4.14 Substation Permits

Purpose

This instruction deals with the use of permits to work in Horizon Power Transmission Substations, and must be read in conjunction with FI 4.4 Secondary Isolations.

Scope

The personnel covered by this instruction are, operational personnel, non-operational personnel, visitors and including Workers operating, servicing, and/ or maintaining (SPS) Standalone Power Systems electrical equipment.

This instruction covers the permits and operating agreements (OA) to work on Horizon Power transmission substations, transmission lines and pilot cables.

This also covers work related to Independent Power Providers (IPP) and important consumers at 66 kV and above.

Permits are applied on both primary plant and secondary plant and to trained and authorised personnel.

Safety

Before commencement of work, a risk assessment must be carried out using the Risk Analysis Procedure (OSH-3.6-1-02), to identify and document the hazards and risks associated with the task and ensure appropriate control measures are implemented.

It is important that, appropriate control measures must be identified, documented and implemented in order to control hazards to As Low as Reasonable Practicable (ALARP).

Systems

There are primary and secondary systems that make up the Horizon Power transmission network. Working on each of these systems requires a separate permit.

Primary Systems

Primary systems incorporate all plant and equipment that can be connected to high voltage (HV) levels of a substation. The key pieces of primary systems are:

- Circuit breaker
- Voltage transformer
- Current transformer
- Isolator or disconnecter
- Earth switch
- Surge diverter
- Power transformer
- Transmission line
- Capacitor
• Reactor

Primary plant also includes any equipment directly associated with the HV plant, such as:

• Buchholz relays on transformers
• SF₆ gas pressure switches on circuit breakers

**Secondary Systems**

Secondary systems incorporate all plant and equipment that cannot be connected to HV levels of a substation.

This field instruction only related to the secondary systems this includes:

• Pilot systems
• Protection circuits
• Metering circuits
• Auxiliary systems
• Tele Protection Signalling (TPS) communications

The following secondary systems **are not** relevant to this field instruction:

• Communications
• Building AC Distribution Board
• SCADA
• DC chargers/batteries
• Fire alarm systems
• secondary plant in
  • power stations, including generator step-up transformers
  • gas turbine sites, including generator step-up transformers
  • distribution circuits outside the zone substation boundary
  • regional power station sites
  • distribution line and cable apparatus

**Permit Issuers and Recipients**

There are certain requirements that a person must meet in order to receive a permit and, once granted, the permit recipient also has specific responsibilities. This section also describes some of the responsibilities of the person issuing the permit, who is known as the Issuing Officer (IO).
Permit Recipients – Primary and Secondary Systems

In order to work on primary and secondary systems, a person must have received a permit from an IO. Depending on the situation and type of permit, a person who has received a permit is known as a:

- Recipient in Charge (RIC)
- Tester in Charge (TIC)
- Recipient / Tester

To be eligible to receive a permit, a person must be appropriately trained, familiar with Horizon Power procedures.

Permit Recipients – Secondary Systems Only

In addition to the requirements listed above, a person must also have the following in order to work on secondary systems:

- Meet the requirements for working on primary systems.
- Be competent in Secondary Systems.
- If required to receive or issue a Secondary System Permit on equipment that has a normal working voltage that exceeds 50 V AC or 120 V DC, hold a current and valid Electrical Worker’s Licence or Line worker Cert. III qualification (or equivalent).

Note: A permit is not required to work on systems that operate at extra low voltage (LV) (0-50 V AC or 0-120 V DC) although it is still a requirement to isolate the take other precautions (always treat as live).

Systems operating at LV and above DO REQUIRE a permit for access.

Permit Recipient Responsibilities

It is highly recommended that the role of the IO and the RIC or TIC is performed by different individuals. In circumstances that prevent this, extra care must be taken to ensure that isolation and checking are rigorously done.

The permit recipient must be certified for receiving permits on pilot cables for the purposes of testing.

The RIC and TIC have the responsibility to ensure that each member of their working team fully understands the boundaries of the work area, conditions of access and the duty of care required. It is also their responsibility to ensure that the personnel under their control are adequately trained and competent for the required work.

All recipients are to clearly understand that they have a responsibility with regard to duty of care.
Issuing Officer (IO) Responsibilities

Logging of Secondary Systems Permits

When a secondary system permit is issued, the IO must log the permit with the appropriate control centre before the work begins. This is necessary so that:

- The control centre knows that people are working on a particular item of secondary equipment and are aware of any implications to the power system, such as the risk of unwanted tripping.
- The control centre can alert the IO if another person attempts to issue a permit on the same or associated equipment. This is particularly important with permits on pilot cables where it is possible that someone may access a pilot junction box at the same time as HV testing is being carried out.

Cancellation of Secondary Systems Permits

Upon completion of the work for which the permit was issued, the secondary systems IO must:

1. Ensure that:
   - All recipients have signed off the permit and acknowledged that they will no longer have access to the equipment.
   - The RIC / TIC have relinquished the permit.
   - The equipment is in the required condition for the next stage of the work.

2. Restore all isolations back to a normal state or set up for the next stage of the work.

3. Cancel the permit and advise the respective control centre that the permit has been cancelled.

If applicable, the condition of the equipment is to be noted on the subsequent STT permit (some, part or all secondary circuits might be re-energised). The Secondary Isolation Schedule (SIS) must also be updated to reflect the revised status of the secondary isolations and attached to the STT.

Work Permit Types

There are a variety of permits that cover work in transmission substations, issued according to the situation.

Vicinity Authority (VA)

A VA is issued by Horizon Power and authorises work near live electrical apparatus by authorised persons where there is a possibility of encroachment into the minimal approach distance (MAD), such as:

- **Primary** systems – vegetation management work near transmission lines and substations
- **Secondary** systems – work near (but no access required to) secondary systems.
**Electrical Access Permit (EAP)**

An EAP is issued by Horizon Power and authorises access to, and work on, an electrical apparatus that has been made safe through isolating and earthing (HV) or short-circuiting (LV), such as:

- **Primary** systems – work on plant such as lines, cables and transformers
- **Secondary** systems:
  - work on protection, control and metering circuits
  - EAP for primary plant plus a Secondary Isolation Schedule (SIS)
  - EAP for secondary systems, with Section 3 on the EAP endorsed by ‘Secondary Isolation Only’ as no protective earthing is applied to secondary systems.

**Note:**

When access to secondary plant is authorised by a primary plant EAP, the isolated secondary plant might not be earthed. This may be because it is extra LV and so does not need to be earthed, or it is to remain live for operational maintenance purposes. Both of these need suitable isolations to primary plant.

If a primary plant permit requires secondary isolations, the primary plant permit IO has to state the isolations in the respective section of the permit for the secondary isolation officer.

Access to secondary plant is permitted after the required secondary plant isolations have been completed by the secondary isolations officer, and the RIC has been instructed on the conditions of the access. These conditions must be attached to the Secondary Isolations Schedule (SIS) of the EAP.

In the case of a Secondary EAP, the IO will write “Isolations per attached SIS” and give instruction according to the conditions of access.

**Sanction to Test (STT)**

A STT is issued by Horizon Power and authorises access to Horizon Power’s network for the purpose of testing, commissioning and energising its electrical apparatus, such as:

- **Primary** systems – example/s
- **Secondary** systems - work on non-isolated, operational or secondary circuits, testing of primary circuits and removal of program earths for testing purposes. An SIS may be required.
Note:

An EAP and a STT must not be simultaneously issued on the same side of the equipment, on either the primary or secondary side of plant. However, when working on opposite sides of plant, an EAP must be issued for primary plant and an STT for secondary plant. In this case both the EAP and the STT are bound by an OA. The OA details must be recorded on both permits.

In the case of remedial repair or construction work on an item of primary plant which only requires an STT, all workers must work under the safety instructions of the STT and the control of the TIC.

Tele Protection Signalling (TPS) Equipment

An STT issued to communications staff to work on TPS equipment must:

- Be accompanied by a Secondary Isolation Schedule (SIS). For more on this, see ‘Use of Secondary Isolation Schedule (SIS) with Permits’ in this field instruction.
- Be issued to the TIC in person, i.e. it must not to be issued remotely.

Operating Authorities

Operating Authorities have clearly defined areas of responsibility within Horizon Power’s network for approving and timing outages.

Horizon Power Control Centre (HPCC)

HPCC controls the transmission system from HV terminals of the generator step-up transformers to zone and terminal substations. This excludes distribution-side feeder’s circuit breakers on indoor and outdoor switchgear.

HPCC is also responsible for:

- Organising HV outages to private customers and private power generator (PPG’s.)
- Managing primary work permits within its Operating Authority boundaries.

Note: Permits to Work in transmission substations must be logged by HPCC.

- Approving and timing outages from zone substations to the distribution network. It also manages outages affecting private customers and PPGs connected to the Horizon Power Distribution Network.
Power Station Authorities

IPP and other privately run power stations, in consultation with System Management, are responsible for approving and timing outages in their power stations. Their authority is from the generator to the HV terminals of step-up transformers and including any associated LV systems.

Operating Agreement (OA)

An OA is not a permit. Rather, it is an agreement between two operating authorities and used to confirm that the state of an operational electrical apparatus will be held in an agreed state until the OA is cancelled. An OA is applied:

- **to equipment owned by Horizon Power and another company**
  
  When a customer plant requires maintenance, construction upgrade and/or tests, they request to isolate their plant from HP network and vice versa to re-connect it. These two isolation scenarios are made by an OA in each case.

- **on Horizon Power network**
  
  When maintenance is required on one of two parallel transmission lines installed on the same structures, an OA is required for work before and during line maintenance until it is restored back to normal conditions.

- **to pilot cable schemes in the Horizon Power network**
  
  When work must be done on a pilot cable that requires other apparatus on the network to be de-energised, an OA is required for work before and during the work until the other apparatus is restored back to normal conditions.

Example

The following is an example of how an OA is organised for work on a pilot cable scheme.

- It is mandatory for safety reasons to switch off the power lines above them on the same structure. This is to avoid induced voltage in the pilot cable by those power lines above.
- This is started by sending a Notice of Intention to Work (NOIW) to HPCC for scheduling the respective isolation switching program for the transmission line. FPS then requests HPCC to isolate the transmission line.
- The OA must clearly indicate the line’s pick ID of the equipment and its isolation points which must be locked off, tagged off and acknowledged by FPS. The OA number must be referenced on the Secondary System permit.
- In this case, Secondary Systems use an EAP or a VA permit of their own to work on the pilot cable.

Permits to Access Assets Not Owned by Horizon Power

To work on assets that are not owned by Horizon Power, the permit is issued by the body responsible for the asset.

**Note:** For work on non-Horizon Power assets, see FI 5.1 Consumer Site Access, in this manual.
Use of Secondary Isolation Schedule (SIS) with permits

When a single apparatus is split into two ‘separate apparatus’ by electrical isolation, an STT can then be issued on the associated secondary equipment while an EAP is in force on the primary equipment. This can only be done if an SIS is made for the work and attached to both relevant permits. Both persons in charge must:

- Agree with applying the primary and secondary isolations.
- Maintain strict control and management of their worksite.
- Effectively communicate to ensure that neither team can impact upon the other during the course of their activities.

A typical situation is when the protection scheme for a line breaker is isolated from the associated line circuit breaker mechanism. If primary and secondary work teams are in agreement to test the line protection schemes under a secondary system STT while the primary side of the breaker is being maintained under an EAP, Primary and secondary systems must be bound by an OA.

References

- Occupational Safety & Heath Act 1984
- Occupational Safety & Health Regulations 1996
- SHMS OSH-3.6-1-02 Job Risk Analysis (JRA) Procedure
- SHMS OSH-3.6-1-26 Personal Protective Equipment
- Electrical Safety Standards
- Field Instruction 1.3 Construction Site Access-Minimum Requirements
- Field Instruction 2.6 Worksite Clothing / Personal Protection Equipment Requirements
- Field Instruction 2.17 Safe Approach Distances
- Field Instruction 2.23 Job Hazard and Risk Management (JRA)
- Field Instructions 4.1 Substation Entry Requirements
- Field Instruction 4.4 Secondary Isolations
- Field Instruction 4.14 Substation Permits
- Field Instruction 8.21 Work Permits