Traffic Open Products and Specifications

TOPAS 2505A

Performance Specification for Above Ground Vehicle Detector Systems for use at Permanent Traffic Signal Installations

Revision	Date	Scope	Authorised by
A (v1)	09/01/15	Draft	Admin
A (v2)	16/01/15	review	MEP
A (v3)	17/3/15	Draft	KF
A (v4)	17/04/15	Final	Board
A (v5)	11/03/16	Final	Board

(This page left intentionally blank)

TOPAS 2505A

PERFORMANCE SPECIFICATION FOR ABOVE GROUND VEHICLE DETECTOR SYSTEMS FOR USE AT PERMANENT TRAFFIC SIGNAL INSTALLATIONS

CONTENTS

1 INTRODUCTION

1.1 This specification covers the requirements for Above Ground Vehicle Detector Systems for use with Permanent Traffic Signal Installations 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 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

1.6 Guidance to potential users of this Product is given in Appendix F.

Implementation

1.7 This specification implements requirements as originally defined in HA specification TR 2505A. Product Approvals to TR2505A 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 All-purpose Roads.

2 FUNCTIONAL REQUIREMENTS

General

2.1 This Specification defines the essential requirements for vehicle detectors used at part of permanent traffic signal installations.

2.2 The Product shall be designed to detect all vehicles subject to the provisions of the Road Traffic Act within a specified detection zone.

2.3 The Product shall be designed to minimise the possibility of false detections from extraneous objects and from objects outside the detection zone.

Performance

2.4 The turn on distance shall be less than or equal to 1m for a target travelling at 96 kmh.

2.5 The turn off delay time shall be less than 600 ms.

2.6 All detection distances are referenced from the stop-line.

2.7 For each detection criteria given in the Appendices to this Specification with the exception of Appendix E, the performance criteria shall be as follows:

i) The low speed threshold setting shall be 6 kph –2 kph +2.5 kph, no detection shall occur below this setting;

ii) Vehicles shall not be detected at more than 60 metres from the stop-line except in Scotland where the boundary shall be increased to 120 metres.

iii) The detector shall produce a reliable "detect" condition over the range 10 to 35 metres for all vehicles traveling above the low speed threshold and below 16 kph;

iv) The detector shall produce a reliable "detect" condition over the range 0 -10 to 25 - 60 metres for all bicycles and mopeds traveling at speeds above 16 kph up to 112 kph;

v) The detector shall produce a reliable "detect" condition over the range 0 -10 to 35 - 60 metres for all vehicles, except bicycles and mopeds, traveling at speeds above 16 kph and up to 112 kph.

2.8 The Product shall be capable of detecting all types of vehicle at all approach speeds between the low speed threshold and 112 kph.

2.9 The Product shall include an ability to diagnose any malfunction or degradation of performance below that required by this specification and in the event of any such detection; the Product shall follow the process for a category 2 fault.

Mutual Interference

2.10 The Product shall not affect, or be affected by, the operation of another similar equipment when correctly mounted and tested in the following positions:

i) back to back with the housings 25 ± 10mm apart;

ii) at right angles with housings 25 ±10mm apart;

iii) face to face with housings 100m apart;

iv) side by side at 5m apart, facing the same direction.

Interface

2.11 The interface between the Product and an associated Signals Controller shall be in accordance with TOPAS 2523.

2.12 An indicator showing the output status of the Product and, if available, the fault status, shall be positioned such that it is visible from behind and below the unit.

2.13 An option may be included that will extinguish the status indicator when the ambient light falls below 55 LUX.

2.14 The Product may provide an addition output that will present the fault status condition. Where this is present, the output that indicates a fault shall be the logic '1' state as defined in TOPAS 2523.

Electrical Requirements

2.15 Any Product shall require a 24v ±20% supply either AC (RMS, 50Hz) or DC.

2.16 Fixed metal parts of the Product shall be bonded together and connected to earth.

2.17 An interruption of the Product's electrical supply shall cause a category 1 fault.

Additional Requirements for Detection Variants

2.18 Individual Products may be designed to perform to one or more than one Appendix defined in Appendix A to Appendix E.

2.19 The Product shall include an internal fault monitor to validate the operational performance at all times.

Construction

2.20 The equipment housing shall be constructed in such a manner and from materials to meet the environmental requirements defined in TR 2130.

2.21 The housing shall be coloured in accordance with the Zebra, Pelican and Puffin Pedestrian Crossings Regulations and General Directions 1997: Direction 8.

2.22 The housing shall be supplied with a fixing bracket that will permit a detector to be accurately aligned to meet the performance requirements.

2.23 The bracket shall be supplied with a locking arrangement capable of maintaining the alignment of a detector and should be designed to resist vandalism.

Reliability

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

Fault Modes

Category 1

2.25 The Product shall present a high impedance output within 3000 ms.

2.26 When power is restored, the Product shall resume normal operation within 5000 ms.

Category 2

2.27 The Product shall present a high impedance output within 3000 ms.

2.28 If the Product is designed with auto fault correction and the fault condition ceases, then the Product shall resume normal detection operation and the fault output signal shall be removed.

3 REFERENCES

References

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 7987:2001	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 at www.topasgroup.org.uk

TOPAS 0600	Self-Certification Procedures for Statutory Approval of Traffic Signal Control Equipment
TOPAS 2500	Specification for Traffic Signal Controller
TOPAS 2523	Traffic Signal Equipment Interfacing Specification
TR 2130	Environmental Tests for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment

Other Publications

3.4 Other publications can be obtained from the Stationary Office

TA 12	Departmental Advice Note TA 12 – Traffic Signals on High Speed Roads
TA 84	Code of Practice for Traffic Control and Information Systems All-purpose Roads
TSRGD	Traffic Signs Regulations and General Directions
ZPPRGD	The Zebra, Pelican and Puffin Pedestrian Crossings Regulations and General Directions

APPENDIX A DYNAMIC DETECTION – MULTIPLE LANE

A1 The width to the detection zone shall be 7.0 metres nominal wide. The Product shall be capable of performing to Specification when positioned at either side of the detection zone.

A2 The Product shall not detect vehicles or other targets when crossing or is beyond the detection zone.

A3 The Performance criteria shall be as defined in section 2.7.

APPENDIX B BI-DIRECTIONAL DETECTION

B1 The Product shall be designed to meet the requirements of either Appendix A, Appendix C or Appendix D except it shall detect both approaching and receding targets.

APPENDIX C DYNAMIC DETECTION - SINGLE LANE

C1 The approach to the Product shall be 3.5 metres nominal width. The detector shall be capable of performing to Specification when positioned at either side of the approach.

C2 The Product shall not detect vehicles in adjacent lanes.

C3 The Performance criteria shall be as defined in section 2.7.

APPENDIX D DYNAMIC DETECTION – SELECTABLE DIRECTION SENSING

D1 The Product shall be designed to meet the requirements of either Appendix A, Appendix C or Appendix D except it shall be selectable to detect unidirectional targets either approaching or receding.

APPENDIX E STATIC DETECTION

E1 The width to the detection zone shall be 3.5 metres nominal wide. The Product shall be capable of performing to Specification when positioned at either side of the detection zone

E2 Vehicles in adjacent lanes shall not be detected.

E3 All targets shall be detected and produce an output signal when stationary within the range 0 to 3 metres.

E4 The Product may provide the option of operating with the approach to the detector being 7.0 metres nominal width. Operation with a wider detection zone may be provided with a different version than that for B1 and B2.

APPENDIX F INFORMATIVE GUIDE

General

F1 This Appendix is an informative guide to Systems Integrators and Highway Authorities who wish to purchase / hire and use Vehicle Detection Equipment, for use with Permanent Traffic Signal Controllers, that has been declared conformant to this specification. Prospective purchasers/hirers should ensure that the procurement contract address the following issues.

Interface characteristics

F2 The procurement contract should specify that where provided, the Interface cable is in accordance with Def Stan 61-12 (part 4) and the minimum number of wires in each core is 7 with a nominal diameter of each wire being not less than 0.20 mm.

F3 The procurement contract should specify whether the Product should be supplied with a connector as having either the Bulgin plug as described in paragraph F4 or a flying lead as described in F5.

F4 The Product when fitted with a plug, it must be the Bulgin Buccaneer type plugs, Series PX0728/P 9 pole (or equivalent) with connection designations as Table F1.

F5 When the detector is supplied with a flying lead it must comprise of a cable generally in accordance with Def-Stan 61-12 (Part 4) 7/0.2 mm PVC insulated, overall braid screened, PVC sheathed (code 7/2/10C or equivalent). The terminated cable should be a minimum length of 1 metre and have the same colour designations as in Table F1.

Contact	Circuit	Core Colour
Pin 1	24v	Red
Pin 2	24v	Black
Pin 3	Earth/Screen	Green/Screen
Pin 4	Common	White
Pin 5	Output	Yellow
Pin 6	Spare	Blue
Pin 7	Spare	Violet
Pin 8	Spare	Orange
Pin 9	Spare	Pink/Brown

Table F1
Bulgin Plug Pin Designations

Marking and Labelling

F6 The purchase contract should specify that the Product is to be fitted with a label displaying the following:

i) The unique Product identifier and serial number;

ii) The HA Specification and associated Appendix against which it has been declared compliant;

iii) The electrical supply requirements of the equipment

APPENDIX Z TECHNICAL FILE CONTENT

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

Only the 'ticked' items are required to be present in a Technical File Pack used to support TOPAS Registration against TOPAS 2505A.

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 2505A 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.	N/A
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