Specification for Portable Traffic Signal Control Equipment for use at Roadworks
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TR 2502 A

SPECIFICATION FOR PORTABLE TRAFFIC SIGNAL CONTROL EQUIPMENT FOR USE AT ROADWORKS

CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1  Introduction</td>
<td>2</td>
</tr>
<tr>
<td>2  Functional Requirements</td>
<td>3</td>
</tr>
<tr>
<td>3  Normative References</td>
<td>7</td>
</tr>
<tr>
<td>4  History</td>
<td>8</td>
</tr>
</tbody>
</table>

Appendix A  Informative Guide
1 INTRODUCTION

1.1 This specification covers the essential requirements for portable traffic signal control equipment for operation at streetworks and roadworks on roads other than motorways.

1.2 This specification supersedes TR0111A from the date of issue and the previous approval process described therein.

1.3 Equipment designed to operate according to this specification shall be approved in accordance with the Secretary of State’s statutory requirements, before it is placed on the UK public highway.

1.4 Approval shall be in accordance with the requirements of the self-declaration process 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 Annex A.

Implementation

1.7 This standard will be immediately implemented from the date of issue. New approvals will be conducted against this standard and TRG 0600.

1.8 Approvals issued against previous standards will remain valid. Retrospective action against this standard is not mandatory.

Glossary of Terms

1.9 A comprehensive glossary of terms is given in Highways Agency document TA84 Code of Practice for Traffic Control and Information Systems for All-Purpose Roads.
2 FUNCTIONAL REQUIREMENTS

**Light Signals**

2.1 The requirements of signal intensity for safety of BS 7987 shall be complied with. For signals this is class AF1; for the controller driving the signals this is class AF5.

2.2 The displayed signal sequence shall comply with TSRGD Regulation 33(3). The duration of the amber periods shall be:

- The amber vehicle signal following the green vehicle signal shall be of a fixed 3-second duration and;
- The red/amber vehicle signal preceding the green vehicle signal shall be of a fixed 2-second duration.

2.3 The Product shall comply with TSRGD Diagram 3000.1, Regulation 35 and comply with the table referenced in TSRGD Regulation 33 (5).

2.4 The dimension and finish of the signal posts shall comply with TSRGD. Regulation 35, Direction 46.

**Timing Accuracy**

2.5 All timed periods shall be accurate to within ± 150 milliseconds.

**Prevention of Hazardous Light Signal Displays**

2.6 The Product shall have functionally independent supervisory control and monitoring processes.

2.7 The Product design shall prevent the display of simultaneous conflicting green vehicle signals and other abnormal signal displays during normal operation, under fault conditions or with permitted operator intervention. A simultaneous conflicting green signal is a Category 1 fault. Fault categories are detailed in Failure Modes.

**System Communications Integrity**

2.8 The Product shall be designed to provide reliable operation for up to 300 metres between any two “system components” under all conditions of deployment without any detectable loss of performance.

2.9 An independent monitoring facility shall be provided to verify the integrity of the communications system.

2.10 If the design of the product shares the intelligence between different units and the communications interface between them is wireless, then the communication between the units shall be as follows:

2.10.1 The Product shall provide a robust and reliable means of fail-safe communication and provide suitable levels of security, accuracy and reliability to all messages being transmitted and received.

2.10.2 The Product shall maintain reliable operation in all reasonably expected conditions of use and shall be unaffected by other sources of radio transmission and by screening or reflections from vehicles or buildings.
2.10.3 The Product shall meet the Electromagnetic Compatibility requirements of BS EN 50293 and its operation shall be unaffected by similar equipment operating independently nearby.

2.10.4 An intermittent loss of communication between controller components shall follow the process for Category 2 fault.

2.10.5 An Intermittent fault is defined as repeated unsuccessful attempts to reach synchronisation or to complete a communications dialogue after 500ms.

2.11 A permanent loss of communications to any signal head shall cause a Category 1 fault.

2.12 A Permanent fault is defined as an unsuccessful attempt to reach synchronisation or to complete a communications dialogue after a period of 2000ms.

**Light Signal Synchronisation**

2.13 The illumination status of each light signal aspect shall be monitored such that each state of all signal units can be validated.

2.14 All light signal heads on the same stage shall have aspects synchronised to within 150ms.

2.15 An intermittent loss of synchronisation (see 2.10.5) shall follow the process for Category 2 fault.

2.16 A permanent loss of synchronisation (see 2.12) shall cause a Category 1 fault.

**Electrical Requirements**

2.17 The Product shall operate using an Extra Low Voltage or Reduced Low Voltage power supply as defined in BS 7671 Requirements for Electrical Installations.

2.18 The Product shall be capable of operating for a minimum continuous period of 16 hours under full-load conditions without attention.

**Start-up Sequence**

2.19 The Product shall be provided with the means to control the safe display of signals to vehicles on switch-on or following the restoration of power by initially displaying a 3-second amber period followed by red on each stage, in cyclic order up to the selectable final stage which shall display a green vehicle signal.

2.20 The controller shall not cycle from one stage to another until the preset all-red from that leaving stage has expired.

2.21 For Vehicle Actuated operation, demands shall be inserted on all stages.

**Modes of Operation**

**General**

2.22 A minimum green vehicle signal period shall be associated with the start of every stage and no signal change shall be possible during the minimum green period. The minimum green running period for each stage shall be configurable to either 7 or 12 seconds.

2.23 An all red vehicle signal period of user configurable duration between 1 to 50 seconds following each stage shall not be violated.
**Vehicle Actuated (VA)**

2.24 The Product shall employ a vehicle detection sub-system approved to TR 2147 or TR 2504.

2.25 The Product shall operate each stage in cyclic order in accordance with vehicle demands.

2.26 The Product shall detect the passage of vehicles during a green signal period and extend this period in proportion to the amount of traffic detected without unduly penalising the traffic on opposing stages.

2.27 The Product shall ensure that traffic control requirements are not compromised by the failure of a vehicle detector unit.

**Fixed Time (FT)**

2.28 The Product shall continuously cycle through its stages sequentially with a fixed configurable maximum green period for each stage.

**Manual Control (MC)**

2.29 Manual selection of configured stages shall be possible.

**Operator Facilities**

2.30 A means shall be provided to configure The Product on set up; monitor operational values to confirm correct operation; and provide diagnostic information for maintenance and fault repair.

**Red Signal Monitoring**

2.31 Provision shall be made to monitor red vehicle signals for failure on each signal head operating at full intensity and at the dimmed level where a dimming facility is provided. Failure of the red signal monitoring facility shall cause a Category 1 fault.

2.32 On failure of all red vehicle signals on an approach, the process for Category 3 fault shall be followed.

**Dimming (Optional)**

2.33 Provision may be made for dimming the signal aspects during periods of low ambient light. Dimming may be provided for the whole signal installation, or on an individual signal head basis.

2.34 If provided, the dimming facility shall automatically reduce the light output of the signals to between a quarter (1/4) and a twelfth (1/12) of their full on-axis intensity when the ambient light level is reduced to 55 Lux. All signal aspects shall immediately switch to full brightness on failure of the dimming facility.

**Failure Modes**

**Category 1**

2.35 All signal heads shall revert to red within 500ms following the detection of a failure.

*Note:* This failure mode policy i.e. reversion to 'All-red' will be reviewed within twelve months of the date of issue of this specification.

2.36 Operation of The Product shall be inhibited until the fault has been cleared and The Product manually reset.

**Category 2**

2.37 The signals shall remain in their current display condition.

2.38 This shall be recoverable to normal operation, via the start-up sequence, when the intermittent fault has been absent for a period greater than 2000ms.
Category 3

2.39 Within 500ms of failure of a red vehicle signal, any green vehicle signal(s) in conflict with that red signal failure approach shall be disabled. Each stage shall cycle with minimum green periods.

2.40 Where more than one approach has complete red signal failure, the Category 1 fault process shall be followed.
3 NORMATIVE REFERENCES

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

British Standards

3.2 British Standards are published by the British Standards Institution, London.

Contact: +44 (0) 1344 404 429

BS 381C Colours for Specific Purposes
BS 4363 Specification for Distribution Units for Electricity Supplies for Construction and Building Sites
BS 6004 Specification for PVC Insulated Cables (Non-Armoured) for Electrical Power and Lighting
BS 6007 Specification for Rubber and Insulated Cables for Electric Power and Lighting
BS 6100 Building and Civil Engineering Terms: Subsection 2.4.1 – Highway Engineering
BS 6500 Specification for Insulated Flexible Cords and Cables
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 60529 Specification for Degrees of Protection Provided by Enclosures (IP Code)

Specifications

3.3 Specifications are published by the Highways Agency.

Contact: http://www.tssplansregistry.org

TR 0100 Inductive Loop Vehicle Detection Equipment
TR 2130 Environmental Tests for Motorway Communications Equipment and Portable and Permanent Traffic Control Equipment
TR 2504 Vehicle Detection Equipment for Portable Vehicle Actuated Traffic Signals
TRG 0600 Self-Certification and Approval of Equipments for the Control of Vehicular and Pedestrian Traffic on Roads

Other Publications

TSRGD Traffic Signs Regulations and General Directions
EMC Regulations 1992, (Statutory Instrument 1992 No 2372)
4 HISTORY

TR 0111     Issue A     November 1991
TR 2502     Issue A     June 2005

Approval of this document for publication is given by the undersigned:

Traffic Signals & Road Lighting Safety
Zone 2/17E
Temple Quay House
2 The Square
Temple Quay
Bristol
BS1 6HA

Mike Smith
Team Manager
Traffic Signals & Road Lighting Safety
APPENDIX A - INFORMATIVE GUIDE

General

A1 This Appendix is an informative guide to Highways Authorities who wish to use Portable Traffic Signal Control Equipment conforming to this specification. Potential users should ensure that the procurement contract addresses the following additional criteria.

Security

A2 The controller door(s) are secured against unauthorised entry by means of suitable lock(s) or security device(s).

Signals Heads

A3 The mounting arrangement of the signal head will, when equipped with apparatus and ballast, withstand a wind speed of at least 26 m/s without toppling, rotating or bending.

Marking and Labelling

A4 Each Controller and Portable Traffic Signal head is clearly marked with its unique serial number and the specification number against which it has been approved.

A5 The controller is also clearly marked with:

i) The single application for which it is approved i.e. 2 Stage, or Multistage;

ii) The electrical supply requirements of the equipment;

iii) The signal load (Number of Heads) capacity of the equipment.