

# TRANSPORT FOR NSW (TfNSW)

## QA SPECIFICATION 3851

### STEEL TAPERED LIGHTING COLUMNS

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#### REVISION REGISTER

Ed/Rev Number	Clause Number	Description of Revision	Authorised By	Date
Ed 1		First Issued	GM, RNIC	11.02.02
Ed 2	2, 5.2, 6	Minor editorial changes	GM, RNIC	20.03.02
Ed 3/Rev 0	“Notice” Spec Ref No Foreword Global Annexure C	RTA PO Box and Fax numbers updated Revision No added. Foreword, incorporating copyright clause, added Text revised to direct imperative style. “shall” replaced by “must”. Reformatting and minor editing to clarify intent. Clauses rearranged and renumbered. Schedule of Identified Records added	GM, IC	29.07.09
Ed 3/Rev 1	9.4	Words “at least” added to wall thickness at base.	GM, IC	14.12.09
Ed 4/Rev 0	Global Guide Notes 1 5.1 5.2 5.3	Clauses rearranged and reworded to improve clarity. Notes on manufacture of lighting columns to other national standards added. Scope reworded. Statement on exclusions in scope moved here from clause 7. New sub-heading titled “Design” added. Clause reworded to clarify actions required of contractor for design of light column. Design loading requirements moved here from clauses 6.2. Requirement added to submit calculations for the column design for approval, or evidence of previous approval. Previously clause 8. Previously clause 9.	GM, IC	14.12.12

<b>Ed/Rev Number</b>	<b>Clause Number</b>	<b>Description of Revision</b>	<b>Authorised By</b>	<b>Date</b>
Ed 4/Rev 0 (cont'd)	5.3.1	Clause on positioning column to avoid obstruction to traffic relocated to spec R151.		
	5.3.3	4th paragraph reworded to omit implied installation requirements.		
	5.3.4	Requirement for steel to conform to AS 3678 and AS 3679 deleted.		
	5.4	Previously clause 10, parts (IIIa) and (IIIb). New sub-heading titled "Column Mounting Base" added.		
	5.5	Previously clause 10, re-titled "Ancillary Items".		
	5.5.2	Access cover screws to comply with spec B240.		
	6	Clause heading re-titled "Manufacture".		
	6.1	Other national standards permitted where deemed by the Principal to be equivalent. Requirement to use the lowest steel grade applicable but not less than 250 MPa.		
	6.2	Previously clause 6.3. (Previous clause 6.2 moved to clause 5.1.)		
	6.3	Previously clause 6.4. "or equivalent" added to statement on welding standard.		
	6.4	Previously clause 11. "or equivalent" added to statement on galvanizing standard.		
	6.5	New clause on certification added.		
	7	New clause titled "Transport, Storage and Assembly" incorporating previous clauses 12 and 13.		
	7.1	Previously clause 13. Clause on delivery moved here from previous clause 7.		
	7.2	Previously clause 12. Heading re-titled "Assembly on Site". Clause on assembly moved here from previous clause 7.		
	Annex C	Schedule of Identified Records updated.		
	Annex M	Reference documents updated.		
Ed 4/Rev 1	Global	References to "Roads and Maritime Services" or "RMS" changed to "Transport for NSW" or "TfNSW" respectively.	DCS	22.06.20

## **GUIDE NOTES**

(Not Part of Contract Document)

### **Manufacture of Lighting Columns to Alternative Standards**

Specification 3851 Edition 3 requires the Contractor to supply steel tapered lighting columns that are designed and manufactured to Australian Standards. Some suppliers are, however, sourcing their street lighting columns from overseas which are not been manufactured to Australian Standards.

In this Edition 4, Clause 6.1 now allows the manufacture of lighting columns to other national standards deemed by TfNSW to be equivalent to the specified Australian Standards.

To enable this, the Contractor must provide the required information at least six weeks prior to the manufacture of the lighting columns. The Project Manager should forward that information to Bridge and Structural Engineering Section for assessment of equivalence with the specified requirements.

Where such other national standards have previously been assessed and approved by TfNSW, further assessment will not be necessary provided that the Contractor produces evidence of this assessment. This Specification requires the Contractor to provide a certification that the columns have been manufactured in accordance with the assessed alternative standards.

The Designer must take note of the fact that various Australian Standards apply to the supply of steel (refer Clause 2.1 of AS/NZS 4677) depending on thickness and shape of steel products. This may lead to inconsistencies in the requirements of steel supply which should be addressed by the Designer.





# STEEL TAPERED LIGHTING COLUMNS

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VERSION FOR: DATE:
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## FOREWORD

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### REVISIONS TO PREVIOUS VERSION

This document has been revised from Specification TfNSW 3851 Edition 4 Revision 0.

All revisions to the previous version (other than minor editorial and project specific changes) are indicated by a vertical line in the margin as shown here, except when it is a new edition and the text has been extensively rewritten.

### PROJECT SPECIFIC CHANGES

Any project specific changes are indicated in the following manner:

- (a) Text which is additional to the base document and which is included in the Specification is shown in bold italics e.g. ***Additional Text***.
- (b) Text which has been deleted from the base document and which is not included in the Specification is shown struck out e.g. ~~Deleted Text~~.



# TfNSW QA SPECIFICATION 3851

## STEEL TAPERED LIGHTING COLUMNS

### 1 SCOPE

This Specification sets out the requirements for the design, manufacture and delivery of tapered lighting columns of both rigid and frangible (slip-base or impact absorbing) type complete with mild steel base plates, curved outreaches, and luminaire spigot for mounting along Freeways, Motorways, Controlled Access Roads, or at bridges and other structures.

The columns must be either circular or multi-sided (minimum of 8 sides) in cross section, and taper from the base to the tip of the curved outreach.

Supply of holding down bolts and associated nuts and washers, electrical wiring and equipment is outside the scope of this Specification.

### 2 STRUCTURE OF THE SPECIFICATION

This Specification includes a series of annexures that detail additional requirements.

#### 2.1 (NOT USED)

#### 2.2 SCHEDULE OF IDENTIFIED RECORDS

The records listed in Annexure 3851/C are **Identified Records** for the purposes of Specification TfNSW Q Annexure Q/E.

#### 2.3 (NOT USED)

#### 2.4 REFERENCED DOCUMENTS

Unless specified otherwise, the applicable issue of a referenced document, other than a TfNSW Specification, must be the issue current at the date one week before the closing date for tenders, or where no issue is current at that date, the most recent issue.

Standards, specifications and test methods are referred to in abbreviated form (e.g. AS 1234). For convenience, the full titles are given in Annexure 3851/M.

### 3 DEFINITIONS

For the purposes of this Specification, the definitions given in AS 1798, AS/NZS 4676 and AS/NZS 4677 apply.

The term “the Supplier” means the supplier of the product covered by the scope of this Specification.

## **4 SUPPLIER'S QUALITY MANAGEMENT SYSTEM**

The Supplier must establish and maintain a Quality Management System complying with AS/NZS ISO 9001 as a means of ensuring that the product conforms to this Specification.

Provide evidence verifying compliance with this Clause.

## **5 TYPE AND CONFIGURATION**

### **5.1 DESIGN**

Obtain from the Principal the following details, to be considered in the design of the lighting columns:

- (a) vehicle speed limits within the immediate area and approaches;
- (b) volume of traffic;
- (c) relative positions of the lighting columns relative to the traffic lanes;
- (d) nature of the roadway and relative locations to residential communities;
- (e) the nature and frequency of intersections (if applicable);
- (f) allowance for local wind conditions;
- (g) structure vibrations for bridge mounted lighting columns, where specified;
- (h) any other factors relevant to the site.

Design the lighting columns in accordance with AS 1170.2 and AS/NZS 4676.

Allow in the design for luminaries of approximately 16 kg weight with a projected windage area of 0.25 m<sup>2</sup>.

The Principal may test prototypes of lighting columns of varying outreach dimensions, representing each type of column specified.

Submit detailed calculations of the column design, including the aperture reinforcing (refer Clause 5.3.3), to the Principal for approval at least 14 days prior to manufacture of the columns. If these calculations have previously been submitted and approved by the Principal, provide evidence of this approval.

### **5.2 OUTREACH ARMS**

#### **5.2.1 Dimensions**

Outreach arms must be curved and in the following lengths: 2.0 m, 3.0 m and 4.5 m, as shown on the Drawings. The length of the outreach arm is the horizontal distance from the vertical centre-line of the column to the tip of the outreach, excluding the lamp mounting spigot.

The curved outreaches must be tapered, with a bend radius of 1.5 m, the radii being measured to the centre-line of the outreach.

The straight end section must be a tangent to the radius inclined at 5° above the horizontal.

The taper must be similar to that of the vertical portion of the column. It must be uniform from the tip to the lower extremity of the curve at its junction with the vertical portion of the column. The transition from the vertical to the curved outreach must be imperceptible. The diameter of the tip of the outreach must be approximately 50 mm to 75 mm.

### **5.2.2 Luminaire Mounting Spigot**

The luminaire mounting spigot must be straight, unthreaded pipe with a nominal outside diameter (OD) of 42 mm and must project 100 mm from the tip of the outreach at an angle of 5° above the horizontal. The projecting distance may be varied by the Principal prior to manufacture in order to meet the requirements of a particular luminaire type.

## **5.3 COLUMNS**

### **5.3.1 Height**

The height of the column from the underside of the base plate to the centre of the luminaire spigot must be 9.0 m, 10.5 m, 12.0 m, 13.5 m or 15.0 m, as shown on the Drawings.

In instances where columns exceeding 15.0 m are required, the columns must be of a see-saw (centre hinged) type to improve service access.

### **5.3.2 Identification Plate**

Permanently and legibly mark all lighting columns with an identification plate securely fixed to the column in accordance with AS/NZS 4677.

### **5.3.3 Service Aperture**

Provide a service aperture in the base portion of each column for access to control gear. The clear dimensions of the aperture must be in accordance with Table 3851.1.

**Table 3851.1 – Service Aperture Dimensions**

<b>Column Height (metres)</b>	<b>Aperture Height (mm)</b>	<b>Aperture Width (mm)</b>
<b>Single Outreach</b>		
9.0, 10.5	570	130
12.0, 13.5, 15.0	570	150
<b>Double Outreach</b>		
9.0, 10.5	670	130
12.0, 13.5, 15.0	670	150

Do not deviate from these sizes without the Principal's approval.

The lower end of the aperture must be 450 mm above the underside of the base plate. Subject to approval by the Principal, an alternative height to aperture opening may be used. Where such a height exceeds 450 mm, provide an additional aperture having a 100 mm x 100 mm clear opening at a height of 60 mm from the underside of the base plate to the lower side of the aperture.

Align the location of the aperture in the column such that it is “parallel” to one of the straight edges of the base plate.

Reinforce the service aperture. Submit detailed calculations of the aperture reinforcing in accordance with Clause 5.1. Provide suitable access covers (doors) as detailed hereafter.

### 5.3.4 Tube Thickness

The wall thickness of sheet steel type tapered vertical tube section and outreach must be at least 3 mm at the base and not less than 1.6 mm at the top.

## 5.4 COLUMN MOUNTING BASE

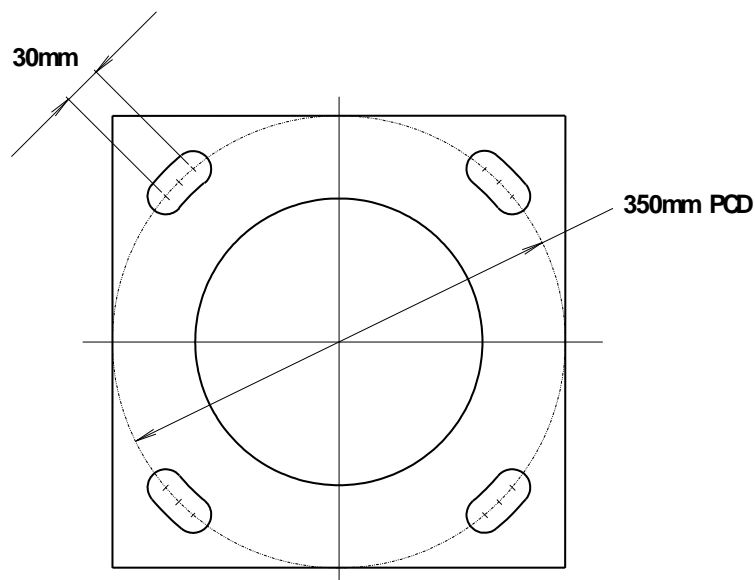
### 5.4.1 Column Mounting Base for Standard and Impact Absorbing Columns

The base plate and anchor bolt details must be in accordance with Table 3851.2.

**Table 3851.2 - Column Mounting Base**

Column height (metres)	Base Plate Thickness (mm)	Holding Down Bolt Size	Slotted Holes Size (mm)	
			Width	Tolerance
9.0, 10.5 and 12.0	25	M24	28	± 1
13.5 and 15.0	32	M30	35	± 1

Weld the mounting plate to the bottom of the straight section. The base plates must be square with four slotted holes on a 350 mm pitch circle diameter (PCD). Locate the slotted holes on the base plate as indicated in Figure 3851.1.



**Figure 3851.1 – Base Plate Holes**

The base plate must have a centre hole not less than 150 mm diameter for cable entry.

#### **5.4.2 Column Mounting Base for Slip-base Columns**

The mounting base for slip-base columns must comply with AS/NZS 4677 or approved equivalent. At least 14 days before commencing fabrication of the column, submit to the Principal copies of the test reports certifying compliance.

The base plate details must be in accordance with Table 3851.2.

Provide all components relating to the slip-base system including all mounting plates, connecting bolts, nuts and washers.

### **5.5 ANCILLARY ITEMS**

In addition to the luminaire mounting spigot (refer Clause 5.2.2), provide the following items with each column.

#### **5.5.1 Panel Mounting Straps**

Provide panel mounting straps within the service aperture. The straps must be of mild steel, with minimum dimension 25 mm x 3 mm x 120 mm length.

Mount the straps at 585 mm centres for single outreach, 685 mm centres for double outreach columns, and towards the rear of the column.

Provide a 10 mm diameter hole at the centre of the bottom strap.

#### **5.5.2 Access Cover (Door)**

Provide a lift-out cover over each access aperture.

The cover must be weatherproof and must fit flush or semi-flush with the face of the column. Semi-flush covers must not project more than 2 mm from the face of the column.

Fit the access covers with M8 grade 316 stainless steel hexagon socket head cap screws complying with Specification TfNSW B240 to prevent unauthorised access to electrical equipment by the general public.

## **6 MANUFACTURE**

### **6.1 MATERIALS**

Material and fabrication standards of lighting columns and their component structural parts must comply with AS/NZS 4677, or other national standards proposed by you and considered by the Principal to be equivalent.

Advise the Principal of such standards to enable assessment for approval by the Principal at least six weeks prior to the commencement of manufacture. If these standards have previously been assessed by the Principal, provide evidence of this assessment.

Use the lowest steel grade applicable under the relevant standard, but which must not be less than 250 MPa.

Where the minimum tensile strength does not apply to the steel performance requirement below a certain thickness, a structural engineer must review and assess the structural integrity of such materials before use.

The designer may nominate the material certification and product conformity requirements where these are not covered by the standard under which the steel is supplied.

## **6.2 STANDARD OF WORK**

The columns must present a smooth appearance overall with particular attention to the junction of the outreach and vertical sections.

Bends must be a true radius, smooth and free of kinks. Check the maximum deviation from the true shape at any point on the curve 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.

Above the top of the base plate, the columns must be circular or multi-sided in cross section throughout.

All tolerances in the fabrication and erection of lighting columns and their component structural parts must comply with AS/NZS 4677 or equivalent.

Slotted holes provided for the base plate mounting bolts must be true to plan with a tolerance of  $\pm 1$  mm. One side of the square base plate must be at right angles to the outreach.

Remove all burrs and blemishes from the edges of the materials used. Remove all sharp corners from exposed edges, holes and openings provided for cables and for access to electrical equipment.

## **6.3 WELDING**

All welds must be in accordance with AS/NZS 4677 or approved equivalent.

Welding must be deposited in runs of sound, clean metal, free from slag inclusions, porosity and undercutting, with good fusion with the parent material. Grind off excess material to give a smooth surface and neat finish, and remove all weld spatter.

## **6.4 SURFACE TREATMENT OF STEELWORK**

### **6.4.1 Pretreatment**

Prior to galvanizing, treat the surface of the steel so that it is completely free from rust and mill scale and is suitable for hot-dip galvanizing.

### **6.4.2 Hot-dip Galvanizing**

Hot-dip galvanize the lighting columns in accordance with AS/NZS 4680 or approved equivalent.

The zinc coating must have a minimum thickness of 45 microns, average coating thickness 55 microns and a bright finished surface free from white rust and stains.

Do not apply further coating to the external surface of the galvanized steel.

## **6.5 CERTIFICATION**

Provide certification that the columns have been manufactured in accordance with the approved design and the specified Australian Standards.

Where the columns are manufactured overseas to Australian or other national standards, provide certification by approved third party certifiers of conformity with these standards.

Submit details of such third party certifiers for approval by the Principal prior to their engagement.

Include with the certification the relevant test certificates demonstrating conformity.

## **7 TRANSPORT, STORAGE AND ASSEMBLY**

### **7.1 TRANSPORT AND STORAGE**

Transport and store the galvanized steel lighting columns in accordance with Appendix F of AS/NZS 4680 or approved equivalent.

Deliver the columns complete with aperture doors, panel mounting straps, and associated screws, studs, nuts and washers.

### **7.2 ASSEMBLY ON SITE**

Deliver the lighting columns to site with its outreach arms detached. Depending on the column length, the column shafts may be delivered as unassembled discrete components.

Provide a truck crane to assist in off-loading when delivering lighting columns to site in order to minimise damage to the columns.

If the columns are delivered unassembled, carry out the assembly work on site, and schedule the work to suit the Principal's construction program.

Submit details of the assembly procedure to the Principal for approval at least 14 days before the proposed date of delivery to Site.

Discontinue such site assembly during adverse weather conditions, which, in the Principal's opinion, would be detrimental to the completed column or at such other times as the Principal may direct.

**ANNEXURES 3851/A TO 3851/B – (NOT USED)****ANNEXURE 3851/C – SCHEDULE OF IDENTIFIED RECORDS**

Refer to Clause 2.2.

The records listed below are Identified Records for the purposes of TfNSW Q Annexure Q/E.

<b>Clause</b>	<b>Description of Identified Record</b>
5.1	Detailed calculations of column design, or evidence of the Principal's approval for column design.
6.5	Certification that the columns have been manufactured in accordance with approved design and specified Australian Standards (or approved alternative standards), and test certificates demonstrating conformity.
7.2	Procedure for on site assembly of lighting column

**ANNEXURES 3851/D TO 3851/L – (NOT USED)****ANNEXURE 3851/M – REFERENCED DOCUMENTS**

Refer to Clause 2.4.

**TfNSW Specifications**

TfNSW Q	Quality Management System
TfNSW B240	Steel Fasteners

**Australian Standards**

AS 1170.2	Minimum design loads on structures – wind loads
AS 1798	Lighting columns and bracket arms – preferred dimensions
AS/NZS 3678	Structural steel – Hot rolled plates, floorplates and slabs
AS/NZS 3679.1	Structural steel – Hot-rolled bars and sections
AS/NZS 4676	Structural design requirements for utility service poles
AS/NZS 4677	Steel utility service poles
AS/NZS 4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles
AS/NZS ISO 9001	Quality management systems – Requirements