

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS P-39
		Former Designation: CEMS A-39 & CEMS A-39, APPX
TITLE: Shot Peening of Metal Parts	CURRENT REV No.: 1704	DATE: Apr. 2017
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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>		

1.0 APPLICATION

Shot peening produces a compressively stressed layer on the surface, which improves the fatigue life of a part by reducing the effect of an applied tensile stress. Some typical applications for shot peening within Navistar are: springs, connecting rods, gears, certain highly stressed shafts, leaf springs, steering knuckles and differential crosses.

2.0 SCOPE

This specification covers the Navistar's requirements for shot peening metal parts.

2.1 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.

3.0 REFERENCE DOCUMENTS

Unless otherwise specified, the latest issue of all referenced standards shall apply. The following Specifications, Standards, and Regulations are referenced in this specification.

Quality System Standard ISO 9001 or TS-16949	NAVISTAR MPAPS B-50	SAE J444
CFR Title 29, Part 1910	SAE J441	SAE J827
NAVISTAR Supplier Packing and Shipping Std. D-13	SAE J442	SAE J2441
NAVISTAR Engineering Design Std. A-16	SAE J443	

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4.0 REQUIREMENTS

Parts supplied to this specification will meet the following requirements.

4.1 Intensity

The intensity designation will include a number and a letter. The letter will specify which Almen test strip (A, C or N) is to be used and the number will indicate the minimum arc height that the treatment will produce on the specified strip. The arc height is measured in 0.025 mm units. Piece part coverage will be 100% minimum unless otherwise specified. An “H” suffix on the intensity designation will indicate special hard shot must be used.

Intensity Designation	Test Strip Arc Height	Shot Size*	
Class	Units	Cast Steel	Cut Wire
8A	8 to 12	S110	--
12A	12 to 16	S170	--
14A	14 to 18	S230	CW23
16A	16 to 20	S330	CW35
6C	6 to 8	S460	CW47
8C	8 to 12	S660	
IND	As Indicated on Drawing		

- * The shot diameter will be no greater than 50% of the radius of any fillet or 25% of any aperture to be peened. See “A.0 - General Information” for discussion.

4.1.1 All areas where specified intensity must be achieved and any areas that cannot tolerate peening will be identified on the drawing.

4.2 Intensity Control

Test strips, holders and gages will conform to the requirements published in SAE J442.

4.2.1 Two strips must be used for each determination. The minimum test frequency to insure the specified intensity is at the beginning and end of each set-up and at last every eight hours. When a test strip does not meet the requirements all parts processed since the last satisfactory test are rejected.

4.2.2 When requested, the supplier will provide the purchaser with test strips and with certification that all parts meet the specified requirements.

4.3 Shot Control

The shot used to process parts to this specification will conform to the requirements published in SAE J441 or SAE J827 and J444, unless otherwise specified. The shot will be at least as hard as the parts being peened except when the intensity designation has an “H” suffix then at least 90% of the hardness values for the shot used will be RC 58 to 65.

4.3.1 The shot will be essentially free from cracks, porosity, sharp edges and broken pieces. Cut wire, if used, must be conditioned to eliminate sharp edges.

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4.4 Shot Peening Equipment

The machine used for shot peening will provide a mechanical means for moving the work through the shot stream in either translation or rotation or both to insure reproducing consistently, in all specified areas, the shot peening intensities required. It will also include a separator for the continuous removal of broken or defective shot during operation.

4.5 Pre Peening Process

All forming, machining, grinding, heat treating, burr removal and other processing in the area to be peened will be completed prior to shot peening except as indicated below. Unless otherwise specified, all testing such as magnetic particle, dye penetrant, hardness, etc., will be completed prior to shot peening.

4.5.1 All areas that require protection from the shot peening treatment will be indicated on the drawing. Materials used for masking will be easily removed by nonabrasive methods. Masking must protect designated areas to within ± 3 mm of designated boundary unless otherwise specified.

4.6 Post Peening Treatments

All shot, shot residue and masking will be removed by nonabrasive methods only.

4.6.1 Straightening after shot peening is prohibited, unless approved by the controlling design engineering department.

4.6.2 Surface finish adjustment of the specified peened area by polishing, lapping and honing, will be limited to material removal of not more than 10% of the "A" intensity arc height if part hardness is less than RC 45; or 5% of the "A" intensity arc height for parts RC 45 and greater. Convert "N" or "C" intensities to equivalent "A" value.

4.6.3 Unless otherwise specified, heating after shot peening such as to bake or cure paint will be limited to: 230°C (450°F) max for steel; 135°C (275°F) max for aluminum.

4.6.4 Treated surfaces will be suitably cleaned and protected with a rust inhibiting coating before shipping or storage.

4.7 Method of Test

4.7.1 Test Strip Intensity

Support the appropriate tests strips so that their exposure simulates that of each specified area. Follow the procedure outlined in SAE J443 to generate an "Intensity Determination Curve." Saturation of the test strip is defined as the "Shortest time" point on the curve from which doubling that time will result in no more than a 10% increase in arc height. Full or 100% coverage of the test strip or complete denting of the surface will correspond very closely to saturation. Use a fresh test strip for each exposure; no strip may be reused.

4.7.2 Piece Part Intensity

All variables, except time, determined above must be maintained. The time to get saturation or 100% coverage of the piece part will vary with the base hardness. This time will be determined visually. A 150% of 1.5 coverage specification refers to 1-1/2 times the piece part saturation time.

4.7.3 Coverage

Piece part coverage will be determined visually using a 10 power magnifying glass. Full or 100% coverage will be uniform with complete denting or obliteration of the original surface.