

# TOPAS

## Traffic Open Products and Specifications

### **TOPAS 2510A**

#### *Performance Specification for Rising Bollards Control Systems*

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# TOPAS 2510A

## PERFORMANCE SPECIFICATION FOR RISING BOLLARDS CONTROL SYSTEMS

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# 1 INTRODUCTION

- 1.1 This specification covers the essential requirements for rising bollard control systems on public highways.
- 1.2 TOPAS specifications are explicitly purchasing specifications and compliance with them is not mandatory. However Local and other Purchasing Authorities may typically require that equipment purchased complies with TOPAS specifications and is TOPAS registered.
- 1.3 Manufacturers may register products as being compliant with this specification, using the process defined in TOPAS 0600.
- 1.4 TOPAS registration requires manufacturers submit a Technical File to an appropriate Technical Assessor to aid compliance verification. The content requirement for the Technical File is defined in Appendix Z of this specification.
- 1.5 Guidance to potential users of this Product is given in Appendix A.
- 1.6 Within this specification, “The Product” shall mean all components necessary to provide a complete operational unit meeting the requirements of this specification and the common requirements defined in TOPAS 0600.
- 1.7 This specification implements requirements as originally defined in HA specification TR 2510A. Product Approvals to TR 2510A 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.

## *Implementation*

- 1.7 This specification implements requirements as originally defined in HA specification TR 2510A. Product Approvals to TR 2510A may be used to register products to this specification as defined in TOPAS 0600.

## 2 FUNCTIONAL REQUIREMENTS

### *General*

- 2.1 The purpose of this specification is to define the essential requirements for a Product that provides controlled access of vehicles to designated areas by lowering and raising bollards or similar devices.
- 2.2 The Product shall include a movable bollard ('vehicle blocker'), vehicle detectors, traffic indicators and a control system.

### *Performance*

- 2.3 A demand to lower the vehicle blocker may be made with a magnetic swipe card, a vehicle tag, vehicle detector, transponder etc.
- 2.4 Detection shall be provided either side of the vehicle blocker to ensure that it only rises after the vehicle has cleared the exit detector.
- 2.5 The controller shall provide outputs to drive two external illuminated indicators as follows:
  - i) a green vehicle indicator illuminated when the bollard is fully retracted;
  - ii) a red vehicle indicator illuminated when the bollard is about to move, moving or in the raised position.
- 2.6 The controller shall provide a steady (non flashing) red fault indicator that illuminates when a fault condition have been detected.
- 2.7 Interlocks shall be provided to prevent the controller from displaying indicators that conflict with the status of the bollards or with each other.

### *Start-up Sequence*

- 2.8 In the absence of mains power the bollards shall be in their fully retracted position with both indicators extinguished.
- 2.9 Upon switching the Product on, or manually clearing a fault, the red indicator only shall be illuminated and the vehicle blocker shall rise after a configurable delay of between 0 and 30 seconds providing the detectors are clear. The system will then follow the following operational sequence.

### *Operation Sequence*

- 2.10 When a valid request for access is received, the controller shall lower the vehicle blocker.
- 2.11 During this period only the red indicator shall be illuminated.
- 2.12 Only when the vehicle blocker is fully retracted shall the red indicator be extinguished and the green indicator illuminated.
- 2.13 When the vehicle clears the entry detector, the green indicator shall be extinguished and the red indicator illuminated.
- 2.14 When the vehicle vacates the exit detector, the vehicle blocker shall rise. If the entry detector detects another vehicle during this period, the red indicator shall remain illuminated and the vehicle blocker immediately retracts.
- 2.15 If, whilst the vehicle blocker is being raised, a demand for access is received, the vehicle blocker shall immediately return to its fully retracted position and repeat the sequence from 2.12.

### ***Manual Control***

- 2.16 Facilities shall be provided to allow the vehicle blocker to be manually raised and retracted as required.
- 2.17 The provisions specified in 2.4 shall not be overridden when operating in this mode of control.
- 2.18 Facilities shall be provided to enable the Product to be:
  - i) reset (following an interruption of the mains supply), or
  - ii) reset following a failure (see 2.33).

### ***Construction***

- 2.19 The controller housing shall be manufactured from suitable material to provide mechanical protection of the controller equipment in the intended environment. See TR 2130.
- 2.20 All cabinet main doors shall be capable of being secured against unauthorised entry by suitable locks.

### ***Electrical Requirements***

- 2.21 All equipment shall be suitable for operation on a nominal 230V RMS, 50 Hz supply.
- 2.22 Indicators connected to the control system shall operate from an Extra Low Voltage supply.
- 2.23 All wiring, termination, earthing and labelling shall be in accordance with BS 7671.
- 2.24 In the event of a mains supply failure being detected by the controller (in which case the failure must be longer than 800 ms) the controller shall shut down as described in paragraph 2.32.

### ***Vehicle Indicator Optical Performance***

- 2.25 The colours of the two vehicle indicators shall be red and green as defined in Table 2.1 and with a minimum luminous intensity of 40 cd in the reference axis.
- 2.26 The light emitting technology used shall be capable of being monitored to meet the requirements of 2.30.
- 2.27 The light emitting area of the indicators shall be nominally 100 mm in diameter and arranged vertically with the red indicator uppermost and aligned to be visible to the driver of an approaching vehicle when in the proximity of the signal indicators.

### ***Chromaticity Requirements***

- 2.28 The colour chromaticity of the optics shall be within the coordinates shown in Table 2.1.

### ***Luminous Intensity Distribution***

- 2.29 The luminous intensity distribution provided by the indicators shall be at least the minimum values shown in Table 2.2.

| Colour | 1°    |       | 2°    |       | 3°    |       | 4°    |       |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|
|        | x     | y     | x     | y     | x     | y     | x     | y     |
| Red    | 0.660 | 0.320 | 0.680 | 0.320 | 0.710 | 0.290 | 0.690 | 0.290 |
| Green  | 0.009 | 0.720 | 0.284 | 0.520 | 0.209 | 0.400 | 0.028 | 0.400 |

**Table 2.1**  
**Colour Chromaticity**

| Horizontal<br>Vertical | 0°  | ±2.5° | ±5.0° | ±10.0° | ±15.0° | ±20.0° |
|------------------------|-----|-------|-------|--------|--------|--------|
|                        | 0°  | 100   | 75    | 65     | 15     | 1.5    |
| ±1.5°                  | 95  | 90    | -     | -      | -      | <1.5   |
| ±3.0°                  | 70  | -     | 45    | -      | -      | <1.5   |
| ±5.0°                  | 40  | -     | -     | 10     | -      | <1.5   |
| ±10.0°                 | 6   | -     | -     | -      | 5      | <1.5   |
| ±15.0°                 | 1.5 | -     | -     | -      | -      | <1.5   |

**Table 2.2**  
**Luminous Intensity Distribution of Indicators**

#### NOTES:

- The four angular distributions of luminous intensity for the indicators are specified as minimum luminous intensities expressed as a percentage of the measured values on the axis 0° horizontal and 0° vertical (the reference axis).
- '-' indicates no specified value but within the field of measurement the light pattern shall be substantially uniform, i.e. the light intensity in each direction at each test point shall meet at least the level achieved by the next consecutive measurement.

### **Fault Conditions**

2.30 The Product shall incorporate facilities to monitor the operation of the indicators and vehicle blocker so that fault conditions can be detected and reported.

2.31 The Product shall continuously monitor for the occurrence of the following fault conditions:

- Mains fault;
- Failure of the demand validation equipment;
- Detection of a 'green indicator/raised vehicle blocker' conflict;
- Entry/exit detector fault;
- Red indicator failure.

- 2.32 In the event of any of the above failure conditions, the system shall immediately retract the vehicle blocker to its fully lowered position and extinguish the red and green indicators.
- 2.33 In the event of the fault conditions in 2.31(ii) to 2.31(v) inclusive, the fault indicator shall be illuminated.
- 2.34 The failure conditions in 2.31 shall be latched (even in the event of a power supply interruption) and require manual resetting on site before normal operation can be resumed.
- 2.35 Upon manual resetting the system the fault indicator shall be extinguished and the system enter the start-up sequence described in 2.8.



## 3 REFERENCES

### *General*

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

### *British Standards*

3.2 The British Standards Institution, London, publishes British Standards.

|             |  |
|-------------|--|
| BS7671      | 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](http://www.topasgroup.org.uk)

|            |  |
|------------|--|
| TOPAS 0600 | Self-Certification Procedures for Statutory Approval of Traffic Signal Control Equipment                       |
| TR 2130    | Environmental Tests for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment |

### *Other Publications.*

|                      |   |
|----------------------|---|
| TSRGD                | Traffic Signs Regulations and General Directions          |
| TAL 4/87             | Rising Bollards   |
| 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 Systems Integrators and Highway Authorities who wish to purchase a rising vehicle blocker control system. Prospective purchasers/hirers should ensure that the procurement contract address the following issues.

### *Marking and Labelling*

- A2 The Procurement Contract should call for all connections to be clearly identified and that the Product is to be fitted with a label displaying the following:
- i) The unique product identifier and serial number;
  - ii) The Specification against which it has been declared compliant;
  - iii) The electrical supply requirements of the Product.

## 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 2510A.

| 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.<br><br>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 2510A  | √        |

|    |                             |   |     |
|----|-----------------------------|---|-----|
|    |                             | 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.       | √   |
| 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 |