PUBLIC TRANSPORT AUTHORITY

SAFEWORKING RULES AND PROCEDURES

2017

WORKING AROUND ELECTRICAL INFRASTRUCTURE

C O N T E N T S

1. PURPOSE

The purpose of this rule is to provide information and protocols for persons to work safely in and around *Electrical Equipment* and *Electrical Infrastructure* in the *Electrified Area* in the Public Transport Authority (PTA) *Network*.

WARNING

All *Workers* must keep themselves, tools, equipment and materials at a *Safe Distance* from *Electrical Equipment* and *Electrical Infrastructure*.

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2. GENERAL

These instructions relate only to *Electrical Infrastructure* within the *Electrified Area.* All other Occupational Health and Safety (OH&S) rules with respect to working on or around the PTA *Network* and industrial safety must also be adhered to.

Electrical Infrastructure includes:

- high-voltage and low-voltage wires and cables and *Electrical Equipment* on structures;
- *Overhead Line Equipment* (*OLE)* and associated equipment;
- electrical *Conductors* carried in above-ground troughs, or buried;
- low-voltage and high-voltage electrical switch rooms; and
- *Substations*.

These safety instructions must be understood and observed by *Workers*.

Any *Worker* working in the *Electrified Area* must have access to a current copy of and be conversant with these safety instructions.

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3. OVERHEAD LINE EQUIPMENT

PTA *OLE* operates at a nominal 25,000 Volts, 50 *Hertz*, alternating *Current* (25kV, 50Hz, AC).

The *OLE* consists of concrete or steel masts, to which are attached *Live* cantilever frames supported on insulators. The *Catenary Wire* is attached to the top of the cantilever frames and the *Contact Wire* is suspended from the *Catenary Wire* by means of droppers. Also mounted on the masts are a *Live Return Conductor* and an *Earth Wire.* A *Return Conductor* must be treated as *Live* and dangerous at all times. Overhead Conductor Rail is installed on the PTA *Network* in specific tunnels with reduced electrical clearance.

The traction return system includes all conducting components which form a conducting path for the traction return *Current* in normal operation and in the case of fault scenarios.

The return circuit includes:

- running rails;
- return *Current* rails;
- return *Current Conductors* or *Return Conductor (RC);*
- *Earth Wires*;
- bonding;
- return *Current* cables; and
- all other components conducting return Currents.

3.1. MANAGEMENT OF THE ELECTRIFIED NETWORK

3.1.1. General

The *Electrical Control Officer* (*ECO)* controls the *Electrified Area* of the PTA *Network* and is located within *Train Control* in the Public Transport Centre.

3.1.2. Electrical Control Officer

ECO responsibilities include:

- monitoring and control of power for the *Traction Distribution and OLE* system*;* and
- performing and coordinating planned and *Emergency De-Energisation* and/or isolation procedures.

3.2. STATUS OF OLE

WARNING

There is a danger from false feeds, residual (capacitive) charge, induced voltage, back feeds, lightning or accidental energisation.

Generally, the status of *OLE* falls into the following categories:

- ***Live*** (energised and dangerous): When a potential difference exists between the equipment and earth.
- ***De-Energised*****:** The status of *OLE* after *Circuit Breakers* and/or *Isolators* feeding an electrical *Section* have been opened and are electrically separated from the source. No earths are applied and no *OLE Permit to Work Issued*.
- **Within an *OLE Permit to Work*:** The status when *OLE* is disconnected and separated from all sources of electricity supply in such a way that this disconnection and separation is secure. Earths have been applied and an *OLE Permit to Work* describing the safe limits of work, has been *Issued*.

4. WORKING IN AN ELECTRIFIED AREA

4.1. DANGER FROM LIVE EQUIPMENT

WARNING
The *OLE* must be treated as *Live* until an *OLE Permit to Work* has been *Issued* and members of the work party have 'signed on'.

All *Workers* must be vigilant of the risks and dangers of working near *Live,* high-voltage equipment.

A site-specific risk assessment must be either carried out, or supported by, a *Person Responsible for Electrification Safety* (*PRES)* before any work activity takes place.

The only occasions upon which the *OLE* may be approached are when:

- a *Vicinity Form* has been *Issued* (refer **Section 11 Vicinity Form**); or
- an *OLE Permit to Work* has been *Issued* (refer **Section 10.2.1 Issue of OLE Permit to Work**).

WARNING
Always follow these lifesaving rules of:
- always have a valid permit to work; and
- always test before touch.

4.2. ELECTRIC SHOCK

All *Workers* who work in the *Electrified Area* must be aware of and understand the protocols to be followed in the event of electric shock.

If a person sustains an electric shock, this must be reported to the *ECO* and the person must immediately consult a medical practitioner.

4.3. WORK PROXIMITY

In this section, 'work' does not include work which involves cranes. For cranes, refer to **Section 5.2 Cranes.**

Live OLE can include but not be limited to:

- booster transformers;
- *Isolators*; and/or
- emergency supply transformers.

4.3.1. Work Greater Than Three (3) Metres from Live OLE

Perform the site-specific risk assessment.

Determine the level of risk that people, equipment or other objects will be less than three (3) metres from *Live OLE*.

If that level of risk is acceptable, then work may be performed.

4.3.2. Work Less Than Three (3) Metres but Greater Than One (1) Metre from Live OLE

Perform the site-specific risk assessment.

Determine the level of risk that people, equipment or other objects will be **less than** three (3) metres but **greater than** one (1) metre from *Live OLE*.

If that level of risk is **not** acceptable, then an *OLE Permit to Work* is normally required.

There is an exception to this.

Demonstrate that controls can be implemented so that the level of risk that anything associated with the work, will be **less than one** (1) metre from *Live OLE*, is acceptable.

If that level of risk, with those controls in place, is acceptable, then a *Vicinity Form* must be *Issued*, describing the controls.

4.3.3. Work Less Than One (1) Metre from Live OLE

Work which takes place **less than** one (1) metre from *Live OLE* requires either:

- an *OLE Permit to Work*; or
- *Authorised Persons* using *Live* line working tools.

Refer also **Section 11 Vicinity Form**.

4.3.4. Work above OLE

All work above the *OLE* must be separated by a solid barrier, so that the risk of liquid or debris falling onto *OLE*, is **eliminated.** If such elimination is not possible, then an *OLE Permit to Work* is required.

4.3.5. Work Near Western Power Lines

Perform the site-specific risk assessment.

Determine the level of risk that people, equipment or other objects will be less than six (6) metres from Western Power transmission overhead lines.

If that level of risk is not acceptable, then approval must be given by the *Electrical Engineering Manager* (*EEM*) before the work can proceed.

4.4. PORTABLE LADDERS

Metal and metal-reinforced ladders are prohibited from use in the *Electrified Area*. Fibreglass-reinforced, timber and other non-conductive ladders are permitted.

When ladders are being carried, they must be kept horizontal, at or below shoulder height and carried by at least two people. When positioning a ladder, care must be taken that it does not come within clearances of the *OLE.* Ladders must be secured prior to use.

NOTE

All *Workers* must take extra care when handling long objects near *OLE.*

When long pipes or long objects are being carried in the *Electrified Area,* they must be carried horizontally at or below shoulder height and by at least two people.

4.5. SCAFFOLDING

In order to erect scaffolding in any *Location,* including station premises, permission to do so is required from the *EEM* or their representative.

4.6. USE OF UMBRELLAS PROHIBITED

Use of umbrellas anywhere on the electrified *Live* 25kV *OLE Network* is prohibited. Public areas such as station *Platforms* are the exception.

4.7. USE OF METAL TAPE MEASURES PROHIBITED

Use of metal tape measures on the electrified *Live* 25kV *OLE Network* is prohibited. Non-conductive, insulated-type tape measures must be used.

4.8. PIPES

Prior to renewing or repairing gas, water or other metal pipes, either above ground or buried alongside the *Track*, a temporary *Jumper Cable* must be connected across any proposed gap in the pipe, before any disconnection is made. The *Jumper Cable* must be left in position until the pipe is again permanently connected.

If a metallic pipe must be replaced with a pipe made of plastic or any other insulating material; then the work must not be carried out without prior approval of the *EEM* or their representative.

The *EEM* or their representative must be notified prior to the installation or removal of any temporary *Jumper Cable.*

Where service pipes belonging to other utilities cross the *Rail Corridor,* insulated joints are deliberately introduced into such pipes to contain *Traction Earth* and reduce the effects of other *Earthing* systems. Care must be taken to ensure these insulated joints are never short *Circuited* by a temporary *Jumper Cable*, tool, or any other device.

4.9. WATER USE IN THE ELECTRIFIED AREA

All hoses used in the *Electrified Area* must be of high quality, with securely-screwed, metal fittings.

All hoses and fittings must be inspected prior to use and only used if in good, serviceable condition.

Any work near the *OLE* necessitating hosing with water which contains chemicals, requires written approval from the *EEM* or their representative.

When hosing, special care must be taken to ensure that the water stream is **not** less than three (3) metres from:

- *Live OLE*; nor
- the electrical equipment mounted on *Electric Multiple Units* (*EMUs*).

4.10. ELECTRICAL APPLIANCES AND POWER TOOLS

Earthed, portable electrical appliances and power tools must not be used in the *Electrified Area*. Only double-insulated electrical appliances and power tools, which comply with the relevant Australian Standard, may be used. A square inside a square, as shown in the figure to the right, is the symbol marked on the case to show that equipment is double insulated.

4.11. FOREIGN OBJECTS

Unauthorised persons must not attempt to approach, nor remove, debris such as string, rope or wire from the *OLE* or from less than three (3) metres from *OLE*, or from the roof of *Rollingstock. Unauthorised* persons must keep themselves and others clear and report any such debris immediately to the *ECO* or *Train Controller,* who will arrange removal by *Competent* persons.

4.12. ATTACHMENTS

Nothing is to be fixed or attached to *OLE* or its supporting structures, without written *Authority* from the *EEM* or their representative.

4.13. ELECTRIC MULTIPLE UNIT EQUIPMENT

All electrical apparatus on the roof, in equipment boxes on the underframe and in the cupboards and lockers in the *Drivers'* cabins of *EMUs* must be treated as *Live* and dangerous.

4.14. LOCOMOTIVES AND ALL OTHER VEHICLES IN THE ELECTRIFIED AREA

4.14.1. Safe Clearance from OLE

Perform a site-specific risk assessment.

In the risk assessment, consider the action of climbing onto *Rail Traffic* or a *Track Vehicle*.

If people were to be at a level that is above that of the cab floor of *Rail Traffic* or on the tray of the back of a truck or any other *Track Vehicle*, determine the level of risk that people or any object will then be **less than** three (3) metres from *Live OLE*.

If the level of risk is unacceptable, then such climbing is not permitted.

4.14.2. Stowing a Locomotive in the Electrified Area

Locomotives can only be stowed in the *Electrified Area* under *Isolated OLE*, or on an unwired road or equivalent.

4.15. ELECTRICAL INFRASTRUCTURE AND OLE

For any work activity, including excavations, the person in charge of the work must ensure controls are in place to ensure both the stability of the *Permanent Way* and that bonding, masts and other lineside structures are neither affected nor damaged.

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5. MOBILE PLANT

Mobile plant is only permitted to be less than three (3) metres from *Live OLE* if controls are implemented and a *Vicinity Form* is *Issued* for the specific task.

To calculate clearances, consideration must be given to such encroachment by any part of the operator, any part of the machine or its load, or by anything affected by the activity.

When applying for a *Vicinity Form* for work associated with mobile plant, the applicant must include details of:

- the mobile plant make, size and registration number;
- proposed dates and times of work;
- the *Location* of proposed work;
- *PRES* name and contact details;
- restrictor chains, their certification date and minimum capacity (if chains are in use); and
- names of *Workers* who will perform the work and *Track Access Permit* number.

The application for a *Vicinity Form* must also demonstrate that appropriate controls will be in place.

The site-specific risk assessment must be performed. With appropriate controls in place, the resulting level of risk that people, equipment or other objects will be less than one (1) metre from *Live OLE*, must be acceptable.

If plant is fitted with electronic slew locks and/or restrictor chains, this must be noted in the safe work method statement.

The *PRES* must also ensure that:

- the complete restrictor chain and securing device is a minimum of 2 x the machine's safe working limit or working load limit displayed on the mobile plant;
- the restrictor chain cannot be detached at any time whilst the mobile plant is in operation;
- the restrictor chain is tested, tagged and *Certified*; and
- if plant is fitted with electronic slew locks and/or restrictor chains, that these are detailed in the safety management plan and that their safe operation is demonstrated on site before use.

The *PRES* is responsible for ensuring that the controls associated with the *Vicinity Form* are implemented.

The *Nominated Person* (*NP*) who *Issues* the *Vicinity Form* must obtain confirmation from the *PRES* that the controls stated on the *Vicinity Form* will be in place for the duration of work for which a *Vicinity Form* is required.

The work must only occur while the *PRES* named on the *Vicinity Form* is on site. Each *Vicinity Form* is *Issued* for a specific task and to a specific *PRES* and is not transferable. If the conditions listed in the *Vicinity Form* cannot be met then there will be a need to apply for a *Permit to Work*.

5.1. RAIL MAINTENANCE VEHICLES

Only machines approved and entered onto the PTA **4010-100-107 - Approved Vehicle Register** may be used in the *Electrified Area.*

The operator is responsible for ensuring that any slew locks and/or restrictor chains to be used are fit for purpose.

5.1.1. Stabling Rollingstock or Road Rail Vehicles

Any *Rollingstock* or *Vehicles* may be stabled in the *Electrified Area* under the following conditions:

- on an unwired road, so that there is no risk that people, equipment or other objects associated with the activity will be less than three (3) metres from normally *Live OLE*;
- governed by an *OLE Permit to Work,* if the level of risk that any part of a person, equipment or object could be less than one (1) metre from normally *Live OLE,* is acceptable;
- under *De-Energised OLE,* if there is an unacceptable level of risk that any part of a person could be less than three (3) metres but greater than one (1) metre, from normally *Live OLE;* or

- under *Live OLE*, where controls are in place to ensure that a *Worker* is not at a level higher than the cab floor of *Rollingstock or Road Rail Vehicles*.

The site-specific risk assessment will identify whether the level of risk is unacceptable.

5.1.2. Track Vehicle Entering Electrified Area

The *Track Vehicle Operator* must contact the *ECO* prior to on tracking, travelling on *Track* and again prior to starting work.

5.2. CRANES

All cranes working within the *Electrified Area* must have a *PRES* appointed. The *PRES* must ensure that the level of risk that any activity associated with works will be less than three (3) metres from *Live OLE,* is acceptable.

A clear work methodology addressing electrical clearance requirements, including lifting plans, must be submitted to the PTA as part of the approval process.

NOTE

It is the responsibility of the *PRES* supervising the crane to inform the operator of any electrical hazard that may be encountered and the limits of work which will apply during operations.

To calculate distances for work involving cranes, take into account the potential of the load to swing. At all times, the load must be **greater than** three (3) metres from *Live OLE*. Nothing associated with crane work can be above *Live OLE,* unless an *OLE Permit to Work* is in place. Nothing associated with the crane work, including the load, can be in the restricted area illustrated in **Figure 5.1** below.

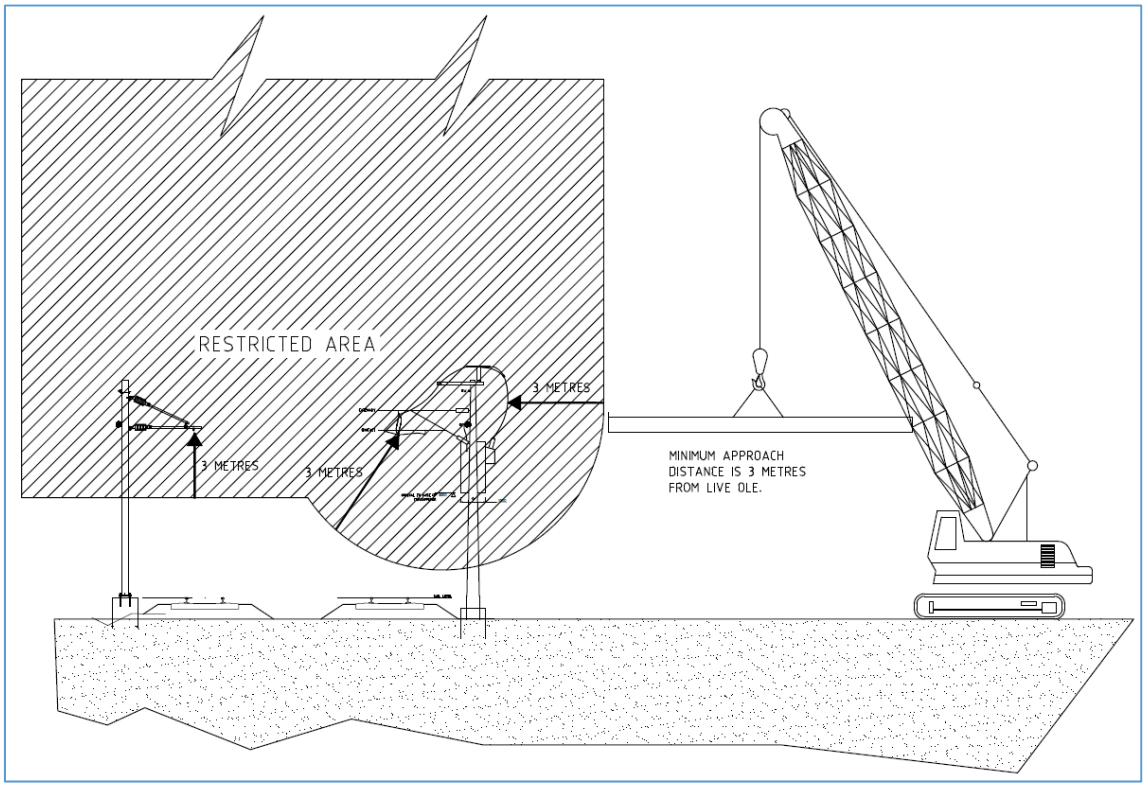

Figure 5.1: Minimum Approach Distance

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6. FIRE

Any fire in the *Electrified Area* must be immediately reported to the *ECO* or *Train Controller.* Communications with *Train Control* must be maintained for the incident duration or a mobile phone number utilised, so the person reporting the incident can be contacted as required.

To report a fire, include details regarding the type of fire, for example grass fire, and whether *Train* services could be disrupted.

Dry sand or earth is suitable for extinguishing a fire. Water must not be used on or near electrical equipment, until the electricity has been *Isolated*. Water must not be directed onto *Electrical Equipment*.

Immediate action must be taken to extinguish fires. Priority must be given to any fire likely to affect personnel, cables or other *Electrical Equipment*. The procedures in the PTA *Safeworking Rules and Procedures* must be observed.

If there is a fire on an *EMU,* consideration must be given to requesting an *Emergency De-Energisation* of *OLE*. Other actions that must be considered are:

- using an appropriate fire extinguisher (leaving *EMU* equipment lockers closed); and
- lowering the *Pantograph* and opening the *EMU* battery switch.

For instructions regarding *Emergency* evacuations, refer to PTA **9000-000-011- Emergency Management Manual.**

WARNING

Untrained persons must not attempt to extinguish fires near *Electrical Infrastructure or Electrical Equipment.*

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7. INFRASTRUCTURE FAULTS

7.1. DAMAGE TO OLE

Any damage, smoking, excessive flashing or arcing on *OLE* or on any *EMU* must be immediately reported as an *Emergency* to the *ECO* or *Train Controller.* Information provided must include the time of the event, the *EMU* number (if involved) and the location of the *Emergency*.

7.2. DEFECTIVE RAIL OR TRACTION BOND

Any *Traction Return Rail* or *Traction Bond* found to be broken or defective must be reported immediately to the *ECO,* who must make arrangements for repairs, as quickly as possible. Some *Traction Bonds* are marked red and are known as red *Bonds*. These red *Bonds* must not be disturbed by anyone other than trained, Overhead Catenary Maintenance staff.

NOTE

A broken or damaged red *Traction Bond* must be treated as a hazardous situation and all *Workers* must keep clear.

Temporary Traction Bonding, to the satisfaction of the *EEM* or their representative, must be installed prior to any rail renewal or work involving breaking the *Traction Return Rail.*

Only *Authorised Persons* are permitted to apply and remove *Temporary Traction Bonds.*

7.3. BOUNDARY FENCES

Boundary fences are either bonded to the *Traction Return Rail* or isolated by an insulated fence panel. Any faulty *Bond* or defective fence insulation must be reported to the *ECO,* who must arrange repairs. Any new or replacement boundary fences must comply with the requirements of PTA **8110-800-047 - Boundary Fences in the Electrified Area**.

7.4. TRACK MAGNETS

Automatic Power Control (APC) *Track* magnets are painted yellow and located each side of a neutral *Section.* Any APC *Track* magnet found to be loose, damaged or defective must be reported immediately to the *ECO,* who must promptly arrange for repair or replacement.

The *ECO* must also arrange with the *Train Controller* for the *Rail Traffic Crew* of any *EMU* which is to pass over the defective magnet, to be warned that the APC *Track* magnet is defective. The *Rail Traffic Crew* must trip the main *Circuit Breaker* on the *Rail Traffic* prior to entering the neutral *Section* and close it after passing through the neutral *Section*.

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8. FAULTY POWER SUPPLY AUTHORITY EQUIPMENT

Any *Worker* noticing a Power Supply Authority overhead line which is not secure and which might fall across or near to the *OLE*, must remain well clear of any hanging wires and report the fault as an *Emergency* immediately, to the *ECO* or *Train Controller*. Any such wires or conductors must be treated as *Live* at all times.

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9. ROLLINGSTOCK AND WAGONS

9.1. LOADING OUTLINES

To prevent damage to *OLE* and to *Rail Traffic* by coming into contact with, or close to, the *OLE*, the *Rollingstock* loading outlines must be strictly adhered to. *Rollingstock* loading outlines are shown in:

- PTA **8190-400-001 - Standard Gauge Mainline Code of Practice Track & Civil Infrastructure;** and
- PTA **8190-400-002 - Narrow Gauge Mainline Code of Practice Track & Civil Infrastructure.**

Rail Traffic Crew for steam *Locomotives* must ensure that no load is stacked higher than cab roof level and that tools and equipment are safely stowed and do not protrude above cab roof level. No *Worker* is permitted to stand on the load while the *Rollingstock* is under *Live OLE*.

9.2. WAGON TARPAULIN AND COVERS

Tarpaulins and covers must be adequately secured to prevent them from becoming loose as a result of wind raising them and causing a trip to a *Circuit Breaker*, or damage to the *OLE.* Ropes must not hang loosely, as they too can damage equipment.

9.3. DIESEL OR STEAM LOCOMOTIVES

To avoid pollution damage to *Electrical Equipment,* when a *Locomotive* is being brought to a stand, the *Driver* should avoid stopping with the exhausts, stacks or vents directly underneath *OLE* insulators or structures.

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10. PERMIT TO WORK

10.1. PLANNED PERMITS TO WORK

A request for an *OLE Permit to Work* must be submitted via the Manager Rail Infrastructure Access (MRIA), in accordance with PTA procedure **8510-000-010 - Planning for OLE Permit to Work, De-energisation and OLE Vicinity Form.**

The Isolation Planner can be contacted via phone (08) 9326 3899. MRIA can be contacted via email to MRIA@pta.wa.gov.au.

10.2. PERMITS TO WORK

10.2.1. Issue of OLE Permit to Work

The *OLE Permit to Work* must only be *Issued* to a *PRES,* who is then responsible for ensuring compliance with all conditions relating to any *OLE Permit to Work Issued* to them.

NOTE

An *OLE Permit to Work* is a form signed and *Issued* by a *NP,* to a *PRES,* for work to be carried out on or near *Isolated Electrical Equipment*. The purpose of the form is to make known to the recipient exactly which equipment is *Isolated* and *Earthed* and upon which, or near to which, it is safe for the work to commence, only so far as the *Electrical Equipment* is concerned.

The *OLE Permit to Work* will show the:

- *Track(s)* concerned;
- *Working Limits* covered under the isolation;
- start and relinquish times;
- relevant signoffs by the *NP* and *PRES;* and
- residual electrical hazards.

NOTE

The *NP* must ensure that the *PRES* fully understands these conditions. The *NP* must brief the *PRES* regarding any additional electrical hazards, which could include cross feeds, *Track Sectioning Cabin (TSC)* roof bushings or bare feeders in the immediate area of the work concerned.

It is the duty of the *PRES* to ensure that each *Worker* in the *Work Group* also understands these conditions. The *PRES* must also inform their relief of these conditions.

Each *Worker* in the *Work Group* must consider the *OLE* to be *Live* until they have signed onto the *OLE Permit to Work*.

The *PRES* is responsible for:

- explaining the *Working Limits* stated on the *OLE Permit to Work* to all members of the *Work Group*;
- ensuring that every member of the *Work Group* and/or any person responsible for the equipment, material or other items associated with the work which require an *OLE Permit to Work*, signs the rear of the *OLE Permit to Work,* prior to starting work;
- remaining at the site of the *OLE Permit to Work* and retaining the *OLE Permit to Work* until it is relinquished or handed over to a relief *PRES.* During handover to a new relief *PRES*, the new *PRES* must be fully briefed by the outgoing *PRES* and all *Workers* must be made aware of the changeover;
- explaining to a relief *PRES,* the conditions stated on the *OLE Permit to Work,* prior to signing over the *OLE Permit to Work* to the relieving *PRES*;
- contacting the *NP* either directly or via the *ECO,* to advise, when a *PRES* is relieved and providing the name, mobile phone number, *Track Access Permit* number and designation of the relief *PRES*, to the *NP* or *ECO*;
- ensuring that each *Worker* in the *Work Group* signs the rear of the *OLE Permit to Work,* prior to relinquishing the *OLE Permit to Work,* or prior to leaving the *Worksite*, to confirm that they and any materials, equipment and/or other objects associated with the work are clear of the *OLE*;
- ensuring that once the *OLE Permit to Work* has been signed off as relinquished, that the *OLE* is treated as *Live* and dangerous and that all *Workers* keep clear of *OLE;* and
- personally relinquishing the *OLE Permit to Work* to the *NP* (or relief) at or before the relinquishment time shown on the *Permit to Work.*

11. VICINITY FORM

The *Vicinity Form* must only be *Issued* to a *PRES,* who then is responsible for ensuring compliance with all conditions relating to any *Vicinity Form Issued* to them.

A *Vicinity Form*:

- is *Issued* by a *NP* to the *PRES* at the *Worksite*. Work under the *Vicinity Form* must only be performed while the *PRES* is on site;
- **is not** an *OLE Permit to Work*;
- can only be used with a documented safe system of work which reduces the risk level to acceptable, that people, equipment or other objects come to be less one (1) metre from *Live OLE*;
- **is not transferable** to any other person (or *PRES*); and
- is *Issued* **prior to starting work** greater than one (1) and less than three (3) metres from *Live OLE.*

All necessary clearances and controls must be included on the *Vicinity Form*. Where possible, a diagram must be included, to help clarify clearances and/or controls. Where mobile plant is being used, the requirements of **Section 5 Mobile Plant** must be complied with.

The *NP* will hand the original form to the *PRES* and a copy will be retained by the *NP*.

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12. SUBSTATION ACCESS REQUIREMENTS

Permission to enter buildings or compounds containing high-voltage equipment can only be granted by the *EEM* or their representative. Prior to entering, a *Worker* must complete an induction.

If the smell of burning or rotten eggs is experienced upon entry, then immediately leave the building or compound and inform the *ECO*.

Prior to any work starting in a building or compound containing high-voltage equipment, a written work methodology must be provided and accepted by the *EEM* or their representative.

Accessing a *Substation*:

Contact *ECO* on (08) 9326 2722 and register the arrival and estimated departure times.

Departing a *Substation*:

Contact *ECO* on (08) 9326 2722 and register the departure.

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13. UNDERGROUND SERVICES

It is prohibited to dig, break the ground or drive anything into the ground, before the whereabouts of buried services and underground cables are located.

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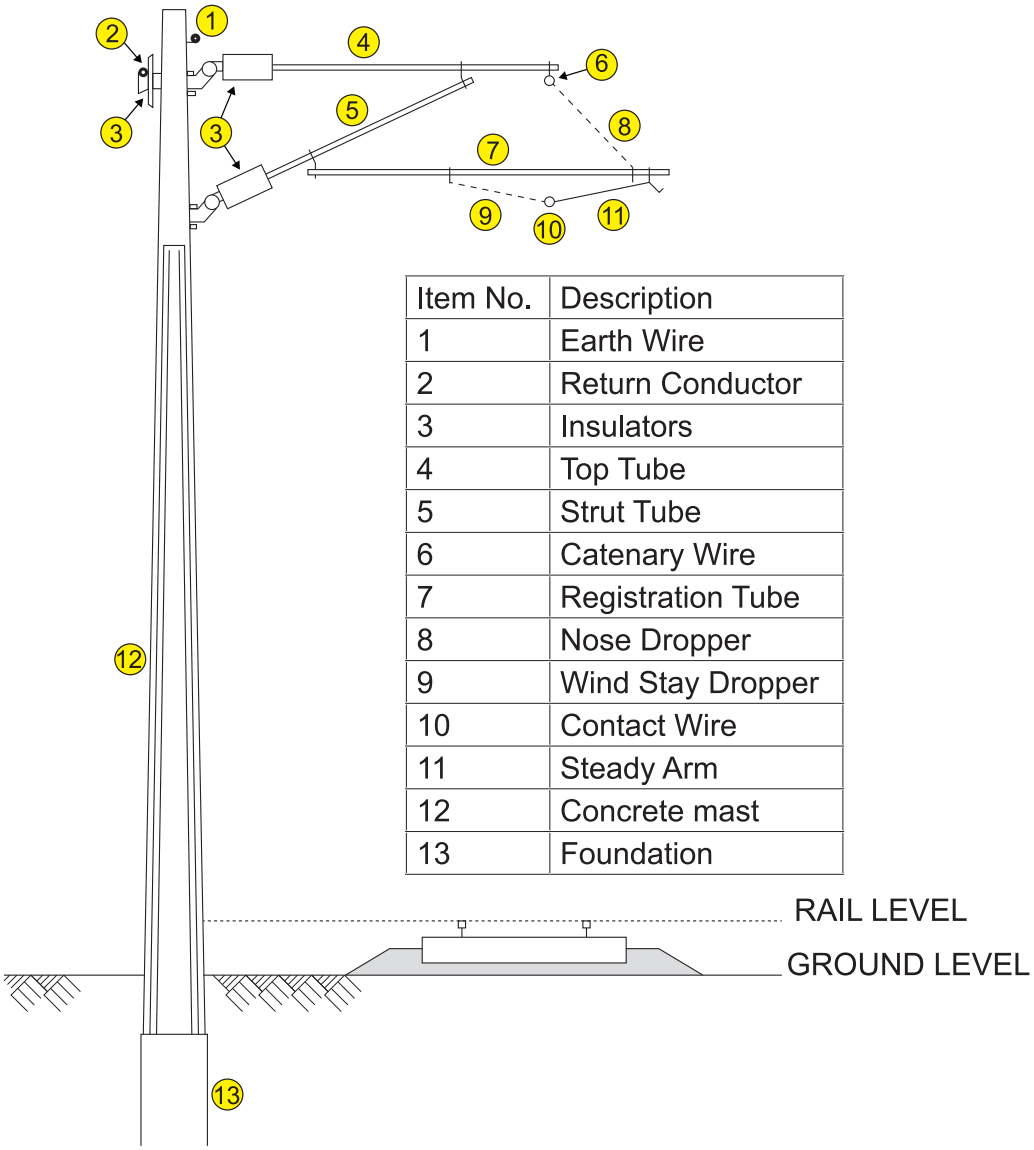
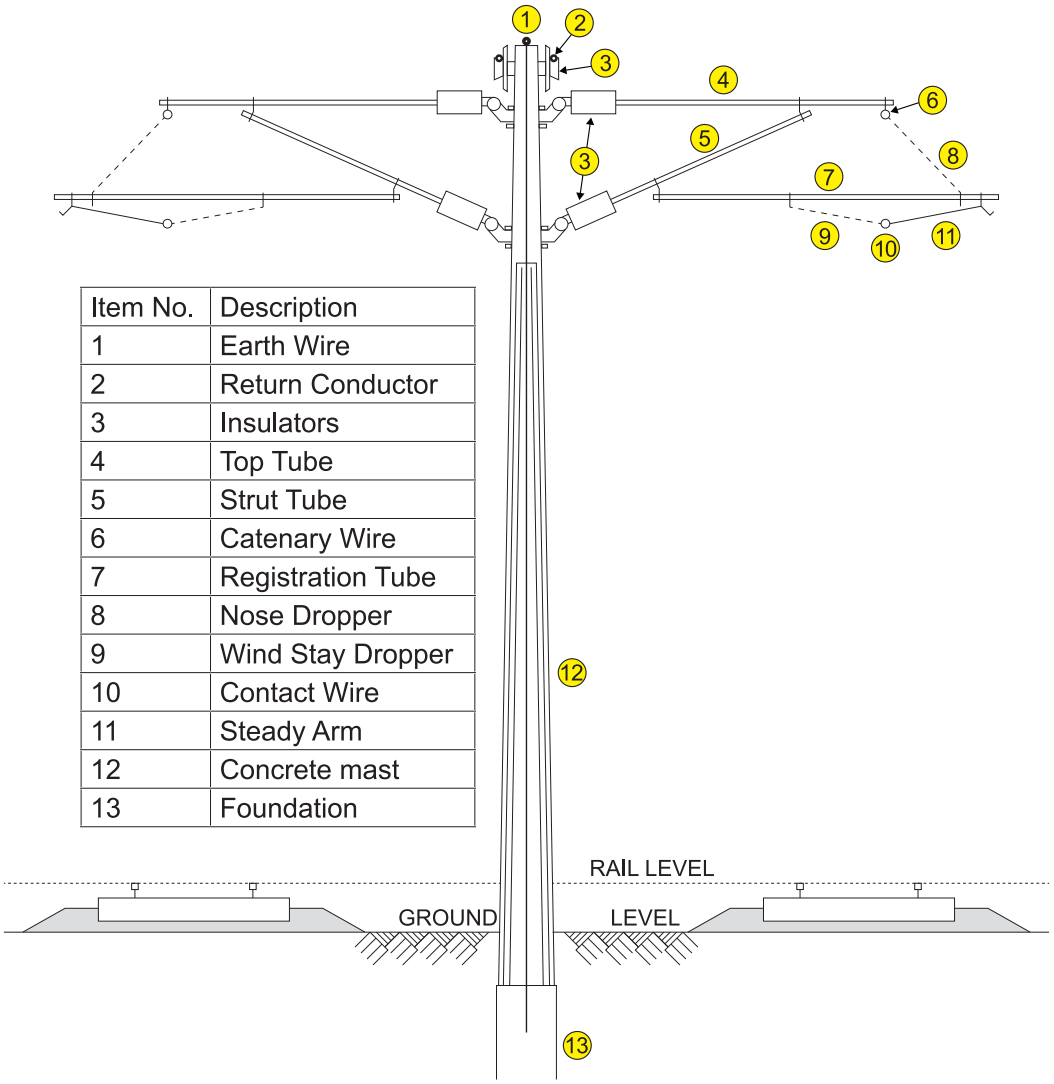
14. FAULTS IN ELECTRICAL INFRASTRUCTURE

If possible, refer to these diagrams when reporting faults, fallen *OLE* or fires in *OLE.*



Item No.	Description
1	Earth Wire
2	Return Conductor
3	Insulators
4	Top Tube
5	Strut Tube
6	Catenary Wire
7	Registration Tube
8	Nose Dropper
9	Wind Stay Dropper
10	Contact Wire
11	Steady Arm
12	Concrete mast
13	Foundation

FIGURE 14.1: Typical Single Track Cantilever Arrangement



Item No.	Description
1	Earth Wire
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4	Top Tube
5	Strut Tube
6	Catenary Wire
7	Registration Tube
8	Nose Dropper
9	Wind Stay Dropper
10	Contact Wire
11	Steady Arm
12	Concrete mast
13	Foundation

FIGURE 14.2: Typical Back to Back Cantilever Arrangement

Structure Numbers are placed on every mast, using a specific numbering format.

LINE NAME	DIRECTION/LOCATION
A = Armadale line F = Fremantle line J = Joondalup line M = Midland line R = Rockingham line T = Thornlie line C = City to Claisebrook line	D = Down P = Platform S = Siding U = Up UD = Up/Down

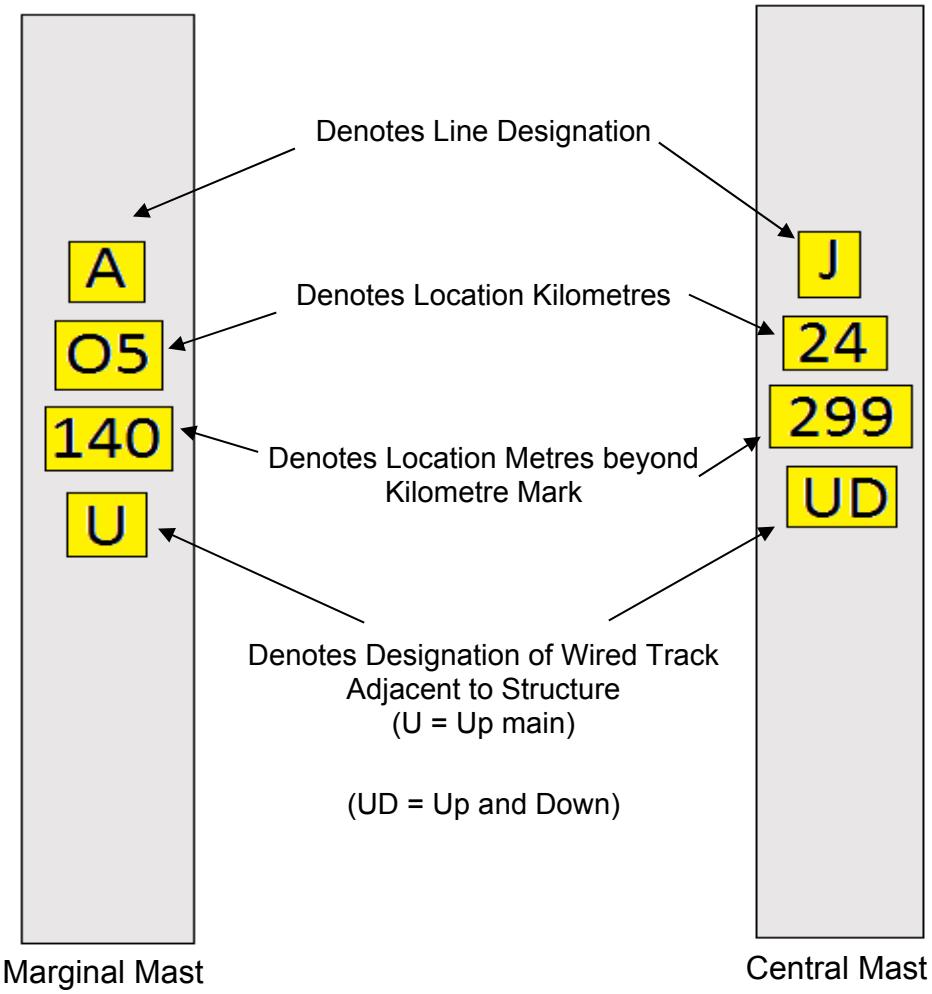

FIGURE 14.3: Typical Structure Numbering

15. REFERENCE

Rule 2019 Planned De-Energisation of Overhead Supply

Rule 2023 Unplanned De-Energisation of Overhead Supply

PTA 4010-100-107 Approved Vehicle Register

PTA 8510-000-010 Procedure for Planning for OLE Permit to Work, De-energisation and OLE Vicinity Form

PTA 8190-400-001 Standard Gauge Mainline Code of Practice Track & Civil Infrastructure

PTA 8190-400-002 Narrow Gauge Mainline Code of Practice Track & Civil Infrastructure

PTA 8110-400-029 Procedure for Applying for Access to the PTA Operating Railway Reserve

PTA 8190-800-002 Assessing Electrical Clearances for all Rail Vehicles Accessing the PTA Electrified Area

PTA 8110-800-038 Procedure for Isolation and Earthing for OLE

PTA 8110-800-047 Boundary Fences in the Electrified Area

PTA 9000-000-011 Emergency Management Manual

ENA NENS 04-2006 National Guidelines for Safe Approach Distances to Electrical and Mechanical Apparatus

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16. EFFECTIVE DATE

1 November 2018