

# TOPAS

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## Traffic Open Products and Specifications

### **TOPAS 2581A**

*Performance Specification for Pedestrian Countdown units for use at Traffic Signals*

<b>Revision</b>	<b>Date</b>	<b>Scope</b>	<b>Authorised by</b>
A (v1)	06/01/15	Draft	Admin
A (v2)	19/03/15	Review	MAC
A (v3)	20/03/15	Draft	Admin
A (V4)	27/03/15	Final	Board
A (v5)	11/03/16	Final	Board

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**TOPAS 2581A**

*Performance Specification for Pedestrian Countdown  
units for use at Traffic Signals*

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# **TOPAS 2581A**

## **PERFORMANCE SPECIFICATION FOR PEDESTRIAN COUNTDOWN UNITS FOR USE AT TRAFFIC SIGNALS**

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# 1. INTRODUCTION

## **Scope**

- 1.1. This specification covers the requirements for pedestrian countdown units for use at traffic signals.

## **Approval**

- 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. Guidance to potential users of this Product is given in Appendix A

## **Implementation**

- 1.7. This specification implements requirements as originally defined in HA specification TR 2581A. Product Approvals to TR2581A 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 TA84 Code of Practice for Traffic Control and Information Systems for All-Purpose Roads.

## 2. FUNCTIONAL REQUIREMENT

- 2.1. The Product shall be capable of displaying a numerical indicator to count down the pedestrian blackout period.
- 2.2. The pedestrian blackout period is defined as the period during which neither the red pedestrian signal nor the green pedestrian signal are illuminated.
- 2.3. The Product shall be a self-contained unit, and shall only be used at traffic signals to regulation 33 of TSRGD in conjunction with pedestrian light signals to diagram 4002.1 or toucan light signals to diagram 4003.5 of TSRGD.
- 2.4. See 0 Dimensions, and mounting arrangements in relation to diagram 4002.1

### Operation and Timing

- 2.5. The Countdown Duration shall be a stored value equal to the pedestrian blackout period.

#### Start up Sequence

- 2.6. On switch-on or restoration of power supply the Product shall display a blank face until the Countdown Duration is set.

#### Timing

- 2.7. A means shall be provided by which the Product synchronises display with the blackout period.
- 2.8. A means shall be provided to ensure reliable and accurate monitoring of the blackout.
- 2.9. All time periods shall be accurate to within 40ms.
- 2.10. The maximum permissible pedestrian blackout time shall be 30s as determined by TOPAS 2500.

#### Display

- 2.11. The display shall activate at the expiry of the green pedestrian signal. It shall cease display at the start of the red pedestrian signal.
- 2.12. The Product shall count down in whole seconds the Countdown Duration (2.5) without prejudice to section 2.13.
- 2.13. Without prejudice to section 2.14 the Product shall never show a time greater than that remaining in the Countdown Duration.
- 2.14. In the event that the blackout period is changed, the Product shall cease display until it has incorporated the change into its operation, and the countdown duration matches the blackout period again.

#### Power Supply Interruptions

- 2.15. In the event of a power supply interruption to the Product equal to or less than the relevant value in Table 1 the Product shall continue to function correctly.
- 2.16. In the event of a power interruption to the Product greater than the relevant value in Table 1 the Product shall shutdown in a safe manner. On restoration of power the Product shall follow the sequence specified in 2.6.
- 2.17. The Product shall meet one of the classes in Table 1 - Power hold up times as determined by the purchasing Traffic Authority.

Class	Minimum hold up time
B1	50ms

B2	100ms
B3	200ms
B4	300ms

**Table 1 - Power hold up times**

### ***Fault Modes***

- 2.18 The Product shall monitor its own operation and shutdown in a safe manner within 100ms if it detects a critical fault condition.
- 2.19 A critical fault condition is defined as a fault which may either cause the display to activate at a time other than the pedestrian blackout or lead to a display that might be misinterpreted.

### ***Reliability***

- 2.20 The Product shall be certified as having a MTBF (Mean Time Between Failure) prediction figure of greater than 20,000 hours in continuous operation.

### ***Construction***

- 2.21 The Product and its housing shall meet the requirements of BS EN 50556 to the same environmental classes defined in TR 2130.

### ***Additional Requirements***

- 2.22 Individual Products may be designed to perform to Appendix C.A facility to monitor the associated red and green pedestrian aspects may be provided within the Product.

- 2.24 If provided, the Product shall monitor these aspects and should either or both aspects fail, the Product shall extinguish its display until such a time as the aspect is functional.
- 2.25 Upon restoration of both red and green pedestrian aspects, the Product shall follow the start-up sequence set out in paragraph 2.6.

### **3. OPTICAL REQUIREMENTS**

- 3.1 0 shows the overall maximum dimensions for the numerical digits and the minimum dimensions in brackets. The dimensions chosen must correspond with one another so that the shape and proportions of the sign are, so far as reasonably practicable, consistent.

#### ***Dimming***

- 3.8 Where display dimming is required the Product shall monitor voltage of the incoming red / green pedestrian signal lines to enable dimming. The Product shall use the voltages as defined in TOPAS 2523 to determine the -appropriate dimming state.

#### ***Chromaticity***

- 3.2 The colour of the numerical display shall be yellow, white or off-white in colour, as defined in BS EN 12966-1:2005+A1:2009 - Road Vertical Signs - Variable Message Signs Part 1.

#### ***Luminance***

- 3.3 In “Bright” mode the on axis luminance intensity of the numerical display shall be 200cd, when displaying “08”.
- 3.4 In “Dim” mode the on axis luminance intensity of the numerical display shall be between 1/4 and 1/12 of “Bright” mode luminance when displaying “08”.

#### ***Viewing Angle***

- 3.5 The Product must be viewable and the display legible inside an angle of 40° either side of the 0° vertical axis through the centre and 40° below the horizontal axis through the centre when displaying “08”.
- 3.6 Viewing angle restriction may be provided using some form of visor or masking system.
- 3.7 The Product should, by design, minimise the effects of phantom illumination, such that there is no discernable display due to phantom illumination at any time.

## 4. ELECTRICAL REQUIREMENTS

- 4.1 The Product shall interface with the existing red and green pedestrian signal lines.
- 4.2 All inputs shall be electrically isolated.
- 4.3 The Product shall interface with Extra Low Voltage (ELV) or Low Voltage (LV) Red and Green Pedestrian Signal inputs as defined in BS EN 50556:2011.
- 4.4 ELV voltages described in 4.3 shall not exceed the limits defined in BS 7671.
- 4.5 The load presented to the red and green pedestrian signals shall be as low as possible to avoid affecting the lamp monitoring facilities of the traffic controller whilst avoiding sensitivity to voltages induced on the on-street cabling.
- 4.6 The Product shall operate using a dedicated permanent power line. The purchasing Traffic Authority shall specify one of the recommended operating voltages shown in Table 2.
- 4.7 The typical working power consumption should be as low as possible and stated for the unit in bright mode displaying "08".

<b>Class</b>	<b>Nominal Supply Voltage (Tolerance)</b>
C1	24V AC (+/- 20%)
C2	24V DC (+/- 20% )
C3	48V DC (-8V +1V)
C4	230V AC (-13% +10%)

**Table 2 - Supply Voltages**



## 5. REFERENCES

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

### **British Standards**

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

BS 7671	Requirements for Electrical Installations
BS EN 50556	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)
BS EN 12966-1: 2005+A1:2009	Road vertical signs – Variable message traffic signs – Part 1: Product standard
BS EN 12368	Traffic Control Equipment - Signal Heads

### **Specifications**

5.3 Topas Limited. Specifications are available from [www.topasgroup.org.uk](http://www.topasgroup.org.uk)

TR 2130	Environmental Tests for Motorway Communications Equipment and Portable and Permanent Road Traffic Control Equipment
TOPAS 2500	Specification for Traffic Signal Controller
TOPAS 0600	Self-Certification Procedures for Statutory Approval of Traffic Control Equipment
TOPAS 2523	Traffic Control Equipment Interfacing Specification
TA 84	Design Manual for Roads and Bridges Volume 8 Section 1 Part 2: Code of Practice for Traffic Control and Information Systems for All-Purpose Roads.

### **Legislation**

The Traffic Signs Regulations and General Directions 2002 (SI 2002/3113) (as amended)

Directive 2004/108/EC

Electromagnetic Compatibility Regulations 2006 (SI 2006/3418)

Directive 2006/95/EC

The Electrical Equipment (Safety) Regulations 1994 (SI 1994/3260)

## ANNEX A - INFORMATIVE GUIDE

### General

- A.1 This Appendix is an informative guide to Traffic Authorities and their contractors who wish to purchase and/or use Pedestrian Countdown Equipment that has been declared conformant to this specification.
- A.2 As the appearance of the display is not a prescribed traffic sign within the Traffic Signs Regulations and General Directions 2002, any installation will need specific site authorisation from the Department for Transport (DfT). In Wales and Scotland, authorisation is granted by the Welsh Assembly Government or the Scottish Executive.
- A.3 Purchasers must ensure that the countdown unit is compatible with the signalling equipment to which it is to be mounted and connected.

### Compatibility

- A.4 The procurement contract should specify the mounting method required.

### Marking and Labelling

- A.5 The procurement contract should specify that each unit shall be individually identified on the back with the following information:
- Serial number
  - Manufacturer name
  - Date of manufacture
  - Electrical power requirements
  - Model type
  - CE mark (as assessed against the directives specified in Section 1.17)

- The TOPAS specification against which it has been declared compliant

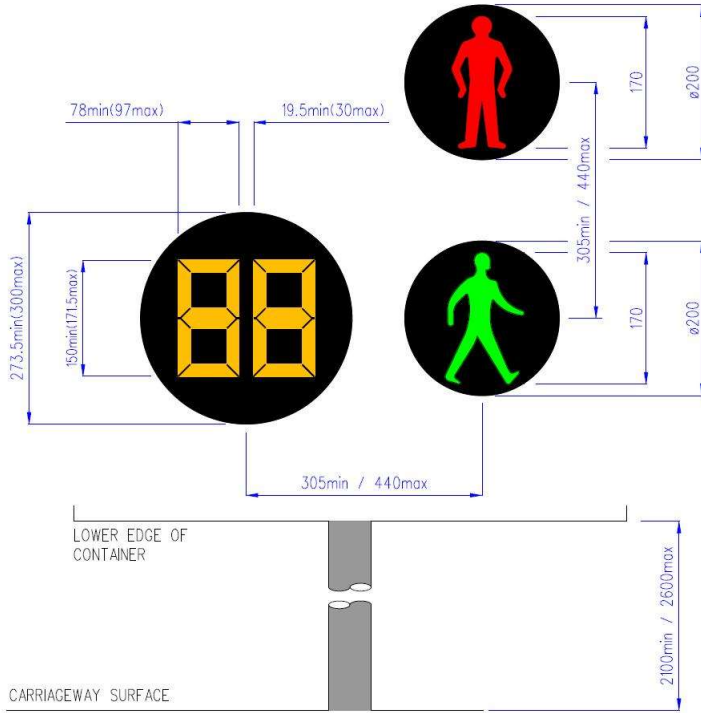
### Connection Lead

- A.6 Where the Product is supplied with a single connection plug and fly-lead (allowing for ease of replacement) the procurement contract should specify that the plug be a 7 pin IP68 rated plug.
- A.7 Where supplied the fly lead should be at least 2.5m long, using multi-stranded cores and with individual cores coloured as defined in Table 3.
- A.8 Faults which may be considered as critical could include the following:
- Single Segment permanently on
  - Loss of two or more segments
  - Internal watchdog failure
  - Loss of timing functions

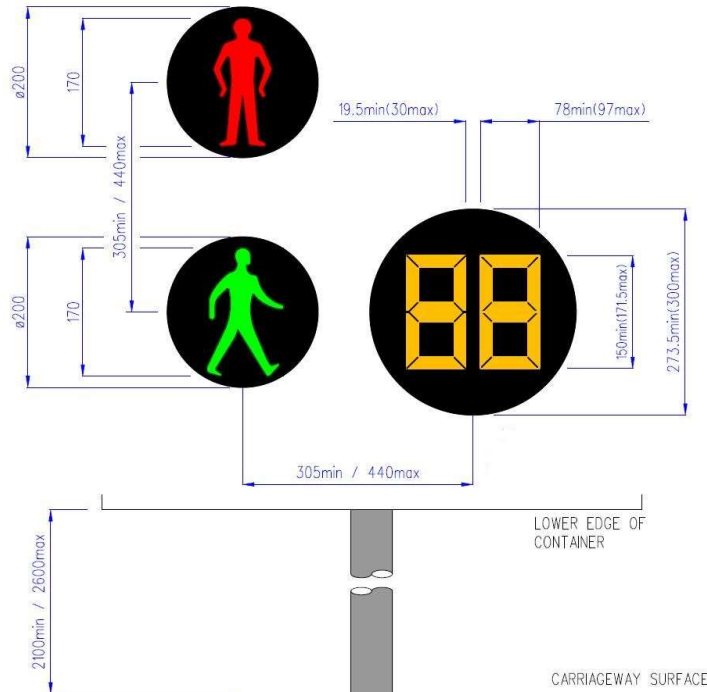
Function	Wire Colour	Connector Pin
Power supply +ve	Red	1
Neutral line	Blue	2
Green Pedestrian Signal	Green	3
Monitoring line Return (Optional)	Yellow	4
Monitoring Line (Optional)	White	5
Power supply -ve	Black	6
Red Pedestrian Signal	Brown	7

Table 3 - Fly-lead Connections

# ANNEX B - DIMENSIONS AND MOUNTING ARRANGEMENTS



Left Hand side mounting



Right Hand side mounting

## ANNEX C - FAULT MONITORING

C.1 The Product may provide the following facilities for fault monitoring.

### General

- C.2 Where required the Product shall provide a monitoring line output, which is connected to the controller to signal a fault condition has occurred.
- C.3 This monitoring line shall be a normally open volt free switch. Under a normal operation the Product shall force the volt free switch closed.
- C.4 Under any fault condition the Product shall release (open) the volt free switch, signalling a fault to the Traffic Signal Controller.
- C.5 In addition to opening the volt free switch the unit shall provide a visual indication of the fault state.
- C.6 The Product shall be monitored by the Traffic Signal Controller via the monitoring line.
- C.7 All faults (critical and non-critical) shall be reported by the Product using the monitoring feedback line, although no distinction needs to be made between the two.

### Failure modes

- C.8 In addition to the Critical Faults detailed in Section 2.19 the Product may also report non-critical faults.
- C.9 Non-critical faults are defined as those faults which do not cause the display to activate at a time other than the blackout or lead to a display that might be misinterpreted.

C.10 These faults shall require reporting via the monitoring line but do not affect the continuous safe operation of the Product.

C.11 If at any point the non-critical fault ceases to be present the Product should close the volt free switch.

C.12 The Unit shall attempt to auto-recover from any non-critical fault after 60s. If the fault is still present it shall continue to attempt an auto-recover up to 10 times within a 24 hour period after which it should remain in a fault state.

### Monitoring Line Interface

- C.13 The monitoring line shall be connected to the Traffic Signal Controller inputs. The Product(s) shall present itself in the same manner as detecting equipment whose interface requirements are set out in TOPAS 2523.
- C.14 Under normal conditions the Product will present a 'Logic 0' state as defined in TOPAS 2523 (Short Circuit).
- C.15 Under fault conditions the Product will present a 'Logic 1' state as defined in TOPAS 2523 (High Impedance).
- C.16 The option to connect multiple Products serially to a single controller input whilst meeting the requirements of paragraph C.13 is permissible.

### On Board Diagnostics

C.17 During a fault condition the Product shall provide an externally visual indication of which fault has occurred.

- C.18 The Product shall keep an historical log of all faults that have occurred including a unique fault identification.

## 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 2581A.

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 certificate's, 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 2581A 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 Agency test results	A reference to Radio Agency tests performance requirements. Copies of the results of Radio Agency testing undertaken by an appropriately qualified independent approved test house must be included in the Technical File Pack.	N/A
12	Primary Safety Test results	For Traffic Control equipment specifically a reference to the Primary Safety Test schedule and test results by part number and issue. A copy of the test results should be included as part of the Technical File Pack.	N/A

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12	Failure Mode Analysis	A reference to the product failure mode analysis requirements and results by document part number and issue.	N/A
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