

NAVISTAR, INC.		
Material, Parts, and Process Specifications (MPAPS)		NUMBER: MPAPS P-9511
		Former Designation: TMS-9511
TITLE: Arc Welding - Aluminum		CURRENT REV No.: 1510
		DATE: Oct. 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: New MPAPS format; editorial changes.		

1.0 APPLICATION

Aluminum cab frames and other welded aluminum assemblies.

2.0 SCOPE

This specification covers the arc welding of structural members which are made from wrought or cast aluminum or aluminum alloy components. The aluminum alloy can be either a nonheat-treatable (e.g., 5052) or heat-treatable (e.g., 6061) grade. It also pertains to fillet welds in tee or lap joints, bevel or flare-V groove welds, square groove welds, and plug or slot welds. The welds shall be made using a gas-metal arc process with a suitable shielding gas such as argon, helium or a mixture of the two gases (MIG: Gas Metal-Arc or TIG: Gas Tungsten-Arc). These processes are to be used interchangeably unless otherwise specified. The location of joints to be welded shall be designated on the engineering drawing using the appropriate welding symbols (per AWS A2.4) and notes to indicate size, type, length and location.

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	AWS A5.10
CFR Title 29, Part 1910	AWS A2.4
NAVISTAR Manufacturing Std. MS-D-13	AWS D1.2
NAVISTAR Engineering Design Std A-16	AWS D8.14
NAVISTAR MPAPS B-50	

4.0 REQUIREMENTS

Fabrication of welded aluminum structures of sheet or plate by means of fillet welds, square or bevel groove welds or plug and slot welds shall conform appropriately to the guidelines requirements and recommendations of AWS D1.2, clause 4, where applicable, in regards to the preparation of base metal,

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assembly, technique, use of tack and temporary welds, weld termination, control of distortion and weld profiles.

4.1 Filler Metal

Filler metal shall be selected on the basis of the base metals being joined, and it shall be determined from AWS A5.10 unless otherwise specified on the engineering drawing.

4.2 Weld Length

Weld length shall be shown on the engineering drawing. Welds shall be acceptable if they are short according to the following table:

TABLE 2 – WELD LENGTH TOLERANCE			
<u>Specified Length</u>		<u>Tolerance</u>	
<u>cm</u>	<u>In</u>	<u>mm</u>	<u>in</u>
15 and Under	6 and Under	6	1/4
Over 15 Thru 30.5	Over 6 Thru 12	13	1/2
Over 30.5 Thru 61.0	Over 12 Thru 24	38	1 1/2
Over 61.0 Thru 122	Over 24 Thru 48	64	2 1/2
Over 122 Thru 244	Over 48 Thru 96	114	4 1/2
Over 244 Thru 488	Over 96 Thru 192	216	8 1/2

4.2.1 The effective weld length shall not include skips, voids, undersize welds, off-location welds, or any other discontinuities defined under Quality.

4.3 Weld Location

The lateral location of the weld in the joint shall be shown by the proper weld symbol. Where desired, this may be supplemented by cross hatching on the Engineering drawing or by a note in the tail of the weld symbol. Where a specified location is shown on the drawing, the starting point of a continuous weld shall be within the tolerance included in Table 3:

TABLE 3 – WELD LOCATION TOLERANCE			
<u>Specified Length</u>		<u>Tolerance</u>	
<u>cm</u>	<u>In</u>	<u>mm</u>	<u>in</u>
15 and Under	6 and Under	± 6	± 1/4
Over 15	Over 6	± 13	± 1/2
Intermittent		± 13	± 1/2

4.3.1 No welds shall be closer than 3 mm (1/8 in) from the edge or end of a joint. When it is required that a weld be hooked or boxed around a corner or end of a joint, it shall be indicated on the engineering drawing as a continuous weld and included in the specified length. Hooked welds shall be a portion of a continuous weld or an individual portion of the weld and shall be free from pinholes, voids, and craters. "No Weld" areas shall be specified on the engineering drawing using a specific note or dimension to define the minimum length of the area where no welding is permitted (or the maximum dimension where welding is excluded from a specified reference point). All welds shall be centered in the joint to ensure fusion between the two members being joined. Portions of the weld off-joint shall be considered as skips or voids.

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4.4 Welded Joints

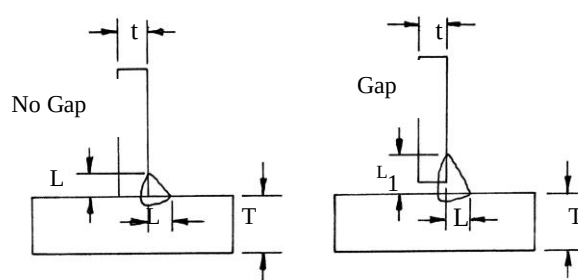
Weld joints in 6xxx series alloys shall be beveled or spaced to permit excess filler alloy dilution. Groove welded joints shall conform to AWS D1.2 recommended joint patterns. The joint patterns can be modified upon prior written approval from Materials Engineering.

4.5 Weld Size

4.5.1 Fillet Weld Size

Weld leg length shall be shown on the engineering drawing, and it shall be the minimum length permitted. The leg length shall be equal to the thickness of the thinnest stock being welded or 3 mm (0.12 in), whichever is greater, unless otherwise indicated on the engineering drawing. When a gap is present, the leg length on the gap side shall be increased by the amount of the gap. See Figure 1.

Figure 1 – Weld Leg Length



$L = 3.0 \text{ mm (1/8 in) minimum}$
or $1.00t$, whichever is greater

$L_1 = 3.0 \text{ mm (1/8 in) + Gap Minimum}$
or $1.00t + \text{gap}$, whichever is greater

4.5.2 Fillet Weld Throat Depth

Unless otherwise specified, a minimum throat depth shall be maintained throughout the length of the weld. The minimum throat depth shall be (1) no gap: 60% of the specified leg length or (2) gap: 60% of the total of the limit for convexity shall not be required, but all other requirements shall be met. Part configuration shall remain functional, and no overlap shall be permitted. See Figure 2.

Figure 2 – Weld Throat

