M14: 2011 SPECIFICATION FOR EDGE MARKER POSTS

In this release:

The main change to M14 in this release is:

- New Section 7 Re-approval Process for M14 Type Approved Edge Marker Posts

Note: This page is not part of M14.
SPECIFICATION FOR EDGE MARKER POSTS

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1. GENERAL

1.1 Scope

This specification sets out requirements for edge marker posts (EMP) as used in the delineation of state highways in accordance with the Manual of Traffic Signs and Markings (MOTSAM) Part II: Markings, Part 2, Section 5.05, Edge Marker Posts \(^{(a)}\) and as envisaged by Figures 5-10 and 5-11 \(^{(1)}\) in that Manual, and its replacement the Traffic Control Devices Manual.

This specification applies only to posts that are capable of self-righting immediately after impact by a vehicle.

This specification sets out the requirements for both the composite post and its components, i.e. the white flexible post, the red band, white and/or yellow reflective strips, and anchoring system. Posts designed to have a detachable above-ground portion that connects to a specific buried anchor, and flexible posts with a modified anchoring system for attachment to an impenetrable surface such as concrete or asphalt, are included in this specification.

2. PHYSICAL REQUIREMENTS

2.1 Materials

2.1.1 Durability

All components of the post shall be made from materials able to resist weather and seasonal effects of the New Zealand climate, excluding wind, \(^{2}\) for a period of at least 10 years.

2.1.2 Cleaning

The supplier shall provide instructions about cleaning agents and cleaning procedure. The type of cleaning agent is at the discretion of the supplier but should take into account toxicity under the "HSNO Act".

2.1.3 White Post

The posts may be plastic or any similar flexible material which presents a minimum hazard if struck by a road user.

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\(^{(a)}\) It excludes situations where MOTSAM’s route delineation is achieved by mounting post sections (i.e. up to 500mm of the top section of an edge marker post) to either (i) the top of guardrails, bridge rails, concrete barriers or (ii) to the non-trafficked side of these features. These are situations where impact is unlikely, and the short length of the post means testing as described here cannot be achieved. However, parts of this specification relating to post width, delineation and colour may be applied to these situations, and the deflection test may provide useful indicator of wind flutter.

\(^{(1)}\) Weather conditions refer to climatic conditions of sun, rain, UV, and temperature range.
The colour of the white post shall comply with AS/NZS 1906.1:1993 (A2) colour co-ordinates for white in daylight viewing. An acceptable shade for comparison is White (N14) as defined in AS 2700S: 1996 (A3).

2.1.4 Red Band

The red band shall be applied according to the manufacturer’s instructions. It shall be well-adhered, durable, colour-fast and fade-resistant.

The colour of the red band shall comply with AS/NZS 1906.1: 1993 (A2) colour co-ordinates for red in daylight viewing. Acceptable shades for comparison are Signal Red (No. 537) and Bold Red (No. 564) as defined in BS 831C: 1996 (A4).

2.1.5 Retroreflective Strips (White and/ or Yellow)

The yellow and white reflective strips shall be adhesive, and applied to the post following the manufacturer’s instructions. These shall comply with the requirements for:

(i) Class I sheeting of AS/NZS 1906.1:1993 Retroreflective materials and devices for road traffic control purposes, retroreflective materials (A2), and
(ii) Shall be approved and gazetted in accordance with section 130 of the Traffic Regulations 1976 (A5).

2.2 Dimensions and Shape

(See also Figure 1: Edge Marker Posts Reflector Arrangements)

2.2.1 White Post

Shape:
The width of the post as projected to a vertical plane shall be between 90mm and 110mm. The centre portion of the post shall have a section that is a minimum of 42mm in width which is either flat, or with a radius of curvature no less than 90mm. The edge portions of the post may be angled or curved, but the post is to present an apparent width 90mm or greater, when viewed directly from the front or rear of the post.

Length:
Posts intended to be inserted directly in the ground shall be a minimum of 1400mm (±10mm) in length.

Posts for use with a specific separate permanent anchor fixed into penetrable ground shall have at least 800mm of white post clear of the top of the anchor. The anchor shall be such that it secures the post and holds it as required by MOTSAM that is upright, and top is parallel to 900mm above the edge of the traffic lane.
Posts intended to be fixed to the impenetrable surfaces shall be 900mm (±10mm) in length including the fixing system, and the portion of white post is to be a minimum of 650mm.

### 2.2.2 Red Band

(MOTSAM types A, B and C faces): The red band shall be 150mm (±3mm) long and shall either:

(iii) Fully encircle the post, or

(iv) Be applied to the front and rear of the post, finishing at the edge of any reflectors, matching the width of both the front and rear of the post to within 1mm.

The sheeting shall be applied to the post face so that the top of the red band is 150mm (±3mm) below the top of the post.

### 2.2.3 Retroreflective Strips

White (MOTSAM type A face): One white retroreflective strip of 450mm length (±5mm) and 40mm minimum width shall be attached centred on the front face and so that the top is located 10mm (±1mm) below the top of the post. The strip is to be attached so as to overlay the red band.

Yellow: (MOTSAM type C face): two yellow retroreflective strips each of 130mm (±3mm) length and 40mm (minimum) width, shall be attached centred on the back face. The top of the first strip shall be located 10mm (±1mm) below the top of the post, and the top of the second 10mm (±1mm) below the bottom of the red band.

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**Figure 1: Edge Marker Posts Reflector Arrangements**

Notes:
1. Refer to MOTSAM Part 2: Markings, Fig 5.9 for reflector types.
2. Reflectors shall be centrally placed about the axis of the post
3. All dimensions are given in mm.
2.3 Anchoring
The edge marker post shall have an anchoring system to ensure that it stays securely in the ground. The anchoring system shall be (a) or (b) as follows:

(a) Posts intended for use in penetrable ground:
   (i) An additional 100mm length, or
   (ii) A hole located between 70mm and 130mm from the bottom end of the post and a suitable stabilising rod or clip to fit the hole so as to secure the post in the ground, or
   (iii) A barb that protrudes at least 10mm from the plane of the post, located between 70mm and 130mm from the bottom end of the post, or
   (iv) A separate permanent anchor, which can be embedded in the ground and to which the white post can be attached.

(b) Posts intended for impenetrable surfaces:
   A device which holds the post upright that can be bolted, riveted or similarly securely fastened to the impenetrable surface.

2.4 Finish
All colours, bands and reflectors shall have a high gloss finish. The post shall have no sharp edges or burs.

2.5 Performance Identification
Individual posts shall be identified with:

(a) Manufacturer’s name, and model, either in code or in full.
   **Note:** where these are coded the full details must be provided separately for inclusion in the Type Approvals list, and must be readily available to the purchaser (for example on packaging).

(b) Date of manufacture.

Unless otherwise specified, posts shall be fully finished, i.e. white with a red band and reflectors attached.

3. PERFORMANCE REQUIREMENTS
**Note:** Appendix B describes the number of samples, and documentation required for testing.

New (i.e. unused) posts must comply with the following functional requirements.

3.1 Deflection
**Requirement:** When tested in accordance with Appendix C of this specification, no post shall deflect more than 134mm.
3.2 Resistance to Vehicle Run Over

**Requirement:** This test requires 3 new posts to be impacted 10 times in accordance with the full-face impact test described in Appendix D, and another 3 new posts to be impacted 5 times in accordance with the angle impact test of Appendix D. When tested in this way each post shall:

- Yield on impact, and then return to an upright position immediately following each impact.

After the completion of each impact test series (full face and angle) for each post:

- The maximum deviation shall be no more than 100mm forwards or backwards from the vertical position. Sixty seconds shall be allowed after completion of the last impact in each series for the post to “recover” before the deviation is measured.
- The post shall stay fixed in the ground and shall not have pulled up any more than 150mm.
- The post shall remain substantially intact (no splitting, cracking or major chipping of material). Major chipping shall be defined by a portion of the post approximately 25mm x 25mm being removed from the post that size equates roughly to the size of a 50 cent coin.
- At least 80% of the delineators and red band shall remain intact and adhered to the post.

3.3 Safety to Road Users

**Requirement:** The following additional requirements apply to the posts that are being tested for compliance with the full face and angle vehicle impact test (Clause 3.2), following the method of Appendix D, of this specification. When tested in this way each post shall meet the following criteria:

(a) Be self-righting after impact;

(b) Throughout impact testing, the post shall not enter the compartment of a motor vehicle, or cause significant change in vehicle velocity or stability, nor damage a lightly padded test vehicle;

(c) Not exhibit behaviour, which in the opinion of the Operations Manager, NZTA National Office, may present injury risk to road users comprising, vehicle occupants, pedestrians, cyclists and motor cyclists by for example:
   (i) Post or post fragments becoming detached and acting as a spear,
   (ii) The intact post splitting, breaking, or losing protective capping so that the broken post could impale a road user,
   (iii) The post acting during impact in a manner that is likely to injure the road user comprising, vehicle occupants, cyclists and motor cyclists and

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3 After the 10th impact in the case of the full-face impacts, and after 5 impacts in the case of the angle impacts.
motorcyclists (through unusual processes of yielding and self righting);

(d) Posts having sharp edges or burs are unacceptable.

### 3.4 Cold Resistance Test

**Requirement:** When tested in accordance with Appendix E of this specification:

(a) The post shall be capable of straightening itself within 60 seconds when bent at the midpoint;

(b) The post shall show no signs of fracturing, cracking or splitting when struck by a 1 kg steel object having a rounded end of approximately 25mm radius, and dropped from a height of 1500mm.

### 4. CERTIFICATION OF DURABILITY

Suppliers of posts shall certify that the posts, red band, reflectors and any ancillary components such as clips or rods and anchors, have been formulated from materials that are known to resist discolouration and embrittlement that would impair the performance of the post. The materials must resist these changes for a minimum period of 10 years of weather and seasonal effects that are typical in New Zealand climatic conditions. If required by the Operations Manager, NZTA National Office, the supplier shall substantiate this certification by, for example, reference to tests, to suppliers’ literature, or the norms of industry good practice.

### 5. TYPE APPROVAL

All posts used on state highways under NZTA M14 shall be required to have gained NZTA Type Approval.

Applications for type approval shall be submitted to the Operations Manager, NZTA National Office and be supported by a test report that shows that the posts meet each of the requirements of this specification. The report is to be prepared by an independent testing organisation having a competence acceptable to the NZTA. One post of the type for which approval is being sought shall be submitted with the application.

The cost of type approval testing and reporting shall not be born by the NZTA.

Posts that qualify for type approval under this specification will be listed in M14 Notes. See also Clause 1.2 above for implementation. Type approval is valid for 5 years from the date that type approval was issued. After this time the approval will be reviewed. If the NZTA considers the performance to be satisfactory then the approval will be renewed. However if they have concerns regarding performance the approval will expire, and the post will be required to be re-tested for compliance with this specification for type approval to be considered again.

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4 Climatic conditions refer to sun, rain, UV, and temperature range encountered in the New Zealand outdoor environment.
Type approval may be withdrawn at any stage if there is evidence of less than satisfactory in-service performance.

Type approval may also be withdrawn if two samples of new (i.e. unused) posts, drawn by the NZTA under the procedures of NZTA P16 and tested by a competent laboratory of their choice to the tests of this specification, fail to meet the requirements of this specification, especially those requirements set out in the above Section 3, Performance Requirements. Suppliers are to be advised that such testing is taking place, and are entitled to be present while such testing is carried out.

Type approval may also be withdrawn, or withheld, if the supplier cannot, when requested, substantiate the certification of durability.

Type approval is given to a post type as described in accompanying documentation and submitted post samples. If the post or any of its components is changed in any way, e.g. in formulation or shape, then this constitutes a new post type, and the supplier is required to notify the NZTA of these changes. The NZTA will have the discretion whether these variants will need to undergo full or partial type approval testing.

6. **SUPPLY AND PACKAGING**

Unless otherwise specified, posts shall be supplied fully finished, i.e. white with a red band and reflectors attached. Posts and especially the reflectors shall be protected from damage during delivery and shall be free from paint overspray or other deleterious coatings.

7. **REAPPROVAL PROCESS FOR M14 TYPE APPROVED EDGE MARKER POSTS**

The re-approval process for M14 Type Approved EMPs is based on:

- Quality documentation
- On-road performance

If the NZTA finds either your quality documentation or on-road performance to be unsatisfactory, then we will ask you to repeat some or all the tests in M14 Specification for Edge Marker Posts, however this is a final last option.

To renew your approval, please submit the following documentation, with a covering letter, to the Operations Manager, NZTA National Office:

7.1 **Quality Documentation**

7.1.1 **Materials**

- Evidence that the reflective material on your EMPs is ISO certified and gazetted, or equivalent
- Evidence that the source materials from which your EMPs are manufactured is ISO certified, or equivalent
• A letter certifying that the material and formulation from which your EMPs are manufactured is the same as it was at the time of the original M14 Approval in 2005, 2006 or 2007.

7.1.2 Manufacturing
A statement describing the manufacturing quality assurance regime including:
• What manufacturing checks are undertaken (e.g. weighing of posts, measuring length)
• The methods are used for manufacturing checks
• The percentage of EMPs that are checked after manufacturing, using the named methods
• The tolerance the EMPs must be within, when compared with the properties of the M14 Approved EMP.

7.1.3 Certification
Copies of any ISO certification or equivalent, letters acknowledging completion of any audits, for the manufacturing plant.

7.1.4 Installation
A copy of the EMP installation instructions and cleaning instructions that you supply to customers.

7.1.5 Sample Post
Please supply one sample post of each type. This is for verification that posts are “fully dressed” when supplied to customers.

7.1.6 Other Documentation
Optional: any other supporting documentation, e.g.:
• Environmental Policy
• Statement of the manufacturing plant's maintenance regime; e.g. how often the machinery is stripped and cleaned, screens replaced, etc.
• Certificate of durability
• Any other advertising material or testing reports to support the application (see also 2.2 below).

7.2. On-road Performance Documentation

7.2.1 NZTA Reporting
If there have been any reported substandard EMPs on the NZTA network, you will be contacted to discuss the issues. You will be asked to explain what changes to manufacturing and quality are to be made to remedy this to ensure no further substandard EMPs are supplied in the future. You may be asked to repeat some or all of the tests in M14.
7.2.2 Data

Optional: Any on-road performance data or laboratory testing data which your company has collected about your EMPs may be submitted in support of your application for M14 Approval renewal.
APPENDIX A

LIST OF REFERENCE DOCUMENTS

A1  NZ Transport Agency (2010)
Manual of Traffic Signs and Markings (MOTSAM) Part I: Traffic Signs and Part II:
Markings, Part 2, Section 5.05, Edge Marker Posts.
NZ Transport Agency, Wellington.

A2  SA & SANZ (1993)
Retroreflective Materials and Devices for Road Traffic Control Purpose.
AS/NZS 1906.1: 1993 Part 1 Retroreflective Materials. Standards Australia and
Standards New Zealand, Wellington.

A3  SA (1996)
Colour Standards for General Purposes - Swatches.
AS 2700S: 1996. Standards Australia, Homebush, NSW.

A4  BSI (1996)
Colours for Identification Coding and Special Purposes.

A5  New Zealand Government (1976)
Traffic Regulations 1976 – Part X, Traffic Islands and Road Markings.
Government Printer, Wellington.
APPENDIX B

SIZE OF SAMPLE FOR TESTING

A sample of posts for testing under this specification shall consist of 13 posts, and they shall be used as follows:

- All 13 posts shall be used to assess that the posts are of consistent appearance.
- Three posts shall be used for the deflection test, then for the full-face vehicle impact test.
- Three posts shall be used for the angle vehicle impact test.
- Three posts shall be used for the cold bend test.
- One post is available should any test need to be repeated if it was incorrectly performed.
- Three of the untested posts are to be labelled with the test laboratory’s name, the date of the test, and an identifier that can be used to track the post through the laboratory’s record system of tests undertaken:
  (i) One of these posts is to be retained by the test laboratory for a period of six years after the test.
  (ii) Two of these posts are to be returned to the supplier.
APPENDIX C

DEFLECTION TESTING

C1 NUMBER OF SAMPLES
Three posts shall be tested for deflection.

C2 METHOD
The post shall be clamped lightly to a bench, with the white reflector up and 1000mm protruding horizontally into free air. A 500gm weight shall be placed at the free end (as close to the end as possible). The deflection is measured from the horizontal plane of the clamped section 20 seconds after the placement of the 500gm weight. Figure C1 shows the test set-up.

C3 REQUIREMENT
No post shall deflect by more than 134mm. Posts intended for ground mounting with a cantilever span less than 1000mm shall comprise of a cross-sectional stiffness not less than that required to satisfy the 134mm criterion at a 1000mm cantilever span.

Figure C1: Deflection Test
APPENDIX D

VEHICLE IMPACT TESTING

D1   NUMBER OF SPECIMENS
Six posts shall be tested for vehicle impact.

D2   METHOD

D2.1 Test Site Preparation and Traffic and Public Safety
Testing is to be carried out in a location that can exclude public traffic. The safety of the general public shall also be ensured (e.g. be aware of people walking, cycling, unleashed dogs, etc.).

The site shall have sufficient visibility so the post, video operator and vehicle driver maintain a line of sight at all times.

In all cases the surface on or in which the edge marker post is installed shall be continuous with the rest of the test area used by the test vehicle in impact testing (i.e. no hard kerb).

D2.2 Installation
(a) Posts intended for use in penetrable ground:
   • The area of ground where the post is located shall be well-compacted gravel.
   • The post shall be installed in accordance with the supplier’s written instructions.
   • A minimum of 1 metre shall protrude above the ground.
   • The post shall be installed so it is vertical. There shall be no apparent gap between the gravel and the post. Care shall be taken that no uncharacteristically large stones are in line with the post’s likely contact area with the ground.

(b) Posts intended for use on impenetrable ground:
   • The area of ground where the post is located shall be concrete or asphaltic concrete.
   • The post shall be attached to the asphaltic concrete or concrete in accordance with the supplier’s written instructions.
   • The post shall be installed so it is vertical. Loose material shall be removed from the line of the post’s likely contact area with the ground.

D2.3 Testing
   • The test vehicle shall be a utility vehicle or commercial van weighing approximately 2 tonnes. A pad of closed cell foam or similar protection shall be fitted to the test vehicle at the point of impact to prevent damage to the vehicle.
Impact testing shall be carried out with the test vehicle travelling 50 to 55km/h.

- **Full face impact testing:** 10 impacts shall be with the plane of the post at 90 degrees to the direction of travel, and the front and rear wheel of the test vehicle shall pass directly over the marker post.

- **Angle impact testing:** 5 impacts shall be with the plane of the post at 70 degrees to the direction of travel, and the front and rear wheel of the test vehicle shall pass directly over the marker post.

Testing shall be immediately discontinued if, at any stage during testing, the test personnel consider they or adjacent personnel are at risk of injury from impacting the post, if vehicle instability is significant on impacting the post, or the test vehicle is at risk of any more than superficial damage. The edge marker post will be reported as failing the safety requirements.

### D2.4 Recording Impact Test Results

Each impact shall be recorded on video, taken of the side of the vehicle closest to the impact, so that each “wheel over” is visible in the video. A closer view of both sides of the post shall be then videoed before testing: (i) for the full-face impact tests after 5 and 10 impacts, and (ii) for the angle impact tests after 5 impacts.

A still photograph shall be taken of the front and rear of each post before impact testing and (i) for the full-face impact after 5 and 10 impacts, and (ii) for the angle impact test after 5 impacts. The identifying sample number and number of impacts shall be clearly labelled on the post and be visible in each photo.

Any signs of damage to the post will be recorded after each impact:

- The post shall stay fixed in the ground, and the post shall not “pull out” of the ground by more than 150mm.
- The post shall remain substantially intact (no splitting, cracking or major chipping of material). Major chipping shall be defined by a portion of the post approximately 25mm x 25mm being removed from the post (this size equates roughly to the size of a 50 cent coin).
- At least 80% of the delineators and red band shall remain intact and adhered to the post.

### D2.5 Safety

After each impact and at the conclusion of the tests, an assessment of the potential of the post to be a safety hazard to road users comprising, vehicle occupants, pedestrians, cyclists and motorcyclists shall be made.

This assessment will include factors such as:

(a) The ability of the post to be self-righting after impact.

(b) Whether throughout the impact testing the post or parts of the post entered the compartment of a motor vehicle, caused significant change in vehicle velocity or stability, or damage to the test vehicle.
(c) Exhibited behaviour which may present injury risk to road users comprising vehicle occupants, pedestrians, cyclists and motorcyclists includes:

(i) Post or post fragments becoming detached and acting as a spear,

(ii) The intact post splitting, breaking, or losing protective capping so that the broken post could impale a road user,

(iii) The post acting during impact in a manner that is likely to injure the road user (through unusual processes of yielding and self-righting).

(d) The post having sharp edges or burs is unacceptable.
APPENDIX E

RESISTANCE TO COLD

E1 TEST SAMPLES

Three posts shall be tested for resistance to cold.

E2 METHOD

Each post shall be conditioned at temperature of (0 ±2) degrees centigrade (ice bath) for 2 hours. The following tests shall then be performed:

(a) Bend Test
The conditioned post shall be capable of straightening itself within 60 seconds when bent at 90 degrees at the midpoint. This test is to be performed eight times in the direction of normal face on vehicle impact.

(b) Impact Test
The conditioned post shall show no signs of fracturing or cracking or splitting when a 1kg steel object with a rounded end of 25mm radius is dropped from a height of 1500mm through a frictionless guide to impact the surface of the post. The post shall be flat in a horizontal position supported at both ends. The test shall be carried out five times and concentrated near the middle of the post. The post shall be conditioned at a temperature of (0 ±2) degrees centigrade for 60 seconds between impact tests.

E3 REQUIREMENT

(a) Each post shall straighten after each bend test.
(b) Each post shall show no signs of cracking, fracturing or splitting after each impact.
APPENDIX F

REPORTING

Reporting of the tests shall include:

F1 DEFLECTION
(a) The deflection measured for each post.
(b) The average deflection of the 3 samples.
(c) Statement whether the posts complied with the deflection requirement.

F2 IMPACT
(a) The location at which impact testing was conducted.
(b) The method of installation.
(c) Photos of all samples tested, for full-face impact before and after 5 and 10 impacts, and for angle impact before and after 5 impacts.
(d) A copy of the video as described in Appendix D, Clause D2.4.
(e) Comments on minor damage or any other significant aspects of the test.
(f) Serviceability – an assessment that the post has passed or failed the serviceability test requirements.
(g) Safety – an assessment that the post has passed or failed the safety test requirements.

F3 COLD RESISTANCE
(a) Results of the bend test.
(b) Results of the impact test.
(c) An assessment of whether the posts complied with the cold resistance test.

F4 ASSESSMENT
An assessment as to whether the post meets all the requirements of all these tests.

F5 DESCRIPTION
A description of the post, and of any unique aspect or markings, so that the post type tested can be uniquely identified. The description shall also include:

(a) Supplier’s name
(b) Date of the test
(c) Statement that the test was performed in accordance with NZTA M14: 2011
(d) Name of the person who conducted the testing.