

Specification for Nearside Signal and Demand Unit

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REGISTRATION OF AMENDMENTS

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TR 2181C**SPECIFICATION FOR NEARSIDE SIGNAL
AND DEMAND UNIT****Contents****Chapter**

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1 INTRODUCTION

General

1.1 This specification supersedes TR2181 Issue B and incorporates within it the requirements for the Puffin, Toucan and Equestrian Nearside Signal and Demand Unit. (Hereafter to be described as “Nearside Unit”).

1.2 The Nearside Unit defined in this specification is an essential component of Puffin, Toucan and Equestrian crossings.

1.3 The Puffin crossing is defined within the Zebra, Pelican and Puffin Pedestrian Crossings Regulations and General Directions 1997. Toucan and Equestrian crossings will be defined in the next issue of the Traffic Signs Regulations and General Directions.

1.4 The next issue of the Traffic Signs Regulations and General Directions is expected to be published in 2001 and will also allow the Puffin type strategy to be used as a pedestrian facility at a signal controlled junction.

1.5 The objective is to provide a Nearside Unit which:

- i) Allows pedestrians, cyclists and equestrians to register a demand to cross the carriageway.
- ii) Indicates to pedestrians, cyclists and equestrians the appropriate time to start to cross the carriageway.

Scope

1.6 This specification details the core functional, environmental, constructional and optical requirements for a Nearside Unit intended for use on crossings with nearside signal facility.

1.7 The Nearside Unit described may be provided as:

- i) One unit housing both push button and nearside signal, reference Figure 8.1. (Chapter 8 Construction.)
- ii) Separate push button unit and nearside signal reference Figure 8.2. (Chapter 8 Construction.)

Implementation

1.8 This specification will be immediately implemented from the date of issue. All new Approvals will be conducted against this specification.

1.9 Approvals issued against TR2181 A and B will remain valid. Retrospective action against TR2181 A and B Approvals will not be necessary.

2 REGULATIONS

2.1 The product shall comply with all relevant statutes in force at the time of supply, and particular attention is drawn to those implementing European Directives.

2.2 Any requirement of the specification for goods or materials must be made in accordance with the general introduction and clauses 104 and 105 of Volume 1 of the Specification for Highways Works.

Approval

2.3 Equipment manufactured to this Standard will require to be Statutory Type Approved (hereafter referred to as Approval) before it may be operated on public roads within the United Kingdom.

Procedures for Statutory Type Approval

2.4 Details of the Approval procedure may be found in Highways Agency standard TRG 0500.

2.5 TRG 0500 details the relationship between the UK Approval and EC Standards Certification.

2.6 Any anomalies or interpretation of requirements of this standard must be resolved with the Approval Authority.

Applications for Approval

2.7 Applications for Approval of equipment or any queries regarding such Approval should be addressed to:

Traffic Systems and Signing Division
Highways Agency
Temple Quay House
2, The Square
Temple Quay
Bristol
BS1 6HA
England

Authorisation

2.8 In the UK, apart from Northern Ireland, any symbols to be displayed on a signal or sign that are not prescribed in the TSR&GD must be authorised by the Department for Transport, Local Government and the Regions (DTLR). In Northern Ireland a similar function is performed by the Department for Regional Development.

3 FUNCTIONAL REQUIREMENTS

3.1 The nearside demand unit shall allow pedestrians, cyclists and equestrians to register a demand to cross the carriageway. It shall also indicate to the above the appropriate time to cross by displaying the correct red and green figure combination.

3.2 The physical dimensions and optical requirements are contained within appropriate sections of this specification.

4 INTERFACES

4.1 The nearside demand unit is required to interface with traffic controllers meeting TR2210 (formerly TR0141C).

5 SAFETY AND RELIABILITY

Light Emitting Safety

5.1 Manufactures shall demonstrate compliance to BS EN 60825-1 Safety of Laser Products.

5.2 No light shall be visible from the Nearside Unit below 25% of the nominal input voltage. Reference TR2210 Traffic Signal Controller, Chapter on Safety Monitoring.

5.3 It shall not be possible under any condition for a pictogram consisting of Red and Green figures to be illuminated such that both coloured figures are displayed simultaneously.

Electrical Safety

5.4 The device in 8.3 and any associated equipment shall meet the safety requirements of BS 7671.

Design Life

5.5 The equipment manufactured to this specification shall have a minimum design life of 10 years with suitable maintenance without degradation of colours, lettering etc.

6 ELECTRICAL REQUIREMENTS

- 6.1 All wiring, termination, earthing and labelling shall be in accordance with BS 7671.
- 6.2 All extraneous metal parts shall be earthed.
- 6.3 All electrical connectors shall be terminated in a suitable manner.
- 6.4 The supply to the signal lamps and “call accepted” indicator shall normally be 48v ac.
- 6.5 No voltage in excess of Extra Low Voltage, as defined in BS 7671 shall be permitted in the Nearside Unit.

7 ENVIRONMENTAL AND EMC PERFORMANCE

EMC Requirements

7.1 The Nearside Unit shall be designed to avoid the production of undue electromagnetic interference and to have immunity from external electromagnetic interference.

7.2 Proof of conformity to the requirements of Directive 89/336/EEC shall demonstrate compliance with BS EN 50293.

Environmental Testing

7.3 The equipment housing shall provide mechanical protection to IK10. Surface cracks are allowed providing complete penetration does not occur, i.e. the integrity of the seal is not broken. This test shall be conducted before the tests listed in 7.4 and consist of a single impact as specified within BS EN 50102 Degrees of protection provided by enclosures for electrical equipment against mechanical impacts (IK code).

7.4 The equipment shall meet the environmental performance requirements specified in BS EN 12368 (Signal Heads) in the following areas:

- i) Dry Heat at 60°C
- ii) Cold
- iii) Damp Heat
- iv) Water Penetration to category IPX5
- v) Bump
- vi) Vibration, Random, Operational

7.5 The equipment housing shall provide Dust Protection to category IP5X. This test shall be carried out in conjunction with Environmental Testing outlined in 7.4.

8 CONSTRUCTION

Physical Requirements

8.1 The dimensions and layout of the front of the Nearside Unit are shown in Figure 8.1 and relate to the overall front elevation of the housing.

8.2 Where separate push button unit and nearside signal are provided for use together, shown in Figure 8.2, the combined height of both units when mounted together shall be within the limits of the complete unit shown in Figure 8.1.

NOTE: The dimensions shown in Figure 8.1 and Figure 8.2 show max and min tolerances.

8.3 A means of inserting a demand shall be provided. This shall fit into an area of between 225mm² and 360mm², and be circular, square or rectangular in shape.

8.4 An internally illuminated “call accepted” indicator, which shall be red and shall be provided around, within or adjacent to the device in 8.3. The call accepted indicator shall be visible to pedestrians, cyclists and equestrians to show that the demand has been registered. The optical performance of this indicator is detailed in 9.8. Call Accepted Indicator.

8.5 The device in 8.3 shall have an in service life of a minimum of 1x10⁶ operations.

8.6 It shall be a design requirement for the device in 8.3, to minimise the risk of jamming by any cause, including foreign objects, moisture or the products of corrosion.

8.7 The legend shown in Figure 8.1 and Figure 8.2 shall be 7mm x-ht (min) Transport Medium Alphabet in white and may be varied as detailed in the Traffic Signs Regulations and General Directions.

Equipment Housing

8.8 Housings shall be constructed of materials that will withstand the rigours of the environment in which it is intended to operate. Proof of compliance shall be by testing to the requirements detailed in Chapter 7 Environmental and EMC Performance.

8.9 The screens of the Nearside Unit shall be impact-resistant and shall be tested to the requirements of the Impact Test described in 7.3.

8.10 Means shall be provided for securely fixing the housing to the signal pole. Access to the fixing shall only be available from inside the housing.

8.11 Means shall be provided to permit access to the housing to facilitate the installation and termination of electrical cables and for maintenance purposes.

8.12 Access to the interior of the housing shall be secured by a T key or by other means approved by the Approval Authority.

8.13 The colour of the front panel for the Nearside Unit shall be black and the rear housing lemon yellow as described in BS 381C 1996.

8.14 There shall be space available within the base of the Nearside Unit to incorporate both an audible and tactile device (to TR0155 and TR0157 respectively).

8.15 Cable entry shall be from the rear of the unit and shall be adequately sealed to prevent the ingress of moisture and any degradation of the Environmental tests in Chapter 7 Environmental and EMC Performance.

8.16 All exposed parts shall be easily replaceable if damaged.

8.17 All external corners and edges of the housing, in excess of 40mm, excepting lower edges, shall be rounded to at least 4mm radius and all other external edges shall have a radius of at least 1.5mm.

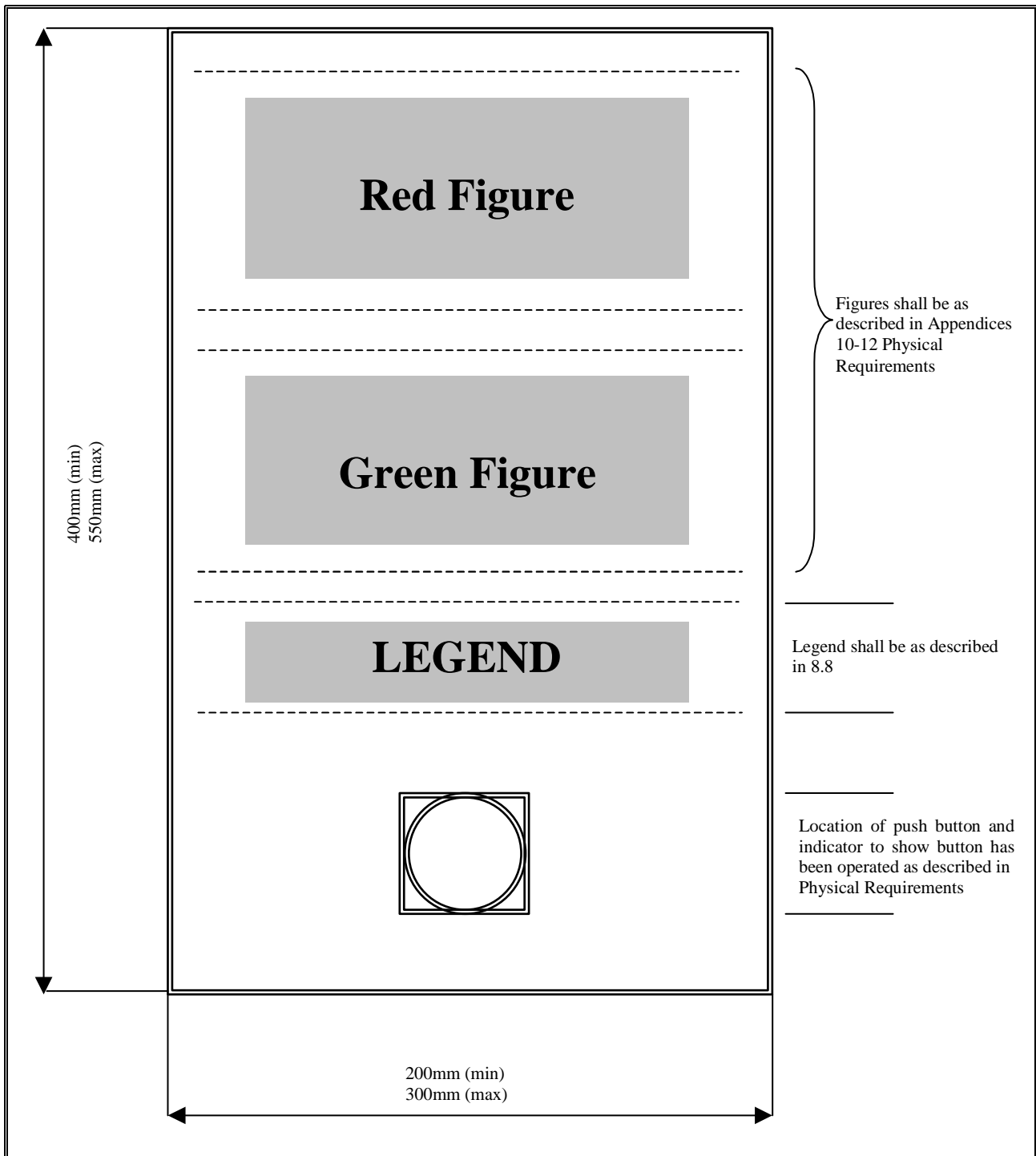


Figure 8.1
Single Housing - Nearside Demand/Display Unit (Layout and Dimensions)

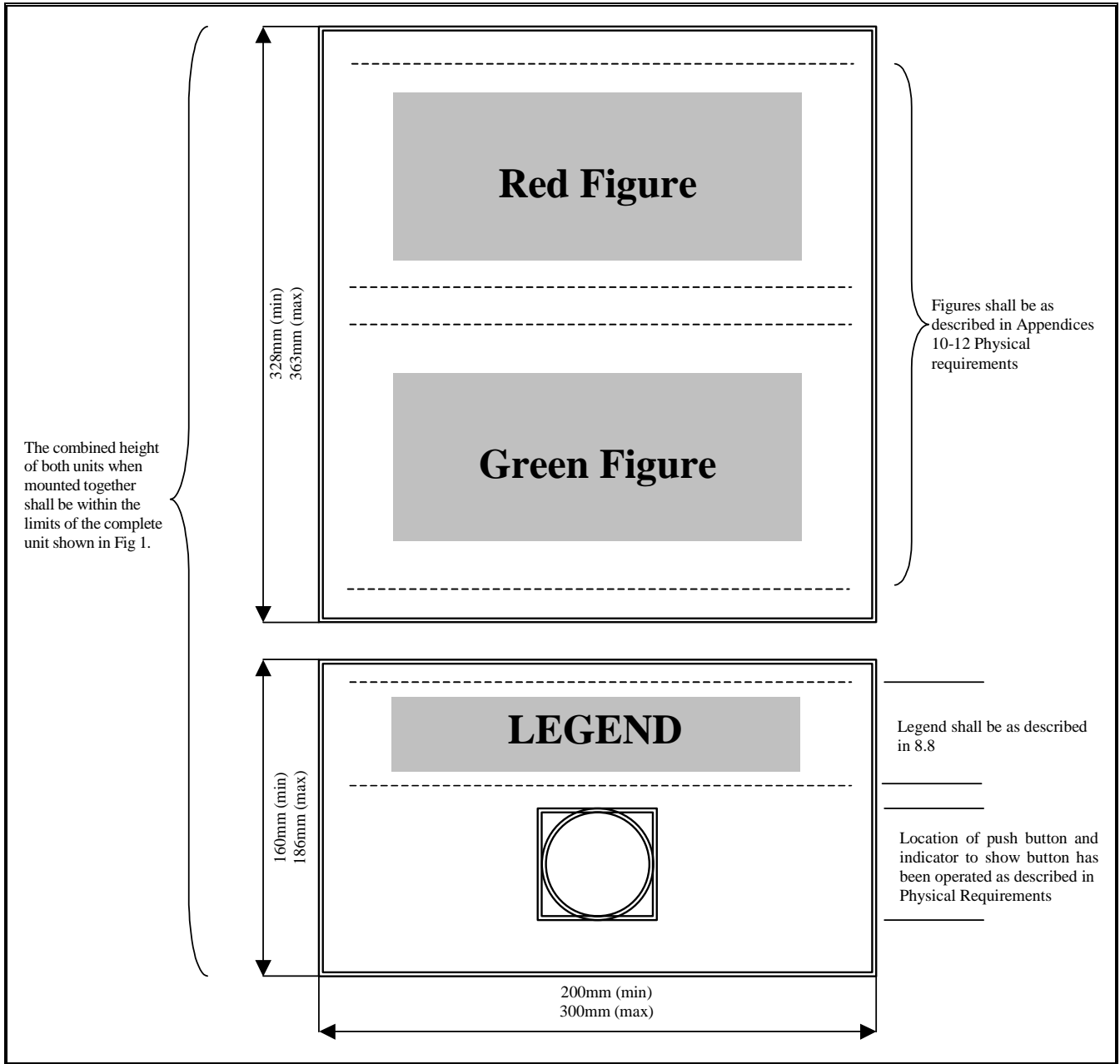


Figure 8.2

Separate Housings - Nearside Demand/Display Units Combined (Layout and Dimensions)

9 OPTICAL REQUIREMENTS

General

9.1 The Nearside Unit shall meet the specified limits for the following:

i) Luminous Intensity, defined within Chapter 10 Puffin Requirement, Chapter 11 Toucan Requirements, or Chapter 12 Equestrian Requirements as appropriate.

ii) Luminance Uniformity, defined within Chapter 10 Puffin Requirement, Chapter 11 Toucan Requirements, or Chapter 12 Equestrian Requirements as appropriate.

iii) Chromaticity (refer to 9.5)

iv) Sun Phantom Ratio (refer to 9.6)

9.2 The background for the signals shall be black.

9.3 Each Nearside Unit shall present a uniform appearance, free from excessively bright spots or sectors over the whole area of the signal face when viewed from any angle within the appropriate Nearside Unit luminous intensity table.

9.4 The light intensity between each point specified within the appropriate Nearside Unit luminous intensity table and Table 9.1 Chromaticity limits for red and green colours shall be continuous and vary smoothly with each change of angle.

Optical Performance Requirements

Chromaticity

9.5 The chromaticity of the figures shall be within the limits specified in Table 9.1 when measured on axis at full brightness and when dimmed to within the range of 15-25% of full brightness.

Sun Phantom

9.6 Phantom intensity when measured on axis under simulated solar illuminance of 40,000 Lux at 10° above the axis shall be greater than 3:1.

Dimming Facility

9.7 The Nearside Unit (Signal and Demand Unit with call accepted indicator) shall be capable of being dimmed to within the range of 15-25% of its full brightness. When the intensity of the near side unit is so reduced it shall fully comply with the requirements for Luminance Uniformity and the Chromaticity limits of Table 9.1.

Call Accepted Indicator

9.8 The internally illuminated "call accepted" indicator as described in 8.4 shall have a minimum intensity of 1cd on axis and shall be visible over the distribution range specified in each Nearside Unit type luminous intensity table when a demand is registered.

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 9.1

Chromaticity Limits for Red and Green Colours

10 PUFFIN REQUIREMENT

Physical Requirements

10.1 The red and green pedestrian figures shall each be 100mm high (min), as referenced in Chapter 15 Working Drawings.

Optical Performance Levels

Luminous Intensity Values

10.2 The minimum luminous intensity distribution of the light output from the red and green pedestrian, figure shall be in accordance with Table 10.1 below.

10.3 The on axis luminous intensity value shall not exceed 50 cd.

10.4 The luminous intensity beyond $\pm 60^\circ$ from the reference axis in the horizontal plane shall be less than 3cd for pedestrian figures.

Luminance Uniformity

10.5 The red and green pedestrian figure shall have a luminance uniformity of 4:1 or better. Luminance measurements shall be taken within a 3mm diameter circular area, on axis, to within 1mm of the edges of the entire area of the figure. The ratio of the highest to the lowest reading obtained shall be used to calculate uniformity.

Horizontal Vertical	0°	±10°	± 20°	±35°
+10°	13	12	8	5
0°	16	13	10	6
-10°	13	12	8	5
-20°	9	8.5	5	4
-30°	6	5	4	3
-40°	3.5	3.5	3	3

Table 10.1

Minimum values of luminous intensity (cd) - Red and Green Figure

11 TOUCAN REQUIREMENTS

Physical Requirements

11.1 The red and green pedestrian figures shall each be 100mm high (min), the red and green cycle figure shall be 50mm high (min) as referenced in Chapter 15 Working Drawings.

Optical Performance Levels

11.2 For the Toucan Nearside Unit, the on axis intensity and light distribution intensity requirements of Table 11.1 below are to be measured with individual Toucan Combination 'on'. The red and green symbols are to be measured separately.

Luminous Intensity Values

The minimum luminous intensity distribution of the light output from the Toucan Combination shall be in accordance with Table 11.1. Unless otherwise defined by the manufacture the optical axis shall be the centre of the pedestrian figure.

11.3 The on axis luminous intensity value shall not exceed 50cd.

11.4 The luminous intensity beyond $\pm 60^\circ$ from the reference axis in the horizontal plane shall be less than 3cd for pedestrian figures.

Luminance Uniformity

11.5 The red and green Toucan Combination shall have a luminance uniformity of 4:1 or better. Luminance measurements shall be taken within a 3mm diameter circular area, on axis, to within 1mm of the edges of the entire area of the figure. The ratio of the highest to the lowest reading obtained shall be used to calculate uniformity.

Horizontal Vertical	0°	±10°	± 20°	±35°
+10°	13	12	8	5
0°	16	13	10	6
-10°	13	12	8	5
-20°	9	8.5	5	4
-30°	6	5	4	3

Table 11.1

Minimum values of luminous intensity (cd) - Red and Green Toucan Combination

12 EQUESTRIAN REQUIREMENTS

Physical Requirements

12.1 The red and green equestrian figures shall be 85mm high (min) as referenced in Chapter 15 Working Drawings.

Optical Performance Levels

Luminous Intensity Values

12.2 The minimum luminous intensity distribution of the light output from the red and green equestrian, figure shall be in accordance with Table 12.1 below.

12.3 The on axis luminous intensity value shall not exceed 50cd.

12.4 The luminous intensity beyond $\pm 60^\circ$ from the reference axis in the horizontal plane shall be less than 3cd for the equestrian figures.

Luminance Uniformity

12.5 The red and green equestrian figure shall have a luminance uniformity of 4:1 or better. Luminance measurements shall be taken within a 3mm diameter circular area, on axis, to within 1mm of the edges of the entire area of the figure. The ratio of the highest to the lowest reading obtained shall be used to calculate uniformity.

Horizontal Vertical	0°	±10°	± 15°
+10°	13	12	8
0°	16	13	10
-10°	13	12	8
-20°	9	8.5	5
-30°	6	5	4
-40°	3.5	3.5	3

Table 12.1

Minimum Values of Luminous Intensity (cd) - Red and Green Equestrian Figure

13 GLOSSARY

Definitions

For the purpose of this specification the following definitions shall apply.

Candela (cd): SI unit of luminous intensity.

Candela per square metre (cd/m²): SI unit of luminance.

Chromaticity: relating to colour. Chromaticities are defined in terms of CIE 79 chromaticity co-ordinates x, y and z.

Equestrian Crossing: a signalled crossing for horse riders that may use pedestrian detection to optimise signal timing.

Equipment Supplier: the organisation offering the equipment for use.

Figure: diagram of an individual Pedestrian, Cyclist or Equestrian to be used on the Nearside Unit.

Illuminance: the area - density of light falling from an external source onto a surface.

Legend: instruction for pedestrians on how to use the crossing. Wording for Nearside Unit detailed in the Traffic Signs Regulations and General Directions.

Luminance: luminance intensity per unit area leaving, passing through or arriving at a surface in a given direction (cd/m²).

Luminous Intensity (candelas [cd]): the luminous intensity of a point source (or an element of a source) in any direction is the ratio of luminous flux emitted by a source in an infinitely small cone containing this direction, to the solid angle of the cone.

Lux: SI unit of illuminance.

Phantom Effect: the appearance of undue images caused by any external light source.

Puffin Crossing: a pedestrian signalled crossing that may use pedestrian detection to optimise signal timings.

Screen: Surface of nearside unit where figure or legend are to be displayed.

Toucan Combination: combination of pedestrian and cyclist figure for use in Toucan Nearside Unit.

Toucan crossing: a signalled shared crossing for pedestrians and cyclists that may use pedestrian detection to optimise signal timings.

Reference Axis: a straight line passing through the centre of the Nearside Unit and perpendicular to the face of the Nearside Unit.

14 REFERENCES

14.1 This specification incorporates by dated or undated reference, provisions from other publications. These normative references are cited at appropriate places in the text and the publications listed hereafter. For dated references, subsequent amendments to, or revisions of, any of these publications apply to this standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to apply.

British Standards

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

Contact: +44 (0) 1344 404 429

BS 381C	Colours for Specific Purposes
BS 7671	Requirements for Electrical Installations
BS EN 12368	Traffic Signals
BS EN 50102	Degrees of protection provided by enclosures for electrical equipment against mechanical impacts (IK code).
BS EN 50293	Electromagnetic Compatibility Road Traffic Signal Systems Product Standard
BS EN 60825-1	Safety of Laser Products

Specifications

14.3 Specifications are published by the Highways Agency.

Contact: +44 (0) 117 372 8300

tss_plans_registry@highways.gsi.gov.uk

TR 0141	Microprocessor Based Traffic Signal Controller.
TR 0155	Audible Unit for use at Pelican Crossings.
TR 0157	Specification for Tactile equipment
TR 2210	Specification for Traffic Signal Controller.
TRG 0500	Statutory Approval of equipment for the Control of Vehicular and Pedestrian Traffic on roads other than motorways.

Other Publications

	Directive 89/336/EEC EMC Directive
	Electricity at Work Regulations 1989
	The Traffic Signs Regulations and General Directions
	Volume 1 Specification for Highways Works
CIE 79	Technical Report. A Guide to the design of Road Traffic Lights

15 WORKING DRAWINGS

15.1 Working Drawings are available from:

DTLR
Great Minster House
76 Marsham Street
LONDON
SW1P 4DR

Bicycle	Drawing No.S24
Green Man	Drawing No. P4002 3 of 3
Horse and Mount	Drawing No.S8
Red Man	Drawing No. P4002 2 of 3

16 HISTORY

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

Traffic Control Systems & Lighting
Zone 2/16E
Temple Quay House
2 The Square
Temple Quay
Bristol
BS1 6HA



M.J. SMITH
Team Manager
Traffic Control Systems & Lighting