

TOPAS

Traffic Open Products and Specifications

TOPAS 2517C

Performance Specification for Electromechanical Variable Message Signs

Revision	Date	Scope	Authorised by
C	11/7/22	Final	Board
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TOPAS 2517C

PERFORMANCE SPECIFICATION FOR ELECTROMECHANICAL VARIABLE MESSAGE SIGNS

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CHANGE LOG

The following outlines significant changes to this specification, from its previous issue which do not impact on currently registered products:

- a) Support for Fixed Text Message Sign removed.
- b) Updated and aligned with current BS EN Standards.
- c) Requirement for maintenance socket removed.
- d) Sign illumination requirements now from EN12899.
- e) Master & Slave lantern references removed.
- f) Requirement to ensure compliance with the Radio Equipment Regulations added if the Product contains radio Equipment.
- g) Section 3 added to pick up UK performance classes against EN12966 and EN12899.
- h) Specification references updated
- i) Appendix A interfaces updated to match current use and remove obsolete references.
- j) Removal of Appendix A2.
- k) Appendix Z updated to current TOPAS standard.

1. INTRODUCTION

1.1 This specification covers the requirements for Electromechanical Variable Message Signs for use on public highways.

1.2 TOPAS specifications are explicitly purchasing specifications and compliance with them is not mandatory. However Local and other Purchasing Authorities may typically require that equipment purchased complies with TOPAS specifications and is TOPAS registered.

1.3 Manufacturers may register products as being compliant with this specification, using the process defined in TOPAS 0600.

1.4 TOPAS registration requires manufacturers submit a Technical File to an appropriate Technical Assessor to aid compliance verification. The content requirement for the Technical File is defined in Appendix Z of this specification.

1.5 Guidance to potential users of this Product is given in Appendix A.

1.6 Within this specification, "The Product" shall mean all components necessary to provide a complete operational unit meeting the requirements of this specification and the common requirements defined in TOPAS 0600.

Implementation

1.7 This specification will be immediately implemented from the date of issue for all new TOPAS Registrations.

1.8 For all products previously registered against TOPAS 2517B which are compliant with this amended specification, manufacturers are simply required to confirm in writing that the product remains compliant. Once confirmation product registration information will be migrated on the TOPAS website.

Glossary of Terms

1.9 A comprehensive glossary of terms is given in the IHE Guidance Note Traffic Control and Information Systems.

1.10 TOPAS Terms are defined in TOPAS 0600 and TOPAS 0601.

2 NATIONAL REQUIREMENTS

2.1 This specification details the functional and performance requirements for electromechanical variable message signs. These signs are defined in BS EN12966:2014 as Continuous Message Signs.

2.2 These signs are similar to fixed signs the only difference being that by some electro- and/ or mechanical means they change between messages i.e. Rotating prism signs, roller blinds etc.

2.3 The size and colour of legends shall be in accordance with the requirements for letters and symbols given in TSRGD, or as authorised by the Department of Transport, the Development Department Secretariat of the Scottish Executive or the Transport Directorate of the Welsh Assembly Government.

2.4 The retro-reflective material forming the sign face shall meet the requirements of BS EN 12899-1:2007 as invoked in TSRGD.

Operational Requirements

2.5 The sign shall be capable of displaying legends without undue distortion to, or gaps in, symbols, letters and borders.

2.6 Where the message is changed mechanically means shall be incorporated to secure the moving parts in their correct relative positions to display the message.

Optional Hand operated Signs

2.7 The handle, wheel, lever or other means of manual operation shall be in easy reach of an operator standing on the ground or catwalk. A means of preventing the message being changed by unauthorised persons shall be incorporated.

2.8 The force which is required to be applied to the handle, wheel, lever or other means of manual operation in order to affect a change in the display shall be not more than 45 Newtons. This shall apply over the whole range of climatic conditions.

Electromechanical Signs

2.9 During a sign changing sequence the time that any misleading message (i.e. changing from one sign face to the next) is displayed shall not exceed 5 seconds except in cases such as advance diversion or road closure signs where this may be longer. In other circumstances, such an automatic warning system, the time shall be reduced to 0.5 seconds.

2.10 Any over travel provided to avoid damage to the operating mechanism shall be the minimum necessary. Free play linkages shall also be kept to a minimum consistent with the maintenance of a legible sign face.

2.11 Protection shall be provided to safeguard the drive mechanism from damage when, for example, the prisms becoming jammed.

2.12 If a power failure to the sign occurs during a message change, then on restoration of power the sign shall display the message as detailed in the Contract Specification (Default Message). This need not necessarily be the message selected prior to the mains failure.

2.13 Following restoration of power and resumption of the remote control interface the sign should move to the correct sign face in accordance with the requirements of 2.9.

2.14 Means shall be provided to operate the sign locally in the event of mains failure. Where a manual means to operate the sign is provided, the conditions in 2.7 and 2.8 shall apply, and a safety device shall be installed to prevent injury to the operator or damage to the sign should the power become restored during manual operation.

2.15 Where a sign is controlled remotely a confirmation of sign status is required. This should include a confirmation of the sign face when not in transition.

2.16 All pivots and bearings shall be non-corrodible and shall be sealed against the ingress of dirt and moisture, where this may degrade the performance of the sign's operation.

2.17 Once an aspect is set there shall be no undue movement of a display message or element. This shall apply over the whole range of climatic conditions.

Monitoring

2.18 Upon power failure a fault condition shall be generated. Facilities shall be provided to monitor the condition locally and/or remotely. (NOTE: This would require UPS or equivalent to meet this requirement to be fitted within the sign)

2.19 The sign shall be designed such that it is possible to operate and monitor the status of the signs locally. The sign status shall be displayed by indicators or displayed on a test set.

Interface Requirements

2.20 The Contract Specification must contain adequate information on the interface requirements relating to the equipment from which the sign is to be controlled.

2.21 It shall be the Manufacturer's responsibility to ensure that the interface provided for the sign is compatible with the sign control system.

2.22 Where the Product uses any Radio Equipment it shall comply with Radio Equipment Regulations and be tested to the requirements of IR2030 and the relevant additional tests defined in BS EN 301489-3. The relevant documentation identified in Appendix Z shall be provided as part of the Product Technical File.

Electrical Requirements

2.23 All equipment shall be suitable for operation in accordance with this specification when connected to the UK mains supply. Equipment must operate according to BS EN12966:2014, section 4.5.3.

2.24 All wiring, termination, earthing and labelling shall be in accordance with BS EN12966:2014, section 4.5.3.

Optical Requirements

Sign illumination

2.25 Where lighting is specified or required it shall be provided in accordance with EN12899-1:2007. The extent of the illumination to be provided shall afford sufficient illumination to permit the legibility as described in Appendix A. The illumination shall not alter significantly the appearance or colour of the sign.

2.26 One or more light sources shall provide the lighting for the sign. Where two light sources are provided, they shall be operated from independent, separately fused circuits, to prevent the failure of one affecting the operation of the other.

2.27 The lighting control gear and fuses shall be located in a suitable, accessible chamber or compartment.

2.28 All forms of light source shall be suitably shielded from traffic view either by reflectors or blanking plates.

2.29 Lighting within the Product shall be so designed as to afford ease of maintenance and to permit the replacement of light emitting components without the need to dismantle large sections of the sign.

2.30 For enclosed signs, means shall be provided for preventing condensation forming within the enclosures, except under the most extreme climate conditions.

2.31 External illumination provided for Fixed Message Signs shall be in accordance with BS EN 12899-1:2007.

Illumination Control

2.32 Means shall be provided to determine the ambient light level adjacent to the Sign. When ambient light conditions deteriorate to a level of 70 LUX, the Product shall switch on the illumination.

2.33 Provision shall be made to avoid illuminating a blank sign face or a sign in a fault condition.

2.34 All units shall operate in a “failsafe” mode, i.e. sign illumination shall be switched on, in the event of failure of the ambient light monitor.

Construction

2.35 The structural performance of VMS including their supports and fixings excluding cantilevers and gantries shall be in accordance with BS EN 12899-1:2007.

2.36 The retro-reflective material forming the sign face shall be in accordance with BS EN 12899-1:2007 as invoked in TSRGD.

2.37 Signs shall be constructed to achieve the minimum clear visibility recognition distance for all legends in accordance with the requirements for motorists travelling at the maximum speed allowed at the proposed location.

2.38 Products manufactured to this standard shall meet the prevailing national requirements.

Flashing Amber Lanterns

2.39 Where flashing amber lanterns are provided, they must conform to sizing within TSRGD and optical performance specified in BS EN12966:2014.

2.40 If detailed in the works specification it shall be possible to synchronise the flashing of the lanterns with an external trigger signal.

2.41 Failure of any individual lantern shall not affect the output of any other lanterns.

2.42 The system shall provide confirmation whenever the lanterns have been activated and shall provide notification of a fault in any part of the lantern control or display.

2.43 Contract Specification shall identify which messages shall make use of flashing lanterns.

2.44 It shall not be possible for the lanterns to be operated when the sign shows a blank face.

2.45 The Product shall provide facilities to report a failure of the dimming and/or illumination.

Failure Modes

2.46 The Sign shall detect and report the following errors when connected to a remote-control system:

- Photocell failure;
- Amber warn lantern failure;
- Heater/Ventilation failure;
- Sign rotation failure.

2.47 The sign shall always attempt to fail in a safe manner by not displaying corrupt messages to drivers.

3 PERFORMANCE CLASSES

3.1 The performance levels and classes stated below have been copied from the National Annex (NA) to BS EN 12966:2014 and BS EN 12899-1:2007 as defined in TSRGD 2016 (amended) which takes precedence over this document.

Chromaticity

Product	Location	Class
Retroreflective sign face material	All	CR1 Table 1
Fluorescent retro-reflective material	All	Table NA.1D
Non-retro-reflective sign face material	All	Class NR1 Table 16

SOURCE: BS EN 12899:2007, Table NA.1.

Coefficient of retroreflection

Product	Location	Class
Retroreflective sign face material	All locations other than those where high-performance materials are required	RA2 Table 4 / R2 Table NA.1A
Retroreflective sign face material	Locations where general purpose high-performance materials are required	Class R3B-UK, Table NA.1B
Retroreflective sign face material	Locations where high-performance materials more suitable for overhead gantry signs are required	Class R3C-UK, Table NA.1C

SOURCE: BS EN 12899:2007, Table NA.1.

Mean illuminance

Product	Location	Class
Externally illuminated signs	Areas with high background luminance	Class E3, Table 22
Externally illuminated signs	Other areas	Class E2, Table 22

SOURCE: BS EN 12899:2007, Table NA.1.

Uniformity of illuminance

Product	Location	Class
Externally illuminated signs	For signs with an area not exceeding 1.5 m ²	Class UE3, Table 23
Externally illuminated signs	For signs with an area exceeding 1.5 m ² and with a height to width ratio less than 2:5	Class UE2, Table 23
Externally illuminated signs	For signs with an area exceeding 1.5 m ² and with a height to width ratio greater than 2:5	Class UE1, Table 23

SOURCE: BS EN 12899:2007, Table NA.1.

NA.3 – Physical Performance Levels

Table NA.3 – Physical Performance

External conditions	Class designation
Temperature	T1
Ingress protection against water and dust	IP56

SOURCE: BS EN 12966:2014+A1:2018, Table 12.

3.2 Temporary deflections caused by wind load, temporary deflections caused by bending and temporary deflections caused by dynamic snow loads should all be in accordance with the national annex to BS EN 12899-1:2007, *Fixed, vertical road traffic signs – Part 1: Fixed signs*.

3.3 In addition, resistance of electrical components to the effects of pollution should be in accordance with pollution degree 2 as described in BS EN IEC 60664-1, *Insulation coordination for equipment within low voltage supply systems –Part 1: Principles, requirements and tests*.

luminance ratio, beam width and colour); and the recognition time (the duration of legibility), depending on approach speed.

3.4 The calculated recognition time should not exceed the maximum recommended reading time for the purposes of this calculation, as detailed in Table NA.4. The process of calculating the recognition time is fully detailed in Annex N of the standard.

4 REFERENCES

General

4.1 Where undated references are listed, the latest issue of the publication applies.

British Standards

4.2 The British Standards Institution, London, publishes British Standards.

BS EN 12899	Fixed, vertical road traffic signs. Fixed signs
BS EN 62265	Degrees of protection provided by enclosures for electrical equipment against mechanical impacts (IK code)
BS EN 60529	Degrees of Protection provided by enclosures (IP Codes)
BS EN 12966	Vertical road signs : Variable Message Signs

Specifications

4.3 TOPAS Limited Specifications are available from www.topasgroup.org.uk

TOPAS 0600	TOPAS Registration process
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Other Publications

4.4 Other publications can be obtained from the Stationary Office.

TSRGD	The Traffic Signs Regulations and General Directions
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APPENDIX A INFORMATIVE GUIDE

General

A1 This Appendix is an informative guide to Highways Authorities who purchase electromechanical variable message signs that have been declared conformant to this specification. Prospective purchasers should ensure that the contract specification provides details of the following:

- The type of the variable message sign required (rotating prism etc.);
 - The supply requirements if these differ from the standard mains supply;
 - The minimum working life of the sign face material;
 - Whether flashing amber lanterns are required, if these are to be synchronised with other equipment, and if higher than normal flashing rates are necessary;
 - Whether an external fault indicator should be fitted (applicable to detector actuated signs);
 - Legend required in the event of a power failure
 - Legend required in the event of detector failure;
 - Whether manual operation is required;
 - The cable infrastructure requirements
 - The legends to be displayed;
 - Whether a monitor signal for “no legend displayed” is required;
 - Whether illumination is provided and the type of illumination control;
 - Whether varying levels of illumination is required, (dimming).
- The control system interface requirements; the sign interface should be one or more of the following:
 - i) An NMCS2 interface as specified in TR 2095;
 - ii) UTMC VMS MIB
 - iii) Clean contact control based on signal and monitoring signs.

Note: The purchaser should be aware the importance of ensuring legends to be used are authorised before manufacture commences.

APPENDIX Z TECHNICAL FILE CONTENT

This appendix defines the necessary content for a Technical File (a collection of relevant documents) which must be reviewed by an appropriate Technical Assessor as part of the TOPAS Registration process (See TOPAS 0600).

Only the 'ticked' items are required to be present in a Technical File used to support TOPAS Registration against TOPAS 2517.

Ref	Item	Description	Required
1	Overview document	<p>A summary document outlining the product, specifying which TOPAS and other relevant specification(s) the product has been designed to comply with, together with a detailed table of contents for the Technical File.</p> <p>Where external certificates or documents are referred to these shall be included either:</p> <p>(a) within this overview document; or (b) supplied separately as part of this Technical File.</p>	✓
2	QA accreditation certificate(s)	A copy of the Quality Management Registration Certificates for the organisation applying for TOPAS Product Registration.	✓
3	Details of all required standards and regulations including CE/CA requirements that apply to the Product	<p>A list of all standards to be complied with.</p> <p>Including explicit CE/CA declarations of performance/conformity for those standards, including all certificates, shall be included in this Technical File.</p>	✓
4	A functional design description of the product	Title, document number, version and date of the overall System Design Document for the Product.	✓

5	Product part numbers	A list of top-level assembly part numbers and their issue states including all firmware / software part numbers and issues.	✓
6	Statement of Compliance (An example template can be found on the TOPAS website)	A clause-by-clause statement of compliance against TOPAS 2517 confirming compliance and/or listing caveats or deviations.	✓
7	Functional test procedures and results	A list of all functional test schedules and test result documents (by document number and issue) that substantiate the Statement of Compliance.	✓
8	BS EN 50293 EMC test procedures and results	(a) Title, document number, version and date of the EMC test performance requirement document. (b) Copies of the results of EMC testing undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File.	✓
9	Optical test procedures and results required by this specification	(a) Title, document number, version and date of the optical test performance requirement document. (b) Copies of the results of optical testing undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File.	✓
10	Environmental test results	(a) A list of relevant Environmental tests performance requirements defined in TOPAS 2130. (b) Copies of the results of the Environmental testing undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File.	✓

11	Radio Equipment Regulations test results	<p>Where the Product uses any Radio Equipment:</p> <p>(a) A copy of the RER Declaration Of Conformity</p> <p>(b) Reference to the RER Technical Documentation for the product (by title, document number and version).</p> <p>(c) Copies of the results of radio testing, undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File. The test results should be those identified in the RER Technical Documentation and should cover any specific IR2030 requirements for the type of radio used.</p> <p>(d) A copy of the Type Examination Certificate for radio equipment not covered by a Designated EN standard.</p>	✓
12	Primary Safety Test procedure and results	<p>For Traffic Control equipment:</p> <p>(a) The title, document number, version and date of the Primary Safety Test schedule.</p> <p>(b) A copy of the test results must be included as part of the Technical File.</p>	N/A
13	Failure Mode Analysis	Title, document number, version and date of the product failure mode analysis requirements and results.	N/A