Traffic Open Products and Specifications

TOPAS 2513A

Performance Specification for Wig Wag Signal Control Equipment

Revision	Date	Scope	Authorised by
A (v1)	15/01/15	Draft	Admin
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TOPAS 2513A

Corrigendum 6/12/24

PERFORMANCE SPECIFICATION FOR WIG WAG SIGNAL CONTROL EQUIPMENT

Updated Appendix Z to include criteria for RED to be included

CONTENTS

1 INTRODUCTION

1.1 This performance specification covers the necessary requirements for vehicle and cattle crossing control equipment as defined in The Traffic Signs Regulations and General Directions.

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 F.

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 TOPAS0600.

Implementation

1.7 This specification implements requirements as originally defined in HA specification TR 2513A. Product Approvals to TR2513A may be used to register products to this specification as defined in TOPAS 0600

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

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 The Products defined in this specification are used to control vehicles at roads on approaches to, or in the vicinity of the following:

- emergency service stations;
- airfields;
- moveable bridges, and tunnels;
- cattle crossings;
- railway crossings.

2.2 The traffic signals at these locations are normally off and operated locally or remotely by an operative, as and when necessary.

2.3 The Product consists of a controller, vehicle traffic signals, control panels and mimic signals for the operator.

2.4 For Vehicle crossings, the signals shall be in accordance with TSRGD Diagram 3014.

2.5 For Cattle crossings, the signals shall be in accordance with TSRGD Diagram 4005.

2.6 The control of the signals shall be as defined in the appropriate application appendix of this specification.

2.7 The signal shall function in one the following three operation modes:

- Signals off;
- Signals on; (Local activation)
- Signal controlled from a remote source.

Performance

2.8 The requirements of signal intensity for safety of BS 7987 shall be complied with. For signals this is class AF1; for the controller driving the signals this is class AF5.

2.9 For Signals with red flashing aspects the displayed signal sequence shall comply with TSRGD Regulation 39. The duration of the amber periods preceding the flashing red signals shall be of a fixed 5-second duration.

2.10 For signals with amber flashing aspects the displayed signal sequence shall comply with TSRGD Regulation 51.

2.11 The light on time shall be between 45% and 55% of the flash cycle time.

2.12 All timed periods shall be accurate to within ± 5%. This accuracy shall be maintained throughout the life of the equipment without subsequent adjustment.

Fault detection and reporting

2.13 The Product shall include the functionality to monitor the operational status of the signals such that faults can be detected and reported.

2.14 If one signal aspect fails, a condition shall be displayed on the control panel.

2.15 In the event of two red aspects on a vehicle crossing failing, on a single approach, the procedure for fault category 1 shall be followed.

System Communication

2.16 Where the interconnection between the Product components is via cables then these shall be compliant with BS 6346.

Wireless Communications Integrity

2.17 Where the interface between the Product components are wireless then the following addition requirements shall apply:

i) The Product shall provide a robust and reliable means of fail-safe communication and provide suitable levels of security, accuracy and reliability to all messages being transmitted and received.

ii) The Product shall maintain reliable operation in all reasonably expected conditions of use and shall be unaffected by other sources of radio transmission and by screening or reflections from vehicles or buildings.

iii) An intermittent loss of communication between any system components shall follow the process for category 2-fault.

iv) An Intermittent fault is defined as an unsuccessful undertaking to reach-synchronisation or to complete a communications dialogue after 500 ms.

Crossing Controller

2.18 The Product shall be shall be capable of operating a maximum of 6 signal sets in pairs.

2.19 The Product shall include facilities to adjust and set all adjustable timing parameters by authorised personnel only.

2.20 The flashing sequence of vehicle crossing signals on either side of a highway and facing in the same direction shall operate in synchronisation.

2.21 A mimic display shall be provided to simulate the operational status of the roadside signals.

Construction

2.22 The equipment housing shall be constructed in such a manner and from materials to meet the environmental requirements defined in TR 2130.

Degrees of protection provided by enclosures (IP Code)

2.23 The Product housing shall be manufactured to BS EN 60529 IP 55.

2.24 The Product housing shall provide mechanical protection to IP XX9. Surface cracks may be allowed providing complete penetration does not occur i.e. no degradation to the IP protection of the equipment. No damage occurs to the equipment contained within the housing, and the equipment continues to operate to its specification.

Reliability

2.25 The Product shall be designed and constructed such that it can deliver a Mean Time Between Failures (MTBF) prediction figure of 12000 hours or greater, continuous operation.

Electrical Requirements

2.26 The Product shall operate from one of the following electricity supplies:

i) 230V ac +10% to -13% at 50 Hz ±4%;

ii) 110V ac (55V-0V-55V) +10% to -13% at 50 Hz ±4%.

2.27 In the event of a supply failure or interruption longer than 50 milliseconds the controller shall cause a category 2 fault.

2.28 All wiring, termination, earthing and labelling shall be in accordance with BS 7671.

Failure Modes

Category 1

2.29 All signals shall be disconnected from the power source within 500 ms.

2.30 A fault condition shall be displayed on the control panel.

2.31 Operation of The Product shall be inhibited until the fault has been rectified and The Product manually reset.

Category 2

2.32 All signals shall be disconnected from the power source within 500 ms.

2.33 A fault condition shall be displayed on the control panel.

2.34 Operation of the Product shall reinitialise in the signals off state when the power is restored.

2.35 When a fault condition is cleared the indication on the control panel shall not be removed until it is cleared by an operator.

3 REFERENCES

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 6346	Electric cables. PVC insulated, armoured cables for voltages of 600/1000 V and 1900/3300 V
BS 7671	Requirements for Electrical Installations
BS 50556	Road Traffic Signal Systems
BS EN 60529	Specification for Degrees of Protection Provided by Enclosures (IP Code)

Specifications

3.3 TOPAS Limited specifications are available at www.topasgroup.org.uk

TOPAS 2130	Environmental Tests for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment
TOPAS 2523	Traffic Control Systems Interfacing Specification
TOPAS 0600	Self-Certification Procedures for Statutory Approval of Traffic Signal Control Equipment

Other Publications

3.4 Other publications can be obtained from the Stationary Office:

TSRGD Traffic Signs Regulations and General Directions

Network Rail Publications

3.5 Network Rail Publications can be obtained from the Railway Safety and Standards Board.

GI/RT 7012 Requirement for Level Crossings

APPENDIX A EMERGENCY SERVICES STATIONS

A1 Products for use at emergency service stations shall provide the following additional features.

A2 Adjustable parameters for each signal shall be as follows:

- Delay from initiation to start of illumination (in the range 0 to 30 seconds).
- Duration of illumination (in the range 30 to 300 seconds.

A3 A remote control and monitoring panel to indicate and enable the following features:

i) a mimic display of the road side signals with blue or white illuminated indicators to confirm to operation all road side signals;

ii) establish the exit direction (for use in conjunction with dual carriageways);

iii) activation of the appropriate signals;

iv) display the operational status of all the roadside signals (Refer to A4);

v) indicate a fault condition visibly;

vi) indicate a fault condition audibly;

vii) mute the audible alarm;

viii) clear a fault condition or cancel an alarm.

A4 The display in A3(i)shall operate in synchronisation with each red vehicle crossing signals.

APPENDIX B AIRFIELDS

B1 Products for use adjacent to Air Fields shall provide the following additional features.

B2 The control of the signals shall be via a remote connection.

B3 The signals shall remain in operation until switched off.

B4 A remotely sited control and monitoring panel that delivers the following functionality:

i) A miniature display of the signals with blue lenses;

ii) A means to activate and deactivate the signals;

iii) A means to indicate a fault condition visibly;

iv) A means to indicate a fault condition audibly;

v) A means to mute the audible alarm and clear a fault.

vi) A means to clear a fault condition.

B5 The miniature blue display shall operate in synchronisation with each red vehicle crossing signals.

APPENDIX C MOVEABLE BRIDGES AND TUNNELS

C1 The Product for use adjacent to moveable bridges is normally used in conjunction with lifting-barriers and shall provide the following additional features.

C2 Means to raise and lower barriers.

C3 Interlocks that validate the positional and operational status of the barriers.

Control and Monitoring Panel

C4 A remote control and monitoring panel to indicate and enable the following:

i) Activation of the signals at either end of the bridge structure independently when interlocks are in normal mode.

ii) Indication that the signals are in operation.

iii) To raise and lower up to two barriers at either end of the bridge structure independently.

iv) The barrier operation shall be manual at all times. If an operator removes pressure from the actuator then movement of the barrier must stop.

v) To show the status of each, of up to four, barriers in each of the following states:

- Raised;
- Changing positions;
- Lowered.

vi) To indicate that a barrier is changing position audibly.

vii) Visible indication of a fault;

viii) Audible indication of a fault;

ix) To mute the audible alarm.

x) To clear a fault condition.

Pedestrian Audible Signal

C5 An audible warning to pedestrians adjacent to the barrier shall be sounded when the barrier is changing positions up or down.

C6 Audible warning signals shall be provided at each end of the bridge structure and should persist from the commencement of the vehicle-crossing signal until the barrier is in the fully lowered position.

C7 The audible signal (Not the same as used at pedestrian crossings) shall be an appropriate constant Tone at 10 dBA above the ambient noise between the limits 50 dBA to 110 dBA measured at a distance of 1 metre of the sound source.

Controller

C8 A facility shall be provided such that the operation of the barrier is only allowed when the vehicle crossing signals are operating.

C9 The Product shall provide an interlock to ensure that the offside barrier can only be operated when the nearside barrier is in the lowered position.

C10 Means shall be provided to detect faults in the barrier movement mechanisms.

C11 If the Controller detects a failure in the barrier detection circuit then the interlock output to the Bridge control system shall be inhibited.

APPENDIX D CATTLE CROSSINGS

D1 The Product used at Cattle crossing shall comprise a pair of signals to TSRGD Diagram 4005. The signals shall flash alternatively for a period of time determined by an operator through the operation of a secure control e.g. key switch.

D2 The rate of the flashing amber signals shall be as specified in the TSRGD. The 'light on' time shall be between 45% end 55% of the flash cycle time.

D3 Up to three remote control and monitoring panels that deliver the following functionality shall be provided:

i) A means to activate the Signals using a key switch.

ii) A means to validate the Signals operation visibly.

iii) A means to indicate a fault condition visibly.

iv) A means to clear a fault condition.

D4 The Controller shall include features to inhibit operation of the crossing signals after use, for a pre-set time period in the range 60 seconds to 300 seconds.

D5 This inhibit period shall commence at the cessation of the preset flashing aspect period.

APPENDIX E RAILWAY CROSSINGS

E1 The control system and fault reporting features shall be as defined in Railway Group Standard GI/RT7012.

E2 Where additional signal are required to prohibit the passage of pedestrians, the signals and their mounting shall be in accordance with TSRGD Regulation 52 and Diagram 4006.

APPENDIX F INFORMATIVE GUIDE

General

F1 This Appendix is an informative guide to Highways Authorities who wish to purchase and use Wig Wag crossing Products that have been declared conformant to this specification. Prospective purchasers should ensure that the procurement contract address the following issue.

Marking and Labelling

F2 Each assembly that comprises the Product must each be fitted with a label displaying the following:

i) The unique Product identifier and serial number;

ii) The application(s) for which it is approved;

iii) The electrical supply requirements of the equipment.

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).

The 'ticked' items are required to be present in a Technical File used to support TOPAS Registration against TOPAS 2513A. **Please read the description criteria carefully.**

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 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	A clause-by-clause statement of compliance against TOPAS 2513A confirming compliance or non-compliance and referencing supporting evidence. (An example template can be found on the TOPAS website)	✓

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. 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	For all products which have any defined optical performance requirements (a) Title, document number, version and date of the optical test performance requirement document. 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 list of relevant Environmental tests performance requirements defined in TOPAS 2130. 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 Equipment Regulations test results	For all products which include any transmitting and/or receiving radio equipment (a) A copy of the RER Declaration Of Conformity (b) Reference to the RER Technical Documentation for the product (by title, document number and version). (c) Copies of the results of radio testing, undertaken by an appropriately qualified independent approved test house must 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. A copy of the Type Examination Certificate for radio equipment not covered by a Designated EN standard.	✓
12	Primary Safety Test procedure and results	For Traffic signal Control equipment only: (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.	✓

13	Failure Mode Analysis	For Traffic signal Control equipment only Title, document number, version and date of the product failure mode analysis requirements and results.	✓