

TCS 001-2-2005



SPECIFICATION

FOR

**TRAFFIC SIGNAL MAST ARMS, JOINT USE
MAST ARMS, JOINT USE POLES & RIGID
STREET LIGHTING POLES**

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PREFACE

A. GENERAL

This specification has been developed by VicRoads. It is one of a number of technical specifications, and associated standard drawings, which set out the requirements for roadside ITS devices, traffic signal equipment and other electrical equipment and associated devices and control systems.

This specification, and associated standard drawings, is intended for use in all relevant works undertaken by or on behalf of VicRoads.

B. APPROVED PRODUCTS

Unless otherwise specified, all equipment covered by this specification shall hold current VicRoads 'Type Approval' certification. To obtain VicRoads 'Type Approval' the manufacturer/supplier must submit a written request, together with a sample product, to VicRoads for evaluation. Such requests shall include all relevant documentation demonstrating compliance with this specification

Type Approval issued in accordance with this specification does not constitute automatic approval against future versions of this specification. Where it is considered necessary, VicRoads may withdraw current Type Approval and request that the affected product be re-submitted for evaluation against future versions of this specification.

All equipment covered by this specification shall be manufactured by an approved manufacturer under a VicRoads approved Quality Assurance System and shall be subject to all requirements of audit therein.

Specification updates. VicRoads specifications and associated standard drawings are subject to periodic review. To keep the specifications up to date, amendments or new editions are issued as necessary. It is therefore important for users of VicRoads specifications to ensure that they have the latest version and associated amendments.

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SECTION 1 – SCOPE AND GENERAL

1.1 SCOPE

This specification covers the requirements for the design, manufacture and testing of large traffic signal poles for use on VicRoads projects including:

- Traffic signal mast arms;
- Joint use mast arms; and
- Joint use poles.

Rigid street lighting poles and poles used for flashing pedestrian crossing installations shall also be deemed to be covered by the relevant clauses of this specification.

1.2 POLE DESCRIPTION AND USE

- **Mast Arm (MA)** – is used to place traffic signal lanterns above the roadway for maximum visibility. Mast arm poles have no street lighting function.
- **Joint Use Mast Arm (JUMA)** – is used to place traffic signal lanterns above the roadway for maximum visibility. Joint use mast arm poles also include a street lighting function.
- **Joint Use Pole (JUP)** – is used for standard traffic signal lantern installation and also include a street lighting function.
- **Rigid Street Light Pole (RSLP)** – is used for street lighting and has no traffic signal function.
- **Flashing Pedestrian Crossing Pole** – is used to place the diagonal flashing yellow lanterns on at ‘zebra’ type pedestrian crossings. Flashing pedestrian Crossing Poles also have a street lighting function. The outreach of these poles is used to place a street lighting luminaire above the crossing.

The general arrangement and nominal dimensions for poles covered by this specification are shown in VicRoads Standard Drawing TC-1105 (and TC-1104 for Flashing Pedestrian Crossing poles).

1.3 DESIGN AND FABRICATION STANDARDS

The design and fabrication of all components for poles covered by this specification shall conform with the following Australian Standards:

| | |
|---------------|--|
| AS 1110.1 | ISO metric hexagon bolts and screws – Product grades A and B – Bolts |
| AS 1110.2 | ISO metric hexagon bolts and screws – Product grades A and B – Screws |
| AS 1111.1 | ISO metric hexagon bolts and screws – Product grade C – Bolts |
| AS 1111.2 | ISO metric hexagon bolts and screws – Product grade C – Screws |
| AS 1112 | ISO metric hexagon nuts (Parts 1-4) |
| AS 1163 | Structural steel hollow sections |
| AS 1237.1 | Plain washers for metric bolts, screws and nuts for general purposes – General plan |
| AS 1237.2 | Plain washers for metric bolts, screws and nuts for general purposes – Tolerances |
| AS 1275 | Metric screw threads for fasteners |
| AS/NZS 1554.1 | Structural steel welding - Welding of steel structures |
| AS/NZS 1554.5 | Structural steel welding - Welding of steel structures subject to high levels of fatigue loading |
| AS/NZS 1594 | Hot-rolled steel flat products |
| AS 2979 | Traffic signal mast arms |
| AS/NZS 3678 | Structural steel - Hot-rolled plates, floor-plates and slabs |
| AS/NZS 3679.1 | Structural steel - Hot-rolled bars and sections |
| AS/NZS 4680 | Hot-dip galvanized (zinc) coatings on fabricated ferrous articles |
| AS 5100.1 | Bridge Design, Part 1: Scope and general principals |
| AS 5100.2 | Bridge Design, Part 2: Design loads |

1.4 RELATED VICROADS SPECIFICATIONS

The following related VicRoads Specifications are defined:

| | |
|---------|--|
| TCS 012 | Luminaires for 150W, 250W and 400W HPS Lamps |
| TCS 050 | Supply of Street Lighting Brackets |

1.5 POLE COMPONENTS AND DIMENSIONS

The overall design and dimensions of all components and the matching parts of all components shall be designed in accordance with the following VicRoads standard drawings:

| | |
|---------|--|
| TC 1068 | RSLP Base Section |
| TC 1104 | Typical Layout – Flashing Pedestrian Crossing |
| TC 1105 | Components for Standard Traffic Signal and Street Lighting Poles |
| TC 1106 | Traffic Signal MA and JUMA - Overhead Lantern Mounting Assembly |
| TC 1107 | MA, JUMA, JUP and RSLP - Baseplate Detail |
| TC 1108 | Weather Cap |
| TC 1109 | Traffic Signal MA and JUMA - Mast Arm Outreach Clamping Detail |
| TC 1110 | Traffic Signal MA, JUMA, and JUP - Column Conduit Entry Detail |
| TC 1111 | JUMA, JUP, and RSLP Street Light Extensions – Spigot Detail and Spigot Cap |
| TC 1112 | Typical 5.5m Mast Arm installation (2.5m Outreach) |
| TC 1113 | MA, JUMA and JUP – Lantern Support Detail |
| TC 1118 | Door Opening and Cable Termination Block Mounting Details |
| TC 1120 | JUP Base Section |
| TC 1121 | JUMA Base Section |
| TC 1122 | MA Base Section |
| TC 1123 | JUMA, JUP, and RSLP Street Light Extension Sections |
| TC 1124 | MA and JUMA Outreach Sections |
| TC 1128 | Terminal Assembly for use with MA, JUP and JUMA |

1.6 RELATED VICROADS STANDARD DRAWINGS

The following related VicRoads Standard Drawings are defined:

| | |
|---------|--|
| TC 1060 | Street Lighting Bracket – Single and Double – Type 1 |
| TC 1061 | Street Lighting Bracket – Single and Double – Type 2 |

VicRoads Standard Drawings are available for downloading from the VicRoads website.

SECTION 2 – DESIGN REQUIREMENTS

2.1 STRUCTURAL DESIGN

The structural design shall be in accordance with the following:

- Mast arms, joint use mast arms and joint use poles shall be designed to comply with the strength and serviceability 'limit state' requirements of AS 2979.
- Design of all rigid street lighting poles shall be in accordance with the requirements of the AS 5100.
- Where dimensions or details shown in AS 2979 differ from the VicRoads standards, VicRoads standards shall apply.
- JUMA's, JUP's, and RSLP's shall be designed to carry a luminaire mass of 20kg and a projected area of 0.25m². Calculations shall be based on the worst case of a VicRoads single or double outreach street lighting bracket up to 5m outreach in any configuration, or a Victorian Electricity Supply Industry (VESI) (ex SECV) curved style single or double outreach public lighting bracket up to 4.5m outreach in any configuration.

Copies of VESI style public lighting bracket drawings VX15/153/2, 3, 10, 14 & 19 (or equivalent distribution company drawings) which show VESI bracket details are available from the relevant distribution company.

2.2 PROOF ENGINEERING

Design of all poles covered by this specification, shall be proof engineered by a VicRoads pre-registered, independent, engineering consultant and proof engineering certification submitted to VicRoads.

SECTION 3 – MANUFACTURING REQUIREMENTS

3.1 FABRICATION

Poles shall be manufactured from steel and shall comply with the following requirements.

3.1.1 Steel

Steel shall comply with the requirements of:

- AS/NZS 3679.1: - Structural steel - Hot-rolled bars and sections;
- AS/NZS 3678: - Structural steel - Hot-rolled plates, floor-plates and slabs;
- AS/NZS 1594 - Hot rolled steel flat products; and
- AS1163: - Structural steel hollow sections.

3.1.2 Welded Joints

Welded steel joints shall comply with the requirements of:

- AS/NZS 1554.1 - Structural steel welding - Welding of steel structures;
or
- AS/NZS 1554.5 - Structural steel welding - Welding of steel structures subject to high levels of fatigue loading, where appropriate.

3.1.3 Seal Welds

Seal welds shall comply with the requirements of:

- AS/NZS 1554.1 - Structural steel welding - Welding of steel structures;
or
- AS/NZS 1554.5 - Structural steel welding - Welding of steel structures subject to high levels of fatigue loading, where appropriate, and shall be continuous.

3.1.4 Exposed Corners

All exposed corners shall be machined or ground to a radius of 3mm minimum.

3.1.5 Bolts, Nuts and Washers

All steel bolts, nuts and washers shall comply with the following Australian Standards:

- AS1110 - ISO metric precision hexagon bolts and screws;
- AS1111 - ISO metric hexagon commercial bolts and screws;
- AS1112 - ISO metric hexagon nuts including thin nuts, slotted nuts and castle nuts;
- AS1237 - Flat metal washers for general engineering purposes(metric series); and
- AS1275 - Metric screw threads for fasteners.

Nuts, bolts and threaded holes shall be re-run after galvanising.

3.2 PROTECTIVE COATING SYSTEM

After fabrication, all steel components shall be hot dip galvanised in accordance with AS/NZS 4680 - Hot-dipped galvanised (zinc) coatings on fabricated ferrous articles.

Thickness shall be measured by a thickness meter in accordance with AS/NZS 4680.

3.3 ACCESS DOORS

After galvanising the street lighting access door and the traffic signal terminal panel access door (see TC-1118), as appropriate, shall be re-fitted to ensure ease of operation and ease of attachment of the door(s) to the pole. Where a door is difficult to attach to the pole the pole may be rejected.

3.4 TERMINAL STRIPS

Terminal strips are to be supplied fitted in the pole. Terminal strips shall be in accordance with VicRoads Standard Drawing TC-1128 Terminal Assembly.

3.5 WEATHER CAP

Joint use poles and joint use mast arms shall be supplied complete with a durable weather cap to cover the spigot (in accordance with TC-1111), pending installation of the lighting outreach assembly.

3.6 MARKINGS

Each completed pole component shall be legibly and durably marked on the exterior surface near the base/end with the following information:

- a. the name, trade name or trademark of the manufacturer or responsible supplier;
- b. VicRoads catalogue number or marking in accordance with VicRoads standard drawings which shall distinguish the particular item from other similar items supplied and/or manufactured by the supplier; and
- c. batch or serial number or other mark which will clearly identify the date of manufacture of the item.

3.7 ALTERNATIVE DESIGNS

Notwithstanding anything contained in this section related to fabrication in steel or protective coating, the supplier may submit designs fabricated or coated with alternative materials subject to VicRoads being provided with documentary evidence that the item will perform in an acceptable manner.

APPENDIX A

REQUIREMENTS FOR TYPE APPROVAL

A1 GENERAL

Mast Arms, Joint Use Mast Arms, Joint Use poles and Rigid Street Lighting poles shall be subject to VicRoads formal Type Approval process.

To enable assessment for the purpose of granting Type Approval, the manufacturer/supplier is to submit a formal, written request for Type Approval, for each pole type submitted, accompanied by the following:

- a. Documentation demonstrating that the pole complies with each relevant clause of this specification;
- b. Fully detailed workshop drawings of the components including cross-sections and dimensions, material details, weld details and protective coating details;
- c. Proof engineering certification, from a VicRoads approved consultant, demonstrating that the product is structurally adequate for the required purpose and conforms to this specification;
- d. Documentation to demonstrate that the pole has been manufactured under a quality assurance system.

A2 PROTECTIVE COATING

The manufacturer/supplier shall submit full details of each coat of the protective coating systems (refer Clause 3.2) including the following:

- protective coating manufacturer and coating identification code;
- technical data sheet including details of the materials in the coating system;
- details of the surface preparation and application;
- guaranteed minimum dry film thickness; and
- name and address of any coating application sub-contractor.

A3 OTHER REQUIRED INFORMATION

VicRoads may require additional information or testing to be carried out as part of its evaluation of the product.