

IMPLEMENTATION SPECIFICATION FOR ROAD **WORKS**

SERIES IM/1300 (IMPLEMENTATION)

ROAD LIGHTING COLUMNS AND BRACKETS, CCTV MASTS AND CANTILEVER MASTS



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1300 ROAD LIGHTING COLUMNS AND BRACKETS, CCTV MASTS AND CANTILEVER MASTS

1301 General

1 This Series shall apply to the design, supply and installation of lighting columns and brackets and CCTV masts and cantilever masts for traffic signals and/or speed cameras (hereafter called cantilever masts) within the following dimensional limitations:

- a) For steel and aluminium lighting columns:
 - i) post top columns not exceeding 20 m nominal height;
 - ii) columns with brackets not exceeding 18 m nominal height;
 - iii) bracket projections not exceeding 0.25 x nominal height or 3 m whichever is the lesser.
- b) For steel CCTV masts:
 - i) post top masts not exceeding 25 m nominal height.
- c) For steel cantilever masts:
 - i) nominal height not exceeding 8.5 m;
 - ii) cantilever projection not exceeding 8.5 m.

Where nominal height is taken as either the distance from the highest point of the mast to the underside of a flange plate, or ground level for planted/socketed columns.

Glass fibre reinforced plastic lighting columns are not permitted for use. Concrete columns are not permitted for use.

Passively safe columns shall comply with the requirements of Clause 1311. Cranked Root columns of any type are not permitted for use.

2 The *Contractor* shall propose lighting columns and brackets, CCTV masts and cantilever masts which have been designed by the manufacturer. The manufacture, supply and verification of lighting columns and bracket arms shall comply with the quality management system.

The Contractor shall design foundations for planted/socketed lighting columns and cantilever masts in accordance with CD 354 Chapter 12 (DMRB 2.2.1) using the soil type information as described in scheme specific Appendices 13/1 and 13/7 by the Contractor.

The Contractor shall, where required, design:

- a) anchorages and attachment systems for columns and masts with flange plates to foundation or bridge deck.
- b) foundations for columns and masts with flange plates.
- c) foundations with retention socket in situations where lighting columns need to be located in vulnerable positions where columns can be hit by high sided vehicles or foundation difficulties are encountered.

as described in scheme specific Appendices 13/1, 13/4 and 13/7.

3 Lighting columns and brackets, CCTV masts and cantilever masts shall be supplied and installed in compliance with the relevant requirements of MSA EN 40-1, MSA EN 40-2, MSA

EN 40-3-1, MSA EN 40-3-2, MSA EN 40-3-3, MSA EN 40-4, MSA EN 40-5, MSA EN 40-6 and, BS 5649-5 and all the other requirements of this Series.

Lighting Columns shall be:

- a) conical as instructed by the Overseeing Organisation;
- b) Stepped tubular in all other areas:
 - i) Steel columns shall be manufactured by roll forming (MSA EN 40-5:2002) and be seamless or welded.
 - ii) Aluminium columns shall be manufactured using single piece extrusion (MSA EN 40-6:2002).
- c) supplied with male fitted column spigots; and
- d) designed for an expected life of 50 years as per the requirements of Annex A of MSA EN 40-3-1.

- 4 Brackets for lighting columns shall include wall mounted brackets and fixtures.
- 5 Temporary lighting on temporary diversions for traffic and crossovers shall comply with this Series.
- 6 Where lighting columns, CCTV masts and cantilever masts are to be in the vicinity of overhead power lines the Contractor shall ensure that the appropriate Electricity Authorities are notified and give written agreement to the specific clearances to be provided and that warning notices are permanently fixed to these columns prior to erection.
- 7 Headroom over the carriageway for cantilever mast shall be in accordance with the requirements of paragraph 3.2 of Standard BD 88 (DMRB 2.2.13).

1302 Design of Lighting Columns, Brackets, CCTV Masts, Cantilever Masts, Foundations, Anchorages and Attachment Systems

- 1 CCTV masts, cantilever masts, the foundations of both planted/socketed columns and columns and masts with flange plates, and the anchorages and attachment systems for columns and masts with flange plates shall be designed to comply with the requirements of Standards CD 354 The UK's Design Manual for Roads and Bridges and the technical approval scheme adopted by the Overseeing Organisation. Street Lighting columns shall be designed to comply with the requirements of Appendix 13/1.

The Contractor shall submit to the Overseeing Organisation a copy of the design and check certificates for lighting columns, brackets, CCTV masts, cantilever masts and foundations. The design of the foundations shall be appropriate to the soil types encountered on site as per Clause 1303.

Aesthetic Requirements

- 2 The aesthetic design of lighting columns, luminaires including those with bracket arms, CCTV masts and cantilever masts shall be submitted by the Contractor to the Overseeing Organisation. The design of lighting columns and luminaires including those with bracket arms

shall comply with the general advice given in BS 5489-1 for the appearance of lighting installations by day and by night both from the viewpoint of the road and from the surrounding neighbourhood.

1303 Data Sheets

- 1 The Contractor shall complete Data Sheets in accordance with the instructions given in Appendix 13/2. The Contractor shall provide the Overseeing Organisation with a copy of the completed Data Sheets for each type of column and bracket, CCTV mast and cantilever mast in PDF format.
- 2 The columns and brackets, CCTV masts and cantilever masts shall not be ordered or erected until the Overseeing Organisation has notified its acceptance of the completed Data Sheet in writing to the Contractor.

1304 Installation of Foundations, Anchorages and Attachment Systems

- 1 A layer of ST4 concrete 75 mm thick, complying with Clause 2602 shall be placed and compacted in the bottom of the excavation up to the base of the column or mast post.
- 2 The cable entry slot shall be temporarily plugged as necessary in order to prevent any ingress of concrete or filling material during the concreting and backfilling operations.
- 3 The hole into which the lighting column or cantilever mast is placed shall be backfilled as follows:
 - a) in the case of metal with concrete or other material described in Appendix 13/1;
 - b) in the case of cantilever masts with concrete or other material described in Appendix 13/7.
- 4 Concrete backfill shall be ST5 concrete complying with Clause 2602, well compacted by vibration over the full planting depth of the column/ mast post. A duct equal in size to the width of the cable entry hole, shall be formed through the concrete filling using a suitable preformed lining tube capable of retaining its cross-sectional shape during compaction. The concrete shall be placed 10 mm above ground level adjacent to the column/mast post and taper to ground level 100 mm from the column/mast post face.
- 5 Earth backfill shall be Class 8 material complying with Clause 601, Table 600-6 unless otherwise described in Appendices 13/1 and 13/7. The material shall be placed in 150 mm thick layers and shall be well rammed and compacted in order to provide full lateral support to the planting depth of the column/mast post. If the backfilling is disturbed for any reason it shall be reinstated in compliance with this Clause. A duct equal in size to the width of the cable entry hole, shall be made through the backfill material using a suitable preformed lining tube capable of retaining its cross-sectional shape during compaction.

Columns, CCTV Masts and Cantilever Masts with Flange Plates

- 6 Concrete in the foundations shall comply with Series 1700.

- 7 The bedding mortar between the underside of the column/mast flange plate and the top of the concrete base shall comply with Clause 2601. The bearing stresses in any bedding mortar under the flange plates shall not exceed 20 N/mm².
- 8 A cable duct, 75 mm diameter, shall be provided through the foundation or bridge component as described in Appendices 13/1, 13/4 and 13/7. For CCTV masts, two 75mm diameter cable ducts shall be provided.
- 9 Design and fabrication requirements for attachments are given in Appendix 13/1.
- 10 Where anchorages in drilled holes are to be used, the Contractor shall, unless otherwise described in Appendices 13/1, 13/4 or 13/7, submit to the Overseeing Organisation at least 4 weeks before installation well attested and documented evidence that the proposed anchorage is:
- a) capable of complying with the test requirements specified in Clause 1305; and
 - b) capable of resisting pulsating loading.
- Anchorage in drilled holes of an expanding type shall not be used.
- 11 For anchorages in drilled holes the hole location shall be checked to ensure that the hole will be clear of reinforcement before drilling is carried out.
- 12 Before installation of anchorages in drilled holes, the hole shall be sound, clean and dry and the tolerance of the hole shall be within the values given by the anchorage manufacturer.
- 13 The threads of steel anchorages shall be lined with grease having a high resistance to creep and being suitable for hot or cold smearing. The grease shall provide protection to the threads for a minimum of either 18 months under cover or 6 months exposed on Site.
- 14 Attachment systems shall be tightened to the appropriate torque and have the minimum thread engagement calculated in accordance with the requirements of BS 6779-1: 1998 (Amd. No. 14290, March 2003) sub-Clause 6.6.4.
- 15 All voids in anchorages, attachment systems and flange plates shall be filled with a non-setting passive filler to prevent the collection of water.
- 16 The flange plate/foundation shall be vented and drained so that no accumulation of moisture forms in the base of the column, potentially accelerating corrosive action.
- 17 Foundations for retention sockets shall be as per the manufacturer's requirements.

1305 Site Tests on Anchorages in Drilled Holes

- 1 The Contractor shall carry out site tests on anchorages in drilled holes. For the purpose of this sub-Clause the types of fixing referred to in clause 1 of BS 8539 shall include "anchorages". Where anchorages are tested they shall be loaded incrementally in tension in accordance with BS 8539 except that they shall be capable of resisting a test load equal to 10 per cent above the nominal tensile load to be resisted by the anchorage in lieu of testing to failure. The tensile load shall be determined in accordance with the criteria given in sub-Clauses 8.15 to 8.18 of Standard BD 26 (DMRB 2.2.1), Chapter 7 of Standard BD 83 (DMRB 2.2.11) and Chapter 9 of BD 88 (DMRB 2.2.13). Incremental loads shall be held for not less

- than half a minute and the test load for not less than five minutes. Readings shall be taken immediately after applying load and at the end of the time intervals stated above.
- 2 The total movement of the anchorage shall not exceed 1.0 mm during the test. Any evidence of slip during loading up to the test load, as demonstrated by a significant change in the slope of the load/extension curve, shall constitute failure.
 - 3 The *Contractor* shall test anchorages selected on behalf of the Overseeing Organisation at the testing frequency as agreed with the Overseeing Organisation.

1306 Materials and Surface Finishes

- 1 All steel fixings including doors, door hinges, chains and locks shall be stainless steel to MSA EN 10029, MSA EN ISO 3506-1 and MSA EN ISO 3506-2 as appropriate or steel to MSA EN 10025-1, MSA EN 10025-2 or MSA EN 40-5 and MSA EN 40-6, galvanized in compliance with Series 1900.
- 2 Where different metals are in contact, consideration shall be given to the necessary measures to avoid galvanic(bi-metallic) corrosion.
- 3 The surface preparation and protection of steel lighting columns, brackets and wall mountings, steel CCTV masts and steel cantilever masts, mountings and housings shall comply with the relevant Clauses in Series 1900.
- 4 The exterior and interior surfaces of the intended planted/socketed depth of an aluminium alloy lighting column shaft and a length of 250 mm above the ground level shall be coated with a non-porous electrically insulating bitumen with a minimum layer thickness 250 µm. The coating shall only be applied after degreasing and after an approved preliminary treatment in order to ensure adhesion.
- 5 The underside of an aluminium alloy flange plate shall be treated before erection with bituminous paint complying with BS 3416 or BS 6949.
- 6 Steel columns shall be coloured unless otherwise specified as the following:
 - a) Black (RAL 9005);
 - b) Signal Grey (RAL 7004); or
 - c) Galvanised.Aluminium columns shall be left bare or anodised where specified by the *Overseeing Organisation*:
 - a) Black (RAL 9005); or
 - b) Signal Grey (RAL 7004).
- 7 Lighting columns shall be painted/coated or anodised before leaving the manufacturer to the required standard. It is the Contractor's responsibility during transit and installation to ensure that the columns remain preserved. Where damage occurs, irrespective of severity, the *Contractor* shall make good the coating matching the factory type and colour of paint to ensure compatibility.

- 8 All paints and coatings shall achieve a minimum adhesion of 750 psi and a minimum coating of 250 µm as specified in Clause 1912.

1307 Handling, Transport and Erection

- 1 Lighting columns and brackets, CCTV masts and cantilever masts shall be handled, transported and stored in such a way as to avoid any structural damage or damage to the surface protection system. Any damage incurred shall be made good in such a way that the structural performance and durability of the item shall be in no way reduced.
- 2 Lighting columns and brackets, CCTV masts and cantilever masts shall be stored clear of the ground in such a way that contact with cement, groundwater, soil or ash or other deleterious material is prevented, and that water does not accumulate on any surfaces or inside sections. Suitable packings shall be placed between the columns/masts to allow a free passage of air and dispersion of water.
- 3 All rivets, bolts, nuts, washers, screws, small plates and small articles generally shall be suitably packed and identified. All such items shall be stored under cover.
- 4 Columns and masts shall be installed true to the vertical and in accordance with the manufacturer's recommendations. The door shall face the direction described in Clause 1308.
- 5 Wall mounted lighting brackets and fixtures shall be fixed as described in Appendix 13/1.

1308 Door/Aperture Requirement for Lighting Columns

- 1 Lighting Columns shall:
- a) be supplied with single or double flush-fitting doors.
 - b) comply with the requirements of MSA EN 40-2 and shall have a minimum opening of:
 - i) Lower aperture and single doors:
500 x 120 mm for 5 and 6 m columns.
600 x 120 mm for 8, 10 and 12 m columns.
 - ii) Upper aperture with double doors:
800 x 120 mm for 8, 10 and 12 m columns.
- They shall have:
- c) Twin clamp fixing arrangement (top and bottom) ;
 - d) Welded weather-strips to the internal surface of the door aperture, and.
 - e) Door openings shall be free from irregularities and burrs.
- Other requirements include:
- f) All doors shall have a suitable earth lug on their internal face;
 - g) The bottom of the door opening shall not be less than 400 mm above ground level;
 - h) Minimum Ingress Protection required from foreign objects and water, door apertures should be rated as:
 - i) IP34 up to 2.5 m above ground level.
 - ii) IP2X more than 2.5 m above ground level.

- i) Doors shall conform to an impact protection category of IK08;
- j) The door shall be pre-assembled at the factory;
- k) The earth cable shall be lugged and double crimped at both ends and attached to the door and column with M8 brass earth bolt, 2 nuts and 2 washers;
- l) The earth cable shall be of a length which allows the door to seat easily on the ground without exerting stress on the cable and terminations;
- m) Columns mounted on bridge parapets or in any locations where if the door could cause harm or be lost if dropped are to be fitted with a door-retaining device. Any steel wire or chain shall be galvanised;
- n) All door locks to have a retaining nut to prevent the loss of locking mechanism and resist un-authorised entry;
- o) Locking mechanism is to be greased immediately following installation and prior to commission;
- p) Columns identified as requiring additional security to the compartment shall be specified by the Overseeing Organisation;
- q) Underground cable entry slots will be 150 x 75 mm;
- r) For the attachment of additional equipment, all holes should be planned at design stage and pre-drilled during factory production before delivery of the column, and
- s) Holes should not be drilled in new steel columns following the galvanising and protected coating processes.

1309 Loading Design of Lighting Columns

- 1 Lighting columns and brackets shall meet the requirements of MSA EN 40-5 and be manufactured from tubular steel unless otherwise stated in the Task Order.
- 2 Lighting columns dimensions shall meet the general requirements of MSA EN 40-2 and shall have a design life of 50 years. All lighting columns and brackets shall carry a unique identification mark, which indicates the name of the manufacturer, year of manufacture and an identification number to enable details of the column and bracket to be determined throughout the life of the column. This information shall be clearly visible after erection of the column.

Column Design and Fabrication

- 3 Designed to MSA EN 40.
- 4 The stress and deflection calculations for columns and brackets shall be based on the maximum bracket projection with a lantern, on each bracket arm, with projected area, length and weight as shown in Table 1300-1.

Table 1300-1: Stress and deflection calculations for columns and brackets

Nominal height	bracket projection	Lantern weight	Projected Area
5 m	post top	12 kg	0.12 m ²

6 m	post top	12 kg	0.12 m ²
8 m	post top	16 kg	0.16 m ²
10 m	post top	20 kg	0.20 m ²
12 m	post top	20 kg	0.20 m ²
5 m	0.5 m	12 kg	0.12 m ²
6 m	0.75 m	12 kg	0.12 m ²
8 m	1.00 m	16 kg	0.16 m ²
10 m	1.50 m	20 kg	0.20 m ²
12 m	1.50 m	20 kg	0.20 m ²

Column performance requirements for all columns, PD 6547.

Mean hourly wind speed V ref 30.0 m/s

Site altitude 250 m

Topography factor 1.0

Terrain category Category 1

Wind gusts of above 42 m/s must be assessed in line with MSA EN 40.

5 Bracket(s), luminaire(s) details as Table 1300-1 plus attachments as detailed below

6 Columns providing an 8 m or greater mounting height shall be designed to accept:

a) signs:

- i) of maximum windage 0.5 m²;
- ii) where eccentricity from the centre line of the column to the centre of area of the sign shall be taken as 300 mm; and
- iii) where the height above ground level at the column to the centre of area of the sign shall be taken as 2500 mm.

7 Columns providing a 6 m or lower mounting height shall be designed to accept:

a) signs:

- i) of maximum windage 0.5 m²;
- ii) where eccentricity from the centre line of the column to the centre of area of the sign shall be taken as 300 mm; and
- iii) where the height above ground level at the column to the centre of area of the sign shall be taken as 2500 mm.

1310 Fold Down (Raising and Lowering or Mid-hinged) Columns

1 When fold down columns are required, they shall be:

- a) capable of being operated by a single operative;
- b) tool-free Mid-Hinged;
- c) fitted with a door and base compartment that is accessible without requiring the column to be folded down;
- d) maintained without the need to hire lifting platforms; and

- e) of a consistent profile and appearance to enable it to be incorporated into locations where standard columns are used.
- 2 The fold down column shall be fitted with a:
- a) standard tri-head lock;
 - b) internal drop latch lock for hinge mechanism; and
 - c) captive length of flexible conduit should protect the internal wiring cables from accidental pinching between the column base and shaft sections.

1311 Passively Safe Columns

- 1 Passively safe columns shall comply with the requirements set in all Series 1300 clauses and shall meet class 100:NE:1-3 in accordance with EN 12767.

1312 Retention Sockets

- 1 Retention Sockets shall be capable of supporting plain tubular lighting columns, conical lighting columns, traffic signal poles and traffic sign posts of varying diameter. They shall be constructed from cast steel to GS240 or ductile iron Grade 500-7 to MSA EN 1563 and be capable of withstanding high-speed vehicle impact forces to steel posts with a wall thickness of 6 mm. All sockets shall be 3rd party independently impact tested with certification to substantiate claims for both socket and foundations.
- 2 Retention sockets shall be tested to withstand vehicular impacts from 300 mm to 900 mm planting depths.
- 3 Where required, standard 90° bend retention sockets shall be supplied with a bottom cable entry bend that can swivel 360 degrees in the horizontal plane.
- 4 The bend of retention sockets shall have the ability to utilise the full bore of 50 mm or 100 mm duct diameters for easy cable entry. The bend shall be compact, allowing the post to rest no further than 150 mm above the foundation base. Ducts shall be able to be inserted a min of 75 mm into the bend and be mechanically fixed to ensure no displacement occurs during backfill.
- 5 All retention sockets shall be able to withstand a turning moment of 3.4 kNm through a load of 230 kg at 1.5 m from the surface (applied to an installed post) without rotation.
- 6 All fixings which secure posts in place shall be securely housed below ground
- 7 All retention sockets shall be supplied with surface mounted pedestrian plugs & side chambers with EN 124 - B125 (12.5 Tonnes) loading. Suppliers of retention rockets shall supply MSA EN 40 & BD94/17 foundation design calculations for all sizes and depths of retention sockets supplied. In the event of an impact to a retention socket that has been installed according to the manufacturer's instructions, the retention socket shall be warrantied against failure.

1313 Uprightness

- 1 Columns shall be installed true to the vertical.

1314 Declaration of Performance / Conformity – CE Marking

- 1 For the purposes of compliance with Clause 104.4, for materials specified in Series 1300, the *Contractor* shall submit to the Overseeing Organisation CE Markings and Declaration of Performance showing compliance with the relevant specifications.