ROADS AND MARITIME SERVICES

TRAFFIC SYSTEMS

SPECIFICATION NO. TSI-SP-046

CABLES FOR TRAFFIC SIGNAL INSTALLATIONS

Issue: 1.0
Dated: 01/07/2016

DISCLAIMER AND CONDITIONS FOR USE OF THIS SPECIFICATION

This specification has been prepared by Roads and Maritime Services (referred to herein as RMS) for use, insofar as it is applicable, in the State of New South Wales for equipment supplied under an RMS order or contract, or under an order or a contract from another party that is required in writing by RMS to use this specification.

The use of this RMS specification other than by those parties stated above and in the manner stated above is not recommended or authorised by RMS. Any such use is entirely the decision of the user alone. RMS disclaims all responsibilities and liabilities arising whether directly or indirectly from any such use. RMS does not warrant that this specification is error free, nor does RMS warrant the suitability, fitness or otherwise of this specification for any stated or implied purposes expressed or implied in this specification or other documents. By using this specification, the user agrees to indemnify RMS against the full amount of all expenses, losses, damages and costs (on a full indemnity basis and whether or not incurred by or awarded against RMS) which may be suffered by any person or RMS in connection with or arising out of the use of this specification in any manner.

RMS is not under any duty to inform you of any errors in or changes to this specification.

RECORD OF AMENDMENTS

Issue	Summary	Date	Approved by
0.1	Initial draft: • Specification number changed from C/12 to TSI-SP-046, templated to suit. • Outdated specification items amended • Multi-pair detector feeder cable added.	Oct 2015	
0.2	Amendments to items 4 to 7 covering quality assurance, inspection, warranty, and provision of information.	April 2016	
0.3	Incorporated comments from reviews.	June 2016	
0.4	Add new item 6.4	June 2016	
0.5	Amend item 6.4, Replace cable drawing, fix format issues.	June 2016	
0.6	Further amend drawing	June 2016	
0.7	Minor change as per review input to make text of headers 4, 5 and 6 consistent.	July 2016	
1.0	Format for publishing following approval	1 July 2016	TSI Mgr.

CONTENTS

1 SCOPE **5**

2 REFERENCES AND APPLICABLE DOCUMENTS **5**

2.1 AUSTRALIAN AND INTERNATIONAL STANDARDS 5
2.2 RMS DOCUMENT 5

3 DEFINITIONS AND GLOSSARY OF TERMS **5**

4 MULTICORE POWER CABLE **6**

5 SINGLE PAIR DETECTOR FEEDER CABLE **6**

6 MULTI-PAIR DETECTOR FEEDER CABLE **7**

7 LOOP CABLE **9**

8 SPECIAL MARKING **9**

9 QUALITY ASSURANCE **9**

9.1 GENERAL 9
9.2 THIRD PARTY ACCREDITATION 9
9.3 QUALITY PLAN 9
9.4 QUALITY AUDITS 9

10 PRE-DELIVERY INSPECTION **10**

11 WARRANTY **10**

12 APPROVAL **10**

1 SCOPE

This specification covers the requirements for traffic signal cables to be supplied to the Roads & Maritime Services, NSW or its contractors.

Note: This specification supersedes specification No. C/12, Issued September 1993.

2 REFERENCES AND APPLICABLE DOCUMENTS

2.1 Australian and International Standards

[1]	AS 1049	Telecommunication cables – Insulation, sheath and jacket;
[2]	AS/NZS 1125	Conductors in insulated electric cables and flexible cords;
[3]	AS/NZS 2276.1	Cables for traffic signal installations - Multicore power cables
[4]	AS/NZS 2276.2	Cables for traffic signal installations - Feeder cable for vehicle detectors
[5]	AS/NZS 2276.3	Cables for traffic signal installations - Loop cables for vehicle detectors
[6]	AS/NZS 3808	Insulating and sheathing materials for electric cables;
[7]	ISO 9001	Quality management systems- requirements.

2.2 RMS Document

[8]	TS201	Approval of ITS Field Equipment

3 DEFINITIONS AND GLOSSARY OF TERMS

RMS – Roads and Maritime Services, a New South Wales government agency.

4 MULTICORE POWER CABLE

Multicore power cables shall comply with AS/NZS 2276.1 [3], except where otherwise supplemented or defined in this specification.

4.1 The total number of cores shall be 29.

4.2 The earth (green/ yellow), neutral (black) and ELV return (grey) of 29-core cable shall be 4mm²; all other cores shall be 1.5mm².

4.3 There shall be no joints in conductors.

4.4 The inner cable end of each drum shall be accessible for visual inspection and electrical continuity testing.

4.5 The reel length shall be nominally 500m, unless defined otherwise in the purchase order.

4.6 The length marking on the cable sheath shall commence from zero at the inner end of each drum.

4.7 Unless otherwise defined in the purchase order, the drum size shall not exceed an overall diameter of 1.5m and a width of 1.0m, and the centre axle-hole size shall be within the range 65 - 100mm in diameter.

4.8 A polyamide jacket is not required.

5 SINGLE PAIR DETECTOR FEEDER CABLE

Single pair feeder cables shall comply with AS/NZS 2276.2 [4]. In addition:

5.1 The reel length shall be nominally 500m, unless otherwise defined in the purchase order.

5.2 A polyamide jacket is not required.

5.3 The length marking on the cable sheath shall commence from zero at the inner end of each drum.

6 MULTI-PAIR DETECTOR FEEDER CABLE

6.1 Multi-pair cables shall comply with Clause 4, 5, 7, 8, 10, 11, 13, 14, 15.1, 15.2, 15.4, 17, 18(a), 18(c) and 19 of AS/NZS 2276.2 [4] , except where otherwise defined in this specification.

6.2 Cables shall have 3, 4, 5 or 6 pairs. The number of pairs required shall be defined on the purchase order. (It is to be noted that the 3 or 4 pair variants are expected to be the most commonly used).

6.3 The overall cable shall be foil screened, with a drain wire in electrical contact with the screen. A typical construction of a 4-pair feeder cable is shown below in Figure 1;

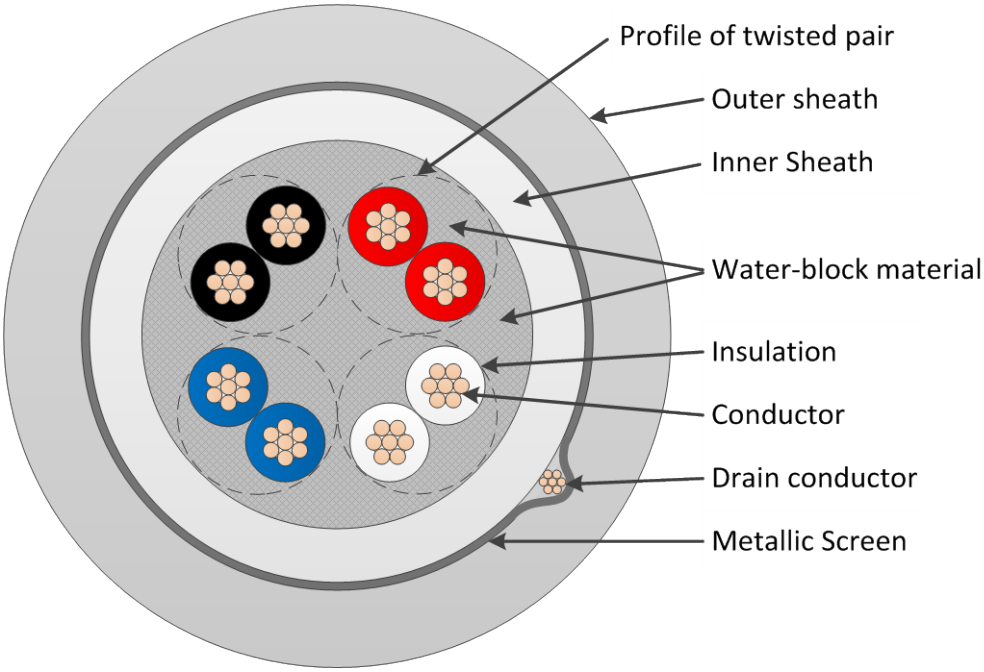

Figure 1 Schematic Diagram - construction of typical 4 Pair Feeder Cable

Note: Multi-pair feeder cables are inevitably less flexible and have greater minimum bend diameter than single pair feeder cables. Accordingly, care shall be taken to check where it is appropriate to use multi-pair feeder cables.

6.4 The interstices around the cores and under the inner sheath shall be water-blocked, to meet the water penetration test requirement in Table 1 of AS/NZS 2276.2 [4].

6.5 The overall cable diameter is not specifically constrained. However, the radial thicknesses of each layer as defined in AS/NZS 2276.2 [4] and its references shall be met.

6.6 Both conductors of a pair shall have the same insulation colour.

6.7 Pair insulation colours shall each differ so pairs can be readily distinguished. Stripes or similar may also be used, provided they are continuous along the insulation. The manufacturer may propose their own colours for the pairs, or use the colours below:

Pair #	1	2	3	4	5	6
Core colour	Black	Red	White	Blue	Orange	Grey

6.8 The reel length shall be nominally 500m, unless otherwise defined in the purchase order.

6.9 A polyamide jacket is not required.

6.10 In addition to the requirement defined in Clause 17 of AS/NZS 2276.2 [4], the length marking on the cable sheath shall nominally commence from zero at the inner end of each drum.

6.11 The inner cable end of each drum shall be accessible for visual inspection and electrical continuity testing.

6.12 Unless otherwise defined in the purchase order, the drum size shall not exceed an overall diameter of 1000mm and a width of 600mm, and the centre axle-hole size shall be within the range of 80 - 100mm in diameter.

7 LOOP CABLE

Loop Cables shall comply with AS/NZS 2276.3 [5], and be as further detailed below

7.1 The insulation material shall be XLPE (cross-linked polyethylene).

7.2 The conductor shall be tinned.

7.3 The reel length shall be nominally 1,000m, unless otherwise defined in the purchase order.

7.4 Unless otherwise defined in the purchase order, the reel size shall not exceed an overall diameter of 450mm and width of 300mm, and the reel centre axle-hole size shall be within the range of 40 -100mm in diameter.

8 SPECIAL MARKING

Each reel or drum of cable shall also be clearly marked with the date of manufacture and the purchaser's order number. This marking shall be applied to the flange(s) of the reel or drum in a readily visible position. All marking shall be resistant to damage by water and transportation.

9 QUALITY ASSURANCE

9.1 General

The supplier and the manufacturer shall operate a quality management system complying with ISO 9001 [7].

9.2 Third Party Accreditation

The supplier and the manufacturer shall have obtained third-party certification under ISO9001 [7] by an accredited independent organisation.

9.3 Quality plan

The manufacturer shall document a quality plan appropriate to the item detailing the quality control tests and assessments which the manufacturer will conduct during manufacture prior to release. This shall include sampling plans and test frequency, and a description of the records to be made, as relevant.

A copy of the quality plan shall be provided to RMS as part of the approval process.

9.4 Quality Audits

RMS reserves the right to examine the supplier's and manufacturer's quality records. RMS also reserves the right to arrange for an independent quality audit.

10 PRE-DELIVERY INSPECTION

All cable covered by this specification shall be subject to a pre-delivery inspection at the supplier's premises in the Sydney area prior to delivery. The inspection shall consist of a visual examination of the cable and a check of the manufacturer's quality and production documentation.

Tests and assessments related to the products shall be carried out by the manufacturer as defined in the manufacturer's quality plan.

11 WARRANTY

Purchase of any items under this specification shall be subject to a warranty period, to be confirmed by the tender, of not less than 12 months following the date of despatch from the supplier's premises.

12 APPROVAL

To gain approval the supplier shall follow the process defined in TS201. Refer [8].

The supplier shall submit the following documentation, as a minimum, in support of a submission for product approval via email to the ITS Help Desk: (ITSHelpDesk@rms.nsw.gov.au).

12.1 A clause-by-clause statement of compliance, and associated evidence, referenced to each compliance item, with this specification and applicable sections of referenced standards.

12.2 Results of tests required in relevant Australian standards.

12.3 Datasheet(s) of the cable(s), which shall include parameters of physical characteristics of the cable(s), i.e. minimum bend radius and pull tension.

12.4 A copy of the manufacturer's quality plan for the cable(s).

12.5 Evidence of third party certification of the supplier and manufacturer's quality system.

12.6 Any other documentation requested by RMS under the processes defined in TS201 [Ref. [8] .

12.7 If subsequently requested by RMS, the supplier shall provide samples of cable(s) for evaluation as part of the approval process.