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**VOLUME 8    TRAFFIC SIGNS AND  
LIGHTING**  
**SECTION 1    TRAFFIC SIGNALS AND  
CONTROL EQUIPMENT**

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**PART 2**

**TD 24/97**

**ALL-PURPOSE TRUNK ROADS  
INSPECTION AND MAINTENANCE  
OF TRAFFIC SIGNALS AND  
ASSOCIATED EQUIPMENT**

**SUMMARY**

This Standard sets out inspection and maintenance requirements for permanent traffic signals and associated equipment at junctions, emergency vehicle stations and signalled pedestrian crossings on all-purpose trunk roads. It supersedes TD 24/86 and Amendment No. 1.

**INSTRUCTIONS FOR USE**

1.    Insert TD 24/97 into Volume 8, Section 1.
2.    Remove TD 24/86 from Volume 8, Section 1.
3.    Archive this sheet as appropriate.

Note: A quarterly index with a full set of Volume Contents Pages is available separately from The Stationery Office Ltd.



**THE HIGHWAYS AGENCY**



**THE SCOTTISH OFFICE DEVELOPMENT DEPARTMENT**



**THE WELSH OFFICE  
Y SWYDDFA GYMREIG**



**THE DEPARTMENT OF THE ENVIRONMENT FOR  
NORTHERN IRELAND**

# **All-Purpose Trunk Roads Inspection and Maintenance of Traffic Signals and Associated Equipment**

Summary: This Standard sets out inspection and maintenance requirements for permanent traffic signals and associated equipment at junctions, emergency vehicle stations and signalled pedestrian crossings on all-purpose trunk roads. It supersedes TD 24/86 and Amendment No. 1.

**REGISTRATION OF AMENDMENTS**

Amend No	Page No	Signature & Date of incorporation of amendments	Amend No	Page No	Signature & Date of incorporation of amendments

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# 1. INTRODUCTION

## 1.1 General

1.1.1 Performance requirements for traffic signals are set out in equipment specifications covering the equipment provided at individual installations.

1.1.2 The inspection and maintenance procedures specified in this Standard are intended to ensure that traffic signals continue to perform in accordance with the equipment specifications, and safety levels are not eroded. These procedures are minimum requirements and may be made more rigorous by individual maintenance schedules where appropriate.

1.1.3 Where this Standard requires that materials or services shall comply with a British Standard, these requirements shall be satisfied by compliance with a relevant National or Government Standard of any Member State of the European Union (EU), provided that the standard in question offers guarantees of safety, suitability and fitness for purpose equivalent to those offered by the British Standard specified.

## 1.2 Scope

This Standard gives the requirements for the inspection and maintenance of permanent traffic signals and associated equipment, emergency vehicle stations and signalled pedestrian crossings installed on all purpose trunk roads. Associated equipment would embrace, amongst other things, such items as traffic signs (fixed or variable) which are part of a signal installation and remote monitoring equipment installed on site.

## 1.3 Maintenance Contracts

1.3.1 Maintenance contractors shall hold Nationally Accredited BS EN ISO 9002 (ref 1) Certification against QAS 3433/287 (ref 1) or QSS 015 (ref 8). Sub-contractors, specialist slot cutting firms and contractors engaged solely in cleaning or lamp changing are not required to be assessed.

1.3.2 All personnel employed on maintenance and inspection work shall be appropriately qualified and have relevant training on the equipment to be maintained.

## 1.4 Superseded Documents

This Standard replaces TD 24/86 (including Amendment No.1) and the Scottish Addendum thereto, which are hereby withdrawn.

## 1.5 Implementation Statement

This standard is to be implemented in accordance with the instructions given in the Trunk Road Maintenance Manual: Volume 2 (ref 3) in England and Wales and in accordance with the requirements of the other Overseeing Organisations of Scotland and Northern Ireland.

## 2. INSPECTION REQUIREMENTS

### 2.1 General

2.1.1 The purpose of the procedures described in this Chapter is to detect operational failure and to identify physical or operational deterioration so that appropriate remedial and/or preventive action may be taken.

### 2.2 Remote Monitoring

2.2.1 Some operational functions are capable of being remotely monitored by either Remote Monitoring Systems (RMS) or Urban Traffic Control (UTC) Systems. Where such monitoring is provided it is expected that the fault log will be regularly checked. This will ensure that faults which occur on the monitored functions are quickly identified, enabling remedial action to be instigated and repairs to be checked. All traffic control systems on roads with a speed limit of 40mph or greater, or where speed discrimination/speed assessment equipment is considered necessary, should be remotely monitored.

2.2.2 The minimum capability of a remote monitoring system shall be to detect the failure of those items in Table 2.1 although most systems will be capable of monitoring other failures as well.

### 2.3 Inspection

2.3.1 A complete site inspection of each installation shall be carried out at periods not greater than 12 months. Each inspection shall cover at least those aspects listed in Table 2.2.

2.3.2 It is recommended that items 1 to 12 of table 2.2 shall be inspected at intervals not exceeding 6 months. Particular sites may require more frequent inspection. Where reliance is placed on fault reporting by third parties (e.g. police or general public) consideration should be given to the display of a fault reporting telephone number within easy visibility of the signals.

2.3.3 Where obscuration of signs or signals can occur due to trees or other vegetation, sites should be inspected at least twice, at intervals not exceeding 3 months, between the months of March and October and where required the appropriate action shall be taken. The primary aim of this inspection shall be to ensure that early remedial action is taken before signals or signs become obscured. The requirements of Circular Roads 52/75 and Trunk Road Maintenance Manual, Volume 2 should also be observed.

2.3.4 A full report detailing all defects found shall be submitted to the Engineer following each inspection.

ITEM	
1	Mains supply failure and Controller switch off or automatic shutdown.
2	Signals stuck.
3	Vehicle red lamp inoperative.
4	Other signal lamp inoperative.
5	Detector Fault Monitor activated.
6	Lamp dimming - failure to operate in a 24hr period
7	Fault Log contents.
8	Loss of UTC or MOVA control.
9	Manual Mode of operation selected.

Table 2.1 Failures detectable by remote monitoring

ITEM	
1	Controller operational.
2	Operation of all signal lamps and Regulatory signs.
3	Signals stuck.
4	Detector Fault Monitor Lamp illuminated.
5	Operation of Pushbuttons and other manual inputs.
6	Illumination of all 'wait' and other indicator lamps.
7	Operation of audible and tactile signals.
8	No gross misalignment of Signals or Above Ground Detectors and no obvious deterioration in optical performance of signals.
9	Physical condition of push button units and detector housings.
10	Physical condition of poles, signal heads, support brackets and backing boards (including any white edge tapes etc.).
11	Physical condition of regulatory and variable message signs.
12	Obscuration of signs, signals or Above Ground Detectors by lamp columns, signs etc.
13	Operation of red lamp monitor circuit.
14	Operation of all user selected and fall back modes.
15	Maximum Green, Minimum Green, Intergreen and Pedestrian Blackout times.
16	Lamp Dimming.
17	Fault Log Contents.
18	Reversion to Fallback Mode of Operation.
19	Correct operation of all detectors including above ground detector alignment.
20	Operation of all Manual Panel facilities.
21	Illumination of all Manual Panel indicators.
22	Operation of cable-less linking.
23	Operation of local links to other apparatus.
24	All equipment clock times.
25	Illumination and operation of variable message signs.
26	Operation of Speed Assessment or Speed Discrimination Equipment (SA/SDE).
27	Operation of ancillary equipment eg Outstation Monitoring Unit (OMU), Outstation Transmission Unit OTU etc.
28	Condition of earth connections, wiring, pole cap assemblies and mechanical support of cables.
29	Condition of cabinet, door seals, locks and hinges.
30	Condition of cabinet base sealing or gas plinth ventilation as applicable.
31	Accessibility of equipment cabinet.
32	Data sheets and Log Books present in cabinet.
33	Condition of earth connections and wiring to poles.
34	Condition and effectiveness of all bonding and earthing.
35	Physical condition of loop and feeder slots and their sealing.
36	Condition of road markings and studs.
37	Mast arm assemblies, which shall be inspected in accordance with the Design Manual for Roads and Bridges, Volume 3. Section 1, Part 4 (ref 5) or in accordance with the requirements of the Overseeing Department.

**Table 2.2 Routine Inspection Requirements**



## 3. MAINTENANCE PROCEDURES

### 3.1 Routine Maintenance

#### 3.1.1 Electro-Mechanical Parts

Electro-mechanical parts including relays shall be inspected yearly (or as specified by the manufacturer, whichever is the sooner) and worn parts adjusted or replaced. Electro mechanical lamp relays must be replaced yearly.

Residual Current Devices shall be test tripped at least yearly, or as directed by the manufacturer; and always before installation.

#### 3.1.2 Back-up Batteries

These shall be replaced in accordance with the manufacturers' schedules.

#### 3.1.3 Lamp Changing

Lamps shall be bulk changed before they have exceeded their normal specified life as follows:

- (a) all signal, 'wait' and other filament indicator lamps, except those used in amber aspects, shall be bulk changed every six months;
- (b) filament lamps used in amber aspects must be replaced at least yearly;
- (c) lamps in regulatory signs shall be checked at 6 monthly intervals, and changed yearly;
- (d) lamps in variable message signs shall be changed at intervals appropriate to the type of lamp used and the mode of operation of the sign.

#### 3.1.4 Lens Cleaning

The signal lens, regulatory signs and variable message signs shall be cleaned at least yearly.

### 3.2 Non-Routine Maintenance

3.2.1 All defects shall be reported without delay to the maintenance contractor for attention. Defects are classified as:

Category (i) - Those which require prompt attention because they present safety hazards or cause unacceptable delay to road users, e.g. conflicting signals, electrical faults, gas leaks, signals damaged and in a dangerous condition, and defective signals which although not included in

the above are likely to cause abnormal traffic conditions; or

Category (ii) - Those which can be included in a regular programme of repair work.

All Category (i) defects shall be attended to as a matter of urgency. All defects that present a safety hazard shall be made safe and arrangements shall be made to ensure that such make safe cover is available on a 24 hour day, 7 day week basis.

All Category (ii) defects shall be attended to and a satisfactory repair concluded within the periods specified in the contract for non-routine maintenance.

3.2.2 Care must be taken to ensure that temporary repairs are permanently repaired as soon as possible.

### 3.3 Records and Monitoring

3.3.1 An efficient and effective service can only be provided if comprehensive records of the layout, specification and operational settings of the equipment on site, together with its fault history, are readily accessible by maintenance and supervisory staff. These documents should afford a complete historical record covering at least the previous 5 years.

3.3.2 The records detailed in 3.3.1 shall be held at the offices of the Engineer supervising the Inspection and maintenance service and at the appropriate depot(s) of any contractor(s).

3.3.3 As a minimum, plans showing the equipment and cabling layout, current control equipment settings, source of power supply and any site specific safety instructions shall be held in the equipment cabinet on site, together with a log book in which brief details of tests, alterations, repairs and inspections of the installation shall be recorded.

3.3.4 Arrangements shall be made for updating all records.

3.3.5 Inspection personnel shall be provided with report/record forms which shall set out the various items to be checked. These shall be completed at the time of the inspection, and delivered to the supervising engineer.

3.3.6 Comprehensive records shall be maintained of all faults reported, their causes, details of subsequent repairs and of routine maintenance work.

3.3.7 Records must be reviewed regularly to identify repeat faults at individual sites or abnormal frequency of similar faults at different sites. Appropriate action should be taken if such situations are identified.

3.3.8 Records of defects and action taken shall be retained for the period of time specified in QAS 3433/287 (ref 1) or QSS (ref 8).

## 4. SAFETY

### 4.1 Road Safety

4.1.1 The requirements of Chapter 8 of the Traffic Signs Manual, (ref 4) shall be observed at all times when carrying out inspections/ maintenance.

4.1.2 Due regard should be paid to the requirements of the New Roads and Street Works Act 1991 (ref 9) and Construction (Design and Management) Regulations 1994 (ref 10) (in Northern Ireland The Street Works (Northern Ireland) Order 1995 and Construction (Design and Management) Regulations (Northern Ireland) 1995) (Refs 11 and 12) when carrying out maintenance work at an installation. Further guidance can be obtained from Volume 6, Section 1 of the Design Manual for Roads and Bridges.

### 4.2 Electrical Safety

4.2.1 Electrical safety checks as defined in BS7671 shall be performed at least every 5 years.

4.2.2 All traffic control systems installed on highways since 1 January 1993 shall comply with the requirements of BS 7671. Equipment installed at earlier dates shall comply with the issue of the IEE Wiring Regulations applicable at the time of installation. If any changes are made to the cabling of an installation, the whole installation shall be upgraded to meet the requirements of BS 7671.

4.2.3 The electrical safety checks must include a comprehensive visual inspection of earth bonding points throughout the installation, and an earth loop impedance test between every pole and the power supply source. Completed Inspection Certificates as defined in BS 7671 shall be submitted to the supervising engineer. (NOTE: it may not be possible to carry out the earth loop impedance test on extra low voltage installations).

4.2.4 The electrical safety checks must be carried out by an appropriately qualified and competent person as required by BS 7671.

4.2.5 All electrical work shall comply with BS 7671 (ref 1).

4.2.6 The Contractor is required to ensure compliance with the Electricity at Work Regulations (ref 2 or ref 7 whichever is applicable) by the use of appropriate contract conditions or training of staff directly under his control. The works specification shall require the Contractor to submit a statement detailing the procedures and safe working arrangements that will be employed to achieve this.

### 4.3 Presence of Gas

Should the engineer suspect the presence of gas, the Gas Company's emergency service shall be immediately informed and their advice sought.

## 5. REFERENCES

### 1. **British Standards**

British Standard BS EN ISO 9002:1994 Quality Systems - Model for Quality Assurance in Production and Installation. BSI.

British Standard 7671 (1992) Requirements for Electrical Installations. BSI.

QAS 3433/287 Installation and Maintenance of Traffic Signals. BSI

2. SI 1989 No 635 Health and Safety - The Electricity at Work Regulations 1989. HMSO.
3. Trunk Road Maintenance Manual: Volume 2 Routine and Winter Maintenance Code.
4. Traffic Signs Manual: Chapter 8, Traffic Safety Measures and Signs for Road Works and Temporary Situations. HMSO.
5. **Design Manual for Roads and Bridges (DMRB): HMSO.**  
Design Manual for Roads and Bridges, Volume 3, Section 1. HMSO.
6. **Manual of Contract Documents for Highways Works (MCHW): HMSO.**  
Manual of Contract Documents for Highways Works, Specification for Highway Works Series 1200. HMSO.
7. SRNI 1991 No 13 Health and Safety - The Electricity at Work Regulations (Northern Ireland) 1991. HMSO.
8. QSS 015 Installation and Maintenance of Traffic Signals. NICQA Ltd
9. New Roads and Street Works Act 1991.
10. Construction (Design and Management) Regulations 1994 (1994 No 3140).
11. The Street Works (Northern Ireland) Order 1995
12. Construction (Design and Management) Regulations (Northern Ireland) 1995

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## ANNEX A: INDUCTIVE LOOP INSPECTION

### A1 Installation Practice

A1.1 Poor installation practice will inevitably shorten the life of detector loop installations. All loops shall be installed in accordance with the Manual of Contract Documents for Highways Works, Specification for Highway Works Series 1200 (ref 6), except in Wales where they shall be installed in accordance with WOEM 1000 - Specification for the Installation of Inductive Loops for Vehicle Detection.

A1.2 The loop location, size, shape, number of turns and type of wire used, details of any joint used and length and type of wire of the feeder cable shall be recorded upon installation and a copy kept in the traffic signal controller cabinet.

### A2 Test Equipment

Test equipment shall be within calibration and suitable for the purpose. Advice on the suitability of available proprietary test equipment can be obtained from the Overseeing Organisation.

### A3 Inspection of Newly Installed Loops

A3.1 In addition to measuring and recording loop parameters as detailed in the Manual of Contract Documents for Highways Works, Specification for Highway Works Series 1200 (ref 6), it is recommended that the following tests be performed before completing the commissioning of the equipment. These tests ensure that the detection system is functioning correctly and provide a record of performance data to be used as a reference for routine inspection and maintenance work. A copy of the recorded data shall be kept in the traffic signal controller cabinet.

- (a) Ensure the detector sensitivity is set in accordance with the manufacturers' instruction for the application intended.
- (b) Check the operation of each detector loop and that it is activated by the passage of a vehicle over the loop and noting that the event is registered at the controller.
- (c) Check the operation of SA/SDE system and compare the result with that obtained simultaneously using independent speed measuring equipment. Ten test results shall be recorded and the mean percentage error recorded. This shall not exceed  $\pm 10\%$ .