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NR/L3/ELP/29987

Module 3

Management of Electrical Risks

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1 Purpose

This module provides a consistent approach to the management of risks when working on or about 25 kV a.c. electrified lines.

NOTE: Further requirements for working on or about the electrified lines are contained in the Rule Book Module AC (GE/RT8000/AC and Handbook HB16 (GE/RT8000/HB16)).

2 Scope

This module states the requirements for the management of the electrical risks involved when work is to be carried out on or about 25 kV a.c. electrified lines in order to prevent danger arising from live overhead line equipment, and live pantographs and other roof-mounted electrical equipment on trains.

It is applicable to Network Rail personnel and to Network Rail's contractors.

To provide a consistent approach to working on or about 25 kV a.c. electrified lines, Train Operating Companies may, as best practice, apply this standard to infrastructure they control.

This Standard also includes:

- Work on or about any future sections of electrification on Network Rail controlled infrastructure and areas required to adopt a process for securing points of disconnection to form points of isolation to use the Supplementary Isolation Process (Module X).
- Planning of isolations, testing and earthing of overhead line equipment on Network Rail controlled infrastructure equipped with 750V d.c. overhead line system (Sheffield Tram Train - Module Y).
- Planning of isolations, testing and earthing of overhead line equipment on Network Rail controlled infrastructure equipped with 1500V d.c. overhead line system (Sunderland Metro Systems Operating Area – Module Z).

3 Assessment and Management of Risk before Attempting Work

3.1 General

Before any work is attempted on or about the electrified lines, the proposed work shall have been risk assessed in accordance with Module 2. The risks shall be managed in accordance with this module, clause 3.

3.2 Work More Than 2.75 metres (9 feet) from Live Equipment (See Appendix A of Module 2)

The competent person preparing the documented safe system of work required by Module 2 shall establish how it is intended to carry out the work without coming within 2.75 metres (9 feet) of any live part of the OLE, or within the vertically unbounded space above 2.75 metres to either side of the live OLE or within 2.75 metres of live pantographs and other roof-mounted electrical equipment on trains.

The competent person shall review:

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- a) the nature and situation of the proposed work; **and**
- b) the tools, materials, plant, appliances and liquids to be used; **and**
- c) the competence and responsibilities of the persons involved in the proposed work; **and**
- d) any other relevant circumstances.

The competent person shall also establish the control measures to be taken.

The competent person shall authorise the safe system of work based on the relevant risk assessment of any part of a person's body or clothing or anything being used coming within 2.75 metres (9 feet) of live equipment.

If the competent person undertaking the risk assessment establishes that there is a intolerable risk of any part of a person's body or clothing or anything being used coming within 2.75 metres (9 feet) of live equipment, the requirements of clause 3.3 shall be carried out.

For any work taking place in an area of reduced wire height (refer to Module 2, clause 3.1), the competent person must seek approval of the safe system of work from the Delivery Unit Electrification and Plant Maintenance Engineer or Designated Project Engineer as per Module 3, clause 3.3.

3.3 Work Less Than 2.75 metres (9 feet) but More Than 600 millimetres (2 feet) from Live Equipment (See Appendix A of Module 2)

The competent person preparing the documented safe system of work required by Module 2 shall describe in the safe system of work how it is intended to carry out the work without coming within 600 millimetres (2 feet) of any live part of the OLE, or live pantographs and other roof-mounted electrical equipment on trains.

No work or any part of the body shall come within 600 millimetres (2 feet) of live equipment.

The competent person shall include in the safe system of work:

- a) a description of the access to, nature and situation of the proposed work; **and**
- b) the tools, materials, plant, appliances and liquids to be used; **and**
- c) the details of any isolation considered necessary; **and**
- d) the competence and responsibilities of the persons involved in the proposed work; **and**
- e) the control measures proposed to be taken.

Screens shall be of adequate size, shape and strength and be positioned to afford protection for persons against the risk of electric shock from the work activity. Where a screen is placed between an accessible standing place and live equipment, the screen shall extend so that the taut string distance from the standing point round the periphery of the screen to live equipment is not less than 2.75 metres (9 feet). Where practicable, screens shall not be perforated. Where this is not practicable, the screen shall not have holes with any dimension greater than 35 mm or 1200 sq mm.

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The establishment and indication of a suitable demarcation line and placing of a rope or temporary fence and/or suitable warning notices to define the limit beyond which no part of the body or anything to be used shall project towards the live equipment.

The provision of suitable temporary screening between the work area and the live equipment.

The prohibition of extending any part of the body or anything being used beyond a specified boundary.

The risk assessment and safe system of work shall be reviewed (see Appendix A) and authorised in accordance with table 1:

Work type	Authorised by
Maintenance	Delivery Unit Electrification and Plant Maintenance Engineer
Projects	Designated Project Engineer

Table 1 – Authorisers of risk assessments and safe systems of work

Where the DPE is not competent in assessment of electrical risks, they shall seek the advice of an identified competent engineer. Competent engineers are those identified as competent in writing by the Route Asset Manager (E&P).

The safe system of work shall be authorised based on the relevant risk assessment of any part of a person’s body, clothing or thing being used not coming within 600 millimetres (2 feet) of live equipment.

If the review shows that there is a intolerable risk of any part of a person’s body, clothing or anything being used coming within 600 millimetres (2 feet), then the proposed work shall not be carried out unless the appropriate OLE is isolated where necessary and earthed and an overhead line permit issued or, where local isolation is permitted, other assurance received in accordance with Modules 7 and 8. The safe system of work shall be amended as appropriate and returned to the competent person.

3.4 Work Less Than 600 millimetres (2 feet) from Live Equipment (See Appendix A of Module 2)

The requirements for work less than 600 millimetres (2 feet) from live equipment are stated in Module 2.

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4 Assessing Safe Systems of Work

Examples of factors requiring consideration when assessing safe systems of work are given in Appendix A.

This list is not exhaustive.

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Appendix A Assessing Safe Systems of Work

A1 Work on door gear and structures in depots, etc.

Work shall not be carried out on fittings, door gear or the structure of buildings near to the live parts of the OLE in depots, inspection sheds, etc. unless the OLE has first been isolated and earthed and an overhead line permit issued or, where local isolation is allowed, such other assurance has been received in accordance with Modules 7 and 8.

A2 Work in sidings

The competent person in charge of a yard or siding(s) shall draw the attention of all persons not familiar with electrified lines to the presence of the OLE and to the conditions under which work is to be carried out, and shall arrange, if necessary, for the OLE to be isolated and earthed in accordance with Modules 7 or 8. Instructions defining the limits of loading and unloading exhibited on notices shall be complied with.

A3 Use of liquids

Measures shall be taken as necessary to control the manner in which paint, water, spray or other liquids are to be carried and used to prevent danger of electric shock arising from live equipment.

A4 Use of rope, wire, tapes, etc.

Measures shall be taken as necessary to control the manner in which rope, wire, measuring tapes and similar items are to be carried and used to prevent danger arising from live equipment.

A5 Use of long articles

Measures shall be taken as necessary to control the manner in which pipes, rods, poles, brooms, mops or similar long articles are to be carried and used to prevent danger arising from live equipment. Where necessary, such long articles shall be carried horizontally, two or more persons being used as appropriate.

A6 Use of shunting poles and brake sticks

Measures shall be taken as necessary to control the manner in which shunting poles and brake sticks are to be carried and used to prevent danger arising from live equipment.

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A7 Trimming or felling of trees and undergrowth

The trimming or felling of trees or undergrowth shall be carried out in such a manner that it is not possible for debris to fall or be projected within 2.75 metres (9 feet) of live OLE or live pantographs and other roof-mounted electrical equipment on trains.

A8 External carriage cleaning

Manual cleaning of the exterior of carriages, etc. shall be carried out at only those locations authorised for this purpose. Where such authority is granted, manual cleaning may be carried out with the OLE live provided the following control measures are complied with:

- a) before cleaning is started, all pantographs on the vehicle concerned shall be lowered and kept in the lowered position whilst cleaning is in progress;
- b) cleaning shall not take place above cant rail level or, where provided, the OLE warning line;
- c) hosepipes shall not be used;
- d) the brushes or other appliances used shall not be of greater length than is necessary to clean up to cant rail level or, where provided, the OLE warning line from the level at which the work is to be carried out. Each brush or other appliance shall bear an electrification warning sign in accordance with Network Rail standard NR/SP/ELP/21131;
- e) the cleaning of vehicle ends, cab windows and destination indicators shall be carried out at only those locations specifically authorised for this purpose;

Where the control measures cannot be met in full, the requirements stated in clause 3 shall be followed.

A9 Loading or unloading of open rail wagons

Loading or unloading of open rail wagons may be carried out by hand methods under live OLE provided the following control measures are complied with:

- a) the work shall be carried out under continuous competent and responsible supervision;
- b) the site of work is not in an area of Reduced Wire Height as per Module 2, clause 3.1;
- c) the floor of the wagon shall not be more than 1.4 metres (4 feet 7 inches) above rail level;
- d) no attempt shall be made to get into the wagon unless there is clear standing space on the floor of the wagon and access shall not be gained by climbing over the wagon sides or ends;
- e) persons engaged in the work shall not stand on any material or thing within the wagon but at all times shall stand on the wagon floor;
- f) no part of any person, or any tool or material being used shall project higher than the top of their head;

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- g) suitable precautions, such as provision of illumination, shall be taken when visibility of the OLE is obscured, e.g. during hours of darkness or in tunnels or under long bridges;

Where the control measures cannot be met in full, the requirements stated in clause 3 shall be followed.

A10 Loading or unloading single deck carflat wagons

The loading or unloading of single deck carflat wagons shall be carried out at only those locations authorised for this purpose by the Delivery Unit Electrification and Plant Maintenance Engineer.

Where such authority is granted by the DUE&PME, loading or unloading may be carried out with the OLE live provided the following control measures are complied with:

- a) the work shall be carried out under continuous competent and responsible supervision;
- b) the floor of the carflat shall not be more than 1.4 metres (4 feet 7 inches) above rail level;
- c) the overall height of the road vehicle shall be less than the limit specified by the DUE&PME for the location concerned, all aerials shall be retracted and hatchback doors secured before loading commences. The limit specified by the DUE&PME shall allow a clearance of not less than 750 millimetres (2 feet 6 inches) between the highest point of the road vehicle and the level of the contact wire;
- d) persons engaged in the work shall remain at all times on the floor of the carflat, except for the purpose of getting into or out of the driving seat of the road vehicle;
- e) the road vehicle shall have a roof over the driving seat to provide a physical barrier between the person gaining access to the driving seat and the OLE;
- f) no part of any person, or any tool or material being used shall project higher than the top of their head;
- g) no straps for securing lifting roofs or similar shall be passed over or removed from road vehicles whilst under the OLE;
- h) suitable precautions, such as provision of illumination, shall be taken when visibility of the OLE is obscured, e.g. during hours of darkness.

Where the control measures cannot be met in full, the requirements stated in clause 3 shall be followed.

A11 Ladders

Portable ladders which are used on or about electrified lines shall, except as described below, be of wood or other approved non-conducting material and not reinforced by metal attachments running along the sides of the ladders.

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Note: Even such a ladder does not provide protection for a person if it comes into contact with, or into close proximity to, live OLE.

Special care shall be taken when carrying or using ladders to avoid them coming close to, or in contact with, live OLE. Ladders shall be carried horizontally, two or more persons being used if necessary.

A12 Specially designed, constructed and approved ladders

Aluminium ladders, specially designed, constructed and approved for cleaning the windscreens and replacing the windscreen wiper blades of certain traction units, may be used by trained staff at locations authorised by the DUE&PME without the need to isolate the OLE provided that:

- a) the ladder shall not be used for any other purpose and, when not in use, is stored adjacent to the track at the point where cleaning is to be carried out, and shall be padlocked to a fixed structure;
- b) the securing padlock shall not be removed until immediately before the ladder is required for use, and the ladder shall be returned to the storage position, and padlocked, immediately after use;
- c) the ladder shall be carried horizontally at all times except when being fixed in the required position below the windscreen;
- d) the person using the ladder shall not raise any part of their body, or any tool, material or equipment, higher than the warning line on the traction unit.

A13 Use of cranes, plant and equipment or similar apparatus capable of being extended

Whenever such plant or equipment has to be used on or near to the electrified lines, the work shall not commence until the OLE has been isolated and earthed and an overhead line permit obtained, except where the outcome from a risk assessment in accordance with Module 2 and this module provides a method whereby the work may be carried out without an isolation.

Whenever possible, work shall be carried out without interfering with the OLE, but if this equipment has to be adjusted or removed, the adjustment or removal shall be done by only the Infrastructure Maintainer's staff, competent contractor's staff or staff authorised by the DUE&PME.

Even when the OLE has been isolated and earthed and an overhead line permit received, the utmost care shall be exercised so that damage is not caused to the OLE, connections, or supports. If any damage is caused it shall be reported immediately to the ECO quoting the OLE structure number.

A14 Servicing and maintaining rail-borne plant and machinery

Servicing and maintenance of rail-borne plant and machinery requiring access to the open decks of vehicles may be carried out under live OLE provided the following control measures are complied with:

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- a) the work shall be carried out under continuous competent and responsible supervision;
- b) the site of work is not in an area of reduced wire height as per Module 2, clause 3.1;
- c) the decking and designated walkways of the vehicle shall not be more than 1.4 metres (4 feet 7 inches) above rail level;
- d) no attempt shall be made to gain access to the vehicle except by the designated access;
- e) persons engaged in the work shall remain on the decking or within the designated walkways and shall not climb or stand on any material or equipment cases, or the like;
- f) no part of any person, or any tool or material being used, shall project higher than the top of their head;
- g) suitable precautions, such as provision of illumination, shall be taken when visibility of the OLE is obscured, e.g. during hours of darkness or in tunnels or under long bridges.

Where the control measures cannot be met in full, the requirements stated in clause 3 shall be followed.

A15 Work on signals

An assessment shall be made for each signal working place, ladder and platform to enable staff to carry out their normal duties in safety.

All other work (e.g. painting or re-wiring) shall be subjected to the requirements stated in clause 3.

A16 Work within fully enclosed structures

Where work is to be carried out entirely within the confines of a totally enclosed structure and the work will not open up access to live equipment, such work may be carried out without the preparation of a documented safe system of work as required in Module 2.

A17 Work on Network Rail OLE adjacent to or abutting other third party electrification systems

A17.1 Work on Network Rail OLE abutting Network Rail (High Speed 1 Ltd) lines

Some headspans in St Pancras station support both Network Rail and Network Rail (High Speed 1 Ltd) OLE. Consideration shall be given to live adjacent or abutting Network Rail (High Speed 1 Ltd) OLE which is separately fed and controlled.

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A17.2 Work on Network Rail OLE abutting Rail For London Infrastructure Ltd (Elizabeth Line) lines

The Neutral Sections at Westbourne Park and Pudding Mill Lane provide the boundary between Network Rail and Rail For London Infrastructure Limited. Consideration shall be given to live abutting Rail For London Infrastructure Limited (Elizabeth Line) OLE which is separately fed and controlled.

A17.3 Work on Network Rail OLE abutting South Yorkshire Supertram Limited (Sheffield Supertram) lines

The section insulator at Tinsley Chord forms the boundary of electrical control between the Network Rail and South Yorkshire Supertram Limited (Sheffield Supertram). Consideration shall be given to live abutting South Yorkshire Supertram Limited (Sheffield Supertram) which is separately fed and controlled.

A17.4 Work on Network Rail OLE abutting Nexus (Sunderland Metro) lines

The section insulator at Pelaw Metro Junction forms the boundary of electrical control between the Network Rail and Nexus (Sunderland Metro). Consideration shall be given to live abutting Nexus (Sunderland Metro) which is separately fed and controlled.

A18 Work on OLE with RC or ATF passing overhead

An assessment shall be carried out to determine the clearances between the OLE and passing RC or ATF. This can be done with the as-fitted design but preferably on site, at height, with an isolation of all relevant electrical sections.

Consideration shall be given to the position of the competent person working on the OLE, before any work commences.

The DUE&PME shall keep and maintain a register of diverging RC or ATF, and associated clearances, for the benefit of risk assessment prior to isolation planning.

The requirements stated in clause 3 and Module 7 have been met.