

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS S-GM-90.101-GS/PL
		Former Designation: ESP-GM-90.101-GS
TITLE: Break Mandrel Blind Rivets – Metric Series (Noun Code – 7220)	CURRENT REV No.: 1506	DATE: June 2015
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<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: Implementation of this standard must be in accordance with the policies and procedures outlined on page MPAPS S-A-0.101. There may also be supplemental group instructions in regard to use of metric standards that should be taken into account.

This standard may differ in some respects with certain segments of 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, dimensionally interchangeable worldwide.

This standard establishes the dimensional and performance requirements of break mandrel blind rivets suitable for use in joining nonstructural component parts of an assembly. This specification contains the essentials of the SAE Standard.

A break mandrel blind rivet is a blind fastener with a self-contained mandrel which during the setting operation is pulled into or against the rivet body forming an upset on the blind end and expanding the body until the mandrel breaks.

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

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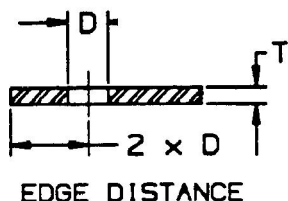
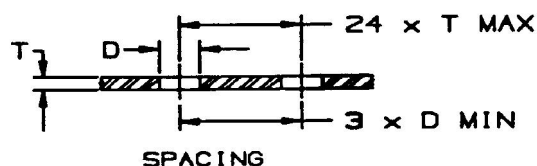
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3.0 **DESIGN CONSIDERATION:**

Installation of a regular rivet requires tooling access to both rivet ends. If access to only one end is possible, a blind rivet which utilizes an integral pull type mandrel to deform the blind end into a clinch may be used. Rivets are best suited for joints that are loaded in shear. As they fill the hole, they will prevent chucking under transverse load but, compared to bolts or screws, rivets have lower strength.

The following edge distance and spacing recommendations apply to all rivets.



Average recommended edge distance is two times the diameter of the rivet. In lightly loaded structures where the rivet performs only a holding function, this can be decreased to 1-1/2 diameters, and in heavily loaded structures, it may be necessary to increase it to as much as 3 diameters to develop required joint strength.

Rivet pitch should be three times the diameter of the rivet. Depending upon nature of load, it may be desirable to decrease or increase this distance. However, it is generally considered that 3 diameters overcome the tendency of the material to fail and concentrate the load on the rivet. Do not space farther than 24 x T of thinnest panel.

Break mandrel blind rivets are considered non-structural. Consideration of material being joined, such as FRP or other relatively soft materials, especially in thin sections should be given. In addition, consideration of the compatibility of rivet materials with materials being joined should be given to avoid corrosion particularly in exterior applications.

Note: In all cases, it is recommended that all completed assemblies be tested under service loads to verify the design.

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.

Metric Series mm	Inch Series
3.2	1/8
4.8	3/16
6.3	1/4

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5.0 PROPRIETARY VARIATIONS: Proprietary pull-break mandrel type blind rivet design features and other details of parts produced by individual manufacturers may vary within envelope dimensions given, provided all requirements of this specification are met.

6.0 DESIGN PARAMETERS:

Nominal Sizes: 3.2, 4.8, and 6.3 mm

Head Style: Protruding or Dome (Regular Head)

Grades:

Grade	19	30	51
Rivet Body Material	Aluminum Alloy 5056 Or Equiv.	Low Carbon Steel	Stainless Steel (300 Series or equivalent)
Mandrel Material	Carbon Steel	Carbon Steel	Stainless Steel (300 or Equivalent)

7.0 MATERIALS: Rivet bodies and mandrel will be made of the materials specified above. When the specific material analysis is not given, the analysis will be selected by the manufacturer and will be such to assure that the rivets meet the mechanical performance requirements.

Nominal Rivet Body	Mandrel Break Load* Newtons						Ultimate Shear Strength Newtons min					
	Grade 19		Grade 30		Grade 51		Grade 19		Grade 30		Grade 51	
	Rivet Body						Rivet Body					
	Aluminum 5056 or Equiv.		Low Carbon Steel		Stainless Steel (300 Series)		Aluminum 5056 or Equiv.		Low Carbon Steel		(Stainless Steel (300 Series)	
	Mandrel – Carbon Steel				Stainless Steel		Mandrel - Carbon Steel				Stainless Steel	
	Min	Max	Min	Max	Min	Max						
3.2 (1/8)	1780	2670	2670	3560	2890	4230	760		1160		1870	
4.8 (3/16)	3340	4670	5120	6450	6230	8450	1690		2400		4230	
6.3 (1/4)	6450	8230	8670	10450	13300	16000	3110		4450		7560	

Ultimate Tensile Strength
Newtons min

Grade 19	Grade 30	Grade 51
Rivet Body		
Aluminum 5056 or Equiv.	Low Carbon Steel	Stainless Steel (300 Series)
Mandrel - Carbon Steel		Stainless Steel
980	1380	2360
2220	3020	5340
4090	5520	9340

NOTE: Rivet sizes 4.8 mm and 6.3 mm diameters, made of carbon steel materials, should not be tested for 3.2 mm and 4.8 mm grip ranges since the rivets are stronger than the test plates.

N=Newton = pound force x 4.448

* Mandrel break load is defined as the load in newtons necessary to break the mandrel when setting break mandrel types of pull mandrel blind rivets.

8.0 MANDREL HARDNESS: In the event that the mandrel hardness is suspect, the following will be used as a referee test. Using a transverse Tukon Microhardness (Knoop Scale) Test at 12.7 mm

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