

Technical Specification

**Transport and Main Roads Specifications
MRTS257 Feeder Cable and Loop Cable for Vehicle
Detector**

November 2020

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1 Introduction

This Technical Specification defines the design, supply and performance documentation requirements for vehicle detector loop and feeder cable for type approval purpose.

Unless otherwise specified herein, preformed loops shall comply with the requirements of this Technical Specification.

This Technical Specification defines the Department of Transport and Main Roads requirements for the loop cable suitable for inductive type vehicle detector loops. The loop cable is intended to be installed in slots cut in roadway surfaces, using a suitable sealant to seal the loop cable in the slots.

Also defined in this Technical Specification are the department's requirements for screened, twisted, balanced-twin feeder cable, and multi-pair versions of this cable, intended for the interconnection of vehicle detector equipment and the aforementioned inductive type vehicle detector loops.

This Technical Specification shall be read in conjunction with MRTS01 *Introduction to Technical Specifications*, MRTS50 *Specific Quality System Requirements*, MRTS204 *Vehicle Detectors* and other Technical Specifications as appropriate.

This Technical Specification forms part of the Transport and Main Roads Specifications Manual.

2 Definition of terms

The terms defined in MRTS201 *General Equipment Requirements* apply to this Technical Specification. Additional terminology relevant to this Technical Specification is defined in Table 2 below.

Table 2 – Definition of terms

Term	Definition
AS/NZS	Australian Standards and New Zealand Standards
CAT	Customer (field) Acceptance Test(s)
CT	Commissioning Tests
FAT	Factory Acceptance Test(s)
IAT	Installation Acceptance Test(s)
Low voltage	Exceeding extra low voltage but not exceeding 1000 V a.c. or 1500 V d.c.
MRTS	Transport and Main Roads Technical Specifications
NATA	National Association of Testing Authorities, Australia
SAT	STREAMS Acceptance Test(s)
STREAMS	Department of Transport and Main Roads Integrated Intelligent Transport System
WHS	Work Health and Safety

3 Referenced documents

The requirements of the referenced documents listed in Table 3 below apply to this Technical Specification.

Where there are inconsistencies between this Technical Specification and the referenced MRTS, the requirements specified in this Technical Specification shall take precedence.

Table 3 – Referenced documents

Document ID	Document name / description
AS/NZS 2276.2	<i>Cables for traffic signal installations Part 2: Feeder cable for vehicle detectors</i>
AS/NZS 2276.3	<i>Cables for traffic signal installations Part 3: Loop cables for vehicle detectors</i>
AS/NZS 3000	<i>Electrical Installations (Wiring Rules)</i>
MRTS01	<i>Introduction to Technical Specifications</i>
MRTS50	<i>Specific Quality System Requirements</i>
MRTS201	<i>General Equipment Requirements</i>
MRTS204	<i>Vehicle Detectors</i>
Standard Drawing 1424	<i>Traffic Signals - Detector loops installation details</i>
Standard Drawing 1425	<i>Traffic Signals - Detector loops placement details</i>
Standard Drawing 1701	<i>Traffic Signals - Detector loops counting/right turn loops and diode connection details</i>
Standard Drawing 1702	<i>ITS - Detector loops motorways management placement details</i>
TRUM Vol 4 Part 5	<i>Traffic and Road Use Management Manual - Configuration and Placement of Vehicle Detection Sensors</i>

4 Quality system requirements

Quality system requirements shall be in accordance with this Technical Specification and the requirements of the contract (including the requirements of MRTS01 *Introduction to Technical Specifications*).

The quality system requirements defined in MRTS201 *General Equipment Requirements* apply to this Technical Specification.

5 Functional requirements

The loop cable is buried in the surface of the asphalt and forms a vehicle detector loop.

The feeder cable connects the detector loop to the vehicle detector unit. The vehicle detector may be a standalone unit or located within a traffic signal controller.

6 Operational requirements

6.1 Environmental conditions

The loop and feeder cable shall be capable of continuous, normal operation in the conditions described below:

- a) installed directly in sunlight
- b) ambient air temperature range between -5°C and 50°C
- c) enclosure air temperature between -5°C and 75°C (when fitted into an enclosure)
- d) ambient ground temperature not exceeding 40°C
- e) a humidity of up to 95% non-condensing

- f) Queensland coastal environment with salt deposit densities in the range of 2.0 to 3.0 g/m²
- g) varied light intensity due to shadows
- h) conditions, both permanent and temporary, that may be unique to the specified location, for example instances of thick smoke and electromagnetic interference, and
- i) vibrations reasonably expected in the installed location.

The loop cable and feeder cable performance shall be unaffected by a humidity of 90% combined with an ambient air temperature of 40°C followed by a sudden drop in temperature of up to 10°C.

Loop and feeder cable operation shall cause no adverse effect on the surrounding environment in which it is installed.

7 Mechanical and physical requirements

Additional mechanical and physical requirements for equipment provided under this Technical Specification are given in the clauses below.

7.1 *Balanced-twin feeder cable*

The twisted balanced-twin feeder cable shall be manufactured to comply with AS/NZS 2276.2 *Cables for traffic signal installations – Part 2: Feeder cable for vehicle detectors* with the following options and requirements.

7.1.1 Options for balanced twin feeder cable

AS/NZS 2276.2 Clause 16: Polyamide Jacket – the jacket is not required.

7.1.2 Additional requirements for balanced twin feeder cable

AS/NZS 2276.2 Clause 11: Water Block Materials – the feeder cables shall be manufactured with fillers used as water block materials.

AS/NZS 2276.2 Clause 17: Marking – an indication of the length of the cable remaining on the drum shall be marked on the cable sheath at intervals of 1 m.

AS/NZS 2276.2 Clause 17: Batch number and Factory codes shall be marked on the cable sheath.

AS/NZS 2276.2 Clause 19: Tests: a type test certificate from a NATA registered authority, or other recognised authority, demonstrating compliance with AS/NZS 2276.2, shall be provided.

7.2 *Multi-pair feeder cable*

The aim of the multi-pair feeder cable is to reduce the space required for three and four separate twin-feeder cables by combining them into one single cable.

The multi-pair cable shall be manufactured to comply with AS/NZS 2276.2, but shall be in the form of *two, *three or *four twin-feeder cables laid up with a helical twist and with the following amendments.

*Twist rates between each pair must be varied to prevent crosstalk.

7.2.1 Exclusions for multi-pair feeder cable

- AS/NZS 2276.2 Clause 6: Construction
- AS/NZS 2276.2 Clause 15.3: Overall Diameter.

7.2.2 Options for multi-pair feeder cable

- AS/NZS 2276.2 Clause 11: Water Block Materials – the feeder cables shall be manufactured with fillers used as water block materials.
- AS/NZS 2276.2 Clause 12: Binding Tapes – binding tape is not required.
- AS/NZS 2276.2 Clause 13: Inner Sheath – the inner sheath is not required.
- AS/NZS 2276.2 Clause 16: Polyamide Jacket – the jacket is not required.
- AS/NZS 2276.2 Clause 17: Marking – an indication of the length of the cable remaining on the drum shall be marked on the cable sheath at intervals of 1 m.
- AS/NZS 2276.2 Clause 17: Batch number and Factory codes shall be marked on the cable sheath.
- AS/NZS 2276.2 Clause 19: Tests – a type test certificate from a NATA registered authority, or other recognised authority, demonstrating compliance with AS/NZS 2276.2, shall be provided.

7.2.3 Additional requirements for multi-pair feeder cable

- An outer sheath shall be applied to the three or the four twin-feeder cables.
- The cable shall have an overall diameter no more than 15 mm.
- The individual twin-feeder cables shall be clearly and durably numbered / labelled to allow identification.
- A schematic diagram similar to Figure 1 of AS/NZS 2276.2 shall be provided outlining the construction of the three-pair or the four-pair feeder cable.

7.3 Loop cable

The loop cable shall be manufactured to comply with AS/NZS 2276.3 *Cables for traffic signal installations – Part 3: Loop cables for vehicle detectors*, with the following options and requirements:

- AS/NZS 2276.3 Clause 7: Conductor shall be tinned annealed copper.
- AS/NZS 2276.3 Clause 8: Insulation - material shall be X-90UV.
- AS/NZS 2276.3 Clause 10: Tests – a type test certificate from a NATA registered authority, or other recognised authority, demonstrating compliance with AS/NZS 2276.3, shall be provided.

8 Applications

Vehicle detector loops and feeder cables configurations shown in the department's Standard Drawings 1424, 1425, 1701 and 1702.

9 Documentation

The documentation requirements defined in MRTS201 *General Equipment Requirements* apply to this Technical Specification.

10 Training

The training requirements defined in MRTS201 *General Equipment Requirements* apply to this Technical Specification.

11 Maintenance

The maintenance requirements defined in MRTS201 *General Equipment Requirements* apply to this Technical Specification. Availability of spare parts shall be maintained for at least seven years following the last purchase date of the equipment.

12 Testing and commissioning

Testing and commissioning requirements are defined within MRTS204 *Vehicle Detectors*.

13 Production sample

A 2 m production cable.

