Rubber Insulated Signal Cable Inspection and Quarantine

ESI-11-01

Applicability

ARTC Network Wide	SMS

Document Audience & Main Points

Audience	Main Points
Signal Maintenance Technicians, Signal Managers, Signal Construction Engineers and Signal Project Engineers	• All signal installation in South Australia to be inspected for rubber insulated signal cable and reported to the Signal Manager by 9 November. • All signals locations with rubber insulated signal cable are to be quarantined and only approved signal staff may do work in these locations.

Document Status

Version #	Date Reviewed	Prepared by	Reviewed by	Endorsed	Approved
1.0	02/09/2015	Standards	Stakeholders	Signal Manager East West	GM Technical Standards 04/09/2015

Background

Rubber insulated cables were installed up to the 1970s when PVC insulation became common place. There is a range of different types of rubber insulation. Over an extended period of time the rubber loses its flexibility and becomes brittle. The insulation then becomes susceptible to cracking and breaking away from the copper conductor. This leaves uninsulated bare copper wires which are a safety hazard.

Previously in New South Wales and Victoria there had been programs in the 1990s to remove the rubber insulated cables.

Safety Objective

ARTC is identifying all installations with rubber insulated signalling cables.

These locations will be quarantined for signalling work.

A Plan to replace the cables will be developed.

Inspection of Signals Location for Rubber Insulated Cables

The Team Manager Signals Maintenance for their respective areas shall arrange a plan to inspect **all** signalling installations for rubber insulated signals cables in accordance with this Signal Engineering Instruction.

The Plan shall complete the inspection and report by the 9th November 2015 for all signals installations within South Australia.

For New South Wales and Victoria the Signal Maintenance Engineer shall work with the Team Managers to set a planned completion date for the Inspections.

The inspections shall be undertaken by Signal Technicians or a higher level person. The results of the inspection shall be recorded on the attached record sheet.

All details shall be completed. The signed Inspection Record shall be scanned and forwarded to the Signal Manager East-West or the Signal Manager North-South.

Precautions for Inspections or other Signals Activities

The rubber insulated signals wires and cables are susceptible to the insulation breaking and falling off if handled or subject to vibration or movement.

The inspections shall not disturb or move the cables. It is sufficient to determine that the rubber insulated cables are in the signals location and not the quantity of cables or wires.

If the signal installation has been confirmed as having rubber insulated signals wires or cables, then precautions shall be taken to ensure that the cables are not disturbed physically or electrically.

Work shall only be undertaken as authorised by the Signal Manager.

Identification and Categories of Rubber Insulated Signals Cables

The rubber insulated signals wires and cables may be of different types. Below is a guide to the different types.

The conductors can be divided up into four categories,

- Cat 1 Single wire, solid conductor
- Cat 2 Single wire, multi-strand conductor
- Cat 3 Multi wire, solid conductor
- Cat 4 PVC Insulated wires and cables

Rubber Insulated Signals Cable types

The rubber insulated signals wires and cables may be of different types. Below is a guide to them:

Cat 1 Single wire, solid conductor

Type *Kerite or other*, - This type of conductor is cotton covered rubber-insulated conductor, and was extensively used for external circuits. When exposed to weather the insulation deteriorates and becomes brittle breaking away leaving conductors exposed, this wire **must** be recorded for future replacement.

For internal wiring another type was also used, the outer insulation was Black, dark Red or Yellow in colour. This type of wire was generally used in relay rooms, this wire is also hard and brittle and insulation can break away if the wire is bent. This wire **must** be recorded for future replacement.

Cat 2 Single wire, multi-strand conductor

Type *Cotton covered Rubber Insulated* - This wire is mainly used on Large shelf Relays between Relay plug tops to the termination (commonly called pig tails) This light Burgundy coloured, cotton covered rubber insulated wire is extremely brittle and insulation actually breaks if the wire is bent. This is extremely undesirable for Relay plug tops. This wire **must** be recorded for future replacement.

Type *VIR*, - this wire commonly called Vulcanised India Rubber (VIR) wire has a multi strand inner core and a solid rubber outer shield, this can deteriorate in weather. This wire **must** be recorded for future replacement.

Type *Cloth covered outer shield, with a white rubber insulated inner shield* - This type of wire was used extensively for internal relay room. This wire's outer shield does fray and anecdotal evidence suggests insulation is brittle and conductors can be exposed. This wire **must** be recorded for future replacement.

Type *Rubber Insulated Outer Insulation,* *Plastic Inner Insulation* (Rubber Insulated Plastic RIP). This wire is double insulated wire, it looks exactly the same as the VIR wire but is the same size in diameter but has a Red inner core plastic insulated, multi strand conductor with a rubber outer protective shield. This wire **must** be recorded for future testing to confirm that it is safe.

Cat 3 Multi wire, solid conductor

Type *Rubber/Neoprene-Insulated Cables* - this cable has an outer shield that looks like modern cable, however the internal conductors are shielded by rubber/neoprene insulation.

Commonly, the rubber / neoprene insulated conductors are Red or Black in colour and these individual conductors are not numbered. This type of cable starts to deteriorate if cable is under stress or if excessive current drawn in the circuit causes heat, then insulation will become brittle and break down. Generally damage is evident at or near the terminating stud. This wire **must** be recorded for future testing to confirm that it is safe.

Identification and Categories of PVC Insulated Signals Cables

PVC Insulated Signals Cable types

Cat 4 PVC insulated wires and cables

PVC insulated single core wires or multicore wires with double insulation are the current acceptable and approved insulated wires for ARTC use. They started in production and in general railway use in the 1970s within Australia.

Records of Cable Type

The signals persons shall complete the attached form for each signalling location inspected.

All records shall be signed by the inspecting person.

Locations with PVC cable are also to be recorded.

The record is to be complete and include every signalling location.

Record of Signals Cables Inspection

Inspection conducted by : . . . . . (Print Name)

Email: . . . . . Telephone: . . . . . .

Location Km	Location Name	Wiring Configuration	Wiring Type Cat# 1,2,3,4	Comment
		Internal		
		External to equip		
		External to Location		
		Internal		
		External to equip		
		External to Location		
		Internal		
		External to equip		
		External to Location		
		Internal		
		External to equip		
		External to Location		
		Internal		
		External to equip		
		External to Location		
		Internal		
		External to equip		
		External to Location		
		Internal		
		External to equip		
		External to Location		

Signals Person Name: . . . . . Position . . . . . .

Signature: . . . . . Date: . . . . . .