



Traffic Open Products and Specifications

TOPAS 2515A

Performance Specification for Equipment to Detect High and Over height Vehicles at Low Structures

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TOPAS 2515A

PERFORMANCE SPECIFICATION FOR EQUIPMENT TO DETECT HIGH AND OVERHEIGHT VEHICLES AT LOW STRUCTURES

CONTENTS

Section

1 Introduction

2 Functional Requirements

3 References

Appendix A Informative Guide

Appendix Z Technical File Content

1 INTRODUCTION

- 1.1 This specification covers the requirements for equipment to detect and protect low structures from overheight vehicles on all 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.

Implementation

- 1.7 This specification implements requirements as originally defined in HA specification TR 2515A. Product Approvals to TR2515A 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.

2 FUNCTIONAL REQUIREMENTS

General

- 2.1 This specification covers the operational requirements of a Product for detecting high and overheight vehicles at restricted height structures.
- 2.2 The Product defined in this specification may include all or a sub-set of the following:
- Controller
 - Height detector (HD)
 - Variable message Signs (VMS)
 - Vehicle Presence Detector (VPD)
 - Structure Incident Detector
- 2.3 A low structure protection scheme includes signs, which are installed adjacent to the carriageway and are used to display pre-defined messages to vehicles approaching the structure. The typical layout of such Products are given in Figure 2.1 and Figure 2.2.
- 2.4 A set of height detectors, prior to the sign, is used to detect high or overheight vehicles.
- 2.5 If a vehicle is detected as being overheight an appropriate message shall be displayed to warn the driver(s) and to provide instructions on the actions to be taken (see paragraph 2.8).
- 2.6 Presence detectors may be used at the height detector locations as verification of the presence of a vehicle.
- 2.7 Where remote monitoring of the system is provided then Structure Incident Detectors may be installed to provide a automatic warning when a possible structure collision/incident has occurred.

System Configuration and Operation

- 2.8 The signs shall be capable of displaying authorised legends that contain words to convey the following information to vehicle drivers. The legends may also contain symbols.
- Legend type A – A blank face
 - Legend type B – Instruction for a driver of an overheight vehicle to take avoiding action.
 - Legend type C – Instruction for the driver to use the middle of the road when clear.
 - Legend type D – Warn drivers that a high vehicle may be approaching in the middle of the road.
 - Legend type E (Optional) – Warn drivers to check height of vehicles – for use in the event of equipment failure.
- 2.9 For all height detection systems signs shall be located on every approach to the structure.

Single Over Height Detection

- 2.10 For a girder or level structure a single height detection system shall be used.
- 2.10.1 An overheight vehicle is defined as one whose height dimension is too great to pass under the protected structure.

- 2.10.2 If an approaching overheight vehicle is detected and validated, by the presence detector if fitted, then, legend B shall be displayed for a predetermined time only on the appropriate sign.
- 2.10.3 The sign on the opposite side of the structure shall not be affected.

Dual Over Height Detection

- 2.11 For an arched structure a dual height detection system shall be used.
- 2.12 If an overheight vehicle is detected then the Product shall operate as that defined in paragraphs 2.10.1 through 2.10.3.
- 2.12.1 A high vehicle is defined as one that is too high to pass under the outer parts of an arched structure but may pass under the centre of the arch.
- 2.12.2 If a high vehicle is detected and validated, by the presence detector if fitted, then legend C shall be displayed for a predetermined time only on the appropriate sign.
- 2.12.3 The sign on the opposite side of the structure shall display legend D for a predetermined time.
- 2.13 When a sign is displaying legend type B, C or D the flashing amber lanterns shall also be operative.
- 2.14 When the predetermined display time has expired then the signs will revert to legend A with the amber lanterns switched off.
- 2.15 The Design Authority shall ensure that where appropriate the provisions of BS EN 60825 Safety of Laser products are incorporated into their design.

Controller

- 2.16 The operation of the Product may be based on a single intelligent device or a number of distributed intelligent devices interlinked by a secure communications media.
- 2.17 The Product shall be capable of processing with simultaneous inputs from all detector locations.
- 2.18 The Product shall provide features that will enable an operator, through a secure interface, to set timing parameters and monitor/change the operational status of all system components e.g. to reset latched failures.
- 2.19 The interface to this process may be in any form although it is preferred that an RJ45 socket be provided so that a remote terminal can configure the Product using an Internet Explorer session using an IP Address and a secure log-on feature.
- 2.20 When an IP address is provided the factory default shall be set as 192.168.1.1. This value shall be configurable by an authorised user.
- 2.21 The product shall provide a remote monitoring interface that can be linked to a telecommunications network.
- 2.22 The time between the overheight detection being confirmed and the message being displayed, shall not be greater than 500 milliseconds except where a delay between 1 and 15 seconds has been defined in the site data.
- 2.23 The length of time a message can be displayed shall be determined by the site data for each VMS. This parameter shall be independently selectable between 1 and 30 seconds in 1-second increments.

- 2.24 The Product shall provide an independent watchdog facility that will monitor the main controller processes and shall cause a category 1-fault condition in the event of a failure.
- 2.25 The Product shall provide the necessary algorithms to determine the direction of travel of overheight and high vehicles in all permutations of beam break sequences.
- 2.26 Where timing parameters are included in the algorithms defined in paragraph 2.25 a means shall be included to enable an authorised person to update these on site.

Height Detectors

- 2.27 The overheight vehicle detector (OVD) and the high vehicle detector (HVD) shall provide the functionality to detect overheight or high vehicles at a defined height above the road surface and in the specific direction approaching the restricted height structure.
- 2.28 The minimum distance along the axis of the sensors up to which valid detection of an interruption or obscuration shall be 25 meters.
- 2.29 The height detectors shall operate in all light conditions and in all weather conditions.
- 2.30 Optical detectors shall conform to the safety requirements defined in BS EN 60825.
- 2.31 Reliable operation shall be maintained in all reasonably expected conditions of use and shall be unaffected by communication transmissions from other sources of radio transmission and by screening or reflections from vehicles or buildings.

- 2.32 Where HVD is required this shall be mounted below and in vertical alignment with the corresponding OVD.
- 2.33 Each height detector shall include a feature that will inform the controller the operational status of each device at intervals of not greater than 300 seconds from the last actuation.
- 2.34 If a height detector develops a fault and ceases to operate the Product shall cause a category 1-fault.

Presence Detector

- 2.35 The Product may provide equipment that will confirm the presence of a vehicle at the same location as the Over height detectors which will:
- Where provided the presence detector shall be used to inhibit the reporting of detections from none vehicular obstructions.
 - The presence detector shall operate in all light conditions and in all weather conditions.
 - The presence detector shall operate in temperatures from –20C to +45C and in humidities from 0% to 100%.
 - The presence detector shall perform as defined by this specification with a confidence limit of not less than 90% for not less than the sooner of:
 - i) A period of three years after delivery to the purchaser;
 - ii) The number of operations corresponding to 10,000,000 vehicles having been detected.
- 2.36 The presence detector shall include a feature that will inform the controller the operational status of the device at intervals not less than 300 seconds.

Variable Message Signs

- 2.37 The VMS deployed, as part of this Product, shall be of the light emitting variety in accordance with TOPAS 2516 and BS EN 12966.
- 2.38 The Product shall provide the functionality to operate up to a maximum of eight VMS.

Structure Incident Detector (Optional)

- 2.39 The option shall consist of a supplementary detection system in close proximity to the structures portal.
- 2.40 The Product shall provide the necessary processing to discriminate between a stationary queue of normal height vehicles and a stationary overheight vehicle.

Electrical Requirements

- 2.41 All equipment shall be suitable for operation in accordance with this specification when connected to the UK mains supply.
- 2.42 All wiring, termination, earthing and labelling shall be in accordance with BS 7671.
- 2.43 In the event of a supply failure or interruption longer than 50 milliseconds the controller shall cause a category 3-fault.

Construction

- 2.44 The general design, construction and assembly of the Product shall be based on sound proven engineering principles.
- 2.45 The equipment housing shall be constructed in such a manner and from materials to meet the environmental requirements defined in paragraph 2.47.

- 2.46 The Product manufactured to this specification shall be designed to have a minimum in-service life of 15 years with suitable maintenance.

Environmental

- 2.47 The equipment shall meet the following environmental performance requirements as specified in TR 2130 in the following areas:

Dry Heat } Change of
Cold } Temperature
Damp Heat Cyclic
Solar Radiation
Wind – Wind Tunnel Test or Static
Loading Test
Water Penetration
Drop and Topple
Bump
Vibration transportation
Vibration, random, Operational

- 2.48 The Product enclosures shall be to BS EN 60529 IP 55 or better.

Failure Modes

Category 1

- 2.49 The product shall set all operational signs on the affected approach to display legend type E if available or set the amber lanterns flashing with a blank sign face.
- 2.50 The approach not affected by the fault shall continue to operate as normal.
- 2.51 If remote monitoring is available the failure shall be reported.
- 2.52 If faults exist on both approaches then the Product shall cause a category 2-fault.
- 2.53 When faults are cleared then normal operation shall be resumed for that approach.

Category 2

- 2.54 Any operational signs shall operate as paragraph 2.49.
- 2.55 If remote monitoring is available the failures shall be reported.
- 2.56 When faults are cleared then normal operation shall be resume for that approach.

Category 3

- 2.57 The Product shall shut down without malfunction. Any signs that still have power, shall display legend type E if available or set the amber lanterns flashing with a blank sign face.
- 2.58 When power is restored the Product shall automatically initialise and resume normal operation.

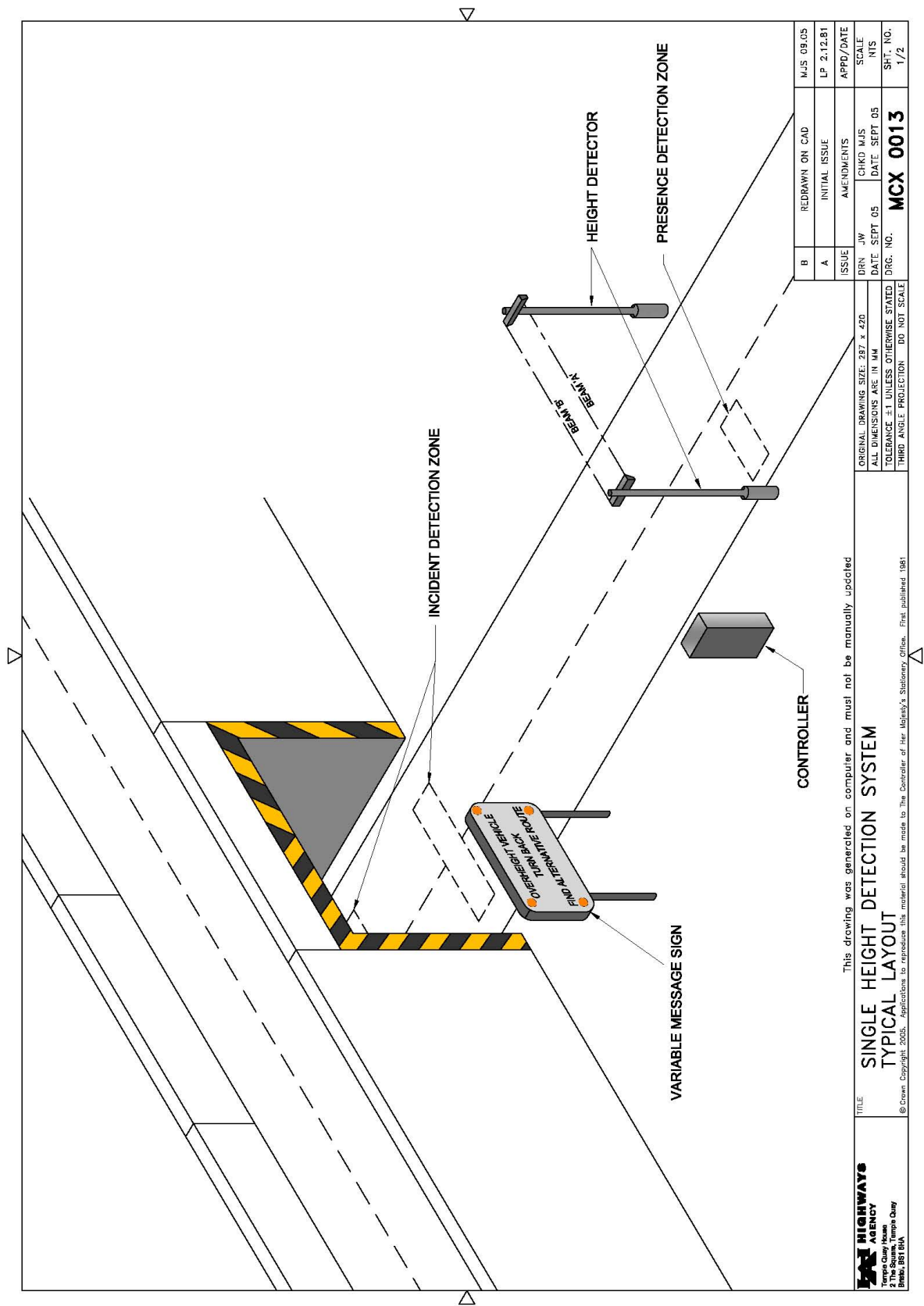


Figure 2.1
Single Height Detection System (Typical Layout)

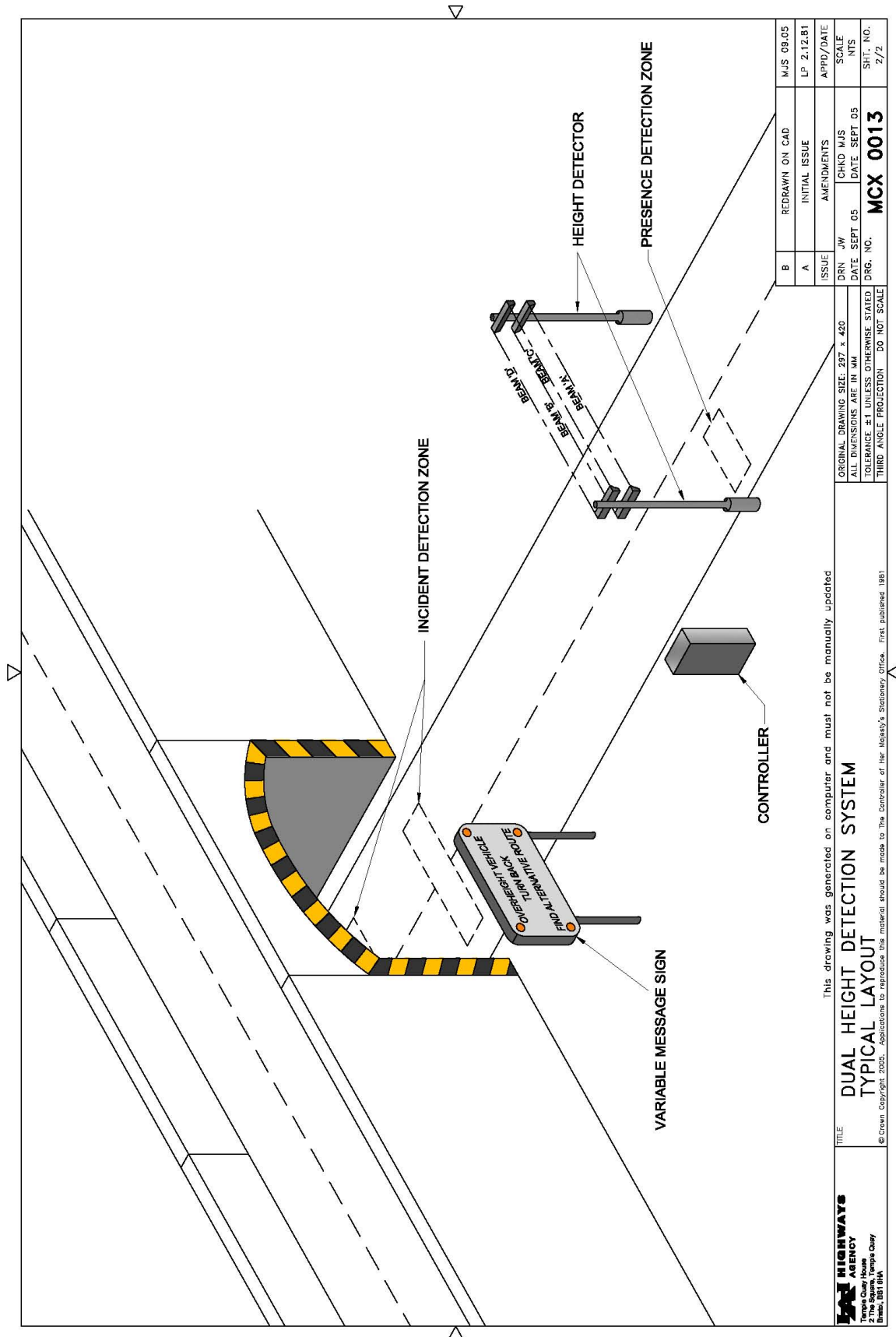


Figure 2.2
Dual Height Detector System (Typical Layout)

3 REFERENCES

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

British Standards

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

BS 7671	Requirements for Electrical Installations
BS 7987	Road Traffic Signal Systems
BS EN 50293	Electromagnetic Compatibility Road Traffic Signal Systems Product Standard
BS EN 60068	Environmental testing
BS EN 60825	"Safety of laser products Part 1: Equipment classification, requirements and user's guide"
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

TR 2130	Environmental Tests for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment
TOPAS 2505	Above Ground Vehicle Detector Systems for Permanent Traffic Signals
TOPAS 2512	Inductive Loop Vehicle detection Equipment
TOPAS 0600	Self-Certification Procedures for Statutory Approval of Traffic Signal Control Equipment

Other Publications

3.4 Other publications can be obtained from the Stationary Office.

TSRGD	Traffic Signs Regulations and General Directions
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 Highways Authorities who wish to purchase / hirer and use Overheight detection equipment that has been declared conformant to this specification. Prospective purchasers should ensure that the procurement contract address the following issues.
- A2 All outputs from the detectors are isolated from earth and their power supplies.
- A3 All outputs from the detectors are protected from accidental reversal of the current flow.

Marking and Labelling

- A4 The purchase contract should ensure that all the Equipment is fitted with a label displaying the following:
 - i) The unique product identifier including serial number;
 - ii) The HA 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 2515A.

Ref	Item	Description	Required
1	Technical File 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 Pack.</p> <p>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.</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 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	Statement of compliance	A clause by clause statement of compliance against TOPAS 2515A confirming compliance and/or listing caveats or deviations.	✓

7	Test procedures and results	A reference to all test schedules and test result documents (by document part number and issue).	✓
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.	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
13	Failure Mode Analysis	A reference to the product failure mode analysis requirements and results by document part number and issue.	N/A