensions	2
Material and Hardness	2
Finishes	3
Restricted Chemical Substances	3
Color Coding	3
Method of Designation	3
Performance Requirements	3
Workmanship	4
Policy for Selecting Parts for New Design	4
Part List	4
Technical Information	6

3.0 RING TYPES: Retaining rings in this standard are provided for both external and internal applications on shafts and in housing bores respectively and are described as follows:

External Regular (EXT-REG) and External Heavy (EXT-HVY) These rings are designed to install into grooves on shafts to provide an external shoulder for locating and retaining a part on the shaft.

External E (EXT-E): These rings are designed to be installed radially on a shaft directly in a plane of the groove to provide an external shoulder for retaining a part on the shaft.

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.

JANUARY 2015

NUMBER: MPAPS S-NM-5.101-GS/PL	TITLE: <i>Tapered and Reduced Cross Section (Circlip) Retaining Rings</i>	REVISION: 1501
---	--	---------------------------------

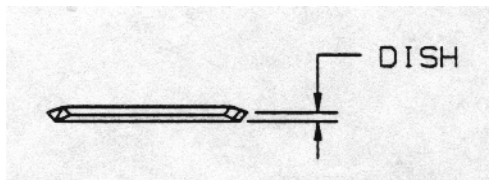
Internal Regular (INT-REG) and Internal Heavy (INT-HVY): These rings are designed to install into grooves in housing bores to provide an internal shoulder for locating and retaining a part within the housing.

4.0 MISCELLANEOUS DIMENSIONS: The following requirements will supplement the data given in the dimensional charts.

Holes or (Slots): The diameter of the holes will be in accordance with the dimensional charts and sufficient material will be retained around each hole (or either side of each slot) to ensure that no permanent distortion of the ring will result when pliers are applied during assembly.

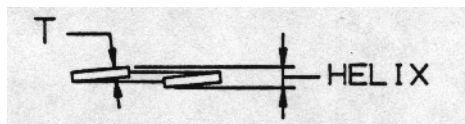
Lug Filet: A filet of minimum radius equal to the maximum thickness of the ring will be formed adjacent to each lug. The filet will blend smoothly with the lug profile.

Radial Flatness (Dish): Radial Flatness will be considered as the height difference occurring between the inner and outer peripheries of the ring, measured between 2 parallel plates, after the charted loads have been applied. It will not exceed the values tabulated.



Dimensions in millimeters:

Nominal Size	Tolerance	Kg +/- 10%
Up to 22	0.1	3
Over 22 Up to 39	0.15	4
Over 39 Up to 82	0.2	6
Over 82 Up to 150	0.25	10
Over 150	0.35	15



Spiral Flatness (Helix Pitch): Spiral flatness will be considered as the overall helical distortion of the ring as shown. It will not exceed 1.8 times the specified maximum ring thickness.

5.0 MATERIAL AND HARDNESS: Spring steel SAE 1060 to 1090 processed to meet the specified hardness ranges and be capable of meeting the test requirements of the Bend and Fracture Test.

Nominal Size	Austempered	Hardened and Tempered
Up to 38 mm	49 to 54 Rc	47 to 52 Rc
Over 38 to 200 mm	46 to 51 Rc	44 to 49 Rc
Over 200 mm	42 to 47 Rc	40 to 45 Rc

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.

JANUARY 2015