# INFRASTRUCTURE MALTA SPECIFICATION FOR ROAD WORKS

# SERIES IM/1200 (IMPLEMENTATION)

# TRAFFIC SIGNS


***This Specification Series implements the requirements in Subsidiary Legislation 499.57, Part II (New Roads and Road Works Regulations) in accordance with the Agency for Infrastructure Malta ACT XXV111, CAP. 588, Part I***

**Date:** **March 2023**
**Version:** **V1.1**

# 1200 TRAFFIC SIGNS

## 1201 Regulations, Sign Classification and Standards

### Regulations

1 Subject to paragraphs 2 and 3 below, all traffic signs used (including retroreflecting road studs and road markings), whether permanent or temporary, shall be of the shape, colour and type prescribed for that use in Subsidiary Legislation 65.05 - Traffic Signs and Carriageway Markings Regulations and any subsequent amending Regulations.

2 The size and graphical form and arrangement of the signs shall be in accordance with the UK Traffic Signs Regulations and General Directions (TSRGD) and the UK Traffic Signs Manual (TSM), Chapters 1 to 8 or as approved by special order of the Overseeing Organisation.

3 The font shall be “UK Transport Medium”.

### Route Direction Signs

4 For route direction signs the applicable design standard and arrangement shall be the UK TSRGD and the UK TSM Chapter 7 - The Design of Traffic Signs, as may be amended by the Overseeing Organisation to reflect the specific requirements particular to the Malta road network including maltese language diacritic markers. The basic design form shall follow the “x-height”, “stroke width” and “virtual tiles” concept in the UK TSM Chapter 7. The use of other national traffic sign design standards shall not be permitted.

5 The Contractor shall invariably forward the final graphical design details of the route direction signs for the approval of the Overseeing Organisation at least 5 working days before the start of fabrication, in AutoCAD format and in (*.PDF) format, in full colour. Detailing on the signs design formats shall include the dimensions, “stroke widths” and virtual “tiles”.

6 Signs that are not prescribed in Regulations need to be specially authorised by Transport Malta and other responsible statutory bodies in Malta. Where the Contractor proposes to use non-prescribed temporary traffic signs, he shall obtain the agreement of the Overseeing Organisation to their intended design and location. Where the Contractor proposes to use prescribed temporary traffic signs, he shall obtain the agreement of the police and the highway authority to their intended location. The Contractor shall obtain authorisation and approval from the Overseeing Organisation for the use of the signs at the specific locations proposed.

7 Signs that are changeable by means other than the purely mechanical require statutory type approval for their construction and operating mechanisms by the Transport Malta or subsequent transport authority bodies in Malta. This requirement is in addition to the need for the design of the sign to be prescribed or specially authorised. The Contractor’s proposal for signs that require statutory type approval shall include the reference numbers of any approval already issued in respect of that equipment. The signs shall not be installed until appropriate

approval or confirmation of existing approval, by the Overseeing Organisation has been obtained.

**Sign Classification**

8 For the purposes of the Contract the following classifications apply:

a) permanent traffic signs. Any of the traffic signs prescribed in S.L.65.05., or specially authorised by Transport Malta or other responsible statutory bodies in Malta , or any part thereof, designed to remain in position at the completion of the Permanent Works or a traffic cone, cylinder or other traffic delineator to be retained by the Employer;

b) prescribed temporary traffic signs. Any of the traffic signs defined in S.L.65.05 Regulations, or specially authorised by Transport Malta or other responsible statutory bodies in Malta, or any part thereof, described in IM Appendix 12/1 which, unless otherwise described in IM Appendix 12/1, comply with the requirements of a permanent traffic sign but which will not remain in position at the completion of the Permanent Works;

c) temporary traffic signs. Any of the traffic signs defined in S.L.65.05., or specially authorised by Transport Malta or and other responsible statutory bodies in Malta, or any part thereof, designed by the Contractor, in compliance with Clause 1216 which will not remain in position at the completion of the Permanent Works.

## 1202 General Requirements for Permanent Traffic Signs

1 Materials for permanent traffic signs and their construction, assembly, location and erection shall comply with this Series and Series 1400. The manufacture and installation of traffic signs shall be in accordance with the quality management scheme described in IM Appendix A of the IM Manual of Contract Works (MCRW), Volume 1.

2 Each complete traffic sign or part thereof shall comply with and be capable of passing the tests of MSA EN 12899-1.

3 Before the commencement of fabrication of any non-prescribed traffic sign described in IM Appendix 12/1, the Contractor shall submit fabrication drawings for the Client’s approval.

4 The backs of traffic signs shall be grey.

5 All signs shall be permanently marked on the reverse with the name or code of the manufacturer together with the month and year of manufacture. The markings shall be discrete but clearly visible upon inspection and comply with the requirements of the UK Traffic Signs Regulations and General Directions or as approved by the Overseeing Organisation.

6 Traffic signs shall be carefully handled to prevent damage and transported and stored in accordance with the sign face manufacturer’s instructions.

7 All signs shall be covered by a minimum manufacturer’s guarantee of 12 years.

8 Transilluminated traffic signs shall comply with BSEN 12899-1 and meet Class L2 and Class U3 of that standard.

**Design**

9 The design of the signs shall comply with the requirements of EN 12899-1 and this Series 1200.

10 The Contractor shall be responsible for:

a) the sign graphical arrangement;

b) the sizing of the signs using the size ranges included in IM Appendix 12/1 and/or the Bills of Quantities;

c) the structural design of the entire sign assembly using the post and foundation sizes included in this IM Series 1200, IM Appendix 12/1 and/or as indicated in the Bills of Quantities.

11 The entire sign assembly shall include the following:

a) mounting backplate and sheeting (including corner radii, edge protection and stiffening),

b) the post/s (including any support struts),

c) the foundations,

d) any related fixtures and fittings.

12 When so required by the Overseeing Organization the Contractor shall forward the final graphical design details of the warning, regulatory and information signs for the approval of the Overseeing Organisation at least 5 working days before the start of fabrication in AutoCAD format and in (*.PDF) format, in full colour. Detailing on the signs design formats shall include the dimensions, “x-height”, “stroke widths” and virtual “tiles” where these are incorporated in the sign.

13 The following parameters from “EN 12899-1 Fixed, vertical road traffic signs. Fixed signs”, shall be applied for loading and deflection:

**Table 1200-1: EN 12899-1 Parameters**

| Parameter | Value |
|---|---|
| Wind speeds for design | Sustained wind speed of 27 m/s; Gusts of up to 37 m/s for 10 second periods |
| Partial safety factor | PAF1 (Table 6) |
| Partial material factor | From Table 7 for the specific material |
| Force coefficient to Aspect ratio | Table NA.2 (UK) |
| Point loads | Class PL3 (Table 10) |
| Maximum Temporary Deflection (Bending) | TDB4 (Table 11) |
| Maximum Temporary Deflection (Torsion) | TDB4 (Table11),TDT4 (Table 12) |

## 1203 Foundations for Permanent Traffic Signs and Signals

1 The type and size of foundations for permanent traffic signs and signals shall be as described in, and unless otherwise stated therein shall comply with, this Clause and/or in theBills of Quantities.

2 All excavations for foundations shall be carried out in compliance with Clause 604 and shall be cleared of all loose material before placing of concrete and backfilling.

3 Unless otherwise described in IM Appendix 12/1 traffic signs and signals supported by a single post placed in the ground shall have the post installed centrally in foundations as described in Table 1200-2 filled in compliance with Clause 2602 with mix ST2 concrete to within 150 mm of the ground surface.

4 The Contractor shall design and construct the sign foundations to comply with the performance required by this specification and for the minimum service life guarantee period stipulated herein. Typical (illustrative) foundation details are indicated in RCD 1200/34.

5 Foundations may need to incorporate water proofing, sulfate resisting and any other additives, reinforcement, base flanges, clamps and associated fixings and anchorages.

6 All concrete foundations shall be finished flush with the existing surrounding finishes except where otherwise indicated in the Drawings.

7 The Contractor shall allow for the reinstatement of any surface to ensure that the finished product meets the finished characteristics of the surrounding/existing surfaces.

8 In the case of planted concrete foundations cast in soft areas the foundation shall not have any concrete within a depth of minimum 300mm from the finished level of the immediately surrounding soft areas.

9 In the case of clamped foundations in soft areas the concrete foundation shall protrude by 50mm above the finished level of the immediately surrounding soft areas.

***Table 1200-2: Sign Foundation Sizing (mm)***

| Post Foundation Sizing | | | | |
|---|---|---|---|---|
| **Foundation Reference** | **Width "W"** | **Depth "D"** | **Length "L"** | **Notes** |
| A | 350 | 600 | 600 | Refer to Drawing TM 35/11 |
| B | 400 | 600 | 600 | Refer to Drawing TM 35/11 |
| C | 400 | 600 | 800 | Refer to Drawing TM 35/11 |
| D | 450 | 700 | 1000 | Refer to Drawing TM 35/11 |
| E | 450 | 800 | 1000 | Refer to Drawing TM 35/11 |
| F | 500 | 900 | 900 | Refer to Drawing TM 35/11 |
| G | 500 | 900 | 1300 | Refer to Drawing TM 35/11 |
| H | 600 | 1000 | 1200 | Refer to Drawing TM 35/11 |

| | | | | |
|---|---|---|---|---|
| I | 600 | 1000 | 1800 | Refer to Drawing TM 35/11 |

***Table 1200-3: Sign Post Size Equivalents***

| Equivalent Post Sizing | |
|---|---|
| **Circular Post (mm)** | **Notes** |
| 76 x 4 | None |
| 89 x 5 | # Sign mounted at right angles to 100mm channel side |
| 114 x 6.3 | # Sign mounted at right angles to 100mm channel side |

***Table 1200-4: Traffic Signpost Details and Foundations - Sign areas up to 1.50m²***

| Height to Centroid | | Area of sign (m²) | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| From | To | Up to 0.25 | | | 0.26 - 0.5 | | | 0.51 - 0.75 | | | 0.76 - 1.0 | | | 1.01 - 1.25 | | | 1.26 - 1.50 | | |
| **4.26** | **4.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 76 | | | 89 | 76 | | 114 | 76 | | 140 | 89 | 76 | 140 | 114 | 89 | 140 | 114 | 89 |
| | | A | | | A | A | | C | A | | C | A | A | D | B | A | E | C | A |
| **4.01** | **4.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 76 | | | 89 | 76 | | 114 | 76 | | 114 | 89 | 76 | 140 | 114 | 76 | 140 | 114 | 89 |
| | | A | | | A | A | | B | A | | C | A | A | D | B | A | D | B | A |
| **3.76** | **4.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 76 | | | 89 | 76 | | 114 | 76 | | 114 | 89 | 76 | 140 | 114 | 76 | 140 | 114 | 89 |
| | | A | | | A | A | | B | A | | C | A | A | D | B | A | D | B | A |
| **3.51** | **3.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 76 | | | 89 | 6 | | 114 | 76 | | 114 | 89 | 76 | 140 | 89 | 76 | 140 | 114 | 89 |
| | | A | | | A | A | | B | A | | C | A | A | D | A | A | D | B | A |
| **3.26** | **3.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 76 | | | 89 | 76 | | 114 | 76 | | 114 | 89 | 76 | 114 | 89 | 76 | 140 | 114 | 89 |
| | | A | | | A | A | | B | A | | C | A | A | C | A | A | D | B | A |
| **3.01** | **3.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 76 | | | 76 | 76 | | 114 | 76 | | 114 | 76 | 76 | 114 | 89 | 76 | 140 | 114 | 76 |
| | | A | | | A | A | | B | A | | B | A | A | C | A | A | D | B | A |
| **2.76** | **3.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 76 | | | 76 | 76 | | 89 | 76 | | 114 | 76 | 76 | 114 | 89 | 76 | 140 | 89 | 76 |
| | | A | | | A | A | | A | A | | B | A | A | C | A | A | C | A | A |
| **2.51** | **2.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 60 | | | 76 | 60 | | 89 | 76 | 60 | 114 | 76 | 60 | 114 | 89 | 76 | 114 | 89 | 76 |
| | | A | | | A | A | | A | A | A | B | A | A | C | A | A | C | A | A |
| **2.26** | **2.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 60 | | | 76 | 60 | | 89 | 60 | | 114 | 76 | 60 | 114 | 76 | 76 | 114 | 89 | 76 |
| | | A | | | A | A | | A | A | | B | A | A | B | A | A | C | A | A |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2.01** | **2.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 60 | | | 76 | 60 | | 89 | 60 | | 89 | 76 | 60 | 114 | 76 | 60 | 114 | 89 | 76 |
| | | A | | | A | A | | A | A | | A | A | A | B | A | A | C | A | A |
| **1.76** | **2.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 60 | | | 76 | 60 | | 76 | 60 | | 89 | 76 | 60 | 114 | 76 | 60 | 114 | 76 | 76 |
| | | A | | | A | A | | A | A | | A | A | A | B | A | A | B | A | A |
| **1.51** | **1.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 60 | | | 60 | | | 76 | 60 | | 89 | 60 | | 89 | 76 | 60 | 114 | 76 | 60 |
| | | A | | | A | | | A | A | | A | A | | A | A | A | B | A | A |
| **1.26** | **1.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 60 | | | 60 | | | 76 | 60 | | 76 | 60 | | 89 | 60 | | 89 | 76 | 60 |
| | | A | | | A | | | A | A | | A | A | | A | A | | A | A | A |
| **1.01** | **1.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 60 | | | 60 | | | 60 | | | 76 | 60 | | 76 | 60 | | 89 | 60 | |
| | | A | | | A | | | A | | | A | A | | A | A | | A | A | |
| **0.01** | **1.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 60 | | | 60 | | | 60 | | | 76 | 60 | | 76 | 60 | | 76 | 60 | |
| | | A | | | A | | | A | | | A | A | | A | A | | A | A | |

| **Note:** | **No. of Posts** |
|---|---|
| | **Post diameter** |
| | **Foundation Type - Refer to Table** 1200-2 |

***Table 1200-5: Traffic Signpost Details and Foundations - Sign areas from 1.51 to 3.0 m²***

| Height to Centroid | | Area of sign 1.51 to 3.0m² | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| From | To | 1.51 - 1.75 | | | 1.76 - 2.0 | | | 2.01 - 2.25 | | | 2.26 - 2.5 | | | 2.51 - 2.75 | | | 2.76 - 3.0 | | |
| **4.26** | **4.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 114 | 140 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 194 | 140 | 140 |
| | | E | C | B | F | C | B | G | D | C | H | D | C | H | D | C | I | E | C |
| **4.01** | **4.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 114 | 140 | 114 | 114 | 168 | 140 | 114 | 18 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 140 |
| | | E | C | B | F | C | B | G | D | B | G | D | C | H | D | C | H | D | C |
| **3.76** | **4.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 89 | 140 | 114 | 114 | 140 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 |
| | | E | C | A | E | C | B | F | C | B | G | D | C | G | D | C | H | D | C |
| **3.51** | **3.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 89 | 140 | 114 | 114 | 140 | 114 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 |
| | | E | B | A | E | C | B | F | C | B | G | D | B | G | D | C | H | D | C |
| **3.26** | **3.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 114 | 140 | 114 | 114 | 168 | 140 | 114 | 168 | 140 | 114 |
| | | D | B | A | E | C | A | E | C | B | F | C | B | G | D | B | G | D | C |
| **3.01** | **3.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 114 | 140 | 114 | 114 | 140 | 140 | 114 | 168 | 140 | 114 |
| | | D | B | A | E | B | A | E | C | B | F | C | B | F | C | B | G | D | B |
| **2.76** | **3.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 114 | 140 | 114 | 114 | 140 | 140 | 114 |
| | | D | B | A | D | B | A | E | C | A | E | C | B | F | C | B | F | C | B |
| **2.51** | **2.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 114 | 114 | 76 | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 114 | 140 | 114 | 114 |
| | | D | B | A | D | B | A | D | B | A | E | C | A | E | C | B | E | C | B |
| **2.26** | **2.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 114 | 89 | 76 | 140 | 114 | 76 | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 114 |
| | | C | A | A | D | B | A | D | B | A | D | B | A | E | C | A | E | C | B |

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2.01** | **2.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 114 | 89 | 76 | 140 | 89 | 76 | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 89 |
| | | C | A | A | C | A | A | D | B | A | D | B | A | D | B | A | E | C | A |
| **1.76** | **2.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 114 | 89 | 76 | 114 | 89 | 76 | 140 | 89 | 76 | 140 | 114 | 76 | 140 | 114 | 89 | 140 | 114 | 89 |
| | | C | A | A | C | A | A | C | A | A | D | B | A | D | B | A | D | B | A |
| **1.51** | **1.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 114 | 76 | 76 | 114 | 89 | 60 | 114 | 89 | 76 | 114 | 89 | 76 | 140 | 114 | 76 | 140 | 114 | 89 |
| | | B | A | A | C | A | A | C | A | A | C | A | A | D | B | A | D | B | A |
| **1.26** | **1.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 114 | 76 | 60 | 114 | 76 | 76 | 114 | 89 | 76 | 114 | 89 | 76 | 114 | 89 | 76 | 140 | 89 | 76 |
| | | B | A | A | B | A | A | C | A | A | C | A | A | C | A | A | C | A | A |
| **1.01** | **1.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 89 | 76 | 60 | 114 | 76 | 60 | 114 | 76 | 60 | 114 | 76 | 76 | 114 | 89 | 60 | 114 | 89 | 76 |
| | | A | A | A | B | A | A | B | A | A | B | A | A | C | A | A | C | A | A |
| **0.01** | **1.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 89 | 60 | | 89 | 76 | 60 | 89 | 76 | 60 | 114 | 76 | 60 | 114 | 76 | 60 | 114 | 76 | 60 |
| | | A | A | | A | A | A | A | A | A | B | A | A | B | A | A | B | A | A |
| **Note:** | | **No. of Posts** | | | | | | | | | | | | | | | | | |
| | | **Post diameter** | | | | | | | | | | | | | | | | | |
| | | **Foundation Type - Refer to Table** 1200-2 | | | | | | | | | | | | | | | | | |

***Table 1200-6: Traffic Signpost Details and Foundations - Sign areas from 3.01 to 6.0m²***

| Height to Centroid | | Area of Sign 3.01 to 6.0m² | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| From | To | 3.01 - 3.5 | | | 3.51 - 4.0 | | | 4.01 - 4.5 | | | 4.51 - 5.0 | | | 5.01 - 5.5 | | | 5.51 - 6.0 | | |
| **4.26** | **4.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 194 | 140 | 140 | 194 | 140 | 140 | 219 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 | 244 | 194 | 140 |
| | | I | E | D | * | F | D | * | G | E | * | H | E | * | H | F | * | I | F |
| **4.01** | **4.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 |
| | | I | E | D | * | F | D | * | G | D | * | G | E | * | H | E | * | H | F |
| **3.76** | **4.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 | 219 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 |
| | | I | E | C | I | E | D | * | F | D | * | G | E | * | G | E | * | H | E |
| **3.51** | **3.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 168 | 140 | 114 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 |
| | | H | E | C | I | E | D | I | F | D | * | G | D | * | G | E | * | H | E |
| **3.26** | **3.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 168 | 140 | 114 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 168 | 140 | 219 | 168 | 140 |
| | | H | D | C | I | E | C | I | E | D | * | F | D | * | G | E | * | G | E |
| **3.01** | **3.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 168 | 140 | 114 | 168 | 140 | 114 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 168 | 140 |
| | | H | D | C | H | E | C | I | E | D | I | F | D | * | F | D | * | G | E |
| **2.76** | **3.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 168 | 140 | 114 | 168 | 140 | 114 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 |
| | | G | D | C | H | D | C | I | E | C | I | E | D | I | F | D | * | F | D |
| **2.51** | **2.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 |
| | | G | D | B | G | D | C | H | D | C | I | E | C | I | E | D | I | F | D |
| **2.26** | **2.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 140 | 114 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 194 | 140 | 140 | 194 | 140 | 114 |
| | | F | C | B | G | D | C | H | D | C | H | D | C | I | E | C | I | E | D |
| **2.01** | **2.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 114 | 140 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 194 | 140 | 140 |
| | | E | C | B | F | C | B | G | D | C | H | D | C | H | D | C | I | E | C |
| **1.76** | **2.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 89 | 140 | 114 | 114 | 140 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 |
| | | E | C | A | E | C | B | F | C | B | G | D | C | G | D | C | H | D | C |
| **1.51** | **1.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 114 | 140 | 114 | 114 | 168 | 140 | 114 | 168 | 140 | 114 |
| | | D | B | A | E | C | A | E | C | B | F | C | B | G | D | B | G | D | C |
| **1.26** | **1.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 114 | 140 | 114 | 114 | 140 | 140 | 114 |
| | | D | B | A | D | B | A | E | C | A | E | C | B | F | C | B | F | C | B |
| **1.01** | **1.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 114 | 89 | 76 | 114 | 114 | 76 | 114 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 114 |
| | | C | A | A | D | B | A | D | B | A | D | B | A | E | C | A | E | C | B |
| **0.01** | **1.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 114 | 89 | 76 | 114 | 89 | 76 | 114 | 89 | 76 | 114 | 114 | 76 | 114 | 114 | 89 | 140 | 114 | 89 |
| | | C | A | A | C | A | A | C | A | A | D | B | A | D | B | A | D | B | A |
| **Note:** | | **No. of Posts** | | | | | | | | | | | | | | | | | |
| | | **Post diameter** | | | | | | | | | | | | | | | | | |
| | | **Foundation Type - Refer to Table** 1200-2 | | | | | | | | | | | | | | | | | |

***Table 1200-7: 1200 5: Traffic Sign Post Details and Foundations - Sign areas from 6.01 to 9.0m²***

| Height to Centroid | | Area of Sign 6.01 to 9.0m² | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| From | To | 6.01 - 6.5 | | | 6.51 - 7.0 | | | 7.01 - 7.5 | | | 7.51 - 8.0 | | | 8.01 - 8.5 | | | 8.51 - 9.0 | | |
| **4.26** | **4.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 244 | 194 | 168 | 244 | 194 | 168 | 244 | 194 | 168 | 244 | 194 | 168 | 273 | 194 | 168 | 273 | 219 | 168 |
| | | * | I | G | * | I | G | * | I | H | * | * | H | * | * | H | * | * | I |
| **4.01** | **4.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 244 | 194 | 168 | 244 | 194 | 168 | 244 | 194 | 168 | 244 | 194 | 168 | 273 | 194 | 168 | 273 | 194 | 168 |
| | | * | I | F | I | I | G | * | I | G | * | * | H | * | * | H | * | * | H |
| **3.76** | **4.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 245 | 168 | 140 | 244 | 194 | 168 | 244 | 194 | 168 | 244 | 194 | 168 | 244 | 194 | 168 | 244 | 194 | 168 |
| | | * | H | F | * | I | G | * | I | G | * | I | G | * | * | H | * | * | H |
| **3.51** | **3.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 219 | 168 | 140 | 244 | 168 | 140 | 244 | 194 | 168 | 244 | 194 | 168 | 244 | 194 | 168 | 244 | 194 | 168 |
| | | * | H | F | * | H | F | * | I | G | * | I | G | * | I | G | * | I | H |
| **3.26** | **3.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 219 | 168 | 140 | 219 | 168 | 140 | 244 | 168 | 140 | 244 | 194 | 168 | 244 | 194 | 168 | 244 | 194 | 168 |
| | | * | H | E | * | H | F | * | H | F | * | I | G | * | I | G | * | I | G |
| **3.01** | **3.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 219 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 | 244 | 168 | 140 | 244 | 194 | 168 | 244 | 194 | 168 |
| | | * | G | E | * | H | E | * | H | E | * | H | F | * | I | F | * | I | G |
| **2.76** | **3.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 194 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 | 244 | 194 | 140 |
| | | * | G | E | * | G | E | * | H | E | * | H | E | * | H | F | * | I | F |
| **2.51** | **2.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 194 | 140 | 140 | 194 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 |
| | | * | F | D | * | G | E | * | G | E | * | G | E | * | H | E | * | H | F |
| **2.26** | **2.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |

| | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 168 | 140 | 194 | 168 | 140 | 219 | 168 | 140 | 219 | 168 | 140 |
| | | I | F | D | * | F | D | * | G | D | * | G | E | * | G | E | * | H | E |
| **2.01** | **2.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 168 | 140 | 219 | 168 | 140 |
| | | I | E | D | I | E | D | * | F | D | * | F | D | * | G | D | * | G | E |
| **1.76** | **2.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 168 | 140 | 114 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 |
| | | H | E | C | I | E | D | I | E | D | I | F | D | * | F | D | * | F | D |
| **1.51** | **1.75** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 194 | 140 | 140 | 194 | 140 | 140 | 194 | 140 | 140 |
| | | H | D | C | H | D | C | H | E | C | I | E | D | I | E | D | I | E | D |
| **1.26** | **1.50** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 194 | 140 | 140 |
| | | G | D | B | G | D | C | H | D | C | H | D | C | H | D | C | I | E | C |
| **1.01** | **1.25** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 114 | 140 | 140 | 114 | 140 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 | 168 | 140 | 114 |
| | | F | C | B | F | C | B | G | D | B | G | D | C | G | D | C | H | D | C |
| **0.01** | **1.00** | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 | 1 | 2 | 3 |
| | | 140 | 114 | 89 | 140 | 114 | 89 | 140 | 114 | 114 | 140 | 114 | 114 | 140 | 114 | 114 | 140 | 140 | 114 |
| | | E | B | A | E | C | A | E | C | B | E | C | B | F | C | B | F | C | B |
| **Note:** | | **No. of Posts** | | | | | | | | | | | | | | | | | |
| | | **Post diameter** | | | | | | | | | | | | | | | | | |
| | | **Foundation Type - Refer to Table 1200-2** | | | | | | | | | | | | | | | | | |

10 Unless otherwise described in IM Appendix 12/1, posts shall be supported for a minimum of 3 days after placing the concrete and backfilling shall not take place until at least 48 hours after placing.

11 For traffic signals and illuminated signs provision shall be made for cable entry through the foundation by means of ducting as described in IM Appendix 12/1.

12 Where pockets are formed in concrete foundations their plan dimensions shall be sufficiently larger than those of the post to allow for positioning and bedding of the post and backfilling of the pocket.

13 All backfilling of foundations shall comply with Clause 609 except that where pipes or buried cables are installed it shall comply with Clauses 505 and 1421 respectively.

14 Reinstatement of existing surfaces above foundations shall comply with Clause 706.

15 Foundations for permanent traffic signs and signals shall be as described in IM Appendix 12/1 and unless otherwise stated, in compliance with this Clause.

16 All excavations for foundations shall be in compliance with Clause 604.

17 Grade ST2 concrete shall be placed in the bottom of the post hole until the planting depth in accordance with IM Appendix 12/1 is reached. The post shall be set vertically in the centre of the hole to the correct planting depth and the void filled to within 150mm of ground level with grade ST2 concrete in accordance with Clause 2602.

18 All backfilling of foundations shall comply with Clause 609, except that where ducts or buried cables are installed compliance shall be with Clauses 505 and 1421 respectively. Reinstatement of existing surfaces above foundations shall comply with Clause 706.

19 Posts shall be supported as required to ensure that the traffic sign post remains vertical during concrete curing.

20 For traffic signals and illuminated traffic signs, provision shall be made for cable entry through the foundation by means of 100mm diameter UPVC street lighting duct of 5mm wall thickness.

21 Where pockets are formed in concrete foundations, their plan dimensions shall be sufficiently larger than those of the post to allow for positioning and bedding of the post and backfilling of the pocket.

22 All posts and base plates shall be provided with the additional protection of a bitumen coating both internally and externally below ground level.

### 1204 Posts for Permanent Traffic Signs

1 The Contractor shall design, size, manufacture, supply and install the posts to comply with the performance required by this Series IM/1200 and for the minimum “Service Life Guarantee” period stipulated herein. The design shall be approved by the Overseeing Organization.

2 The sign post shall comply with the schedules in Table 1200-3, Table 1200-4, Table 1200-5, Table 1200-6 and Table 1200-7 and the Bills of Quantities. The post size range indicated in these tables (schedules) are based on tubular (CHS) galvanised structural steel grade S235

to EN 10210. The Overseeing Organisation will also consider alternative sizing proposals that provide equivalent performance.

3 All permanent sign posts shall comply with this Clause and the recommendations set in the UK National Annex of MSA EN 12899-1. Steel posts shall be tubular or rectangular hollow sections complying with MSA EN 10210 and shall be manufactured from steel complying with grade S275 JO or S275 J2:

a) steel posts shall be galvanised to the requirements of EN 1461 and EN 10240;
b) aluminium posts shall be tubular or rectangular hollow sections;
c) passively safe posts to EN 12767 are outside the scope of this Series IM/1200.

4 All posts shall be fitted with a base plate and plastic end caps. The size of the base plate shall be sufficient to prevent rotation in the ground or foundation.

5 Posts shall not protrude above the top of the sign unless supporting an external luminaire, in which case the protrusion shall be kept to a minimum.

6 Signs incorporating electrical ancillaries shall have the equipment enclosed in a large base housing. Access to the interior shall be by means of a weatherproof door having tamper-resistant locks. The lower edge of the door shall be positioned so that when installed it is no less than 300mm above ground level and orientated to oppose oncoming traffic. In the case of signs supported by more than one post such compartment shall be on the post furthest from the carriageway.

7 All holes cut in posts to provide a route for internal wiring shall be bushed to prevent chafing of any wiring and suitably protected using a zinc rich material specifically designed to provide a rust inhibiting coating.

8 A suitable earthing stud, complete with two brass washers, a brass nut and lock nut, shall be provided on metal sign doors.

9 All brackets, clips and butting plates used in sign assemblies shall be manufactured from stainless steel. All screws, bolts, nuts and washers shall be stainless steel, but where these are in contact with materials which may be damaged by overtightening or electrolytic action, protective washers of nylon or other approved material shall be inserted. Posts shall be protected against corrosion in accordance with Clause 1221. All posts and base plates shall be provided with the additional protection of a bitumen coating both internally and externally below ground level.

10 Post types and brackets shall be as described in IM Appendix 12/1.

11 All exposed ends of any hollow posts shall be capped to prevent the ingress of rain and moisture.

12 Multiple posts included within the same sign assembly shall be terminated level to each other and their height adapted to compensate for ground level difference.

13 Posts shall be fixed vertically plumb in all circumstances.

**Posts for Permanent Traffic Signs in Coastal Areas**

14 All permanent sign posts shall be aluminium.

## 1205 Sign Plates for Permanent Traffic Signs

1 All permanent sign plates shall comply with this Clause and the recommendations set in the UK National Annex of MSA EN 12899-1 MSA EN 12899-1. Plate signs not exceeding 1.2 m in height and 2.4 m width shall be made of a single sheet. Where more than one sheet is used to make up a sign, the number of sheets shall be kept to a reasonable minimum and the separate sheets shall be rectangular and of comparable size and shape.

2 Sign plates shall be in 99.5% aluminium in a semi-worked state conforming to EN 573-3 and EN 485-2, 1050A – H/24 or H14 or approved equivalent.

3 The minimum thickness shall be as follows:

a) ≤ 3.0$m^2$: 25/10

b) ≥ 3.0$m^2$: 30/10

4 Extruded plank signs up to 4.8 m wide shall have no vertical joints. Above this size, joints in extruded planks shall preferably be positioned at a vertical support; if not, then the vertical joints in adjacent planks shall not be less than 1.0 m apart and only one joint per extruded plank is permitted.

5 Fabricated plank signs up to 4.8 m wide shall have no vertical joints, but each plank may be constructed from a maximum of two pieces of sub-strate material, producing one split line. Split lines shall be lined up vertically or horizontally. Above 4.8 m wide, joints in the stiffening extrusions of adjacent planks shall preferably be positioned at a vertical support; if not, then the vertical joints in the stiffening extrusions of adjacent planks shall not be less than 0 m apart and only one such joint per fabricated plank shall then be permitted.

6 Where top and bottom light spill screens are required in IM Appendix 12/1, these shall extend for the whole width of the sign and be fabricated out of the same material as the sign plate.

7 Top and bottom light spill screens shall be considered as part of the sign plate and any stiffeners and mounting fittings shall be designed to accommodate the combined size.

## 1206 Faces for Permanent Traffic Signs

1 Faces for permanent traffic signs shall be as described in IM Appendix 12/1. They shall comply with MSA EN 12899-1 and with this Clause.

2 All sheeting shall be fixed in accordance with the sheeting manufacturer's instructions.

3 Only vertical and horizontal joints shall be permitted and all joints in plastics sheeting shall be overlapped by not less than 6mm. The overlap in the horizontal joints shall be from the top. Butt joints in plastics sheeting shall not be used, except between individual planks or in electrocutable overlay film, or as recommended by the sheeting manufacturer.

4 All materials comprising the sign face, including the background, border and legends shall be carefully matched for colour at the time of sign fabrication to provide uniform appearance both

by day and night. The sheeting manufacturer's recommendations on colour matching methods shall be observed.

5 Letters, numerals, symbols and borders shall be clear cut, sharp edged and without cracks.

6 Any cut-out letters, numerals, symbols and borders shall be of material compatible with the sheeting to which they are applied. They shall be applied in accordance with the sheeting manufacturer's instructions.

7 Screen processed letters, numerals, symbols and borders shall be screen printed with materials in accordance with the sheeting manufacturer's instructions. Any inks, pastes and finishing coats used shall be compatible with the sheeting material or the face panel of internally illuminated signs.

8 Sheeting materials including letters, numerals, symbols and borders shall be fully adhered and there shall be no air bubbles, creases, cracks or other blemishes. Where the sheeting manufacturer requires the assembled materials to be provided with a coat of clear lacquer, it shall be uniform and continuous. All lacquer shall be applied at the time of fabrication of the sign face and shall be of a type specified or supplied by the sheeting manufacturer.

9 The sign face reflective material (sheeting) shall comply with:

a) EN 12899-1 for retroreflection Class RA2, or

b) DIN 67520-4 or UNI 11122 (or equivalent) for retroreflection Class RA3. Additionally for Class RA3 the ratio of the greater and lesser retroreflection values shall not be greater than 2.5 for the entrance angle range 5º to 30º.

10 The chromaticity and luminance factors of the sheeting shall conform to EN 12899-1, Table 2, Class CR2 unless approved otherwise by the Overseeing Organisation.

11 Sheeting (including edges) shall be airtight with no airgaps. Where signs are composed of more than one panel gap-bridging of sheeting shall not be permitted.

12 Where requested in IM Appendix 12/1 or the Bills of Quantities signs shall be protected by an overlay film resistant to defacement (graffiti). The type of film used shall be approved by the sheeting producer.

13 The sign face shall be Class P3 to EN 12899-1, Table 13 (i.e Not pierced).

**Paint Colour (Where Applied)**

14 When painting is required (Eg. the rear face of the mounting backplate and the post/s) the colour shall be finished using a surface colour coating that bonds with the sign substrate (including any corrosion protection layers) and in accordance to the durability category indicated.

i. the colour shall be "Aircraft Grey" (BS 381C) or an approved close equivalent;

ii. the thickness shall be ≥ 40µ;

iii. the adhesion shall be 4 to 4.5N (new signs, aluminium) in accordance with EN 2409.

iv. the resistance to bending (elasticity) shall pass the test (EN 1519) using the 5.5mm mandrel (new signs);

v. the hardness shall be H – 2H (EN 9395);

vi. the impact resistance (EN 8901) shall pass the test from a height of 300/600/900mm (0.9kg weight);

vii. the corrosion resistance (EN 9590 or EN ISO 9227) shall pass the test with no oxidation (aluminium);

viii. the specular gloss shall be between 55 to 60 gloss (EN 2813, 20/60/85 degrees);

ix. the Erichson Cupping test (EN ISO 20482) depth shall be ≥ 12.65mm (new signs, aluminium).

**Mounting Support Backplate**

15 The materials for the permanent mounting support backplate shall be inn aluminium as described in Table 1200-8.

16 Any stiffeners and reinforcement chords shall be integral to the support backing plate.

17 The connection of the backplate to the post shall be detailed and installed in such a way as to prevent rotation of the sign.

18 The Contractor shall design, size (where applicable), manufacture, supply and install the mounting backplate to comply with the performance required by this specification for the minimum “Service Life Guarantee” period stipulated herein.

19 Faces of backplate substrates shall be prepared to receive sign face materials in compliance with EN 12899-1 and to the recommendations of the sign face material (sheeting) manufacturer.

20 The edges of plate or sheet sign substrates shall conform to EN 12899-1, Class E2 (minimum) and must not exhibit any sharp edges.

21 Any corner shall have a radius between 10mm and 50mm (or as approved by the Overseeing Organisation) depending on the sign panel size.

22 Edge reinforcement and/or plate stiffening will be permitted when used to attain the required performance requirements.

23 The fixing of any back plate shall ensure that any horizontal edges are always level and that the vertical edges are plumb.

24 Signs erected on two or more posts shall have the outermost posts positioned so that the distance from the centre of the post to the edge is 300mm unless otherwise indicated. Any intermediate posts shall be distributed evenly where reasonably practicable and where such installations do not hinder pedestrian movement on a footpath.

**Permanent Traffic Signs – Asset Inventory Tag/s**

25 An asset identification adhesive tag having a unique serial alphanumeric reference given by the Overseeing Organization shall be attached to the sign for asset inventory purposes.

26 Numerals and lettering shall be in black font “UK Transport Medium” and in accordance with RCD1200/32. Italic fonts shall not be used.

27 The tag shall be in form of an adhesive sheet to EN 12899-1 and shall have a retroreflective class RA1 (minimum) to EN 12899-1.

28 The resistance to weathering shall be in accordance with EN 12899-1, clause 4.1.1.5.

29 The colour shall be in the form of black legend/s and a white background.

30 Tags should be placed in the most conspicuous position on the back of the backplate, normally near the back left side bottom corner, and shall not be masked by the sign supports.

## 1207 Construction and Assembly of Permanent Traffic Signs

### General

1 Construction and assembly of traffic signs shall comply with MSA EN 12899-1 and with this Clause.

2 All sign plates and planks, frames, purlins, posts and other components shall be de-burred prior to assembly.

3 Where framing and stiffening are not an integral part of the sign plate their joints shall be welded or joined with suitable brackets utilising nuts, bolts and washers.

4 Where purlins are adopted they shall be attached to each vertical member of the sign frame and the sign stiffening and framing shall be continuous in the vertical direction. Purlins shall be spaced equally apart. Connections shall be made at every point where a purlin crosses a post.

5 Where purlins are not adopted the sign stiffening and framing shall be continuous in the horizontal direction.

6 Rivets and other devices used for fixing sheet sign plates to their stiffeners or framework, or in the construction of housings, shall be of a material compatible with the materials being joined. Spacing of rivets or other fixing devices shall be uniform and shall not exceed 150 mm around the outside edge of any sheet or section of sheet and shall not exceed 300 mm on cross braces. Hollow rivets shall not be used. Where sign plates need to be stiffened this shall be achieved in a manner such that the sign face material is not punctured or otherwise damaged to accommodate the stiffening.

7 An additional washer of neoprene, nylon or other suitable material shall be used between the sign face and any metal nuts, bolts, washers and screws to protect it from corrosive or other damaging effects.

8 Where supports to traffic signs, including external lighting luminaires, are required to have flange plates these shall be secured by anchorages and attachment systems complying with Series 1300. The bolts shall be lightly greased before final installation and they and their anchorages shall be installed so as to achieve the loadings, torque settings and other requirements described in IM Appendix 12/1.

9 Sheet and plank signs shall be connected to posts by an appropriate method. Banding systems shall be of stainless steel complying with AISI Grade 201.

10 Plank signs shall be assembled in accordance with the manufacturer's instructions.

11 Where ferrous components are permitted any drilling of them shall be completed before the application of any finish.

12 Any hole drilled in plates with plastics sheeting to accommodate a rivet or bolt shall immediately prior to the insertion of the rivet or bolt have a clear lacquer, recommended by the plastics sheeting manufacturer, applied to its edge to prevent the ingress of moisture. The surfaces of rivets or bolts exposed on the sign face shall be covered by a suitable material of a colour to match that part of the face.

13 Prior to fitting any sign to any lighting column, the Contractor shall ensure that the sign is included in the technical approval of the lighting column in accordance with the Technical Approval Scheme adopted by the Overseeing Organisation. No holes shall be drilled in the lighting column except those whose location and size are included in the technical approval.

14 Traffic signs to be erected on road lighting columns shall have fixings compatible with the column cross-section and finish. Wiring shall be contained in external conduit complying with BS 4568. Conduits shall be affixed to concrete lighting columns with stainless steel banding systems complying with AISI Grade 201. Conduits shall be affixed to other lighting columns with stainless steel clamps which shall be screwed with stainless steel screws into tapped holes in the lighting column. Alternatively, permanent cabling shall be placed on the inside of the lighting column and shall exit via a bushed drilled hole.

15 Flanges and Clamped Anchorage for Post / Foundation - The flanges or clamp anchorage at the post to foundation connection shall be to the requirements of EN 12899-1 and this Series IM/1200.

**Variable Message Traffic Signs**

16 Not Used

## 1208 Location and Erection of Permanent Traffic Signs

1 The approximate location of each traffic sign is described in IM Appendix 12/1. All traffic signs shall have their exact location determined and recorded in compliance with Clause 1403.

2 All posts shall be erected plumb and where two or more posts are provided for any one sign, the faces of the posts shall be lined up.

3 Signs erected on two posts shall have each post positioned so that the distance from the centre of the post to the edge of the sign plate is 300 mm unless otherwise described in IM Appendix 12/1.

4 Any pockets formed in concrete foundations to receive the posts shall be cleaned out immediately prior to erection. The posts shall be placed centrally in the pockets and be bedded on mortar designation (i) complying with Clause 2404 and, unless otherwise described in IM

Appendix 12/1, the pockets shall be filled up to finished foundation level with mix ST5 concrete.

5 Traffic signs mounted on posts, except those on gantries, shall be erected to have their face plumb and be orientated in relation to the carriageway in accordance with Chapter 1 of the Traffic Signs Manual.

6 Traffic signs mounted on gantries shall be erected as described in IM Appendix 12/6 and all other traffic signs shall be erected as described in IM Appendix 12/1.

7 The site records required by Clause 1402, shall include daily records for non-lit traffic signs.

8 No traffic sign shall be dismantled, re-sited or removed without the prior approval of the Overseeing Organisation.

## 1209 Covering or Blanking of Permanent Traffic Signs

1 Where it is required in IM Appendix 12/1 that permanent traffic signs be blanked-out or have an alternative message, the method to be adopted shall comply with the following, unless otherwise described in IM Appendix 12/1:

a) for plate signs: A cover plate compatible with the plate sign's material, or a covering of a suitable, opaque, non damaging material, or, for covering periods of up to one year, a self adhesive plastic film to support the temporary sign face sheeting;

b) for other traffic signs: A covering of a suitable, opaque, non-damaging material.

2 Cover plates shall be suitably fixed to give a 10 mm minimum air gap between the sign face and cover plate. The fixing method shall not cause damage or staining to the sign face. Any holes remaining in the finished sign face after removal of the plate shall be filled with a suitable material, of a colour to match that part of the face.

3 Where self-adhesive plastic film is used it shall be compatible with the sign face materials and be applied and removed in compliance with the manufacturer's instructions.

4 Any loose covering used must be sufficiently opaque to prevent reflection from and legibility of the covered sign and be securely fastened to the back of the sign. Under no circumstances shall tape or other adhesive material be applied to the face of the sign. Sufficient space shall be left between the covering and the face to permit air flow over the sign.

5 Traffic signs which are to be covered shall not be erected on trafficked highways without the covering in place.

6 Removal of any covering shall be carried out with the minimum disturbance to traffic.

7 Irrespective of any requirement in IM Appendix 12/1 to cover signs, any traffic sign erected at such a time that its legend does not relate either wholly or in part to the traffic movement and route in operation, shall have its sign face securely covered with one of the materials in sub-Clause 1 of this Clause until such time as its legend is applicable.

8 Where permitted by the Overseeing Organisation and subject to prior written approval the signs may be "crossed-off" using materials similar to those stipulated in the same Series IM/1200 and having the following characteristics:

a) Black strips between 100mm and 150mm wide depending on the size of the sign,

b) Formed from two intersecting lines approximately at 45 degrees to the horizontal,

9 The sign surface shall be cleaned from any marks after the removal of the blanking.

## 1210 Durability (Entire Sign Assembly)

1 Environmental Conditions - The environmental conditions relevant to corrosion and deterioration and applicable to each and every completed sign assembly shall be those indicated in ISO 9223: Corrosion of metals and alloys — Corrosivity of Atmospheres — Classification, determination and estimation, and EN 12899-1.

2 The applicable categories from ISO 9223 and EN12899-1 and the permitted sign types and associated materials shall be as shown in Table 1200-8:

***Table 1200-8: Durability – Selection of Materials (Minimum requirements)***

<table>
<tr><th>ISO 9223 Category (i)</th><th>Location (ii)</th><th>Corrosivity Level</th><th>Sign Type</th><th>Material for Backplate including any related fittings (iii)</th><th>Material for Post including any related fittings (iii)</th></tr>
<tr><td rowspan="2">All</td><td rowspan="2">All</td><td rowspan="2">All</td><td>Temporary (All)</td><td rowspan="2">Painted Steel</td><td rowspan="2">Painted steel</td></tr>
<tr><td>Class V and VI (Rural)</td></tr>
<tr><td rowspan="2">C3 to C4</td><td rowspan="2">Inland</td><td rowspan="2">From Medium to High</td><td>Permanent Class III to V roads</td><td rowspan="3">a. Aluminium plate (Solid), or<br>b. Aluminium foil sheeting over polymer core (Composite), or<br>c. Fibre-reinforced synthetic polymer resin.</td><td>Hot dip galvanized steel</td></tr>
<tr><td>Permanent Class HD to III roads</td><td rowspan="2">Aluminium sections / elements</td></tr>
<tr><td>C5M</td><td>Coastal</td><td>Very High (inc. high salinity air and sea spray)</td><td>Permanent Class HD to Class V Roads</td></tr>
</table>

*Notes:*

*i. The applicable category shall be as indicated in IM Appendix 12/1 or in the Bills of Quantities or as directed by the Overseeing Organisation.*

*ii. Inland - This shall be assumed as a distance more than 1 km from the coastline (or as directed by the Overseeing Organization).*

*iii. Alternative solutions / materials providing equivalent performance will also be considered subject to approval by the Overseeing Organisation.*

10 Materials shall be able to perform for the periods stipulated in the "Service Life Guarantee" as described in this IM Series 1200 without losses in excess of the rates of corrosion of the different materials described in ISO 9223 Table 2.

11 Anti-galvanic protection shall be applied where dissimilar materials can come into contact.

**Fasteners, Fastenings, Fixings, Fixtures**

12 All fasteners, fastenings, fixings, fixtures, collars, brackets and attachments shall have the durability specifications equivalent to that of the main components of the sign.

**Minimum Service Life Guarantee of the Entire Sign Assembly**

13 The complete sign assembly (i.e sheeting, backplate, post, foundation) shall not exhibit any of the following deficiencies within the minimum service life guarantee:

a) UV fading, peeling, delamination or cracking
b) Losses exceeding 30% of sheeting retroreflection and colour
c) Visible corrosion
d) Structural bending, deflection, loss of plumb and torsion
e) Foundation to post slack

14 The minimum service life guarantee for each complete sign assembly shall be as shown in Table 1200-9:

***Table 1200-9: Durability – Minimum Service Life***

| **Sign Assembly Requirements vs Minimum Service Life Guarantee (Permanent)** | | **Notes** |
|---|---|---|
| **Sheeting** | | |
| RA2 – 8 years | RA3 – 12 years | |
| **Backplate and Posts** | | |
| All Ambient Categories – 15 years | | |

*Note: If required by the product warranty conditions the Contractor shall ensure that digitally-imaged signs produced by thermal transfer be protected by a clear overlay film recommended by the producer.*

## 1211 Permanent Traffic Bollards

1 Permanent traffic bollards shall incorporate a prescribed traffic sign unless otherwise specified in IM Appendix 12/1.

2 Retroreflective fluorescent yellow conspicuity panels shall be installed only on the front and side faces of Traffic Bollards unless otherwise specified in IM Appendix 12/1.

3 All faces of Traffic Bollards which are not signs or conspicuity panels shall be coloured black

4 Internally illuminated bollards, when instructed, shall comply with MSA EN 12899-2 and be of the uplighter variety. They shall be vertically installed, assembled, correctly orientated,

connected and left in good working order, strictly in accordance with the manufacturer's instructions. Uplighters shall be securely fixed with rag bolts in their correct positions.

**Retroreflective Bollards – Self-Righting (Springback) - General**

5 Self-righting traffic bollards shall be Type A retroreflective self-righting bollards (RSRB's) as specified in BS 8442 unless otherwise specified in IM Appendix 12/1.

6 They shall comply to BS 8442 (or equivalent), clause 14 as follows:

a) Height (H): 900mm minimum.

b) Impact class: 70, NE, 4 (EN 12767) minimum

c) Retroreflection of the sheeting shall be Class RA2 (minimum), to EN 12899-1.

d) Retroreflective incorporated sign shall have a diameter of 300mm (min.)

e) Retroreflective yellow panels/bands shall always be mounted on the sides and front and back.

f) The units shall have a UV stabilised plastic body and must include all accessories, anchor/s, fixtures and base bracketing in accordance with the manufacturer's instructions.

**Retroreflective Bollards – Installation**

7 The units shall be installed in strict compliance with the producer's approved method.

8 The units shall be located on the flat approach ahead of the permanent nosing. The installation shall permit the unobstructed full deflection (and rebound return) of the bollard on impact. An "illustrative" arrangement is included below showing the clear deflection zone behind and in front of the bollard.

9 The Contractor shall remove any unserviceable items in the way of the new installation and render good the road surface.

**Figure 1 Typical (Illustrative) example of the installation in front of nosing**

10 The retroreflective bollard shall be installed at a safe distance of "H"+50mm away from the tip of any central strip or traffic island, where "H" is the overall height of the bollard and base supplied. This arrangement is shown in drawing RCD 1200/33.

**Rendering safe of Transilluminated Bollard connections (where applicable)**

11 In cases where the new installed unit replaces an existing transilluminated bollard ( i.e electrically connected) the Contractor shall render safe all live wiring and block the connection box.

**Transilluminated Bollards – General**

12 Transilluminated (internally illuminated) traffic bollards shall comply with EN 12899-2. They shall have a minimum height of 900mm (Class OH1) and shall be Type 1 TTB (i.e incorporated sign).

13 The specific visual performance characteristics recommended in the UK National Annex to EN 12899-2 shall apply BUT the retroreflective material shall have a retroreflection class RA2 (minimum) to EN 12899-1.

14 The diameter of the incorporated sign face on the bollard shall be 300mm. The application of adhesive non-transilluminated roundels shall not be permitted.

15 The units shall have a proprietary UV-stabilised plastic body (5 year anti-fading guarantee).

**Transilluminated Bollards - Impact Resistance**

16 The impact resistance class shall be as follows:

a) Class IR2 TTB – section 4.1.3.4 (deflectable, spring-back) or,

b) Class IR3 TTB – section 4.1.3.4 (shape regain, deformable)

**Transilluminated Bollards - Fixing**

17 The base light fixtures shall be compatible with the illuminated part of the unit for the specific model and the impact resistance class.

18 Bollards shall be secured by stainless steel bolts, nuts and washers. Bolts and anchorages cast into the foundation shall be capable of complying with the performance requirements of EN 12899:2 when tested as described therein and in accordance with the specific impact resistance class.

**Traffic Bollards for Cycle Lanes**

19 These shall be located to mark the start of the delineation line between the cycle lane and the carriageway.

20 The bollards shall be non-illuminated, retroreflective self-righting (springback) units and comply with BS 8442 (or equivalent) as follows:

a) Height (H): 900mm minimum.

b) Impact class: 50, NE, 4 (EN 12767) minimum

21 The retroreflection of the sheeting shall be Class RA2 (minimum) to EN 12899-1.

22 The body colour shall be white with retroreflective yellow panels/bands mounted on the sides and front and back.

23 The cycle lane bollard units shall have a UV stabilised plastic body and must include all accessories, anchor/s, fixtures and base bracketing in accordance with the manufacturer's instructions.

24 They shall be installed in strict compliance with the producer's approved method and be located ahead of the flat approach to the cycle lane separation line (or ahead of the permanent kerbed nosing). The installation shall permit the unobstructed full deflection (and rebound return) of the bollard on impact.

***Figure 2 Cycle Lane Springback Bollards***

## 1212 Permanent Marker Posts

**Hazard Marker Posts (Delineators) - General**

1 Hazard marker posts shall be Type D3 or D4 to MSA EN 12899-3 and comply with the classes recommended in the UK's National annex to that standard.

2 The reflectors shall be Type R1, Class 3 and comply with Diagram 560 of the UK's Traffic Signs and General Directions. The retroreflective sheeting shall be protected from damage from overrunning vehicles by raised edges or other acceptable methods.

3 The hazard marker post shall be installed so that its top is between 750mm and 1000mm above ground level, unless otherwise required by the Client, and it shall present a projected width of not less than 100mm.

**Hazard Markers (Delineators) -Placement**

4 When so directed by the Overseeing Organisation retroreflective hazard markers shall be placed to delineate hazards.

5 The markers shall be of the type that are incorporated into posts using retroreflectors to EN 12899-3.

6 The retroreflective marker shall be in the form as indicated in the UK TSRGD Diagram 561 or close equivalent.

7 All types of retroreflectors from those indicated in EN 1299-3 (i.e R1 / R2 / R3) shall be permitted.

**Hazard Markers (Delineators) – Retroreflection**

8 The retroreflection value (minimum) shall be as indicated in EN 12899-3 for the specific retroreflector type.

9 When fixed directly onto the hazard the support brackets shall be steel, aluminium or plastic. The units shall be fixed using either screws or strong adhesive. The fixing level shall ensure that a smooth line of reflectors is visible to the driver.

10 No reflectors shall be installed in front of hazards at locations that may lead drivers into misjudging the true carriageway borders.

11 Hazard markers incorporated into posts shall be of the "springback" type and have alternate black and white stripes. The colour of the retroreflective marker shall be:

a) Single face red or amber or white;

b) Double face red/white

12 The fixing and depth below ground shall be as indicated by the manufacturer.

*Figure 3 Hazard Markers incorporated in Post*

**Distance Marker Posts**

13 Distance marker posts shall be made from hard-wearing polymer and shall be supplied and installed with a ground socket or mounted on a safety fence in compliance with the distance marker post manufacturer's instructions.

### 1213 Traffic Cylinders (High Impact Resistance) - General

1 The traffic cylinders (high impact) shall be of the rebound / springback type and must return to a full "upright" position after impact at the speed indicated herein.

2 The cylinders shall be of the "embedded / anchored in ground" type.

3 The requirements shall be as described in Table 1200-10 Table 1200-11.

**Table 1200-10: Traffic Cylinders – General Requirements**

| Item | Requirement | Notes |
|---|---|---|
| **Height** | 750mm to 1000mm or close approximate | |
| **Colour** | Red or Orange with white retroreflective strips of class RA2 (EN 12899-1) | Or as approved by the Overseeing Organisation. |
| **Standards** | a) United States NCHRP 350<br>b) EN 12767 | US nomenclature – Channelizer posts / delineators |
| **Impact:**<br>**Performance Standard** | a) Texas Transportation Institute (TTI)<br>b) AASHTO TTCD 14-01 (NTPEP) | Details required |
| **Weathering** | 1,000 hours UV exposure - Pass | Tensile strength + elongation data required |

*Note: Equivalent alternative performance and test standards will also be considered*

**Traffic Cylinders (High Impact Resistance) - Impact Performance**

**Table 1200-11: Traffic Cylinders – Impact Performance Requirements**

| Item | Requirement | Notes |
|---|---|---|
| **Test Configuration** | Min. 8 units to NTPEP set-up | Impact and wheel-over tests |
| **Vehicle Test Speed** | 80 km/h minimum | |
| **Number of Impacts** | 100 min. | |
| **Retention of Verticality** | ± 5 degrees | Lean and List |
| **Retroreflective Sheeting Loss** | 50% max. | |
| **Damage** | No cracking , splitting | |

*Note: Alternative units demonstrating an equivalent performance during site trials will also be considered if supported by documented technical evidence and/or trial data.*

**Traffic Cylinders (High Impact Resistance) - Safety**

4 The units shall be certified as safe on impact in accordance with the United States NCHRP 350 or European EN 12767 or approved equivalent or as approved by the Overseeing Organisation.

**Traffic Cylinders (High Impact Resistance) - Installation**

5 The Contractor shall install the units in strict compliance with the manufacturer's recommended methods.

## 1214 Road Markings

**General**

1 Road markings shall be white or yellow (Classes Y1 and Y2) complying with MSA EN 1436 Table 6, as appropriate except where an alternative shade has been specified in IM Appendix 12/3. The markings shall consist of continuous or intermittent lines, letters, figures, arrows or symbols and comply with sub-Clauses 2 to 8 of this Clause. Statutory requirements controlling road markings are contained in CAP 65.05 (Laws of Malta).

2 The size and graphical form and arrangement of the roadmarkings shall be in accordance with the UK Traffic Signs Regulations and General Directions (TSRGD) and the UK Traffic Signs Manual (TSM), Chapters 1 to 8 or as approved by special order of the Overseeing Organisation.

**Permanent Road Markings**

3 Permanent road markings shall be one of the following materials and comply with the colour, location and material type requirements described herein, in IM Appendix 12/3 or in the Bills of Quantities:

a) thermoplastic road marking material or paint in accordance with MSA EN 1871;

b) permanent preformed road markings in accordance with MSA EN 1790;

c) other materials as described in IM Appendix 12/3 or in the Bills of Quantities.

They shall also be tested in road trials ("P", Passover class) in accordance with the procedure stated in EN 1824 (or alternatively to EN 13197) to demonstrate compliance with the requirements as stated in sub-Clauses 3 to 6:

i. to the Roll-over class P5 (minimum), or

ii. to the Roll-over class as described in IM Appendix 13/3 or in the Bills of Quantities.

The test report shall give particulars of the quality and quantity of the material, including drop on glass beads laid at the test site for future reference and comparison purposes should such a need arise. The requirements in clause 1222 shall also apply.

4 Road markings shall have the following road performance as defined in MSA EN 1436 for the period of the functional life starting from the date of application or when the road is trafficked, whichever is later. The materials to be used shall be to the same mix, material quality, quantity and rate of application as used on the test site.

***Table 1200-12: Roadmarkings - Requirements of marking screed, spray***

| Property | MSA EN 1436 Reference | Requirement | Value |
|---|---|---|---|
| Colour | Table 6 | 1. White | x, y co-ordinates given |
| | | 2. Yellow Class Y1, Y2 | x, y co-ordinates given |
| Luminance Factor | Table 5 | 1. Class B2 | 0.3 |
| | | 2. Class B1 | 0.2 |
| Skid Resistance | Table 7 | 1. Class S2 | 50 |
| | | 2. Class S2 | 50 |
| Retroreflectivity | Table 2 Class of RL for dry markings | 1. Class R2 | 100 |
| | | 2. Class R1 | 80 |
| Softening Point of screeded thermoplastics | Table 6 of MSA EN 1871 | 1. SP4 | $>110^{0C}$ |
| | | 2. SP4 | $>110^{0C}$ |

*** Note: 1 = White, 2 = Yellow**

5 The width tolerances and thickness for screed, spray, preformed and extruded white or yellow lines shall be in accordance with The UK's Traffic Signs Regulations and General Direction 2016. With the exception of the road markings listed in Regulation 32 (2) of The Traffic Signs Regulations and General Directions, in no case shall any materials be laid more than 6 mm

thick. Unless specified, all white markings shall be reflectorised with glass beads in accordance with MSA EN 1423 and MSA EN 1424 by incorporation (apart from preformed markings) into the road marking mixture and to the wet surface of the marking. The glass beads shall not have more than 1,000 ppm of Arsenic Trioxide, 200 ppm of Lead and 1,000 ppm of Antimony. The Contractor shall supply test certificates showing compliance with these requirements.

6 Where there is requirement for improved visibility in wet conditions at night, products showing the following performance in addition to that stated in sub-Clause 3 shall be used:

***Table 1200-13: Requirement for improved visibility in wet conditions at night***

| Property | MSA EN 1436 Reference | Requirement | Value |
|---|---|---|---|
| Retro reflectivity | Table 3 | Class RW3 | 50 |

7 Where there is a requirement for improved skid resistance as referred to in IM Appendix 12/3 products showing the following performance in addition to that stated in sub-Clause 3 shall be used:

***Table 1200-14: Requirement for improved skid resistance***

| Property | MSA EN 1436 Reference | Requirement | Value |
|---|---|---|---|
| Skid Resistance | Table 7 | Class S3 | 55 |

8 The pavement shall be prepared in accordance with the following:

a) Where the marking is to be applied on concrete carriageways, the transverse texturing shall be freed from all traces of curing compound by wire brushing or other approved means. Prior to the application of the thermoplastic material a tack coat compatible with the road surface and the marking material shall be applied in accordance with the manufacturer's instructions.

9 The application of permanent road markings shall be in accordance with the Sector Scheme described in IM Appendix A. Road marking materials shall only be applied to surfaces which are clean and dry. Markings shall be free from raggedness at their edges and shall be uniform and free from streaks. Longitudinal road markings shall be laid to a regular alignment.

**Preparatory Works - Existing Surface Texture**

10 The Contractor shall only lay material on pavement surfaces having sufficient texture to ensure the required durability. The Contractor shall thus be responsible for establishing the existing texture depth (EN 13036-1) of the carriageway and reporting the results to the Overseeing Organisation before proceeding with the works. Carriageway surfaces exhibiting texture below that recommended by the roadmarkings producer shall be:

a) prepared using a primer / bond coat to the recommendations of the road marking producer;

b) re-textured using methods approved by the Overseeing Organisation.

11 A primer and/or bond coat shall always be applied on concrete parts of the carriageways, block setts.

12 The Contractor shall clean, prepare, brush / wash and dry the carriageway surface to enable a strong bond to be formed between the road marking material and the carriageway using whatever methods are fit for purpose BUT without damaging the pavement surface and for which payment shall be as described in the Bills of Quantities.

13 The surface preparation of the substrate shall be applied in strict accordance with the manufacturer's recommendations to ensure compliance to the specified requirements throughout the guarantee period.

**Setting Out**

14 The Contractor shall be responsible for the correct setting out of all lines, words, arrows, stripes and symbols.

15 Spray paint shall not be used for the setting out of symbols, text or numerals where this will remain visible after the marking has been laid. In these instances road marking chalk should be used. Where white paint is used to set out longitudinal markings this must be covered by the road marking material.

**Roadmarking Reflectorisation**

16 Reflectorisation shall be with solid glass beads, complying with EN 1423 (drop-on) and EN 1424 (pre-mixed). In the case of materials with pre-mixed beads the drop-on beads shall also be applied to provide "immediate" initial retroreflection to the levels specified above. Only glass-beads indicated by the manufacturer for the required retroreflection class shall be permitted.

**Roadmarking Material - Composition**

17 The formulation of the line marking and its application on site are the responsibility of the Contractor and any material composition or techniques may be utilized provided the performance requirements are achieved.

**Thickness**

18 The benchmark thickness for the acceptance of the markings shall be the manufacturer's recommended dry-film thickness (excluding the drop-on glass beads) for the durability class indicated in IM Appendix 12/3.

19 The applied dry layer thickness shall ensure the performance of the markings to the specified requirements and for the duration of the durability requirements.

**Testing**

20 Minimum testing frequency and test criteria shall be as indicated in clause 1224 and shall include the following:

a) Luminance;

b) Retroreflection;

c) Dimensional tolerances;

d) Skid resistance ;

e) Dry Film thickness (Test procedure to be proposed by the Contractor and approved by the Overseeing Organisation.

**Durability Performance – "Passover / Roll-Over" Class**

21 The road markings shall perform "within specifications" for the minimum passes indicated in the "P" Passover class (EN 1824 or EN 13197) in sub-clause 1214.3 or as described in IM Appendix 12/3 or in the Bills of Quantities.

*Note1: EN 1824 (UK practice) identifies wheel passes as "rollover" and is limited to Class P5. For classes higher than P5 and certified to EN 1824 only extrapolation of the additional thickness required - if any - shall be permitted if supported by a declaration by the producer.*

*Note2: To establish the durability performance the Overseeing Organisation may consider traffic merge, weave and lane traffic distribution based on documented traffic counts, systematic observation and engineering judgement.*

22 The Contractor shall protect newly laid markings from being trafficked over by vehicles or pedestrians until sufficiently set / cured to prevent damage to the marking or injury to the public.

**Temporary Road Markings**

23 Temporary road markings shall only be used with the prior approval of the Overseeing Organisation. They shall comply with Sub-Clauses 2 to 8 above and be constructed from either:

a) a proprietary preformed road marking material complying with MSA EN 1790 and assessed as removable under that standard, or

b) paint to MSA EN 1871.

24 When temporary road markings are used on surfaces that will continue to be used by public traffic after their removal, any shadow trace remaining after their removal shall be permanently obliterated. Preformed materials shall not be used for this obliteration. Upon removal they shall be disposed of off-site and if any making good is necessary to the road surface it shall be satisfactorily carried out before the road is opened to traffic.

25 Temporary road markings constructed from a preformed road marking material or paint shall only be applied to surfaces that are clean and dry. The marking material shall be new and,

together with any primer, shall be stored and installed in accordance with the manufacturer's instructions and within the recommended shelf life.

26 Temporary roadmarkings (white or yellow) shall have a minimum durability class P5 and shall comply in their entirety to the specifications for this class of durability.

**Spray Paint Markings (Permanent or Temporary) - Particular Requirements**

27 Spray paint markings shall have the following characteristics:

a) Type 1 (as defined in EN 1436, clause 3.7);

b) Durability class P5 (1 million passes) to EN 1824 or EN 13197

c) Application: Machine-applied spray

d) Retroreflection: Drop-on glass beads

e) No pickup time: Class T3 (≤ 20 minutes to EN 13197, Table 2)

**Thermoplastic Markings (Permanent) - Particular Requirements**

28 Thermoplastic markings shall have the following characteristics:

a) Type 1 (as defined in EN 1436, clause 3.7);

b) Durability class P6 (2 million passes) to EN 1824 or EN 13197

c) Softening point: SP4 minimum to EN 1871 (Wilhelmi method)

d) Application: Machine-applied screed or extrusion; Sprayed thermoplastic marking will be permitted subject to prior approval from the Overseeing Organisation and upon submission of evidence of equivalent performance of the material.

e) Retroreflection: Pre-mixed and Drop-on glass beads or approved equivalent

f) No pickup time: Class T3 (≤ 20 minutes to EN 13197, Table 2)

**Test Conditions: No Pick Up Time**

29 The test reference ambient conditions shall be those described in EN 13197, Annex A, A.3. The Overseeing organisation shall consider increasing the pick – up time when wind direction denotes higher and persistent humidity (i.e "rih isfel" conditions).

**Masking of Existing Road Markings**

30 The Contractor's proposed method of masking existing road markings shall be agreed with the Overseeing Organisation.

31 When black masking materials are required to cover existing permanent road markings, they shall comply with BS 7962 other than for specular gloss where they shall have an initial value for specular gloss of no greater than 3, and a retained value following exposure to traffic of no greater than 3. The total thickness of original and masking materials shall not exceed 6mm.

**Removal of Road Markings**

32 The removal of road markings on surfaces that will continue to be used by traffic shall be undertaken in a manner that will avoid damage to the surface.

33 The removal of temporary road markings shall comply with sub-Clauses 10 and 11 of this Clause.

34 For bituminous running surfaces, the removal of permanent road markings shall be by mechanical means or forced air abrasive (shot blasting) only. Hot Compressed Air (HCA) lance shall be permitted on other types of running surfaces. In all cases the Contractor shall submit details of the proposed method for the Overseeing Organisation's consent.

**Longitudinal Road Markings Lateral Tolerances**

35 For longitudinal road markings, the lateral tolerance shall be within ± 25mm from the designed position. Any discontinuities between road markings shall be replaced with a smooth taper from one road marking to the other. The length of the transition shall be derived from table below. All road markings shall comply with the dimensions, angles and proportions stated in the UK Traffic Signs Regulations and General Directions 2016.

***Table 1200-15: Length of transition for discontinuities in road markings***

| Speed Limit (kph) | Taper |
|---|---|
| 50 | 1 in 40 |
| 64 | 1 in 40 |
| 70 | 1 in 45 |
| 80 | 1 in 45 |

## 1215 Road Studs

**Retroreflecting Road Studs**

1 Requirements controlling retroreflecting road studs (both permanent and temporary) are contained in the UK Traffic Signs Regulations and General Directions 2016 and the UK Traffic Signs Manual Series.

**Type and Colour**

2 The road studs body and reflectors shall be of the type and colour indicated in the UK Traffic Signs Regulations and General Directions and the UK Traffic Signs Manual (Chapter 5).

3 The studs shall be of in any retroreflective colour required by the Regulations (white, amber, red, green).

**Anchoring Spigot**

4 Additionally, road studs used in "stress" locations (curves, weaving / merge sectors) and in Road Classes HD to III shall have a durable metal body and a reinforcing anchoring spigot.

5 The studs retroreflective directionality (uni-direction or bi-direction) and retroreflected colour in each direction shall be as required by the Regulations. These shall be indicated in IM Appendix 12/3 and the Bills of Quantities.

**Placement and Spacing**

6 The specific location placement of the studs shall be as directed by the Overseeing Organisation or as detailed in the Drawings.

7 The Contractor shall be responsible for the proper setting out, alignment and accurate on-site measurements for placement.

8 Depending on the speed, the width of the carriageway and other factors the spacing of the road studs shall be selected from the following:

***Table 1200-16: Road Stud Spacing***

| Type | Speed | Spacing |
|---|---|---|
| Single Centre Line<br>Double Centreline<br>Lane Line<br>Edge Line | ≤60 km/h<br>> 60 km/h | 12m<br>18m |
| Warning lines | ≤60 km/h<br>> 60 km/h | 6m<br>9m |
| Curves | ≤60 km/h<br>> 60 km/h | 6m<br>9m |
| Spacing may be further reduced to delineate nosings, islands and similar. | | |

**Removal of Existing Studs**

9 All existing studs in the way of the new units shall be removed when so directed by the Overseeing Organisation and the surface made good.

**Dimensions and Class**

10 The nominal dimensions for reflective studs shall be 100mm x 90mm or close equivalent.

**Permanent Retroreflecting Road Stud Classes**

11 The permanent studs shall comply with the following Classes as described in IM Appendix 12/3 and the Bills of Quantities:

i. EN 1463-1: Types P1(Glass), A or P2(Plastic), A or P3(With Abrasion resistance), A

ii. EN 1463-1, Table 1 and 2;

   a. PR (Photometric requirements) PRP1 (EN 1463-1, Table 4);
   b. NCR1 (EN 1463-1, Table 9).

iii. EN 1463-1: Height Class H1 (up to 18mm above asphalt) or

a. Height Class H2 (between 18mm and 20mm above asphalt)
b. EN 1463-1:
c. Horizontal dimensions Class HD1

iv. EN 1463-2: Retro-reflection resistance (Night time visibility) R1 (100% retention);

a. Assessment Performance S1 (42+ remaining), R1 and DV1.

12 The fixing adhesive shall be selected from one of the following:

a. bitumen-based hot melt compound having a BBA HAPAS certificate (or equivalent). The compound shall perform at very high and sustained pavement temperatures (60 degrees and over);
b. hot applied compound having a BBA HAPAS certificate (or equivalent);
c. cold applied compound having a BBA HAPAS certificate (or equivalent);
d. as recommended by the road stud manufacturer.

**Retroreflecting Road Studs - Glass Road Studs**

13 The studs shall be circular with a nominal diameter of 100mm and an overall height of 45mm or close equivalent.

14 The glass road studs shall be of the “embedded / inset” dome type and comply with MSA EN 1463-1 and 2 and with the following Classes:

a. Form: Dome or Dome/Flat Top
b. EN 1463-1:
    i. Types P1A
    ii. PRP1 (Table 4);
    iii. NCR1 (Table 9).
c. EN 1463-1:
    i. Height Class H1 (up to 18mm above asphalt) or,
    ii. Height Class H2 (between 18mm and 20mm above asphalt)
d. EN 1463-1: Class HD1
e. EN 1463-2:
    i. Retro-reflection resistance (night time visibility) R1;
    ii. Performance S1.

15 They shall be manufactured from tempered optical glass with 360° viewing angle and with a reflector height of 13mm or 19.5mm (or close equivalent).

16 They shall be in the form of either rounded or flat-top “dome”. These shall not be interchanged for a grouped cluster.

17 All inset studs openings shall be cut by mechanical circular milling dedicated for this purpose and infilled using a proprietary grout.

**Non-Retroreflecting Road Studs (Metal)**

18 Non-retroreflecting metal studs shall conform to the UK “Zebra, Pelican and Puffin Pedestrian Crossing Regulations and General Directions 1997”.

19 They shall be rectangular or square and comply with BS EN 1463-1:1998 and BS EN 1463-1, Product type P(NR)A, Performance class H1, HD1, PRP0, NCR0 and Road Performance class (BS EN 1463-2) S1, R0.

**Non-Retroreflecting Road Studs (Ceramic)**

20 The top surface of the marker shall be convex (domed) with a radius of curvature between 90 mm and 150 mm or close equivalent. The radius within 13 mm of the edge may be less, but any change in curvature shall be gradual.

21 When viewed under natural daylight conditions, the perceived colour shall be white.

22 The diameter of the base shall be 100 ±10 mm or close equivalent and the thickness at the centre shall be between 13 mm and 20 mm.

23 The thickness at the edge shall be between 3 mm and 6 mm.

24 The markers shall have a minimum compressive strength of 5kN.

25 The glaze on the top surface of the ceramic markers shall have a thickness of not less than 0.075 mm and a scratch hardness of not less than 6 on the Mohs scale.

**Temporary Retroreflecting Road Studs**

26 Non retroreflecting road studs are not permissible for use in the works” Non retroreflecting Road Studs

27 All non-retroreflecting road studs shall be installed in accordance with the manufacturer’s instructions in locations, and complying with any other requirements, described in IM Appendix 12/3.

## 1216 Traffic Cones, Traffic Cylinders, Flat Traffic Delineators and Other Traffic Delineators

**General**

1 Traffic cones and traffic cylinders, hereinafter termed cones and cylinders, shall comply with Designation 1 or Designation 2 of MSA EN 13422.

2 Flat Traffic Delineators, hereinafter termed FTDs, shall comply with sub-Clauses 3 to 17 of this Clause.

3 An FTD shall comprise a flat blade fixed to a base. The flat blade may incorporate stiffeners provided that they do not encroach into the white retroreflective area.

4 FTDs shall be constructed of rubber or plastic materials. It shall be possible to insert and remove blades without requiring a special tool. The height of the FTD shall be 750 mm or 1000 mm as stated in IM Appendix 12/4. The width of the top of the blade shall be 45 ± 10 mm. Other dimensions shall be in accordance with Diagram 7102 of TSRGD 2016

5 FTD bases shall be so designed that they will stack without binding and without causing damage to the retroreflective surfaces. Additionally, the blades and their attachment to the base or fixing shall be so designed that the blade's face presents throughout its design life a plane to the approaching traffic no more than 12.5° from the vertical.

6 FTD bases may be coloured red, black, grey or brown. They may have a 100 mm wide white reflective line placed on one edge of the base provided:

a) the edge of the base where the white line is to be attached comprises a sloping surface which is at an angle to the road surface of no more than 60° and is of such dimensions either to fully accommodate the 100 mm wide white line or, where the angle between the road surface and the sloping surface exceeds 30°, to accommodate at least 80 mm of the width of the white line, the excess (maximum 20 mm) being returned onto the top surface of the base;

b) the material from which the base is manufactured allows proper adhesion or attachment of the white reflective line to prevent it becoming detached during normal use;

c) the coverage of white reflective material is maintained at more than 70% of the area treated.

7 The white reflective strip material shall comply with MSA EN 1436 and MSA EN 1871 or MSA EN 1790 as appropriate. Additionally, when tested using a portable retroreflectometer the white line shall have a coefficient of retroreflectance of Class R2 or better to Table 2 of MSA EN 1436.

8 FTD blades shall be coloured red and white as indicated in Diagram 7102 of TSRGD 2016

9 The white portions of the FTD blades shall comply with the chromaticity co-ordinates and luminance factor given in MSA EN 12899-1.

10 The red portions of the FTD shall comply with the chromaticity co-ordinates and luminance factor for traffic cones given in MSA EN 13422 when measured in accordance with BS 873 : Part 1.

11 That part of the blade coloured white shall comprise retroreflective material, complying with the requirements for Class 1 or Class 2 as specified in MSA EN 12899-1, which shall be securely applied or attached to the blade to prevent it becoming detached during normal use.

12 The red portions may also be retroreflective.

13 The minimum mass of the FTD including any ballast recommended by the manufacturer shall comply with the mass of a traffic cone as defined in MSA EN 13422.

14 FTDs shall be clearly and durably marked with the following information in the following order:

a) the name, trade mark or other means of identification of the manufacturer or vendor;

The marking shall be in characters legible at a normal reading distance such that the total area of the marking does not exceed 30 cm².

15 All markings shall be sufficiently durable to last the expected life of the FTD to which they are applied and in no case less than 5 years.

16 When checked by inspection and by rubbing lightly, first for 15 seconds with a piece of cloth soaked in water and then for 15 seconds with a piece of cloth soaked in petroleum spirit,

followed by 15 seconds with a piece of cloth soaked in diesel oil, the marking shall still be legible.

17 FTDs shall be supplied with the following information:

a) instructions for ballasting (if required);

b) instructions for fixing blades to bases.

18 Other traffic delineators hereinafter termed delineators shall be as described in IM Appendix 12/4.

19 The Contractor shall submit to the Overseeing Organisation a copy of a test certificate confirming that samples of the identical type of cone, cylinder, FTD or delineator as those to be used in the Works and supplied as permanent cones, cylinders, FTDs or delineators under the Contract, have been tested and found to comply with sub-Clauses 1 to 18 of this Clause.

**Permanent Cones, Cylinders, FTDs and Other Delineators**

20 Where required in IM Appendix 1/5 the Contractor shall arrange for the tests described in sub-Clauses 22 to 56 of this Clause, for cones, cylinders, FTDs and other delineators, to be carried out at an approved testing laboratory. The numbers to be tested, as given in IM Appendix 1/5, are to be selected at random from the batch to be supplied under the Contract. Failure of any test will result in rejection of the batch.

**Temporary Cones, Cylinders, FTDs and Other Delineators**

21 The Contractor shall submit to the Overseeing Organisation certification substantiating that at least 1 in every 500 of any batch of cones, cylinders, FTDs and delineators to be used in the Temporary Works have passed the tests described in sub-Clauses 22 to 56 of this Clause as appropriate.

**Testing**

22 Cones and cylinders shall be tested in compliance with MSA EN 13422.

23 FTDs shall be tested in compliance with sub-Clauses 24 to 55 of this Clause.

24 Test procedures shall be carried out on each size of FTD and each method of attachment between blade and base.

25 When tested in accordance with sub-Clauses 31 to of this Clause with the exception of the white retroreflective material, no part of the FTD shall crack, split or deform.

26 When samples with retroreflective portions attached are tested in accordance with sub-Clauses 31 to 38 of this Clause the coefficient of luminous intensity, R (as defined in Publication CIE No 54; Retroreflection, definition and measurement), after testing shall be not less than 80% of the value previous to the test.

27 When tested in accordance with sub-Clauses 39 to 43 of this Clause, no part of the FTD with the exception of white retroreflective material, shall crack, fracture or split and any ballast or ballast container shall not have become displaced within the base or separated from it. Any

ballast container as either an integral part of the base or enclosed within it shall not have been damaged to the extent that ballast is discharged. Caps or bungs to ballast containers shall not have been forced from their sockets or other fixings.

28 When tested in accordance with sub-Clauses 44 to of this Clause, no part of the FTD with the exception of white retroreflective material shall crack, fracture or split. Bases shall remain in contact with the reference surface.

29 When tested in accordance with sub-Clauses 50 to 55 of this Clause, no part of the FTD with the exception of the white retroreflective material shall crack, fracture or split. Bases shall remain in contact with the reference surface.

30 Throughout the tests in sub-Clauses 31 to 38, 44 to 49, and 50 to 55 of this Clause, the blade shall remain fixed in position. On completion of the testing in accordance with sub-Clauses 44 to 49 and 50 to 55 of this Clause the residual deflection of the top of the blade in any horizontal direction, measured 30 seconds to 60 seconds after completion of the tests, shall be not more than 12.5% of the height of the FTD. The height of the FTD, H, is as measured from the reference surface.

**Low Temperature Impact Test**

31 The test shall be conducted using a steel ball swung on a pendulum. The apparatus shall be as shown in HCD Drawing Number K3. The steel ball shall have a mass of 0.9 ± 0.045 kg and be suspended by one or two steel pendulum wires of not more than 1 mm diameter so that the pendulum radius is 1750 ± 10 mm. The point of impact shall be vertically beneath the centre of radius of the pendulum and at a height on the specimen of H/2 ± 10 mm where H is the height of a FTD above the reference surface.

32 FTDs shall be fixed to the reference surface using the base.

33 The test shall be carried out on specimens with and without retroreflective portions attached.

34 For samples with retroreflective portions attached, the coefficient of luminous intensity, R, of every such face at an observation angle of 20° and at an entrance angle normal to the face of the blade prior to the conditioning shall be determined; the definitions of observation angle and entrance angle being those given in BS 873: Part 1.

35 All test samples shall be conditioned for a period of not less than 2 hours at a temperature of -16 ± 2°C. Impact testing shall be carried out within 60 seconds after conditioning.

36 Impact shall be made in ambient conditions of not greater than 20°C.

37 Within 1 hour of impacting, samples shall be immersed with retroreflective portions attached, in water at 20 ± 5°C for 10 minutes. After draining for 10 minutes the coefficient of luminous intensity, R, shall be measured in accordance with sub-Clause 34 of this Clause.

38 The sample shall be examined and any damage, percentage change in the coefficient of luminous intensity, or any detachment of a blade from its base shall be reported.

**Drop Test**

39 FTDs requiring the addition of ballast shall be ballasted as instructed by the manufacturer.

40 The FTD shall be conditioned for a period of not less than 2 hours at a temperature of 32 ± 2°C.

41 Within 1 minute after conditioning the FTD shall be suspended with its normal vertical axis horizontal (any cap or bung to a ballast container forming an integral part of the FTD shall be positioned uppermost) and with its lowest part 1500 ± 5 mm above a solid horizontal surface and dropped once vertically from rest onto the solid surface.

42 The test detailed in sub-Clause 41 shall be repeated after conditioning at a temperature of -16 ± 2°C.

43 Any damage observed shall be reported.

**Bending Test**

44 The test shall be carried out on specimens with and without retroreflective portions attached.

45 The blade shall be fixed to the base in accordance with the manufacturer's instructions. The blade and its base shall be conditioned for a period of not less than 2 hours at a temperature of -16 ± 2°C. Within 1 minute after conditioning, the blade shall be bent over about its base line by applying a force to the face of the blade at a point on its vertical centre line H/2 ± 10 mm from the top, so that the top edge touches the reference surface or a surface coplanar with it as indicated in the HCD Drawing Number K3. H is the height of the FTD. When the top edge of the blade touches the reference surface the bending force shall be removed immediately.

46 From 30 seconds to 60 seconds after completion the maximum residual horizontal deflection of the top of the blade shall be measured from the vertical axis passing through the centre of the base of the blade and perpendicular to the reference surface.

47 The test shall be repeated in the opposite direction.

48 The procedure in sub-Clauses 45 to 47 of this Clause shall be repeated at a temperature of 32 ± 2°C.

49 The deflections, any damage observed, any detachment of the blade from its base, and any movement of the base shall be reported.

**Fatigue Test**

50 The test shall be carried out on specimens with and without retroreflective portions attached. This test is to be carried out on a different specimen to that or those tested in sub-Clauses 31 to 38 and 44 to 49 of this Clause.

51 The blade shall be fixed to the base in accordance with the manufacturer's instructions. The test shall be carried out after conditioning the blade and its base for a period of not less than 2 hours at a temperature of -16 ± 2°C.

52 By applying a force to the face of blade at a point on its vertical centre line H/2 ± 10 mm from the top, the top of the blade shall be oscillated as indicated in the HCD Drawing Number K3 at a frequency of 60 oscillations per minute to 90 oscillations per minute at an amplitude of H/4 for 10 minutes with the reference surface held in a horizontal position. H is the height of

the FTD. One oscillation is the movement from the upright position to the maximum amplitude in one direction, then to the maximum amplitude in the opposite direction and then the return to the upright position.

53 From 30 seconds to 60 seconds after completion the maximum residual horizontal deflection of the top of the blade shall be measured from the vertical axis passing through the centre of the base of the blade and perpendicular to the reference surface.

54 The procedure in sub-Clauses 51 to 53 of this Clause shall be repeated at a temperature of 32 ± 2°C.

55 The deflection, any damage observed and any detachment of the blade from its base shall be reported.

56 Other traffic delineators shall be tested in compliance with IM Appendix 12/4.

## 1217 Road Danger Lamps and High Intensity Flashing Beacons

1 Road danger lamps and high intensity flashing beacons shall be used in accordance with Regulations 55 and 54 respectively of the UK's TSRGD 2016.

## 1218 Temporary Traffic Signs

1 Temporary traffic signs shall be designed by the Contractor, comply with Clause 1201, satisfy Clause 117, have the consent of the Overseeing
Organisation prior to installation and comply with sub-Clauses 2 to 6 of this Clause.
Temporary traffic signs shall comply with The UK's Traffic Signs Regulations and General Directions 2016, and be designed in accordance with Working Drawings for Traffic Sign Design and Manufacture.

2 Temporary traffic signs shall be constructed as follows:

a) plate signs and internally illuminated signs:

i) the coefficient of retroreflection of the material for the faces of signs used for Standard and Relaxation works, as defined in Chapter 8 (Part 1 Design) of the Traffic Signs Manual, and any amendment thereto including the amendments specified in sub-Clause 117.8, shall be as given in MSA EN 12899-1 for Class 1 material;

ii) where the sign is to be erected for less than 6 months, it shall, unless IM Appendix 12/1 requires it to be constructed to a similar standard as a permanent sign, be either a portable sign complying with MSA EN 12899-1 or a fixed short life sign complying with sub-Clause 3 of this Clause;

iii) where the sign is to be erected for periods of 6 months or more, or where IM Appendix 12/1 requires it to be constructed to the standard for a permanent sign, it shall comply with the requirements for permanent traffic signs;

iv) in addition to either (i) or (iii) above, electrical work related to temporary traffic signs shall comply with the Series 1400 except Clauses 1402, 1410 and 1425;

b) bollards and marker posts shall comply with Clauses 1210 and 1211;

c) road studs:
   i) temporary retroreflecting road studs shall comply with Clause 1213 and only be installed for periods of up to 3 months and thereupon be replaced;
   ii) if permanent retroreflecting road studs are used for temporary purposes they shall comply with Clause 1213;

d) road markings, cones, cylinders and delineators, road danger lamps and high intensity flashing beacons shall comply with Clauses 1212, 1214 and 1215 as appropriate;

e) portable traffic signals and haul route crossing signals shall, where relevant, comply with Clause 1217;

f) any other signal, lamp, barrier or device shall be suitable for its intended purpose and where relevant shall comply with appropriate British Standards.

3 Fixed short life signs shall be constructed as follows:

a) materials:
   i) sign plates may be constructed of materials to the standard for a permanent sign, or alternatively shall be constructed of timber, hardboard, plywood or chipboard;
   ii) stiffening frames for sign plates constructed of timber, hardboard, plywood or chipboard, shall be constructed of timber, mild steel or aluminium sections;
   iii) mounting posts shall be constructed of steel, cast iron, aluminium alloy, reinforced or prestressed concrete or timber;
   iv) fittings for signs made of materials to the standard for a permanent sign shall be similar to those used for permanent signs. For signs made of timber, hardboard, plywood or chipboard, fittings shall be of steel, stainless steel, or brass wood screws, or wire nails. Adhesives may be used for fixing provided they are weatherproof and are not affected by variations in temperature;
   v) sign plates constructed of timber, hardboard, plywood or chipboard shall be sealed or otherwise treated to ensure that the final finish will provide a satisfactory appearance and will not deteriorate during the period the sign is expected to be in use;

b) construction:
   i) sign plates shall be constructed on similar principles to those required for permanent signs, although stiffening may be omitted provided the sign plate passes the bending test given in BS 873: Part 1;
   ii) stiffening frames constructed of timber members shall be jointed so that they withstand adverse weather conditions;
   iii) mounting posts constructed of timber shall have dimensions that are sufficient to withstand the estimated loading on the sign;
   iv) fixing of signs to the stiffening frame where required, and to the mounting posts shall be by screwing, nailing or gluing;

v) timber sign plates, stiffening frames and mounting posts shall be preserved with copper/chrome/arsenic (CCA) complying with BS 4072. The sign plate face shall be finished to comply with MSA EN 12899-1.

4 Erection of temporary traffic signs mounted on posts shall comply with Clause 1208.

5 Any temporary covering of temporary traffic signs shall comply with Clause 1209. Any temporary covering of road studs and road markings shall comply with any requirements described in IM Appendix 12/3.

6 Removal of temporary traffic signs shall be carried out as soon as they become superfluous or a hazard to traffic. Methods of removal shall ensure the minimum disturbance to traffic consistent with safety. Making good shall be carried out immediately after removal of the traffic sign.

7 Posts shall not protrude above the top of the sign unless supporting an external luminaire, in which case the protrusion shall be kept to a minimum.

## 1219 Traffic Signals

### General

1 Traffic Signals and Box Signs shall comprise road junction signals, puffin, toucan and Pegasus crossing signals, wig-wag signals, variable message and over-height vehicle box signs and shall be as described in IM Appendix 12/5.

2 Traffic signals shall comply with sub-Clauses 3 to 15 of this Clause and the requirements described in IM Appendix 12/5. The installation and maintenance of traffic signals shall be in accordance with the quality management scheme described in IM Appendix A.

3 Traffic signal equipment shall comply with MSA EN 12368 . It shall consist of control equipment including detector loops of a type which has received statutory type approval by Transport Malta or subsequent transport authority bodies in Malta in accordance with the procedure described in CAP.60. and S.L.65.05. Traffic signal equipment with such statutory type approval shall be deemed valid for use in Northern Ireland. They shall be maintained and serviced as described in IM Appendix 12/5.

4 All traffic safety and management measures associated with work on traffic signals shall comply with Clause 117, and any work entailing the switching off of existing signals shall not be carried out until the highway authority has been informed and until agreed alternative traffic management measures are in operation to safeguard and control vehicles using the highway.

### Controllers

5 Controllers shall be provided and installed as described in IM Appendix 12/5. The cabinet shall be mounted on a foundation, with or without an adjacent inspection chamber as described in IM Appendix 12/5. The foundation shall make provision for the entry of the appropriate number of cable ducts.

6 Traffic signal controllers shall, in addition to any testing carried out in compliance with Clause 1424 be tested before delivery to Site and again after installation but before commissioning, to ensure they comply with the specification in IM Appendix 12/5.

**Cabling and Electrical Requirements**

7 Traffic signal equipment on each post shall be connected to the controller in accordance with the requirements described in IM Appendix 12/5.

8 The installation shall comply with SL 545.24 Electrical Installations Regulations and regulations of the electricity supplier which provides the supply.

9 Cables shall be PVC insulated and sheathed 600/1000 V grade with steel wire armouring to BS 6346 and shall be installed in ducts in compliance with Clause 1421 and terminated in compliance with Clause 1423. Reinstatement shall be in compliance with Clause # 706.

10 Earthing of all posts, pushbutton boxes and the controller cabinet shall comply with Clause 1420. One conductor in each cable between a post and the equipment cabinet shall be a protective conductor and shall bond the earth terminal at the post to the main earth terminal.

11 Cable testing shall be in accordance with Clause 1424. Tests (a), (b), (c), (e), (f), (g), (h) and (j) as defined in sub- Clause 1424.2 shall be conducted and all measurements recorded.

**Telecommunications Carrier Interface**

12 Where a connection interface to the plant of a telecommunications carrier is specified in IM Appendix 12/5 the installation shall comply with the rules and regulations of that carrier.

**Posts**

13 Posts for traffic signals shall be installed in compliance with Clause 1203 and in the locations specified in IM Appendix 12/5.

**Signal Heads**

14 All backing boards shall have a border of Class 1 retroreflective material (white). Pressure sensitive material shall normally be supplied but vacuum applied material may be used in accordance with the manufacturer's process. Application of pressure sensitive material shall take place only on dry surfaces. An ambient temperature of 15°C minimum is recommended for satisfactory adhesion. The material shall have a 50 mm width throughout. Where the continuous border bridges each backing board/signal head a distinct cut edge shall be made to avoid any subsequent stretching/ shrinkage of dissimilar surfaces. The finished border shall be of a neat appearance and not made up of short lengths of cuttings.

**Road Markings**

15 Road markings associated with traffic signals shall comply with Clause 1212.

### 1220 Detector Loops

16 The installation and testing of detector loops shall be in accordance with the Overseeing Organisations requirements at the time.

### 1221 Controlled and Un-controlled Crossings

17 The location of controlled and un-controlled crossings shall be as described in IM Appendix 12/5. Details shall be as described in IM Appendix 12/5.

18 Surfacing of Zebra crossing areas shall be laid with materials and to methods specified in IM Appendix 12/5. The finished surfacing shall have a minimum skid resistance Class of S4 when tested in compliance with MSA EN 1436.

19 Non retroreflecting road studs shall comply with Clause 1213.

20 Road markings shall be white and comply with Clause 1212 for permanent markings and be of the material described in IM Appendix 12/5.

21 Traffic signals, related control and other equipment where incorporated in controlled crossings together with installation and reinstatement shall comply with Clause 1217 for permanent traffic signals.

### 1222 Traffic Signs on Gantries

1 Where traffic signs (including signals) are erected on gantries the signs shall comply with the requirements of the relevant Clauses of this Series.

2 Fabricated steel gantries shall be constructed to the requirements described in IM Appendix 12/6, and to comply with Series 1800. Reinforced or prestressed concrete gantries shall be as described in IM Appendix 12/6 and shall comply with Series 1700.

### 1223 Preparation and Finish of Metal and Other Surfaces

#### General

1 Permanent traffic signs and, where specified in IM Appendix 12/1 prescribed temporary traffic signs shall be prepared, protected against corrosion and finished in compliance with MSA EN 12899-1 and with sub-Clauses 2 to 9 of this Clause.

#### Faces

2 Faces of sign plates shall be prepared to receive sign face materials in compliance with MSA EN 12899-1 and to the recommendations of the sign face material manufacturer following completion of any preparation and finish in sub-Clauses 3 and 6 of this Clause.

**Steel Sign Plates, Purlins, Frames and Fittings**

3 Steel sign plates, frames and fittings and purlins shall be prepared and protected in compliance with MSA EN 12899-1 and be as described in IM Appendix 12/1. Preparation to clean steel 2nd Quality and painting of surfaces shall comply with Series 1900.

**Steel Posts and Post Housings**

4 Steel posts and post housings shall be prepared and protected in compliance with BS 873 : Part 7. Painting shall comply with Series 1900 and be as described in IM Appendix 19/2.

**Aluminium or Aluminium Alloy Posts and Post Housings**

5 Aluminium or aluminium alloy posts and post housings shall, unless otherwise required in IM Appendix 19/2, be left unpainted, except for the bituminous coating required by BS 873: Part 7 below ground level. A matt appearance shall be achieved in accordance with sub-Clause 6 (b) of this Clause.

**Aluminium or Aluminium Alloy Sign Plates, Framework and Stiffening and Luminaire Housings**

6 Backs of aluminium or aluminium alloy sheet and planks forming plate signs and external parts of luminaire housings and other permanently exposed components shall, to prevent specular reflection, be dulled using a method to be agreed by the Overseeing Organisation or be coated with either paint or plastics as follows:

a) plastics coating, and pre-treatment before its application, shall be in compliance with MSA EN 12899-1;

b) surfaces to be painted shall be lightly abraded in accordance with sub-Clauses 1903.5 and 1903.6 or degreased and etch primed with primer detailed in Series 1900 Table 1900-2, Item No. 14 Except for etch primed surfaces, all surfaces shall be immediately cleaned in accordance with sub-Clause 1903.9. All surfaces, including etch primed surfaces, shall be applied with one coat of matt polyurethane paint to Series 1900 Table 1900-2, Item No. 168, and colour as described in IM Appendix19/2. The paint application shall comply with the appropriate recoat times (over etch primer) as detailed in the paint manufacturer’s data sheet and Clauses in Series 1900.

**Internally Housed Electrical Components and Ancillary Equipment**

7 Ferrous steel shall be finished inside and out by galvanizing, electro-plating or zinc or aluminium spray all in accordance with Series 1900, or other equivalent preparation and finish. Aluminium and other metals shall unless otherwise required in IM Appendix 14/4 be left untreated.

**Stainless Steel Components**

8 Unless otherwise required in IM Appendix 19/2 stainless steel shall be left untreated except where the component is visible against the sign face when it shall be covered by a suitable material, of a colour to match that part of the face.

**Cast Iron and Cast Steel Components**

9 External surfaces shall be prepared and protected as described in IM Appendix 19/2. Cabinets and feeder pillars shall have final coats of paint applied on Site after final installation including the fitting of any internal apparatus required as part of the Permanent Works. Internal surfaces shall unless otherwise specified in IM Appendix 19/2 receive the same treatment as for external surfaces except that final paint coats shall be applied before internal components are installed.

## 1224 Testing of Roadmarkings

**General**

1 Testing shall include the following characteristics (in the Dry):

a) Luminance;
b) Retroreflection - Dry;
c) Dimensional tolerances;
d) Skid resistance;
e) Dry Film thickness (measurement procedure to be proposed by the Contractor and approved by the Overseeing Organisation)

2 Where required in IM Appendix 12/1 or the Bills of Quantities testing shall include the “Wet” condition.

**Number of measuring points per section of Roadmarkings**

3 The selection of locations shall be strictly random.

4 The values herein refer to roadmarkings installed on asphalt. The values for concrete surfacing shall be extrapolated from EN 1436 for the corresponding asphalt values.

5 A minimum of five (5) in number measurements shall be made in each measuring section.

6 The number of test locations shall be as shown in Table 1200-17:

***Table 1200-17: Test locations for Roadmarkings***

| **Length of a longitudinal roadmarking to be assessed (m)** | **Area of non-longitudinal roadmarkings to be assessed ($m^2$)** | **Number of measuring sections (no.)** | **Length / Area of each measuring sections (m / $m^2$) and distribution of measurements per section** |
|---|---|---|---|
| < 1000 | < 120 | 1 | Continuous Longitudinal |
| 1000 to 5000 | 120 to 600 | 2 | |

| | | | |
|---|---|---|---|
| 6000 to 10000 | 601 to 1200 | 3 | 100m at equal intervals;<br>Intermittent Longitudinal<br>10 line lengths - In middle of every second line;<br>All other markings<br>1 item – Throughout. |
| > 10000 | > 1200 | 4 | |

**Acceptance Criteria**

7 The selection of locations shall be strictly random.

8 The requirements in Table 1200-18 and Table 1200-19 shall apply.

***Table 1200-18: Acceptance criteria for Roadmarkings (1)***

| Characteristic | | Specification (#1) | Test Range for Values Mean | Remarks |
|---|---|---|---|---|
| Retroreflection | Dry | RL ≥ 100 (R2) | 80 to 120 | |
| | Wet | RL ≥ 50 (RW3) | 45 to 55 | Only where specified |
| Luminance | | ≥ 0.30 (B2) | 0.24 to 0.36 | β factor |
| Skid Resistance | | ≥ 45 (S1) | 42 to 48 | |
| Skid Resistance (Improved) | | ≥ 55 (S3) | 52 to 58 | Only where specified in IM Appendix 12/1 |

*(#1) See TM (ADT) Series 1200 and EN 1436*

***Table 1200-19: Acceptance Criteria for Roadmarkings (2)***

| Characteristic | | Values Mean | Compliance | Remarks |
|---|---|---|---|---|
| Retroreflection | Dry | < 80 | Section failed | |
| | | > 120 | Section passed | |
| | | 80 to 120 | *Additional testing* | See Table 1200-20 |
| | Wet | < 45 | Section failed | |
| | | > 55 | Section passed | |
| | | 45 to 55 | *Additional testing* | See Table 1200-20 |
| Luminance | | Basis as above | Basis as above | |

| | | | | |
|---|---|---|---|---|
| Skid Resistance | | | | |
| Skid Resistance (Improved) | | | | |

**Additional Testing**

9 Additional testing, where required and approved by the Overseeing Organisation shall be as in Table 1200-20.

***Table 1200-20: Additional Testing of Roadmarkings***

| Characteristic | Additional measurements | Location | Acceptance (Mean) |
|---|---|---|---|
| Retroreflection | 15 | Continuous lines:<br>Intermediate to first set<br>Other markings:<br>Adjacent to first set | ≥ mean in Table 1200-19 (Passed)<br>----------<br>< mean in Table 1200-19 (Failed) |
| Luminance | 15 | | |
| Skid Resistance | 5 | | |

**Acknowledgment**

10 The basis of this clause 1222 – Testing of Roadmarkings – including the acceptance criteria – is the German ZTV - M 2000 - Additional Technical Conditions of Contract and Guidelines for Markings on Roads - Annex 5.

### 1225 Reflectors on Vehicle Restraint Systems (VRS)

1 When so directed by the Overseeing Organisation retroreflectors shall be mounted on road safety barriers, road concrete barriers, parapets, and railings using retroreflectors to EN 12899-3 and Series IM 400, clause 420.

2 Generally, retroreflectors shall not be installed onto VRS systems wherever the adjacent hardstrip is less than 0.5m wide (inclusive of edge marking).

3 The retroreflected colour shall be identical to that normally applicable to road studs.

4 The fixing level shall ensure that a smooth line of reflectors is visible to the driver. On “W” type metal VRS the reflectors shall be located in the concave space of the barrier beam. In a 3 wave arrangement the reflectors shall be installed along one concave space only.

5 No reflectors shall be installed onto VRS systems at locations that may lead drivers into misjudging the true carriageway borders (Eg. VRS horizontal alignment is not parallel to the edgline marking.

6 VRS reflectors shall not be used in conjunction with any adjacent retroreflective road studs.

### 1226 Rumble Strips – Transverse to direction of travel

1 The transverse rumble strips shall comply with the Transport Malta document “Speed Management on Maltese Roads Policy and Technical Guidance” clause 1.12.

2 The restrictions (due to noise generation) associated with placement within residential areas shall apply.

3 The technical characteristics in Table 1200-21shall apply:

***Table 1200-21: Rumble Strip (Transverse) Characteristics***

| Characteristic | Value | Notes |
|---|---|---|
| Placement | Transverse | Across the carriageway |
| Approach distance to hazard | 50m | UK TAL 11/93 |
| Total number of strips | 10 minimum | Incorporating all groups and for each intervention in respect of the identified sensitive area / location; See TAL11/93; |
| Number of groups | 1 minimum | ≤ 50km/h; See TAL 11/93; |
| | 2 minimum | ≤ 70km/h; See TAL 11/93; |
| | 4 minimum | ≤ 80km/h: See TAL 11/93; |
| Number of strips per group | 5 minimum | See TAL 11/93; |
| Height | 13mm; No vertical face to exceed 6mm height; | ≥ 200m from residential area; See UK DMRB TA 87/04 clause 3.41 and UK TAL 11/93; |
| | 5mm | ≤ 200m from residential area; See UK DMRB TA 87/04 clause 3.41 and UK TAL 11/93; |

| | | |
|---|---|---|
| Width of strips | 100mm | LTN 1/07, clause 5.1.11 |
| Spacing groups | 30m | ≤ 50km/h |
| | 40m | ≤ 80km/h |
| Spacing between single bars in group | 300mm | ≤ 50km/h; See UK DMRB TA 87/04 clause 3.42; |
| | 400mm | ≤ 70km/h; See UK DMRB TA 87/04 clause 3.42; |
| | 500mm | ≤ 80km/h; See UK DMRB TA 87/04 clause 3.42; |
| Material | Thermoplastic Grade SP4 or approved equivalent | |
| Colour | White | Retroreflective |
| Visual Performance EN 1436 | R2, B2, S1 | Retroreflection, Luminance,<br>Skid Resistance |
| Durability Class | P6 (min) | EN 1824 or EN 13197 |
| Use of Regulatory / Warning Sign/s | Mandatory | Rumble bars to be complementary. |
| Clear gap from kerb | 750mm to 1000mm | To allow drainage; To allow for cyclists; See TAL 7/93. |

7 The specific location and placement shall be as directed by the Overseeing Organisation or as detailed in the Drawings.

8 The Contractor shall be responsible for the setting out, proper alignment and detailed site measurements.

### 1227 Rumble Markings – Edge of Carriageway

4 The arrangement and dimensions of the edge rumble markings shall be as indicated in drawing RCD 1200/35.

5 The technical characteristics in Table 1200-22 shall apply:

***Table 1200-22: Rumble Markings (Edgeline) Characteristics***

| Characteristic | Value | Notes |
|---|---|---|
| Material | | Thermoplastic Grade SP4 or approved equivalent |
| Colour | White | |
| Visual Performance EN 1436 | R2, B2, S1 | Retroreflection, Luminance,<br>Skid Resistance |
| Durability Class | P6 (min) | EN 1824 or EN 13197 |

6 The specific location and placement shall be as directed by the Overseeing Organisation or as detailed in the Drawings for the particular works ordered.

7 The Contractor shall be responsible for the setting out, proper alignment and detailed site measurements.

### 1228 Yellow Bar Markings

1 The yellow bar markings must comply with the Transport Malta document “Speed Management on Maltese Roads Policy and Technical Guidance” clause 1.3.

2 The specific location and placement shall be as directed by the Overseeing Organisation or as detailed in the Drawings.

3 The Contractor shall be responsible for the setting out, proper alignment and detailed site measurements.

4 The technical characteristics in Table 1200-23 shall apply:

***Table 1200-23: Yellow Bar Markings Characteristics***

| Characteristic | Value | Notes |
|---|---|---|
| Material | | Cold Plastic (MMA) or Thermoplastic Grade SP4 or equivalent |
| Colour | Yellow | |
| Visual Performance EN 1436 | R2, B2, S1 | Retroreflection, Luminance,<br>Skid Resistance |
| Durability Class | P6 (min) | EN 1824 or EN 13197 |

5 The yellow bar spacing and distance shall be as indicated in the UK Traffic Signs Manual.

## 1229 Miscellaneous

**Traffic Mirrors**

1 The mirror unit reflector shall be manufactured from:

a) highly polished and unbreakable (vandal-proof) stainless steel grade AISI 201, Anti-vandal polycarbonate

or,

b) Vandal-resistant acrylic.

2 The mirror unit frame shall be manufactured from:

a) UV-resistant thermoplastic polymer plastics or similar for units with a polycarbonate and acrylic reflector;

b) Stainless steel or hot-dip galvanized equivalent for units with a stainless steel reflector;

and shall incorporate an adjustable mounting bracket for both wall and pole mounting applications. This must be made of stainless steel or hot-dip galvanized equivalent for units with stainless steel reflectors.

3 The mirrors must provide a reflection of at least 60%.

**Traffic Mirrors - Round and Convex: Size and Viewing distance**

4 The size shall be as follows (viewing distance is included for guidance):

a) 400mm / 10m

b) 600mm / 15m

c) 800mm / 20m

d) 1000mm / 25m

**Traffic Mirrors - Rectangular and Planar (Size and Viewing distance)**

5 The size shall be as follows (viewing distance is included for guidance):

a) 600mm x 450mm / 15m

b) 800mm x 600mm / 20m

c) 1000mm x 800mm / 25m

**Traffic Mirrors - Subway (or for other internal spaces)**

6 The mirror unit reflector shall be manufactured from highly polished and unbreakable (vandal-proof) stainless steel grade AISI 201.

7 The mirror unit frame shall be manufactured from stainless steel or hot-dip galvanized equivalent and shall incorporate an adjustable mounting bracket for both wall and pole mounting applications. This must also be made of stainless steel or hot-dip galvanized equivalent.

8 The mirrors must provide a reflection of at least 60%.

9 The size shall be as follows (viewing distance is included for guidance):

a) 400 / 10m

b) 600 / 15m

**Belisha Lights and Posts Assembly**

10 The system shall comply with BS 8442 section 13 or approved equivalent

Posts

11 The posts shall be of the non-illuminated type.

12 Steel posts shall be hot-dipped galvanized to EN ISO 1461 and finished in alternate black and white bands (the lowest band being coloured black). The bands shall be not less than 275mm and not more than 335mm wide except that the lowest band may be up to 1 metre wide. The above shall include for all necessary surface preparation and application of undercoats / primers /etchers as required.

13 The post shall be of the stepped type 2.1m min. to 3.1m maximum height and complete as detailed in drawings RD 13-11-09 and RD 13-11-10.

Electrical

14 The posts shall have an earth electrode bonded to the beacon and a double-pole switch located at the access point of the beacon so that each pair of belisha lights can be isolated from the electricity supply for maintenance works.

15 The beacons shall be protected by a safety device comprising a double-pole RCBO with a sensitivity of 30mA.

16 The assembly shall incorporate a 70 watts metal halide compact flood light (IP IP54 rated) and a roto flash unit (including all required ancillaries) or approved equivalent.

17 The system shall include all electrical cables between the luminaire, flash facility, flood light and inspection hole at the base of beacon and the post foundations.

18 The Contractor shall be responsible for the compilation and submission of the Enemalta applications. The assembly shall be energized by a cable installed in uPVC ducts between the inspection hole at the base of beacon and the nearest existing electricity supply.

19 The system shall be commissioned in conjunction with Enemalta and submission of Enemalta application, connecting and terminating as per Enemalta regulations.

Beacon Globe

20 The globe shall be coloured amber and incorporate a UV stabilised polyethylene 275mm - 300mm diameter globe, IP54 rated and vandal proof, a holding gallery and collar with tamper proof fixtures including luminare and all other required ancillaries.

21 A modular beacon light shroud shall be incorporated when so indicated by the Overseeing Organization.

**Cranking of Sign Posts**

22 Cranking of posts shall be installed where and as required to provide for improved visibility and when space is limited for sign supports. It may also be required along narrow pedestrian footpaths. Visibility for drivers must be retained.

**Figure 4 Cranking of Sign Posts**

**Cleaning of Traffic Signs, Roadmarkings and other similar Road Ancillaries**

Traffic Signs (including bollards, cylinders, reflectors and similar)

23 The Contractor shall rinse, hose or low-pressure jet with water or a water / mild detergent mixture and allow to dry naturally.

24 For signs covered with a graffiti-resistant overlay the use of detergents shall not be permitted.

25 Any residual tar and other tacky materials shall be cleaned using a very small quantity of clear turpentine BUT ALWAYS after performing a small test patch to confirm that the turpentine does not damage the sheeting.

26 Graffiti from sign faces that are not protected by an anti-graffiti overlay shall be removed using a mild citrus-based cleaner. More stubborn graffiti shall be cleaned using a very small quantity of clear turpentine BUT ALWAYS after performing a small test patch to confirm that the turpentine does not damage the sheeting.

Roadmarkings

27 Roadmarkings shall be cleaned using the following methods:

a) controlled-pressure water jetting (the use of an approved detergent is permitted);

b) brush cleaning with a mixture of an approved bio-degradable degreaser and/or detergent and water;

c) approved equivalent alternative.

Whichever method is used the Contractor shall:

a) be required to perform a preliminary trial prior to demonstrate fitness of purpose;

b) ensure the removal of all traces of detergent / degreaser from the road surface before demobilizing.

**Hazard Marker Paint**

1 The Contractor shall prepare the surface in accordance with the paint producer's approved methodology including priming and minor infilling using a proprietary concrete repair mortar.

2 Unless otherwise stated and on structures that are load bearing the proprietary repair mortar shall comply with BS EN 1504-3 Class R2. It shall have a compressive strength at of ≥ 13 MPa in 1 hour and 30 MPa in 28 days.

3 The yellow bands shall be to the dimensions in the UK TSRGD Diagram 530.2 / 532.2 and must be reflectorised (≥ 100mcd).

4 The works may require working at height and the use of dedicated specialized lifting and / or hoisting equipment and protection platforms.

**Ballasting of Temporary Traffic Signs**

5 Ballasting of low level temporary traffic signs shall be in accordance with the UK Traffic Signs Manual and BS 8442. The guidance and simplified graphical design published by the UK TMCA (Traffic Management Contractor's Association) in the TTM Advice Note 4 – Guidance on BS 8442:2015, Ballasting of Temporary Road Signs may be used.

6 Bespoke insufficient and shabby solutions shall not be permitted.

## 1230 Annex 1 - Signs for Route Direction Signs: Arterial, Distributor and High Traffic Roads (Road Classes HD to III)

**Materials, Design and Performance**

7 Route signs in Arterial , Distributor and/or other road classes designated as high traffic routes (Classes HD to II) shall be constructed in aluminium backplate and posts with a clamping baseplate – See also Table 1200-8.

8 An illustrative arrangement of a proprietary product is shown in Figure 5, Figure 6 and Figure 7 – Equivalent products will also be considered.

9 This requirement shall invariably be applied for direction signs in grouped clusters.

**Approved Illustrative Specimens**

10 Approved sign assemblies can be viewed at the **Kappara Junction – Node EA15**.

**Figure 5 Kappara EA15: Route Direction Signs - Aluminium Slat Type Panels (Illustrative)**

**Figure 6 Kappara EA15 - Route Direction Signs - Aluminium Posts (Illustrative)**

**Figure 7 Kappara EA15 - Route Direction Signs - Aluminium Posts and Metal Base Clamp detail (Illustrative)**

## 1231 Annex 2 – Rubber Modular Roundabout Units

**Design and Arrangement**

1 The installation must comply with the Transport Malta requirements for speed management and turning radii of heavy vehicles and buses. Information is available from Transport Malta, TMRSD, Marsa:

info.tm@transport.gov.mt

The restrictions associated with placement in routes forming a part of the public bus network shall be strictly applied.

2 The rubber modular unit parts of the roundabout shall permit the arrangement/s indicated and described in the UK DMRB TD 54/07: Design of Mini-Roundabouts or close equivalent subject to the approval of the Overseeing Organisation.

**Modular Unit Features**

3 These shall be as indicated below (or close equivalent) in Figure 8:

a) Type 2 (illustrative only)

***Figure 8 Modular Roundabout***

**Colour bands**

4 The permitted colour bands must be one of the following:

a) Black/white
b) Black/yellow
c) Red/white
d) As approved by the Overseeing Organisation

### Infill

5 The infill material shall be as indicated in the Drawings or Bills of Quantities. The infill surfacing must be “domed” to allow for water drain-off.

**Radius**

6 The radius/diameter shall be as indicated in the Drawings and/or the Bills of Quantities.

7 The individual units shall be precision-fabricated to the required radius. Excessive gaps in between the radial elements shall not be permitted

**Other requirements**

8 The modular units shall allow for overrun including HGV's. The upward slope shall not be more than 15 degrees / 15mm upstand as required by the UK Traffic Advisory Leaflet 12/93 - Overrun Areas or as approved by the Overseeing Organisation.

9 The modular units shall be located and secured using corrosion-protected bolts.

10 The units must be UV-weathering protected for a guaranteed serviceability of at least 10 years.

## 1232 Annex 3 – Rubber Modular Round Topped Road Humps

**Design and Arrangement**

1 The rubber round topped road humps must comply with the Transport Malta document "Speed Management on Maltese Roads Policy and Technical Guidance". This document is available on request from Transport Malta, TMRSD, Marsa.
info.tm@transport.gov.mt

2 The restrictions on noise generation associated with placement within residential areas shall be strictly applied.

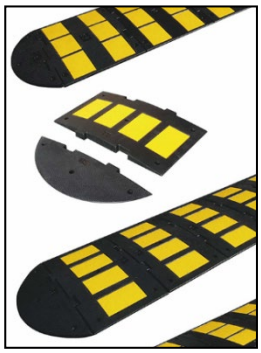
3 The restrictions associated with placement in routes forming a part of the public bus network shall be strictly applied.

4 The installed system shall consider the requirements of cyclists and surface water drainage.

**Technical Characteristics**

5 The technical characteristics Table 1200-24 and in Attachment 1 to Annex 3 (see also Figure 9 and Figure 10) herein shall apply:

***Table 1200-24: Rubber Round Topped Humps: Technical Characteristics***

| Characteristic | Description | Notes |
|---|---|---|
| Material | Recycled polymer-modified elastic PVC sections, or approved similar | See Italian Road Code (CdS) Article 42; |
| Colour | Black / Yellow |  <br>  <br>See Italian Road Code (CdS) Article 42; |
| Speed of road sector | 1. ≤ 30 km/h<br>2. ≤ 40 km/h<br>3. ≤ 50 km/h | As approved by Transport Malta for the specific road or road sector. |
| Markings colour | Yellow | As per Series IM/1200 |
| Markings Visual Performance EN1436 | R1,<br>B1,<br>S1. | Retroreflection,<br>Luminance,<br>Skid Resistance. |

6 The specific location and placement shall be as directed by the Overseeing Organisation or as detailed in the Drawings.

7 The approach ad departure slopes shall not be higher than 6mm.

8 The Contractor shall be responsible for the site measurements, setting out, and alignment.

9 The elements shall comprise male and female end caps and be fixed to the road surface using heavy duty lock bots and nuts.

**Traffic Signs**

i. The installation shall be supplemented by the regulatory posted signs and warnings.

**Attachment 1 to Annex 3 – Rubber Modular Round Topped Road Humps**

Sizes

a) Type 1: 485 x 610 x 30 (H) ≤ 50km/h
b) Type 2: 500 x 900 x 50 (H) ≤ 40km/h
c) Type 3: 500 x 1200 x 70(H) ≤ 30km/h
d) See Figure 10 (Circular)

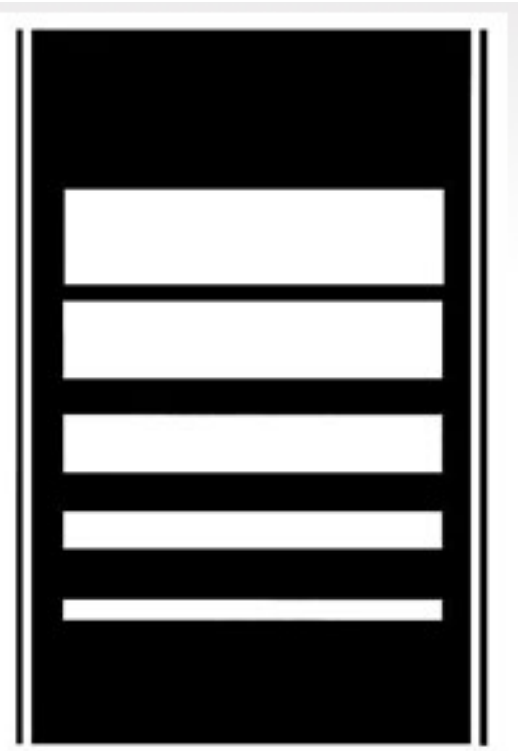


***Figure 9 Italian CDS, Art 42, Fig ii.473***

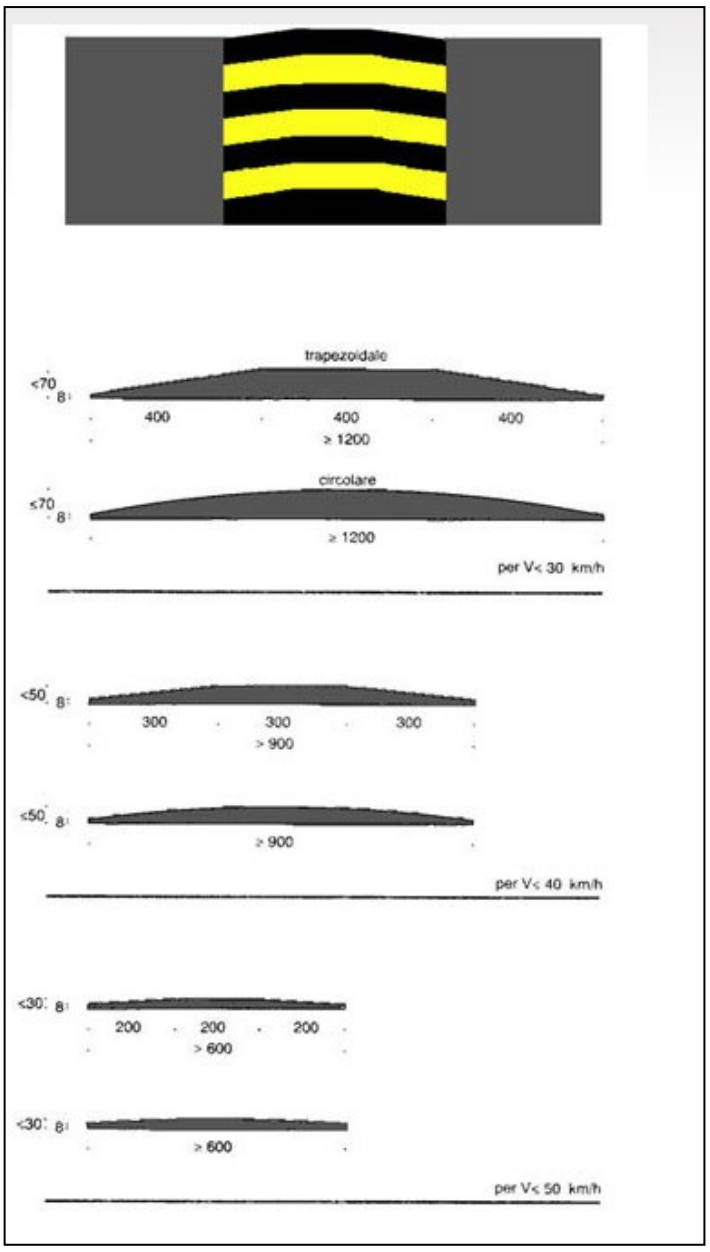



***Figure 10 Italian CDS, Art 42, Illustrative only***

**Supplementary Traffic Signs (Illustrative)**


## 1233 Annex 4 – Rubber Modular Raised Flat-topped Crossing Humps

**Design and Arrangement**

1 The raised crossing flat-topped humps must comply with the Transport Malta document "Speed Management on Maltese Roads Policy and Technical Guidance". This document is available on request from Transport Malta, TMRSD, Marsa.
info.tm@transport.gov.mt

2 The restrictions on noise generation associated with placement within residential areas shall be strictly applied.

3 The restrictions associated with placement in routes forming a part of the public bus network shall be strictly applied.

4 The installed system shall consider the requirements of cyclists and surface water drainage.

5 Attachment 1 to Annex 4 shall also apply.

**Technical Characteristics**

7 The technical characteristics in Table 1200-25 shall apply:

***Table 1200-25: Rubber Flat Topped Crossings: Technical Characteristics***

| Characteristic | Description | Notes |
|---|---|---|
| Material | Recycled polymer-modified elastic PVC sections, or approved similar | See Italian Road Code (CdS) Article 42; |
| Colour | Black / Yellow |  <br>  <br>See Italian Road Code (CdS) Article 179 (42) and Annex 1 |
| Markings colour | White and Yellow | As per Series 1200 |
| Markings Visual Performance EN1436 | R1,<br>B1,<br>S1. | Retroreflection,<br>Luminance,<br>Skid Resistance. |

8 The specific location and placement shall be as directed by the Overseeing Organisation or as detailed in the Drawings.

9 The approach and departure slopes shall not be higher than 6mm.

10 The Contractor shall be responsible for the site measurements, setting out, and alignment.

11 The elements shall comprise male and female end caps.

12 The elements shall be fixed to the road surface using heavy duty lock bolts.

13 3 Traffic Signs

14 The installation shall be supplemented by the regulatory posted signs and warnings.

**<u>Attachment 1 to Annex 4</u> - Rubber Modular Raised Flat-topped Crossing Humps**

Sizes – See Figure 11 (trapezoidal)

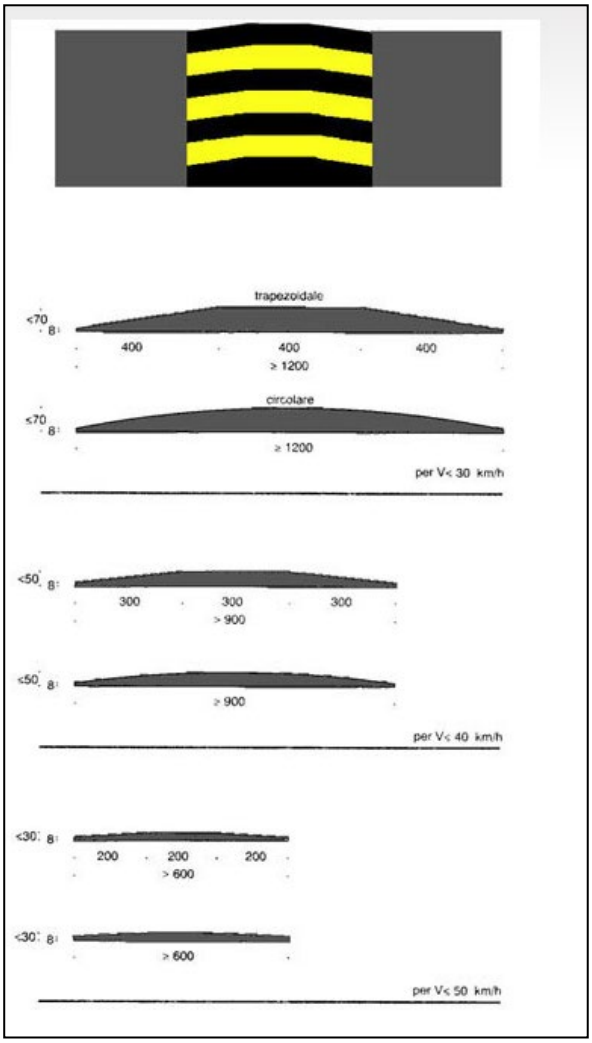



***Figure 11 Italian CDS, Art 42, Illustrative only***