Traffic Open Products and Specifications

TOPAS 2517B

Performance Specification for Electromechanical Variable Message Signs

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B (v1)	26/03/19	Draft	Board MP

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TOPAS 2517B

PERFORMANCE SPECIFICATION FOR ELECTROMECHANICAL VARIABLE MESSAGE SIGNS

CONTENTS

CHANGE LOG

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

a) Specification references updated to align with prevailing UK practice.

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

None

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 2517A 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 Highways Agency document TA 84 Code of Practice for Traffic Control and Information Systems for All-Purpose Roads.

2 FUNCTIONAL REQUIREMENTS

General

2.1 This specification details the functional and performance requirements for electromechanical variable message signs.

2.2 In order to provide the number of messages required including a blank aspect, the sign types will generally fall into one of the following categories.

i) Fixed Text Message Sign;

ii) Defined Text Message Sign.

Sign Legends

2.3 For Fixed Message Signs 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 For Defined Text Message Signs (ie. dot matrix type) the legends shall consist of fluorescent yellow alphanumeric on a black background, or as defined in the contract specification. The character set shall be as defined in the Departmental Standard issued by the Department of Transport, unless otherwise agreed by the Department. All signs of this type, and their legends, require authorisation by the Department of Transport, the Development Department Secretariat of the Scottish Executive or the Transport Directorate of the Welsh Assembly Government.

2.5 For Fixed Text Message Signs the retro-reflective material forming the sign face shall to the requirements of BSEN12899 as invoked in TSRGD.

Operational Requirements

Fixed Text Message Signs

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

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

Hand operated Signs

2.8 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.

2.9 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 normally experienced and in wind gusts up to 160 km/h.

Electromechanical Signs

2.10 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.

2.11 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.

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

2.13 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.

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

2.15 Where a manual means to operate the sign is provided, the conditions in 2.8 and 2.9 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.

2.16 Where a sign is controlled remotely a confirmation of sign status is required.

2.17 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.

2.18 Once an aspect is set there shall be no undue movement of a display message or element when it is subjected to wind gusts of 160 km/h nor shall the message be changed by such gusts.

Defined Text Message Signs

2.19 Weatherproof screen(s) where required over the front face of the sign, shall be as 2.43 to withstand, without undue distortion, wind gusts of up to 160 km/h.

2.20 The sign equipment shall provide a conformation signal when the required message is being displayed.

2.21 A battery backup shall be provided to ensure that in the event of a mains failure any message displayed is retained, without corruption, and subsequent changes of not less than 5 messages shall be possible with correct operation for not less than 24 hours. Lanterns will not require to be battery backed.

Monitoring

2.22 Upon power failure a fault condition shall be generated. Facilities shall be provided to monitor the condition locally and/or remotely.

2.23 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.

2.24 All printed circuit boards shall be protected against corrosion by a conformal coating.

Interface Requirements

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

2.26 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

2.27 All equipment shall be suitable for operation in accordance with this specification when connected to the UK mains supply.

2.28 All wiring, termination, earthing and labelling shall be in accordance with BSEN12966 as invoked in TSRGD.

2.29 One or more mains outlet socket(s) shall be provided for maintenance tools and test equipment. The socket(s) shall be either 13A to BS 1363 or 16A to BS EN 60309-2 and shall be protected by a residual current device to BS 4293, of maximum rating 30 mA residual current.

Optical Requirements

Sign illumination

2.30 Where lighting is specified or required it shall be provided in accordance with TSRGD. 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.

2.31 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.

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

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

2.34 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.

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

2.36 External illumination provided for Fixed Message Signs shall be in accordance with BSEN12899 as invoked in TSRGD.

Illumination Control

2.37 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.

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

2.39 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.

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

Construction

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

2.42 For Fixed Text Message Signs the retro-reflective material forming the sign face shall be in accordance with BSEN 12899 as invoked in TSRGD.

2.43 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 12899.

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

2.45 Signs not requiring such protective screen(s) in accordance with 2.43, where the moving parts forming the legends are exposed to all weather conditions, shall have mechanisms capable of continued operation when subjected to all the environmental conditions expected in the United Kingdom.

2.46 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.

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

Environmental

2.48 The Product enclosure shall comply with the requirements of BSEN12966 as invoked in TSRGD.The enclosure shall provide mechanical protection to comply with the requirements of BSEN12966 as invoked in TSRGD.

Flashing Amber Lanterns

2.49 Where flashing amber lanterns are provided they must conform to sizing within TSRGD and optical performance specified in EN12966 with UK classes in TOPAS2516.

2.50 Deleted

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

2.52 Failure of any lamp(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.

2.53 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.

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

2.55 Deleted

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

Failure Modes

Detector Activated Signs

2.57 Failure of a detector or mains supply shall result in resetting the sign to a blank face, or an authorised legend as detailed in the works specification.

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

2.58.1 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.

2.58.2 The fault lamp shall be illuminated when a condition, as described in 2.57 exists.

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

Fixed Text Message Sign

2.59 The Optical performance of Light emitting Signs shall be in accordance with TOPAS 2516.

2.60 The Fixed Text message 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.

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

Defined Text Message Sign

2.62 The Defined message sign shall detect and report the following failures when remotely connected to a control system:

- Photocell failure;
- Amber warn lantern failure;
- Heater/Ventilation failure;
- Pixel failure;
- Message Failure.

2.63 Where characters that make up the fixed text message consists of a number of light sources the contract specification will define the failure thresholds that identify the number of illumination failures that should trigger both pixel and message failures.

2.64 When light source failures transverse the pixel fail threshold the sign will continue to display the message and a minor failure shall be reported to the remote control system.

2.65 When sufficient light source failures transverse the message fail threshold the sign will blank and a major failure shall be reported to the remote control system.

3 REFERENCES

General

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

British Standards

3.2 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

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

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

Other Publications

3.4 Other publications can be obtained from the Stationary Office.

	Directive 89/336/EEC EMC Directive
TSRGD	The Traffic Signs Regulations and General Directions
MCHW Volume 1	Manual of Contract Documents for Highway Works

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, dot matrix etc.);
- The supply requirements if these differ from the standard mains supply;
- The minimum working life of the sign face material;
- The failure thresholds for both pixel and message failures
- 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) A separate control and monitoring line for each legend;
  - iii) RS232C, CCITT V24 and V28;
  - iv) Parallel control lines using coded combinations;
  - v) IEEE 802.3u/100Base-T.
  - vi) 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 HA specification number;

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

iii) The electrical supply requirements of the product;

iv) 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 2517B.

Ref	Item	Description	Required
1	Technical File 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 Pack. Where copies of external certificates or documents are referred to these may be included within the Technical File overview document or supplied separately as part of the Technical File Pack.	✓
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 CE markings that apply to the product	A list of all directives complied with and how achieved. Typically this would be references to explicit CE Technical Files and certificates, copies of which would be included in the Technical File Pack.	✓
4	A functional design a description of the product	A reference to the overall System Design Documentation for the product (by document part number and issue).	✓
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	Test procedures and results	A reference to all test schedules and test result documents (by document part number and issue).	✓

7	Statement of compliance	A clause by clause statement of compliance against TOPAS 2517A confirming compliance and/or listing caveats or deviations.	✓
8	EMC test results	A reference to EMC test performance requirements. Copies of the results of EMC testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File Pack.	✓
9	Optical test results	A reference to Optical tests performance requirements. Copies of the results of Optical testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File Pack.	N/A
10	Environmental test results	A reference to Environmental tests performance requirements. Copies of the results of the Environmental testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File Pack.	✓
11	Radio Agency test results	A reference to Radio Agency tests performance requirements. Copies of the results of Radio Agency testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File Pack.	N/A
12	Primary Safety Test results	For Traffic Control equipment specifically a reference to the Primary Safety Test schedule and test results by part number and issue. A copy of the test results should be included as part of the Technical File Pack.	N/A
13	Failure Mode Analysis	A reference to the product failure mode analysis requirements and results by document part number and issue.	N/A