PART R50 SUPPLY OF LIGHTING COMPONENTS

CONTENTS

1. GENERAL

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.

Unless specified otherwise on the drawings, the definitions in AS 1798, AS 2979, AS 4676 and AS 4677 apply to this Part.

Documents referenced in this Part are listed below:

AS 1111	ISO Metric Hexagon Commercial Bolts and Screws
AS 1112	ISO Metric Hexagon Nuts
AS 1158	Public Lighting Code
AS 1214	Hot-Dip Galvanised Coatings on Threaded Fasteners
AS 1252	High-Strength Steel Bolts with Associated Nuts and Washers
AS 1554	Structural Steel Welding
AS 1594	Hot Rolled Steel Flat Products
AS 1627	Metal Finishing – Preparation and Pre-Treatment of Surfaces
AS 1798	Lighting Poles and Bracket Arms- Preferred Dimensions
AS 2979	Traffic Signal Mast Arms
AS 3678	Structural Steel- Hot Rolled Plates, Floor Plates and Slabs
AS 3679	Hot Rolled Steel Sections
AS 4100	Steel Structures
AS 4600	Cold Formed Steel Structures
AS 4676	Structural Design Requirements for Utility Service Poles
AS 4677	Steel Utility Service Poles
AS 4680	Hot Dip Galvanized (Zinc) Coatings on Fabricated Ferrous Articles
AASHTO	Manual for Assessing Safety Hardware (MASH) (available from: http://safety.fhwa.dot.gov/roadway_dept/policy_guide/road_hardware/ctrmeasures/mash)

The following DPTI Drawings:

Drawing		Amendment No.
Drawing No. S-4055:		
sheet 30	Pile Footing and Anchor Details for Impact Absorbing Poles	5
sheet 38	Slip Base Road Lighting Pole: Column and Outreach	2
sheet 39	Slip Base Road Lighting Pole: Pole Base and Footing.	2
sheet 40	Impact Absorbing Road Lighting Pole (Base Pole Mounted): Standard and Combination Road Lighting Pole.	1
sheet 41	Combination Traffic Signals/Road Lighting Mast Arm.	0
sheet 42	Traffic Signal mast Arm.	1
sheet 48	Traffic Signals for Railway Crossings – Mast Arm.	0
sheet 49	Traffic signals for railway crossings – Combination TS/Road lighting Mast Arm	0

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

2. MATERIALS

Materials used in the structural components of light poles must comply with AS 4677.

Steel used in mounting plates / base plates must comply with the requirements of AS 3678, Grade 250 or Grade 350.

The columns and outreach arms must be fabricated from steel coil conforming to AS 1594, Grade HA300.

Notwithstanding the above, silicon plus phosphorous content must not exceed 0.03% by weight

3. DESIGN AND TESTING OF LIGHTING POLES AND MAST ARMS

3.1. General

The poles must be designed to comply with the following:

(a) the requirements of AS 4676 for strength and serviceability;

(b) loading from luminaires of 16 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 must not exceed 4% of vertical section height and the deflection of the outreach must not exceed 4% of the nominal horizontal outreach length; and

(d) the light pole must not vibrate excessively under limit state wind loading.

The Contractor must 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 must supply a copy of the calculations at least 45 days prior to delivery.

The poles and associated components must be manufactured under a quality system certified to AS 9001.

Submission of the evidence of compliance with AS 4676 and this clause, including calculations (where not previously provided) shall constitute a **HOLD POINT**.

3.2. Frangible Poles

For frangible poles, the Contractor must provide evidence of compliance with requirements of AS 1158 and Attachment A with regard to impact testing for frangibility and safety performance.

Submission of the evidence of compliance with AS 1158 and Attachment R50A, including calculations (where not previously provided) shall constitute a **HOLD POINT**.

4. GENERAL REQUIREMENTS

4.1. General

Unless specified otherwise in the **Contract Specific Requirements**, all lighting components must be manufactured to the shape and dimensions shown on the Drawings and must be provided with all associated equipment shown on the Drawings, such as panel mounting straps, doors, brackets and washers.

The columns must be supplied assembled as one section.

Outreaches and columns must be separate units. The columns and outreaches must be such that for a specific pole type, any outreach can be assembled onto any column to form a pole.

Traffic signal outreaches for combination mast arms must be separate from the column and must be such that they can be assembled onto any combination mast arm of the same type.

The taper on an outreach must be uniform from the tip to the lower extremity of the outreach. The taper of the outreach must 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.

4.2. Dimensions

The outside diameter of the tip of an outreach at the junction with the spigot must be approximately 50 to 75 mm. The straight end section of an outreach must be a tangent to the radius and inclined above the horizontal as shown on the Drawings.

Above the top of the base plate, the cross-section of the columns must be as follows (refer to drawings):

Slip base:	Circular
Impact absorbing:	Multi sided with a minimum of 8 sides (the use of circular cross-section columns is subject to prior approval)
Combination mast arm:	Circular or multi sided columns with a minimum of 8 sides
Mast arm:	Circular or multi sided columns with a minimum of 8 sides

4.3. Spigot

The luminaire fixing spigot must be straight, unthreaded Grade C250 CHS with a minimum clear aperture of 32 mm nominal bore and must project 125 mm from the tip of the outreach in line with the axis of the outreach. Refer to Drawing S4055 sheet 40.

4.4. Service Access Opening and Junction Box Opening

An opening must be provided for access to control gear positioned as shown on the Drawings.

The opening must have suitable lift out cover (door). The cover must be made weatherproof and must fit flush with the face of the column. A built-in locking device must be incorporated, using an M8 dome-head bolt with Allen key fitting. All opening covers must be interchangeable for poles of the same height and type.

A junction box opening must be provided for Combination TS/Road Lighting Pole and Combination TS/Road Lighting Mast Arm. The position, size of the opening and the details of the mounting plate are shown on the Drawings.

Two mounting straps for an accessory rack must be provided inside the column opposite the service access opening on the rear wall with 25 mm clearance between the strap centre and the wall.

4.5. Wall Thickness

The road lighting columns and the outreaches must have a minimum wall thickness of 3 mm, except where shown otherwise on the Drawings.

4.6. Identification Plate

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

5. MANUFACTURE

5.1. General

Unless specified otherwise, poles must be manufactured in accordance with AS 2979 and AS 4677.

Bends must 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 must 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 must not exceed 1 % of the radius and the rate of gap increase must not exceed 1 in 50.

The manufacture of poles and outreaches must 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 must be vertical under fully loaded condition.

Components must be manufactured within the following tolerance:

Mounting plates/base plates:	2 mm
Slotted holes for base plate anchor bolts:	1.0 mm.

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

5.2. Welding

All welding must comply with AS 4677. All welds must 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 must not exceed 35 mm in length.

The column to base plate, inner seal weld must be flush with the lower face of the base plate. Any deformation caused during fit-up must be repaired.

6. PROTECTIVE TREATMENT

6.1. Cleaning

Prior to galvanising, all sharp edges and burrs resulting from cutting and drilling must be removed. The columns, outreaches and footing units must 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.

6.2. Hot-Dip Galvanising

Columns, outreaches, mounting plates and footing units must be hot-dip galvanised after fabrication in accordance with AS 4680. Threads of bolts and nuts must be cleaned by centrifuging, brushing or similar process after galvanising in accordance with AS 1214. The M8 dome-head bolt for aperture cover must be either cadmium or zinc plated.

Galvanised Components must have a bright zinc appearance and not show evidence of “white rust”.

6.3. Repair of Galvanised Components

Areas of galvanised components damaged during transport, handling or storage or left bare by cutting or welding subsequent to galvanising must 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 must be applied before rusting occurs.

Damage to components galvanised after fabrication has been completed must only be repaired by methods permitted by AS 4680, Appendix E, "Renovation of Damaged or Uncoated Areas".

7. TRANSPORTATION AND STORAGE OF GALVANISED COMPONENTS

Components must be stored in accordance with the recommendations of AS 4680, Appendix F.

8. HOLD POINTS

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

CLAUSE REF.	HOLD POINT	RESPONSE TIME
3.1	Evidence of compliance with AS 4676 and AS 1158 and submission of design calculations (where not provided beforehand).	36 working days
3.2	Frangible poles: Evidence of compliance with Attachment A “Crash Test Requirements” and AS 1158.	7 working days

ATTACHMENT R50A

FRANGIBLE POLE CRASH TEST REQUIREMENTS

Crash testing must be based on AASHTO Manual for Assessing Safety Hardware (MASH). There are two types of frangible poles, slip-base and energy-absorbing.

CRASH TESTS

The crash tests required for each pole type are:

Slip-base 3 tests: (MASH 3-80, 81, 82) 1100 kg vehicle at 50 km/h and 100 km/h and 2270 kg vehicle at 100km/h

Energy-absorbing 2 tests: (MASH 1-40 and 2-45) 1100 kg vehicle at 50 km/h, and 1500 kg vehicle at 70 km/h. Optional tests are: (MASH 2-40 and 41) 1100 kg vehicle and 2270 kg vehicle at 70 km/h

TEST EVALUATION

Evaluation, based on the factors detailed in Table 5-1 of MASH, must 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

A report must be prepared detailing the crash tests. It must 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 and sequential photographs;

(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.

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