



Florida Department of Transportation

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Tallahassee, FL 32399-0450

KEVIN J. THIBAUT, P.E.
SECRETARY

August 9, 2021

Khoa Nguyen
Director, Office of Technical Services
Federal Highway Administration
3500 Financial Plaza, Suite 400
Tallahassee, Florida 32312

Re: State Specifications Office
Section: **965**
Proposed Specification: **9650000 REVISED: General Provisions for Aluminum Items (Including Welding).**

Dear Mr. Nguyen:

We are submitting, for your approval, two copies of the above referenced Supplemental Specification.

The changes are proposed by Tim McCullough from the State Materials Office to meet all external publications including the Standard Plans and ASTM. The revised proposed specification can be misinterpreted by the Contractor and to avoid/mitigate on any future projects we have added the word Connection for J-Arm Connection plate. The proposed changes will meet project needs and provide the ability for a quick review of project requirements.

Please review and transmit your comments, if any, within two weeks. Comments should be sent via email to daniel.strickland@dot.state.fl.us.

If you have any questions relating to this specification change, please call me at 414-4130.

Sincerely,

Signature on file

Daniel Strickland, P.E.
State Specifications Engineer

DS/ra

Attachment

cc: Florida Transportation Builders' Assoc.
State Construction Engineer

GENERAL PROVISIONS FOR ALUMINUM ITEMS (INCLUDING WELDING)

(REV ~~84-922~~-21)

SECTION 965 is deleted and substituted by the following:

965-1 ~~Surface Appearance and Protection~~General.

~~The exterior surfaces of aluminum castings, pipes, tubes, formed sheets, and structural shapes shall, when placed in the work, have a clean, uniform silvery appearance, free of dark streaks and discoloration.~~ This Section covers the material and fabrication requirements for aluminum components. All aluminum light poles, J-arms, and railings supplied under this Specification shall be from producers currently on the Department's Production Facility Listing. Producers seeking inclusion on the Department's Production Facility Listing must meet the requirements of Section 105.

~~Aluminum members (including specifically aluminum light poles and signs poles) which are of such size or shape that the surfaces might be marred during transit and prior to their being installed, shall be appropriately and adequately protected against such damage, by wrapping with paper or by other effective means.~~

965-2 ~~Certification and Mill Analysis~~Fabrication.

~~For aluminum materials used for pipe, tube, sheet and other structural shapes for structures other than drainage, the fabricator must maintain a certified mill analysis of the alloys for three years following fabrication.~~ Provide fabricated components in accordance with AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, the Design Plans, and this section. Verify the strength of each Lot by tensile test. Alternate testing will not be accepted. Provide certifications as specified in 965-4, upon request. Protect against damage and marring during transit and delivery.

965-2.1 Light Poles: Provide aluminum lighting poles in accordance with this section and Table 965-1. Weld arms and poles in the T4 condition, using the filler metal ER4043, ER4047, ER5183, ER5356, or ER5556 in accordance with AWS D1.2 Aluminum Structural welding Code. Weld to castings in accordance with 965-2.3. Heat treat the arm and pole, until aged to the T6 condition. Transverse welds are only allowed at the base. Equip poles with a vibration damper, when specified in the contract documents.

Provide exterior surface with a clean, uniform silvery appearance, free of dark streaks and discoloration. Finish the pole and arm with a satin rubbed finish.

965-2.2 Overhead Sign Components: Provide aluminum toll gantry J-arms in accordance with this section and Table 965-1. Weld tube to plate connections in the T4 or T6 condition, using the filler metal ER4043, ER4047, ER5183, ER5356, or ER5556 in accordance with AWS D1.2 Aluminum Structural welding Code. Heat treat tube and plate in the T4 condition until aged to the T6 condition.

Provide exterior surface with a clean, uniform silvery appearance, free of dark streaks and discoloration.

965-2.3 Castings: Provide aluminum castings in accordance with this section and Table 965-1. Weld aluminum castings to itself or aluminum tube to castings using the filler metal

ER4043, in accordance with AWS D1.2 Aluminum Structural welding Code. Heat treat the castings, until aged to the T6 condition.

965-2.4 Railing: Provide aluminum railing in accordance with this section and Table 965-1. Weld aluminum railing using the filler metal ER4043, ER4047, ER5183, ER5356, or ER5556 in accordance with AWS D1.2 Aluminum Structural welding Code.

965-2.5 Static Sign Assemblies: Provide aluminum sheet, plate and structural shapes in accordance with this section and Table 965-1. Weld structural profiles to itself or aluminum components using ER4043, ER4047, ER5183, ER5356 or ER5556 in accordance with AWS D1.2 Aluminum Structural Welding Code. Heat treat the structural profiles, until aged to the T6 condition.

<u>Table 965-1: Material Requirements for Aluminum Components</u>				
<u>Product</u>	<u>ASTM</u>	<u>Alloy/Temper</u>	<u>Reportable Properties</u>	<u>Supplementary Requirements</u>
<u>Pole, Arm, Extrusions</u>	<u>B221</u>	<u>6061-T6</u>	<u>Alloy, Temper, Thickness</u>	<u>Report Tensile Strength</u>
		<u>6063-T6</u>		
<u>Bars, Plates, Stiffeners, Backing Ring, Shims, Shapes</u>	<u>B221</u>	<u>6063-T6</u>		
	<u>B209</u>	<u>6061-T6</u>		
<u>Castings</u>	<u>B26</u>	<u>356-T6</u>		
	<u>B108</u>			
<u>Railing</u>	<u>B221</u>	<u>6351-T5</u>		
	<u>B241</u>	<u>6061-T6</u>		
	<u>B210</u>			
	<u>B429</u>			
<u>J-Arm Tube</u>	<u>B429</u>	<u>6061-T6</u>		
	<u>B221</u>			
<u>J-Arm Connection Plate</u>	<u>B209</u>	<u>6061-T6</u>		
<u>Sheet</u>	<u>B209</u>	<u>6061-T6</u>		
		<u>5154-H38</u>		
		<u>5052-H38</u>		
<u>Structural Shapes</u>	<u>B308</u>	<u>6061-T6</u>		

965-3 Welding Aluminum Sign Structures:

Welding and weld details shall be in accordance with Section 14 of the AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals; ANSI and AWS D1.2 “Structural Welding Code—Aluminum”, including the requirements for qualifications of procedures and welders, as specified therein.

1. Alloys: The aluminum alloys to welded under these specifications may be any of the following alloys:

~~Wrought Nonheat-treatable Alloys:~~~~Alloy 3003~~~~Alloy Alclad 3004~~~~Alloy 5052~~~~Alloy 5083~~~~Alloy 5086~~~~Alloy 5456~~~~Wrought Heat-treatable Alloys:~~~~Alloy 6061~~~~Alloy 6063~~~~Cast Heat-treated Alloy~~~~Alloy SG-70A (ASTM Designation)~~

~~2. Filler Metals: The filler metals to be used with particular base metals shall be as shown in the table below except that other filler metals may be used if approved by the Engineer.~~

Table 965-4

Base Metal	Filler Metal
3003 to 3003	ER1100
Alclad 3004 to Alclad 3004	ER4043
5052 to 5052	ER5356*
5083 to 5083	ER5183
5086 to 5086	ER5356*
5456 to 5456	ER5556
6061 to 6061	ER5356*
6063 to 6063	ER5356*
SG-70A to 6061	ER4043
SG-70A to 6063	ER4043

*ER5183, ER5356, and ER5556 may be used interchangeably for these base metals.

965-4 Welding Aluminum Structures Other Than Sign Structures.

~~The welding of aluminum structures, other than sign structures, such as aluminum bridge and railing structures and their aluminum components, shall be in accordance with ANSI and AWS D1.2 "Structures Welding Code Aluminum", including the requirements for qualifications of procedures and welders, as specified therein.~~

965-5.3 Paint for Poles, Pedestals, and Posts

Paint systems used on aluminum poles, pedestals, and posts shall meet the color requirements as specified in the Contract Documents. All paint systems shall possess physical properties and handling characteristics that are compatible with the application requirements of Section 646. Materials shall be specifically intended for use over aluminum. Paint systems shall exhibit no loss of adhesion or total color difference (ΔE^*_{ab}) greater than 8.0 units for five years after final acceptance as specified in 5-11. An aluminum pole, pedestal, post, or sign panel that exhibits a cumulative surface area of delamination in excess of 50 square inches will constitute

an adhesion failure. Delamination shall be defined as any area of exposed metal surface subsequent to hand tool cleaning. A ΔE^*_{ab} value exceeding 8.0 units per the International Commission on Illumination L*a*b* 1976 (CIELAB) space and color difference formula, measured in accordance with ASTM D2244, will constitute a color retention failure.

The Department will measure and enter in the Department's database the CIELAB color chromaticity coordinates for the color of the top coat of sample coupons provided as required by 646-2.7 using a BYK-Gardner Handicolor colorimeter using D65 illuminant and 2-degree geometry settings. The Department-measured CIELAB chromaticity coordinates shall define the initial color and will be used for resolution of color retention failures and the resolution of color retention disputes.

965-4 Certification

Produce a certificate of compliance for all aluminum castings. Produce other certificates of compliance at the request of the Engineer. Certificates of compliance shall identify that the material has been sampled and tested in accordance with the applicable ASTM and shall include the reportable properties and supplementary requirements of the applicable sections listed above.

**GENERAL PROVISIONS FOR ALUMINUM ITEMS
(INCLUDING WELDING)
(REV 8-9-21)**

SECTION 965 is deleted and substituted by the following:

965-1 General.

This Section covers the material and fabrication requirements for aluminum components. All aluminum light poles, J-arms, and railings supplied under this Specification shall be from producers currently on the Department's Production Facility Listing. Producers seeking inclusion on the Department's Production Facility Listing must meet the requirements of Section 105.

965-2 Fabrication.

Provide fabricated components in accordance with AASHTO LRFD Specifications for Structural Supports for Highway Signs, Luminaires and Traffic Signals, the Design Plans, and this section. Verify the strength of each Lot by tensile test. Alternate testing will not be accepted. Provide certifications as specified in 965-4, upon request. Protect against damage and marring during transit and delivery.

965-2.1 Light Poles: Provide aluminum lighting poles in accordance with this section and Table 965-1. Weld arms and poles in the T4 condition, using the filler metal ER4043, ER4047, ER5183, ER5356, or ER5556 in accordance with AWS D1.2 Aluminum Structural welding Code. Weld to castings in accordance with 965-2.3. Heat treat the arm and pole, until aged to the T6 condition. Transverse welds are only allowed at the base. Equip poles with a vibration damper, when specified in the contract documents.

Provide exterior surface with a clean, uniform silvery appearance, free of dark streaks and discoloration. Finish the pole and arm with a satin rubbed finish.

965-2.2 Overhead Sign Components: Provide aluminum toll gantry J-arms in accordance with this section and Table 965-1. Weld tube to plate connections in the T4 or T6 condition, using the filler metal ER4043, ER4047, ER5183, ER5356, or ER5556 in accordance with AWS D1.2 Aluminum Structural welding Code. Heat treat tube and plate in the T4 condition until aged to the T6 condition.

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965-2.3 Castings: Provide aluminum castings in accordance with this section and Table 965-1. Weld aluminum castings to itself or aluminum tube to castings using the filler metal ER4043, in accordance with AWS D1.2 Aluminum Structural welding Code. Heat treat the castings, until aged to the T6 condition.

965-2.4 Railing: Provide aluminum railing in accordance with this section and Table 965-1. Weld aluminum railing using the filler metal ER4043, ER4047, ER5183, ER5356, or ER5556 in accordance with AWS D1.2 Aluminum Structural welding Code.

965-2.5 Static Sign Assemblies: Provide aluminum sheet, plate and structural shapes in accordance with this section and Table 965-1. Weld structural profiles to itself or aluminum components using ER4043, ER4047, ER5183, ER5356 or ER5556 in accordance with AWS D1.2 Aluminum Structural Welding Code. Heat treat the structural profiles, until aged to the T6 condition.

Table 965-1: Material Requirements for Aluminum Components				
Product	ASTM	Alloy/Temper	Reportable Properties	Supplementary Requirements
Pole, Arm, Extrusions	B221	6061-T6	Alloy, Temper, Thickness	Report Tensile Strength
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J-Arm Tube	B429	6061-T6		
	B221			
J-Arm Connection Plate	B209	6061-T6		
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		5154-H38		
		5052-H38		
Structural Shapes	B308	6061-T6		

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The Department will measure and enter in the Department's database the CIELAB color chromaticity coordinates for the color of the top coat of sample coupons provided as required by 646-2.7 using a BYK-Gardner Handicolor colorimeter using D65 illuminant and 2-degree geometry settings. The Department-measured CIELAB chromaticity coordinates shall define the

initial color and will be used for resolution of color retention failures and the resolution of color retention disputes.

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Produce a certificate of compliance for all aluminum castings. Produce other certificates of compliance at the request of the Engineer. Certificates of compliance shall identify that the material has been sampled and tested in accordance with the applicable ASTM and shall include the reportable properties and supplementary requirements of the applicable sections listed above.