

Main Roads Specification

MRS95

Switchboards and Cables

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Switchboards and Cables

1 INTRODUCTION

This Specification applies to the supply and installation of switchboards and cables for the supply of electrical power to electrical installations including traffic signal installations and Rates 2 and 3 road lighting installations.

This Specification shall be read in conjunction with MRS01 *Introduction to Specifications* and other Specifications as appropriate.

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

2 MEASUREMENT OF WORKS

2.1 Standard Work Items

In accordance with the provisions of Clause 2 of MRS01 *Introduction to Specifications*, the standard work items covered by this Specification are listed in Table 2.1.

Table 2.1 – Standard Work Items

Standard Item No.	Description	Unit of Measurement
Switchboards		
6801	Supply of URD pillar switchboard and ancillary components, [type].	each
6802	Supply of pole mounted switchboard and ancillary components, [type].	each
6803	Installation of URD pillar switchboard and ancillary components, [type].	each
6804	Installation of pole mounted switchboard and ancillary components, [type].	each
6637	Supply and installation of joint use traffic signal and road lighting pole, [length] metres long.	each
Electrical Cables		
6811	Supply of underground road lighting cable, [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].	m
6812	Supply of aerial road lighting cable, [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].	m
6813	Supply of traffic signal cable, [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].	m
6814	Supply of loop detector cable, [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].	m
6815	Supply of cable, [usage], [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].	m
6816	Supply of cable joint, [fused unfused].	each
6817	Supply of aerial cable strain clamp.	each
6818	Supply of aerial cable connector, [type].	each
6819	Supply of right angle strain relief bushing (to suit 26 mm diameter hole).	each
6821	Installation, jointing and termination of underground road lighting cable, [cores].	m
6822	Installation, jointing and termination of traffic signal cable, [cores].	m
6823	Installation, jointing and termination of loop detector cable, [cores].	m

Standard Item No.	Description	Unit of Measurement
6824	Installation, jointing and termination of cable, [<i>usage</i>], [<i>cores</i>].	m
6825	Installation, jointing and termination of aerial road lighting cable, [<i>cores</i>].	m
6826	Removal of underground cable.	m
6827	Removal of aerial cable.	m
Mains Connection		
6831	Supply of mains connection equipment including the supply of mains connection cable, [<i>length</i>], [<i>usage</i>], [<i>conductor size</i>], [<i>number of cores</i>] cores, [<i>core insulation</i>], [<i>sheath insulation</i>], [<i>conductor material</i>].	each
6832	Installation of mains connection including mains connection cable.	each

2.2 Work Operations

Item 6801 Supply of URD pillar switchboard and ancillary components, [*type*].

Work Operations incorporated in the above item include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Supply of URD pillar base, turret and insulation panel;
- c) Supply of electrical components including din rail, mains isolation switch, circuit breakers, change over switch and contactors;
- d) Supply of photoelectric control switch, Nema type base socket, junction box, fittings and cabling to switchboard;
- e) Supply of earth stake and cabling;
- f) Supply of 4.1 metre mounting pole, cap and holding-down bolt anchor cage; and
- g) Supply of Type 4 electrical pit, 100 mm PVC conduit to switchboard and 50 mm PVC conduit to pole.

Item 6802 Supply of pole mounted switchboard and ancillary components, [*type*].

Work Operations incorporated in the above item include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Supply of pole mounted switchboard enclosure;
- c) Supply of electrical components including din rail, mains isolation switch, circuit breakers, change over switch and contactors;
- d) Supply of photoelectric control switch and socket;
- e) Supply of earth stake and cabling; and
- f) Supply of Type 4 electrical pit and 50 mm PVC conduit to switchboard.

Item 6803 Installation of URD pillar switchboard and ancillary components, [*type*].

Work Operations incorporated in the above item include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Installation of pillar base;
- c) Installation of traffic signal post footing including anchor cage and traffic signal post;
- d) Installation of pit and conduit;
- e) Installation and mounting of switchboard electrical components;
- f) Installation of photoelectric control switch and cabling to switchboard;
- g) Installation and cabling of earth stake;

- h) Connection of mains connection cabling and road lighting cabling to switchboard;
- i) Testing of installation; and
- j) Installation of pillar turret on pillar base.

Item 6804 Installation of pole mounted switchboard and ancillary components, [type].

Work Operations incorporated in the above item include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Installation of switchboard on pole;
- c) Installation of pit and conduit;
- d) Installation and mounting of switchboard electrical components;
- e) Installation of photoelectric control switch and cabling to switchboard;
- f) Installation and cabling of earth stake;
- g) Connection of mains connection cabling and road lighting cabling to switchboard;
- h) Testing of installation; and
- i) Installation of switchboard cover.

Item 6637 Supply and installation of joint use traffic signal and road lighting pole, [length] metres long.

Work Operations incorporated in the above item include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Supply, fabrication and installation of pole,
- c) Mortar grouting of base plate;
- d) Supply and installation of traffic signal terminal panel and road lighting terminal panel;
- e) Supply and installation of road lighting cable from pit to luminaire and supply and installation of road lighting junction box in pit;
- f) Supply of all fixing bolts, nuts and washers; and
- g) Testing of road lighting installation.

Item 6811 Supply of underground road lighting cable, [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].

Item 6812 Supply of aerial road lighting cable, [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].

Item 6813 Supply of traffic signal cable, [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].

Item 6814 Supply of loop detector cable, [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].

Item 6815 Supply of cable, [usage], [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].

Item 6816 Supply of cable joint, [fused | unfused].

Item 6817 Supply of aerial cable strain clamp.

Item 6818 Supply of aerial cable connector, [type].

Item 6819 Supply of right angle strain relief bushing (to suit 26 mm diameter hole).

Work Operations incorporated in the above items include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*; and

b) Supply of all materials to the Site.

Item 6821 Installation, jointing and termination of underground road lighting cable, [cores].

Work Operations incorporated in the above item include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Installation of cables through ducting;
- c) Connection and termination of cables;
- d) Replacement of draw ropes in ducting; and
- e) Testing of installation.

Item 6822 Installation, jointing and termination of traffic signal cable, [cores].

Work Operations incorporated in the above item include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Installation of cables through ducting, posts, mast arms and poles;
- c) Connection and termination of cables, including the connection and termination of cables at the appropriate terminal assembly within the traffic signal post, mast arm or joint use pole;
- d) Replacement of draw ropes in ducting; and
- e) Testing of installation.

Item 6823 Installation, jointing and termination of loop detector cable, [cores].

Item 6824 Installation, jointing and termination of cable, [usage], [cores].

Work Operations incorporated in the above items include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Installation of cables;
- c) Connection and termination of cables; and
- d) Testing of installation.

Item 6825 Installation, jointing and termination of aerial road lighting cable, [cores].

Work Operations incorporated in the above item include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Installation of cable;
- c) Connection and termination of cables; and
- d) Testing of installation.

Item 6826 Removal of underground cable.

Item 6827 Removal of aerial cable.

Work Operations incorporated in the above items include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) De-energisation of circuit;
- c) Removal of cable; and
- d) Transport to Main Roads' storage site.

Item 6831 Supply of mains connection equipment including the supply of mains connection cable, [length], [usage], [conductor size], [number of cores] cores, [core insulation], [sheath insulation], [conductor material].

Work Operations incorporated in the above item include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Supply of mains connection equipment;
- c) Supply of mains connection cable from pole to switchboard (for Rate 3) or road lighting pole/cable joint (for Rate 2); and
- d) Supply of UV stabilised 50 mm PVC conduit and fittings.

Item 6832 Installation of mains connection including mains connection cable.

Work Operations incorporated in the above item include –

- a) Work Operations listed in Clause 2.1.5 of MRS01 *Introduction to Specifications*;
- b) Installation of mains connection equipment on pole;
- c) Installation of conduit on pole and to pit;
- d) Installation of conduit from pit to switchboard (for Rate 3) or road lighting pole/cable joint (for Rate 2);
- e) Installation of cable from pit to switchboard (for Rate 3) or road lighting pole/cable joint (for Rate 2); and
- f) Testing of installation.

2.3 Calculation of Quantities

Quantities for the supply and installation of underground cable for traffic signals (other than multicore) and road lighting cable shall be the sum of the measured duct length plus 4 metres for each pit through which the cable passes.

Quantities for the supply and installation of traffic signal multicore cable shall be the sum of the measured duct length plus 12 metres for each pit at controller, posts, joint-use poles and mast arm columns and 2 metres at each intermediate pit through which cable passes plus 5 metres from pit to terminal connection.

Quantities for the supply and installation of aerial cable shall be the sum of measured span lengths plus 2 metres for each span, for each type of cable specified.