

TOPAS

Traffic Open Products and Specifications

TOPAS 2510B

Performance Specification for Rising Bollards Control and Indicator Systems

Revision	Date	Scope	Authorised by
B (v6)	18/4/23	Draft	MP/KF
A	13/3/16	Final	Board

© Traffic Open Products And Specifications Limited 2023.

This document is the property of Traffic Open Products And Specifications Limited and shall not be reproduced in any media in part or in full without the prior written permission of Traffic Open Products And Specifications Limited unless this copyright statement is attached.

Contains public sector information licensed under the Open Government Licence v3.0 and are reproduced and adapted by permission.

Limitation of Liability

Traffic Open Products And Specifications Limited does not accept any liability for any losses damages injury or death or other adverse consequence arising from the use or application of this document and the information therein.

(This page left intentionally blank)

TOPAS 2510B

PERFORMANCE SPECIFICATION FOR RISING BOLLARDS CONTROL AND INDICATOR SYSTEMS

CONTENTS

Section

- 1 Introduction
- 2 Functional Requirements
- 3 References

Appendix A Informative Guide

Appendix Z Technical File Content

CHANGE LOG

The following outlines significant changes to this specification, from its previous issue which may impact on currently registered products:

- a) Includes reference to requirements for products used for the purpose of Hostile Vehicle Mitigation throughout

Corrigendum 9/12/24

Table 1 Note – text in brackets completed following word ‘axis’

1 INTRODUCTION

1.1 This specification covers the essential requirements for rising bollard control and indicator systems on public highways.

1.2 TOPAS specifications are explicitly purchasing specifications and compliance with them is not mandatory. However Local Highway Authorities 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 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

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

1.7 For all Products previously registered against TOPAS 2510A which are compliant with this amended specification, manufacturers are simply required to confirm in writing that the Product remains compliant. Once confirmation has been received the Product Registration information will be migrated on the TOPAS website.

Glossary of Terms

1.8 A comprehensive glossary of terms is available within the IHE Guidance Note ‘Traffic Control & Information Systems’

1.9 TOPAS Terms are defined in TOPAS 0600 and TOPAS 0601.

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 retracting and raising bollards or similar devices.

2.1.1 In the context of this specification where the term 'retracted' is used it shall be taken as referring to the open, accessible state of the bollard. Correspondingly where the term 'raised' is used it shall be taken as referring to the closed or obstructing state of the bollard.

2.2 The Product shall include a movable bollard ('vehicle blocker'), vehicle detectors, traffic indicators and a control system.

2.3 The Product addresses use cases for access restriction and for hostile vehicle mitigation. Where these use cases have differing requirements this is stated.

2.4 Where Products are in use for both Access Restriction and Hostile Vehicle Mitigation (HVM) the functionality shall be evidenced in the technical file for both cases at all points where the requirements differ within this specification.

2.5 In the sections below all facilities apply to both types of bollard system unless titled for one type only.

Performance

2.6 A demand to lower the vehicle blocker may be made with a magnetic swipe card, a vehicle tag, vehicle detector, transponder, etc.

2.7 Detection shall be provided either side of the vehicle blocker to ensure that it only rises after the vehicle has cleared the exit detector.

2.7.1 Detection shall respond appropriately to the full range of vehicle types to be blocked.

2.8 The controller shall provide outputs to drive external illuminated vehicle 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.

These indicators have the significance ascribed to them in TSRGD.

2.9 The controller also shall provide a steady (non-flashing) red fault indicator that illuminates when a fault condition has been detected.

2.10 Interlocks shall be provided to prevent the controller from displaying vehicle indicators that conflict with the status of the bollards or with each other.

Access Control Bollard Systems

Unpowered state

2.11 For Products providing access restriction, in the absence of mains power the bollards shall be in their fully retracted position with both vehicle indicators extinguished.

Start-up Sequence

2.12 For Products providing access restriction, upon switching the Product on, resumption of power after an interruption or manually clearing a fault, the red vehicle indicator(s) 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.

2.12.1 Optionally manual intervention may be required to start or restart the system.

2.13 The Product will then follow the operational sequence below

Operation Sequence

2.14 When a valid request for access is received, the controller shall lower the vehicle blocker.

2.15 During this period only the red vehicle indicator(s) shall be illuminated.

2.16 Only when the vehicle blocker is fully retracted shall the red vehicle indicator facing the permitted vehicle be extinguished and the green vehicle indicator facing the permitted vehicle illuminated.

2.17 When the vehicle clears the entry detector, the green vehicle indicator shall be extinguished and the red vehicle indicator illuminated.

2.18 For Products used for access restriction, when the vehicle vacates the exit detector, the vehicle blocker shall rise. If the entry detector detects another vehicle during this period, the red vehicle indicator shall remain illuminated and the vehicle blocker immediately retract.

2.19 For Products used for access restriction, 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 2.17.

Hazardous Vehicle Mitigation Systems

Unpowered state

2.20 For Products providing HVM, in the absence of mains power the bollards shall remain in their last position or be operated via another power source.

Start-up Sequence

2.21 For Products providing a HVM, upon switching the Product on, resumption of power after an interruption or manually clearing a fault, the red vehicle indicator only shall be illuminated and unless already in the raised position, the vehicle blocker shall rise after a configurable delay of between 0 and 30 seconds providing the detectors are clear .

2.22 Optionally manual intervention may be required to start or restart the system.

2.23 The Product will then follow the operational sequence below.

Operation Sequence

2.24 When a valid request for access is received, the controller shall lower the vehicle blocker.

2.25 During this period only the red vehicle indicator shall be illuminated.

2.26 Only when the vehicle blocker is fully retracted shall the red vehicle indicator facing the permitted vehicle be extinguished and the green vehicle indicator facing the permitted vehicle illuminated.

2.27 When the vehicle clears the entry detector, the green vehicle indicator shall be extinguished and the red vehicle indicator illuminated.

2.28 For Products used as an HVM when the vehicle vacates the exit detector, the vehicle blocker shall rise. If the entry detector detects another vehicle during this period, the red vehicle indicator shall remain illuminated and the vehicle blocker shall continue to rise and then repeat the sequence from 2.24.

Manual Control – All Bollard Types

2.29 Facilities shall be provided to allow the vehicle blocker to be manually raised and retracted as required.

2.30 The provisions specified in 2.7 shall not be overridden when operating in this mode of control.

2.31 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 2.49).

Construction

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

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

Electrical Requirements

2.34 All equipment shall be suitable for operation on a nominal 230V RMS, 50Hz supply or 3 phase equivalent.

2.35 Indicators connected to the control system shall operate from an Extra Low Voltage supply.

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

2.37 For Access restriction, 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 follow the procedures of 2.46 below.

2.38 For HVM, 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 revert to the power supply of 2.20 and continue to operate if provided otherwise it shall follow the requirements of 2.47.

Vehicle Indicator Optical Performance

2.39 The two vehicle indicators shall have a luminous intensity between 40 cd and 100 cd on the reference axis.

2.40 The light emitting technology used shall be capable of being monitored to meet the requirements of 2.44.

2.41 The light emitting area of the vehicle indicators shall be nominally 100 mm in diameter and arranged vertically with the red vehicle indicator uppermost and aligned to be visible to the driver of an approaching vehicle when in the proximity of the signal vehicle indicators.

Chromaticity Requirements

2.42 The chromaticity of the light emitted by the vehicle indicators shall be within the area bounded by the chromaticity coordinates shown in Table 2.1.

Luminous Intensity Distribution

2.43 The luminous intensity distribution provided by the vehicle indicators shall be at least the minimum values shown in Table 2.2 except at Horizontal $\pm 20^\circ$, for which the requirements are maxima.

Fault Conditions

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

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

- i) Mains fault;

- | | |
|---|---|
| <ul style="list-style-type: none"> ii) Failure of the demand validation equipment; iii) Detection of a 'green vehicle indicator/raised vehicle blocker' conflict and for systems with more than one approach, green vehicle indicator to green vehicle indicator conflict; iv) Entry/exit detector fault; v) Red vehicle indicator failure. vi) Failure of access request message equipment at the bollard system. | <ul style="list-style-type: none"> i) The unique product identifier and serial number; iii) The Specification against which it has been declared compliant; iv) The electrical supply requirements of the Product. |
|---|---|

2.46 For access restriction, 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 vehicle indicators.

2.47 For HVM, in the event of any of the failure conditions 2.45 i), iii) or v), the system shall remain in its current position and extinguish the red and green vehicle indicators. For failure conditions 2.45 ii), iv) or vi) the red vehicle indicator shall remain lit.

2.48 In the event of the fault conditions in 2.45 ii) to 2.45 vi) inclusive, the fault indicator shall be illuminated.

2.49 The failure conditions in 2.45 shall be latched (even in the event of a power supply interruption) and require manual resetting on site before normal operation can be resumed.

2.50 Upon manual resetting the system the fault indicator shall be extinguished and the system enter the start-up sequence described in 2.12 or 2.21 as applicable.

Marking and Labelling

2.51 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:

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 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	-	-	-	0.5	<1.5
±15.0°	1.5	-	-	-	-	<1.5

Table 2.2
Luminous Intensity Distribution of Vehicle indicators

NOTES:

1. The four angular distributions of luminous intensity for the vehicle 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) except where the percentages are shown as <1.5% where the intensity should be less than this figure (see 2.39 & 2.43 above).
2. '-' 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.

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.

BS 7671	Requirements for Electrical Installations
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 50556	Road traffic signal systems

Specifications

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

TOPAS 0600	TOPAS Registration Process
TOPAS 2130	Environmental Tests for Road Traffic Control Equipment

Other Publications.

TSRGD	Traffic Signs Regulations and General Directions
TAL 4/97	Rising Bollards
TAL 1/16	Influence of bollards on pedestrian evacuation flow
TAL 2/13	Using bollards to reduce threats from vehicles
TAL 1/11	Vehicle Security Barriers within the Streetscape
Directive 2014/30/EU	EMC Regulations 2016, (Statutory Instrument 2016 No 1091)

APPENDIX A INFORMATIVE GUIDE

A1 Audible facilities are not defined in this Specification. If audible facilities are requested by the purchaser, they should consider the risks to pedestrians and other road users as well as the benefits both in the operational and fault states of the audible part of the system.

A2 Two-way operation of rising bollards. The operational sequences of this specification do not preclude the use of rising bollards in the presence of bi-directional controlled access. The sequences allow for provision of a green indication on one side only of a bi-directional site. Note too that addressing two-way traffic may be by road layout, use of a central island, signing and marking or other means and may include the use of separate bollards for each direction.

APPENDIX Z TECHNICAL FILE CONTENT

This appendix defines the necessary content for a Technical File (a collection of relevant documents) which must be reviewed by an appropriate Technical Assessor as part of the TOPAS Registration process (See TOPAS 0600).

The 'ticked' items are required to be present in a Technical File used to support TOPAS Registration against TOPAS 2510B. Please read the description criteria carefully.

<i>Ref</i>	<i>Item</i>	<i>Description</i>	<i>Required</i>
1	Overview document	<p>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.</p> <p>Where external certificates or documents are referred to these shall be included either:</p> <p>(a) within this overview document; or (b) supplied separately as part of this Technical File.</p>	✓
2	QA accreditation certificate(s)	A copy of the Quality Management Registration Certificates for the organisation applying for TOPAS Product Registration.	✓
3	Details of all required standards and regulations including CE/CA requirements that apply to the Product	<p>A list of all standards to be complied with.</p> <p>Including explicit CE/CA declarations of performance/conformity for those standards, including all certificates, shall be included in this Technical File.</p>	✓
4	A functional design description of the product	Title, document number, version and date of the overall System Design Document for the Product.	✓

5	Product part numbers	A list of top-level assembly part numbers and their issue states including all firmware / software part numbers and issues.	✓
6	Statement of Compliance (An example template can be found on the TOPAS website)	A clause-by-clause statement of compliance against TOPAS 2510B confirming compliance and/or listing caveats or deviations.	✓
7	Functional test procedures and results	A list of all functional test schedules and test result documents (by document number and issue) that substantiate the Statement of Compliance.	✓
8	BS EN 50293 EMC test procedures and results	<p>(a) Title, document number, version and date of the EMC test performance requirement document.</p> <p>(b) Copies of the results of EMC testing undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File.</p>	✓
9	Optical test procedures and results required by this specification	<p>(a) Title, document number, version and date of the optical test performance requirement document.</p> <p>(b) Copies of the results of optical testing undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File.</p>	✓
10	Environmental test results	<p>(a) A list of relevant Environmental tests performance requirements defined in TOPAS 2130.</p> <p>(b) Copies of the results of the Environmental testing undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File.</p>	✓

11	Radio Equipment Regulations test results	<p>Where the Product uses any Radio Equipment:</p> <p>(a) A copy of the RER Declaration Of Conformity</p> <p>(b) Reference to the RER Technical Documentation for the product (by title, document number and version).</p> <p>(c) Copies of the results of radio testing, undertaken by an appropriately qualified independent approved test house <u>must</u> be included in the Technical File. The test results should be those identified in the RER Technical Documentation and should cover any specific IR2030 requirements for the type of radio used.</p> <p>(d) A copy of the Type Examination Certificate for radio equipment not covered by a Designated EN standard.</p>	✓
12	Primary Safety Test procedure and results	<p>For Traffic Control equipment:</p> <p>(a) The title, document number, version and date of the Primary Safety Test schedule.</p> <p>(b) A copy of the test results must be included as part of the Technical File.</p>	N/A
13	Failure Mode Analysis	Title, document number, version and date of the product failure mode analysis requirements and results.	N/A