Traffic Open Products and Specifications

TOPAS 2517C

Performance Specification for Electromechanical Variable Message Signs

Revision	Date	Scope	Authorised by
B (v1)	26/03/19	Final	Board MP
C v1	02/10/21	Draft	

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TOPAS 2517C

PERFORMANCE SPECIFICATION FOR ELECTROMECHANICAL VARIABLE MESSAGE SIGNS

CONTENTS

CHANGE LOG

The following outlines significant changes to this specification, from its previous issue which may impact on currently registered products:

2. Functional requirements changed to National Requirements
2.1 Specification now references EN12966 for continuous message signs
2.2 Defined text message sign option removed, and definition of continuous sign and types provided
2.4 Retroreflective material now specific to EN12899
2.7 & 2.8 Hand operation now made optional and must operate according to climatic range of the sign not just wind speed
2.16 Updated to operate over full climatic range
2.19 -2.21 Sections on Defined text message removed
2.21 -2.22 Electrical requirements now conform to EN12966
2.23 Sign illumination now confirms to EN12899
2.35 Retro-reflective sign facing must confirm to EN12899
2.36 Optional front screen must meet requirements of EN12966
2.38 Signs without optional protective screens must operate over all climatic conditions and may offer de-ice function
3 Performance classes new section added covering applicable tables for performance in EN12899 and EN12966

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.

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 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 BSEN12899 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, level 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 is displayed shall not normally 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 sign occurs during a message change, then on restoration of power the sign shall display the message as detailed in the Contract Specification. This need not necessarily be the message selected prior to the mains failure.

2.13 Means shall be provided to operate the sign locally in the event of mains failure.

2.14 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.

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.

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 Design Authority's responsibility to ensure that the interface provided for the sign is compatible with the sign control equipment.

Electrical Requirements

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

2.23 All wiring, termination, earthing and labelling shall be in accordance with BSEN12966:2014 section 4.5.3.

Optical Requirements

Sign illumination

2.24 Where lighting is specified or required it shall be provided in accordance with EN12899:2007. 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.

2.25 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.

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

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

2.28 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.

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

2.30 External illumination provided for Fixed Message Signs shall be in accordance with BS EN12899.

Illumination Control

2.31 Means shall be provided to determine the ambient light level adjacent to the Product that may be overridden by the output contacts of a mechanism, which is controlled either locally or remotely.

2.32 Provision shall be made to avoid illuminating a blank sign face except under fault conditions.

2.33 All units shall operate in a “failsafe” mode, i.e. sign illumination shall be switched on, in the event of failure of the illumination control system.

2.34 When ambient light conditions deteriorate to a level of 70 LUX, the Product shall switch on the illumination.

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.

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

2.37 If, by the nature and design of the sign mechanism, a waterproof screen or screens are required over the face of the sign, such screen(s) shall be of a material complying with the requirements of BS EN 12966.

2.38 Signs located behind such screens shall be provided with adequate means to prevent the formation of condensation under all climatic conditions.

2.39 Signs not requiring such protective screen(s) in accordance with 2.37, where the moving parts forming the legends are exposed to all weather conditions, shall have mechanisms capable of continued operation when subjected to all climatic conditions. With option of de-ice function for rotating signs.

2.40 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.

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

Flashing Amber Lanterns

2.42 Where flashing amber lanterns are provided they must conform to sizing within TSRGD and optical performance specified in EN12966 with UK classes as specified in the National Annex.

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

2.44 Failure of any light source(s) shall not affect the operation of the other. Similarly the failure of any master or slave unit shall not inhibit the operations of a working master or slave unit as appropriate.

2.45 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.

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

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

Failure Modes

Detector Activated Signs

2.48 Failure of a detector, communications connection shall result in resetting the sign to a blank face, or an authorised legend as detailed in the works specification.

2.49 Where stated in the works specification, an external fault indicator may be fitted.

2.49.1 The fault lamp shall be red and may be installed either on the sign or on an associated cabinet. It shall be easily visible from outside the enclosure.

2.49.2 The fault lamp shall be illuminated when a condition, as described in 2.48 exists.

2.49.3 A battery back up may be provided which shall ensure the fault lamp can remain illuminated for a minimum period of 48 hours if required.

2.50 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.

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

3 PERFORMANCE CLASSES

The performance levels and classes stated below have been copied from the National Annex (NA) to BS EN 12966:2014 +A1:2018 (incorporating corrigenda June 2018 and April 2021) 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 m2	Class UE3, Table 23
Externally illuminated signs	For signs with an area exceeding 1.5 m2 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 m2 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*.

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*.

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.

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 1363-4:	13A Plugs, socket-outlets and adapters. Specification for 13A fused connection units switched and unswitched
BS 4293	Specification for residual current operated circuit breakers
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 60309-2	Couplers for industrial purposes
BS EN 12966	Vertical road signs : Variable Message Signs

Specifications

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

TOPAS 0600	Self-Certification and Approval of Equipment for the Control of Vehicular and Pedestrian Traffic on Roads

Other Publications

4.4 Other publications can be obtained from the Stationary Office.

TSRGD	The Traffic Signs Regulations and General Directions

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) A separate control and monitoring line for each legend;
  - iv) RS232C, CCITT V24 and V28;
  - v) Parallel control lines using coded combinations;
  - vi) IEEE 802.3u/100Base-T.
  - vii) To protect the future roll out of digital networks, either hard-wired or virtual, the 100Base-T interface shall be included for all Product builds unless otherwise instructed.

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

A2 The purchase contract should ensure that each Electromechanical Variable Message Sign is approved to this standard and is fitted with a label displaying the following:

i) A conformity symbol identifying this TOPAS specification number;

ii) The unique product identifier, version and serial number;

iii) The electrical supply requirements of the product;

The primary control and monitoring interface

APPENDIX Z - TECHNICAL FILE CONTENT

This appendix defines the necessary content for a Technical File Pack (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 Pack used to support TOPAS Registration against TOPAS 2517C.

Ref	***Item***	***Description***	***Required***
1	Overview document	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. Where external certificates or documents are referred to these shall be included either: (a) within this overview document; or (b) supplied separately as part of this Technical File.	✓
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	A list of all standards to be complied with. Including explicit CE/CA declarations of performance/conformity for those standards, including all certificates, shall be included in this Technical File.	✓
4	A functional design description of the product	Title, document number, version and date of your 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 2517C 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 must 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 must 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 must be included in the Technical File.	✓

11	Radio Test results required by this specification	Copies of the results of Radio testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File. Reports should be those listed on the UKRR Declaration of Conformity & the Technical File and any specific IR2030 requirements	✓
12	Primary Safety Test procedure and results	For Traffic Control equipment: (a) The title, document number, version and date of the Primary Safety Test schedule. (b) A copy of the test results must be included as part of the Technical File.	N/A
13	Failure Mode Analysis	Title, document number, version and date of the product failure mode analysis requirements and results.	N/A