Performance Specification for Equipment to Detect High and Overheight Vehicles at Low Structures
TR 2515 A

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

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1 INTRODUCTION

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

1.2 This specification supersedes specifications MCE 0147 and MCE 0156 and the approval process described therein.

1.3 As a statutory requirement equipment manufactured according to this specification must be approved before its use is permitted on the public highway.

1.4 Statutory Approval (Approval) shall be in accordance with the requirements for Self-Certification set out in TRG 0600.

1.5 Within this specification, “The Product” shall mean all components necessary to provide a complete operational system meeting the requirements of this specification and the Common Requirements defined in TRG 0600.

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

Implementation

1.7 This specification will be immediately implemented from the date of issue for all new approvals.

1.8 Equipment Approvals for this product issued under the previous procedures defined in TRG 0500 will remain valid and no retrospective action will be required providing the build state of that equipment remains unmodified.

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:
  - A period of three years after delivery to the purchaser;
  - 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 TR 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
- 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 resumed 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 NORMATIVE 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.

Contact: +44 (0) 1344 404 429

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 Specifications are published by the Highways Agency.

Contact: +44 (0) 117 372 8270

Web address: http://www.tssplansregistry.org/

TR 2130 Environmental Tests for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment
TR 2505 Above Ground Vehicle Detector Systems for Permanent Traffic Signals
TR 2512 Inductive Loop Vehicle detection Equipment
TRG 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.

Contact: +44 (0)20 7242 6393

Web address: http://www.tso.co.uk

TSRGD Traffic Signs Regulations and General Directions
4 HISTORY

MCE 0147    A    March 2000
MCE 0156    A    June 1989
TR 2515    A    September 2005

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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.