

**TABLE OF CONTENTS**

- 1.0 Scope**
- 2.0 References**
- 3.0 Definitions**
- 4.0 Submission & Design Requirements**
  - 4.1 Design - Signal Heads
  - 4.2 Design - Aluminum Components
- 5.0 Materials**
  - 5.1 Structural Steel
  - 5.2 Steel Hardware
  - 5.3 Cast Alloy Materials
  - 5.4 Aluminum Pipe
  - 5.5 Marking
- 6.0 Equipment - Not Used**
- 7.0 Production**
  - 7.1 Galvanizing
  - 7.2 Welding
  - 7.3 Single Member Arms
  - 7.4 Pole Plate and Clamp Assembly
  - 7.5 Traffic Signal Hanger Assemblies
- 8.0 Quality Assurance**
  - 8.1 Warranty
- 9.0 Toronto Transportation Purchase of Material by Purchase Order**
  - 9.1 Submissions
  - 9.2 Technical Information to be Supplied to the Bidder
  - 9.3 Technical Information to be Provided in Quotations
  - 9.4 Inspection
  - 9.5 Packaging and Shipment
  - 9.6 Proof Testing
  - 9.7 Measurement for Payment
  - 9.8 Basis of Payment
- 10.0 Designated Sources Requirements  
- Not Used.**

## **1.0 Scope**

This specification covers the requirements for single member mast arms, pole plates and clamps, and traffic head hanger assemblies.

## **2.0 References**

This specification refers to the following standards, specifications or publications:

### **Toronto Transportation:**

TTS 808.210 Signal Heads

### **Other:**

ANSI Standard B18.2.1 - 1981 - Square and Hex Bolts and Screws, Inch Series.

ANSI Standard B18.2.2 - 1972 - Square and Hex Nuts.

ANSI/ASTM Standard A48-76 - Gray Iron Castings.

ASTM A53 - 90b - Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless.

ASTM B241/8241M-96 - Aluminum and Aluminum Alloy Seamless Pipe.

ASTM-B85-96 Standard Specifications for Aluminum - Alloy Die Coatings:

W47.1 Certification of Companies for Fusion Welding of Steel

W47.2 Certification of Companies for Fusion Welding of Aluminum

### **CSA Standards:**

CAN 3-G40.2 - M92 - Structural Quality Steels.

G164 - M92 - Hot Dip Galvanizing of Irregularly Shaped Articles.

S157 - M83 - Strength Design in Aluminum.

W59 - 1989 - Welded Steel Construction (Metal-Arc Welding).

## **3.0 Definitions**

- Not used.

## **4.0 Submission & Design Requirements**

### **4.1 Design - Signal Heads**

All equipment shall be designed to withstand loading of an aluminum five-section traffic signal head with 300 mm lenses, complete with backboard, as per TTS 808.200.

## **4.2 Design - Aluminum Components**

Structural design shall conform with the requirements of CSA Standard S157.

## **5.0 Materials**

### **5.1 Structural Steel**

Structural steel shall conform with the requirements of CSA Standard CAN 3-G40.21M, minimum yield strength 300 MPa.

### **5.2 Steel Hardware**

Galvanized steel or steel bolts shall conform with the requirements of ANSI Standards B18.2.1 and B18.2.2, minimum yield strength 400 MPa.

### **5.3 Cast Alloy Materials**

Fittings cast from non-ferrous alloys shall conform with the requirements of ASTM-B-85-96 and shall be of strength compatible with other components and the design requirements. Fittings cast from ferrous alloys shall meet the requirements of ANSI/ASTM Standard A48, Class 300.

### **5.4 Aluminum Pipe**

Aluminum pipe shall conform with the requirements of ASTM/B241 and B241M-96 alloy and strength requirements compatible with other components and the design requirements.

### **5.5 Marking**

Each traffic signal arm shall have identification marking showing the manufacturer's name or trade mark, the length of the arm, the year of manufacture and the manufacturer's part number.

## **6.0 Equipment**

- Not used.

## **7.0 Production**

### **7.1 Galvanizing**

All structural steel, steel hardware and cast ferrous components shall be hot dip galvanized in accordance with the requirements of CSA Standard G164M.

### **7.2 Welding**

All welding shall conform with the requirements of CSA W59, W47.1 and W47.2.

### **7.3 Single Member Arms**

Single member arms shall be manufactured by tapering and bending aluminum tube to the required

dimensions. The end of the arm shall be provided with a 50 mm IPS tenon, 100 mm long, for mounting of a hanger. The tenon shall be horizontal when the arm is mounted on a vertical surface.

The vertical rise of the mast arm as measured from the center of the pole plate to the center of the tenon shall be as given in Table 1.

**TABLE 1**

**Aluminum Single Member  
Arm Dimensions**

Arm Length (m)	Angle (deg.)	Arm Rise (m)	Wall Thickness (mm)	Arm Dia. (mm)
1.2	25	0.53	3.2	101.5
1.8	25	0.61	3.2	101.5
2.4	25	0.84	3.2	101.5
3.0	15	0.61	3.2	127
3.6	15	0.84	3.2	127
4.6	15	1.07	4.8	127
5.5	10	0.91	4.8	152.5
6.1	10	1.07	4.8	152.5
6.7	10	1.14	4.8	152.5
7.6	10	1.35	4.8	152.8

#### **7.4 Pole Plate and Clamp Assembly**

The pole plate assembly shall be fabricated from structural steel complete with flat steel pole straps with four hex head bolts, nuts, lockwashers and round washers where mounting on metal or concrete poles is required, or complete with four 17.5 mm diameter bolt holes where mounting on wood poles is required. The pole plate collar attachment (arm spigot) to the aluminum arm shall be HSS plate, welded to pole plate. Aluminum arm shall be retained by a minimum of three hex head bolts, nuts, lockwashers and round washers. Pole plate assemblies for use with metal or concrete poles shall be fabricated to suit pole diameters in size ranges as follows:

1. 102 mm to 151 mm (4" to 6")
2. 152 mm to 203 mm (6" to 8")
3. 203 mm to 254 mm (8" to 10")

<b>Arm O.D.</b>	<b>101.5 mm</b>	<b>127 mm</b>	<b>152.5 Mm</b>
Arm size (m)	1.2 - 2.4	3.0 - 4.6	5.5 – 7.6
Plate thickness (mm)	6.35	9.52	9.52
Back Bar (mm)	6 x 50	9.5 x 50	9.5 x 50
Arm Pocket thickness (mm)	3	4.5	4.5
Clamping No. Bolts Size	2 12.5 x 62.5	3 12.5 x 62.5	3 12.5 x 62.5
Arm Spigot Thickness (mm)	3.4	4.76	
Mounting No. Bolts Size	4 19 x 127 or 19 x 178		

Pole plate assemblies for use with wood poles shall be fabricated to suit pole diameters in size ranges as follows:

1. 204 mm to 254 mm
2. 255 mm to 356 mm
3. flat surface

### **7.5 Traffic Signal Hanger Assemblies**

Traffic signal hanger assemblies shall be comprised of a signal head fitting coupled with a rubber cushion to a rigidly mounted arm fitting restricting vertical deflection of the signal head to 15° in either direction. The hanger shall be suitable for slip-fitting to a 50 mm IPS mast arm tenon and be locked in place

with two stainless steel set screws. An adjustment shall be provided to enable transverse adjustment from plus 7° to minus 4°. The signal head fitting shall be 38 mm IPS threaded tenon with a full-length key slot and a hole near the bottom to hold a cotter pin. Hardware shall include a conduit locknut, a keyed serrated lock washer, a cotter pin and two compression nuts. The entire assembly shall be suitable for connection to the boss of a signal head.

## **8.0 Quality Assurance**

### **8.1 Warranty**

All equipment covered by this specification is to be guaranteed by the Supplier to be free of material or workmanship defects for a period of one (1) year from the date of delivery to Toronto Transportation. Any equipment which is proven to be defective in material or workmanship will be replaced or repaired by the Supplier at no cost to Toronto Transportation. Warranty is for the equipment only and specifically excludes labour or sub-contracting charges.

## **9.0 Toronto Transportation Purchase Of Material By Purchase Order**

### **9.1 Submissions**

Where Toronto Transportation is purchasing material by purchase order, the Supplier shall submit four copies of shop drawings, detailed bill of materials and details of equipment nameplates to Toronto Transportation for review. Shop drawings will include all detailed dimensions and a complete list of components and accessories. Shop drawings submitted for review will be stamped with “approved” by Toronto Transportation if found to be acceptable, or will be marked with corrections if not found to be acceptable. The Supplier shall resubmit corrected shop drawings within 14 calendar days. One copy of the final approved drawings will be returned to the supplier along with written notification to commence fabrication. Within 14 calendar days of receipt of the notification to commence fabrication, the supplier shall submit six (6) copies of all final approved shop drawings to Toronto Transportation.

Production of material shall not commence until the shop drawings are marked “approved”.

If the Supplier has previously submitted shop drawings and received “approval” from Toronto Transportation, only reference to the original submission is required.

### **9.2 Technical Information to be Supplied to the Bidder**

The following technical information shall be supplied to the bidder in the Supply Contract Documents:

1. Length of mast arm.
2. Type of pole for mast arm mounting.

### **9.3 Technical Information to be Provided in Quotations**

Each bidder shall submit with its quotation four copies of the outlined specification and preliminary layout drawing to Toronto Transportation for preliminary approval.

If the bidder has previously submitted this information and it has been previously approved by Toronto Transportation only reference to the original is required.

### **9.4 Inspection**

All material and workmanship is subject to an inspection by Toronto Transportation’s representative prior to shipment and upon delivery to Toronto Transportation.

The Supplier shall notify Toronto Transportation of the date that the fabrication of the equipment will commence.

Toronto Transportation’s representative or agent shall have access to the place of manufacture, while work is being performed, for the purpose of inspecting and examining plant records and certificates, material used, process of manufacturing and to make any tests considered necessary to ensure compliance with this specification.

### **9.5 Packaging and Shipment**

All materials shall be shipped complete with hardware, suitably packaged to avoid damage and to ensure that all parts are delivered as an entity.

Aluminum arms shall be wrapped with packing material. Small components, hardware, fittings and accessories shall be packaged in cardboard containers and protected with packing material.

The Supplier shall advise Toronto Transportation three days in advance of the shipping date of its intent to deliver. Delivery shall take place during the normal business hours at the site.

### **9.6 Proof Testing**

Where a manufacturer has not previously supplied acceptable material to Toronto Transportation in accordance with the requirements of this specification, Toronto Transportation may require proof testing. Such testing shall be done by Toronto Transportation personnel, in the presence of the Supplier, and using such methods, including testing to destruction, as may be required to determine conformance with the design requirements of this specification. The Supplier shall supply two items of each type of equipment for these tests at no cost to Toronto Transportation.

### **9.7 Measurement of Payment**

Measurement will be made for each item complete with all components and accessories.

### **9.8 Basis of Payment**

Payment at the quotation price for traffic signal arms, hangers, fittings, for each complete acceptable steel pole and shall be full compensation for all labour, equipment and materials required for the manufacture, testing, supply and delivery at the time and at the place specified.

## **10.0 Designated Sources Requirements List of Approved Manufacturers**

- Not used.