Material Specification for Traffic Signal Arms, Hangers, Fittings and Hardware

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TTS 808.200.01 SCOPE

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

TTS 808.200.02 REFERENCES

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

Canadian Standards Association

CAN/CSA G40.21-M92	Structural Quality Steels
CSA G164-M92	Hot Dip Galvanizing of Irregularly Shaped Articles.
CAN/CSA S157-M83	Strength Design in Aluminum
CSA W47.1:09	Certification of Companies for Fusion Welding of Steel
CSA W47.2-11	Certification of Companies for Fusion Welding of Aluminum
CSA W59	Welded Steel Construction (Metal-Arc Welding)

ASTM International

A48	Standard Specification for Gray Iron Castings
A53	Specification for Pipe, Steel, Black and Hot Dipped, Zinc-Coated Welded and Seamless
B241/B241M	Aluminum and Aluminum Alloy Seamless Pipe.
B85	Standard Specifications for Aluminum - Alloy Die Coatings

American National Standards Institute

ANSI B18.2.1	Square and Hex Bolts and Screws, Inch Series
ANSI B18.2.2	Square and Hex Nuts

Institute of Transportation Engineers

ST-017B	Equipment and Material Standards of the Institute of Transportation Engineers

TTS 808.200.03 DEFINITIONS – Not Used

TTS 808.200.04 DESIGN AND SUBMISSION REQUIREMENTS

TTS 808.200.04.01 Design – Signal Heads

Signal heads shall be designed to be attached to the traffic signal hanger assemblies using cushion hangers, adjustable mid-section hangers, or dual-end hangers with standard 38 mm internal pipe size gusseted pipe and fittings. Structural design of aluminum shall be according to CAN/CSA S157.

TTS 808.200.04.02 Design – Aluminum Components

Structural design shall be according to the requirements of CAN/CSA S157.

TTS 808.200.04.03 Submission Requirements

Shop drawings and specification sheets for the traffic signal arms, hangers, fittings and associated hardware shall be submitted to the Contract Administrator for review and acceptance in advance of the commencement of fabrication or procurement of the equipment. Manufacturer part numbers and description of all equipment being supplied shall be included.

Shop drawings submissions shall be submitted in Portable Document Format (PDF) format via e-mail or through downloadable link.

If alterations are required as indicated by the Contract Administrator, the Supplier shall resubmit corrected shop drawings within 5 Working Days.

Production of material shall not commence until the acceptance has been received from the Contract Administrator.

Once fabrication of the equipment has commenced, materials and dimensions shown on the final shop drawings shall not be changed without approval of the Contract Administrator. Resubmission of revised shop drawings showing any changes from the final shop drawings will be required.

TTS 808.200.05 MATERIALS

TTS 808.200.05.01 Structural Steel

Structural steel shall be according to the requirements of CAN/CSA G40.21M, minimum yield strength 300 MPa.

TTS 808.200.05.02 Steel Hardware

Galvanized steel or steel bolts shall be according to the requirements of ANSI B18.2.1 and B18.2.2, minimum yield strength 400 MPa.

TTS 808.200.05.03 Cast Alloy Materials

Fittings cast from non-ferrous alloys shall conform with the requirements of ASTM B85 and shall be of strength compatible with other components and the design requirements. Fittings cast from ferrous alloys shall meet the requirements of ASTM A48, Class 300.

TTS 808.200.05.04 Aluminum Pipe

Aluminum pipe shall be according to the requirements of ASTM B241/B241M alloy and strength requirements compatible with other components and the design requirements.

TTS 808.200.05.05 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 manufacturer’s part number.

TTS 808.200.06 EQUIPMENT – Not Used

TTS 808.200.07 PRODUCTION

TTS 808.200.07.01 Galvanizing

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

TTS 808.200.07.02 Welding

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

TTS 808.200.07.03 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 centre of the pole plate to the centre of the tenon shall be as given in Table 1.

Table 1: Aluminum single member arm dimensions

Arm length (m)	Angle (degree)	Arm rise (m)	Wall thickness (mm)	Arm diameter (mm)
1.2	25	0.53	3.2	101.5
1.8	25	0.61	3.2	101.5
2.4	15	0.84	3.2	101.5
3.0	15	0.64	3.2	127.0
3.6	15	0.84	3.2	127.0
4.6	10	1.07	4.8	127.0
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

TTS 808.200.07.04 Double Arm Brackets

Double arm brackets shall be fabricated from 38 mm IPS schedule 40, aluminum pipe to the length specified in the Contract Documents. Arm length shall be 300 mm or 600 mm.

Each bracket shall consist of a cast aluminum 90° flanged street elbow, pole plate, and hexagonal or octagonal locknut and a neoprene washer.

The cast pole plate shall be provided with four 16 mm diameter bolt holes for mounting on wooden poles and with lipped edges, top and bottom, suitable for use with 16 mm wide stainless steel strapping.

TTS 808.200.07.05 Pole Plate Clamp Assembly

The pole plate assembly shall be fabricated from structural steel complete with flat steel pole straps with four hex head bolts, nuts, lock washers 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:

- 102 mm to 151 mm
- 152 mm to 203 mm
- 203 mm to 254 mm

Pole plate assemblies shall be as given in Table 2.

Table 2: Pole plate assemblies

Arm (outside diameter)	101.5 mm	127 mm	152.5 mm
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. Bolt sizes		4 19 x 127 or 19 x 176	

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

- 204 mm to 254 mm
- 255 mm to 356 mm
- flat surface

TTS 808.200.07.06 Traffic Signal Hangers 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.

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 traffic signal hangers shall be slip-fitted onto the tenon of the mast arm, adjusted to vertical and secured in position. The lower compression nut on the signal hanger shall be turned down against the spread cotter pin. The upper compression nut and conduit locknut shall be securely tightened.

Upon completion of signal head adjustments, the slip-fitter set screws shall be tightened to bite into the mast arm tenon.

TTS 808.200.07.07 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 the Contract Administrator three Working Days in advance of the shipping date of its intent to deliver. Delivery shall take place during the normal business hours at the site.

TTS 808.200.08 QUALITY ASSURANCE

TTS 808.200.08.01 Warranty

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

TTS 808.200.09 OWNER PURCHASE OF MATERIAL

TTS 808.200.09.01 Measurement and Payment

For payment purposes, a count shall be made of the number of single member mast arms complete with brackets, pole plates and clamps, and traffic head hanger assemblies, delivered and accepted.

Payment at the price specified in the purchasing order shall be for the supply of traffic signal arms delivered to the destination on the date and time specified.