Southern Ports

High Voltage Electrical Isolation and Access Procedure

DOCUMENT CONTROL

Version	Description	Reviewed by	Approved by	Issue Date
1	New document.	Electrical Supervisor	Electrical Technologist	14/01/2015
2	Updated to include National Fire Protection Association 70E and Arc flash, Energy System Safety Rules and so on.	Electrical Supervisor	Electrical Technologist	27/04/2016
3	Update to Southern Ports.	Electrical Technologist	Electrical Technologist	17/12/2019
4	Review and update.	Electrical Technologist	Chief Operating Officer	24/08/2023
5	Change Port Manager title to Maintenance Manager. Addition of HV Operator Nomination Letter Template & minor formatting.	Maintenance Manager	Chief Operating Officer	20/03/2025

AUDIT

This Electrical Isolation and Access Procedure shall be reviewed or revised:

- where a Risk Assessment or Audit identifies a need to review
- legislative changes impacting this Electrical Isolation and Access Procedure
- following a significant incident involving this Electrical Isolation and Access Procedure
- at least every two years.

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1 INTRODUCTION

1.1 Purpose

This High Voltage Electrical Isolation and Access Procedure has been prepared to ensure electrical safety, isolation practices and statutory requirements governing work on high voltage apparatus by electrically trained personnel.

The main purpose is to ensure the safety of employees and contractors, avoidance of damage to company equipment and continuity of supply.

This procedure has been developed for the safe and efficient switching, isolation and restoration of power to electrical plant and equipment.

This procedure is not intended to replace or alter any legal requirement or Australian Standard, it is intended that this procedure be used in addition to any such requirements or standards.

Whilst this procedure is intended to cover high voltage apparatus it may also be applied to apparatus and areas operating at other voltages.

1.2 Scope

In Scope	Out of Scope
Electrical safety, isolation practices and statutory requirements governing work on high voltage apparatus by electrically trained personnel. Safe and efficient switching, isolation and restoration of power to electrical plant and equipment. Apparatus and areas operating at other voltages.	High Voltage activities outside of Southern Ports.

1.3 Roles and responsibilities

There are five classifications of personnel involved in switching operations at the Port of Esperance as shown in Table 1 below. Appendix A contains the detailed Roles, Responsibilities and attributes required for each classification.

Table 1: Roles and Responsibilities

Role	Responsibilities
High Voltage Operator	The *High Voltage Operator* is the person Appointed by the Resident Maintenance Manager for the purpose of issuing and executing Switching Programs and Permits in accordance with the requirements detailed in Appendix A.
High Voltage Switcher	A *High Voltage Switcher* is a person authorised by the *High Voltage Operator* to perform the safe switching of high voltage apparatus to restore power after a supply fault without a Switching Program Permit in accordance with the requirements detailed in Appendix A.
Recipient in Charge	An authorised *Recipient* responsible for accepting and relinquishing Permits and who is in charge of all *Recipients* signed onto that Permit in accordance with the requirements detailed in Appendix A.
Recipient	A person conducting work under a High Voltage Electrical Access Permit, Vicinity Authority, or Sanction to Test Permit, directly reporting to the *Recipient in Charge*.
Safety Observer	A competent person whose sole duty is to observe and warn personnel against unsafe approach to live apparatus and other safety hazards while a Working Party is engaged and in accordance with the requirements detailed in Appendix A. The person cannot perform any other work while undertaking the role of *Safety Observer*.

1.4 Referenced Documents

1.4.1 Legislation, Standards and Codes of Practice

Legislation, Standards and Codes of Practice referenced by this Electrical Isolation and Access Procedure are shown in Table 2 below. Where there is any discrepancy between this Electrical Isolation and Access Procedure and the Acts, Regulations and Standards referred to within it, the Acts, Regulations and Standards shall take precedence.

Table 2: Legislation, Standards and Codes of Practice

Reference	Title
Department of Mines, Industry Regulation and Safety	Code of Practice for Persons working on or near energised electrical installations
AS/NZS 3008.1.1:2017	Electrical Installations - Selection of cables - Cables for alternating voltages up to and including 0.6/1 kV - Typical Australian installation conditions
AS/NZS 3000:2018	Electrical installations (Wiring Rules)
Western Power/Horizon Power	Electrical System Safety Rules 2016
WA	Electricity (Licensing) Regulations 1991
WA	Electricity (Network Safety) Regulations 2015
WA	Electricity Act 1945
WA	Electricity Regulations 1947
Safe Work Australia	General guide for working in the vicinity of overhead and underground electrical lines
IEEE1584-2002	Guide for performing arc-flash hazard calculations
ENA C(b)1-2006	Guidelines for design and maintenance of overhead distribution and transmission lines
Department of Mines, Industry Regulation and Safety	Guidelines for the safe management of high voltage installations
Department of Mines, Industry Regulation and Safety	Guidelines for the safety of buildings near network operator electrical assets
NFPA 70E	Handbook For electrical safety In the workplace
Safe Work Australia	Model Code of Practice: Managing electrical risks in the workplace
ENA NENS 09-2014	National Guideline for the Selection, Use and Maintenance of Personal Protection Equipment for Electrical Arc Hazards
ENA NENS 03-2006	National guidelines for safe access to electrical and mechanical apparatus
ENA NENS 04-2006	National guidelines for safe approach distances to electrical and mechanical apparatus
Department of Mines, Industry Regulation and Safety	Safe working guidelines for electrical workers
AS 4836:2023	Safe working on or near low-voltage and extra-low voltage electrical installations and equipment
AS 2067:2016	Substations and high voltage installations exceeding 1 kV AC
Director of Energy Safety	WA Electrical Requirements 2023
Western Power/Horizon Power	Western Australian Service and Installation Requirements 2022
WA	Work Health and Safety (General) Regulations 2022
WA	Work Health and Safety Act 2020

1.4.2 *Southern Ports Documents*

Southern Ports documents referenced in this Electrical Isolation and Access Procedure are shown in Table 3 below.

Table 3: Southern Ports Documents

Reference	Title
D23/2427	Authority to Work
D19/6372	Arc Flash Protection Electrical Procedure
D18/2169	Barricading, Guarding and Signage Procedure
D16/1016	Electrical Access Permit
D16/3134	Electrical Sanction to Test Permit
D16/3116	Electrical Vicinity Authority Permit
D23/4742	Isolation and Tagging Procedure
D16/808	Low Voltage Electrical Procedure
D16/1002	Personal Protective Equipment Procedure
D16/716	Reporting and Investigating Electrical Events Procedure
D16/291	Switching Program Permit
D16/807	Temporary Disconnection and Safe Handling of Electrical Cables
D18/24902	Work Health and Safety Management Plan

1.5 Definitions

Definitions for terms used in this Electrical Isolation and Access Procedure are shown in Table 4 below.

Table 4: Definitions

Term	Definition
Alive, Live or Energised	Electrical equipment may be termed alive, live or energised where a potential difference exists between the electrical equipment and earth.
Appropriate	Being suitable to, or proper for, the duty concern.
Approved	Approved shall mean approved by an authorized *High Voltage Operator*.
Arc Flash	A dangerous condition associated with the possible release of energy caused by an electric arc.
Authorised	Having the permission of the appropriate authority for the duty concerned.
Barriers	Barriers may consist of natural boundaries, temporary erected structures or flagging, bunting and/or tape as appropriate to the work area.
Circuit Breaker / Auto Re-closer	An item of electrical apparatus designed to isolate an electrical system under conditions of load and/or fault currents.
Competent	Means having acquired the knowledge and skills enabling that person to perform the task required, in a safe and effective manner.
Conductors	A wire, cable or form of metal designed for carrying electric current.
Dead	An isolated electrical apparatus at an earth potential.
De-energised	Means equipment has been disconnected from all sources of electricity supply but not necessarily isolated earthed or out of commission.
Discharged	Means an electric charge has been removed by the application of a suitably earthed conductor.
Earthed	Electrical apparatus which is electrically connected to earth effectively ensuring an immediate and continuous discharge of electrical energy.
Electrical Equipment	Any appliance, wire, fitting, component, conduit or apparatus that uses, conveys or controls electricity which is live or can be made live.
Electrical Supervisor	A competent person, Authorised by a *Regional Manager*, who is given the overall responsibility for the operation, maintenance and safety of a defined high voltage system.

Table 4: Definitions

Term	Definition
Electrician	Person engaged in the installation, maintenance, repair or testing of electrical equipment and holding a current Western Australian Unrestricted Electrical Worker's license.
Extra-low Voltage	Voltages that are do not exceed 50 V_{AC} or 120 V_{DC}.
High Voltage Electrical Access Permit	A High Voltage Electrical Access Permit is a form of authorisation used to allow access to, and work upon, high voltage electrical apparatus.
High Voltage	A voltage in excess of nominal 1000 V_{AC} or 1500 V_{DC}
High Voltage Operator	The *High Voltage Operator* is a competent person Authorised by the Maintenance Manager to take responsibility for the Port's High Voltage system. The *High Voltage Operator* is the only person on site who can conduct the isolation of any high voltage equipment at the Port for access, maintenance or repair purposes.
High Voltage Switcher	A *High Voltage Switcher* is a competent person authorised by the Authorised *High Voltage Operator* who can operate a high voltage switch for the purposes of restoring power after a fault or for making a piece of equipment safe.
Isolated	The state of electrical apparatus which has been disconnected from all sources of supply and rendered incapable of being made live without premeditated and deliberate manual operation.
Isolator	A device, which for reasons of safety, provides a physical break in the circuit in the open position. The length of the break is dependent upon the voltage and the insulating medium.
Locked	Arranged so as to prevent any operation of electrical switches/apparatus and requires deliberate action with a key or tool to defeat the locked status.
Low Voltage	Voltage exceeding 50 V_{AC}. or 120 V_{DC} but not exceeding 1000 V_{AC}. or 1500 V_{DC}.
May, Should	Recommended, but discretionary.
Minimum Approach Distance	The minimum separation distance that must be maintained to a live electrical apparatus.
Must, Shall, Will	Mandatory.
Notification of Request	A formal request to perform work on or in the vicinity of High Voltage equipment requiring a formal Permit as described in this Electrical Isolation and Access Procedure.
Off	Any operation of a circuit breaker, isolator, switch, link, disconnector or the removal of approved earthing equipment, so as to break the associated electrical circuit.
On	Any operation of a circuit breaker, isolator, switch, link, disconnector or the application of approved earthing equipment, so as to connect the associated electrical circuit.
Prove	To Prove that High Voltage equipment is de-energised using an approved High Voltage testing device. The testing device shall be positively assessed both before and after testing on the isolated equipment. It is standard practice to prove the testing device is working correctly by testing both before and after on a manufacturer's supplied testing facility. If a manufacturer's supplied testing facility is not available, it is standard practice to prove the testing device is working correctly by testing both before and after on a known live conductor. All three phases of a High Voltage conductor shall be proven dead at the same location.
Program Earths	Earthing equipment applied as part of a High Voltage Switching Program.

Table 4: Definitions

Term	Definition
Recipient	A person conducting work under a High Voltage Electrical Access Permit, Electrical Vicinity Authority Permit, or Electrical Sanction to Test Permit, directly reporting to the *Recipient in Charge*.
Recipient in Charge	An authorised *Recipient* responsible for accepting and relinquishing Permits and who is in charge of all *Recipients* signed onto that Permit.
Remote Switching	Operation of a High Voltage Switch by means of remote switch not directly in vicinity of apparatus. The High Voltage Switch can be observed when switching.
Sanction to Test	The form of Authorisation that Permits the testing of High Voltage electrical apparatus.
Safe Approach Distance	The minimum separation in air from an exposed conductor that shall be maintained by a person, or any object (other than insulated objects designed for contact with live conductors) held by or in contact with that person.
Safety Observer	A *Safety Observer* is a person specifically assigned the duty of observing and warning against unsafe approach to equipment and other potential hazards. This is particularly important when working near live exposed high voltage equipment. This person must be competent in advanced cardiopulmonary resuscitation.
Switching Operation	Any action involved in de-energising, energising or earthing a portion of electrical apparatus in accordance with a prepared Switching Program. Actions by operators to stop and start plant are not switching operations as defined by this Electrical Isolation and Access Procedure.
Switching Program	A chronological sequence of events which shall be followed to make specific electrical apparatus: • Dead prior to work commencing; and • Energised following completion of work.
Vicinity Authority	The form of authorisation which allows work in the vicinity of high voltage electrical apparatus.
Workers	Workers at Southern Ports include Employees, Contractors and consultants who are performing work, but not Visitors.
Workplace	An area, ship, vehicle, building, or other structure, where employees work or are likely to occupy in the course of their work.
Working Party	All *Recipients* working under a Permit.
Working Earths	Working Earths are the responsibility of the recipient in charge and the Working Party. Working Earths are applied to provide obvious confirmation of Program Earths. They are applied following the issuing of a High Voltage Electrical Access Permit.

2 HIGH VOLTAGE

2.1 Permit System

The following formal Permits, as appropriate to the task, must be obtained for any High Voltage work at Southern Ports:

- High Voltage Electrical Access Permit
- Electrical Sanction to Test Permit
- Electrical Vicinity Authority Permit
- Switching Program Permit

The Permit forms are available for download from the Southern Ports Intranet. The form should always be downloaded from the Intranet to ensure that the latest approved copy is being used.

2.1.1 Switching Program Permit

The Switching Program Permit is required to be completed and approved by the *High Voltage Operator* prior to isolating or switching any High Voltage Equipment, including Circuit Breakers, Transformers, Cables, Fuses, Links, Isolators or Earth Switches.

Any switching must be planned prior to being conducted. Steps must be performed in the sequence as described on the Switching Program Permit.

A Switching Program is not required for the restoration of power following a supply fault.

2.1.2 High Voltage Electrical Access Permit

The Electrical Access Permit is required to be completed and approved by the *High Voltage Operator* before gaining access to any High Voltage equipment for the purposes of testing, inspection, maintenance, repair or any other activity, where the *Electrical Worker* may make contact with or infringe Safe Approach Distances to conductors or parts in the High Voltage equipment which are capable of being made live at High Voltage by normal switching or other means. For example, removal or installation of racked circuit breaker mechanisms, removal of transformer terminal box covers, removal of High Voltage switchboard panels, inspection of busbar.

The *High Voltage Operator* shall use the Electrical Access Permit to detail isolation and earthing and this shall be communicated to the *Recipients*.

Any *Recipient* may request that additional precautions be taken during the course of work and they shall be advised of this right prior to the commencement of work by the *High Voltage Operator* and the *Recipient in Charge*.

2.1.3 Vicinity Authority Permit

The Electrical Vicinity Authority Permit is required to be completed and approved by the *High Voltage Operator* before work is undertaken in an area in close proximity to energised High Voltage equipment.

This would normally be required by non-electrical workers who are required to work in the vicinity of energised High Voltage equipment. For example, a Working Party conducting vegetation control in a High Voltage transformer compound or mechanical work around a High Voltage cable reel or overhead line.

Clear communications shall be made by the *High Voltage Operator* to advise *Recipients* of an Electrical Vicinity Authority Permit of the safe working area, live points, and earthing.

The *High Voltage Operator* may use the Electrical Vicinity Authority Permit to mandate the use of barriers, signs and/or *Safety Observer*.

The *High Voltage Operator* shall disable any auto reclose devices and inform the *Network Operator* to prevent circuit re-closure, as necessary.

All *Recipients* of an Electrical Vicinity Authority Permit shall satisfy themselves concerning earthing or other precautions taken, the location of the points of supply and the proximity of any adjacent live conductors.

2.1.4 High Voltage Electrical Sanction to Test Permit

The Electrical Sanction to Test Permit is required to be completed and approved when it is necessary to work on an apparatus in such a manner that the apparatus may be made alive at high voltage from either normal or test sources.

It is a special form of Permit allowing the livening of apparatus and/or the connection of test equipment, and other work on or near apparatus which does not comply with the conditions for the issue of an access Permit.

For example, the Very Low Frequency testing of High Voltage cables. An Electrical Sanction to Test Permit shall not be on issue with an Electrical Vicinity Authority Permit or Electrical Access Permit at the same time.

If switching is required to set up the equipment for testing, the switching operations shall form part of the Switching Program Permit.

The *High Voltage Operator* may use the Electrical Sanction to Test Permit to mandate the use of barriers, signs and/or *Safety Observer*.

Each person involved in the testing must sign on to the Electrical Sanction to Test Permit before commencing the test and sign off, on completion of the tests.

2.2 Requirements

2.2.1 General

No person shall approach any exposed, normally live conductor, except as provided in this High Voltage Electrical Isolation and Access Procedure.

Each person shall assure themselves of their own safety and the safety of those working under their direction by following the approved procedure for ensuring that conductors are dead and an Electrical Access Permit, Electrical Vicinity Authority Permit or Electrical Sanction to Test Permit is issued before work commences.

Approaching live conductors or electrical apparatus not confirmed as isolated and earthed shall be avoided at all times.

Work shall not be performed on live high voltage conductors unless conducted in accordance with live line working procedures.

For the purpose of this Electrical Isolation and Access Procedure, work of an operational nature such as turning on or off circuit breakers, switches, isolators or similar control devices and the removal or replacement of drop out fuses shall not be regarded as work on live electrical apparatus.

A failure of the supply does not render electrical apparatus safe to be worked upon until such time as the electrical apparatus is isolated, earthed and an Electrical Access Permit is issued in accordance with these procedures

2.2.2 Authority to Work

Authority to Work upon or within the vicinity of any high voltage electrical apparatus shall be obtained before any work is commenced.

Work on electrical apparatus which can be made live by a switching operation or by any other means shall be conducted under an Electrical Access Permit, Electrical Vicinity Authority Permit or Electrical Sanction to Test Permit, as appropriate.

Every person involved in the area of work shall be included in the authorisation.

The Electrical Access Permit, Electrical Vicinity Authority Permit or Electrical Sanction to Test Permit shall include details of location and a clear description of the electrical apparatus which is the subject of the necessary work or working area including adjacent live apparatus and hazards.

The precautions taken to ensure that such work can be safely performed shall be explained to those persons involved in and conducting the work by the *High Voltage Operator*.

2.2.3 Carrying Equipment near Live High Voltage Conductors

Extreme care shall be exercised to avoid accidental contact between live conductors and any tools, ladders or equipment being carried in the proximity of live conductors. When in the vicinity of overhead conductors or overhead electrical apparatus, ladders shall be carried below waist height by two persons.

2.2.4 Minimum Approach Distances

Unnecessary approach to live conductors or contact with parts not confirmed as dead shall be avoided at all times.

At Southern Ports, Minimum Approach Distances to Live Electrical Conductors or Equipment shall follow Western Power/Horizon Power's Electrical System Safety Rules. Relevant extracts are reproduced in Appendix B.

Although not all Southern Ports sites have uninsulated Overhead High Voltage Conductors, the Western Power/Horizon Power Electrical System Safety Rules information is included here for completeness and for the awareness, information and safety of *Electrical Workers* and other personnel employed at Southern Ports.

No part of a Person's body, material, equipment, vehicle or machinery not insulated for the voltage concerned must come closer than the Minimum Approach Distances for live exposed electricity works specified in Appendix B, unless specific procedures approved by the *High Voltage Operator*, including barriers or live working techniques or other procedures are utilised.

2.2.5 Work Health and Safety Regulations – Overhead Conductors

Under the Work Health and Safety (General) Regulations 2022, no ordinary (i.e. unauthorised) Person may enter the Danger Zone around live overhead electrical conductors which is defined as:

- Within 0.5 metres of a live insulated overhead power line or aerial bundled conductor line of a voltage of not more than 1,000 volts.
- Within 1.0 metre of a live uninsulated overhead power line of a voltage of not more than 1,000 volts.
- Within 3.0 metres of a live overhead power line, whether insulated or not, of a voltage exceeding 1,000 volts but not more than 33,000 volts.
- Within 6.0 metres of a live overhead power line, whether insulated or not, of a voltage exceeding 33,000 volts.

High Voltage Cables – Approach Distances

The minimum approach distance to a High Voltage cable at Southern Ports shall be as indicated in Table 7 of Appendix B.

No work in close proximity to an underground or exposed High Voltage cable shall be performed without the approval of the *High Voltage Operator* and the any necessary High Voltage Permits completed.

A person operating a powered tool or plant shall not operate it within 500 mm of a 6.6 kV or 11 kV cable at the Southern Ports without approval from the *High Voltage Operator*.

2.2.6 Ring Main Unit Earth Switches

The Earth Switches are mechanically interlocked with the Isolator.

When open or closed, the Earth Switch must be locked with the padlock fitted to the locking mechanism.

If closed as part of a Switching Program, the high voltage isolation lock shall be fitted with a High Voltage Isolation Tag.

2.2.7 Communications

Communications relating to the operation of, or access to, electrical apparatus shall be clear and concise.

Electrical apparatus shall be referred to by its specific name and number.

Verbal instructions, either in person, by telephone or radio shall be confirmed by repeating the message back to the originator to avoid any misunderstanding.

2.2.8 Reporting of Hazards and Incidents

Reporting Hazards

Personnel shall report to their immediate supervisor all hazards due to defective electrical apparatus which may come to their attention.

The supervisor shall implement immediate action to rectify any defects, or to isolate and earth the faulty equipment.

Details of incidents, hazards and action taken shall be recorded in the site Electrical Record Book.

Reporting Incidents

All electrical incidents that occur in Western Australia, irrespective of their seriousness, must be reported.

Immediately report electrical incidents at Southern Ports to the *Electrical Supervisor*. Refer to the Southern Ports Reporting and Investigating Electrical Events Procedure.

The *Electrical Supervisor* is responsible for notifying the Maintenance Manager and the relevant Network Operator:

- Western Power (13 13 51)
- Horizon Power (13 23 51)
- If the person making the report cannot identify the network operator, the accident must be reported to the Director of Energy Safety at Building and Energy (1800 678 198).

2.2.9 Cables

No work shall commence on any cable until it is positively identified, and a Permit is issued.

Each cable shall be positively identified in the presence of the *High Voltage Operator* by use of cable plans showing cable route and by suitable test equipment.

2.2.10 Isolation and Tagging

Isolation and tagging procedures are detailed in the Southern Ports Isolation and Tagging Procedure. The Isolation and Tagging Procedure is to be followed when locking out High Voltage apparatus.

In the case of High Voltage Apparatus and equipment, the Roles of the competent persons *Individual Isolator* and *Group Isolator*, as defined in the Southern Ports Isolation and Tagging Procedure, are to be performed only by the authorised *High Voltage Operator*.

An Isolation Point, as defined under the Southern Ports Isolation and Tagging Procedure, is a point where an energy source can be visibly disconnected or inhibited, de-energised and locked out.

Each High Voltage switch, isolator or earth switch which is switched to the off position for the purpose of isolating a section of electrical apparatus or equipment shall be fitted with an Isolation Lock and Isolation Tag by the *High Voltage Operator*.

The *Recipient in Charge* shall then ensure that the Working Party attaches their Personal Locks complete with Personal Danger Tags to the Isolation Point by means of a Hasp and/or Lock Box, as appropriate, and as per the instructions in the Southern Ports Isolation and Tagging Procedure and to the approval of the *High Voltage Operator*.

The *High Voltage Operator* shall sign Isolation Tags with details of the Permit number and a description of the electrical apparatus.

After work has been completed, the *Recipient in Charge* is responsible to ensure that all Personal Danger Tags and Locks have been removed from the Isolation Points before signing off the Permits with the *High Voltage Operator*.

Once all the Personal Locks and Personal Danger Tags are removed and the Permits relinquished to the satisfaction of the *High Voltage Operator*, the *High Voltage Operator* can cancel the Permit and remove the Isolation Locks in preparation for the safe energisation of the apparatus or equipment.

2.2.11 Repair or Replacement of Electrical Apparatus

Any cable tails exposed when electrical apparatus has been removed for repair shall be shown to be dead by the visible application of shorting and earthing conductors bolted solid to cable terminals.

Repaired or replaced electrical apparatus shall pass appropriate insulation resistance tests, phasing tests and voltage tests before being energised.

Such tests shall be recorded in the site Electrical Log Book.

An **Out of Service** tag shall be fitted to the earthed cable tails of cables that are removed from service.

2.2.12 Testing Instruments

All test instruments used to detect whether electrical apparatus is alive or de-energised shall be proved to be in correct working order visual inspection shall be made for physical damage or contamination before and after each use.

Test instruments and test apparatus shall be calibrated and assessed by an approved and qualified testing authority on a six monthly basis and be marked to show the date of the next routine test. Records of such tests shall be kept on site.

Test instruments will also include all hot sticks, earth sticks, gloves, barriers, covers, portable earthing devices and other equipment used for operating High Voltage apparatus.

2.2.13 Familiarity with Installation

The *Electrical Supervisor* shall maintain constant monitoring of the electrical network so as to verify the validity of the relevant single line system diagram.

Action shall be taken to have any discrepancies rectified as a matter of urgency.

*High Voltage Operator*s and *Recipients* in charge shall maintain familiarity with the electrical apparatus for which they have been authorised.

2.2.14 Operating Records

The *Electrical Supervisor* shall be responsible for maintaining a central file of master programs, completed Switching Programs, High Voltage Electrical Access Permits, High Voltage Electrical Vicinity Authority Permits and High Voltage Electrical Sanction to Test Permits.

The *Electrical Supervisor* shall be responsible for the recording control of High Voltage keys issue.

2.2.15 Posting of Safety Observers

When deemed necessary by the *High Voltage Operator* or requested by the *Recipient in Charge*, *Safety Observers* shall be posted and a record made on the Permit.

*Safety Observer*s shall be appointed by the *High Voltage Operator* who shall give them specific instructions as to the nature of their duties on each occasion that they are posted.

2.2.16 Personal Protective Equipment

Separate Southern Port guidelines should be referred to regarding the specific requirements for personal protective equipment. However, the minimum requirements below apply to all personnel conducting switching operations:

- safety boots;
- trousers (Cat 2);
- long sleeved shirts and jackets (Cat 2);
- approved leather gloves;
- safety glasses;
- safety helmet with face shield for switching operations.

All Safety clothing shall be category rated in accordance with National Fire Protection Association NFPA 70E Standard for Electrical Safety in the Workplace.

Any person performing switching of Live High Voltage Circuit Breakers and standing directly in front of the equipment must wear:

- cotton underwear;
- non-flammable socks;
- 40 calories/cm2 arc flash suit;
- 40 calories/cm2 arc flash face shield;
- hearing protection;
- safety glasses; and
- leather boots.

2.2.17 Switching Program

Prior to preparing a Switching Program, a Notification of Request, may be submitted, if necessary, which takes into account all available information regarding the current status of the electrical apparatus concerned.

The Switching Program shall clearly describe each step necessary to make dead specific electrical apparatus and shall include details of the equipment, its location and identification and the switching operation required.

The Switching Program shall be written in such a manner that the required switching operation causes the minimum disruption to the electrical system.

The Approved *High Voltage Operator* may prepare the Switching Program. A second High Voltage Operator shall check the Switching Program, other than the author of the program, who is familiar with the relevant electrical apparatus.

The Switching Program may only be executed once approved by the *High Voltage Operator* and at the time of approval.

If execution of the Switching Program is not immediate upon approval, re-approval by the *High Voltage Operator* just prior to execution is necessary.

Any difficulties encountered in conducting a Switching Program shall be rectified by the *High Voltage Operator* and endorsed by the *High Voltage Operator Electrical Supervisor*.

The changes shall be noted on the file copy of the Switching Program.

The time that each step, as detailed on the Switching Program is performed, shall be written into the appropriate column on the Switching Program.

A Switching Program may be filed as a master Switching Program as a controlled document for specific switching circumstances which may be repeated.

However, prior to approval of the master program, the network conditions shall be verified as being consistent with the program steps and shall be approved for use on such occasion by an *Electrical Supervisor* or *High Voltage Operator*.

2.3 Procedure

2.3.1 Switching Operations

Isolating

Switching operations on high voltage electrical apparatus shall only be performed by an Authorised *High Voltage Operator* or *High Voltage Switcher*.

Switching operations shall be conducted only in accordance with the prepared Switching Program.

Switch operating mechanisms with metal handles or operator earth mats shall be visually checked to ensure their connection to the earthing system before operating.

After switching, the correct operation of the switch or isolator shall, where practicable, be visually confirmed.

The electrical apparatus shall also be assessed with approved testing instruments to prove that the electrical apparatus is de-energised.

Switches and isolators operated to de-energise electrical apparatus shall be securely locked in the off position.

Isolation Tags shall be placed on each switch or isolator.

When electrical apparatus is equipped with remote or automatic operation, the control circuits shall be rendered inoperative and Isolation Tags attached.

Earthing

Under no circumstances shall the neutral or earth of a low voltage distribution system be used, or be regarded, as a suitable electrode.

Earthing equipment shall only be connected after the electrical apparatus has been proven to be de-energised by approved test equipment and after the test instrument has been proved to operate correctly.

The earth must then be immediately applied.

Whenever practicable, earthing shall be accomplished by the use of the equipment integral earthing switches and these shall be locked in position and Equipment Isolation

tags shall be placed. Approved earthing equipment shall be used to short circuit and earth all conductors where integral earthing switches are not incorporated.

Approved portable earthing equipment shall first be connected to a high voltage earthing system or to an earth electrode driven for this purpose before connection to de-energised conductors.

Approved earthing equipment shall be connected immediately after each point of isolation of the high voltage supply.

In addition, local earthing equipment shall be applied within sight of the actual work area.

Approved earthing equipment shall be positioned such that the connections remain effective even though adjacent electrical apparatus may be disconnected.

The *High Voltage Operator* shall inspect the *a*pproved earthing equipment at regular intervals whilst work is in progress to ensure its continued effectiveness.

The *High Voltage Operator* must complete program earthing.

These earths shall be applied before issue of the High Voltage Electrical Access Permits or High Voltage Electrical Sanction to Test Permit.

The *Recipient in Charge* is responsible for the application and removal of all working earths on site, which may be applied after the issue of the High Voltage Electrical Access Permit but shall be removed prior to cancellation of the High Voltage Electrical Access Permit and with the approval of the *High Voltage Operator*.

Where additional working earths are necessary, the *High Voltage Operator* shall clearly nominate the safe working zone where such earths may be applied under the direction of the *Recipient in Charge*.

Once the *Recipient in Charge* fully understands the safe working zone, the *High Voltage Operator* may issue the Permit.

The working earths may only be applied within the safe working zone as directed by the *Recipient in Charge* and shall be recorded in the High Voltage Electrical Access Permit, High Voltage Electrical Vicinity Authority Permit or High Voltage Electrical Sanction to Test Permit.

Earthing Removal

Removal Earthing equipment detailed in the Switching Program, shall only be removed under the supervision of the *High Voltage Operator*. Portable earthing equipment shall be first disconnected from the conductors before being disconnected from the earthing system.

Energising

Switching operations on high voltage electrical apparatus shall only be performed under the direct control of a *High Voltage Operator*.

The *High Voltage Operator* shall ensure that the electrical apparatus is clear and ready for energising and that a High Voltage Electrical Access Permit, High Voltage Electrical Vicinity Authority Permit or High Voltage Electrical Sanction to Test Permit has been cancelled in accordance with this Electrical Isolation and Access Procedure.

Switching operations necessary to energise the electrical apparatus shall be conducted in accordance with the Switching Program.

A *High Voltage Operator* may regard all electrical apparatus which they control as being clear and ready for energising provided no High Voltage Electrical Access Permit, High Voltage Electrical Vicinity Authority Permit or High Voltage Electrical Sanction to Test Permit covering the apparatus is on issue, or notification of any kind, including the existence of Isolation or Personal tags, has been received to the effect that the apparatus is unfit for being made alive.

If any electrical apparatus becomes de-energised due to automatic opening or other cause it must be assumed by all personnel that it may immediately be energised.

All work must cease until the integrity of the isolation is confirmed.

Remote Switching

Remote switching devices installed may be used without the Personal Protective Equipment requirements being met.

The remote switching of any High Voltage switch shall follow the following protocols:

- To be used by authorised/trained personnel only (*High Voltage Switcher*).
- Be used for re-energisation only after load shed event.
- Inspection of High Voltage switch must take place before and after to confirm position of High Voltage switch.
- Inspection of High Voltage Sub to ensure that no personnel are located inside the substation room during operation of switch.
- Line of sight maintained during switching.

Emergency Switching

Emergency switching is unplanned switching where safety of personnel is at risk, or for preventing damage to plant.

In emergency switching conditions, switching may be required where a written program has not been prepared.

The device operated and time of operation shall be recorded by the *High Voltage Switching Operator* and the reasons and actions taken, recorded in the Electrical Log Book.

All instances of emergency switching shall be recorded in the Electrical Log Book and the Maintenance Manager notified.

2.3.2 Permits

No High Voltage work is to be undertaken without an authorised Permit except as otherwise described in this Electrical Isolation and Access Procedure.

Radio, Telephone and Fax Communications

No High Voltage Electrical Access Permit, High Voltage Electrical Vicinity Authority Permit or High Voltage Electrical Sanction to Test Permit shall be issued by radio, telephone, facsimile or electronic means nor verbally communicated.

These Permits shall be issued in person by the *High Voltage Operator* to the *Recipient in Charge* using the approved forms. However, approval of Switching Programs may be conducted by email and scanning.

Emergency switching operations or instructions may be issued by telephone or radio in accordance with this procedure.

Only *High Voltage Operators* are authorised to issue and follow switching instructions via radio or telephone.

2.3.3 Records Management

The following completed documents may arise as a consequence of executing this procedure and shall be filled in the *Electrical Supervisor's* office:

- High Voltage Electrical Access Permit
- Electrical Sanction to Test Permit
- Electrical Vicinity Authority Permit

- Switching Program Permit
- Template - High Voltage Authorised Person Appointment

APPENDIX A: PERMIT SYSTEM ROLES AND RESPONSIBILITIES

Detailed roles and responsibilities for High Voltage Electrical isolation and access are shown in Table 5 below.

Table 5: Permit system – Roles and Responsibilities

Role	Responsibilities
High Voltage Operator	The *High Voltage Operator* is the person Appointed by the *Resident* Maintenance Manager and is responsible for the following: • Overall responsibility and accountability for the operational safety of High Voltage personnel and the High Voltage system • Issuing of High Voltage Permits – Electrical Access Permit, Vicinity Authority, Sanction to Test • Preparation and approval of Switching Programs • Switching of High Voltage equipment • Application of earths • Proving that apparatus or equipment is de-energised • Liaison and co-ordination with other internal and external parties • Review and approve associated *Job Hazard Analysis*'s • Install barriers where necessary, to clearly define the work zone • Describe and where practicable, show the *Recipient in Charge* and the initial *Recipients* the following: • Limits of the work zone • Isolating arrangements • Location of the applied program earths • Adjacent live points • Approval of *Recipients* in Charge and *Recipients* • Approval of Safety Observers • Cancellation of the Permits, first ensuring that all *Recipients* have been accounted for and that the Permit is relinquished by the *Recipient in Charge* • Maintain and test Personal Protective Equipment • Assess qualifications and competency for *High Voltage Operators* and *High Voltage Switchers*. • Request the Registered Maintenance Manager Approval for a new High Voltage Operator appointment. • Reporting to Regulatory Authorities • Maintaining records of all Permits and Switching Programs issued • Co-ordinate Multiple working parties Minimum Selection Criteria • Electrical trade or relevant qualifications • Demonstrated knowledge to the satisfaction of the *Electrical Supervisor* of: ○ Electrical Protection fundamentals ○ Fault finding ○ Approved Switching Course ○ High Voltage equipment ○ Completed a High Voltage Course and continued refreshers. ○ Positive safety record ○ System network knowledge ○ Current Advanced First Aid certificate including CPR training ○ Thorough understanding of relevant codes, regulations, procedures ○ Power generation and/or distribution experience

Table 5: Permit system – Roles and Responsibilities

Role	Responsibilities
High Voltage Switcher	The *High Voltage Switcher* is authorised by the *High Voltage Operator* to safely switch high voltage apparatus to restore power after a supply fault and is responsible for: • Safety of operations personnel and plant affected by the switching. • Communication with Operations or Maintenance Personnel or *Supervisors*, as appropriate. • Wearing of appropriate Personal Protective Equipment during switching operations. • Use remote switching facilities where installed. • Ensuring that there are no other current Permits which may interfere with the intended work Minimum Selection Criteria • System Network Knowledge • Must be inducted • Shall be fit for work • Shall be experienced in Advanced first aid/CPR • Shall demonstrate an understanding of the work to be performed • Shall demonstrate an understanding of the danger around the working area • Shall have qualifications and experience appropriate to the type of work being undertaken • Completed a High Voltage Course and continued refreshers. • Shall demonstrate competency in High Voltage Switching • A minimum of 3 years' experience in high voltage networks • Appointment will be at the discretion and approval of the *High Voltage Operator*
Recipient in Charge	The *Recipient in Charge* has the overall responsibility for their Working Party's safety under the terms of the High Voltage *Electrical Access Permit*, *Vicinity Authority* or *Sanction to Test* and is responsible for the following: • To understand the apparatus to be covered and to be satisfied that the Permit meets the Working Party's needs. • To understand what is to be done, how it will be done and what equipment will be used. • Be satisfied that the precautions are satisfactory. • To ensure that all *Recipients* understand and are satisfied with the precautions taken and the conditions of the Permit. • To completion a Job Hazard Analysis (*Job Hazard Analysis*) in collaboration with the Working Party. • To make any special request for additional isolation, earthing, fuse removal, and so on. • To sign on to the Permit as *Recipient in Charge* and to ensure that all *Recipients* sign on to the Permit and apply their personal lock and danger tag as required. • The *Recipient in Charge* can only sign onto one Permit at a time. • Wherever practicable, check all points of isolation. Consideration being given to items of plant unearthed at the work site, like underground cables. • To ensure that any additional working earths are applied before any work commences. • To communicate to the Working Party the duration of the Permit and when they may commence work. • To be broadly familiar with the experience of each member of the Working Party and to be satisfied they can work safely under the Permit. • Prior to the issue of the Permit, to discuss with the *High Voltage Operator* and reach agreement on all aspects relating to the work and the Permit and in

Table 5: Permit system – Roles and Responsibilities

Role	Responsibilities
	particular, the earthing requirements. If this agreement is not reached, the *Recipient in Charge* has a right and responsibility to reject the Permit. • To obtain permission from the *High Voltage Operator* if additional equipment is to be operated, or additional working earths are to be fitted within the work zone. • To continually monitor the work zone for any changes that may occur that may impact the safety of the Working Party and to communicate these changes to the Working Party. • To ensure that all members of the Working Party are trained as appropriate and fully capable of working safely. • Confirm any instruction given to *Safety Observer*s by the *High Voltage Operator*. • In the case of additional *Recipients*, ensure that they are given full and complete instruction and sign onto the Permit. • To ensure that all *Recipients* are informed of any change in conditions under which the *Recipients* are working. • To ensure that when *Recipients* leave the work area on completion of their work, they sign off the Permit and remove their personal danger tags. • To notify the *High Voltage Operator* that the work has ceased, that all personnel have left the work site and to request cancellation of the Permit by the *High Voltage Operator*. • To ensure that the Permit is displayed or accessible at the work site at all times during the periods of work and that the Permit does not leave site. • To ensure *Recipients* wear appropriate personal protective equipment. • In the case of *Recipients* returning after a temporary absence, ensure that they are given full and complete instruction. • Provide, on request, a suitable *Recipient* to accompany visiting supervisory staff while inspecting the work. • Ensure that in the event of a changeover of *Recipient in Charge*, that the outgoing *Recipient in Charge* signs off the Permit and explains the isolations to the new *Recipient in Charge*. The new *Recipient in Charge* shall sign onto the Permit and take responsibility for the *Recipients* and that this is authorised by the *High Voltage Operator*. • Remove all working earths that were applied after Permit issue. • Inspect the work site for hazards in order to allow for safe energisation after Permit cancellation. • Notify the *High Voltage Operator* responsible for the issue of the Permit of any missing *Recipients* that have not signed off the Permit. The *Recipient in Charge* may sign off missing *Recipients* only with the authorisation of the *High Voltage Operator* Minimum Selection Criteria The *Recipient in Charge* must have: • Familiarity of equipment covered by the Permit. • Positive safety record. • Current Senior First Aid certificate, including Advanced Cardiopulmonary Resuscitation training. • Demonstrated understanding of Southern Ports procedures. • Demonstrate good communications skills. • Must be inducted and shall be fit for work. • Shall demonstrate an understanding of the hazards around the working area. • Shall have qualifications and experience appropriate to the type of work being undertaken. • Shall be approved at the discretion of the *High Voltage Operator*. Additional *Recipient in Charge* Responsibilities for Sanction to Test:

Table 5: Permit system – Roles and Responsibilities

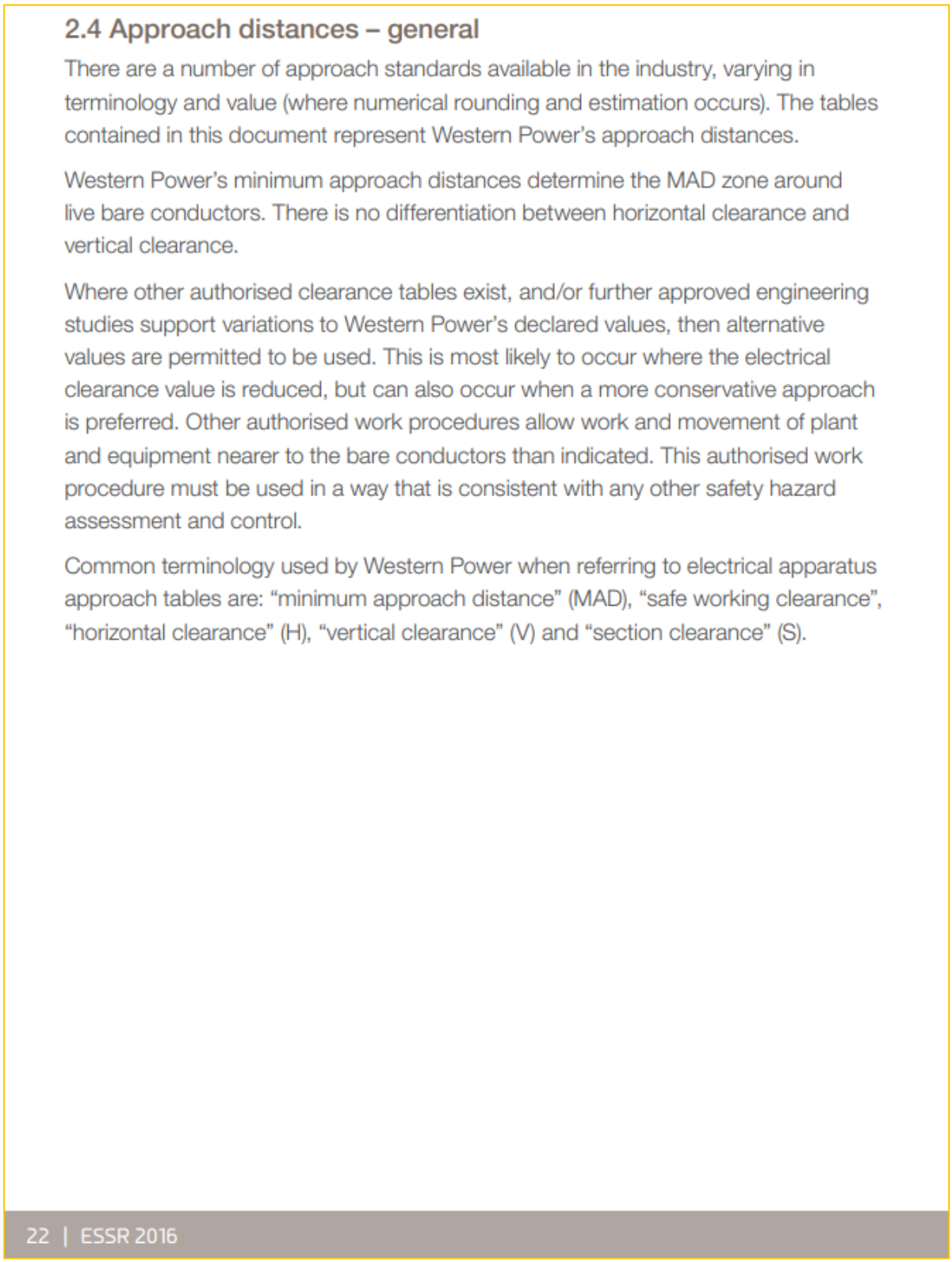
Role	Responsibilities
	The *Recipient in Charge* is the 'authorised tester' to whom a Sanction to Test Permit has been issued whose additional responsibilities include: • Ensuring that isolation (including secondary isolation) and earthing has been conducted and are adequate for the safe performance of the intended work or tests. • Ensuring the safety of adjacent work parties, by informing the *High Voltage Operator* when equipment is due to be energised. • Obtain permission from the *High Voltage Operator* if equipment is to be operated, earths are to be removed or additional earths are to be fitted, within the zone approved by the *High Voltage Operator*. This approval may be given in writing on the Permit when it is first issued. (The issuing *High Voltage Operator* must ensure that the zone is isolated to allow for safe testing within the zone). • Relinquishing the apparatus in the same condition, in which it was received, whenever possible, or advising the *High Voltage Operator* and entering details of any changes on the 'relinquishment' section of the Permit. • Ensuring that all *Recipients* sign off on completion of the work and tests. Similar conditions apply as for the cancellation of an access Permit. • Notifying the *High Voltage Operator* that work has ceased and all personnel have left the work site. Minimum Selection Criteria • Trade or tertiary qualifications. • Qualifications and or experience on equipment covered by the Sanction to Test. • Positive safety record. • Senior First Aid Certificate including Advanced CPR training. • Demonstrated understanding of Southern Ports procedures. • Demonstrate good communications skills.
Recipient	The *Recipient* conducts work under an High Voltage Electrical Access Permit, High Voltage Electrical Vicinity Authority Permit or High Voltage Electrical Sanction to Test Permit and is responsible for: • Understanding the Permitted area of access. • Understanding the Isolation Points. • Understanding where the earthing has been conducted and be satisfied that it is adequate. • Knowing the location of adjacent live points. • Signing on to the Permit and attaching a personal danger tag as appropriate before the work commences. • Checking the current conditions or status of the Permit with the *Recipient in Charge* after a temporary absence from the site. • Signing off the Permit where necessary and removing their personal danger tag after completion of work and prior to leaving site. • Notifying the *Recipient in Charge* prior to leaving site. • Wearing appropriate personal protective equipment. • Contributing to the *Job Hazard Analysis*. • Shall be approved by a High Voltage Operator or Recipient in Charge. Minimum Selection Criteria • Must be inducted. • Shall be fit for work. • Shall demonstrate an understanding of the work to be performed. • Shall demonstrate an understanding of the danger around the working area. • Shall have qualifications and experience appropriate to the type of work being undertaken.

Table 5: Permit system – Roles and Responsibilities

Role	Responsibilities
Safety Observer	The *Safety Observer* observes and warns personnel against unsafe approach to live apparatus and other safety hazards and is responsible for: • Understanding the Permitted area of access. • Understanding the Isolation Points. • Understands where the earthing has been conducted and is satisfied that it is adequate. • Knowing the location of adjacent live points. • Signing onto the Permit and attaching a personal danger tag before the work commences. • Checking the current conditions or status of the Permit with the *Recipient in Charge* after a temporary absence from the site. • Signing off the Permit where necessary and removing their personal danger tag after completion of work and prior to leaving site. • Notifying the *Recipient in Charge* prior to leaving site. • Wearing appropriate personal protective equipment. • Contributing to the Job Hazard Analysis. • Shall be approved by a *High Voltage Operator* Minimum Selection Criteria • Must be inducted. • Shall be fit for work. • Shall demonstrate an understanding of the work to be performed. • Shall demonstrate an understanding of the danger around the working area. • Shall have qualifications and experience appropriate to the type of work being undertaken. • Senior First Aid certificate including advanced Cardiopulmonary resuscitation. • Completed a rescue course for electrical Incidents. • Approved at the discretion of the *High Voltage Operator* or *Electrical Supervisor*.

APPENDIX B: MINIMUM APPROACH DISTANCES

The following tables are an extract from Western Power/Horizon Power's Electrical System Safety Rules 2016. Although not all Southern Ports have uninsulated Overhead High Voltage Conductors, this information is included here for completeness and for the awareness and information of Electrical Workers and other personnel employed at Southern Ports. Minimum Approach Distance (MAD) applies to live electrical conductors. The Minimum Approach Distances for High Voltage Electrical Cables given in the tables of this Appendix shall be adhered to at all times unless the *High Voltage Operator* gives approval.



2.4 Approach distances – general

There are a number of approach standards available in the industry, varying in terminology and value (where numerical rounding and estimation occurs). The tables contained in this document represent Western Power's approach distances.

Western Power's minimum approach distances determine the MAD zone around live bare conductors. There is no differentiation between horizontal clearance and vertical clearance.

Where other authorised clearance tables exist, and/or further approved engineering studies support variations to Western Power's declared values, then alternative values are permitted to be used. This is most likely to occur where the electrical clearance value is reduced, but can also occur when a more conservative approach is preferred. Other authorised work procedures allow work and movement of plant and equipment nearer to the bare conductors than indicated. This authorised work procedure must be used in a way that is consistent with any other safety hazard assessment and control.

Common terminology used by Western Power when referring to electrical apparatus approach tables are: "minimum approach distance" (MAD), "safe working clearance", "horizontal clearance" (H), "vertical clearance" (V) and "section clearance" (S).

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Figure 1: ESSR Page 22

2.5 Approach distances for persons

2.5.1 Authorised persons

Table 2.1: Approach distances for authorised persons

Voltage	Distance (mm)
Up to 1,000	Avoid Contact
6,600	700
11,000	700
22,000	700
33,000	700
66,000	1,000
132,000	1,200
220,000	1,800
330,000	3,000

Note: These represent nominal minimum personal clearances. A reduction in the values shown in Table 2.1 is permitted where authorised work methods and/or barriers and/or insulation may be in use. Increases in these values may be required when the risk assessment and work methods support it.

Note[1]: For authorised Live Work, refer to the clearances from Western Power's High Voltage Live Work Manual.

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Figure 2: ESSR Page 23

2.5.2 Ordinary persons

Table 2.2: Approach distances for ordinary persons

Voltage	Distance (mm)	Distance (mm)[1]
Up to 1,000	1,000	1,000
6,600	3,000	2,000
11,000	3,000	2,000
22,000	3,000	2,000
33,000	3,000	2,000
66,000	6,000	Not Permitted Live
132,000	6,000	Not Permitted Live
220,000	6,000	Not Permitted Live
330,000	6,000	Not Permitted Live

Note[1]: After consultation with Western Power, completion of a risk assessment and while under direct (constant) supervision of a duly authorised person.

Figure 3: ESSR Page 24

2.6 Approach distances for plant, equipment and vehicles

2.6.1 Approach distances for plant, equipment and vehicles operated by authorised persons

Table 2.3: Approach distances for plant, equipment and vehicles operated by authorised persons

	Mobile Plant		Vehicles
Voltage	Insulated Distance (mm)	Uninsulated Distance (mm)	Distance (mm)
Up to 1,000	Contact allowed	1,000	600
6,600	700	1,200	700
11,000	700	1,200	700
22,000	700	1,200	700
33,000	700	1,200	700
66,000	1,000	1,400	1,000
132,000	Not applicable	1,800	1,200
220,000	Not applicable	2,400	1,800
330,000	Not applicable	3,700	3,000

Note: A safety observer must be used according to approved procedures when working with vehicles and mobile plant on or near electrical apparatus.

Note[1]: For authorised live work refer to the clearances in Western Power's High Voltage Live Work Manual.

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Figure 4: ESSR Page 25

2.6.2 Approach distances for plant, equipment and vehicles operated by ordinary persons

Table 2.4: Approach distances for plant, equipment and vehicles operated by ordinary persons

	Mobile Plant	Vehicles
Voltage	Distance (mm)	Distance (mm)
Up to 1,000	1,000	600
6,600	3,000	900
11,000	3,000	900
22,000	3,000	900
33,000	3,000	900
66,000	6,000	2,100
132,000	6,000	2,100
220,000	6,000	2,900
330,000	6,000	3,400

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Figure 5: ESSR Page 26

2.7 Approach distances to insulated cables

In all circumstances insulated cables must be treated as live unless proved otherwise using approved procedures.

A VA permit must be issued prior to using a powered tool for excavation within the MAD or physically moving the high voltage cable to ensure that the controller is aware of the risk to the system.

Refer to the relevant Work Instruction/Practice for further information.

Table 2.5: Minimum approach distances to insulated cables

Nominal Voltage	Powered tool or plant (mm)	Non-powered hand tool/ non-destructive digging
Up to 1,000	300	Approach with care, avoid contact
1,000 to 33,000[1]	500	Approach with care, avoid contact
66,000 to 330,000[2]	3,000	Approach with care, avoid contact

Note: Powered tools may be used at distances of 1000mm or more from underground cables between 66,000 volts and 330,000 volts providing:

i. *Appropriate hazard identification and risk assessment methodology has been used*

ii. *Potholing has identified the relevant cables; and*

iii. *Non-powered hand tools can then be used from 1,000mm to the relevant cable/s.*

Note[1]: Less than 500mm hand dig.

Note[2]: Less than 3,000mm: For distances less than 3,000m, an appropriate hazard identification and risk assessment methodology must be used and the cable's

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Figure 6: ESSR Page 27