

PART R50
SUPPLY OF LIGHTING COMPONENTS

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1. GENERAL

- .1 This Part specifies the requirements for the supply of poles and associated components used for the support of lighting and/or signalling equipment. It includes slip base poles, impact absorbing poles and combination road lighting poles/mast arms.
- .2 Unless specified otherwise on the drawings, the definitions in AS 1798, AS 2979, AS 4676 and AS 4677 apply to this Part.
- .3 Documents referenced in this Part are listed below:
 - (a) AS 1111 ISO Metric Hexagon Commercial Bolts and Screws
 - (b) AS 1112 ISO Metric Hexagon Nuts
 - (c) AS 1158 Public Lighting Code
 - (d) AS 1214 Hot-Dip Galvanised Coatings on Threaded Fasteners
 - (e) AS 1252 High-Strength Steel Bolts with Associated Nuts and Washers
 - (f) AS 1554 Structural Steel Welding
 - (g) AS 1594 Hot Rolled Steel Flat Products
 - (h) AS 1627 Metal Finishing – Preparation and Pre-Treatment of Surfaces
 - (i) AS 1798 Lighting Poles and Bracket Arms- Preferred Dimensions
 - (j) AS 2979 Traffic Signal Mast Arms
 - (k) AS 3678 Structural Steel- Hot Rolled Plates, Floor Plates and Slabs
 - (l) AS 3679 Hot Rolled Steel Sections
 - (m) AS 3845 Road Safety Barrier Systems and Devices
 - (n) AS 4100 Steel Structures
 - (o) AS 4600 Cold Formed Steel Structures
 - (p) AS 4676 Structural Design Requirements for Utility Service Poles
 - (q) AS 4677 Steel Utility Service Poles
 - (r) AS 4680 Hot Dip Galvanized (Zinc) Coatings on Fabricated Ferrous Articles
 - (s) AASHTO Manual for Assessing Safety Hardware (MASH)
- .4 The following DPTI Drawings:

Drawing		Amendment No.
<u>Drawing No. S-4055:</u>		
sheet 30	Pile Footing and Anchor Details for Impact Absorbing Poles	6
sheet 39	Slip Base Road Lighting Pole: Pole Base and Footing.	2

DPTI standard drawings are available from the following web site: <http://www.dpti.sa.gov.au/standards>.

2. MATERIALS

- .1 Materials used in the structural components of light poles shall comply with AS 4677.
- .2 Steel used in mounting plates / base plates shall comply with the requirements of AS 3678, Grade 250 or Grade 350.
- .3 The columns and outreach arms shall be fabricated from steel coil conforming to AS 1594, Grade HA300.
- .4 Notwithstanding the above, silicon plus phosphorous content shall not exceed 0.03% by weight

3. DESIGN AND TESTING OF LIGHTING POLES AND MAST ARMS

General

- .1 The poles shall be designed to comply with the following:
 - (a) the requirements of AS 4676 for strength and serviceability;
 - (b) loading from luminaires of 10 kg mass and a projected wind area of 0.2 square metres;
 - (c) under serviceability limit state, the deflection of the pole from vertical position shall not exceed 4% of vertical section height and the deflection of the outreach shall not exceed 4% of the nominal horizontal outreach length; and
 - (d) the light pole shall not vibrate excessively under limit state wind loading.
- .2 The Contractor shall provide shop drawings including welding details for every type of light pole and drawings detailing a suitable pile footing and the high strength anchor bolts. Where the Contractor has not previously provided a copy of the design calculations to the Principal, the Contractor shall supply a copy of the calculations at least 45 days prior to delivery.
- .3 The poles and associated components shall be manufactured under a quality system certified to AS 9001.
- .4 Submission of the evidence of compliance with AS 4676 and this clause, including calculations (where not previously provided) shall constitute a **HOLD POINT**.

Frangible Poles

- .5 For frangible poles, the Contractor shall provide evidence of compliance with requirements of AS 1158, AS3845.2 and Attachment R50A with regard to impact testing for frangibility and safety performance.
- .6 Submission of the evidence of compliance with AS 1158, AS3845.2 and Attachment R50A, including crash test documentation and calculations (where not previously provided) shall constitute a **HOLD POINT**.

4. GENERAL REQUIREMENTS

General

- .1 Unless specified otherwise by the Principal, all lighting components shall be manufactured to comply with AS1798:2014. Supplying of the pole design drawings with all associated equipment (door, panel mounting straps, brackets, bolts and washers) shall contribute to a **HOLD POINT**.
- .2 The columns shall be supplied assembled as one section.
- .3 Outreaches and columns shall be separate units. The columns and outreaches shall be such that for a specific pole type, any outreach can be assembled onto any column to form a pole.
- .4 Traffic signal outreaches for combination mast arms shall be separate from the column and shall be such that they can be assembled onto any combination mast arm of the same type.
- .5 The taper on an outreach shall be uniform from the tip to the lower extremity of the outreach. The taper of the outreach shall be similar to that of the vertical portion of the column, so that the transition from the vertical to the curved outreach is smooth, continuous and imperceptible.

Dimensions

- .6 The outside diameter of the tip of an outreach at the junction with the spigot shall be approximately 50 to 75 mm. The straight end section of an outreach shall be a tangent to the radius and inclined above the horizontal as shown on the Drawings.
- .7 Typical DPTI used pole dimensions

Type of Lighting Pole	Nominal Mounting Height	Vertical Section Height	Road Lighting Outreach Arm Projection	Mast Arm Outreach
Slip Base Road Lighting Pole	10.5m	8.5m	2m, 3m or 4.5m	n/a
	12m	10m		
Impact Absorbing Standard & Combination Traffic Signal/Road Lighting Pole	10.5m	8.5m	2m, 3m or 4.5m	n/a
	12m	10m	2m, 3m or 4.5m	
Combination Traffic Signal/Road Lighting Pole with Mast Arm	10.5m	8.5m	2m, 3m or 4.5m 2m, 3m or 4.5m	3.5m or 5.5m

Spigot

- .8 The luminaire fixing spigot shall be straight, unthreaded Grade C250 CHS with a minimum clear aperture of 32 mm nominal bore and shall project 125 mm from the tip of the outreach in line with the axis of the outreach.
- .9 Spigot upcast angle (Loaded at 10kg): 0.0°

Service Access Opening and Junction Box Opening

- .10 An opening shall be provided for access to control gear with dimension: 130mm (width) x 400mm (height); Bottom of door opening to underside of base plate shall be 300mm
- .11 The opening shall have suitable lift out cover (door). The cover shall be made weatherproof and shall fit flush with the face of the column. A built-in locking device shall be incorporated, using an M8 dome-head bolt with Allen key fitting. All opening covers shall be interchangeable for poles of the same type.
- .12 Two 120mm in length mounting straps for the isolation panel mounting shall be provided inside the column opposite the service access opening on the rear wall. Strap positions to be determined to mount approved isolation panel mounting tray.
- .13 For combination pole with mast arm, access door opening shall be opposite to Traffic Signal Outreach
- .14 A junction box opening shall be provided for Combination Traffic Signal/Road Lighting Pole and Combination Traffic Signal/Road Lighting Mast Arm with the following typical dimension and position:

Mounting Plate dimension	75mm (width) x 200mm (height)
Cut-out dimension	32mm (width) x 75mm (height)
Center of the opening to underside of base plate	3.5m

Traffic Signal Bracket Mounting Height (for Combination Traffic Signal/Road Lighting Pole)

- .15 The following traffic signal bracket mounting positions shall be provided for Combination Traffic Signal/Road Lighting Pole

Bracket Position	Dimension from underside of Base Plate to Top of Traffic Signal Bracket
1	2300
2	2877
3	3157
4	4014
5	4254

Wall Thickness

- .16 The road lighting columns and the outreaches shall have a minimum wall thickness of 3 mm

Identification Plate

- .17 All lighting columns shall be permanently and legibly marked with an identification plate securely fixed to the column in accordance with AS 4677. The plate shall include manufacture date, model type and manufacturer

5. MANUFACTURE

General

- .1 Unless specified otherwise, poles shall be manufactured in accordance with AS 2979 and AS 4677.
- .2 Bends shall be free of kinks and ripples in excess of 2 mm in amplitude. The maximum deviation from the true shape at any point on the curve shall be checked by means of an internal template, which allows for the diametrical taper of the outreach. When placed against the inside of the outreach any gaps between the outreach and the template shall not exceed 1 % of the radius and the rate of gap increase shall not exceed 1 in 50.
- .3 The manufacture of poles and outreaches shall be such that after assembly and standing, the vertical axis is straight and within 0.4 degrees perpendicular to the top mounting plate and the outreach is set in the plane of the vertical axis. For Combination Mast Arms, the traffic signal mounting pipe shall be vertical under fully loaded condition.
- .4 Components shall be manufactured within the following tolerance:

Mounting plates/base plates:	2.0 mm
Slotted holes for base plate anchor bolts:	1.0 mm.

One side of the square base plate shall be at right angles to the outreach.

Welding

- .5 All welding shall comply with AS 4677. All welds shall be Category SP and prequalified in accordance with AS 1554.1. Where intermittent fillet welds are used for attachment of reinforcement at door openings, gaps between welds shall not exceed 35 mm in length.
- .6 The column to base plate, inner seal weld shall be flush with the lower face of the base plate. Any deformation caused during fit-up shall be repaired.

6. PROTECTIVE TREATMENT

Cleaning

- .1 Prior to galvanising, all sharp edges and burrs resulting from cutting and drilling shall be removed. The columns, outreaches and footing units shall be chemically cleaned and fluxed so that the surface of the steel is completely free from rust and mill scale and is suitable for hot-dip galvanising.

Hot-Dip Galvanising

- .2 Columns, outreaches, mounting plates and footing units shall be hot-dip galvanised after fabrication in accordance with AS 4680. Threads of bolts and nuts shall be cleaned by centrifuging, brushing or similar process after galvanising in accordance with AS 1214. The M8 dome-head bolt for aperture cover shall be either cadmium or zinc plated.
- .3 Galvanised Components shall have a bright zinc appearance and not show evidence of “white rust”.

Repair of Galvanised Components

- .4 Areas of galvanised components damaged during transport, handling or storage or left bare by cutting or welding subsequent to galvanising shall be cleaned of any weld slag, heavy wire brushed and painted with two coats of an organic zinc rich paint, as approved under APAS 29/16, which shall be applied before rusting occurs.
- .5 Damage to components galvanised after fabrication has been completed shall only be repaired by methods permitted by AS 4680, Appendix E Renovation of Damaged or Uncoated Areas.

7. TRANSPORTATION AND STORAGE OF GALVANISED COMPONENTS

- .1 Components shall be stored in accordance with the recommendations of AS 4680, Appendix F.

8. HOLD POINTS

.1 The following is a summary of Hold Points referenced in this Part:

CLAUSE REF.	HOLD POINT	RESPONSE TIME
3.4	Evidence of compliance with AS 4676 and AS 1158 and submission of design calculations (where not provided beforehand).	36 working days
3.6	Frangible poles: Evidence of compliance with Attachment R50A "Frangible Crash Test Requirements" and AS 1158 and AS3845.2.	As specified in the contract
4.1	Pole design drawings with all associated equipment (door, panel mounting straps, brackets, bolts and washers)	36 working days

9. ATTACHMENT R50A FRANGIBLE POLE CRASH TEST REQUIREMENTS

- .1 Crash testing shall be based on AS3845.2 and AASHTO Manual for Assessing Safety Hardware (MASH).
- .2 Test pole configuration and installation shall be representative of in-service pole installations and be verified by a DPTI representative.
- .3 Test shall be conducted in Australia

CRASH TESTS

- .4 There are two types of frangible poles, slip-base and energy-absorbing. The crash tests required for each pole type are:

Slip-base

No requirement for crash tests. However the Contractor shall provide evidence of compliance with DPTI Drawing S-4055 Sheet 39 - Slip Base Road Lighting Pole: Pole Base and Footing.

Energy-absorbing

Test One: A vehicle with a mass of 1100kg at 50 km/h (MASH 1-40 as per AS3845.2 Table 9.2), and

Test Two: A vehicle with a mass ranging from 2000kg to 2270kg at 60 km/h, with the same evaluation criteria as per MASH 1-41 and AS3845.2.

TEST EVALUATION

- .5 Evaluation, based on the factors detailed in Table 5-1 of MASH, shall include the following:
 - (a) Test article should readily activate in a predictable manner
 - Slip-base: the pole should detach from the base, and the base should remain intact.
 - Energy-absorbing: The pole should yield by progressively deforming.
 - (b) Acceptable test article performance
 - Slip-base: The pole should not significantly retard the vehicle.
 - Energy-absorbing: The pole should capture the vehicle and remain in contact with it, as illustrated in AS 1158.1.2.
 - (c) Occupant Risk from detached elements or intrusions
 - No part of the pole /luminaire should penetrate the occupant compartment.
 - There should be limited deformation of the occupant compartment -refer MASH Section 5.3.
 - Pole elements that could present a hazard to other traffic or pedestrians (including luminaires, access doors and electrical components) should remain attached to the pole.
 - The impacted pole should not be an undue hazard to other traffic or pedestrians:
 - Slip-base: the pole should fall behind the vehicle
 - Energy-absorbing: the pole should remain attached to the footing.
 - (d) The vehicle should remain upright. Roll and pitch are not to exceed 75 degrees.
 - (e) The Occupant Impact Velocities should not exceed 12 m/s.
 - (f) The Occupant Ride Down Acceleration should not exceed 20 G.

TEST DOCUMENTATION

- .6 A report shall be prepared detailing the crash tests. It shall contain:
 - (a) a description of the tested pole installation, including drawings;
 - (b) details of the test conditions, including type and mass of vehicle;
 - (c) a description of the tests, including vehicle speed, pole and vehicle deformation and trajectory, supplemented with videos, sequential photographs and detail photographs including before and after pictures of the base mounting, door and door reinforcing, impact zone and the front of impacting vehicle.
 - (d) an assessment of the performance compared with the evaluation factors listed above; and
 - (e) a conclusion and recommendation about the acceptability of the pole.