TOPAS 2540A

Traffic Signalling Systems Performance Specification for Temporary Traffic Management

Revision	Date	Scope	Authorised by
A (v5)	06/07/20	Draft	Admin

TOPAS 2540A

TRAFFIC SIGNALLING SYSTEMS PERFORMANCE SPECIFICATION FOR TEMPORARY TRAFFIC MANAGEMENT

CONTENTS

1. INTRODUCTION

1.1 This specification covers the requirements for portable & temporary traffic signal controller equipment incorporating pedestrian facilities for operation at road works & Haul Route Crossings on roads other than motorways.

1.2 In this specification “road works” are defined as any works or temporary restrictions which cause partial or total obstruction of any road or highway. Examples may include highway improvement schemes, excavations, structural or maintenance works of any kind, street works or any other work executed on or near the highway together with the necessary working space, safety zones, space required for the storage of any materials, the construction of any temporary structures and the operation of any constructional plant required for the execution of such work, including associated surveys and inspections.

1.3 “Road” in England and Wales is defined as ‘any highway and any other road to which the public has access and includes bridges over which a road passes’ (RTA 1988 sect 192(1)). In Scotland, the definition is extended to include any way over which the public have a right of passage (R(S)A 1984 sect 151(1)).

1.4 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.

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

1.6 TOPAS registration requires manufacturers to 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.

1.7 Guidance to potential users of this product is given in Appendix F

1.8 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

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

1.10 Approvals issued against previous standards will remain valid. Retrospective action against this standard is not mandatory.

Product Definition

1.11 'Portable' light signal control equipment uses light signals prescribed in UK Statutory Instrument No.362 Traffic Signs Regulations and General Directions 2016 which are intended for the control of vehicular traffic and pedestrians for relatively short periods of time.

1.12 'Portable' light signals are normally mounted on a post fixed to a tripod or wheeled base unit can be easily moved by one operative.

1.13 'Temporary' traffic signal control equipment uses full size light signals and is capable of being used in any control configuration implemented by permanently installed light signals including signalised crossing facilities.

1.14 'Temporary' light signals are mounted on a post in a container that cannot be moved without the use of mechanical handling equipment.

Glossary of Terms

1.15 A comprehensive glossary of terms is given in Chapter 6 of the Traffic Signs Manual.

2. NATIONAL REQUIREMENTS

Signals Sequences

2.1 Legislations require that traffic signalling equipment must be designed to present to the road user only those signals and signal sequences defined in the Traffic Signs Regulations and General Directions 2016.

Controller Start up sequence

2.2

a Where Traffic Control, Traffic Control with Pedestrian, stand alone Pedestrian or Haul Route facilities are provided within the same controller, then each facility shall function independently of the other with regard to start up requirements.

b After or during start up, demands shall be inserted (in appropriate modes of operation) for all phases to ensure that no vehicles are trapped against a phase.

Controller Fault Conditions

Category 1

2.3 All signal heads shall revert to "OFF" within 500 milliseconds following the detection of a Category 1 failure. This will override any other requirement for a timing period to be maintained (e.g. minimum green, all-red, amber, red/amber).

2.4 "OFF" shall include non-operation of "wait" and demand indicators and tactile and audible devices.

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

Category 2

2.6 The signals shall remain in their current display condition. This may result in some otherwise fixed times (e.g. amber, red/amber, all-red) being extended.

2.7 This shall be recoverable to normal operation, via the start-up sequence, when the intermittent fault has been absent for a period greater than 2 seconds.

Category 3

2.8 Within 500 milliseconds of failure of a red vehicle signal, any green vehicle signal(s) in conflict with that red signal failure approach shall be disabled. Each stage shall cycle with minimum green periods.

2.9 Where more than one approach has complete red signal failure, the Category 1 fault process shall be followed.

Fault Recording (Optional)

2.10 Fault recording facilities shall be provided in the controller in accordance with BS EN 12675:2000 5.4 Storage of Faults.

2.11 The fault log shall record the date and time of fault clearances. The

fault log shall have, as a minimum, the capacity to record 255 events

Reliability

2.12 The controller shall be designed to have a minimum in-service life of 7 years with suitable maintenance.

Timing Accuracy

2.13 All timed periods for red & green signals shall be accurate to within ±250 milliseconds.

2.14 Amber and Red/Amber time accuracy shall comply with TRSGD 2016.

Electrical Requirements

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

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

2.17 In the event of a power supply interruption to the controller longer than 50 milliseconds the Product shall shut down in a safe manner. On restoration of the supply the Product shall follow the associated Start-up sequence.

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

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

Light Signal Synchronisation

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

2.21 All light signal heads on the same phase shall have aspects synchronised to within 150 milliseconds.

2.22 An intermittent loss of synchronisation (repeated unsuccessful attempts to attain synchronisation within 500 milliseconds) shall follow the process for Category 2 fault.

2.23 A permanent loss of synchronisation (failure to synchronise within 2 seconds) shall cause a Category 1 fault.

System Communications Integrity

2.24 The Product shall be designed to provide reliable operation for up to 300 metres between any two “system components” under all normal conditions of deployment without any detectable loss of performance.

2.25 An independent monitoring facility shall be provided to verify the integrity of the communications system.

2.26 If the overall design of the Product divides the intelligence into separate discrete components and the interface between them 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 between controller components shall follow the process for Category 2 fault.
iv) An 'intermittent loss of communication' is defined as repeated unsuccessful attempts to complete a communications dialogue within 500 milliseconds.
v) A permanent loss of communication to any system component shall cause a Category 1 fault.
vi) A 'permanent loss of communication' is defined as an unsuccessful undertaking to complete a communications dialogue within a period of 2 seconds.
vii) If the equipment uses wireless communication, its operation shall be unaffected by similar equipment operating independently nearby. See also paragraph 2.1 of TOPAS 0600.

Equipment Housing

2.27 The Product in its housing shall meet the requirements of BS 7987 to the same environmental performance classes as defined in TOPAS 2130.

2.28 Any covers, doors, flaps, or similar allowing access to controls, circuits or live parts when opened shall meet the IP ratings of BS 7987.

2.29 Safety critical timing adjustments to the Product shall only be accessible via the main housing door (see Control Facilities and Indications).

2.30 An Operator's Panel may be provided which gives access to certain controls without the need to open the main housing door (see Control Facilities and Indications.) The Operator's Panel shall be provided with a means to prevent unauthorised operation.

Dimming

2.31 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, on an individual signal head basis and, if provided, shall comply with clause 2.32.

2.32 This dimming facility shall automatically reduce the intensity of the light signal. The amount of dimming applied and the associated ambient light level(s) shall be as per TOPAS 2523.

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

Part Time Operation

2.34 The traffic signals may be switched on or off at specific times or for specific tasks or

reasons. Switch–on of signals shall be as defined in the relevant start-up sequence. The signals shall be switched off under part–time control during a nominated stage provided that all minimum running periods have expired.

3. REFERENCES

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

British & European Standards & Directives

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

BS EN 50293	Electromagnetic Compatibility Road Traffic Signal Systems Product Standard
BS EN 12675	Traffic Signal Controllers - Functional Safety Requirements
BS EN 12368	Traffic Control Equipment - Signal heads
BS EN 50556	Road Traffic Signal Systems
2014/30/EU	Electromagnetic Compatibility Directive
2014/35/EU	Low Voltage Directive (Safety)
2011/65/EU	RoHS Directive
2014/53/EU	Radio Equipment Directive (RED)

Specifications

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

TOPAS 0600	Self-Certification and Approval of Equipment for the Control of Vehicular and Pedestrian Traffic on Roads
TOPAS 2508	Performance Specification for Tactile Equipment for use at Pedestrian Crossings
TOPAS 2509	Performance Specification for Audible Equipment for use at Pedestrian Crossings
TOPAS 2130	Environmental Tests for Road Traffic Control Equipment
TOPAS 2504	Performance Specification for Vehicle Detection Equipment for Vehicle Actuated Portable Traffic Signals
TOPAS 2505	Performance Specification for Above Ground Vehicle Detector Systems for use at Permanent Traffic Signals Installations
TOPAS 2511	Performance Specification for Nearside Signal and Demand Units
TOPAS 2512	Performance Specification for Below Ground Vehicle Detection Equipment
TOPAS 2581	Performance Specification for Pedestrian Countdown Units for use at Traffic Signals
MCE 0108	Siting of inductive loops for vehicle detecting equipment at permanent road traffic signal installations

Other Publications

TSR&GD Traffic Signs Regulations and General Directions
MCHW Volume 1 Specification of Highways Works
An introduction to the Use of Portable Vehicular Signals (The Pink Book)
TAL 2/11 Portable Traffic Signals for the Control of Vehicular Traffic
TAL 3/11 Signal-controlled Pedestrian Facilities at Portable Traffic Signals
Safety at Street Works and Road Works – A code of Practice (The Red Book)
Traffic Signs Manual Chapter 8
Traffic Signs Manual Chapter 6

END OF SECTION

APPENDIX A

Performance Specification for Traffic Control Equipment for Use at Haul Route Crossings (formerly TR2501A)

FUNCTIONAL REQUIREMENT

General

A2.1 The purpose of the Product defined in this specification is to control haul route traffic crossing over a public highway between sites or within a single site.

A2.2 The displayed signal sequence shall comply with TSRGD 2016 Schedule 14 Part (1) para 4.

A2.3 The light signals to be used with the Product shall comply with TSRGD 2016 Diagram 3000.

A2.4 The dimension and finish of the signal posts shall comply with TSRGD 2016 Schedule 14 General Direction 5.

Prevention of Hazardous Light Signal Displays

A2.5 The Product shall have functionally independent supervisory control and monitoring processes.

A2.6 This process shall prevent the display of simultaneous conflicting green vehicle and any other abnormal signal displays during normal operation, under fault conditions or when under operator control. Any non-conformant display shall be a Category 1 fault. Fault categories are defined in Fault Modes.

Signals ON/OFF

A2.7 A facility to switch the signals on or off, from the operators' panel, shall be provided.

A2.8 Switching the signals off shall not affect the operation of the Product, but when the signals are switched back on they shall start up in accordance with the sequence specified in A2.9.

Start-up Sequence

A2.9 The Product shall, on switch-on or following the restoration of power, drive each stage to automatically display a 3 second amber vehicle signal followed by red, in cyclic order up to the selectable final stage which shall display a green signal.

A2.10 The Product shall not cycle from one stage to another until the preset all-red from that leaving stage has expired.

Modes of Operation

General

A2.11 A minimum green vehicle signal period shall be associated with the start of every stage and no signal change shall be possible during this period.

A2.12 The minimum green running period for each stage shall be

configurable to either 7 or 12 seconds.

A2.13 An all red vehicle signal period of configurable duration between 1 to 50 seconds following each stage shall not be violated.

Vehicle Actuated (VA)

A2.14 The Product shall employ. a vehicle detection sub-system in accordance with:

- TOPAS 2504 with 'nudge' facility disabled; or
- TOPAS 2505

A2.15 On selection of VA mode, demands for all stages shall be registered in the equipment. The Product shall then respond to all further demands as specified.

A2.16 The Product shall operate each stage in cyclic order in accordance with vehicle demands.

A2.17 The Product shall detect the passage of vehicles during a green vehicle signal phase and extend the green period in proportion to the amount of traffic detected without unduly penalising the traffic on the opposing stage.

A2.18 The maximum period that a vehicular green signal may be held by vehicular extensions after a demand has been registered for an opposing stage shall be preset at a value in the range between 10 and 60 secs and adjustable in incremental steps no greater than 5 seconds.

A2.19 In the event of a green period being terminated by the operation of the maximum green running period, provision shall be made to ensure that a demand is registered for a return to the interrupted stage as soon as possible.

A2.20 Right of way shall remain on the nominated phase after the expiry of the max green time in the absence of any demand on an opposing phase.

A2.21 The Product shall ensure that traffic control requirements are not compromised by a failure of a detector unit or by a change in operational mode.

Manual Control (MC)

A2.22 A suitably marked facility for selecting the individual modes of control shall be provided on the operator's panel. The control facilities shall include:

A2.22.1 select any stage in any sequence;

A2.22.2 select and hold the signals at all red;

A2.22.3 when changing between stages or settings the signal sequencing and preset timings defined in 2.14 shall be maintained.

Operator Facilities

A2.23 The Product's main panel shall only be accessible by authorised personnel.

A2.24 A means shall be provided to configure the Product on set up, monitor operational values to confirm correct operation and provide diagnostic information for maintenance and fault repair.

Red Signal Monitoring

A2.25 The Product shall provide functionally to monitor red vehicle signals for failure at each

signal head in full intensity and at the dimmed level when fitted. Failure of the monitoring equipment shall cause a Category 1 fault.

A2.26 On failure of all red vehicle signals on an approach, the process for a Category 3 fault shall be followed.

Speed Assessment/Speed Discrimination

A2.27 Equipment shall be capable of being used with Speed Assessment (SA) or Speed Discrimination (SD) equipment.

A2.28 The requirements for SA/SD equipment are defined in TOPAS 2500.

Controller Housing

A2.29 The controller housing shall be manufactured from suitable material to provide mechanical protection of the controller equipment in the intended environment. See TOPAS 2130.

A2.30 All cabinet main doors shall be capable of being secured against unauthorised entry by suitable locks.

A2.31 The operator's panel facilities shall only be accessible via a locked door/flap without the need to open the main housing door.

A2.32 A non-latching facility shall be provided for holding all the signal heads at the All-red condition when in VA mode.

A2.33 This facility shall be mounted on the outside of the controller housing. This shall be unmarked and easily accessible to the operator.

APPENDIX B

Performance Specification for Portable Traffic Signal Control Equipment for Use at Roadworks (formerly TOPAS 2502B)

FUNCTIONAL REQUIREMENT

Light Signals

B2.1 The light signals to be used are prescribed in TSRGD 2016 Diagram 3000.1

B2.2 The displayed signal sequence shall comply with TSRGD 2016 schedule 14 Part (1) para 4.

B2.3 The dimension and finish of the signal supports shall comply with TSRGD 2016 Schedule 14 General Direction 5.

Prevention of Hazardous Light Signal Displays

B2.4 The Product shall have functionally independent supervisory control and monitoring processes.

B2.5 The Product design shall prevent the display of simultaneous conflicting green vehicle signals and other abnormal signal displays during normal operation, under fault conditions or with permitted operator intervention. A simultaneous conflicting green signal is a Category 1 fault. Fault categories are detailed in Failure Modes.

Start-up Sequence

B2.6 When signals are switched on at start-up or restoration of power, the Product shall initially display a 3 second amber period followed by red on each stage, in cyclic order up to the selectable final stage which shall display a green vehicle signal after an all-red period equal to the longest all-red period pre-set in the controller

B2.7 When ‘Manual Control Mode’ (see B2.25) is selected, the final stage shall not display green but move through a 3-second amber to red and await a manual command. The controller shall not move to a manually selected stage until the signals have been at all-red for at least the maximum pre-set all-red period.

B2.8 Alternatively, all signal heads may display a red vehicular signal simultaneously without any other prior vehicular signal display. The controller shall not cause any green signal to be displayed until the signals have been at all-red for at least the maximum pre-set all-red period.

Initial set-up

B2.9 On initial set-up, where the Product has independently powered signal heads relying on a communication system to provide instructions to change the signal display, in order to perform the start-up sequences defined in B2.6 to B2.8, it would be necessary for the communication system to be established and verified to all signal heads before any signals are illuminated. As an alternative, it shall be permissible for each signal head to show an immediate red signal display, or a three second amber display followed by red, when its related control unit is powered up, provided that it shall not be possible for any green signals to be displayed until all signal heads have been switched on, the communication system established and verified to all signal heads and the maximum preset all-red period has elapsed.

B2.10 The controller shall not cycle from one stage to another until the preset all-red associated with the stage being left has expired.

B2.11 On selection of Vehicle Actuated operation, demands shall be inserted on all stages. (see **Modes of Operation**)

Modes of Operation

General

B2.12 The Product shall be capable of operating under:

i) Vehicle Actuation (VA);
ii) Manual Control; and
iii) Fixed Time (FT)

B2.13 A suitably marked facility for selecting the mode shall be provided.

(see Control Facilities and Indications)

B2.14 A minimum green vehicle signal period shall be associated with the start of every stage and no signal change shall be possible during the minimum green period. The minimum green running period for each stage shall be configurable to either 7 or 12 seconds.

B2.15 An all-red period to follow each stage shall be user configurable between 1 and 50 seconds by 1 second increments. Different all red times may be set for different stages. On stage changes under all control modes the all red time shall not be violated. Under manual control the operator may call and hold all-red as a stage.

Vehicle Actuated (VA)

B2.16 The Product shall employ a vehicle detection sub-system registered to TOPAS 2504.

B2.17 The Product shall operate each stage in cyclic order in accordance with vehicle demands and extensions.

B2.18 The Product shall detect the passage of vehicles during a green signal period and extend this period in proportion to the amount of traffic detected without unduly penalising the traffic on opposing stages.

B2.19 On the failure of a vehicle detector a permanent demand shall be registered for the appropriate stage.

B2.20 The maximum period that a vehicular green signal may be held by vehicular extensions after a demand has been registered for an opposing stage shall be preset at a value in the range between 10 and 60 secs and adjustable in incremental steps no greater than 5 seconds.

B2.21 In the event of a green period being terminated by the operation of the maximum green running period, provision shall be made to ensure that a demand is registered for a return to the interrupted stage as soon as possible.

Fixed Time (FT)

B2.22 The Product shall continuously cycle through its stages sequentially with a fixed configurable maximum green period for each stage.

Manual Control (MC)

B2.23 Manual selection of configured stages (including all-red) shall be possible.

B2.24 It shall not be possible for the minimum green running period to be omitted or foreshortened by manual control.

B2.25 When switching to Manual Control, from VA, or FT, any demand for a stage not running shall be cancelled.

B2.26 If the change to Manual Control is made whilst the signals are in:

i) amber or red/amber the

ii) signals shall continue to cycle through on the fixed, or selected timings until vehicular green is reached;

iii) all-red prior to a vehicular green selected the all-red shall continue, without interruption, as if it has been pre-selected;

iv) all-red other than that prior to the green selected, an all-red period of at least that expected to follow the previous stage shall expire before the change.

v) vehicular green selected, the signals, after satisfying the minimum green period, shall continue until a different command is selected on Manual, or the operation returned to VA, or FT.

vi) on a different vehicular green to that selected, a change to the selected green shall take place following the expiry of the minimum green and the appropriate intergreen between the running green and that selected.

Signal Aspects On/Off

B2.27 A facility to switch all signals, on and off, from an operator panel, shall be provided. This shall not switch power off to the Product but allow all normal safety monitoring facilities to remain enabled.

B2.28 When the signal aspects are switched on they shall start up in accordance with the sequence specified in B2.6 to B2.8.

Operator Facilities

B2.29 A means shall be provided to configure the Product on set up; monitor operational values to confirm correct operation; and provide diagnostic information for maintenance and fault repair.

Red Signal Monitoring

B2.30 The Product shall be capable of monitoring all red signals. (See Red Signal Monitoring in Informative Guide Appendix F.)

B2.31 In the event of all monitored red 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 3 fault. (See Red Signal Monitoring in Appendix F.)

B2.32 Signal aspects shall immediately switch to full brightness on failure of the dimming facility.

Control Facilities and Indications

B2.33 Control facilities which shall only be accessible via the main housing door shall include the selection of:

i) the vehicular maximum green running period;

ii) the all-red period to follow each stage.

B2.34 The following control facilities are also to be provided and may be used via an operator panel select mode of operation;

switch all signals on and off with a single action (B2.27).

B2.35 The facilities referred to in paragraphs in B2.33 and B2.34 shall be devices that are capable of being readily identified by the operator and shall clearly indicate the selection made.

B2.36 Indications shall also be provided to show each of the following:

iii) the presence of a stored demand on each stage;

iv) the operation of the detector when

v) the stage is displaying the green signal;

vi) the current state of each signal on each stage;

vii) the occurrence of a hazardous light signal display (any non-permitted combination of signal displays)

viii) conflicting green failure;

ix) the occurrence of a red lamp or red lamp monitor failure;

B2.37 The indications in B2.36 shall be capable of being readily identified by the operator and shall clearly indicate the status.

APPENDIX C

Performance Specification for Pedestrian Facilities at Temporary Standalone Traffic Signals (formerly TOPAS 2503B)

FUNCTIONAL REQUIREMENTS

Light Signals & Pedestrian Push Buttons

C2.2 The displayed signal sequence shall comply with TSRGD 2016 Schedule 14 Part (1) para 4.

C2.3 The vehicular light signals shall comply with TSRGD 2016 Diagram 3000.

C2.4 The pedestrian signal displays and push button or demand unit shall comply with either:

- TSRGD 2016 diagrams 4002.1 and 4003; or
- Diagrams 4002.1 and 4003.8; or
- Diagram 4003.1.

C2.5 The dimension and finish of the signal posts shall comply with TSRGD 2016 Schedule 14 General Direction 5.

Prevention of Hazardous Light Signal Displays

C2.6 The Product shall have functionally independent supervisory control and monitoring processes.

C2.7 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.

Start-up Sequence

C2.8 On switch-on or restoration of power, the Product shall display a red man signal to pedestrians and no signal to vehicles.

C2.9 After expiry of a fixed preset period in the range 5 to 7 seconds, a green signal shall be displayed to vehicles.

C2.10 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

C2.11 Appropriate means shall be provided so that the pedestrian phase can be demanded using the push button box.

C2.12 A registered demand shall be latched and shall be removed on commencement of the pedestrian green man signal.

C2.13 The demand shall be confirmed by displaying the Wait signal on the pedestrian push button box.

C2.14 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.

C2.15 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)

C2.16 The Product shall employ a vehicle detection sub-system approved to TOPAS 2505.

C2.17 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.

C2.18 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.

C2.19 The Maximum Green running period shall be timed from the receipt of a pedestrian demand.

C2.20 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

C2.21 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

C2.22 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

C2.23 This intergreen period shall immediately follow the Invitation-

to Cross period, and shall comprise the following:

i) 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;

ii) 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;

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

Manual Operation

C2.24 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;

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

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

iii) 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.

C2.25 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.

C2.26 It shall not be possible for either phase to be changed until the minimum green running period has expired.

C2.27 When switching to Manual Control, from VA, any demand for the phase not running shall be cancelled.

C2.28 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

C2.29 A facility to switch the signals on or off, from the operators panel, shall be provided.

C2.30 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 C2.8 to C2.10.

Speed Discrimination / Speed Assessment Equipment

C2.31 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

C2.32 The Product shall include functionality that will monitor all vehicle red signals on each approach.

Operation of Red Signal Monitor

C2.33 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.

Control Facilities and Indications

C2.34 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;
ii) select vehicle maximum green running period.

C2.35 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;
iii) select and hold the signals at all- red under manual control; switch the signals on and off.

C2.36 Each of the means in C2.34 and C2.35 shall be devices that are capable of being positively located and clearly indicate to the operator the selection made.

C2.37 Indications shall also be provided to show each of the following:

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

APPENDIX D

Performance Specification for Portable Traffic Control Equipment with Pedestrian Facilities for Use at Roadworks (formerly TOPAS 2537A)

FUNCTIONAL REQUIREMENTS

Capability

D2.1 The Product shall be capable of controlling at least

1. two vehicle phases; and
2. one pedestrian phase.

D2.2 The vehicular light signals shall comply with TSRGD 2016 Diagram 3000.1.

D2.3 The displayed vehicular signal sequence shall comply with TSRGD 2016 Schedule 14 Part (1) para 4.

D2.4 The pedestrian signal displays and push button or demand unit shall comply with either:

- TSRGD 2016 diagrams 4002.1 and 4003; or
- Diagrams 4002.1 and 4003.8; or
- Diagram 4003.1.

D2.5 The dimension and finish of the signal posts shall comply with TSRGD 2016 Schedule 14 General Direction 5.

Prevention of Hazardous Signal Displays

D2.6 The Product shall have functionally independent supervisory control and monitoring processes.

The following table indicates those signal states of conflicting phases (vehicle/vehicle or vehicle/ pedestrian) which represent a hazardous signal display:

	Opposing phase display				
Phase display	Green	Amber	Red	Red Amber	Ped blackout
Green	•	•		•	•
Amber	•	•		•	•
Red					
Red Amber	•	•		•	•

• Conflicting signal display

Fig 1: Conflicting vehicle displays:

D2.7 The Product design shall prevent the display of conflicting signal displays during normal operation, under fault conditions, or with permitted operator intervention. An attempted conflicting signal shall follow the process of a Category 1 fault. Fault categories are detailed in the Fault Modes section

Start-up Sequence

D2.8 When signals are switched on at start-up or restoration of power the Product shall initially display a red pedestrian signal to pedestrians and no signal to vehicles.

D2.9 After a preset period of 7 seconds the Product shall show a 3-second amber period followed by red on each stage, in cyclic order up to the selectable final stage which shall display a green vehicle signal after an all-red period equal to the longest all-red period pre-set in the controller.

D2.10 On display of the green signal to vehicles, stored demands for pedestrians and all vehicle stages shall be inserted and the Product shall commence normal vehicle actuated (VA) operation unless or until Manual or Fixed Time (FT) is selected. (See Modes of Operation)

D2.11 When 'Manual Control Mode' (D2.34) is selected, the final stage shall not display green but move through a 3-second amber to red and await a manual command. The controller shall not move to a manually selected stage until the signals have been at all-red for at least the maximum pre-set all-red period.

D2.12 Alternatively, all signal heads may display a red signal simultaneously without any other prior signal display. The controller shall not cause any green signal to be displayed unless the signals have been at all-red for at least the maximum pre-set all-red period.

Initial set-up

D2.13 On initial set-up, where the Product has independently powered signal heads relying on a communication system to provide instructions to change the signal display, in order to perform the startup sequences defined in D2.8 to D2.12, it would be necessary for the communication system to be established and verified to all signal heads before any signals are illuminated. As an alternative, it shall be permissible for each signal head to show an immediate red signal display, or a three second amber display followed by red, when its related control unit is powered up, provided that it shall not be possible for any green signals to be displayed until all signal heads have been switched on, the communication system established and verified to all signal heads and the maximum preset all-red period has elapsed.

D2.14 The controller shall not cycle from one stage to another until the preset all-red associated with the stage being left has expired.

Modes of Operation

General

D2.15 The Product shall be capable of operating under:

i) Vehicle Actuation (VA);
ii) Manual Control; and
iii) Fixed Time (FT)

D2.16 A suitably marked facility for selecting the mode shall be provided.

(see Control Facilities and Indications)

D2.17 A minimum green vehicle signal period shall be associated with the start of every stage and no signal change shall be possible during the minimum green period. The minimum green running period for each stage shall be configurable to either 7 or 12 seconds.

D2.18 An all-red period to follow each vehicle stage shall be user configurable between 1 and 50 seconds by 5 second increments. Different all red times may be set for different stages. On stage changes from a wholly vehicular stage to another wholly vehicular stage under all control modes the all red time shall not be violated. Under manual control the operator may call and hold all-red as a stage.

Vehicle Actuated (VA)

D2.19 The Product shall employ a vehicle detection sub-system approved to TOPAS 2504.

D2.20 The Product shall operate each stage in cyclic order in accordance with vehicle demands and extensions and pedestrian demands.

D2.21 The Product shall detect the passage of vehicles during a green signal period and extend this period in proportion to the amount of traffic detected without unduly penalising the traffic on opposing stages.

D2.22 On the failure of a vehicle detector a permanent demand shall be registered for the appropriate stage.

D2.23 If a pedestrian pushbutton is pressed when the green pedestrian signal is not being displayed a demand shall be latched and shall be removed at the commencement of the pedestrian green period.

D2.24 The “WAIT” indicators or push button indicators (as appropriate) on all push button boxes related to a particular pedestrian phase shall be illuminated when there is a latched demand present for that phase.

D2.25 The maximum period that a vehicular green signal may be held by vehicular extensions after a demand has been registered for an opposing stage (vehicular or pedestrian) shall be preset at a value in the range between 10 and 50 seconds, and adjustable in incremental steps no greater than 5 seconds.

D2.26 In the event of a green period being terminated by the operation of the maximum green running period, provision shall be made to ensure that a demand is registered for a return to the interrupted stage as soon as possible.

Vehicular to Pedestrian Intergreen

D2.27 This period shall immediately follow the appropriate vehicular stage and shall comprise

i) A fixed period of three seconds during which the signals shall display vehicular amber and pedestrian red

ii) This shall be followed by a period of three seconds during which the signals shall display vehicular red and pedestrian red (the vehicular clearance period). This period can only be extended above three seconds by the intervention of manual control or SA/SD equipment if used.

Invitation-to-Cross Period

D2.28 During this period the signals shall display vehicular red and pedestrian green. It shall immediately follow the vehicular to pedestrian intergreen and shall be fixed at 7 seconds.

Pedestrian to Vehicular Intergreen

D2.29 This shall immediately follow the Invitation-to-cross period, and shall comprise the following:

i) a period when the signals shall display vehicular red and pedestrian signals neither red nor green (blackout). The blackout time shall be in the range between 3 and 15 seconds and adjustable in incremental steps no greater than 1 second;

ii) This shall be followed by a period during which the signals shall display vehicular red and pedestrian red signals. The minimum all-red time shall be in the range 2 to 5 seconds and adjustable in incremental steps no greater than 1 second. This period can only be extended above the minimum by the intervention of manual control;

iii) This shall be followed by a fixed period of 2 seconds when the signals shall display vehicular red and amber and pedestrian red signals.

Fixed Time (FT)

D2.30 The Product shall continuously cycle through its stages sequentially with a fixed configurable maximum green period for each stage.

D2.31 Each pedestrian “WAIT” indicator or push button indicator (as appropriate) shall be illuminated at all times when its associated pedestrian signal shows red.

Manual Control (MC)

D2.32 Manual selection of configured stages (including all-red) shall be possible.

D2.33 It shall not be possible for the minimum green running period to be omitted or foreshortened. The amber, red/amber and pedestrian black-out shall not be selectable under Manual Control.

D2.34 When switching to Manual Control, from VA, or FT, any demand for a stage not running shall be cancelled.

D2.35 If the change to Manual Control is made whilst the signals are in:

i) amber or red/amber the signals shall continue to cycle through on the fixed, or selected timings until vehicular green is reached;

ii) all-red prior to a vehicular green selected the all-red shall continue, without interruption, as if it has been pre-selected;

iii) all-red other than that prior to the green selected, an all-red period of at least that expected to follow the previous stage shall expire before the change.

iv) vehicular green selected, the signals, after satisfying the minimum green period, shall continue until a different command is selected on

Manual, or the operation returned to VA, or FT.

v) on a different vehicular green to that selected, a change to the selected green shall take place following the expiry of the minimum green and the appropriate intergreen between the running green and that selected.

Signal Aspects On/Off

D2.36 A facility to switch all signals, including any audible and tactile units, on and off, from an operator panel, shall be provided. This shall not affect the operation of the controller.

D2.37 When the signal aspects are switched on they shall start up in accordance with the sequence specified in D2.8 to D2.12.

Operator Facilities

D2.38 A means shall be provided to configure the Product on set up; monitor operational values to confirm correct operation; and provide diagnostic information for maintenance and fault repair.

Red Signal Monitoring

D2.39 The Product shall be capable of monitoring all red vehicular signals.

(See Red Signal Monitoring in Informative Appendix F.)

D2.40 In the event of all monitored red vehicular 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.

(See Red Signal Monitoring in Appendix F.)

D2.41 Signal aspects shall immediately switch to full brightness on failure of the dimming facility.

D2.42 Speed Assessment / Speed Discrimination Equipment

D2.43 The Product shall be capable of being used with Speed Assessment (SA) or Speed Discrimination (SD) equipment. SA or SD equipment must be used when the Product is used on High Speed Roads (defined as roads with an 85th percentile approach speed equal to or greater than 35mph) as specified in the current issue of TOPAS 2500, Appendix L.

Control Facilities and Indications

D2.44 Control facilities which shall only be accessible via the main housing door shall include the selection of:

i) the pedestrian to vehicular stage all-red clearance period;

ii) the vehicular maximum green running period;

iii) the vehicular red and pedestrian black-out period.

D2.45 The following control facilities are also to be provided and may be used via an operator panel.

i) select mode of operation;

ii) select and hold a vehicular stage;

iii) insert a pedestrian demand, either singularly or continuously;

iv) select and hold the signals on the vehicular (all-red) clearance period;

v) select and hold the signals on the

vi) pedestrian (all-red) clearance period

vii) switch all signals, including any audible and tactile units, on and off with a single action (see D2.36).

Note: Facilities ii) – v) above become operative when manual mode is selected.

D2.46 Note: Action vi) above shall not switch power off to the Product, but allow all normal safety monitoring facilities to remain enabled (see D2.36).

D2.47 The facilities referred to in paragraphs D2.44 and D2.45 shall be devices that are capable of being readily identified by the operator and shall clearly indicate the selection made.

D2.48 Indications shall also be provided to show each of the following:

i) the presence of a stored demand on each stage;

ii) the operation of the detector on a vehicular stage when the stage is displaying the green signal;

iii) the current state of each signal on each stage;

iv) the occurrence of a hazardous light signal display;

v) conflicting green failure;

vi) the occurrence of a red lamp or red lamp monitor failure;

vii) the presence of an output from any SA/SD equipment present.

D2.49 The indications in D2.48 shall be capable of being readily identified by the operator and shall clearly indicate the status.

APPENDIX E

Performance Specification for Portable Traffic Signal Control Equipment for Standalone Pedestrian Facility (formerly TOPAS 2538A)

FUNCTIONAL REQUIREMENTS

Capability

E2.2 The Product shall be capable of operating a two stage pedestrian facility (one vehicle stage and one pedestrian stage). The Product shall be capable of operating at least two pedestrian aspects and four vehicular aspects per stage.

Light Signals

E2.3 The vehicle light signals shall comply with TSRGD 2016 Diagram 3000.1.

E2.4 The displayed vehicular signal sequence shall comply with TSRGD 2016 Schedule 14 Part (1) para 4.

E2.5 The pedestrian signal displays and push button or demand unit shall comply with either:

- TSRGD 2016 diagrams 4002.1 and 4003; or
- Diagrams 4002.1 and 4003.8; or
- Diagram 4003.1.

E2.6 The dimension and finish of the signal supports shall comply with TSRGD 2016. Schedule 12 General Direction 5.

Prevention of Hazardous Signal Displays

E2.7 The Product shall have functionally independent supervisory control and monitoring processes.

Figure 1 indicates those signal states of conflicting phases (vehicle/vehicle or vehicle/ pedestrian) which represent a hazardous signal display.

	Vehicular display			
Pedestrian display	Green	Amber	Red	Red / Amber
Green	•	•		•
Red				
Ped black out	•	•		•

• Conflicting signal display

Fig 1: Conflicting signal displays

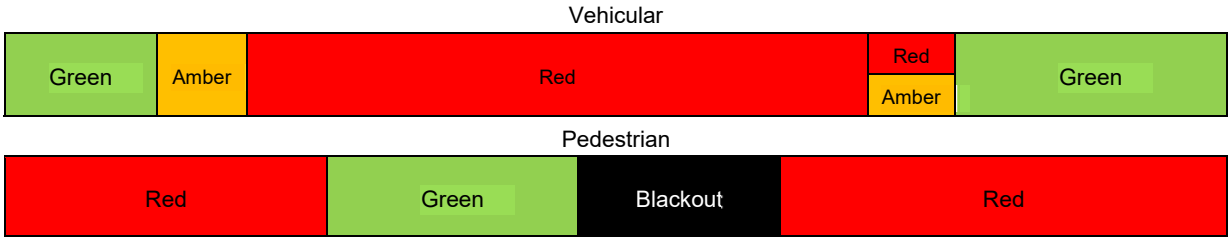

Fig 2: Permitted pedestrian and vehicle signal sequences

E2.8 Figure 2 shows the permitted sequences of signals. Non permitted sequences represent hazardous displays.

E2.9 The Product design shall prevent the display of conflicting signal displays during normal operation, under fault conditions, or with permitted operator intervention. An attempted conflicting signal shall follow the process of a Category 1 fault. Fault categories are detailed in the Fault Modes section

Start-up Sequence

E2.10 When signals are switched on at start-up or restoration of power, the Product shall initially display a red pedestrian signal to pedestrians and no signal to vehicles.

E2.11 After a preset period of 7 seconds the Product shall show a green signal to vehicles.

E2.12 On display of the green signal to vehicles, stored demands for pedestrians and all vehicle stages shall be inserted and the Product shall commence normal vehicle actuated (VA) operation unless or until Manual or Fixed Time (FT) is selected. (See Modes of Operation)

E2.13 Alternatively, all signal heads may display a red signal simultaneously without any other prior signal display. The controller shall not cause any green signal to be displayed unless the signals have been at all-red for at least the maximum pre-set all-red period.

Initial set-up

E2.14 On initial set-up, where the Product has independently powered signal heads relying on a communication system to provide instructions to change the signal display, in order to perform the start-up sequences defined in E2.10 to E2.13, it would be necessary for the communication system to be established and verified to all signal heads before any signals are illuminated. As an alternative, it shall be permissible for each signal head to show an immediate red signal display, or a three second amber display followed by red, when its related control unit is powered up, provided that it shall not be possible for any green signals to be displayed until all signal heads have been switched on, the communication system established and verified to all signal heads and the maximum pre-set all-red period has elapsed.

Modes of Operation

General

E2.15 The Product shall be capable of operating under:

i) Vehicle Actuation (VA);
ii) Manual Control; and
iii) Fixed Time (FT)

E2.16 A suitably marked facility for selecting the mode shall be provided. (see Control Facilities and Indications)

E2.17 A minimum green vehicle signal period shall be associated with the start of every stage and no signal change shall be possible during the minimum green period. The minimum green running period for each stage shall be configurable to either 7 or 12 seconds.

Vehicle Actuated

E2.18 The Product shall employ a vehicle detection sub-system approved to TOPAS 2504.

E2.19 The Product shall operate each stage in turn in accordance with

vehicle demands and extensions and pedestrian demands.

E2.20 The Product shall detect the passage of vehicles during a green signal period and extend this period in proportion to the amount of traffic detected.

E2.21 On the failure of a vehicle detector a permanent demand shall be registered for the appropriate stage.

E2.22 If a pedestrian pushbutton is pressed when the green pedestrian signal is not being displayed a demand shall be latched and shall be removed at the commencement of the pedestrian green period.

E2.23 The “WAIT” indicators or push buttons indicators (as appropriate) on all pushbutton boxes related to a particular pedestrian phase shall be illuminated when there is a latched demand present for that phase.

E2.24 The maximum period that a vehicular green signal may be held by vehicular extensions after a demand has been registered for the pedestrian stage shall be preset at a value in the range between 10 and 50 seconds, and adjustable in incremental steps no greater than 5 seconds.

E2.25 In the event of the vehicle green period being terminated by the operation of the maximum green running period, provision shall be made to ensure that a demand is registered for a return to the interrupted stage as soon as possible.

Vehicular to Pedestrian Intergreen

E2.26 This period shall immediately follow the vehicular stage and shall comprise:

i) A fixed period of three seconds during which the signals shall display vehicular amber and pedestrian red

ii) This shall be followed by a period of three seconds during which the signals shall display vehicular red and pedestrian red (the vehicular clearance period). This period can only be extended above three seconds by the intervention of manual control or SA/SD equipment (if used).

Invitation-to-Cross Period

E2.27 During this period the signals shall display vehicular red and pedestrian green. It shall immediately follow the vehicular to pedestrian intergreen and shall be fixed at 7 seconds.

Pedestrian to Vehicular Intergreen

E2.28 This shall immediately follow the Invitation-to-cross period, and shall comprise the following:

i) A period when the signals shall display vehicular red and pedestrian signals neither red nor green (blackout). The blackout time shall be in the

range between 3 and 15 seconds and adjustable in incremental steps no greater than 1 second;

ii) This shall be followed by a period during which the signals shall display vehicular red and pedestrian red signals. The minimum all-red time shall be in the range 2 to 5 seconds and adjustable in incremental steps no greater than 1 second. This period can only be extended above the minimum by the intervention of manual control;

iii) This shall be followed by a fixed period of 2 seconds when the signals shall display vehicular red and amber and pedestrian red signals.

Fixed Time (FT)

E2.29 The Product shall continuously cycle between the vehicle stage and the pedestrian stage using the pedestrian invitation period and maximum green timings set for VA working.

E2.30 Each pedestrian “WAIT” indicator or push button indicator (as appropriate) shall be illuminated at all times when its associated pedestrian signal shows red.

Manual Control (MC)

E2.31 When switching to:

i) the vehicular green; or

ii) the pedestrian green

it shall not be possible for the following periods to be omitted or manually foreshortened: the amber, red/amber, clearance period/ periods, pedestrian green, pedestrian black-out periods.

E2.32 The amber, red/amber, pedestrian black-out shall not be selectable under Manual Control.

E2.33 It shall not be possible for the minimum green running period to be omitted or foreshortened by manual control.

E2.34 When switching to Manual Control, from VA, any demand for the phase not running shall be cancelled.

E2.35 If the change to Manual Control is made whilst the signals are in the amber, red/amber, pedestrian green, pedestrian blackout, or either clearance period, the signals shall continue to cycle through on the fixed, or selected timings until vehicular green is reached.

E2.36 If the change to Manual Control is made whilst the signals are in the vehicular green period, the signals, after satisfying the minimum green period, shall continue until a different command is selected on Manual, or the operation returned to VA or FT.

Signal Aspects On/Off

E2.37 A facility to switch all signals, including any audible and tactile units, on and off, from an operator panel, shall be provided. This shall not affect the operation of the controller.

E2.38 When the signal aspects

are switched on they shall start up in accordance with the sequence specified in E2.10 to E2.13.

Operator Facilities

E2.39 A means shall be provided to configure the Product on set up; monitor operational values to confirm correct operation; and provide diagnostic information for maintenance and fault repair.

Red Signal Monitoring

E2.40 The Product shall be capable of monitoring all red vehicular signals. (See Red Signal Monitoring in Informative Guide Appendix F.)

E2.41 In the event of all monitored red vehicular 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. (See Red Signal Monitoring in Appendix F.)

Speed Assessment / Speed Discrimination Equipment

E2.42 The Product shall be capable of being used with Speed Assessment (SA) or Speed Discrimination (SD) equipment. SA or SD equipment must be used when the Product is used on High Speed Roads (defined as roads with an 85th percentile approach speed equal to or greater than 35mph) as specified in the current issue of TOPAS 2500, Appendix L.

Control Facilities and Indications

E2.43 Control facilities which shall only be accessible via the main housing door shall include the selection of:

i) the pedestrian to vehicular stage all-red clearance period;

ii) the vehicular maximum green running period;

iii) the vehicular red and pedestrian black-out period.

E2.44 The following control facilities are also to be provided and may be used via an operator panel:

i) select mode of operation;

ii) select and hold the vehicular stage;

iii) insert a pedestrian demand, either singularly or continuously;

iv) select and hold the signals on the vehicular (all red) clearance period;

v) select and hold the signals on the pedestrian (all red) clearance period;

vi) switch all signals, including any audible and tactile units, on and off with a single action (see E2.38).

Note: Facilities ii) – v) above become operative when manual mode is selected.

E2.45 Note: Action vi) shall not switch power off to the Product, but allow all normal safety monitoring facilities to remain enabled (see E2.38).

E2.46 The facilities referred to in paragraphs in E2.43 and E2.44 shall be devices that are capable of being readily identified by the operator and shall clearly indicate the selection made.

E2.47 Indications shall also be provided to show each of the following:

i) the presence of a stored demand on each stage;

ii) the operation of the detector on the vehicular stage when the stage is displaying the green signal;

iii) the current state of each signal on each stage;

iv) the occurrence of a hazardous light

v) signal display;

vi) conflicting green failure;

vii) the occurrence of a red lamp or red lamp monitor failure;

viii) the presence of an output from any SA/SD equipment present.

E2.48 The indications in E2.47 shall be capable of being readily identified by the operator and shall clearly indicate the status.

APPENDIX F - INFORMATIVE GUIDE

General

F1. This Appendix provides additional information regarding the use of portable and temporary traffic signals. It includes additional criteria which should be addressed by traffic authorities and other users in their procurement contracts.

Other equipment

F2. The equipment covered by this Specification is only part of the equipment required for a complete portable or temporary traffic signal installation. Additional equipment includes:

- Vehicle signal heads
- Vehicle detectors

This additional equipment is required to be type approved to the appropriate specifications.

Regulations

Use of this equipment is also subject to regulation, and attention is drawn to the TSRGD 2016 regulations

Mounting of Traffic Signals

F3. The procurement contract should call for the mounting arrangement for the complete system to withstand a wind speed of at least 26 m/s without toppling, rotating or bending.

Detectors

F4. Guidance on above ground vehicle detectors is given in Traffic Advisory Leaflet 16/99, The Use of Above Ground Vehicle Detectors.

Red Signal Monitoring

F5. The Product may have both monitored and unmonitored vehicular red signal aspects. The purpose of red signal monitoring is to allow operation of the crossing only when at least one red signal aspect is visible to drivers on each approach. It is for the body responsible for granting permission for the use of the equipment (usually the traffic authority) to determine which, if any, red aspects are unmonitored.

Electrical Power Source

F6. If the Product is required to operate for more than 16 hours under full-load conditions without attention this must be stated in the procurement specification.

Application

F7. The equipment covered by this specification is for use in road works situations only (see the definition of “road works” in 1.2). It is not intended for use as a temporary replacement for permanent traffic signal equipment.

Security

F8. The controller door(s) are secured against unauthorised entry by means of suitable lock(s) or security device(s).

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 2540.

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	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 2540 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.	✓
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 Test results (OFCOM IR 2030)	Copies of the results of Radio testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File Pack. Reports should be those listed on the EU Declaration of Conformity & the Technical File or specific IR 2030 requirement	✓
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.	✓
13	Failure Mode Analysis	A reference to the product failure mode analysis requirements and results by document part number and issue.	□