

**Engineering System Integrity
Electrical Network Safety Rules**

**Engineering Procedure
Electrical Distribution Unit**

Electrical Distribution Network Management

PR D 78202

Working High Voltage Instruction

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Document control

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1 Purpose and scope

To describe the procedures required for the issuing and cancellation of a Working High Voltage Instruction (WHVI) form (*PR D 78202 FM01 Working High Voltage Instruction*) for working near or on/within Transport Asset Holding Entity of New South Wales (TAHE)'s High Voltage (HV) AC aerial lines and cables outside substations.

2 Definitions

Refer to the **Electrical Safety Definitions** page available on the **RailSafe** site.

3 General

A WHVI must specify:

- a. The HV aerial lines or cables and Low Voltage (LV) aerial lines where required, that need to be isolated and earthed.
- b. The date and time of isolation.
- c. Any necessary Special Instructions. These must include:
 - i. Details of other Electrical Network Operators' services for which an Operating Agreement must be received to allow work to be carried out.
 - ii. For HV aerial lines:
 - o All feeders carried on the poles concerned, distinguishing between those which are to be isolated and earthed and those which are to be treated as live.
 - o Any exposed electrical equipment that is located under the isolated line within the work area, such as LV aerial lines, 1500 Volt OHW etc.
 - o Any HV equipment that crosses over the isolated line within the work area and which may present a hazard.
 - iii. For HV cables:
 - o All cables in the trench, troughing or on a cable tunnel shelf at the worksite, distinguishing between those which are to be isolated and earthed and those which are to be treated as live.
 - iv. Reference to any other WHVI which may be affected by, or is associated with this WHVI.
- d. Switching operations required to:
 - Isolate the High and Low Voltage aerial lines or cables and to earth them where applicable, and the location of safety earths.
 - Maintain supply to other areas of the Sydney Trains Electrical Network.
 - Maintain continuity of earthing, checking bridges disconnected, etc.
- e. The area in which Permits and/or Operating Agreements may be issued.
- f. All special tests which need to be done before the equipment is returned to service.
- g. Details of generators to maintain supply for an asset affected by the WHVI.

NOTE

Switching operations relating to the maintenance of supply will be actioned at the discretion of the Electrical System Operator (ESO) with considerations to the state of the overall Sydney Trains electrical network.

4 Issue of WHVI's Under Normal Conditions

4.1 Requesting a WHVI

The person responsible for organising each job must establish whether an Electrical Permit to Work is required in accordance with the *PR D 78700 Working around Electrical Equipment*. If uncertainty exists about the identification of any equipment, advice must be obtained from an Authorised Person (Mains) familiar with the equipment and/or area or Authorised Officer (Mains) prior to nominating the equipment from which removal of supply is requested.

For work which requires an Electrical Permit to Work and/or an Operating Agreement to be issued, the form *PR D 78501 FM01 Request for Electrical Permit to Work* nominating the electrical equipment to be isolated must be forwarded to the Electrical Network Team.

Work scope including (but not limited to) the following may require specific testing (refer to standard testing document) prior to returning the HV Transmission Line or Cable back into service upon completion of work:

- a. Excavation near buried cables.
- b. HV Transmission Line or cable relocation.
- c. HV Transmission Line maintenance including pole renewal or any work involving the disconnection of continuous conductors and/or insulation.

The type of testing must be nominated on the electrical permit request by the person responsible for organising the job. Testing requirements shall be noted in the Special Instructions of the WHVI.

For external joint-use and crossing feeders, relevant details including scope, testing requirements, equipment, location and work area must be provided to the electrical network team. After the external outage request (or a flyer) has been initiated by the network team, the final details of external resources can be confirmed by the person requesting the job.

If a generator is required as a result of the lodgement of a Request for Electrical permit to work, the person organizing the job is responsible for making these arrangements.

The Electrical Network Team shall provide approvals for requested High Voltage equipment based on the predicted network status ensuring network integrity and disseminating disruption notices if required.

4.2 Issuing a WHVI

Under normal conditions a WHVI must be issued by an Officer authorised to do so by the Electrical Network Manager, referred to in this section as the “Issuing Officer”.

Following on from the requirements defined in Section 3 General, the issuing officer must ensure the following information on the WHVI(s) is/are correct before issuing WHVI(s) to ICON Electrical:

- a. The date and time of Working High Voltage Instructions are relevant to the date and time requested in the relevant Requests for Electrical Permit to Work.
- b. High and Low voltage equipment as identified by the requester have been included on one or more Working High Voltage Instructions.
- c. Special instructions as per Section 3 Item (c), adhering to the information provided by the territories and/or operating diagrams.
- d. Switching instructions as per Section 3 Item (d).
- e. The area in which Permits and/or Operating Agreements may be issued is correct and complete and is fully covered by the high and low voltage aerial lines or cables (including other Electrical Network Operators' services where required), from which supply is to be removed mentioned above.
- f. All necessary testing requirements as per Section 3 Item (f) (if required).
- g. Details of generators as per Section 3 Item (g) (if required).

Additionally, the Issuing officer must ensure the following:

- h. External stakeholders have been advised where switching is required for interfacing equipment (for example Bulk Supply Points).
- i. For non-Sydney Trains electrical equipment that require isolation:
 - i. Relevant details have been included on the WHVI.
 - ii. External stakeholders have been engaged.
- j. If the planned duration of a WHVI is more than 5 days, an EOD Advice may be required as per *PR E 72009 Preparing and Lodging an EOD Advice of Alteration*. The Issuing Officer shall confirm that the relevant Advice has been lodged before issuing the WHVI.
- k. The date and time of Working High Voltage Instructions are in agreement with the network integrity assessment performed by the Electrical Network Team.

Where supply is required to be removed from 1500 Volt overhead wiring for work to be carried out, the procedure detailed in instruction *PR D 78302 1500 Volt Authority* must be complied with.

4.3 Checking and Approval of a WHVI

An ESO must check the WHVI using a controlled copy of the relevant Operating Diagrams, supporting documentation provided by the Electrical Network Team, or other safety documentation available to ICON Electrical. This checking must include that the following information is correct:

- a. The date and time of Working High Voltage Instructions
- b. Description of High and Low voltage equipment
- c. Special instructions as per Section 3 Item (c)
- d. Switching instructions as per Section 3 Item (d)
- e. The area in which Permits and/or Operating Agreements may be issued is correct and complete and is fully covered by the high and low voltage aerial lines or cables (including other Electrical Network Operators' services where required), from which supply is to be removed mentioned above
- f. All necessary testing requirements as per Section 3 Item (f) (if required)
- g. Details of generators as per Section 3 Item (g) (if required).

Any adjustments that need to be made to an issued WHVI shall be completed and verified by the Electrical Network Team upon receiving feedback from the ESO checking the WHVI.

Once checking is complete and the ESO is satisfied that the WHVI meets the criteria set above, they must forward the checked copy of the WHVI to the Electrical Network Team for approval.

NOTE

When any other WHVIs are cross-referenced in the Special Instructions, the details on those WHVIs must also be examined. This is to ensure that any switching operations will not compromise the electrically safe work area for another WHVI.

The Authorised Officer (Mains) must check:

- Section 4.2 Items (a) to (j)
- That the details on all Electrical Permit Requests and/or Operating Agreements fit within items (Dates and Times) and (Area in which Permits may be issued)

and Approve the WHVI(s).

The Issuing Officer will then make available the Approved WHVI to the.

- Work Group controlling the WHVI, together with the approved electrical permit to work request forms, and
- Electrical System Operator.

4.4 Alterations to a WHVI

If it becomes necessary to make minor alterations that will not alter the Electrically Safe Work Area of the WHVI after it has been Issued, the person making the alteration must ensure that all copies have been amended.

The WHVI must then be re-checked by both an Authorised Officer (Mains) and an ESO. Each amendment must be initialled and dated by the person checking.

Once a WHVI is in force, no alterations may be made to it in relation to the switching required for the isolation except as below.

- a. The ESO may amend the switching required to maintain supply to allow for changes to the system arrangements.
- b. If it is necessary to alter the special instructions of a WHVI which will cause the conditions of an associated Electrical Permit and/or Operating Agreement to be altered:
 - an Electrical Permit has not been issued, the person issuing the proposed Electrical Permit and the prospective Permit Holder must be informed of the change
 - or
 - if an Electrical Permit and/or Operating Agreement has been issued, the Electrical Permit and/or Operating Agreement shall be cancelled and re-issued in consideration of the alteration.
- c. If it is necessary to overhaul a line airbreak switch at substations which is a point of isolation for the WHVI, the procedure described in Section 10 shall be followed.

5 Issue of WHVI's Under Emergency Conditions

- a. An Authorised Officer (Mains) on site must communicate verbally with the Issuing Officer regarding the High and Low Voltage aerial lines or cables, including other Electrical Network Operators' services, that need to be isolated and earthed for the work to be carried out safely.

Reference shall be made to controlled copies of Operating Diagrams and an appropriate field inspection shall be carried out.

Once agreement has been reached about the equipment to be isolated and the timing of the isolation, the Authorised Officer (Mains) on site must communicate to the ESO the details required to be included on the WHVI as set out in Section 3.

- b. The Issuing Officer must issue the WHVI verbally to the Authorised Officer (Mains) on site, who must record the details on a WHVI form and approve the WHVI. Alternatively, the WHVI may be issued by fax, an electronic un-editable means such as an email containing a locked PDF document or may be hand delivered. Work must not proceed until any discrepancy has been resolved.

This WHVI is deemed an Emergency WHVI. The WHVI form must be used with the word "EMERGENCY" written in front of the title.
- c. The field and ESO's copies of the emergency WHVI must be checked and approved in the same way as for a WHVI for planned work. Minor alterations to an emergency WHVI after it has been issued must be dealt with in the same way as for a WHVI for planned work.
- d. In the absence of an Authorised Officer (Mains), an Authorised Traction Operator, with knowledge of the electrical equipment in the area, may carry out the

procedures in (a) and (b) above when approved by the Electrical Network Manager or the Electrical Engineer having authority over the area concerned.

NOTE

This approval will only be granted on a case by case basis, and is only current for the particular Emergency WHVI.

6 Responsibility of the Person in Charge of the WHVI

6.1 Responsibilities Relating to Removal of Supply

When given clearance by the ESO to proceed with **proving dead, earthing and issuing of Electrical Permits or Operating Agreements**, the Authorised Person (Mains) in charge of the WHVI must:

- a. Print their name and sign on the back of the WHVI as the Authorised Person (Mains) in charge of the WHVI and enter the date and time.
- b. Where required, ensure that an Operating Agreement is received from other Electrical Network Operators and the working earths have been applied. Check that the equipment listed on the Operating Agreement corresponds with that listed on the WHVI, and list the details of the Operating Agreement on the back of the WHVI. The Operating Agreement must be kept with the WHVI until the Operating Agreement is cancelled.
- c. For HV aerial lines and cables, arrange for proving dead to be carried out in accordance with the procedure detailed in *PR D 78203 High Voltage Operating Procedures*.
- d. For HV aerial lines and cables, arrange for earths to be applied in accordance with the procedure detailed in PR D 78203.

NOTE

Portable earths are to be recorded on the form *PR D 78501 FM02 Portable Rail Connection/Earthing Schedule*, the completed form being attached to the completed WHVI.

- e. For LV aerial lines and cables, arrange for the isolation and proving dead to be carried out in accordance with *PR D 78401 Isolation and Energisation of Low Voltage Equipment*.

6.2 Responsibilities Relating to Issue of Permits and/or Operating Agreements

Upon completion of all the necessary isolation, proving dead and earthing procedures, the person in charge of the WHVI must:

- a. Ensure that each Authorised Person (Mains) who will be issuing a Permit and/or an Operating Agreement has a copy of the approved WHVI and the completed PR D 78501 FM02.
- b. Arrange for an Electrical Permit to Work and/or an Operating Agreement to be issued for each separate work party to carry out work near or on/within the specified electrical equipment. Refer to *PR D 78500 Electrical Permits*.
- c. On the back of the WHVI form, list the details of all Electrical Permits to Work and/or Operating Agreements issued on the WHVI. Print the name of the person to whom the Permit/Operating Agreement was issued and print the name of the Authorised Person who issued this Permit/Operating Agreement.

Each Electrical Permit to Work and/or Operating Agreement issued on the WHVI must be numbered as a sub-number of the WHVI. For example, the first Electrical Permit to Work and/or Operating Agreement issued under WHVI number 1234 must be numbered 1234/1, the second 1234/2 and so on, consecutively.

- d. Contact the ESO immediately after the issue of one or more Permits and/or Operating Agreements and advise the identifying numbers of the Permits and/or Operating Agreements issued. This requirement also applies to Operating Agreements, if received.

The Authorised Person (Mains) in charge of the WHVI is not required to remain in the vicinity of the work unless holding an Electrical Permit to Work.

NOTE

Where the Authorised Person (Mains) in charge of the WHVI is also the Person in charge of a work party, that person shall be the Permit Holder.

If the Authorised Person (Mains) in charge of the WHVI becomes aware that work will not be completed in time for supply to be restored by the time stated on the WHVI, the ESO is to be immediately informed. The WHVI remains in force until all issued Permits and/or Operating Agreements have been cancelled.

6.3 Transfer of Responsibility

- a. The Authorised Person (Mains) must advise the ESO:
 - before ceasing to be in charge of the WHVI
 - where the WHVI and any Operating Agreements, if received, will be left for the next shift.

When ceasing duty, the Authorised Person (Mains) in charge of the WHVI relinquishes responsibility for holding the WHVI and the Operating Agreements if received.

- b. The Authorised Person (Mains) taking over the WHVI must:
 - advise the ESO
 - take responsibility for the WHVI and the Operating Agreement if received, by printing their name and signing the WHVI in the space provided and entering the date and time.

7 Backup Record of Permits and/or Operating Agreements

The ESO must record on the reverse side of the ESO's copy of the WHVI, the identifying number of the Permits and/or Operating Agreements issued on the WHVI, and Operating Agreements if received, as advised by the Authorised Person (Mains) in charge of the WHVI.

8 Procedure in case of the WHVI being lost

In the event that the original copy of the WHVI is lost, the Authorised Person (Mains) in charge of the WHVI must contact the ESO immediately and arrange for a replacement WHVI.

The replacement may be transmitted verbally and transcribed onto the appropriate form, or may be transmitted by fax or by an electronic un-editable means such as an email containing a locked PDF document. Both sides of the form must be replaced.

The replacement WHVI must be endorsed “REPLACEMENT - Original Lost”. The date, time and initials of the Authorised Person (Mains) in charge of the WHVI must be included with this endorsement.

When completing the reverse side of the replacement form, the identifying numbers of all Permits and Operating Agreements issued on the lost WHVI, and Operating Agreements if received, as recorded on the ESO’s copy, must be used to ensure that all Permits and Operating Agreements that were issued, and Operating Agreements if received, are included on the replacement WHVI.

The book copies of Permits and Operating Agreements should then be used to establish to whom the individual Permits and Operating Agreements were issued.

9 Cancellation of WHVI's

Before supply is restored, the Authorised Person (Mains) in charge of the WHVI must:

- a. Ensure that any special tests which need to be done before the equipment is energised have been completed satisfactorily.
- b. Arrange for all Electrical Permits to Work and Operating Agreements issued on the WHVI to be cancelled and for all working earths to be removed; refer to the completed PR D 78501 FM02.
- c. Enter the time each Permit or Operating Agreement is cancelled in the space provided on the WHVI.
- d. Cancel the WHVI by printing their name, sign and enter the date and time of cancellation on the back of the WHVI.
- e. Forward a copy of the back of the Cancelled field WHVI listing the cancelled permits to the ICON Electrical.

NOTE

If the Authorised Person (Mains) cannot forward the back of the Cancelled Field WHVI listing the cancelled Permits to ICON Electrical.

- **The APM in charge of the WHVI shall contact the ESO and advise of the:**
 - **WHVI number**
 - **the individual permit and operating agreements:**
 - **number**
 - **cancelled by**
 - **time and date.**
 - **The ESO shall record all of the details onto the rear of ICON Electrical copy of the WHVI form with a note as too advised by whom and repeat the information back to the APM for confirmation.**
-

- f. Advise ICON Electrical that:
 - all Electrical Permits to Work issued on the WHVI have been cancelled
 - all working earths have been removed
 - all other issued Network Operators' Operating Agreements have been signed off
 - supply may be restored to the aerial lines or cables specified on the WHVI.
- g. Forward the cancelled WHVI to the appropriate Electrical Engineer's Office.
- h. ICON Electrical must:
 - i. Verify the name of the person giving clearance, against the recorded person in charge of the WHVI.
 - ii. Verify the advice received by the Authorised Person (Mains) that all permits have been cancelled.
 - iii. Accept clearance to restore supply only from the Authorised Person (Mains) in charge of the WHVI.
- i. Arrange for supply to be restored per *PR D 78201 Removal and Restoration of High Voltage Supply*.

10 Work at the limits of an isolation

10.1 Overhaul of the Substation Line Air Break Switch

Prior to the start of work, the Authorised Person (Substations) must obtain an Electrical Permit to Work. This Electrical Permit to work shall be referenced as portion of the switching requirements of the required Substation Access Permits.

If it is necessary to overhaul the line air break switch which is a point of isolation for the WHVI, with the concurrence of the ESO an Authorised Person (Substations) is permitted to extend the isolation within the substation, provided the Substation Access Permit is endorsed with the words “Line Air Break Switch No. _____ is to be checked open and Danger Tagged in accordance with current WHVI No. _____ prior to the cancellation of this Permit.”

The ESO must authorise the removal of the Danger Tag which was attached for the WHVI. The Authorised Person (Substations) holding the Permit must replace this Danger Tag before cancelling the Permit and advise the ESO that the Danger Tag applied for the WHVI has been replaced.

The safety earths, on the line or cable for the WHVI, must not be removed in connection with the work carried out in accordance with Section 10.1.

11 Reference documents

D2021/6078 Electrical Switching Incidents from Human Error

PR D 78201 Removal and Restoration of High Voltage Supply

PR D 78202 FM01 Working High Voltage Instruction

PR D 78203 High Voltage Operating Procedures

PR D 78301 Removal and Restoration of 1500 Volt Supply

PR D 78302 1500 Volt Authority

PR D 78401 Isolation and Energisation of Low Voltage Equipment

PR D 78500 Electrical Permits

PR D 78501 FM01 Request for Electrical Permit to Work

PR D 78501 FM02 Portable Rail Connection/Earthing Schedule

PR D 78700 Working around Electrical Equipment

PR E 72009 Preparing and Lodging an EOD Advice of Alteration