

Isolation Procedure

WNH Q30 - Revision 1.0

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1.0 This Document

1.1 Purpose

The purpose of this document is to

- a) protect people working on plant from sources of energy associated with that plant;
- b) provide practical guidance about implementing isolations; and
- c) set the minimum requirements for identifying, implementing and documenting plant operations.

1.2 Scope

This procedure applies on all Woolnorth Renewables' (Woolnorth) worksites. This document applies to any isolation designed to protect a worker from unexpected energisation, start-up, or release of energy, while they are working on plant.

1.3 Application Framework

1.3.1 Hazards Associated with Plant

When working on plant, protection is needed from:

- a. movement or operation of the plant itself;
- b. contact with energy;
 - i. used to operate the plant;
 - ii. used to carry out processes in the plant;
 - iii. produced or carried by the plant; and
 - iv. stored within the plant.

The forms of energy or hazards involved may include:

- a) electrical energy (electrical power supply, static charges, batteries, capacitors);
- b) mechanical energy (mechanical drives, moving and rotating machinery);
- c) pressure energy (water pressure, compressed air, vacuum, hydraulics);
- d) gravitational energy (counterweights, vehicle runaways, hung-up material, etc.);
- e) potential energy (springs, structural strain);
- f) thermal energy (hot or cold surfaces and substances, heat radiation);
- g) noise;
- h) vibration;
- i) non-ionising radiation (lasers, welding, electro-magnetic fields, microwaves);
- j) ionising radiation (X-rays, radioactive sources);
- k) hazardous substances (corrosive, poisonous, asphyxiates, flammable, explosive, chemically reactive substances); and

1.3.2 Isolation Procedures for Work on Plant

In general, when work is being carried out on plant, it is necessary for the workers to be protected and protect themselves from sources of energy. Work on plant varies widely in its nature and complexity, and a single isolation process cannot provide the protection and flexibility required to cover all situations. This procedure identifies four categories of isolations:

- a) directly controlled isolations,
- b) personal isolations,
- c) group isolations, and,
- d) remote isolations.

2.0 General Principles of Isolation

2.1 Overview

- a) equipment **shall** be isolated by the use of an approved method (see appendices of approved methods);
- b) isolated equipment **shall** be rendered incapable of being energised without premeditated and deliberate action;
- c) once access has been given to work on isolated equipment, the isolations or conditions within the worksite **shall** not be changed without the knowledge and approval of the people working on the isolated equipment;
- d) all personal, remote and group isolation operations **shall** be identified and recorded on a schedule of planned operations (SOPO);
- e) all personal, remote and group isolations **shall** be locked or otherwise immobilised and remote and group isolations shall be tagged;
- f) where an isolation point is identified in multiple permits or SOPO's it **shall** either:
 - i. have a separate lock and tag for each permit to work;
 - ii. any equipment operated which can be operated via remote control subsequent to local Isolation **shall** be tagged at the remote-control point such that a premeditated action is needed to remove such tagging. E.g. SCADA tags.
- g) equipment used as an isolation point **shall** not be worked on while being used as an isolation point;
- h) where the integrity of the isolation device is questionable, further isolation or additional safety measures **shall** be implemented;
- i) following isolation, the equipment to be worked on **shall** be proven de-energised prior to accessing the equipment; and
- j) remote and group isolation points **shall** only be altered with the approval of the AIO subject to the terms and conditions of the permit to work.

2.2 Principles of Electrical Isolation

- a) an isolation **shall** have a break of a distance appropriate to the voltage and insulating medium. If possible, the break should be visible;
- b) for access to any phase of a multiphase supply, all phases **shall** be isolated;
- c) for high voltage plant where the Isolation point does not have a visible break, it **shall**:
 - i. be withdrawn to the isolated position and be proven de-energised with approved earthing devices applied;
 - ii. have control circuits isolated, locked and tagged. Where such isolation is performed by a miniature circuit breaker (MCB) / Circuit Breaker (CB) which cannot be locked, further isolation **shall** be required to provide a double break i.e. withdrawal of fuses/links and /or cable terminations; and
 - iii. Voltage transformer (VT) and Capacitive Voltage Transformer (CVT) secondaries **shall** be isolated by the withdrawal of all applicable fuses/links or by opening an isolation switch/MCB. The fuses/links **shall** be secured or the isolation switch/MCB **shall** be locked and tagged. Applicable VT selection switches **shall** be tagged. In addition to the above, for work on a CVT, secondaries **shall** be further isolated by the withdrawal of fuses/links or opening MCB's or slide disconnect links to provide a double break.
- d) where isolation of low voltage circuits requires the withdrawal of fuses/links, all subsequent exposed live terminals shall be made safe to avoid accidental contact;

- e) where transformers remain connected within an isolated section of a high voltage conductor, then a risk assessment shall be carried out to determine the need for other safety measures to guard against alternative sources of supply e.g. backup generators or alternate supplies on the LV sides of transformers; and
- f) where a switch truck/carriage/circuit breaker has been removed from its cubicle, other safety measures **shall** be taken to prevent access to exposed Live Conductors, e.g. spout shutters locked, busbar covers installed, switchgear door locked and tagged.

2.3 Principles of Mechanical Isolation

- a) equipment **shall** be unwound, un-tensioned or drained, vented and depressurised to prevent uncontrolled movement, or otherwise made safe for work;
- b) an isolation device **shall** have an appropriate design to withstand the hydraulic, pneumatic, or mechanical energy;
- c) all gates, valves and mechanical linkages utilised as isolations **shall** be restrained in position, locked and tagged;
- d) rotating and linear actuating equipment **shall** be stationary, and should be restrained and have its motive force and control circuits Isolated;
- e) pressure vessels, piping, ducts, and vents **shall** be isolated, and drained to ensure their condition/status remains unchanged for the duration of the work;
- f) valves utilised as drains **shall** be tagged;
- g) motorised valves and gates **shall** have their control and/or power circuits isolated;
- h) where energised equipment cannot be de-energised, an appropriately designed and approved locking device **shall** be used to prevent movement; and

3.0 Earthing

3.1 Purpose of Earthing

Earthing is carried out to ensure that an effective discharge of electrical energy to the general mass of earth is maintained for the protection of the work party from inadvertent energisation, induction and capacitive discharge. Operational earths are applied as part of an isolation process prior to accessing the isolated equipment. Work earths are applied as the work progresses to maintain an equipotential work site when disconnecting and reconnecting equipment.

3.2 Principles of Earthing

- a) all earths (operational or work) **shall** be applied and removed in accordance with the requirements of the temporary earthing of power system equipment standard;
- b) all power system equipment **shall** be 'proven de-energised' using an approved voltage detection device prior to the application of earths;
- c) operational earths **shall** be rated, at least, to the fault level at the point where applied;
- d) when work is to be carried out on isolated high voltage equipment, operational earths **shall** electrically and visually bond all three phases together and the phases to earth through a recognised earth point;
- e) generally, all work on isolated high voltage electrical equipment **shall** be done between visible (to the work party from the worksite) operational earths. Where it is not possible, due to lack of space or design standard to apply earths to all sources of high voltage supply or for the earths to be visible, operational earths **shall** be applied at the closest practical points to the worksite and no work **shall** commence on the isolated equipment until it has been positively identified and proven de-energised at the work site;
- f) all operational earths **shall** be tagged using the 'Danger - Do Not Operate' tag. A tag **shall** be applied for each permit to work/schedule of planned operations utilising the same set of operational earths, to specifically identify the number of permit to work/schedule of planned operations relying on the operational earths in the provision of a safe work environment. The tag **shall** be displayed and applied at the recognised earth point and **shall** display the following information:
 - i. the schedule of planned operations number;
 - ii. a brief description of the application point;
 - iii. Applied by (print & sign); and
 - iv. Date of placement
- g) where conductors are to be disconnected within an isolated and earthed section, and simultaneous worker contact is possible between the two ends or between equipment connected to the two ends, additional work earths, short circuits or bonds **shall** be applied, at the work site, to ensure equipotential work area conditions are maintained across the two ends before such disconnection is undertaken by the work party; and
- h) where isolated conductors and equipment have been disconnected from earth, it is possible that they are at a significant potential difference to earth. When this occurs it is due to the effects of induction or capacitance. Workers **shall** not make contact with unearthed conductors or equipment without first connecting work earths using insulated work practices.

4.0 Key Roles in the Isolation System

4.1 Overview

The roles and responsibilities associated with the isolation system outlined in this procedure mirror those outlined in the Permit to Work Procedure (WNH Q25). Because of the important role that Authorised Issuing Officers (AIOs) play in isolations, the details of their role are re-iterated and clarified further below.

4.2 Responsibilities of Authorised Issuing Officer (AIO)

The AIO **shall** be an authorised person and is responsible for:

- a) Liaising with Project Managers (PMs) or Job Managers (JMs) to plan outages where delegated;
- b) Negotiating access requirements;
- c) Preparing, authorising and actioning schedules of planned operations;
- d) Operating power system equipment under the direction of Woolnorth;
- e) Conducting a risk assessment for:
 - i. performing operational activities;
 - ii. maintaining system security prior to carrying out fault finding;
 - iii. Locking and tagging out of service, switchgear and operating control mechanisms; and
 - iv. The application of operational earths and associated tags where necessary for the issue of a permit to work. The operator may engage a competent employee to apply operational earths.

5.0 General Isolation Process

5.1 Overview

To protect people working on plant from sources of energy associated with that plant, the following isolation process is necessary:

Note: it remains essential that the work party clearly understand the workplace hazards and controls as well as the scope of the work before commencing the isolation and work:

- a) **stop** the plant;
- b) **isolate**, dissipate or restrain the energy sources;
- c) **lock and Tag** or otherwise ensure that the plant cannot be re-energised;
- d) **verify** that the isolation, dissipation and restraints are effective;
- e) **sign on** to the permit to work;
- f) **work on** the plant;
- g) **sign off** the permit to work;
- h) **remove any locks and tags; and**
- i) **restore** and re-energise the plant

5.2 Choice of Particular Isolation Process

To cover the varied range of work on plant and equipment, four variations on the general isolation process are to be used (see Figure 1). The choice of process will depend on the scope and complexity of the work.

5.2.1 Directly Controlled Isolation

For work on plant where:

- a) isolation, dissipation or restraint of energy sources is carried out by physical removal or separation of plant components.
- b) each worker can keep the means of isolation, dissipation and restraint under continuous observation and control.
- c) there is no potential to interrupt generation.

Then a directly controlled Isolation procedure may be used. The directly controlled isolation may be a requirement of the permit to work.

Note: Such work might include the maintenance of power tools and the servicing of light vehicles.

Note: In these cases, it may not be necessary or practicable to lock and tag energy sources. Isolation can be achieved by unplugging power leads, disconnecting pipelines and hoses, or removing vehicle ignition keys. Re-energisation of the plant can be effectively prevented, without the need for locking and tagging out, by coiling up power leads or hoses that are in direct control of the worker performing the work.

5.2.2 Personal Isolation

For work on plant requiring isolations as a control where:

- a) each worker involved does not have direct close control of the means of isolation, dissipation and restraint;
- b) four or less isolation points are involved;
- c) six or less workers are involved and they can easily liaise with each other during the work;
- d) the work will be completed by the end of the current shift/day;

- e) there is no potential to interrupt production at the whole wind turbine circuit or wind farm levels;
- f) there are no high voltage (greater than 1,000 Volts) energy sources involved; and
- g) at least one of the workers involved is competent and authorised to personally determine, carry out and check the isolations required.

**Then a personal isolation process shall be used (refer to personal isolation process section in this procedure).
The personal isolation may be a requirement of the permit to work system.**

Note: Such work will include most routine maintenance and similar tasks carried out by individual workers or by small groups.

Note: In these cases, the plant involved should be fitted with isolating switches on electrical power sources, and other suitable devices on other sources of energy and be locked.

5.2.3 Group Isolation

For work on plant requiring isolations as a control where:

- a) The work is identified as high risk or involves high voltage (>1000 V) or other forms of high energy such as high pressure air lines or supporting heavy structures (gravitational energy);
- b) None of the workers have the specialised technical competence and authorisation to personally determine, carry out and check the isolations required;
- c) More than four points of isolation;
- d) More than six workers are involved;
- e) The work will take longer than one shift to complete;
- f) The work has the potential to interrupt production at the whole wind turbine circuit, cable string of turbines, or wind farm levels; and,

Then a group isolation procedure following the process steps outlined in this procedure will be used. The group isolation will be a requirement of the permit to work.

Note: Such work could include major maintenance work, major construction or modification work to wind farms, or work on high voltage electrical installations.

Note: In these cases, it is only practicable for the isolation, dissipation and restraint of energy sources to be carried out by a designated, competent and authorised person (an Authorised Issuing Officer) for that purpose. However, it is still necessary to give all workers involved the means (through the use of the group isolation board and personal isolation locks) to ensure that the plant cannot be re-energised until they have stopped work on the plant.

5.2.4 Remote Isolation

For work on plant requiring isolations as a control where:

- a) isolations are required to be completed at a location away from the primary person managing the isolations (coordinating AIO) i.e. the isolations are conducted remotely from the coordinating AIO and it is impractical for this AIO to travel to complete all the isolations themselves.

Then a remote isolation procedure following the process steps outlined in this procedure will be used. The remote isolation shall be a requirement of a permit to work and shall only be used when it can be clearly demonstrated that it is impractical for the coordinating AIO to conduct the isolations at the location that the physical isolations are to be conducted. Remote Isolations are to be conducted as an adjunct to a Group Isolation and not as a stand-alone operation.

5.2.5 Isolation Type Flow chart

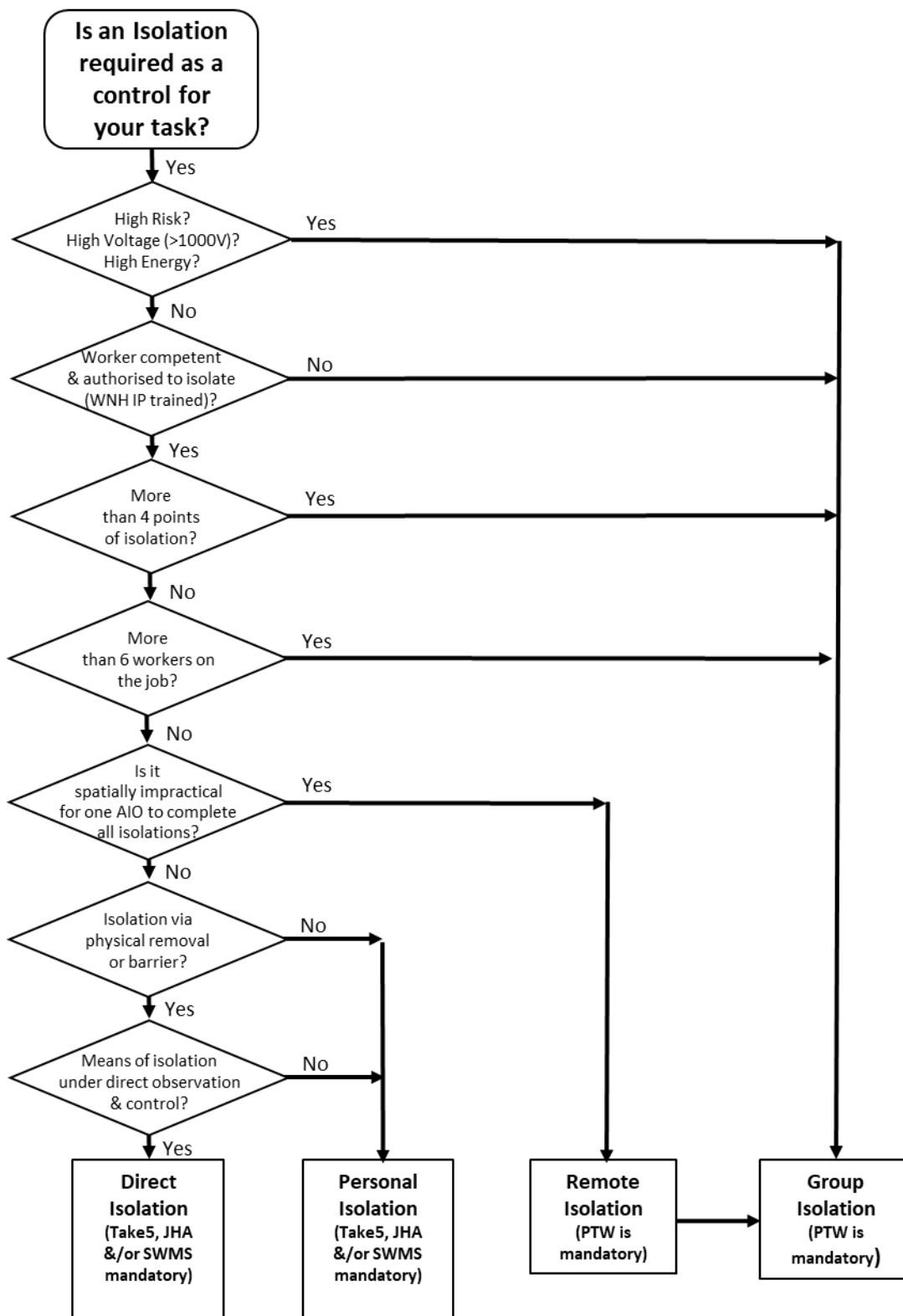


Figure 1. Isolation Work flow chart outlining the work activities for which each isolation strategy is mandatory.

5.3 Directly Controlled Isolation Process (Where Locking or Tagging is not mandatory)

5.3.1 Identification of Sources of Energy

The worker **shall** personally identify:

- a) all potentially harmful sources of energy coming into the plant;
- b) all potentially harmful sources of energy contained within the plant; and
- c) any plant or contents likely to move

Note: Energy fed into the plant may have more than one source and supply line.

5.3.2 Isolation, Dissipation and Restraint of Energy Sources

The worker **shall** bring the plant to a safe state to work on by, as appropriate:

- a) stopping the plant in a controlled manner;
- b) isolating any sources of energy feeding the plant;
- c) dissipating any sources of energy contained within the plant; and
- d) restraining the plant, materials and any other sources of energy that cannot be dissipated.

Note: In these cases, isolation may only involve unplugging power leads, disconnecting air hoses, turning off and removing the ignition keys of vehicles, etc.

5.3.3 Verifying the Effectiveness of Energy Controls

The worker **shall** verify the effectiveness of the isolation, dissipation and restraint of energy sources. (Test and prove dead).

Note: Verification may be done by visually checking the energy controls, by attempting to start the plant, or by other suitable tests or measurements.

5.3.4 Working on the Plant

The worker may then carry out work on the plant. While doing so, the worker **shall** ensure that no other person re-energises the plant.

Note: The worker can prevent others from re-energising the plant by keeping the leads, hoses or keys under their direct control.

5.3.5 Re-energising and Returning the Plant to Service

After the work on the plant is complete, the worker **shall** check and ensure that the plant is clear of tools, equipment, materials and persons who may be affected before the plant is re-energised and returned to service.

5.3.6 Action if Plant is not Fit to Return to Service

If the worker stops work on the plant without finishing his or her tasks, or otherwise leaves the plant unfit for use, he or she **shall** ensure that the plant is kept out of operation and site supervisors or their delegates informed of the situation and issues. A defect/restriction lock and tag shall be applied.

5.4 Personal Isolation Process

To determine if this process is suitable for the type of work to be carried out, refer to the general isolation process in this procedure.

5.4.1 Identification of Sources of Energy

The worker **shall** personally identify:

- a) all potentially harmful sources of energy coming into the plant;
- b) all potentially harmful sources of energy contained within the plant; and
- c) any plant or contents likely to move

Note: Energy fed into the plant may have more than one source and supply line.

5.4.2 Isolation, Dissipation and Restraint of Energy Sources

Each worker **shall** either personally bring the plant to a safe state to work on, or if other workers are also working on the same plant, personally check that this has been done by another worker.

The plant **shall** be brought to a safe state by a competent person, as appropriate:

- a) Stopping the plant in a controlled manner;
- b) Isolating any sources of energy feeding the plant;
- c) Dissipating any sources of energy contained within the plant and preventing energy building up again during the course of the work; and
- d) Restraining the plant, materials and any other sources of energy that cannot be dissipated.

Note 1: If the plant or equipment affects operations or services, the worker shutting it down shall liaise with the people affected by the isolation to ensure it can be shut down without creating an unacceptable level of risk or unintended impact.

Note 2: Isolation of energy sources should be done by physically interrupting the supply of energy. This can be done by turning off isolating switches in electrical circuits, by closing valves, by disconnecting batteries, leads, cables or hoses, by blanking off pipelines, etc. The means of isolation should be of a type that can be readily checked by a visual inspection and it should act directly on the supply line. It should not act through control circuits or emergency stop mechanisms. The point of isolation should be as close to the plant concerned as practicable.

Note 3: Dissipating sources of energy in the plant can be done by opening valves to drain pipelines, pressure vessels and hydraulic accumulators, by opening access hatches and inspection covers, by earthing, by releasing springs, by dropping counterweights, etc.

Note 4: If internal sources of energy cannot be dissipated, they can be restrained by securing mechanical sources of energy such as springs or gravity devices, etc. Plant that can move can be restrained by applying brakes, by inserting chocks or sprags, etc. Other types of plant they may have to be restrained include fans or pumps that may be moved by flow through them.

5.4.3 Locking and Tagging

Where possible **each** worker **shall** lock every device used for isolating, dissipating or restraining energy on the plant. Where multiple workers are involved, typically a hasp would be utilised to allow all workers to attach to each isolation point. If the Isolation point is not fitted with a built-in provision for locking, an alternative lock or other means of immobilising the point of Isolation **shall** be used. The locking **shall** be done with Red personal isolation locks. No tagging is mandatory for his type of isolation, however, the Danger Do Not Operate tags may be utilised to provide further information for the work group on the specific details on the isolation or to provide the personal contact details to a lockset that has been leant to a contractor. The mandatory requirements of a personal isolation, however, are,

- that the personal details (name, mobile phone number) of the person applying the isolation lock are present (typically on the actual lock);
- and that the “person lock follows the person” i.e. at the end of the day the personal lock is removed from the isolation point by returning the plant to service or placing an orange defect/restriction lock and associated tag (see section on Action if Plant is not Fit to Return to Service).

Note 1: If the isolation device is operated by removing a key from it and it does not have provision for individual workers to lock it, the personal isolation procedure may not be appropriate, and it may be necessary to use a group isolation approach.

Note 2: Devices which are not capable of being locked directly should, as far as practicable, be secured with a chain, pin or other suitable means, or by removing the handle or operating mechanism.



5.4.4 Verifying the Effectiveness of Energy Controls

Each worker **shall** either personally verify the effectiveness of the isolation or if other workers are also working on the same plant, personally check and observe when this is being done by another worker.

Note: Verification may be done by visually checking the energy controls, by reading gauges and meters, by attempting to start the plant, or by other suitable tests. However, no attempt to start the plant shall be made if work has already started on the plant.

5.4.5 Working on the Plant (including Testing & Repositioning)

If verification shows that sources of energy have been effectively isolated, dissipated and restrained, the worker may then carry out work on the plant. If it is possible for stored energy to re-accumulate during the work on the plant, the workers **shall** monitor the re-accumulation and take appropriate action as necessary.

If and when the equipment requires testing, it **shall** be the responsibility of the person conducting the test to notify the Person in Charge (PIC) prior to starting the test. The PIC **shall** decide who from the work party is required to perform the test. The extent to which workers not involved in the test will be removed from the immediate work area or indeed the entire permitted work site (if a PTW is in force), will be addressed by the PIC and an AIO in the planning and risk assessment for the work.

If a change of isolation is required the workers involved in the test shall remove their locks. The PIC shall remove their lock from the isolation points. When the revised isolations have been actioned by the work party they will then lock on to the isolation points that exist at that time. If further work on the plant is required after testing the above process will be reversed and the work site conditions and isolations will be established to allow work to proceed safely.

Note: While work is being carried out, the possibility that the plant might become re-energised or that energy might re-accumulate can be prevented by, for example, earthing electrical conductors, leaving drain valves open, etc.

5.4.6 Prohibition on Operation of Locked or Tagged Isolation Devices

All persons **shall** be prohibited from:

- attempting to operate an energy isolation, dissipation or restraint device which has been isolated; and
- attempting to otherwise re-energise or restart the plant while persons are working on it.

5.4.7 Removal of Locks and Tags

As each worker stops work on the plant, they **shall**:

- clear the plant of any tools, equipment or materials that they have and that are not required by other workers still working on the plant; and
- replace any guards that are not required to be left open for access by other workers still working on the plant.

After doing this and getting clear of the plant, the worker **shall** then remove their personal isolation locks and tags (if used).

5.4.8 Action before Re-energising Plant

Before removing the last isolation locks and tags, the worker or group of workers involved **shall**:

- a) Check and ensure that the plant is clear of tools, equipment, materials and persons; and
- b) Check and ensure that all guards have been replaced, and the plant is fit for use.

After the last worker removes their locks and tags, they **shall** inform any plant operators or other workers affected that the plant is no longer isolated, and may re-energise the plant.

Note: The workers involved in checking the plant and re-energising it shall be competent and authorised to do so. If they are not, the group isolation procedure shall be used.

5.4.9 Action if Plant is not Fit to Return to Service

If any worker stops work on the plant without finishing their tasks, or otherwise leaves the plant unfit for use, they **shall** place a defect/restriction Lock and 'Danger Do Not Operate' tag to the inoperable plant isolator or otherwise ensure that the plant is kept out of operation and advise operational staff of the plant status. At a minimum, The personal contact details of the person fitting the orange lock(name, mobile phone number) and the brief reason for the defect/restriction status of the isolation point provided on the tag. The Danger Do Not Operate tag is mandatory when using an orange lock.



5.5 Group Isolation Process

To determine if this process is suitable for the type of work to be carried out, see Section 5.2.5.

5.5.1 Selection of Person to carry out the Actual Isolation

The Project/Job Manager will select and designate an appropriately competent and authorised person (Authorised Issuing Officer - AIO) to plan and carry out the isolation and restoration of the plant once work is completed. The AIO **shall** have adequate knowledge of the plant and the competencies required to carry out the isolation and restoration.

5.5.2 Identification of Sources of Energy

Based upon the scope of the work, the AIO **shall** personally identify:

- all potentially harmful sources of energy coming into the plant;
- all potentially harmful sources of energy contained within the plant; and
- any plant or contents likely to move.

The AIO will then prepare a schedule of plant operations (SOPO) which will document all operations, isolations, earthing, dissipating, draining and restraining steps required to ensure the safety of all workers. The AIO will take into account and plan for any testing, commissioning and progressive restoration of the plant when preparing the SOPO. The SOPO **shall** be verified by the Project/job manager (if competent) or other competent person/s (e.g. another AIO) before commencing the isolation.

5.5.3 Isolation, Dissipation and Restraint of Energy Sources

The AIO **shall** personally bring the plant to a safe state to work on as detailed on the SOPO. The completion of each step on the schedule of plant operations **shall** be marked as complete immediately after it is done.

The plant **shall** be brought to a safe state by, as appropriate:

- stopping the plant in a controlled manner;
- isolating any sources of energy feeding the plant;
- dissipating any sources of energy contained within the plant and preventing energy building up again during the course of the work including earthing and draining; and
- restraining the plant, materials, and any other sources of energy that cannot be dissipated.

5.5.4 Locking and Tagging the Plant

The AIO **shall** lock every device used for isolating the plant. If the isolation point is not fitted with a built-in provision for locking, an alternative lock or other means of immobilising a point of Isolation **shall** be used. The locking **shall** be done with Yellow Isolation (i.e. only one key opens all locks used – this may be different under remote isolations). The AIO **shall** also tag every device or other means used for isolating, dissipating or restraining energy on the plant with a 'Danger – Do Not Operate' tag. This may include "cross locking" other group isolation boards or isolation points.

The AIO **shall** ensure the 'Danger – Do Not Operate' tag has the following legible information:

- the schedule of plant operations number;
- the description and state of the Equipment (the tag is applied to);
- the name and signature of the AIO; and
- the date of tagging.



5.5.5 Verifying the Effectiveness of Energy Controls

The AIO **shall** verify the effectiveness of the isolation, dissipation and restraint of energy sources with the PIC (and all the work party if practical to do so).

5.5.6 Placing Keys in a Group Isolation Board and Locking and Tagging the Group Isolation Board

If verification shows that sources of energy have been effectively isolated, dissipated and restrained, the AIO **shall** place the keys they used to lock the devices for isolating, dissipating or restraining energy on the plant, and any remaining isolation locks from a set of locks in a group isolation board. The AIO will then place a green 'Authorised Issuing Officer' lock on the group isolation board.

At this point the AIO may authorise the work to commence on the plant covered by the permit to work. This process involves approving the PIC to start work and apply his personal lock to the group isolation board. All workers who are to work on the plant **shall** then sign on to the permit to work and lock the group isolation board with a red personal isolation lock.

Before locking on to the group isolation board, all workers should personally verify, or require the AIO or PIC, to demonstrate that the sources of energy have been effectively isolated, dissipated and restrained (test & prove de-energised).



5.5.7 Working on the Plant (including Testing & Repositioning)

Following the directions of the PIC a worker may lock onto the group isolation board, they may then commence/carry out work on the plant. If it is possible for stored energy to re-accumulate during the work on the plant, the PIC and the workers **shall** monitor the re-accumulation and take appropriate action as necessary. This identified hazard **shall** be included on the Permit to work and JHA with appropriate control measures put in place. If, and when, the equipment requires testing, it **shall** be the responsibility of the person conducting the test to notify the PIC prior to starting the test. The PIC **shall** decide who from the work party is required to perform the test.

The extent to which workers not involved in the test will be removed from the immediate work area or indeed the entire permitted work site, will be addressed by the AIO and PIC in the planning and risk assessment for the project.

5.5.8 Prohibition on operation of locked or tagged isolation devices

All persons **shall** be prohibited from:

- a) attempting to open a locked or tagged group isolation board;
- b) attempting to operate an energy isolation, dissipation or restraint device which has been locked or tagged; and
- c) attempting to otherwise re-energise or restart the plant while persons are working on it.

5.5.9 Removal of Locks and Tags from the Group Isolation Board

As each worker completes work on the plant and gets clear of the plant, the worker **shall** remove their personal isolation lock from the group isolation board and sign off the PTW. Persons shall only need to remove their lock/tag if they are leaving the worksite e.g. there is no need to remove locks for lunch or short periods throughout the shift if agreed by the PIC. Personal isolation locks must stay with the person to whom they have been issued. They must be removed any time the person has to leave the work area/site. Personal isolation lock owners may be asked to return to site to remove their locks if left on.

5.5.10 Removal of Locks and Tags from the Plant itself

After all locks have been removed from the group isolation board, the AIO may remove the green AIO lock, open the group isolation board and remove the keys that they used to lock the devices used for isolating, dissipating or restraining energy on the plant.

The AIO **shall** then:

- a) check and ensure that the plant is clear of tools, equipment, materials and persons;
- b) check and ensure that all guards have been replaced, safety devices are operating, and the plant is fit for use; and
- c) check that all primary protective assets are returned fully to service and that any links are returned to their normal operational state.

The AIO may then remove the isolation locks and tags from the plant. They may then re-energise the plant and shall inform any plant operators or other workers affected that the plant is no longer isolated. The station log **should** then be updated showing the work is complete.

5.5.11 Action if Plant is not Fit to Return to Service.

If work on the plant stops without finishing the work, or otherwise leaves the plant unfit for use, the PIC **shall** ensure that the plant is kept out of operation. The PIC will attach an orange 'Defect/Restriction' lock and 'Hazardous or Unusual Condition' tag to the group isolation board and advise operational staff of the plant status.



5.6 Remote Isolation Process

5.6.1 Selection of Authorised Issuing Officers for Remote Isolations

The PM/JM will select appropriately competent and authorised AIOs or equivalent personnel (if from another business such as TasNetworks) to conduct any remote isolations and restorations required for a job. The AIOs will have adequate knowledge of the plant and the competencies required to carry out all aspects of the required isolations and restorations. The designation and authorisation of AIOs is to be conducted using the Remote Isolation section of the Permit To Work (WNH Q25.1). This process includes the designation of a coordinating AIO and the remote AIO/s that will conduct isolations on plant that are too impractical for the coordinating AIO to do themselves.

5.6.2 Identification of Sources of Energy

Based upon the scope of the work, the coordinating AIO **shall** personally identify:

- a) all potentially harmful sources of energy coming into the plant;
- b) all potentially harmful sources of energy contained within the plant; and
- c) any plant or contents likely to move.

The coordinating AIO will then prepare a schedule of planned operations which will document all operations, isolations, earthing, dissipating, draining and restraining steps required to ensure the safety of all workers. The AIO will take into account and plan for any testing, commissioning and progressive restoration of the plant when preparing the SOPO. The SOPO **shall** be reviewed and authorised by at least one other competent AIO before commencing the isolations.

5.6.3 Isolation, Dissipation and Restraint of Energy Sources

The coordinating AIO and the Remote AIO/s **shall** personally bring the plant they are responsible for to a safe state to work on as detailed on the SOPO. If remote isolations are required by another company, the SOPO shall have the switching details for the other company attached. The coordination and sequence of events shall be reviewed

and agreed as adequate prior to practical implementation. The completion of each step on the SOPO **shall** be marked as complete immediately after it is done.

The plant **shall** be brought to a safe state by, as appropriate:

- stopping the plant in a controlled manner;
- isolating any sources of energy feeding the plant;
- dissipating any sources of energy contained within the plant and preventing energy building up again during the course of the work including earthing and draining; and
- restraining the plant, materials, and any other sources of energy that cannot be dissipated.

5.6.4 Locking and Tagging the Remote Isolation Points

The Coordinating AIO and Remote AIO/s **shall** lock every device used for isolating the plant. If the isolation point is not fitted with a built-in provision for locking, an alternative lock or other means of immobilising a point of Isolation **shall** be used. The locking **shall** be done with yellow group Isolation locks that are from a separate keyed-alike lock set from the main isolations. The exception to this will only be in the case of isolations completed on plant managed by other companies e.g. TasNetworks. In this case that Company's lock sets shall be utilised.

The coordinating and remote AIOs **shall** tag every device or other means used for isolating, dissipating or restraining energy on the plant with a 'Danger – Do Not Operate' tag (or equivalent for other companies). This may include "cross locking" other group isolation boards or isolation points. The keys associated with the locks used by the coordinating AIO will be managed as per a group isolation (locked within lock box), whereas the keys from the remote isolations shall be secured for the duration of the job by the respective remote AIOs. This can include securing them within a group isolation lock box if, for example, work is being conducted by workers at the remote isolation location. The 'Danger – Do Not Operate' tags shall have the following legible information:



- the schedule of plant operations number;
- the description and state of the equipment (the tag is applied to) ;
- the name and signature of the remote authorised issuing officer; and
- the date of tagging.

5.6.5 Verifying the Effectiveness of Energy Controls

The AIOs for the job shall verify the effectiveness of the isolation, dissipation and restraint of energy sources at their respective isolation and/or work sites. This will include with the PIC at thier point of work (and all the work party if practical to do so).

5.6.6 Verbal Assurance that Isolations Have Been Completed

A clear path of communication is to be established between the AIOs of the job prior to commencement of the work and documented in the Permit To Work. Verbal assurances shall be conducted between the AIOs as line items in the SOPOs.

6.0 Locking and Tagging

The section below describes the types of locks and equipment used for isolation and their use to support the isolation procedures described above.

6.1 Locking Rules

An isolation point **shall** not be operated, nor an attempt made to override or tamper with an isolation point that has been secured by a personal isolation lock/tag or an isolation lock.

Note: contravention of this rule may result in severe disciplinary action.

- Each person **shall** lock on using their personal isolation lock prior to starting work and remove their personal lock once they have finished work or are about to leave site.
- The PIC will remove their personal lock when leaving site, but will ensure that a 'Defect/Restriction' Lock and 'Hazardous or Unusual Condition' tag is attached until the work is complete or until transferred to another PIC.
- Isolation locks **shall** only be placed or removed by a competent and AIO.
- All personal isolation locks **shall** have the owner's name and contact information on the lock.
- Personal isolation locks **shall** only be placed or removed by the owner, unless the lock/tag removal process is followed with due process and authorisation.
- A person **shall** not lend their personal isolation lock or key to another person.
- Loss of a personal isolation lock or a key for a personal isolation lock **shall** be reported as an HSE incident.
- Only locks that are approved by Woolnorth and meet the criteria of this procedure can be used.

6.2 Isolation Points to be Locked

Where isolation points have provision for locking, such locking arrangements should be used to prevent re-energising. If the isolation point is not fitted with a built-in provision for locking, an alternative lock or other means of immobilising a point of isolation should be used. Isolation points that cannot be locked will be communicated to the Site Supervisor, and to the PIC and work party if a PTW is in place.

All group isolation points **shall** be tagged.

6.3 Personal Isolation Locks (RED)

Personal isolation locks attached to isolation devices signify that persons are currently engaged in work on the plant, and that it is likely that those persons will be injured if the isolating devices are not maintained in the safe position. Personal isolation locks are red in colour and issued to individuals who need to lock out energy sources. Personal isolation locks are uniquely keyed and have the name and phone number of the holder.



The PIC uses their personal isolation lock to lock onto the group isolation board and to secure the clear pocket holding the PTW.

These locks have only one (1) key and no master key. They are registered locks, thus preventing duplication.

6.3.1 Personal Isolation Lock Holder's Responsibilities

- Ensures the lock is maintained in good condition.
- Ensures their key is in their possession or control at all times.
- Ensures the lock has their name and mobile phone number clearly described on the lock.
- Ensures their lock is placed on equipment isolation points or group isolation board(s) or multiclasp after signing onto a permit to work when required.

6.3.2 When to use a Personal Isolation Lock

Personal isolation locks **shall** be used by all personnel when work requiring isolating energy sources by personal or group isolations is required.

6.3.3 Application and Removal

A personal isolation Lock **shall** only be applied and removed by the person who owns it. The only time a personal isolation lock may be removed by another person is after the approval process has been completed in accordance with section 5.4.10 and reported as an incident through the HSE system.

6.3.4 Equipment being Tested

When the equipment requires testing, it **shall** be the responsibility of the person conducting the test to notify the other employees who have personal isolation locks attached to the equipment isolation points or group isolation board. Each of these employees **shall** remove their own personal isolation lock(s) prior to carrying out the testing. If further work on the plant is required after the testing, the isolation/s **shall** be fully restored and all workers **shall** then re-place their personal isolation locks onto the equipment isolation points or group isolation board.

6.3.5 Work is not Completed

If work has not been completed and the employee needs to leave the work site, then their personal isolation lock must be removed and they must sign off the PTW. In the case where a personal lock is removed from a group isolation board where the work is incomplete or the equipment is out of service, the AIO lock will remain in place to ensure safety until the work has been complete and the equipment is brought back into service. An orange defect/restriction lock and 'Hazardous or Unusual Condition' tag must also be placed on the isolation point or group isolation board by the PIC until the equipment is fit for service.

Note: Persons shall only need to remove their lock/tag if they are leaving the worksite e.g. there is no need to remove locks for lunch or short periods throughout the shift if agreed by the PIC.

They must be removed any time the person has to leave the work site. Personal isolation lock owners may be asked to return to site to remove their locks if left on (see section 5.4.10).

6.4 Group Isolation Locks (YELLOW)

Group isolation locks are yellow coloured locks and come in sets of 5, 10 and 20. There are multiple sets and each set of isolation locks are keyed alike, with only one key per set. They are applied by AIOs when isolating equipment as part of group or remote isolations.

6.4.1 Application and Removal

Isolation locks are applied when a group or remote isolation is required by an AIO for the sole purpose of securing a number of isolation points, as detailed in a SOPO that is accompanying a PTW.

- Isolation locks must be accompanied by a completed 'Danger - Do Not Operate' tag.
- Isolation points which are being used for multiple permit to work/SOPO must have a separate Isolation Lock and 'Danger - Do Not Operate' tags for each permit to work unless managed by a master SOPO and permit to work arrangement.
- The key for any isolation locks used must be locked in either the group isolation board, or if a remote isolation, held by the AIO on their person or at a designated location. Similarly, any isolation locks left over from a set following group isolations must be locked in the group isolation board or, if a remote isolation, held by the AIO on their person or at a designated location.
- Isolation locks **shall** only be removed by an AIO when all personal isolation locks have been removed and the permit to work has been handed back by the PIC.

6.5 Authorised Issuing Officer Locks (GREEN)

An AIO lock is green in colour and is used to secure all isolation point keys in a group isolation board prior to the issue of a permit to work. The green locks are individually keyed, with locks and keys held by each AIO.

The AIO lock is the first lock on and last off a group isolation board.



6.5.1 Authorised Issuing Officer Lock Holder Responsibilities

- Ensures the lock is maintained in good condition.
- Ensures the key is held in the operational key cabinet or in an agreed location.
- Ensures that they apply an AIO lock to secure the isolation keys prior to Issuing the permit to work.

6.5.2 Application and Removal

An AIO lock **shall** only be applied and removed by an AIO authorised for that area of operations and equipment. The AIO lock is applied after the equipment has been suitably isolated and the key(s) and remaining locks have been placed in the group isolation board or group isolation board. Personal isolation locks (including the PIC) can then be applied in line with this procedure. The AIO lock stays in place until the equipment is ready to be de-isolated.

6.5.3 Work is not Completed

If work has not been completed or the equipment needs to be left out of service during a group isolation, all personal isolation locks will be removed by their owners at the end of the shift/day. The green AIO lock will, however, remain in place to ensure safety until the work has been complete and the equipment is ready to be brought back into service. The PIC shall also attach an orange 'Defect/Restriction' lock and 'Hazardous or Unusual Condition' tag, and remove their personal isolation lock (see below).

6.5.4 Work is Completed

When work is completed, all personal isolation locks are removed by their owners and the permit to work is signed off. The PIC for the work then signs off the permit and hands it back to an AIO listing any restrictions to the plant. An AIO can then remove the AIO lock to gain access to the keys and remaining locks for de-isolating the equipment and restoring the plant for operational use.

6.6 Defect/Restriction Locks (ORANGE)

Defect/restriction locks are orange in colour. A defect/restriction lock is placed on equipment to indicate defects, restrictions or that it is not fit for service. Anyone can attach a defect/restriction lock and a 'Hazardous or Unusual Condition' tag to defective or restricted equipment. The defect must be reported to the site supervisor and the defect/restriction lock key should normally be transferred to them for control.

The key may be kept in the possession of the person placing the lock for short duration situations not affecting energy production (such as replacing a non-critical fan motor over a 2 day period) or, when a permit to work is incomplete, the PIC may keep the 'Defect/Restriction' lock key in their direct control and possession.

A defect/restriction lock and 'Hazardous or Unusual Condition' tag on operational equipment can only be removed after agreement between the Site Supervisor and the person who applied the lock.

The defect/restriction will be logged in the operational log. Defect/restriction locks must be accompanied by a 'Hazardous or Unusual Condition' tag which has been completed in full including a clear description of the issue.



6.7 Group Isolation Boards

Group isolation boards are to be utilised to house all isolation lock keys and any remaining isolation locks from that set relating to the isolation being performed.

These group isolation boards provide a facility for all work team members, AIOs, and the PIC to place their personal locks on the box that house the keys to the locks that isolate the energy sources around which they will be required to work.



6.7.1 Using a Group Isolation Board

- All isolation lock keys and unused locks from that set for the pending isolation are in or locked to the group isolation board.
- Authorised issuing officer places a green AIO's lock on the group isolation board.
- Authorised issuing officer issues the permit to work.
- Person in charge and instructed persons each sign onto the permit to work.
- Person in charge places the permit to work into the lockable pouch and locks the pouch onto the group isolation board with their red personal lock.
- Workers place their personal isolation locks on group isolation board.
- Where not enough holes exist, always leave one (1) free spot for multi clasp on box.

6.8 Permit to Work Sleeve

The permit to Work sleeve holds the permit to work and is locked onto the group isolation board by the PIC with their red personal lock. The sleeve has a clear front so the permit to work number and job details can be seen to aid in locking on to the correct job.



7.0 Lock and Key Identification

7.1 Personal Isolation Locks and Key

Personal isolation locks issued to Woolnorth employees are identified with:

- a) the employee's name and mobile number **shall** be provided to one face of the lock.

Personal isolation locks available for issue to contractors are identified with:

- a) the unique key identification number (located on the key); and
- b) a sticker with the contractor's individual name and contact number **shall** be attached to one face of the lock to enable identification of the lock to the contractor.

7.2 Group Isolation Locks and Keys

Isolation locks come in sets with one key per set and are identified as follows:

- a) Engraved on one face of the lock:
 - i. Isolation;
 - ii. Lock;
 - iii. Set XXX (where XXX is the sequence number of the lock set type); and
 - iv. Lock Y of Z (where Y is the number of the individual lock within the set and Z is the total number of lock that make up the set)

7.3 Authorised Issuing Officer Locks and Key

Authorised issuing officer locks are identified as follows:

- a) Engraved on one face of the lock:
 - i. Issuing;
 - ii. Officer; and
 - iii. Lock XXX (where XXX is the Authorised Issuing Officer Lock sequence number)

7.4 Defect/Restriction Locks and Keys

Defect/restriction locks are identified as follows:

- a) Engraved on one face of the lock:
 - i. Defect;
 - ii. Restrict; and
 - iii. Lock XXX (where XXX is the Authorised Issuing Officer Lock sequence number)

8.0 Lock and Key Management

If any worker leaves site without removing his or her personal isolation lock(s), and it is not practicable to recall the worker to remove them, the lock may be removed by an AIO following authorisation by the Woolnorth General Manager or their direct delegate. Authorisation must include confirmation that the owner of the lock and/or danger tag is safe and no longer on site or around the equipment related to the lock and/or tag. The removal of locks with this process shall only be used as a last resort (not for convenience) e.g. a worker having to drive back to site is practical. If a lock is removed it will be treated as an incident and reported through the HSE system.

Similarly, if keys to any type of isolation lock are lost while they are in use, the AIO for the plant will approve the removal of the locks following authorisation by the Woolnorth General Manager or their direct delegate, and once the work is complete and the remaining workers have removed their locks and it is safe to do so. Again, the removal of the locks will be reported as an HSE incident. Damaged or lost locks from a lock set will have the entire lock set decommissioned.

9.0 Lock Administration

Lock administration responsibilities include:

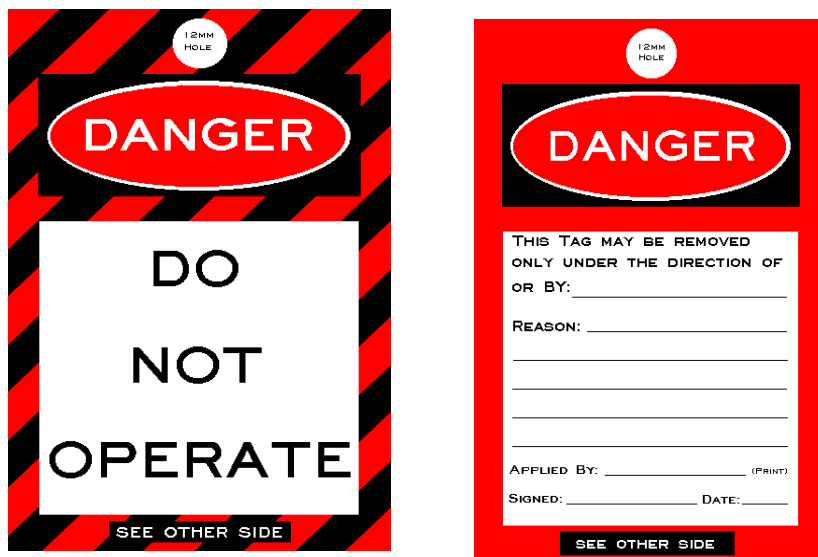
- a) Maintaining a process where contractors arriving on site are trained and assessed on the isolation procedure and temporarily issued with a set of red personal isolation locks with a key prior to working on site, and that all contractors who complete work on site return their red personal isolation locks.
- b) Maintaining a process where locks will only be made available to personnel that have had appropriate training and authorisation.

10.0 Isolation and Operational Control Tags

The principle function of isolation & operational control tags is to identify isolation points upon which persons lives depend, or to identify unsafe and/or hazardous conditions that could endanger personnel or cause damage to Equipment.

10.1 ‘Danger – Do Not Operate’ Tag

No person **shall** operate equipment to which a ‘DANGER – Do Not Operate’ tag is attached.



10.1.1 When do I use this Tag?

In conjunction with an isolation lock to identify isolation points.

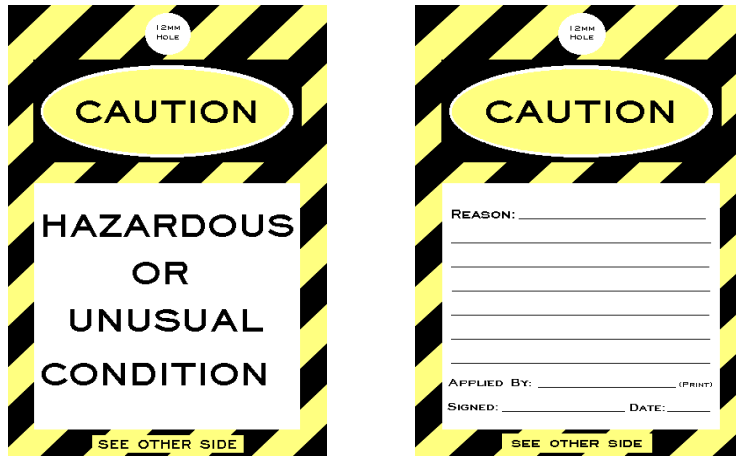
10.1.2 Application and Removal

This tag along with an isolation lock **shall** be placed on all equipment isolation points required to be isolated to complete the work safely. This tag **shall** also be attached to any operational control points identified in the SOPO (auto/manual selector switches for example).

This tag must be in place prior to the issuing of a permit to work.

A ‘DANGER – Do not Operate tag’ is used as part of a permit to work system and **shall** only be placed and removed by an AIO.

10.2 'Hazardous or Unusual Condition' Tag



10.2.1 When do I use this Tag?

This tag is a dual function tag which is used to identify a 'hazardous condition' or an 'unusual condition' existing on equipment. **The word 'HAZARDOUS' or the words 'UNUSUAL CONDITION' must be circled on the tag** to indicate the condition. **Where there is a danger to people or equipment the isolation points must be locked in the safe position using a defect/restriction lock and 'Hazardous or Unusual Condition' tag as per this procedure.**

These tags **shall** be used to provide:

- a) a visual warning that operation could be hazardous;
- b) advice that operation, may still be possible, but caution or restrictions may apply;
- c) a visual warning that the normal functioning or operation has been changed; and
- d) a warning that there is incomplete work on a device and it may have defects/restrictions of use.

10.2.2 Application and Removal

An employee may use a 'CAUTION – HAZARDOUS OR UNUSUAL CONDITION' tag where it would still be safe to use/operate the equipment with proper caution. The employee must inform the appropriate line manager of the problem with the equipment to ensure remedial or corrective action is taken or arranged.

The 'CAUTION – HAZARDOUS OR UNUSUAL CONDITION' tag may only be removed by an authorised and competent person when:

- a) the equipment has been replaced, repaired and restored to it's design or 'normal operating' condition;
- b) the changed operation or condition of the equipment has been incorporated into standard operating procedures; and
- c) the unusual condition no longer exists.

11.0 Schedule of Planned Operations (Isolation Sheets)

The purpose of this section is to set the standard to which schedule of planned operations (SOPOs) are to be prepared, completed and filed, for work on Woolnorth assets and equipment. A SOPO shall be produced for all group isolations to ensure the detail required to safely complete and maintain the isolations during work on plant, and the restoration of that plant back to service, is conducted in a safe and efficient manner.

11.1 Responsibilities

11.1.1 Authorised Issuing Officer

As designated in the permit to work procedure (WNH Q25).

11.2 Standard

11.2.1 General

All schedules of planned operations shall comply with this procedure.

Authorised Issuing Officers compiling, checking and actioning schedule of planned operations must be authorised for the specific site, wind farm, location and/or the equipment.

11.2.2 Schedule of Planned Operations Numbering

As per the permit to work procedure – with a ‘/’ then sequential alphabetic character.

11.3 Schedule of Planned Operations Format

The format of the *schedule of planned operations* **shall** be as per the SOPO template (WNH Q30.1).

11.3.1 Compilation

- a) schedule of planned operations can be hand written or computer generated;
- b) all schedule of planned operations (SOPO) **shall** be compiled by an AIO for the wind farm, location and/or equipment;
- c) when compiling the schedule of planned operations, the AIO is to review all relevant single line diagrams, schematic diagrams, procedures and/or any other relevant information;
- d) the objectives of the schedule of planned operations must be clearly defined prior to compilation as a control measure of the permit to work;
- e) a separate schedule of planned operations should be compiled for each objective and the objective must clearly state what is to be achieved. The schedule of planned operations may be broken down to have numerous sub-objectives;
- f) the schedule of planned operations objective **shall** refer to the permit to work and any generation outage approval and the scope of work where applicable;
- g) all schedules of planned operations should be written in a logical operational sequence, sub-objectives if used are to be clearly identified;
- h) when using the schedule of planned operations for the return to service of equipment it must be checked against, the action items of the schedule of planned operations for the equipment’s removal from service;

- i) all entries made on schedule of planned operations must be legible and clearly defined; and
- j) all equipment **shall** be identified by; wind farm/location, device type and device number or name.

If the operations are to be conducted at one wind farm/location only, the wind farm/location identification can be specified in the schedule of planned operations general information.

When two or more wind farm/locations are involved all remote equipment **shall** have the specific wind farm/location identification for each operational item.

- a) abbreviations in appendices, can be used in the compilation of the schedule of planned operations;
- b) operational items that provide Isolation **shall** be marked for tagging in the tagging column and marked for locking in the locking column of the schedule of plant operations. All operational earthing **shall** be marked for tagging in the tagging column to indicate a 'Danger - Do Not Operate' tag is attached as part of the operation;
- c) the use of an approved operational procedure as an operational item within a schedule of planned operations is allowable provided that all individual isolations are detailed on the schedule of plant operations, and its completion time **shall** be recorded on the schedule of planned operations;
- d) proving dead before applying earths, **shall** be recorded as a separate line item;
- e) the application of earths **shall** be recorded as a separate line item;
- f) the removal of each set of earths **shall** to be recorded as a separate line item;
- g) work site delineation (where appropriate) **shall** be specified as an operation on the schedule of planned operations;
- h) all permit to work issue (handover) and hand back **shall** be recorded as a separate line item;
- i) all assurance information **shall** be recorded as a separate line item;
- j) any error in a schedule of planned operations **shall** be crossed out with a single line, initialled by a preparing AIO and confirmed by a checking AIO. Correction fluid must not be used;
- k) when more than one sheet is required to meet the operational objective, cross-referencing must be used i.e. 'sheet 1 of 2', 'sheet 2 of 2', etc;
- l) last Item entry requirements;
- n) The last operational item on the schedule of planned operations **shall** meet the objective of the schedule of planned operations, which may include:
 - i. the number of the permit to work issued;
 - ii. or assurance information communicated;
 - iii. or operations are for changed configurations/system switching; and
 - iv. or return to service
- o) Each hand written schedule of planned operations **shall** be ruled off after the last operation; and
- p) All entries **shall** be checked for accuracy and completeness before the schedule of planned operations is signed by the compiling AIO.

11.4 Schedule of Planned Operations Colour Specifications

All computer generated schedule of planned operations **shall** utilise the following colours:

- a) Black or blue Operational items;
 - i. Isolation points;
 - ii. Work site delineation;
 - iii. Permit to work details; and

iv. Assurance information.

- b) Green Sub-objectives and/or locations (if applicable); and
- c) Red Earthing details

When the schedule of planned operations is hand written, the authorised person **shall** maintain the colours as defined for computer generated schedule of planned operations, if possible. When the range of colours is not available, the following **shall** apply;

- a) Black or blue All other entries or information; and
- b) Red Earthing detail

Note: When mono-colour printer, pen or fax generated schedule of planned operations are used, other forms of highlighting shall be used to highlight appropriate entries e.g. underline.

11.5 Checking and Approving Schedule of Planned Operations

- a) Schedule of planned operations **shall** be checked to ensure that the action items meet the required objective;
- b) Schedule of planned operations **shall** be checked, signed and approved by an AIO, other than the person that compiled the schedule of planned operations, before it is actioned;
- c) During the checking process the AIO should check the schedule of planned operations against single line diagrams, schematic diagrams, procedures and/or any other relevant information;
- d) Schedule of planned operations can be checked, signed off and approved remotely by means email communication; and
- e) When a registered computer generated schedule of planned operations is selected from the database and printed, it **shall** be checked by an AIO for the wind farm, location, equipment.

11.6 Pre-Approved Schedule of Planned Operations

A pre-approved SOPO is used to compile a SOPO for routine maintenance activities that are repeated on a regular basis.

A pre-approved schedule of planned operations is one that has:

- a) been compiled as per this procedure;
- b) been checked as per this procedure;
- c) signed and approved by two AIOs;
- d) been protected so it cannot be modified e.g. been converted into PDF format or similar;
- e) validated and signed by the AIO prior to issuing the Permit to Work, and,
- f) be no older than 7 years.

If the pre-approved SOPO needs modification due to change of scope, it **shall** not be used. A new schedule of planned operations **shall** be compiled and approved as per this procedure.

11.7 Schedule of Planned Operations Isolation Additions/Deletions

The isolations documented on a Schedule of Planned Operations (SOPO) can be changed if required in accordance with requirements of this procedure using a SOPO Isolation Additions/Deletion form (Appendices).

The following requirements apply to SOPO Isolation Additions/Deletions:

- a) a SOPO Isolation Additions/Deletions form **shall** be used to record the changes to isolations. The changes may be temporary or permanent;
- b) prior to a SOPO Isolation Additions/Deletions form being prepared the Authorised Issuing Officer **shall** liaise with the Person In Charge, outlining the details of the proposed changes to be undertaken;

- c) the work party and PIC shall sign off the Permit To Work prior to the changes to isolations being made;
- d) where an isolation point is permanently deleted a black/blue line **shall** be used to strike out the isolation point on the original SOPO (and any copies) and **shall** be initialled by the Authorised Issuing Officer;
- e) once the isolation changes have been made;
 - i. The completed "Schedule of Planned Operations Additions/Deletions" form shall be attached to the original SOPO for the Permit to Work. Similarly, all copies of the original SOPO shall have copies of the SOPO Additions/Deletions sheet attached; and
 - ii. The PIC and Work Party sign on to accept the changed Permit To Work conditions.
- f) Where multiple SOPO Isolation Additions/Deletions forms have been implemented under the original SOPO the AIO and PIC may agree to the AIO preparing an updated SOPO to reflect the current status of the plant and isolations;
- g) Where this occurs:
 - i. The SOPO shall be checked by another AIO and the PIC;
 - ii. The updated SOPO shall be entered into the PTW tracking sheet as a new record; and
 - iii. All previous SOPO's and SOPO Isolation Additions/Deletions forms used under the PTW shall be clearly marked and identifiable as superseded.

11.8 Actioning of a Schedule of Planned Operations

- a) a schedule of planned operations is to be actioned as planned. Where there is more than one operator actioning a schedule of planned operations it is allowable to carry out action items concurrently, provided it is operationally safe;
- b) a schedule of planned operations must not be altered once the operating sequence of actions has commenced without prior and specific approval to proceed from the operating authority, which controls the equipment affected. Where approval to change the operating sequence is granted by the operating authority, the schedule of planned operations must be amended, checked and re-authorised before work resumes. The re-authorisation of the schedule of planned operations would normally be done by re-countersigning. Where the re-authorisation has been verbal, the details must be noted in the appropriate log prior to continuing;
- c) The completion of each action item **shall** be acknowledged with the actioned time and operators initials on the schedule of planned operations;
- d) When the actioning date of the schedule of planned operations is different to the compilation date, the actioning date and time is to be recorded in the appropriate line item/s;
- e) When taking over a partly completed schedule of planned operations, the contents must be fully understood before continuing;
- f) Any modifications to an approved computer-generated schedule of planned operations are to be reflected in the database master, if applicable;
- g) On completion of the schedule of planned operations, the authorised person **shall**:
 - i. Make appropriate entries in operational log;
 - ii. The original/copy of the completed schedule of planned operations **shall** be attached to the permit to work or locked in the group isolation box with the isolation keys;

11.9 Schedule of Planned Operations Copies and Filing

When a computer-generated schedule of planned operations is attached to the permit to work and issued to the PIC, a completed copy (including completion acknowledgment) **shall** be filed appropriately in the wind farm/location with the permit to work.

When a commissioning program or an operation procedure/checklist is utilised as a schedule of planned Operations, a copy **shall** be retained with the wind farm/location log.

On the completion of work, the SOPO and the associated permit to work, **shall** be stapled together along with any other relevant information and appropriately filed in the wind farm/location for a minimum of 3 months.

12.0 Definitions

The following is a set of frequently used terms and abbreviations. The list is not comprehensive but aims to develop a common understanding. The abbreviations can be used as indicated in lieu of the full word for written communication.

Term	Abbreviation	Description
Access authority	AA	Safe Access Authority used by TasNetworks
Alternating current	ac	A current that reverses at regularly recurring intervals of time and which has alternately positive and negative values.
Air break switch	ABS	An approved switch for breaking current at or below the designed rating.
Ampere	A	Unit of electrical current
Auto recloser	A/R	Automatic device that initiates the reclosing of switching equipment as desired after it has opened automatically under abnormal or fault conditions.
Automatic	AUTO	
Automatic voltage regulator	AVR	A voltage sensitive device that is used to control the voltage of the regulated circuit.
Auxiliary	Aux	An item not directly part of a specific device or system but required for its functional operation.
Bearing	Brg	Part of machine that bears the friction, commonly between rotating shaft and its housing.
Blue phase	BØ	
Boiler	Blr	A closed vessel together with a furnace, in which steam or other vapour is generated for driving a turbine and / or for heating.
Capacitive voltage transformer	CVT	A voltage transformer (VT) connected to the primary conductor through a capacitance divider.
Capacitor	Cap	
Circuit	Cct	A conductor or system of conductors through which an electric current is intended to flow.
Circuit breaker	CB	A mechanical switching device capable of making carrying and breaking currents under normal circuit conditions and also making, carrying for a specified time, and breaking currents under specified abnormal circuit conditions such as those of short-circuit.
Close		The operation of an item of equipment e.g. movement of the contacts from the normally open to the normally closed position, or movement of the position of a valve.
Closed		An operational state of an item of equipment.
Combination fuse switch	CFS	A device within a distribution switchboard that performs both LV circuit protection and close and open functions.
Combined voltage and current transformer	CVCT	Instrument transformer connected in series with the primary conductor, comprising both a CT and a VT portion.
Commissioned		Operationally checked to comply with operational specification.
Control switch	C/Sw	A manually operated switching device for controlling power-operated devices. NOTE: It may include signalling interlocking etc, as dependent functions.
Cooling water	C/W	A fluid used to remove heat from rotating machinery or from its components.
Court	Crt	
Crescent	Cres	

Term	Abbreviation	Description
Current transformer	CT	An instrument transformer, with its primary winding connected in series with the conductor carrying the current to be measured or controlled.
Delay		The operational state of an item of equipment, where a delay has been purposely introduced in the action of the equipment. e.g. sensitive earth fault protection switched to 'Delay'
Dewatering	D/W	
Direct current	Dc	Uni-directional current, practically non-pulsating current.
Disconnect	DS	A switch used for changing connections in a circuit, or for isolating a circuit or equipment from a source of power. Not normally capable of making or breaking load or fault current.
Distribution switchboard	DSB	A power switchboard used for the distribution and protection of one or more electrical circuits at Low Voltages.
Earth fault	E/F	A short-circuit current between a conductor and earth resulting from an insulation failure or from the bridging of insulation.
Earth switch	ES	An approved mechanical switching device for electrically connecting a circuit or piece of equipment to earth.
Expulsion drop out (fuse)	EDO	A vented fuse in which the expulsion effect of gases produced by the arc and lining of the fuse folder, either alone, or aided by a spring, extinguishes the arc.
Extra low voltage	ELV	See definitions
Feeder line	Fdr	
Generator	G	Electric equipment that converts mechanical power into electric power.
Guide vane	GV	Part of a reaction turbine for regulating the quantity of water admitted.
Governor	Gov	The assembly of fluid, electrical, or mechanical control equipment used for regulating the flow of water, steam, or other medium to a rotating machine's prime mover for such purposes as starting, holding speed or load, or stopping.
Hill top valve	HTV	Valve at top of higher pressured section or penstock.
High voltage	HV	See definitions.
Highway	Hwy	
In		The operational state of an item of equipment, where a function of the equipment is enabled e.g. auto reclose 'In' means that the auto recloser is switched to initiate reclose of the respective circuit breaker.
In service		See definitions
Instantaneous	Inst	The operational state of an item of equipment, where no delay has been purposely introduced in the action of the equipment e.g. Sensitive earth fault protection switched to Instantaneous.
Instructed person	IP	See definitions.
Intake gate	I/G	
Isolator	Isol	See disconnect
Authorised issuing officer	IO	See definitions
Junction box	JB	An enclosure for connecting conductors with the use of terminals.
Kilovolt	kV	Unit of electric potential difference and electromotive force ($\times 10^3$).
Kilovolt ampere	kVA	Unit of 'apparent' power ($\times 10^3$).

Term	Abbreviation	Description
Kilowatt	kW	Unit of 'real' power ($\times 10^3$).
Low voltage	LV	See definitions
Machine	m/c	A generator or motor
Main inlet valve	MIV	Valve at exit of penstock and entry of spiral casing.
Main switch board	MSB	
Megavolt ampere	MVA	Unit of 'apparent' power ($\times 10^6$).
Megawatt	MW	Unit of power ($\times 10^6$).
Miniature circuit breaker	MCB	A LV circuit breaker assembled as an integral unit in a supporting and enclosing housing of moulded insulating material, the over-current and tripping means being integrated within the unit.
Mobile generator unit	MGU	Transportable AC power unit for temporary installation.
Motor	M	An electric equipment that converts electric power into mechanical power.
Multiple earthed neutral	MEN	A system of earthing in which the parts of an electrical installation required to be earthed are connected to the general mass of earth and, in addition, are connected within the electrical installation to the neutral Conductor of the supply system.
Neutral	N	
Number	No.	
On soak		The operational state of an item of equipment, where the equipment is energised, but is not delivering or transferring power.
One trip to lockout		The operational state of an item of equipment, where only one opening operation of the mechanism will be permitted before the contacts are locked in the open position. This will be the case where the auto recloser is 'Out'.
Open		The operation of an item of equipment e.g. movement of the contacts from the normally closed to the normally open position, or movement of the position of a valve.
Operator		See definitions
Optical ground wire	OPGW	
Out		The operational state of an item of equipment, where the function of the equipment is disabled e.g. auto reclose 'Out' means the auto recloser is switched to not initiate reclose of the respective circuit breaker.
Out of service	OOS	See definitions.
Overcurrent	O/C	A current exceeding the rated value (for conductors, the rated value is the current-carrying capacity).
Overhead	OH	
Overvoltage	O/V	Excessive voltage, exceeding a predetermined value is the current-carrying capacity).
Overhead	OH	
Permit to work	PTW	A work approval and risk control system applicable to all work being carried out on Woolnorth owned and/or operated plant and assets.
Person in charge	PIC	A person trained as a PIC and is authorised to issue special permits for confined space, concealed services and hot work; and who will take charge of the conduct of work and the work site defined in a permit and is accountable for the safety of people (IPs, visitors or members of the public) and equipment within the scope of the work.
Phase	Ø	(pronounced Phi)
Term	Abbreviation	Description
Pole	P	

Pole mounted recloser	PMR	
Primary	Prim	Referring to the main power circuits or energy input side of a transformer.
Pump		A machine for raising, driving, exhausting, or compressing fluids, as by means of a piston, plunger, or rotating vanes.
Red phase	RØ	
Receiver	Rx	A device to re-convert an intermediate signal into the original signal.
Remote terminal unit	RTU	A slave control device located at a wind farm for remote control of units or switchgear by supervisory control or from which supervisory indications or selected telemeter readings are obtained to be displayed at a master Wind farm.
Return to service	RTS	
Safe approach distance	SAD	See definitions
Supervisory control and data acquisition	SCADA	
Secondary	Sec	Referring to auxiliary or control circuits, or energy output side of transformers.
Sensitive earth fault	SEF	An earth fault that is limited by the resistivity of the earth
Schedule of planned operations	SOPO	See switching sheet
Subwind farm	SubStn	
Switching sheet	Sw/Sh	See definitions
Switch	Sw	A device used to close or open, or both, one or more electric circuits.
Tag		See definitions
Tap changer	T/C	A selector switch device used to change transformer taps to permit changing the voltage ratio.
Test energise		The operation of an item of equipment to connect de-energised equipment to the power system to evaluate its performance under controlled conditions, to place the equipment on soak.
Time delay	T/D	See delay
Tower	T	
Transmitter	Tx	A device that converts an original signal into an intermediate signal, suitable for sending via a bearer.
Transducer relay cubicle	TRC	
Transformer	TF	A device which, when used, will raise or lower the voltage of alternating current of the original source.
Transmission line	T/L	
Under frequency	UF	A frequency that is less than a predetermined value.
Underground	UG	
Undervoltage	U/V	A voltage that is less than a predetermined value.
Valve	V/v	Any device for closing or modifying the passage through a pipe, outlet, inlet or channel, in order to control the flow of liquids or gases.
Voltage transformer	VT	An instrument transformer intended to have its primary winding connected in shunt with the power supply circuit, the voltage of which is to be measured or controlled.
Volt	V	Unit of electric potential difference and electromotive force.
Volt ampere reactive	VA _r	Unit of 'reactive' power.
Watt	W	Unit of 'real' power.
White phase	WØ	

13.0 Accountabilities

The General Manager of Woolnorth is to ensure that hazards identified in Site Risk registers are managed in accordance with their level of risk and that delegated personnel within the business are aware of their HSE risk management responsibilities, As Far As Reasonably Practicable (AFARP).

All staff within Woolnorth conducting operational activities must ensure AFARP that they understand the requirements of this procedure and that their activities are in compliance with this procedure.

All staff and contract managers are to ensure the operational personnel they are responsible for have access to this procedure, understand the core requirements of this procedure and that they are provided with adequate supervision to minimise the risks of incidents in hazardous environments AFARP.

The HSE Manager for Woolnorth is to ensure AFARP that this procedure reflects industry best practice, meets National and State legislative requirements and Standards and that this document is maintained within the Plan-Do-Check-Act cycles of the businesses HSE system.

14.0 References

The following manuals and references are to be used for assisting in managing hazards and controls associated with hot work on Woolnorth work sites.

- Tasmanian Fire Service website - www.fire.tas.gov.au
- Code of Practice Welding Processes July 2012
- Tasmanian Code of Practice Welding Processes CP134 December 2012
- Safe Use of Angle Grinders (Worksafe Victoria)

Tag template – 145X85mm

 DANGER DO NOT OPERATE SEE OTHER SIDE	 DANGER THIS TAG MAY BE REMOVED ONLY UNDER THE DIRECTION OF OR BY: _____ REASON: _____ APPLIED BY: _____ (PRINT) SIGNED: _____ DATE: _____ SEE OTHER SIDE
 CAUTION HAZARDOUS OR UNUSUAL CONDITION SEE OTHER SIDE	 CAUTION REASON: _____ APPLIED BY: _____ (PRINT) SIGNED: _____ DATE: _____ SEE OTHER SIDE