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NR/L3/ELP/29987

Module Y

Isolation and Earthing of Sheffield Tram Train D.C. Overhead Electrified Lines

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Reference documentation

GE/RT8000/HB16	AC electrified lines
GE/RT8000/HB17	DC electrified lines
NR/L2/CTM/018	Competence and Training in Traction Power Distribution
BS-EN 50122-1	Railway applications — Fixed installations — Electrical safety, earthing and the return circuit Part 1: Protective provisions against electric shock
Sheffield Tram Train	Managing Maintenance Boundaries – Method of Work – Maintenance Overlap (OLE)

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1 Purpose

This module sets out the actions to be taken to avoid danger from the presence of d.c. overhead electrified lines.

The requirements of 25kV a.c. Electrified Lines as defined in this standard apply to the Tram Trains d.c. overhead line, except where indicated in this module.

2 Scope

This module applies to those parts of Network Rail Infrastructure Limited (known as Network Rail) controlled infrastructure equipped with the 750V d.c. overhead line system.

This module applies to Network Rail personnel and Network Rail’s contractors and contains mandatory statements applicable to other persons.

To provide a consistent approach to working on or about 750V d.c. Electrified Lines, Train Operating Companies may, as best practice, apply this module on infrastructure they control.

The module does not include requirement for the following:

- Work on or about Network Rail controlled infrastructure equipped with the 1500V d.c. overhead line system

3 Definitions

For the purpose of this module, the following definitions apply:

Abutting sections	Those sections additionally switched off to minimise the risk of re-energisation of Emergency Switched Off sections. See 'Affected section(s)' and 'Emergency Switch Off'.
Affected Section(s)	The area isolated in an emergency, not including abutting sections. See 'Abutting sections'.
Authorised Person	Person who holds a certificate to show that they are competent to carry out specific duties in relation to the requirements of this standard. <i>NOTE: Only Authorised Persons specifically trained on Tram Train 750V d.c. overhead line equipment are permitted to carry out the specific duties outlined in this module.</i>

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Coast-through section insulator	<p>A non-bridging section insulator introduced into d.c. OLE and designed so two electrical sections which must not be connected directly are kept separated even during the passage of the pantographs of electric trains.</p> <p><i>NOTE: APC magnets are installed so the section insulator is non-bridging when one side has been isolated and a train inadvertently travels through to the isolated section.</i></p>
Designated earthing point	<p>A location at which the d.c. OLE may be earthed, for the purpose of issuing Overhead Line Permits, using specifically approved earths, securing devices and insulated earthing poles.</p> <p><i>NOTE: For tram train the designated earthing point is attached to an insulator with a bond connected from the designated earthing point to the rail.</i></p>
Earth	<p>The general mass of the earth and any conductor in direct electrical connection with it.</p> <p><i>NOTE 1: 'Earth', for the purpose of d.c. OLE only, is also used to denote the traction return circuit (not the OLE supporting structures which are not connected to the traction return rails but double insulated from it).</i></p> <p><i>NOTE 2: The term 'Earth' is also used to refer to the cable used to form a connection between isolated d.c. OLE and the traction return rail. See 'Traction return rail(s)' and 'portable earth'.</i></p>
Earthed	<p>The 750V d.c. Tram Train system is deliberately insulated from Earth and return to the substation is via the rails. For clarity and consistency with 25kV a.c. standard terms the term Earthed relates to systems utilising the return path.</p> <p><i>NOTE: Due to double insulation of the tram train 750V d.c. system, certain parts are neither considered Live or Earthed. These sections are defined as 'floating' but can be considered as Earthed under isolated conditions.</i></p>
Earthing pole	<p>A device consisting of a handle, primary insulator and other attachments, used for the application and removal of specifically approved long earths and continuity jumpers for d.c. OLE.</p>
Emergency Switch Off	<p>An disconnection of d.c. OLE initiated by the Electrical Control Operator in circumstances when it is essential to switch off the electricity supply immediately to remove danger to persons from live OLE.</p> <p>Such an isolation is effected by the Electrical Control Operator switching off the electricity supply from the lines in the immediate affected area including, as necessary, abutting sections. See 'Affected section(s)' and 'Abutting sections'.</p>
Feeder	<p>A transmission line or cable in the electrical power distribution system for:</p> <p>(a) bringing a supply of electricity to a Substation;</p> <p>(b) connecting a Substation or Track paralleling hut to the OLE.</p>

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Portable earth	A portable appliance specifically approved for 750V d.c. OLE for establishing electrical connection between isolated OLE and earth. (See Notes under 'Earth').
Long portable earth	A specifically approved portable earth for 750V d.c. OLE, for use at all locations, with a pole-applied electrical clamp at one end and a hand-applied clamp at the other. These earths are clamped to the return rail and secured to the OLE structure, clear of loading gauge, using approved devices.
Nominated Person	Person certified as competent to carry out Isolation and Earthing, to issue and cancel overhead line permits in accordance with the requirements of this standard. <i>NOTE: Only Nominated Persons specifically trained on Tram Train 750V d.c. overhead line equipment are permitted to carry Isolation and Earthing requirements outlined in this module.</i>
Section	A length of OLE between substations, or between a substation and a terminal end.
Substation	A building or compound containing electrical equipment that converts high voltage electricity supplies from the DNO to d.c. traction voltage for distribution to the OLE. <i>NOTE: References to Feeder Station are compatible with definition of Substation in this module.</i>
Track Section Location	A building or compound containing d.c. electrical equipment which is arranged to connect together electrically a number of sections of OLE.
Traction return circuit	The traction return rail(s) and associated cables through which electricity flows from the electric train back to the substation.
Voltage limiting device	A protective device against permanent existence of an inadmissible high touch accessible voltage. BS-EN 50122-1
Voltage testing device	A specifically approved device for use on those parts of the OLE normally live at 750V d.c., operated from ground level, used to verify that the OLE under test has been switched off.

For the purpose of this module, the following abbreviations apply:

a.c.	alternating current
COSS	Controller of Site Safety

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d.c.	direct current
DNO	Distribution Network Operator
ECO	Electrical Control Operator
EC	Electrical Control
OCC	Operational Control Centre
OLE	Overhead Line Equipment
PICEE	Person In Charge of Electrical Emergency
SYSL	South Yorkshire Supertram Limited.
TSL	Track Sectioning Location

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4 Description of the Electrification System

4.1 Electrified Lines

The new Tinsley Chord links lines between South Yorkshire Tram network from Sheffield City Centre and the mainline railway through Rotherham to Parkgate, encompassing both tramway and railway infrastructure

The route is energised at 750v d.c. and forms the boundary of electrical control between the Network Rail York Electrical Control (EC) and Supertram Nunnery Operational Control Centre (OCC).

4.2 Supply of Electricity

Electricity is supplied to traction Substations at 11,000 V (11kV), 50Hz frequency, alternating current (a.c.), from the DNO. Duplicate supplies are afforded to each substation, with automatic change-over arrangements to enable either incoming supply to support the total substation capacity.

4.3 The Electric Traction Circuit

The high voltage a.c. supplies from the Distribution Network Operator (DNO) are transformed and rectified to the traction voltage of 750V d.c. at the traction substations.

From the rectifiers, the positive (+) pole of the traction supply feeds the OLE sections through feeder circuit breakers and ground-mounted isolating disconnectors.

Traction current is collected from the OLE by the train pantograph, from where it is fed to the train's traction and auxiliary equipment. Having passed through the axles and wheels of the train, the current is returned via the bonded running rails to the negative bus bars in the substations, and finally back to the negative (-) pole of the rectifiers to complete the circuit.

The negative pole of the supply is not deliberately earthed at any point, to discourage the flow of stray return currents in the earth. Wherever possible, all traction return rails are bonded together. The network utilises axle counter, wheel detection systems and relies upon a negative return via red bonds as follows:

- 2 x 800mm² cables from negative busbar to spider plate;
- 3 x 240mm² cables from spider plate to traction rail.

The traction return current passing through the running rails and the bonding system is not dangerous to human life.

However, if the rails are broken or separated, or the bonds become detached a dangerous voltage may be present and they shall not be touched.

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4.4 Traction Substations and Track Sectioning Locations

Switching Stations are situated at intervals alongside the electrified lines. They include Traction Substations, where the electricity from the electricity supply industry is provided to the railway system and Track Sectioning Locations (TSLs), which perform the function of switching, sectioning, paralleling and electrical protection.

Traction Substation and TSLs are unattended and are kept closed, locked and alarmed for security.

Access to the traction substations is restricted to staff who have been trained for this purpose, who shall report their presence to the Electrical Control Operator (ECO).

The equipment contained in Traction Substation and TSLs are monitored and controlled by the ECO, who is directly responsible for maintaining the continuity of the traction power supply and for the control of all switching operations in the substations and TSLs, that are carried out via the Supervisory Control and Data Acquisition (SCADA) system. The ECO is also responsible for giving permission for the operation of the OLE feeder, section and bypass disconnectors.

The traction power system normally operates with all substations contributing. However, in the event of a single feeder outage, the remaining feeders are designed to be able to support the full service during the outage period, whilst maintaining voltage within standard limits.

The Tinsley Chord is fed from three traction substations, named as follows:

- Blackburn Meadows
- Carbrook
- Ickles

A TSL, containing a remotely operated circuit breaker interfacing with manual disconnectors is named as follows:

- Tinsley TSL

4.5 Overhead Line Equipment

The OLE comprises a mixture of designs to suit different types of location and service speeds. Network Rail infrastructure, consists of a derivative of Series 2 equipment utilising a contact wire supported from Bonomi cantilevers and Supertram infrastructure consists of fixed termination tramway equipment.

The OLE control boundary includes a single point OLE overlap at the transition between Network Rail Series 2 derivative OLE equipment and Supertram simple tramway equipment, with an auto tensioning catenary system overlapping with a fixed tension trolley wire system.

OLE support structures are not in general bonded to the track, but are incidentally-earthed through their foundations and double-insulated from the OLE conductors.

Sections of OLE, other than terminal ends, are normally double-end fed from the substations at each end, and all are protected by over-current, switchgear earth fault, and inter-tripping schemes.

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The Up Tinsley and Down Tinsley lines are electrically connected (at Tinsley East Junction and Parkgate Junction) and are divided into sections, which extend from one substation to another or, from one substation to a TSL. There are separate sections for each track. Each section of OLE is fed through a circuit breaker at a substation or TSL.

At substations and TSLs the OLE is fed via manually operated off-load feeder disconnectors; with bypass disconnectors, which are normally open, are provided to enable adjacent sections to be connected together when the substation is out of service. The bypass disconnector at Ickles is motorised and can be remotely operated by the ECO. These are isolating disconnectors operated from ground level. Each disconnector has a unique identifying number and is provided with a unique locking device, the key of which is kept in the box provided for that purpose.

The OLE is further divided into sub-sections, where demanded by operational reliability considerations. The sub-sectioning points are bridged by manually operated off-load section disconnectors.

Details of the sectioning arrangements are given in the appropriate Isolation Diagrams and Isolation Instructions.

4.6 Electrical Control Room

Responsibility for OLE control is split between Network Rail and Supertram at a defined location on the Tinsley Chord, with each control room applying their own standards and procedures up to this point.

Network Rail electric control is delivered by York EC and Supertram electric control is delivered by Nunnery Operational Control Centre.

The traction power system is continuously monitored over the SCADA system by the ECO at York EC. All substations, track paralleling huts and OLE sections are normally energised, unless required to be made safe for work on or near the equipment.

The SCADA system allows the status of the substation equipment to be continuously monitored and controlled.

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The ECO can be contacted by the following means:

CONTACT NUMBERS FOR ELECTRICAL CONTROL OPERATOR

Electrical Control Room	NRN Band III Radio Note ¹	ETD (Railway Telephone Dialling)		PSTN Telephone Numbers (Public Subscriber Telephone Network)
		Short Code Note ²	ETD Railway Extension Trunk Dialling)	
York – Network Rail	2-174	174	037-5836 037-5837 037-4902 037-4906	01904 525952
	2-173	173	037-4691 037-4692 037-4693 037-4872	01904 525952
Nunnery – Supertram				0114 279 8126 0114 279 2550

Notes

- 1 If busy 'P' button to obtain priority call
- 2 The ECO is able to identify calls coming in on short code emergency numbers; consequently, these must only be used for emergencies.

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5 Isolation

5.1 Existing Module Status

The following clause provides details of the status of each module with respect to its application to Tram Train. All references in each module to 25kV a.c. electrified railways shall equally apply to 750V d.c. Tram Train electrified railway unless otherwise specified.

5.1.1 Module 1 – General Requirements

The requirements of Module 1 remain unchanged with respect to the introduction of this module.

5.1.2 Module 2 – Assessment of Electrical Risks

The requirements of Module 2 remain unchanged with respect to the introduction of this module.

NOTE: The electrical clearances for 25kV a.c. electrified systems defined in Module 2 apply to the 750V d.c. tram train electrified system.

5.1.3 Module 3 – Management of Electrical Risks

The requirements of Module 3 remain unchanged with respect to the introduction of this module.

5.1.4 Module 4 – Maintaining the Integrity and Safe Operation of 25 kV a.c. Electrified Lines

5.1.4.1 General

The requirements of Module 4 shall apply including the identified measures outlined in this clause.

5.1.4.2 Traction Bonding

Clause 4 of this module contains a description of the traction bonding system for Tram Train 750V d.c. overhead electrified lines. The Tram Train system adopts axle counter systems and does not use impedance bonds.

Work on the running rails involving the disconnection of any bonds affecting the continuity of the traction return circuit shall be undertaken only in accordance with the method statements accepted by the Delivery Unit Electrification & Plant Engineer.

No OLE or extraneous infrastructure shall be bonded directly to traction return rail.

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5.1.4.3 Red Bonds

For the purposes of this module the requirements of Module 4, Clause 4.2 shall apply with the following additional requirements:

- In the case of tram train 750V d.c. OLE certain bonds connected to the running rails from Substations and TSLs shall be marked in red.
- Return conductors, auxiliary supplies transformers and harmonic dampers are not fitted to the Tram Trains d.c. OLE.

5.1.4.4 Red Bonds found Broken or Disconnected

For the purposes of this module the requirements of Module 4, Clause 5.2 shall apply with the following additional requirements:

- The reporting and repair of defective bonds found, during electrification maintenance activities, shall be in accordance with the method statements accepted by the Delivery Unit Electrification & Plant Engineer.
- If both red bond negative return cables from the traction return spider plate to a return current busbar in the traction substation are disconnected, severed, or otherwise seriously damaged, then the ECO shall arrange for the de-energisation of the substation and of the OLE in accordance with EC instructions; and for the repairs to be undertaken by authorised staff.
- If all three, red bond negative return cables from the traction return spider plate to the running rail are disconnected, severed, or otherwise seriously damaged, then the ECO shall arrange for the de-energisation of the substation and of the OLE in accordance with EC instructions; and for the repairs to be undertaken by authorised staff.

5.1.4.5 Laying Out Rails Alongside the Track

The requirements for earthing rails laid out, or left, alongside the running rails on 25kV a.c. electrified lines as defined in Module 4, clause 7.5 shall **not** be applied to the Tram Trains d.c. overhead line equipment.

5.1.5 Module 5 – Particular Actions to Be Taken by the Infrastructure Maintainer

5.1.5.1 General

The requirements of Module 5 shall apply including the identified measures outlined in this clause.

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5.1.5.2 Actions to be Taken in Relation to Emergency Switch Off(s)

For the purposes of this module the requirements of Module 5, Clause 5, shall apply, to the Tram Trains d.c. overhead line equipment, in conjunction with the requirements in this clause.

The ECO shall switch on the abutting sections, when it is necessary to restore electricity to assist movement of traffic outside the limits of the emergency switched off section, subject to an assurance having been received that:

- a) no trains are standing across the OLE section insulators;
- b) the Signaller has protected the emergency Switched Off section by blocking to electric trains; and
- c) any normally-open OLE disconnectors have been physically checked to ensure that they are in the open position.

Where it is necessary to disconnect electrical supplies from the Supertram network to facilitate an Emergency Switch Off the ECO shall liaise with Nunnery Operational Control Centre to complete these actions.

Where the Supertram network requires an Emergency Switch Off on their infrastructure, Nunnery Operational Control Centre shall liaise with the Network Rail EC to implement the requirements outlined above in order to isolate the abutting section between Network Rail and Supertram infrastructure.

Both Network Rail and Supertram control signals and where required shall liaise to manage movements of trains prior to and post Emergency Switch Off.

Where both Supertram and Network Rail require supplies to be disconnected, an Emergency Switch Off shall only be declared when both parties have disconnected supplies and confirmation has been received.

5.1.5.3 Restoration after Emergency Switch Off

Immediately after the emergency has passed, the person in charge of the emergency switch-off shall:

- Inform the ECO or arrange for this to be done;
- Await further instructions from the ECO.

When the ECO receives the information that the Emergency Switch Off is no longer required, provided that the affected area has not been isolated and earthed for the purpose of issuing an Overhead Line Permit, as described in clause 5.1.7, of this module, the ECO shall request the person on site who has been granted the Emergency Switch Off to confirm that all persons and materials are clear of the OLE.

The ECO shall then:

- Return the system to the normal and advise all persons concerned accordingly;
- Advise the person in charge of the Emergency Switch Off that they have been relieved of this duty.

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5.1.6 Module 6 – Planning of Isolations

5.1.6.1 General

The requirements of Module 6 shall apply to this module. Some specific Tram Train interpretations of Module 6 are outlined in this clause.

5.1.6.2 Isolations Spanning the Section Insulator at the Network Rail / Supertram Boundary

The section insulator at Tinsley Chord forms the boundary of electrical control between the Network Rail York EC and Supertram Nunnery Operational Control Centre (OCC). York EC is designated as responsible for managing isolations spanning the boundary section insulator.

The procedure for isolations spanning a section insulator forming the boundary between electrical controls is stated in clause 5.1.7.3. of this module.

At the planning stage Route Isolation Planner shall agree with York EC and Nunnery OCC that complete section(s) either side of the section insulator or abutting subsection(s) within the adjacent complete section(s) or a combination of the above are to be isolated.

Where Nunnery OCC requires an isolation on the Supertram infrastructure that requires Network Rail to implement an isolation on Network Rail infrastructure, they shall agree the requirements during the planning stage in accordance with Network Rail procedures.

5.1.7 Module 7– Isolation and Earthing of Overhead Line Equipment

5.1.7.1 General

The requirements of Module 7 shall apply to this module unless superseded by the requirements defined in Module X. Some specific Tram Train interpretations of Module 7 are outlined in this clause.

5.1.7.2 Earthing the Overhead Line Equipment

Earthing shall be completed in accordance with Module 7, Clause 11. Section insulators shall be treated in accordance with the requirements for neutral sections and hence Module 7, Clause 11.3.4, shall be applied here.

5.1.7.3 Work Spanning the Section Insulator at the Network Rail / Supertram Boundary

The section insulator at Tinsley Chord forms the boundary of electrical control between the Network Rail York Electrical Control (EC) and Supertram Nunnery Operational Control Centre (OCC). York EC is designated as responsible for managing isolations spanning the boundary section insulator and shall request Nunnery OCC to switch off, test and apply local earths in accordance with Form TC, Part 1 (as shown in Appendix A).

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The authority between both Network Rail ECO and the Supertram Power Controller is in the form of a numbered message which both record on their copy of an identical Form TC.

Nunnery OCC shall issue a declaration confirming to York EC, that the electrical sections identified in the Form TC, Part 2 have been switched off and local earths applied.

The Network Rail ECO shall arrange for the isolation of the sections of OLE for which Network Rail is responsible, in accordance with the electrical control instructions and Module 7, Clause 8 and Module X.

The section insulator shall be treated as a discontinuity and earthing shall be applied at a Designated Earthing Point on each side.

When the Network Rail ECO is satisfied that the OLE on both sides of the section insulator has been isolated, they shall issue a Form GBSIP B authority for the OLE spanning the section insulator to the Nominated Person. The limits of isolation for the Form GBSIP B shall be those shown on the isolation instructions for the combined isolation. The Network Rail ECO shall record the Form AE Part 1 and Form GBSIP B message numbers and date on Part 3 of the Form TC.

The Nominated Person shall then carry out the requirements for securing, testing and earthing in accordance with Module 7 and Module X on the OLE sections abutting the section insulator.

The Nominated Person shall then issue a Form C spanning the section insulator, within the limits of the combined isolations detailed on the Form GBSIP B. Where a Form C is to be issued on Supertram infrastructure the Nominated Person shall issue the Form C to the Supertram competent person.

On completion of the work, Overhead Line Permits shall be cancelled in accordance with Module 7, Clause 22. The Nominated Person shall then arrange for portable earths to be removed only from the Network Rail OLE sections abutting the section insulator in accordance with Module 7, Clause 23.

The Network Rail ECO shall record the Form GBSIP B cancellation time in Part 4 of the Form TC. The Network Rail ECO shall inform the Supertram Power Controller that the declaration is now cancelled and both parties shall sign to acknowledge the cancellation in Part 4 of the Form TC. The Supertram Power Controller shall return the Supertram disconnectors to the normal position and record in Part 5 of the Form TC. The Supertram Power Controller shall inform Network Rail EC that the declaration is now cancelled and both parties shall sign to acknowledge the cancellation in Part 5 of the Form TC.

5.1.7.4 Earthing the Connections between a Return Current Busbar and Rail

The requirements for earthing the connections between a Return Current Busbar and Rail on 25kV a.c. electrified lines, as defined in Module 7, Clause 16 shall **not** be applied to the Tram Trains d.c. overhead line equipment.

The following procedure shall apply:

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- Confirm one or more of the negative return cables from the traction return circuit to a traction substation is intact and correctly connected, and the cross-bonding is also intact and correctly connected, before work is carried out on the traction return circuit without an Overhead Line Permit or Permit-to-Work on High Voltage Electrical Equipment.
- If **all** negative return cables from the traction return circuit to a traction substation are disconnected, severed, or otherwise seriously damaged, then work shall be carried out on the traction return circuit only under an Overhead Line Permit and Permit-to-Work on High Voltage Electrical Equipment.

The negative return arrangements at the substations are identified in clause 4.3.

5.1.8 Module X – Implementation of Earthed Isolations on Overhead Line Equipment

Module X provides additional requirements and guidance for Module 7, Clause 8 with respect to securing measures when implementing an Earthed Isolation

The key deviations in Module X from Module 7 are as follows:

- Introduction of Form GBSIP B (replacing Form B);
- Introduction of Form GBSIP STED (replacing Form STED);
- Additional securing measures (e.g. padlocks).

5.1.9 Module 8 – Local Isolation and Earthing of Overhead Line Equipment

The requirements of Module 8 remain unchanged with respect to the introduction of this module.

NOTE: There is no requirement to apply local isolation procedures within the tram train electrified railway.

5.1.10 Module 9 – Isolation and Earthing when Constructing or Dismantling Overhead Line Equipment

The requirements of Module 9 remain unchanged with respect to the introduction of this module.

5.1.11 Module 10 – Use of Voltage Testing Devices, Portable Earthing Equipment and Temporary Continuity Jumpers

The requirements of Module 10 remain unchanged with respect to the introduction of this module.

Only testing devices approved for use on Tram Train 750 d.c. electrified equipment shall be used.

Only continuity jumpers of a type specifically approved for use on Tram Trains 750V d.c. OLE shall be used.

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Only portable earths of a type specifically approved for use on Tram Train 750V d.c. OLE shall be used.

5.1.12 Module 11 – Working On Overhead Line Equipment

The requirements of Module 11 shall apply with the exception that Clause 9. This Clause shall **not** be applied to the Tram Trains 750V d.c. overhead line equipment (see also clause 5.1.7.4).

Only testing devices approved for use on Tram Train 750 d.c. electrified equipment shall be used.

5.1.13 Module 12 – Management of Local Isolation Instructions for Overhead Line Equipment

The requirements of Module 12 remain unchanged with respect to the introduction of this module.

NOTE: There is no requirement to apply local isolation procedures within the tram train electrified railway.

5.1.14 Module Z – Isolation and Earthing of Sunderland 1500V d.c. Overhead Electrified Lines

There are no requirements to follow this Module

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Appendix A – Form TC

General

When it is necessary to revise a form, the form and this index will be updated in accordance with the appropriate change process described in NR/L2/CSG/STP001/02.

Any future re-issue of forms is controlled by the Electrical Power Standards and Controls Steering Group. Any proposed revisions to forms should be forwarded to the Steering Group, who will review the form and pass it to the Standards and Controls Management team for publication at the next available opportunity.

NOTE From time to time it may be necessary to publish a revised version of a form. As a result there may be instances when the version number on Connect is more recent than that identified in the index. The most recent version of the form should be the one used.

For organisations that are not eligible to free of charge standards, there are a number of ways for suppliers, principal contractors and subcontractors to access Network Rail standards and controls: -

- Online: IHS Network Rail Standards Online at: <http://uk.ihs.com/products/rail/index.htm> Call IHS Customer Services on 01344 328300 for login details.
- Online: SAI Global Network Rail Standards Online [Standards Management – i2i | SAI Global Infostore](#) or call SAI Global for more details on 0203 327 3140
- Hard copy: To buy individual standards and controls, call IHS Markit Customer Services on 01344 328300 or emeastore@ihs.com

A.1 Form TC

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NR/L3/ELP/29987/TC	2	03/12/2022	Declaration of Switched-Off OLE at Section Insulator Forming Boundary Between Network Rail & SuperTram