

# TRANSPORT FOR NSW (TfNSW)

## QA SPECIFICATION 3412

### SUPPLY OF GUIDE POSTS (NON-TIMBER)

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#### REVISION REGISTER

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Ed 2/Rev 1	2.1 Annex A	Subclause on Details of Work added. Option for specifying type of guide post required added.	GM, CPS	26.11.13
Ed 2/Rev 2	Global	References to “Roads and Maritime Services” or “RMS” changed to “Transport for NSW” or “TfNSW” respectively.	DCS	22.06.20





# SUPPLY OF GUIDE POSTS (NON-TIMBER)

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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 3412 Edition 2 Revision 1.

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 3412

## SUPPLY OF GUIDE POSTS (NON-TIMBER)

### 1 SCOPE

This Specification sets out the requirements for non-timber guide posts. It covers rigid, semi-flexible and flexible (buried or driven) guide posts, which may be made from metal, plastic, rubber, compressed organic matter, composite materials, or a combination of these.

### 2 STRUCTURE OF THE SPECIFICATION

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

#### 2.1 PROJECT SPECIFIC REQUIREMENTS

Project specific requirements are shown in Annexure 3412/A.

#### 2.2 (NOT USED)

#### 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 3412/M.

### 3 DEFINITIONS

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

The following definitions apply to this Specification:

**Guide post:** Posts used to mark the edge of the road carriageway. They assist the road user by indicating the alignment of the road ahead, especially at horizontal and vertical curves, and under some circumstances, by providing a gauge with which to assess available sight distance.

**Flexible guide post:** A guide post which deflects when impacted by a vehicle and then returns to a vertical position, without maintenance intervention.

- Semi-flexible guide post:** A guide post which fails by bending when impacted by a vehicle, and can be straightened with maintenance intervention.
- Rigid guide post:** A guide post which either fractures or remains intact and straight, but not vertical, when impacted by a vehicle.
- Delineators:** The small retroreflectors or panels of retroreflective sheeting that are attached to guide posts to provide a coherent pattern of delineation of the edges of the carriageway as an aid to night driving.

## 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 PRODUCT CERTIFICATION

Provide a certificate of compliance, not more than 3 years old, verifying that the guide post conforms to the requirements of this Specification. The tests verifying conformity must be carried out not more than 3 years before the supply of the relevant guide posts and delineators.

New certification will be required every three years or whenever a change in product formulation or configuration is made.

## 6 PRODUCT REQUIREMENTS

### 6.1 COLOUR

The whole of the surface of each guide post above the ground level must be durable gloss or semi-gloss opaque white. The colour must be whiter than Y35 Off White of AS 2700S.

### 6.2 FINISH

The above ground section of the guide post must be free of sharp edges and burrs and discolouration or other defects that may affect its appearance and/or serviceability. The surface of the guide post must be easily cleaned of dirt, mould and the like, in a manner to be specified by the supplier. Any plastic must be non-fogging and anti-bleeding.

### 6.3 DIMENSION AND SHAPE

Comply with the following dimensional requirements:

#### (a) Width

The above the ground section of guide posts must have a width of 100 mm  $\pm$  5 mm.

**(b) Length**

Guide posts must be of such length to provide a height of 1000 mm above the ground surface and minimum anchoring depths recommended by the manufacturer, but must not be less than 500 mm for rigid guide posts and 350 mm for flexible and semi-flexible guide posts.

The tops of the guide posts must be flat but, depending on the method of installation recommended by the supplier, the bottom may be either rectangular or pointed over a length of approximately 80 mm.

The shape of the guide post must be such that delineators can be permanently and securely attached to the guide post.

**6.4 INSTALLATION, CLEANING, REMOVAL AND DISPOSAL INSTRUCTIONS**

Provide recommendations on the method of installation, anchoring depth, cleaning, removal and disposal of the guide posts.

**6.5 ANCHORAGE**

Design the guide posts to resist bending, twisting and displacement due to wind and/or impact forces. They must be effective in resistance to vertical removal by persons other than personnel using recommended removal tools.

**6.6 MATERIALS**

State the types of materials used in the manufacture of guide posts.

**6.7 MARKINGS**

To enable traceability of the guide post, each post must be legibly and indelibly marked with the following:

- (a) Name of the supplier;
- (b) Month and year of manufacture.

The lettering size must be between 5 mm and 10 mm high.

Place the markings on at least one side of the guide post and 500 mm from the top of the guide post.

Clearly mark guide posts 1000 mm from the top to show the ground level for installation.

**6.8 DELINEATORS**

Supply guide posts with either two retroreflector delineators (one red, one white) or with a single retroreflector delineator (red or white or yellow), as ordered.

Delineators must be either:

- (a) circular 85 mm diameter Type A (corner cube) retroreflectors with a minimum of 6 segments and complying with AS 1906.2; or

- (b) Class 1A retroreflective sheeting complying with AS 1906.1, with a minimum area of 10,000 mm<sup>2</sup>. It must be in circular, oval or rectangular configuration. Where a rectangular or oval configuration is used, it must have a minimum width of 50 mm.

Centrally locate delineators between the edges of the guide post. The top of each delineator must be between 50 mm and 100 mm from the top of the guide post.

Fix the delineators to the guide post so that they are weatherproof and vandal resistant and so that they can be replaced if necessary without damaging the guide post.

Do not use corner cube delineators that can be damaged by vehicular impact on flexible or semi-flexible guide posts.

## 6.9 END TREATMENT

Guide posts manufactured from thin walled hollow sections or sheet material of less than 10 mm thickness must each be fitted with a cap on the top of the guide post.

Each cap must cover the whole top of the guide post, have minimum dimensions 100 mm by 25 mm and be of the same colour and durability as the guide post. It must be rounded so that no sharp edges are present. Attach each cap so that it cannot be dislodged from the guide post by a force of 500N pulling on the cap in a direction away from the guide post.

Alternatively, the tops of guide posts manufactured from plastic must incorporate rounded edges and corners.

## 7 PHYSICAL PROPERTIES AND PERFORMANCE

### 7.1 DURABILITY

There must be no appreciable deterioration in physical properties of the guide post material after a minimum of 720 hours under accelerated weatherometer conditions.

### 7.2 HEAT RESISTANCE - FLEXIBLE GUIDE POSTS

Flexible guide posts must be sufficiently resistant to heat and a representative sample must pass the following test:

- (a) Condition the guide post at 60°C (plus or minus 2°C) for two hours in an oven;
- (b) Remove the guide post from the oven. Clamp the base so that the guide post is vertical with the top of the guide post protruding 1000 mm. Shape the jaws of the clamp to suit the profile of the guide post. Bend the conditioned guide post adjacent to the clamp in the direction of the adjacent traffic flow to form a 90° angle. Then subject the conditioned guide post to three cycles of bending through 180°, all within two minutes of its removal from the oven, so that it finishes bent in the form of a right angle. Release the guide post from the bent position immediately after three cycles of bending;
- (c) Record the horizontal deflection at the top of the guide post from a vertical line 30 seconds after release from the bent position. The deflection must not exceed 50 mm;

- (d) Record the condition of the guide post. The guide post must show no signs of fractures, cracks or splits.

### **7.3 COLD RESISTANCE - SEMI-FLEXIBLE AND FLEXIBLE GUIDE POSTS**

Semi-flexible and flexible guide posts must be sufficiently resistant to cold and a representative sample must pass the following test.

- (a) Condition the guide post at 0°C (plus or minus 2°C) for two hours in an ice bath.
- (b) Remove the guide post from the ice bath, clamp in a vertical position with the top of the guide post protruding 1000 mm. Shape the jaws of the clamp to suit the profile of the guide post. Bend the conditioned guide post adjacent to the clamp in the direction of the adjacent traffic flow to form a 90° angle within 30 seconds of its removal from the ice bath;
- (c) Manually straighten a semi-flexible guide post;
- (d) Release the guide post from the clamp 60 seconds after removing it from the ice bath and place the guide post in the ice bath for an additional period of 60 seconds;
- (e) Repeat (b) to (d) above until the guide post has been bent for the fourth time. Then, **for flexible guide posts only**, immediately release the guide post from the bent position and record the horizontal deflection at the top of the guide post from a vertical line 60 seconds after release. The deflection for flexible guide posts must not exceed 50 mm. Straighten a semi-flexible guide post manually.

**Note: The requirements of Clauses 7.3 (f) to (i) of this test are not applicable to guide posts manufactured of metal.**

- (f) Again, return the guide post to the ice bath for a minimum of 60 seconds;
- (g) Remove the guide post from the ice bath, and place the guide post in a horizontal position, clamped securely with a minimum length of 1000 mm clear between supports;
- (h) Drop a steel ball weighing 1 kg for a distance of 1500 mm vertically through a low friction guide so that it impacts the centre of the face of the guide post that is displayed toward the adjacent traffic flow;
- (i) Recondition the guide post in the ice bath for an additional period of 60 seconds. Repeat (g) and (h) above until the steel ball has been dropped for the fifth time;
- (j) Record the condition of the guide post. The guide post must show no signs of fractures, cracks or splits.

### **7.4 RIGIDITY**

Guide posts must be sufficiently rigid and a representative sample must pass the test(s) applicable to the type of guide post specified. Conduct the tests at 23°C (plus or minus 2°C). Shape the jaws of the clamp to suit the profile of the guide post so that the guide post cannot rotate in the clamp.

#### **7.4.1 Rigid Guide Posts**

- (a) Securely clamp the guide post to a bench in a horizontal position with the top of the guide post unsupported and protruding 1000 mm;

- (b) Apply a 10 kg mass to a point 50 mm from the top of the guide post so that the force from the mass is applied in the direction of the adjacent traffic flow. Continue to add mass in 10 kg increments until the guide post fractures;
- (c) Record the mass at which fracture occurs. Fracture must occur between a minimum mass of 30 kg and a maximum mass of 100 kg.

Do not use rigid guide posts that fail in a ductile manner.

#### 7.4.2 Maximum Rigidity of Flexible and Semi-flexible Guide Posts

- (a) Securely clamp the guide post to a bench in a horizontal position with the top of the guide post unsupported and protruding 1000 mm;
- (b) Apply a 10 kg mass to a point 50 mm from the top of the guide post so that the force from the mass is applied in the direction of the adjacent traffic flow;
- (c) Record the vertical deflection of the top of the guide post from its initial position. The deflection must exceed 500 mm.

#### 7.4.3 Semi-flexible Guide Posts

- (a) Securely clamp the guide post to a bench in a horizontal position with the top of the guide post unsupported and protruding 1000 mm;
- (b) Bend the guide post adjacent to the clamp in the direction of the adjacent traffic flow to 90° and straighten. Repeat this procedure 10 times, allowing a maximum of 3 minutes between procedures;
- (c) Apply a 0.9 kg mass to a point 50 mm from the top of the guide post, so that the force from the mass is applied in the direction of the adjacent traffic flow. Record the vertical deflection of the top of the guide post from its initial position. The deflection must not exceed 130 mm;
- (d) Remove the mass. The top of the guide post must return unassisted to no more than 10 mm from its initial position within 10 minutes of the removal of the mass. Record the final deflection.

Alternatively, the rigidity of a semi-flexible guide post may be tested in a wind tunnel. In this case, carry out testing after bending and straightening the guide post 10 times as specified in Clauses 7.4.3 (a) and (b). Clamp the base of the guide post so that the post is vertical with the top of the post protruding 1000 mm. The guide post must be able to withstand a wind speed of 12.5 m/s applied in the direction of the adjacent traffic flow with a maximum horizontal deflection at the top of 130 mm. After the wind is removed, the top of the guide post must return unassisted to no more than 10 mm from the vertical position.

#### 7.4.4 Flexible Guide Posts

- (a) Clamp the guide post securely to a bench in a horizontal position with the top of the guide post unsupported and protruding 1000 mm;
- (b) Bend the guide post adjacent to the clamp in the direction of the adjacent traffic flow to 90° and allow it to straighten. Repeat this procedure 10 times allowing a maximum of 3 minutes between procedures;

- (c) Apply a 0.9 kg mass to a point 50 mm from the top of the post so that the force from the mass is applied in the direction of the adjacent traffic flow. Record the vertical deflection of the top of the guide post from its initial position. The deflection must not exceed 130 mm;
- (d) Remove the mass. The top of the guide post must return unassisted to no more than 10 mm from its initial position within 10 minutes of the removal of the mass. Record the final deflection.

Alternatively, the rigidity of a flexible guide post may be tested in a wind tunnel. In this case, carry out testing after bending and allow the post to straighten 10 times as specified in Clauses 7.4.4 (a) and (b). Clamp the base of the guide post so that the post is vertical with the top of the post protruding 1000 mm. The guide post must withstand a wind speed of 12.5 m/s applied in the direction of the adjacent traffic flow with a maximum horizontal deflection at the top of 130 mm. After the wind is removed, the top of the guide post must return unassisted to no more than 10 mm from the vertical position.

## **8 PERFORMANCE GUARANTEE**

The supplier must provide a performance guarantee statement. It must clearly indicate the nature of the guarantee and the service life expectancy guarantee. Endorse the warranty period on the documentation of the product.

## ANNEXURE 3412/A – PROJECT SPECIFIC REQUIREMENTS

*NOTES TO TENDER DOCUMENTER: (Delete this boxed text after customising Annexure 3412/A)*

*Nominate below the type of guide post required (whether Rigid, Semi-flexible or Flexible) by deleting whichever is not applicable.*

Type of guide post required:	<b>Rigid / Semi-flexible / Flexible*</b>
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## ANNEXURES 3412/B TO 3412/L – (NOT USED)

## ANNEXURE 3412/M – REFERENCED DOCUMENTS

Refer to Clause 2.4.

### Australian Standards

AS 1742.2	Manual of uniform traffic control devices – Traffic control devices for general use
AS 1906	Retroreflective materials and devices for road traffic control purposes
AS 1906.1	Retroreflective sheeting
AS 1906.2	Retroreflective devices (non-pavement application)
AS 2700S	Colour Standards for General Purposes
AS/NZS ISO 9001	Quality management systems – Requirements