Design Manual for Roads and Bridges

Road Layout
Inspection & Assessment

CS 125
Inspection of traffic signs

(formerly TD 25/15)

Revision 2

Summary
This document sets out the requirements for the inspection of permanent traffic signs.

Application by Overseeing Organisations
Any specific requirements for Overseeing Organisations alternative or supplementary to those given in this document are given in National Application Annexes to this document.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
2	Mar 2020	Revision 2 (March 2020) Revision to update references only. Revision 1 (December 2019) CS 125 revision 1 replaces CS 125 revision 0. Requirements for the maintenance and operation, and disposal of permanent traffic signs have been removed from the document and provided in separate documents, CM 125 and CZ 125, so that the documents and requirements are aligned with the lifecycle stages. Revision 0 (July 2019) CS 125 replaces TD 25/15. This full document has been written in compliance with the new Highways England drafting rules.

Foreword

Publishing information

This document is published by Highways England.

This document supersedes CS 125 revision 0, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

Requirements and advice for the inspection, maintenance and disposal of traffic signs are defined in this document, CM 125 [Ref 4.N] and CZ 125 [Ref 1.N].

Traffic signs facilitate the safe use and effective operation of the highway by communicating directions, warnings, regulations and other information to road users. Inspection, maintenance and disposal of traffic signs are necessary because:

1) traffic signs are subject to legislation and their legal status, or that of an associated statutory provision, can be affected if there is a failure in the performance of a traffic sign or associated equipment;
2) over-provision of traffic signs can have a negative visual impact on the environment and can have a detrimental impact on comprehension by road users where there is an overload of information;
3) the visual performance of traffic signs reduces during the hours of darkness and degrades over time, reducing conspicuity and legibility;
4) impairment of the visibility and legibility of traffic signs can be detrimental to road safety by distracting road users and/or hindering drivers' uptake of vital information;
5) deterioration of supporting structures and electrical installations can occur, potentially becoming hazardous to road users, road workers and/or other parties;
6) rectification of defects and preventive maintenance are key to a traffic sign installation achieving its design life.

Further guidance on the reasons for inspecting, maintaining and disposing of traffic signs can be found in sections 8 and 9 of TSM Chapter 1 [Ref 8.N].

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 3.N] apply to this document.

Abbreviations

Abbreviations

Abbreviation	Definition
TSM	Traffic Signs Manual
TSRGD	The Traffic Signs Regulations and General Directions (TSRGD [Ref 7.N])

Terms and definitions

Terms

Term	Definition
Associated equipment	All items, other than traffic signs, necessary to form a complete traffic sign installation and can include items such as traffic sign posts, lighting units and electrical installations.
Traffic sign	The meaning given by section 64(1) of the Road Traffic Regulation Act 1984 (RTRA 1984 [Ref 6.N]) although, for the purposes of this document, does not include road markings or road studs.

1. Scope

Aspects covered

1.1 This document shall be used for the inspection of permanent traffic signs.

1.2 This document shall be read in conjunction with CM 125 [Ref 4.N] (maintenance of traffic signs) and CZ 125 [Ref 1.N] (disposal of traffic signs), which contain related requirements and advice for traffic signs that have been installed and are in use.

1.3 The requirements in this document shall apply to all traffic signs, together with associated equipment, in permanent use on motorway and all-purpose trunk roads except:

1) road markings and road studs within the scope of CS 126 [Ref 1.I];
2) structures within the scope of CS 450 [Ref 2.I];
3) lighting columns.

NOTE *Traffic signs mounted on structures within the scope of CS 450 [Ref 2.I] or mounted on lighting columns remain within the scope of this document.*

1.4 Users of this document shall establish the processes, procedures and frequencies of the inspection activities needed to meet the requirements of this document.

Implementation

1.5 This document shall be implemented forthwith on all schemes involving the inspection of permanent traffic signs on the Overseeing Organisations' motorway and all-purpose trunk roads according to the implementation requirements of GG 101 [Ref 3.N].

Use of GG 101

1.6 The requirements contained in GG 101 [Ref 3.N] shall be followed in respect of activities covered by this document.

2. Inspection

General

2.1 The following elements shall be assessed as part of the inspection of traffic signs:

1) visual performance;
2) structural integrity;
3) electrical safety;
4) the need for removal or replacement.

NOTE *The inspection of each traffic sign installation is necessary to:*

1) identify defects which can affect safety or operational performance;
2) determine the overall condition of the asset;
3) gather intelligence for use in determining the frequency of subsequent inspections.

Frequency of inspections

2.2 Inspections of each traffic sign shall be undertaken periodically under both daytime and night-time conditions so that the requirements of this section can be met.

2.3 The frequency and timing of the inspection of each traffic sign shall be determined by means of a risk assessment.

2.3.1 Factors to be assessed in the risk assessment should include:

1) whether the traffic sign is essential for safety (e.g. a warning traffic sign) or is necessary for the enforcement of a statutory provision;
2) whether the traffic sign is to be illuminated by a means of internal or external lighting during the hours of darkness to comply with TSRGD [Ref 7.N] or for night-time visibility;
3) the interval since the previous inspection;
4) the status and condition of the components of each traffic sign asset, as recorded at the previous inspection;
5) the extent to which a traffic sign installation is exposed to adverse weather conditions such as strong winds;
6) the proximity of vegetation which can obscure the visibility of a traffic sign and/or affect the rate at which dirt or vegetation builds-up on the traffic sign face;
7) seasonal growth in vegetation which can obscure the visibility of a traffic sign;
8) the proximity of the carriageway, which can affect the rate at which dirt builds up.

2.3.2 The inspection regime may comprise a combination of on-site inspections, routine patrols, and mobile inspections using automated asset data collection technologies.

2.3.3 The duration between inspections of each traffic sign should be no greater than two years.

Competency of inspectors

2.4 Inspectors of traffic signs shall be competent in both the application of this document and the key factors which affect achievement of the requirements.

Visual performance

2.5 Inspection of each traffic sign shall determine whether there are any defects or failures which are preventing:

1) the minimum clear visibility distance for the type of traffic sign from being achieved when assessed under both daytime and night-time conditions in accordance with the relevant value given in Table 2.5;
2) all elements of the traffic sign from being legible when assessed under both daytime and night-time conditions;
3) illumination of the traffic sign where required by TSRGD [Ref 7.N];
4) all traffic sign lighting units (where provided) from:
   a) functioning;
   b) operating during the hours of darkness only;
   c) being correctly aligned towards the traffic sign face.

Table 2.5 Reference sources for the minimum clear visibility distance of particular traffic sign types

Traffic sign type	Reference for minimum clear visibility distance
Directional and other worded traffic signs	Appendix E of TSM Chapter 7 [Ref 11.N]
Regulatory traffic signs	Sections 1, 8, 9 or 11 of TSM Chapter 3 [Ref 9.N]
Warning traffic signs	Appendix A of TSM Chapter 4 [Ref 10.N]

2.6 Assessments of the minimum clear visibility distance and the legibility of a traffic sign shall identify all defects arising from:

1) obscuration or obstruction caused by dirt, graffiti, posters, vegetation or other traffic signs, street furniture or structures;
2) loss, damage or fading of traffic sign face material;
3) degradation in retroreflectivity or variances in retroreflectivity where a part of a traffic sign has been replaced;
4) incorrect placement, mounting height or orientation of traffic signs relative to users;
5) incorrect vertical or horizontal alignment of the panels of a traffic sign;
6) a failure of internal or external illumination under night-time conditions;
7) a failure of the structure supporting a traffic sign.

2.6.1 The assessment of minimum clear visibility distance may be undertaken by estimating the minimum clear visibility distance achieved from a moving vehicle which is travelling at the prevailing traffic speed.

2.6.2 Where the minimum clear visibility distance to a traffic sign cannot be estimated or particular defects affecting visibility cannot be identified from a moving vehicle, the assessment should be made during a visit to the traffic sign installation.

2.6.3 Where a traffic sign is mounted on the nearside of the road, the minimum clear visibility distance should be assessed to or from the centre of the nearest lane.

2.6.4 Where a traffic sign is mounted on the offside of the road, the minimum clear visibility distance should be assessed to or from the centre of the closest lane to which the traffic sign relates.

2.6.5 The assessment of legibility should replicate a road user travelling towards and reading a traffic sign from the closest lane to which the traffic sign relates.

2.6.6 The assessment of legibility should begin from the relevant minimum clear visibility distance for the type of traffic sign, which can be identified from Table 2.5, and continue to the point at which it is no longer realistic for a driver to continue reading the traffic sign.

2.6.7 An evaluation of the extent to which colours have faded and there has been loss or damage to the legend should be included in the assessment of legibility.

NOTE 1 Any fading, loss or damage can significantly affect the contrast between different elements of the traffic sign, and hence its legibility.

NOTE 2 *The effects of fading, loss or damage can have a more significant impact on the legibility of a traffic sign under night-time conditions.*

2.6.8 Where degradation in the retroreflective performance of a traffic sign or a part of a traffic sign is suspected, the extent of the problem and the need for intervention should be ascertained by measuring the coefficient of retroreflection.

NOTE *Appendix A provides advice on measuring the coefficient of retroreflection.*

2.6.9 Where the positioning of a traffic sign in relation to the carriageway is suspected of compromising legibility, the extent of the problem and the need for intervention should be ascertained by reference to TSM Chapter 1 [Ref 8.N], which contains guidance on the correct placement, mounting height and orientation of traffic signs in relation to the carriageway.

Structural integrity

2.7 Inspection of each structure supporting a traffic sign shall determine whether the structure has any defect or failure which is:

1) presenting or can present a safety hazard to road users, road workers or other parties;
2) affecting or can affect the service life of the structure.

2.8 Inspections shall include a check of whether all structural elements, fixtures and fittings are present, serviceable and securely attached in accordance with the manufacturer's installation and maintenance instructions.

2.9 Where a structural element, fixture or fitting is not present, not serviceable or not securely attached in accordance with the manufacturer's installation and maintenance instructions, a defect shall be identified.

NOTE 1 *Appendix D illustrates the key structural elements, fixtures and fittings typically required for a post-mounted traffic sign installation.*

NOTE 2 *Common sources of failure in supporting structures can include:*

1) insufficient foundations, demonstrated by excessive movement in the structure or the surrounding ground;
2) corrosion of traffic sign posts or extension posts owing to damage, loss of material (concrete posts) or failure of protective measures;
3) cracking, buckling or leaning of passively safe traffic sign posts;
4) missing or insecure clips, bands, bolts, washers or nuts;
5) damaged channels, potentially caused by over-tightening of bands or the nuts for clips, or the absence of washers;
6) missing or insecure panel butting clamps/plates or joints at the interfaces between panels;
7) missing post caps, leading to a build-up of moisture and corrosion within the post;
8) missing or unsecured doors to recesses; and
9) seized door locks.

Electrical safety

2.10 Inspection of each electrical installation which forms part of a traffic sign installation shall determine whether the electrical installation has any defect or failure which is presenting or can present a safety hazard to road users, road workers or other parties.

2.11 Inspection and testing of electrical installations shall be conducted in accordance with the requirements and recommendations of BS 7671 [Ref 5.N].

The need for removal or replacement of traffic signs and associated equipment

2.12 The need for the removal or replacement of traffic signs and associated equipment shall be identified during inspections.

NOTE 1 Factors leading to removal or replacement of a traffic sign or traffic sign infrastructure can include:

1) loss, damage or fading of traffic sign face material so that the traffic sign is no longer legible;

2) degradation in retroreflective performance so that coefficient of retroreflection measurements are below the intervention levels given in Appendix C;

3) an irreparable structural defect;

4) theft of key components;

5) installations, such as traffic sign posts, become disassociated with a traffic sign and present:

a) a hazard to road users, road workers or other parties;

b) an unlawful obstruction of the highway.

NOTE 2 A traffic sign can be obsolete or become obsolete if, for example:

1) there is no longer a clear need for the traffic sign or the information on the traffic sign is incorrect;

2) the traffic sign is no longer prescribed in TSRGD [Ref 7.N];

3) the traffic sign is not prescribed in TSRGD [Ref 7.N] and has not been specially authorised by the relevant Secretary of State;

4) the traffic sign does not align with the terms of the statutory provision, which has caused it to be placed on the highway;

5) it is a temporary traffic sign, subject to removal in the timescales given in TSRGD [Ref 7.N].

NOTE 3 The ongoing legitimacy of some traffic signs is subject to the timescales given in TSRGD [Ref 7.N]. Appendix G provides examples of such traffic signs.

NOTE 4 CZ 125 [Ref 1.N] defines the requirements for the disposal of traffic signs and is applicable once the need for the removal or replacement of a traffic sign or associated equipment has been identified.

3. Categorisation of defects

General

3.1 In the absence of an overarching contractual requirement of the Overseeing Organisation, traffic sign defects shall be categorised in accordance with Table 3.1.

Table 3.1 Categorisation of defects

Category	Description	Typical examples of defects
Critical	A defect which requires prompt attention because it represents an immediate or imminent safety hazard, or there is a breach of statutory duty.	1) A defect or failure which means that the visual performance requirements of Section 2 are not met for a regulatory or warning traffic sign, or other traffic signs where a partial or incomplete message is detrimental to road safety (for example, because it distracts road users and/or hinders drivers' uptake of critical information). 2) A defect or failure in a structure supporting a traffic sign which is presenting an immediate or imminent safety hazard. 3) A defect or failure in an electrical installation which is presenting an immediate or imminent safety hazard. 4) Missing regulatory traffic signs, warning traffic signs or yellow globes.
Non-critical	All other defects	1) A defect or failure which means that the visual performance requirements of Section 2 are not met for informatory or directional traffic signs, and where there is no immediate or imminent safety hazard. 2) Structural elements, fixtures or fittings of a traffic sign not present, not serviceable or not secured, where the failure of one or more components does not represent an immediate or imminent safety hazard.

NOTE 1 The criteria in Table 3.1 allow the severity and likelihood of any risk to the safety of road users, road workers and other parties, and the effective operation of the highway to be taken into account in the categorisation of defects.

NOTE 2 Appendix E provides examples of the categorisation of defects.

NOTE 3 Appendix F provides examples of manufacturing defects that can be encountered.

NOTE 4 CM 125 [Ref 4.N] defines the requirements for the maintenance of traffic signs and is applicable once a defect has been identified and categorised.

4. Inventory and records

Inventory

4.1 All fields of the Overseeing Organisation's asset management system shall be fully populated and updated using the asset data arising from the inspection of each traffic sign.

4.1.1 Each traffic sign should be assigned an identification number or code which uniquely identifies the asset from other traffic sign assets.

4.1.2 The identification number or code should be displayed on the traffic sign installation.

4.2 Where a label is to be applied to a traffic sign or to a traffic sign post or support for asset identification purposes, the label must comply with the requirements of the TSRGD [Ref 7.N].

NOTE *General Directions 8 and 9 of TSRGD [Ref 7.N] define requirements for the sizing and placing of identification codes and other labels on traffic signs, posts and supports.*

Records

4.3 Records of the inspection of each traffic sign shall be maintained, including all defects identified and details of any action taken or required.

4.4 In the absence of an overarching contractual requirement of the Overseeing Organisation, records of inspection shall be retained for a minimum of seven years.

4.5 In the absence of an overarching contractual requirement of the Overseeing Organisation, retained records shall be handed over to the Overseeing Organisation at the end of any contract which includes the requirements of this document.

4.6 In the absence of an overarching contractual requirement of the Overseeing Organisation, any database, drawing or model of as-installed traffic sign assets shall be updated within one month of a change which affects the information shown in the database, drawing or model.

5. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. CZ 125, 'Disposal of traffic signs'
Ref 2.N	BSI. BS EN 12899-1, 'Fixed, vertical road traffic signs. Fixed signs'
Ref 3.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'
Ref 4.N	Highways England. CM 125, 'Maintenance of traffic signs'
Ref 5.N	BSI. BS 7671, 'Requirements for Electrical Installations, IET Regulations'
Ref 6.N	RTRA 1984, 'Road Traffic Regulation Act 1984'
Ref 7.N	The Stationery Office. TSRGD, 'The Traffic Signs Regulations and General Directions 2016'
Ref 8.N	The Stationery Office. TSM Chapter 1, 'Traffic Signs Manual Chapter 1 - Introduction'
Ref 9.N	The Stationery Office. TSM Chapter 3, 'Traffic Signs Manual Chapter 3 - Regulatory Signs'
Ref 10.N	The Stationery Office. TSM Chapter 4, 'Traffic Signs Manual Chapter 4 - Warning Signs'
Ref 11.N	The Stationery Office. TSM Chapter 7, 'Traffic Signs Manual Chapter 7 - The Design of Traffic Signs'

6. Informative references

The following documents are informative references for this document and provide supporting information.

Ref 1.I	Highways England. CS 126, 'Inspection and assessment of road markings and road studs'
Ref 2.I	Highways England. CS 450, 'Inspection of highway structures'

Appendix A. Measuring the coefficient of retroreflection

The coefficient of retroreflection is a measure of the amount of light reflected by the retroreflective sheeting material used in the construction of a traffic sign face. As a traffic sign ages, its retroreflective performance will degrade at a rate determined primarily by the extent of exposure to environmental factors such as sunlight, moisture and pollutants.

For traffic signs constructed in accordance with BS EN 12899-1 [Ref 2.N], the measurement of the coefficient of retroreflection should only be necessary seven years after installation for Performance Class RA1 materials or 10 years after installation for Performance Class RA2, R2, R3B-UK and R3C-UK materials.

Earlier measurements of the coefficient of retroreflection may be necessary where:

1) retroreflectivity is suspected of having degraded at a faster rate than assumed in this document;
2) the traffic sign has an overlay or coating for dew resistance or protection against graffiti which affects its retroreflective performance.

To assess the extent of degradation in the retroreflective performance of a traffic sign, the coefficient of retroreflection of the white areas of each traffic sign, including both original and replacement parts, should be measured.

The measurement of the coefficient of retroreflection should be carried out using a calibrated, handheld retroreflectometer with the settings adjusted to an observation angle of 20' and an entrance angle of +5°. Reference should be made to BS EN 12899-1 [Ref 2.N] for supplementary details of the procedure to be followed in measuring the coefficient of retroreflection, including definitions of the observation angle and the entrance angle.

The retroreflectometer should be positioned against the traffic sign face and operated in accordance with the manufacturer's instructions.

Before the measurement is carried out, the traffic sign face should be cleaned and the performance class of the retroreflective sheeting material under assessment should be identified.

Appendix B provides examples for the identification of material performance classes where details are not available in traffic sign asset records or on the back of the traffic sign.

The coefficient of retroreflection for colours other than white may be tested if:

1) there are no white areas of a traffic sign, or these are too small to be measured;
2) a non-white element of a traffic sign is suspected of having degraded at a faster rate than white or other areas of the traffic sign; or
3) it is necessary to take a series of measurements to identify the performance class or approximate age of the material under test.

Where the coefficient of retroreflection of part of the traffic sign is measured to be less than the relevant intervention level stated in Appendix C, the traffic sign should be considered to be defective.

When measuring and interpreting the coefficient of retroreflection of a coloured area of a traffic sign where the colour has faded (e.g. a red border fading to white), the coefficient of retroreflection can show an unwanted increase in retroreflectivity.

Where a measurement of the coefficient of retroreflection shows an increase in retroreflectivity, the traffic sign should be considered to be defective.

Mobile technologies can be used to take coefficient of retroreflection measurements where an equivalent level of performance to a handheld retroreflectometer can be demonstrated.

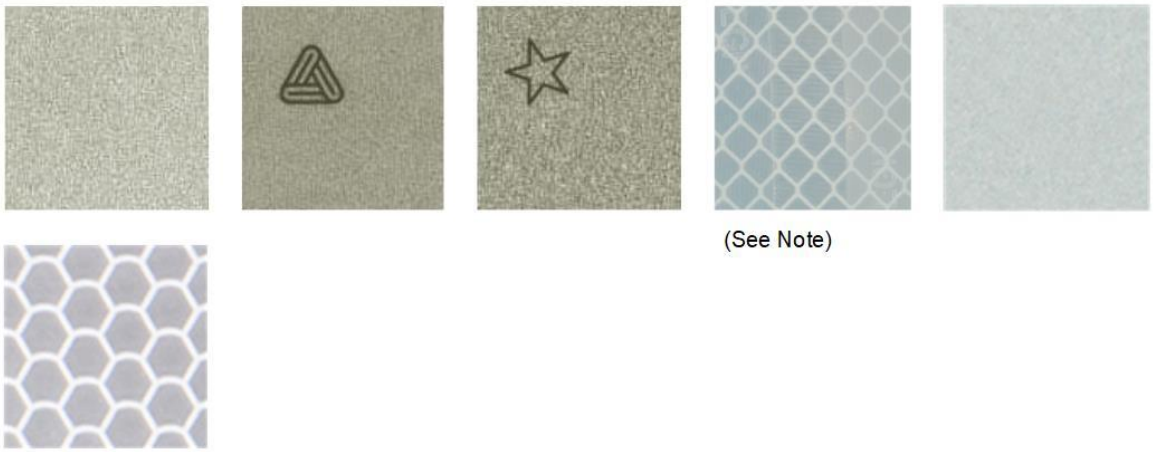
Appendix B. Examples of retroreflective sheeting materials

This appendix provides examples in Figures B.1 to B.5 of retroreflective sheeting materials from each of the coefficient of retroreflection performance classes in BS EN 12899-1 [Ref 2.N].

Where the coefficient of retroreflection of a traffic sign is being measured in accordance with the guidance in Appendix A and in the absence of information in asset records or on the back of the traffic sign, these examples can be used to assist in the identification of the material performance class in use on the traffic sign.

Further information about the sheeting materials in use on traffic signs can be sought from sheeting material manufacturers and suppliers of traffic signs.

Figure B.1 Examples of Class RA1 material, BS EN 12899-1:2007, Table 3



NOTE:

Shows an Engineer Grade Prismatic (EGP) material which is subject to a European Technical Approval in accordance with clause 4.2 of BS EN 12899-1 [Ref 2.N]. The manufacturer has declared that the performance of the material is equivalent to Class RA1.

Figure B.2 Examples of Class RA2 material, BS EN 12899-1:2007, Table 4

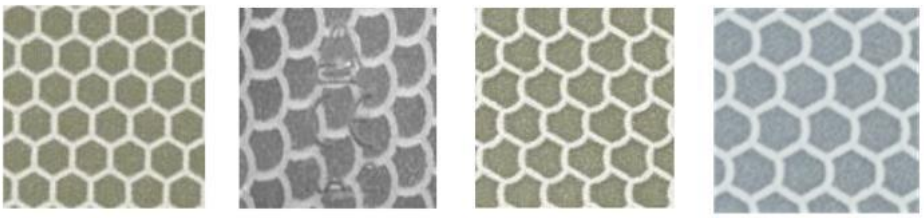


Figure B.3 Examples of Microprismatic Class R2 material, BS EN 12899-1:2007, Table NA.1

Figure B.4 Examples of Microprismatic Class R3B-UK material, BS EN 12899-1:2007, Table NA.2

Figure B.5 Examples of Microprismatic Class R3C-UK material, BS EN 12899-1:2007, Table NA.3

Appendix C. Coefficient of retroreflection intervention levels

This appendix provides details in Tables C.1 to C.5 of the intervention levels which are applicable to retroreflective sheeting materials in each of the coefficient of retroreflection performance classes in BS EN 12899-1 [Ref 2.N].

Where the coefficient of retroreflection of a traffic sign is being measured in accordance with the guidance in Appendix A, the intervention level for the colour and coefficient of retroreflection performance class of a traffic sign is used to determine whether the traffic sign is defective.

Table C.1 Coefficient of retroreflection intervention levels - class RA1

Geometry of measurements		Row	Coefficient of retroreflection invention level by colour (cd.lx^{-1}.m^{-2})							
Observation angle	Entrance angle		White	Yellow	Red	Green	Blue	Brown	Orange	**Grey**
20'	+5^{o}	A	50	35	10	7	2	0.6	20	30
		B	**40**	**28**	**8**	**5.6**	**1.6**	**0.5**	**16**	**24**
		C	**N/A**	**19.6**	**5.6**	**3.9**	**1.1**	**0.3**	**11.2**	**16.8**

Notes

1) Row A contains the minimum coefficient of retroreflection for each colour of a new sign and is shown for information only.
2) Rows B and C contain the intervention levels. Intervention levels shown in row B represent 80% of the minimum coefficient of retroreflection for a new sign; the reduced intervention level in row C is applicable to coloured areas of signs created by digital or screen printing, or using overlay film.
3) All values have been derived from Table 3 of BS EN 12899-1 [Ref 2.N].

Table C.2 Coefficient of retroreflection intervention levels - class RA2

Geometry of measurements		Row	Coefficient of retroreflection invention level by colour (cd.lx^{-1}.m^{-2})								
Observation angle	Entrance angle		White	Yellow	Red	Green	Dark Green	Blue	Brown	Orange	Grey
20'	+5º	A	180	120	25	21	14	14	8	65	90
		B	**144**	**96**	**20**	**16.8**	**11.2**	**11.2**	**6.4**	**52**	**72**
		C	**N/A**	**67.2**	**14**	**11.8**	**7.8**	**7.8**	**4.5**	**36.4**	**50.4**

Notes

1) Row A contains the minimum coefficient of retroreflection for each colour of a new sign and is shown for information only.
2) Rows B and C contain the intervention levels. Intervention levels shown in row B represent 80% of the minimum coefficient of retroreflection for a new sign; the reduced intervention level in row C is applicable to coloured areas of signs created by digital or screen printing, or using overlay film.
3) All values have been derived from Table 4 of BS EN 12899-1 [Ref 2.N].

Table C.3 Coefficient of retroreflection intervention levels - class R2

Geometry of measurements		Row	Coefficient of retroreflection invention level by colour (cd.lx^{-1}.m^{-2})								
Observation angle	Entrance angle		White	Yellow	Red	Green	Dark Green	Blue	Brown	Orange	Grey
20'	+5º	A	180	120	25	21	14	14	8	65	90
		B	**144**	**96**	**20**	**16.8**	**11.2**	**11.2**	**6.4**	**52**	**72**
		C	**N/A**	**67.2**	**14**	**11.8**	**7.8**	**7.8**	**4.5**	**36.4**	**50.4**

Notes

1) Row A contains the minimum coefficient of retroreflection for each colour of a new sign and is shown for information only.
2) Rows B and C contain the intervention levels. Intervention levels shown in row B represent 80% of the minimum coefficient of retroreflection for a new sign; the reduced intervention level in row C is applicable to coloured areas of signs created by digital or screen printing, or using overlay film.
3) All values have been derived from Table NA.1A of BS EN 12899-1 [Ref 2.N].

Table C.4 Coefficient of retroreflection intervention levels - class R3B-UK

Geometry of measurements		Row	Coefficient of retroreflection invention level by colour (cd.lx^{-1}.m^{-2})										
Observation angle	Entrance angle		White	Yellow	Red	Green	Dark Green	Blue	Brown	Orange	Grey	Fluorescent Yellow	Fluorescent Orange
20'	+5°	A	300	195	60	30	24	19	9	150	150	180	90
		B	**240**	**156**	**48**	**24**	**19.2**	**15.2**	**7.2**	**120**	**120**	**144**	**72**
		C	**N/A**	**109.2**	**33.6**	**16.8**	**13.4**	**10.6**	**5**	**84**	**84**	**101**	**50**

Notes

1) Row A contains the minimum coefficient of retroreflection for each colour of a new sign and is shown for information only.
2) Rows B and C contain the intervention levels. Intervention levels shown in row B represent 80% of the minimum coefficient of retroreflection for a new sign; the reduced intervention level in row C is applicable to coloured areas of signs created by digital or screen printing, or using overlay film.
3) All values have been derived from Table NA.1B of BS EN 12899-1 [Ref 2.N].

Table C.5 Coefficient of retroreflection intervention levels - class R3C-UK

Geometry of measurements		Row	Coefficient of retroreflection invention level by colour (cd.lx^{-1}.m^{-2})								
Observation angle	Entrance angle		White	Yellow	Red	Green	Dark Green	Blue	Brown	Fluorescent Yellow	Fluorescent Orange
20'	+5^{o}	A	300	250	75	35	29	17	10	180	90
		B	**240**	**200**	**60**	**28**	**23.2**	**13.6**	**8**	**144**	**72**
		C	**N/A**	**140**	**42**	**19.6**	**16.2**	**9.5**	**5.6**	**101**	**50**

Notes

1) Row A contains the minimum coefficient of retroreflection for each colour of a new sign and is shown for information only.
2) Rows B and C contain the intervention levels. Intervention levels shown in row B represent 80% of the minimum coefficient of retroreflection for a new sign; the reduced intervention level in row C is applicable to coloured areas of signs created by digital or screen printing, or using overlay film.
3) All values have been derived from Table NA.1B of BS EN 12899-1 [Ref 2.N].

Appendix D. Illustration of key structural elements, fixtures and fittings

This appendix describes one way of installing a traffic sign on traffic sign posts so that the installation is structurally sound. The example illustrated in Figure D.1 and Figure D.2, and described in the notes, reflects the most common type of traffic sign mounting arrangement found in the United Kingdom. For details of alternative approaches to sign installation, reference should be made to installation instructions provided by manufacturers and suppliers.

Figure D.1 Illustration of the rear of a sign showing a complete set of clips, panel butting clamps/plates and post camps.

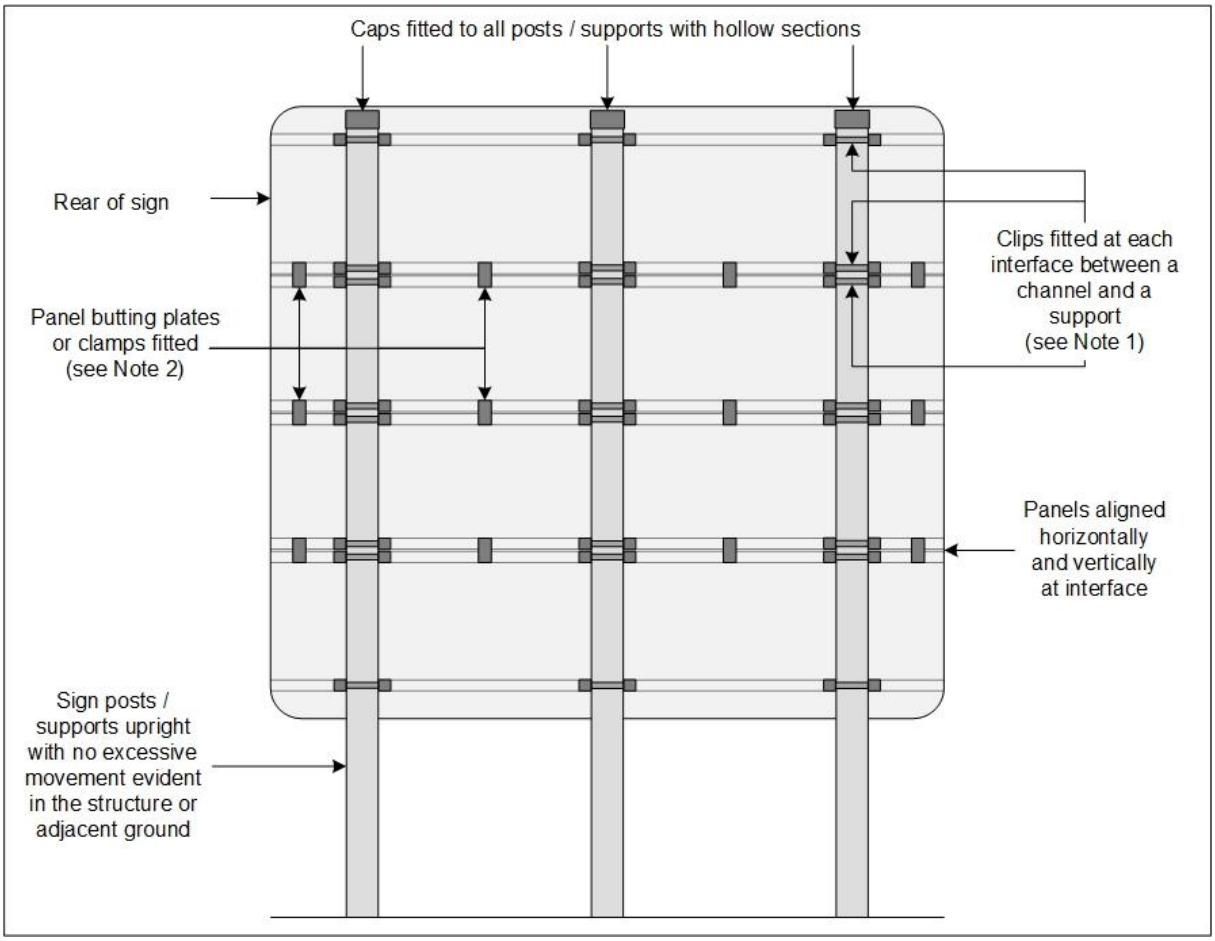
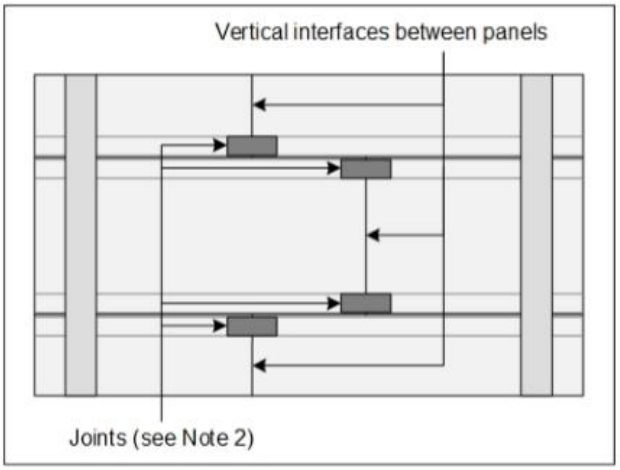


Figure D.2 Illustration of part of the rear of a sign showing joints installed at vertical interfaces between panels to fasten the panels together (for clarity of the illustration, the clips and butting clamps/plates are not shown).



NOTES:

1) Appropriately sized clips are attached at each point where a channel, which is designed to accept a clip, square head bolt, nut and washer, crosses a support. The washer is placed between the nut and the clip. The nut is tightened to the torque recommended by the clip supplier to secure the clip to the traffic sign and to the support. Where a torque setting is not specified, the nut is made tight plus a ¼ turn.
2) The individual panels of multi-panel traffic signs are secured together using butting plates or clamps, and, where necessary, joints at vertical interfaces.
3) The following are outputs of design activities carried out in accordance with BS EN 12899-1 [Ref 2.N] by the manufacturer, supplier, installer and/or consultant to meet the structural performance specified or required by the Overseeing Organisation:
   a) post/support type and configuration;
   b) foundation type and configuration;
   c) the design or selection of the traffic sign substrate;
   d) the design or selection of channels and their configuration/spacing; and
   e) the design or selection of clips; butting clamps/plates; joints at vertical interfaces; and associated fixings including nuts, bolts and washers.
4) Where it is necessary to verify the structural soundness of the above aspects of a traffic sign installation, reference should be made to the installation instructions provided by the manufacturer, supplier, installer and/or consultant, and the declared performance of the installation with respect to BS EN 12899-1 [Ref 2.N].
5) Stainless steel banding is typically suitable for attaching smaller traffic signs to irregular support sizes or shapes such as lighting columns. In all other situations, the appropriate size clip is used.

Appendix E. Examples of the categorisation of defects

Table E.1 provides examples of the categorisation of critical defects.Table E.2 provides examples of the categorisation of non-critical defects.

Table E.1 Examples of critical defects

Figure E1.1 Partially detached traffic sign panel presenting an immediate hazard to road users.

Figure E1.2 Damaged enclosure allowing rain water access to live electrical components.

Figure E1.3 Traffic sign panel with damaged channels and detached post clip, presenting an imminent hazard to road users.

Figure E1.4 Traffic sign post subject to corrosion and collapse, presenting an imminent hazard to road users.

Table E.1 Examples of critical defects (continued)

Figure E1.5 Regulatory traffic sign to diagram 616 is illegible, having faded significantly.

Figure E1.6 Loss and fading of traffic sign face material rendering warning traffic sign illegible.

Figure E1.7 Mis-alignment of unsecured traffic sign panels, rendering traffic sign illegible at critical decision-making point.

Figure E1.8 Significant obscuration of traffic sign by vegetation when viewed from minimum clear visibility distance. Obscuration may result in late lane changing.

Figure E1.9 Structural integrity significantly affected by three missing post clips and absence of panel butting plates.

Figure E1.10 Damaged and unused traffic sign posts in a pedestrian area, presenting an unlawful obstruction of the highway.

Table E.1 Examples of critical defects (continued)

Figure E1.11 Incomplete installation of a passively safe post, allowing movement of the post. This type of post is also subject to a manufacturer's safety notice requiring the installation of sharp grit between the sleeve and the post. 	

Table E.2 Examples of non-critical defects

Figure E2.1 Significant dirt and/or vegetation build-up, affecting legibility, particularly at night. 	**Figure E2.2 Dirty bollard and traffic sign to diagram 610.** 

Table E.2 Examples of non-critical defects (continued)

Figure E2.3 Traffic sign misaligned; degradation and dirt visible on the upper traffic sign under illumination (two defects).

Figure E2.4 Dirt build-up on traffic sign face and damage to panel, affecting orientation (two defects).

Figure E2.5 Day-burning lighting unit with one bulb failed (two defects).

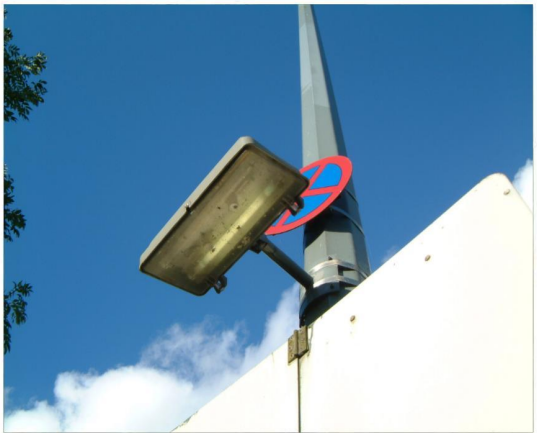


Figure E2.6 Degradation of traffic sign face material (beyond repair)

Figure E2.7 No post caps.

Appendix F. Examples of manufacturing defects

Table F.1 provides examples of manufacturing defects.

Table F.1 Examples of manufacturing defects

Figure F1.1 Shrinking of overlay material revealing the white reflective material below. 	**Figure F1.2 Cracking of overlay material.** 

Appendix G. Examples of signs which are subject to the timescales stated in the Traffic Signs Regulations and General Directions

Table G.1 provides examples of temporary traffic signs which need to be removed within the timescales stated in TSRGD [Ref 7.N].

Table G.1 Examples of temporary signs to be removed within the timescales stated in the Traffic Signs Regulations

Figure G1.1 Temporary traffic sign to diagram 7014 subject to removal within three months of the completion of works to construct the new road layout. 	**Figure G1.2 Temporary traffic sign to diagram 2701.1 to be removed within six months of the completion of the housing development to which it refers.** 

Road Layout
Inspection & Assessment

CS 125
England National Application Annex to CS 125
Inspection of traffic signs

(formerly TD 25/15)

Revision 1

Summary
There are no specific requirements for Highways England supplementary or alternative to those given in CS 125.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Highways England team. The email address for all enquiries and feedback is: Standards_Enquiries@highwaysengland.co.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
1	Dec 2019	Highways England National Application Annex to CS 125.

Department for Infrastructure
An Roinn Bonneagair

Road Layout
Inspection & Assessment

CS 125
Northern Ireland National Application Annex to CS 125 Inspection of traffic signs

(formerly TD 25/15)

Revision 1

Summary
This National Application Annex contains the Departure for Infrastructure, Northern Ireland specific requirements for inspection of traffic signs.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated team in the Department for Infrastructure, Northern Ireland. The email address for all enquiries and feedback is: dcu@infrastructure-ni.gov.uk

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
1	Dec 2019	Department for Infrastructure, Northern Ireland National Application Annex to CS 125.

Foreword

Publishing information

This document is published by Highways England on behalf of Department for Infrastructure, Northern Ireland.

This document supersedes CS 125 revision 0, which is withdrawn.

Contractual and legal considerations

This document forms part of the works specification. It does not purport to include all the necessary provisions of a contract. Users are responsible for applying all appropriate documents applicable to their contract.

Introduction

Background

This National Application Annex contains the Department for Infrastructure, Northern Ireland specific requirements related to inspection of traffic signs.

Assumptions made in the preparation of this document

The assumptions made in GG 101 [Ref 1.N] apply to this document.

NI/1. Applicability of CS 125 in Northern Ireland

NI/1.1 The requirements in CS 125 shall not apply in Northern Ireland.

NI/1.1.1 The Department for Infrastructure should be contacted for further guidance and advice related to the inspection of traffic signs.

NI/2. Normative references

The following documents, in whole or in part, are normative references for this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

Ref 1.N	Highways England. GG 101, 'Introduction to the Design Manual for Roads and Bridges'

Road Layout
Inspection & Assessment

CS 125
Scotland National Application Annex to CS 125 Inspection of traffic signs

(formerly TD 25/15)

Revision 1

Summary
There are no specific requirements for Transport Scotland supplementary or alternative to those given in CS 125.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Transport Scotland team. The email address for all enquiries and feedback is: TSStandardsBranch@transport.gov.scot

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
1	Dec 2019	Transport Scotland National Application Annex to CS 125.

Llywodraeth Cymru
Welsh Government

Road Layout
Inspection & Assessment

CS 125
Wales National Application Annex to CS 125 Inspection of traffic signs

(formerly TD 25/15)

Revision 1

Summary
There are no specific requirements for Welsh Government supplementary or alternative to those given in CS 125.

Feedback and Enquiries
Users of this document are encouraged to raise any enquiries and/or provide feedback on the content and usage of this document to the dedicated Welsh Government team. The email address for all enquiries and feedback is: Standards_Feedback_and_Enquiries@gov.wales

This is a controlled document.

Contents

Release notes

Version	Date	Details of amendments
1	Dec 2019	Welsh Government National Application Annex to CS 125.