Traffic Open Products and Specifications

TOPAS 2503B

Performance Specification for Pedestrian Facilities at Temporary Stand-alone Traffic Signals

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B (v1)	08/01/15	Draft	Admin
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TOPAS 2503B

PERFORMANCE SPECIFICATION FOR PEDESTRIAN FACILITIES AT TEMPORARY STAND-ALONE TRAFFIC SINGLAS

CONTENTS

1 INTRODUCTION

1.1 This specification covers the requirements for Pedestrian Facilities at Temporary Stand-alone Traffic Signals for use on roads other than motorways.

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 implements requirements as originally defined in HA specification TR 2503A. Product Approvals to TR2503A 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

Light Signals

2.1 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.

2.2 The displayed signal sequence shall comply with TSRGD Regulation 33(3). The duration of the amber periods shall be:

i) the amber vehicle signal following the green vehicle signal shall be of a fixed 3 second duration and;

ii) the red/amber vehicle signal preceding the green vehicle signal shall be of a fixed 2-second duration.

2.3 The Product shall comply with TSRGD Diagram 3000, Regulation 33 and comply with the table referenced in TSRGD Regulation 33 (5).

2.4 The Pedestrian Signals shall comply with TSRGD Diagram 4002.1, Regulation 47.

Timing Accuracy

2.5 All timed periods shall be accurate to within ± 150 milliseconds.

Pedestrian Push Button Box

2.6 The Pedestrian Push button box shall be compliant with TSRGD Diagram 4003 and Regulation 47 (6).

Prevention of Hazardous Light Signal Displays

2.7 The Product shall have functionally independent supervisory control and monitoring processes.

2.8 The Product design shall prevent the display of simultaneous conflicting green vehicle signals and green pedestrian signals and other abnormal signal displays during normal operation, under fault conditions or with permitted operator intervention. An attempted simultaneous conflicting green shall follow the process of a Category 1 fault. *Fault categories are detailed in the Fault Modes section.*

System Communications Integrity

2.9 The Product shall be designed to provide reliable operation with a distance of 50 metres between any system components under all conditions of deployment without any detectable loss of performance.

2.10 If the overall design of the Controller divides the intelligence into separate discrete components and the interface between these is wireless, then the wireless communication shall be as follows:

i. The Product shall provide a robust and reliable means of fail-safe communication and provide suitable levels of security, accuracy and reliability of all data 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 to any signal head shall follow the process for a Category 3 fault.

iv. An intermittent communication fault is defined as an unsuccessful undertaking to complete a communications dialogue after 500 ms.

2.11 A permanent loss of communications to any system component shall cause a Category 1 fault.

2.12 A Permanent communication fault is defined as an unsuccessful undertaking to complete a communications dialogue after a period of 2000ms.

Light Signal Synchronisation

2.13 The status of each light signal aspect shall be monitored such that each state of each aspect on all signal units can be validated.

2.14 All light signal heads on the same stage shall have aspects synchronised to within 150 ms.

2.15 A permanent loss of synchronisation shall cause a Category 1 fault.

Electrical Requirements

2.16 The Product shall operate using an Extra Low Voltage or Reduced Low Voltage power supply as defined in BS 7671 Requirements for Electrical Installations.

2.17 The Product shall be capable of operating for a minimum continuous period of 16 hours under full-load conditions without attention.

2.18 In the event of a supply interruption equal to or less than 50 milliseconds the controller shall continue to function correctly.

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

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

Start-up Sequence

2.21 On switch-on or restoration of power, the Product shall display a red man signal to pedestrians and no signal to vehicles.

2.22 After expiry of a fixed preset period in the range 5 to 7 seconds, a green signal shall be displayed to vehicles.

2.23 On display of green signal to vehicles, a stored demand for pedestrians shall be inserted, and the controller shall commence normal VA operation, unless or until the Manual mode is selected.

Modes of Operation

General

2.24 Appropriate means shall be provided so that the pedestrian phase can be demanded using the push button box.

2.25 A registered demand shall be latched and shall be removed on commencement of the pedestrian green man signal.

2.26 The demand shall be confirmed by displaying the Wait signal on the pedestrian push button box.

2.27 When in the Vehicle Actuated mode the controller shall respond to signals generated by detectors installed to detect the presence of vehicles approaching or passing through the controlled area and pedestrian demands registered from the Push Button Box.

2.28 When in the Manual mode the controller shall respond only to the operation of manually operated commands from an operators panel via authorised personnel.

Vehicle Actuated Operation (VA)

2.29 The Product shall employ a vehicle detection sub-system approved in accordance with TOPAS 0600.

2.30 On selection of VA mode, demands for the vehicle phase shall be inserted and the controller shall then respond to this and all further demands.

2.31 The vehicle phase shall terminate, when a pedestrian demand is registered: and,

i) the minimum green period, pre-set at 10 seconds, has expired and no vehicle extensions are present; or

ii) the maximum green running period has expired.

2.32 The Maximum Green running period shall be timed from the receipt of a pedestrian demand.

2.33 The maximum period that a green signal may be held by vehicle extensions after a demand for right of way has been registered on the pedestrian phase shall be preset at a value in the range between 10 to 60 seconds, and adjustable in incremental steps of not less than 5 seconds.

Vehicle to Pedestrian Intergreen Phase

2.34 The intergreen vehicle to Pedestrian Phase shall immediately follow the vehicle phase and shall comprise a delay of three seconds between the vehicle signals changing to red and before the Pedestrian signal can change to green.

Invitation-to-Cross Period

2.35 This is the period during which the signals shall display vehicle red and pedestrian green shall immediately follow the vehicle to pedestrian phase and shall be preset at a value of 7 seconds.

Pedestrian to Vehicle Intergreen Phase

2.36 This intergreen period shall immediately follow the Invitation-to-Cross period, and shall comprise the following:

a period when the signals shall display vehicle red and pedestrian blackout signal. The blackout time shall be pre-set at a value in the range between 3 and 15 seconds; and adjustable in incremental steps of no greater than 1 second;

iii) a period when the signals shall display vehicle red and pedestrian red signals. The minimum all-red time shall be preset at a value in the range 2 to 5 seconds, and adjustable in incremental steps of no greater than 1 second;

iv) a fixed period of 2 seconds when the signals shall display vehicle red and amber and pedestrian red signals.

Manual Operation

2.37 A suitably marked facility for selecting the individual modes of control shall be provided on the operator's panel. The control facilities shall include

select and hold the vehicle phase;

v) insert a pedestrian demand, either singularly or continuous;

vi) select and hold the signals at all red. It shall not be possible to foreshorten the all-red period;

vii) move to the all-red clearance period directly from either phase and initiate an immediate change to this period, subject only to the minimum green period, without the need to select the next right of way.

2.38 If the right of way is switched from one phase to the other, neither the amber signal, red/amber signal, or pre-set all red shall be omitted or manually foreshortened.

2.39 It shall not be possible for either phase to be changed until the minimum green running period has expired.

2.40 When switching to Manual Control, from VA, any demand for the phase not running shall be cancelled.

2.41 If the change to Manual Control is made whilst the signals are:

i) either vehicle or pedestrian green, then the green shall continue, without interruption, as if it has been pre-selected;

all red, then the all-red shall continue, without interruption, as if it has been pre-selected.

Signals On/Off

2.42 A facility to switch the signals on or off, from the operators panel, shall be provided.

2.43 Switching the signals off shall not affect the operation of the Product, but when the signals are switched on they shall start up in accordance with the sequence specified in 0 to 0.

Dimming (Optional)

2.44 Provision may be made for the dimming of the signal aspects during periods of low ambient light conditions. Dimming may be provided for the whole signal installation or on an individual signal head basis and, if provided, shall comply with clause 0.

2.45 This dimming facility shall automatically reduce the intensity of the light signal to between a quarter (1/4) and a twelfth (1/12) of their full-on axis intensity when the ambient light level is reduced to 55 Lux and will automatically revert to the full intensity when the light level exceeds 110 Lux.

2.46 Aspects shall immediately switch to full intensity on failure of the dimming facility.

Speed Discrimination / Speed Assessment Equipment

2.47 Equipment shall be capable of being used with Speed Assessment (SA) or Speed Discrimination (SD) equipment, as specified in the current issue of TOPAS 2500.

Red Signal Monitor

2.48 The Product shall include functionality that will monitor all vehicle red signals on each approach.

Operation of Red Signal Monitor

2.49 In the event of all red vehicle signals failing on an approach or a failure of the red signal monitor being detected, then the Product shall follow the procedure for a Category 1 fault.

Controller Housing

2.50 The controller housing shall be manufactured from suitable material to provide mechanical protection of the controller equipment in the intended environment. See TR 2130.

2.51 All cabinet main doors shall be capable of being secured against unauthorised entry, by suitable locks.

2.52 The operator's panel facilities shall only be accessible via a locked door/flap without the need to open the main housing door

2.53 Manual Panel facilities (see 0) shall only be accessible via a locked door/flap and shall be possible without opening the housing main door.

Reliability

2.54 The procurement contract should call for the controller to have an MTBF prediction figure of greater than 12,000 hours continuous operation.

Control Facilities and Indications

2.55 Means shall be provided which are only accessible via the housing main door to:

i) select the pedestrian to vehicle phase all-red clearance period;

i) select vehicle maximum green running period.

2.56 Means shall be provided only via access to the Manual Panel to:

i) select method of control;

ii) hold the vehicle phase;

insert artificial pedestrian demands;

select and hold the signals at all- red under manual control;

switch the signals on and off.

2.57 Each of the means in 0 and 0 shall be devices that are capable of being positively located and clearly indicate to the operator the selection made.

2.58 Indications shall also be provided to show each of the following:

- the presence of a stored demand on each phase;
- the operation of the detector on the vehicle phase when the phase is displaying the green signal;
- the current state of each signal on each phase;
- the occurrence of a conflicting green failure;
- the occurrence of a red lamp/red signal monitor failure;
- when an output from the SA/SD equipment is present and;
- when an all-red extension following a maximum change due to the SA/SD equipment is present.

Fault Modes

Category 1

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

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

Category 2

2.61 The Product shall shut down in a safe manner.

2.62 On restoration of the supply the Product shall follow the Start-up sequence in paragraph 0.

Category 3

2.63 The signals displays shall remain unchanged.

2.64 This shall be recoverable to normal operation when the intermittent fault has been absent for 1500 ms

3 REFERENCES

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

British Standards

3.2 British Standards are published by the British Standards Institution, London.

BS 7671	Requirements for Electrical Installations
BS 7987	Road Traffic Signal Systems
BS EN 50293	Electromagnetic Compatibility Road Traffic Signal Systems Product Standard
BS EN 60529	Specification for Degrees of Protection Provided by Enclosures (IP Code)

Specifications

3.3 Topas Limited specifications are available from www.topasgroup.org.uk

TOPAS 2512	Inductive Loop Vehicle Detection Equipment
TR 2130	Environmental Tests for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment
TOPAS 2505	Above Ground Vehicle Detector Systems for Permanent Traffic Signals
TOPAS 0600	Self-Certification Procedures for Statutory Approval of Traffic Signal Control Equipment

Other Publications

TSRGD Traffic Signs Regulations and General Directions

MCHW Volume 1 Specification for Highways Works

Directive 89/336/EEC EMC Regulations 1992, (Statutory Instrument 1992 No 2372)

APPENDIX A - INFORMATIVE GUIDE

General

A1 This Appendix is an informative guide to the Highways Authorities who wish to purchase or hire Temporary Traffic Signal Control Equipment that has been declared conformant to this specification. Potential users should ensure that the procurement contract address the following criteria.

Security

A2 The procurement contract should call for the controller door(s) to be secured against unauthorised entry by a suitable lock(s) or security device(s) in accordance with the local or national standards.

Signals Heads

A3 The procurement contract should call for the mounting arrangement for the signal head, when equipped with apparatus, and ballast to withstand a wind speed of at least 26 m/s without toppling, rotating or bending.

Marking and Labelling

A4 The procurement contract should call for each Controller and Temporary Traffic Signal head to be clearly marked with the following:

i) the specification number against which it has been approved;

ii) the unique product identifier and serial number;

iii) any optional functionality that has been included in the self-declaration;

iv) the electrical supply requirements of the equipment;

v) the signal load (Number of Heads) capacity of the equipment.

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 2503B.

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 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	Statement of compliance	A clause by clause statement of compliance against TOPAS 2503B	✓

		confirming compliance and/or listing caveats or deviations.	
7	Test procedures and results	A reference to all test schedules and test result documents (by document part number and issue).	✓
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.	✓
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.	✓
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