Plant & Equipment Isolation Procedure

Safety Management System

SMS 06.02.11

Auckland Airport

COPYRIGHT:

TABLE OF CONTENTS

Paragraph **Page**

RECORD OF REVIEWS & APPROVAL OF CONTENTS

Control and distribution details for this Manual are as follows:

- The Word master is in the MS Team "AA PCS-Safety and Wellbeing". A pdf is made for publication and saved into the appropriate The Radar SharePoint document library using the same pdf file name as the existing version in that library to ensure any hyperlinks still function, including hyperlinks to the document from The Radar.
- The Word master uses SharePoint "version history" to retain full details of changes over time.
- The final pdf is attached to an email and distributed to external users, and the sent email saved into SharePoint to give it a doc number, which is recorded in the table overleaf to retain an auditable record of who the document has been sent to.

UNCONTROLLED COPYHOLDERS

The Radar SMS landing page SharePoint doc library (enables links from The Radar, Infoport wiki, etc) - pdf copy. Corporate website, PTW docs landing page.

REVIEW PROCESS

A document review process is in place requiring content reviews at regular intervals (see bottom left-hand footers for recommended frequencies). Unique SharePoint document numbers (prior to the Dec 2021 update these were not used for this document) containing evidence of review, and evidence of document owner approval of content and amendments, are listed below. Paragraphs affected by amendments at each review may be marked by lines in the right margin (except for major rewrites, consequential changes to Table of Contents, etc).

RECORD OF REVIEWS, DISTRIBUTION & APPROVAL OF CONTENTS *(cont)*

Content Review Date:	Reviewers:	Document Numbers in evidence of review:	Amendment Date:	Doc Owner:	Document Numbers in which doc owner approves content of amended Manual:	Date of approval:	Document Numbers of emails issuing to external holders
1-12-16	Andy Catterall	unknown	1-12-16	Andy Catterall	unknown	unknown	unknown
30-04-21	David Orange	unknown	30-04-21	David Orange	unknown	unknown	unknown
May - Dec 2021	Chris Nolan, David Orange, Kristina Cooper, several other ES staff	AIAL-1336572876-102460, 461, 517, 600, 617, 619, 620, 633 & 634	17-12-21	Chris Nolan	AIAL-1336572876-102633 & 34	09-12-21	tbc

1 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this document is to provide practical guidance about the use of isolation procedures (including isolation, earthing, and draining) to protect persons working on Equipment or Plant.

1.2 Scope

The isolation procedure is applicable to all work being undertaken at or on Auckland Airport owned and/or operated Equipment or Plant and assets. This document applies to isolation procedures designed to protect a worker from unexpected energisation, start-up, or release of energy, while they are working on Equipment or Plant. It covers 3 categories of isolations:

I. Directly controlled isolations where locking and tagging is not necessary.

II. Personal isolations where it is practicable for the worker to personally isolate the Equipment or Plant, and the worker is competent and authorised to do so.

III. Group isolations where the actual isolation shall be carried out by an Isolation Leader.

This document does not cover:

I. normal Equipment or Plant operation (undertaken in accordance with SOPs and manufacturer's instructions)

II. minor servicing tasks (Note normal risk assessment and JSA/SOP procedures and manufacturer's instructions must nevertheless always be followed)

III. live work procedures (strongly discouraged as isolation should always occur if possible but if live work is unavoidable then bespoke risk assessment, controls and PPE must be in place to reduce the risk to ALARP with sign-off of the intended work at the managerial level required in Auckland Airport's RAM))

IV. HV Isolations (Refer instead to Auckland Airport HV Operations Manual and HV Pre-Isolation or Commissioning Process as well as associated HV Procedures, Switching Schedules, Stand-over Requirements and SOPs)

V. Work being undertaken at the Auckland Airport precinct on equipment, plant and assets not owned by AIAL. (Note an appropriate isolation procedure must be followed in this situation which has been communicated and agreed between all workers involved in the work but it does not need to be this Procedure)

2 RESPONSIBILITIES

2.1 Permit Issuer

As designated in the permit to work procedure.

2.2 Authorised person

A person, who has delegated authority to act as the *authorised person*, shall be able to:

i. compile equipment isolation check sheet.

ii. sign as the 'prepared by authorised person', for equipment isolation check sheet.

iii. carry out duties as designated by the permit issuer.

iv. Competently isolate equipment under personal lock out.

2.3 Isolation Leader

This is the person responsible for the placement of the Isolations on the respective equipment, shall be able to:

i. compile schedule of equipment and where to Isolate and how many points of Isolation required for the safe Isolation of the Equipment or Plant.

ii. sign the Isolation Sheets, as Isolated.

iii. carry out duties as designated by the authorised person.

iv. has the adequate knowledge of the Equipment or Plant and the technical competence and authorisation to personally determine, carryout and check isolations and restorations as required.

3 APPLICATION FRAMEWORK

3.1 Hazards associated with Equipment or Plant

During routine operations, persons will normally be protected from contact with potentially harmful sources of energy associated with Equipment or Plant by the usual hazard controls (separation, guarding, other engineering controls and administrative controls), or because the source of energy is contained within the Equipment or Plant.

When work has to be carried out on the Equipment or Plant (during installation, servicing, maintenance, repair, cleaning, dismantling, etc.), the usual hazard controls cannot always be used. In particular, guards, interlocks and other safety devices may have to be removed or by-passed, and workers may have to enter or place parts of their bodies in hazardous areas of the Equipment or Plant.

In these cases, alternative ways to protect workers become necessary. When working on Equipment or Plant, protection is needed from:

i. movement or operation of the Equipment or Plant itself.

ii. movement of water.

iii. movement of fuel.

iv. contact with energy.

v. used to operate the Equipment or Plant.

vi. used to carry out processes in the Equipment or Plant.

vii. produced or carried by the Equipment or Plant.

viii. stored within the Equipment or Plant.

The forms of energy or hazards involved may include:

i. electrical energy (electrical power supply, static charges, batteries, capacitors).

ii. mechanical energy (mechanical drives, moving and rotating machinery).

iii. pressure energy (water pressure, compressed air, vacuum, hydraulics).

iv. gravitational energy (counterweights, vehicle runaways, hung-up material, etc.).

v. potential energy (springs, structural strain).

vi. thermal energy (hot or cold surfaces and substances, heat radiation).

vii. Noise.

viii. Vibration.

ix. non-ionising radiation (lasers, welding, electro-magnetic fields, microwaves).

x. ionising radiation (X-rays, radioactive sources).

xi. hazardous substances (corrosive, poisonous, asphyxiant, flammable, explosive, chemically reactive substances).

xii. Baggage handling systems (conveyor belts; powered rollers, sortation plant, etc.)

xiii. biologic hazards (bacteria, insects, reptiles, etc).

3.2 Isolation procedures for work on Equipment or Plant

In general, when work is being carried out on Equipment or Plant, it is necessary for the workers to protect themselves from sources of energy associated with the Equipment or Plant by following an isolation procedure. The isolation procedure provides for each worker involved to personally ensure that energy sources associated with the Equipment or Plant are isolated, dissipated or restrained, and continue to be isolated, dissipated or restrained until the worker stops work on the Equipment or Plant.

Work on Equipment or Plant varies widely in its nature and complexity, and a single isolation process cannot provide the protection and flexibility required to cover all situations. To provide this flexibility, three isolation processes for use in different circumstances are given in the 'isolation process section'. The criteria for the choice of isolation process are also covered in this section.

3.3 Responsibilities of operators for equipment directly associated with the power system

The operator shall be an authorised person and is responsible for:

i. Liaising with planning departments to plan outages where delegated.

ii. Negotiating access requirements.

iii. Preparing and authorising schedules of planned operations.

iv. Operating power system equipment under the direction of Auckland Airport.

v. Actioning schedules of Equipment or Plant operations.

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.

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.

3.4 General principles of isolation

Isolated equipment shall be rendered incapable of being energised without premeditated and deliberate action.

Equipment shall be isolated by the use of an approved method.

All complex/group isolation operations shall be identified on an equipment isolation check sheet.

Where Isolation points have provision for locking, such locking arrangements shall 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 shall be used.

All isolations shall be locked and tagged in accordance with this procedure

Isolation points shall be tagged. Where an Isolation point is used for multiple permits to work it shall:

i. have a separate tag for each permit to work; or

ii. have a separate tag for each equipment isolation check sheet; or

iii. be tagged in accordance with approved equipment isolation check sheets procedures including isolations register arrangements.

Tags (other than SCADA) shall be suitably displayed, and include:

i. be cross locked in accordance with an agreed Isolation arrangement signed off as part of the permit to work.

ii. equipment operated via remote control subsequent to local Isolation shall be tagged on the SCADA system such that a premeditated action is needed to remove such tagging.

iii. REMOTE / LOCAL switches to be set to LOCAL and tagged.

iv. equipment used as a point of Isolation shall not be worked on.

v. Isolation points can only be altered with the approval of the Isolation Leader subject to the terms and conditions of the permit to work.

3.5 Principles of electrical isolation

An Isolation point shall have a break of a distance appropriate to the voltage and insulating medium that is visible (if possible).

For high voltage Equipment or Plant – if the Isolation point does not have a visible break, it shall:

i. be withdrawn to the isolated position.

ii. be proven De-energised and approved earthing devices applied to confirm isolation.

iii. have control circuits isolated, locked (as appropriate) and tagged. Where Isolation is performed by an MCB/CB which cannot be locked, further Isolation shall be required i.e. withdrawal of all applicable fuses/links to provide a double break.

VT and CVT secondaries shall be isolated by the withdrawal of all applicable fuse/ links or by opening an Isolation switch or MCB. The fuses/links shall be secured or the Isolation switch/MCB shall be locked. 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.

Where isolation of low voltage circuits requires the withdrawal of fuses/links, all subsequent exposed live terminals shall be made safe.

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.

NOTE: Where a switch truck/carriage has been removed from its cubicle, other safety measures shall be taken to prevent access to Live Conductors, e.g. spout shutters locked, busbar covers installed, switchgear door locked and Tagged.

3.6 Principles of mechanical isolation

Equipment shall be unwound, un-tensioned or drained, vented and depressurised to prevent uncontrolled movement, or otherwise made safe for work.

An isolation device shall have an appropriate design to withstand the hydraulic, pneumatic, or mechanical energy.

All necessary gates, valves and mechanical linkages utilised as isolation points shall be restrained in position, locked and tagged.

Rotating and linear actuating equipment shall be stationary, and where appropriate, restrained and/or its motive force and control circuits Isolated.

Pressure vessels, penstocks, piping, ducts, and vents shall be isolated, and drained where appropriate, to ensure their condition/status remains unchanged for the duration of the work.

Valves utilised as drains shall be tagged.

Motorised valves and gates shall have their control and/or power circuits isolated.

Where energised equipment cannot be de-energised, an appropriately designed and approved locking device shall be used to prevent movement.

Systems used to apply and maintain seals, shall be monitored for the duration of the work.

Where the integrity of the isolation device is questionable, further isolation or additional safety measures are required.

Where practical, the equipment shall be proven de-energised.

4 GENERAL EARTHING PRINCIPLES

Earthing is carried out to ensure that an effective discharge of electrical energy to the general mass of earth is maintained for the reasons of personal safety.

All temporary earths (portable earths) shall be applied and removed in accordance with the requirements of IEC/EN 61230(and its amendments): Live working – Portable equipment for earthing or earthing and short-circuiting.

When work is to be carried out on de-energised high voltage power system equipment, the equipment is to be earthed to ensure no harm to the work party through inadvertent energising, induction or capacitive discharge.

All high voltage electrical work shall be done between earthing devices unless, due to lack of space or design standard, it is not physically possible to apply earths to all sources of high voltage supply. In this situation, no work shall commence on isolated Equipment until it has been positively identified and proven de-energised at the work location.

All workers when carrying out duties, shall wear and use appropriate personal protective equipment and clothing (with non-metal fittings), as specified in the safe work practices handbook and in the PPE procedure.

Operational earths shall be used to visually bond all three phases together and to bond the phases to earth through a recognised earth point.

All power system equipment within Auckland Airport's power system shall be 'proven de-energised' using an approved voltage detection device prior to the application of earths.

Operational earths are applied as an operational function in the preparation of equipment prior to the issue of a permit to work and are part of the terms and conditions of the permit to work.

All operational earths shall be tagged using the 'Danger - Do Not Operate' tag. A tag shall be applied for each permit to work / equipment isolation check sheet utilising the same set of operational earths, to specifically identify the number of permit to work / equipment isolation check sheet relying on the operational earths in the provision of a safe work environment. The tag shall be suitably displayed and applied at the recognised earth point and shall display the following information:

i. The associated permit to work / equipment isolation check sheet number.

ii. A brief description of the application point.

iii. Applied by (print & sign).

iv. Date of placement.

In addition to operational earthing requirements, work earths shall be utilised during work to minimise the effect of induction through the creation and maintenance of an equipotential work environment.

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 must 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.

4.1 Delineation of work sites

Work site delineation is provided to direct movement of the work party to and from the area in which it is safe to work under the terms and conditions of the permit to work.

All delineated work sites shall:

i. Be established prior to the issue of the permit to work.

ii. Be defined by barrier markers erected to indicate, as clearly as possible, the work site in which work is to be performed. Where it is not possible and/or practicable to use physical barrier markers, approved procedures shall be followed.

iii. Be arranged so that the equipment to be worked on is accessible without interfering with the barrier markers.

iv. Have a clearly defined entry point. This may require separate entry points for personnel and vehicles.

v. Have appropriate barrier markers and/or signs placed at points where it is possible to move into the safe approach distance to conductors, which shall be regarded as energised.

vi. Have appropriate barrier markers and/or signs placed at points where other hazards exist, e.g. excavations.

Workers shall not cross under/over or interfere with barrier markers that delineate a work site except in an emergency situation that threatens the safety of personnel, equipment or the environment and then only with due consideration for personal safety.

5 ISOLATION PROCESS

5.1 General Isolation Process

To protect people working on Equipment or Plant from sources of energy associated with that Equipment or 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.

i. **stop** the Equipment or Plant.

ii. **isolate**, dissipate or restrain the energy sources.

iii. **lock and Tag** or otherwise ensure that the Equipment or Plant cannot be re-energised.

iv. **verify** that the isolation, dissipation and restraints are effective.

v. **sign on** to the permit to work.

vi. **work on** the Equipment or Plant.

vii. **sign off** the permit to work.

viii. **remove any locks and tags.**

ix. **restore** and re-energise the Equipment or Plant.

5.2 Choice of particular isolation process

To cover the varied range of work on Equipment or Plant and equipment, three variations on the general isolation process are to be used. The choice of process will depend on the scope and complexity of the work.

A. Directly controlled isolation

For work on Equipment or Plant where:

i. Isolation, dissipation or restraint of energy sources is carried out by physical removal or separation of Equipment or Plant components and;

ii. Each worker can keep the means of isolation, dissipation and restraint under continuous observation and control and;

iii. There is no high voltage (greater than 1,000 Volts), high pressure or high energy sources involved and;

iv. There are no special conditions that have been imposed by the Permit Issuer on the PTW due the non-routine nature of the works.

Then a directly controlled Isolation procedure following the process steps in part D of this section 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 Equipment or Plant can be effectively prevented, without the need for locking and tagging out, by coiling up power leads or hoses.

B. Personal isolation

Is work on Equipment or Plant where:

i. Each worker involved does not have direct close control of the means of isolation, dissipation and restraint and;

ii. Fewer than four energy sources are involved and;

iii. Fewer than six workers are involved, and they can easily liaise with each other during the work and;

iv. The work will be completed by the end of the current shift and;

v. There are no special conditions that have been imposed by the Permit Issuer on the PTW due the non-routine nature of the works and;

vi. There is no high voltage (greater than 1,000 Volts), high pressure or high energy sources involved.

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 Equipment or Plant involved should be fitted with isolating switches on electrical power sources, and other suitable devices on other sources of energy and be locked and tagged.

C. Group isolation

Is work on Equipment or Plant where:

i. More than four energy sources are involved or;

ii. More than six workers are involved or;

iii. There is high voltage (greater than 1,000 Volts), high pressure or high energy sources involved or;

iv. The work will take longer than one shift discussion around shift length to complete or;

v. There are special conditions that have been imposed by the Permit issuer on the PTW due the non-routine nature of the works or;

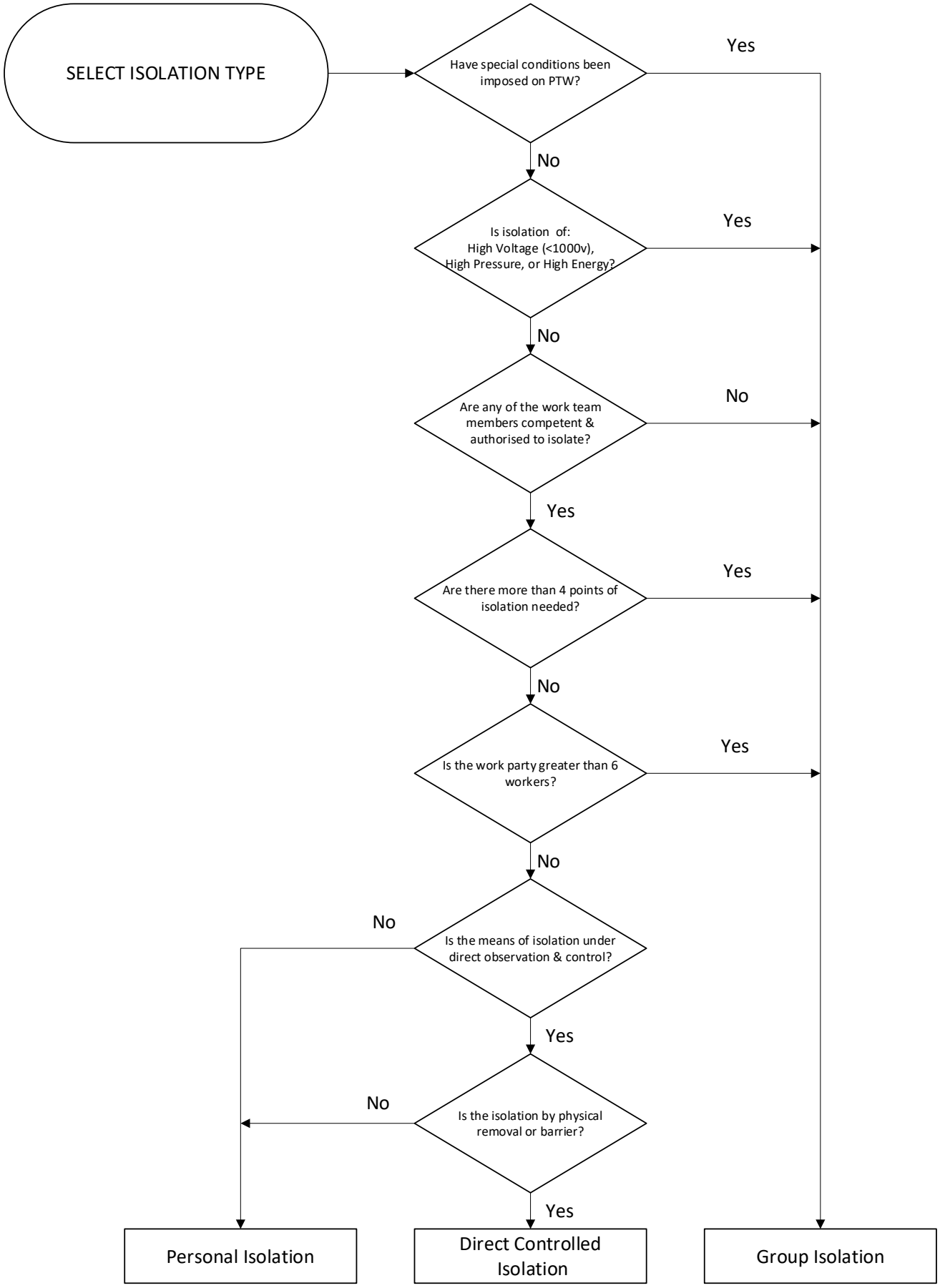
vi. None of the workers are Isolation Leaders.

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 will include major maintenance work, major construction or modification work to power stations, or work on high voltage electrical installations, etc.

Note: In these cases, it is only practicable for the isolation, dissipation and restraint of energy sources to be carried out by a Isolation Leader 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 Equipment or Plant cannot be re-energised until they have stopped work on the Equipment or Plant.

D. Isolation type flowchart



5.3 Directly controlled isolation process (where locking or tagging is not necessary)

To determine if this process is suitable for the type of work to be carried out, see Section 5.1 above.

A. Identification of sources of energy

The worker shall personally identify:

i. all potentially harmful sources of energy coming into the Equipment or Plant.

ii. all potentially harmful sources of energy contained within the Equipment or Plant.

iii. any Equipment or Plant or contents likely to move.

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

B. Isolation, dissipation and restraint of energy sources

The worker shall bring the Equipment or Plant to a safe state to work on by, as appropriate:

i. Stopping the Equipment or Plant in a controlled manner.

ii. Isolating any sources of energy feeding the Equipment or Plant.

iii. Dissipating any sources of energy contained within the Equipment or Plant.

iv. Restraining the Equipment or 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.

C. Verifying the effectiveness of energy controls

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

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

D. Working on the Equipment or Plant

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

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

E. Re-energising and returning the Equipment or Plant to service

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

F. Action if Equipment or Plant is not fit to return to service

If the worker stops work on the Equipment or Plant without finishing his or her tasks, or otherwise leaves the Equipment or Plant unfit for use, he or she shall ensure that the Equipment or Plant is kept out of operation and asset owners or their delegates informed of the situation and issues. Where possible an OUT-OF-SERVICE lock and tag should be applied, as per Section 6.6.

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.

A. Identification of sources of energy

A worker intending to work on Equipment or Plant shall personally identify:

i. All potentially harmful sources of energy coming into the Equipment or Plant.

ii. All potentially harmful sources of energy contained within the Equipment or Plant.

iii. Any Equipment or Plant or contents likely to move.

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

B. Isolation, dissipation and restraint of energy sources

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

The Equipment or Plant shall be brought to a safe state by a competent person, as appropriate:

i. Stopping the Equipment or Plant in a controlled manner.

ii. Isolating any sources of energy feeding the Equipment or Plant.

iii. Dissipating any sources of energy contained within the Equipment or Plant and preventing energy building up again during the course of the work.

iv. Restraining the Equipment or Plant, materials, and any other sources of energy that cannot be dissipated.

Note 1: If the Equipment or 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 Equipment or Plant concerned as practicable.

Note 3: Dissipating sources of energy in the Equipment or 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, by closing cover plates on radioactive gauges, etc. Equipment or Plant that can move can be restrained by applying brakes, by inserting chocks or sprags, etc. Other types of Equipment or Plant they may have to be restrained include fans or pumps that may be moved by flow through them.

C. Locking and tagging

Where possible each worker shall lock every device used for isolating, dissipating or restraining energy on the Equipment or Plant. 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. Each worker shall tag every device or other means used for isolating, dissipating or restraining energy on the Equipment or Plant with a 'Personal Danger Tag'. The worker shall write on the tag in the spaces provided:

i. Name.
ii. the reason for isolation/tagging.
iii. the name of the person (printed).
iv. the signature of the person.
v. the date of tagging.

Note 1: Locking provides physical security to ensure that the device used for isolating, dissipating or restraining energy is not inadvertently operated. Tags do not provide a reliable means of restraint on the device as they can inadvertently be removed. The purpose of a tag is to provide information, not security.

Note 2: 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 the group isolation procedure in Section 4.2.

Note 3: 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.

Note 4: The locks of several workers can be attached to the same device by means of hasps with holes for several locks.

D. Verifying the effectiveness of energy controls

Each worker shall either personally verify the effectiveness of the isolation, dissipation and restraint of energy sources, or if other workers are also working on the same Equipment or 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 Equipment or Plant, or by other suitable tests. However, no attempt to start the Equipment or Plant shall be made if work has already started on the Equipment or Plant.

E. Working on the Equipment or Plant (including testing)

If verification shows that sources of energy have been effectively isolated, dissipated and restrained, the worker may then carry out work on the Equipment or Plant. If it is possible for stored energy to re-accumulate during the work on the Equipment or 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 other workers who have personal isolation locks attached to the equipment isolation points. Each of these workers shall remove their own personal isolation lock(s) prior to carrying out the testing and move to a safe position before testing commences. If further work on the Equipment or Plant is required after the testing, the isolation shall be fully restored, and all workers shall then replace their personal isolation locks onto equipment isolation points. Additional copies of the equipment isolation check sheet may be used to ensure that the isolation is fully restored.

Note: While work is being carried out, the possibility that the Equipment or 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.

F. Prohibition on operation of locked or tagged isolation devices

All persons shall be prohibited from:

i. Attempting to operate an energy isolation, dissipation or restraint device which has been locked or tagged.

ii. Attempting to otherwise re-energise or restart the Equipment or Plant while persons are working on it.

G. Removal of locks and tags

As each worker stops work on the Equipment or Plant, they shall:

i. Clear the Equipment or Plant of any tools, equipment or materials that they have and that are not required by other workers still working on the Equipment or Plant.

ii. Replace any guards that are not required to be left open for access by other workers still working on the Equipment or Plant.

After doing this and getting clear of the Equipment or Plant, the worker shall then:

i. Remove their personal isolation locks and personal danger tags.

ii. Remove name and details from or tear up or otherwise destroy the tags.

Note: Destruction of tags after removal will prevent re-use and indicate that the tag has not been removed inadvertently or by accident.

H. Action before re-energising Equipment or Plant

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

i. Check and ensure that the Equipment or Plant is clear of tools, equipment, materials and persons.

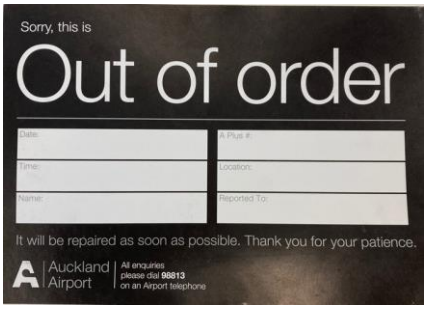
ii. Check and ensure that all guards have been replaced, and the Equipment or Plant is fit for use.

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

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

I. Action if Equipment or Plant is not fit to return to service

If any worker stops work on the Equipment or Plant without finishing his or her tasks, or otherwise leaves the Equipment or Plant unfit for use, he or she shall place an OUT-OF-SERVICE Sign/Lock and or 'CAUTION DO NOT OPERATE' tag to the inoperable Equipment or Plant isolator or otherwise ensure that the Equipment or Plant is kept out of operation and advise operational staff of the Equipment or Plant status.



J. Removal of locks and tags if worker unavailable

If any worker has left the 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 Isolation Leader after the personal isolation lock/tag removal form/process has been completed and duly authorised by the responsible officer or their direct delegate to ensure that owner of the personal isolation lock and/or danger tag is safe and no longer on site or around the equipment related to the lock and/or tag.

Note: Removal of locks with this process shall only be used as a last resort – a worker having to drive back to site is practicable no matter how inconvenient.

5.5 Group isolation process

To determine if this process is suitable for the type of work to be carried out, see Section 5.1 above.

A. Selection of person to carry out the actual isolation

The asset owner (or their delegate) will select and designate an Isolation Leader to plan and carry out the isolation and restoration of the Equipment or Plant once work is completed.

B. Identification of sources of energy

Based upon the scope of the work, the Isolation Leader shall personally identify:

i. all potentially harmful sources of energy coming into the Equipment or Plant.

ii. all potentially harmful sources of energy contained within the Equipment or Plant.

iii. any Equipment or Plant or contents likely to move.

The Isolation Leader will then prepare a schedule of Equipment or Plant operations which will document all operations, isolations, earthing, dissipating, draining and restraining steps required to ensure the safety of all workers. The Isolation Leader will take into account and plan for any testing, commissioning and progressive restoration of the Equipment or Plant when preparing the schedule of Equipment or Plant operations. The schedule of Equipment or Plant operations shall be verified by another competent and Isolation Leader before commencing the isolation.

C. Isolation, dissipation and restraint of energy sources

The Isolation Leader shall personally bring the Equipment or Plant to a safe state to work on as detailed on the schedule of Equipment or Plant operations. The completion of each step on the schedule of Equipment or Plant operations shall be marked as complete immediately after it is done.

The Equipment or Plant shall be brought to a safe state by, as appropriate:

i. stopping the Equipment or Plant in a controlled manner.

ii. isolating any sources of energy feeding the Equipment or Plant.

iii. dissipating any sources of energy contained within the Equipment or Plant and preventing energy building up again during the course of the work including earthing and draining.

iv. restraining the Equipment or Plant, materials, and any other sources of energy that cannot be dissipated.

D. Locking and tagging the Equipment or Plant

The Isolation Leader shall lock every device used for isolating the Equipment or 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 locks. The Isolation Leader shall also tag every device or other means used for isolating, dissipating or restraining energy on the Equipment or Plant with a 'Danger – Do Not Operate' tag.

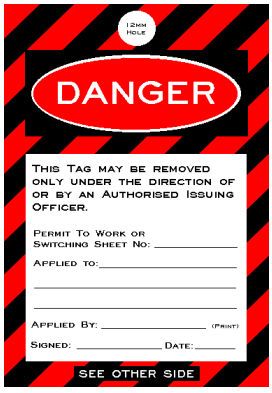
The Isolation Leader shall ensure the 'Danger – Do Not Operate' tag has the following legible information:

i. the schedule of Equipment or Plant operations number.

ii. the description and state of the Equipment (the tag is applied to).

iii. the name and signature of the Isolation Leader.

iv. the date of tagging.



E. Verifying the effectiveness of energy controls

The Isolation Leader shall verify the effectiveness of the isolation, dissipation and restraint of energy sources with the person in charge (and all the work party if practical to do so).

F. 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 Isolation Leader shall place the keys they used to lock the devices for isolating, dissipating or restraining energy on the Equipment or Plant, and any remaining isolation locks from a set of locks in a group isolation board. The Isolation Leader will then place a green 'Isolation Leader' lock on the group isolation board/box. At this point the Isolation Leader may authorise the work to commence on the Equipment or Plant covered by the permit to work to the person in charge of the work. All workers (including an Isolation Leader if working

on the Equipment or Plant being isolated) who are to work on the Equipment or Plant shall then sign on to the permit to work and lock the group isolation board with a red personal isolation lock.

Before locking the group isolation board/box, all workers must personally verify, or require the Isolation Leader to demonstrate, that the sources of energy have been effectively isolated, dissipated and restrained (Prove test prove).

G. Working on the Equipment or Plant (including testing)

After a worker has locked and tagged the group isolation board/box, they may then carry out work on the Equipment or Plant. If it is possible for stored energy to re-accumulate during the work on the Equipment or 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 other workers who have personal isolation locks attached to the group isolation board. Each of these workers shall remove their own personal isolation lock(s) prior to carrying out the testing and move to a safe position before testing commences. If further work on the Equipment or Plant is required after the testing, the isolation shall be fully restored and all workers shall then replace their personal isolation locks onto the group isolation board. Additional copies of the equipment isolation check sheet may be used to ensure that the isolation is fully restored.

H. Prohibition on operation of locked or tagged isolation devices

All persons shall be prohibited from:

i. attempting to open a locked or tagged group isolation board.

ii. attempting to operate an energy isolation, dissipation or restraint device which has been locked or tagged.

iii. attempting to otherwise re-energise or restart the Equipment or Plant while persons are working on it.

I. Removal of locks and tags from the group isolation board

As each worker stops work on the Equipment or Plant and gets clear of the Equipment or Plant, the worker shall remove their personal isolation lock from the group isolation board.

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 person in charge. 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.

J. Removal of locks and tags from group isolation board if worker unavailable

If a worker has left the site without removing his or her personal isolation lock from the group isolation board, and it is not practicable to recall the worker to remove them, the lock may be removed by an Isolation Leader after the personal isolation lock/tag removal form/process has been completed and duly authorised by the responsible officer or their direct delegate to ensure the owner of the personal isolation lock and/or danger tag is safe and no longer on site or around the equipment related to the lock and/or tag.

Note: Removal of locks with this process shall only be used as a last resort – a worker having to drive back to site is practicable no matter how inconvenient and workers may be recalled to remove their lock and/or tag at their own time and expense.

K. Removal of locks and tags from the Equipment or Plant itself

After all locks have been removed from the group isolation board, the Isolation Leader may remove the green Isolation Leader lock, open the group isolation board and remove the keys he or she used to lock the devices used for isolating, dissipating or restraining energy on the Equipment or Plant.

The Isolation Leader shall then:

i. check and ensure the Equipment or Plant is clear of tools, equipment, materials and persons.

ii. check and ensure that all guards have been replaced, safety devices are operating, and the Equipment or Plant is fit for use.

iii. check that all primary protective assets are returned fully to service and that any links are returned to their normal operational state.

The Isolation Leader may then remove the isolation locks and tags from the Equipment or Plant. He or she may then re-energise the Equipment or Plant and shall inform any Equipment or Plant operators, or other workers affected that the Equipment or Plant is no longer isolated.

L. Action if Equipment or Plant is not fit to return to service.

If work on the Equipment or Plant stops without finishing the work, or otherwise leaves the Equipment or Plant unfit for use, the person in charge shall ensure that the Equipment or Plant is kept out of operation. The person in charge will attach a yellow 'OUT-OF-SERVICE' lock and 'CAUTION DO NOT OPERATE' tag to the group isolation board and advise operational staff of the Equipment or Plant status.

6 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: this rule is a cardinal rule that if breached 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 person in charge will remove their personal lock when leaving site, but will ensure that an 'OUT-OF-SERVICE' Lock and the filled in top part of the 'CAUTION DO NOT OPERATE' tag is attached until the work is complete or until

transferred to another person in charge. The filled in bottom part of 'CAUTION DO NOT OPERATE' tag is attached to the key.

Isolation locks shall only be placed or removed by a competent person.

All personal isolation locks shall be easily identifiable to another person.

Personal isolation locks shall only be placed or removed by the owner.

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.

Only locks that are approved by Auckland Airport and meet the criteria of this procedure can be used. Contractors to liaise with AIAL over the use of locks.

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. The locking and tagging continuous improvement spreadsheet should be used to record isolation points that can't be locked.

All Isolation points shall be tagged.

6.3 Personal isolation locks (RED)

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 employee number of the holder (short term contractor's personal details will be at the contractor's lock sign out area and on an accompanying tag/sticker).

The person in charge uses their personal isolation lock to lock out group isolations.

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

A. Personal isolation lock holders' responsibilities

Ensures the lock is maintained in good condition.

Ensures their key is always in their possession or control.

Ensures the lock has their name attached (either by ID tag or on the lock itself).

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.

B. 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.

C. 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 a personal isolation tag/lock removal form has been completed in full and signed by either the Authorised Person or their delegate. (Appendix A - Personal isolation lock/tag removal form). This must be reported as an incident in Risk Manager.

D. Work is in test

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

E. 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. 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 Isolation Leader lock will remain in place to ensure safety until the work has been complete and the equipment is brought back into service. A yellow OUT-OF-SERVICE lock and the filled in top part of the 'CAUTION DO NOT OPERATE' tag must also be placed on the isolation point and the group isolation board by the person in charge until the equipment is fit for service. The filled in bottom half is returned with the key

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 person in charge.

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.

6.4 Isolation locks (YELLOW)

Isolation locks are Yellow coloured locks and come in sets of 6. There are multiple sets and each set of isolation locks are keyed alike. They are applied by Isolation Leaders when isolating equipment as part of group Isolations.

A. Application and removal

Isolation locks are applied when group isolation is required by an Isolation Leader for the sole purpose of securing a number of isolation points, as detailed in a SOP and 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/schedule of Equipment or Plant operations must have a separate Isolation Lock and 'Danger - Do Not Operate' tags for each permit to work unless managed by a master schedule of Equipment or Plant operations arrangement.

Any isolation locks left over from a set must be locked in the group isolation board along with the keys for that set(s), or locked to the group isolation board by the Isolation Leader lock.

Isolation locks shall only be removed by an Isolation Leader when all personal isolation locks have been removed and the permit to work has been handed back by the person in charge.

6.5 Isolation Leader locks (GREEN)

An Isolation Leader 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 area qualified Isolation Leaders.

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

A. Isolation Leader lock holder responsibilities

Ensures the lock is maintained in good condition.

Ensures the key is held in the operational key cabinet.

Ensures that they apply an Isolation Leader lock to secure the isolation keys prior to Issuing the permit to work.

B. Application and removal

An Isolation Leader lock shall only be applied and removed by an Isolation Leader authorised for that area of operations and equipment. The Isolation Leader 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 person in charge) can then be applied in line with this procedure. The Isolation Leader lock stays in place until the equipment is ready to be de-isolated.

C. Work is not completed

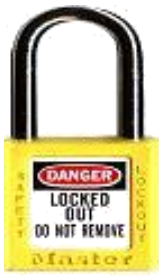
If work has not been completed, all personal isolation locks will be removed by their owners. The green Isolation Leader lock will remain in place. If a worker needs to leave the work site, then their personal isolation lock must be removed. In the case where a personal lock is removed from a group isolation board where the work is incomplete or the equipment is out of service, the green Isolation Leader lock will remain in place to ensure safety until the work has been complete and the equipment is ready to be brought back into service. The person in charge shall attach a yellow 'OUT-OF-SERVICE' lock and the filled in top part of the 'CAUTION DO NOT OPERATE' tag, (the bottom filled in half is attached to the key) and remove their personal isolation lock. Under circumstances where the incomplete work may be easily completed by another person prior to returning the Equipment or Plant to service, the person in charge may after handing back the permit to work transfer control of the key to 'OUT-OF-SERVICE' lock to an Isolation Leader, asset owner or delegate.

D. 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 person in charge for the work then signs off the permit and hands it back to an Isolation Leader listing any restrictions to the Equipment or Plant. An Isolation Leader can then remove the Isolation Leader lock to gain access to the keys and remaining locks for de-isolating the equipment and restoring the Equipment or Plant for operational use.

6.6 OUT-OF-SERVICE locks (YELLOW)

OUT-OF-SERVICE locks are yellow in colour. An OUT-OF-SERVICE lock is placed on equipment to indicate defects, restrictions or that it is not fit for service. Anyone can attach an OUT-OF-SERVICE lock and the the filled in top half of the 'CAUTION DO NOT OPERATE' tag to defective or restricted equipment. The defect must be reported to operational staff and the OUT-OF-SERVICE lock key together with the filled in bottom half of the 'CAUTION DO NOT OPERATE' tag 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 person in charge may keep the 'OUT-OF-SERVICE' lock key in their direct control and possession.

An 'OUT-OF-SERVICE' lock and 'CAUTION DO NOT OPERATE' tag on operational equipment can only be removed after agreement between an operator and either the person who applied the lock, or the Asset owner or delegate.

The defect/restriction will be logged in the operational log. 'OUT-OF-SERVICE' locks must be accompanied by a 'CAUTION DO NOT OPERATE' 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, Isolation Leaders, and the person in charge 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.

A. Using a group isolation board/box

All isolation lock keys and unused locks from that set for the pending isolation are in or locked to the group isolation board.

Isolation Leader places a green Isolation Leader's lock on the group isolation board.

Isolation Leader issues 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 his 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 documentation and is locked onto the group isolation board by the person in charge 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 LOCK AND KEY IDENTIFICATION

7.1 Personal isolation locks and key

Personal isolation locks are identified with a tag containing the following information:

i. the workers name

ii. the workers phone number or radio call sign

iii. 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.

Engraved on the side of the lock:

iv. the unique key identification number.

7.2 Isolation locks and keys

Isolation locks come in sets of 5, 10 and 20 and are identified as follows:

Engraved on the side of the lock:

i. NNXXX(where NN is the number of locks in the set and XXXX is the sequence number of the lock set type).

7.3 Isolation Leader locks and key

Isolation Leader locks are identified as follows:

i. the isolation leaders name

ii. the isolation leaders phone number or radio call sign

iii. a sticker with the isolation leaders individual name and contact number shall be attached to one face of the lock to enable identification of the lock to the contractor.

Engraved on the side of the lock:

iv. the unique key identification number.

7.4 OUT-OF-SERVICE locks and keys

OUT-OF-SERVICE locks are identified as follows:

Engraved on the side of the lock:

i. the unique key identification number.

8 LOCK AND KEY MANAGEMENT

8.1 Lost personal isolation lock key

If a personal isolation lock key is lost while the worker is locked onto an isolation the personal isolation lock/tag removal form/process must be completed to remove their lock when work is completed, then the owner must advise the lock administrator and be issued with a new set of isolation locks. If it is lost when not locked onto an isolation, then the owner must advise the lock administrator and be issued with a new set of isolation locks.

Note: it costs more to purchase a new key than a new set of locks

8.2 Lost/damaged personal isolation lock

If a personal isolation lock is lost or damaged the owner must advise the lock administrator and be issued with a new set of isolation locks once the owner is reduced to a number of locks that does not allow them to work effectively.

8.3 Lost isolation lock key

Isolation lock sets have 2 keys – one with the set, and the spare key kept in a locked regional lock cabinet. If a key is lost, the lock administrator must be notified so that a new key can be ordered. The lock set should be taken out of service until the new key is obtained.

Note: it is assumed that the key cannot be lost while the key is being used in an isolation, as it is locked in a group isolation board

8.4 Lost/damaged isolation lock

If an isolation lock is lost or damaged, it must be reported to the lock administrator and the set be taken out of service until a replacement lock is obtained.

8.5 Lost Isolation Leader lock key

If an Isolation Leader lock key is lost while the lock is being used on isolation, the Isolation Leader lock shall be removed by an Isolation Leader and replaced with another Isolation Leader lock until the permit to work is handed back. The Isolation Leader removing the lock must advise the lock administrator.

8.6 Lost/damaged Isolation Leader lock

The Isolation Leader in control of the lock must advise the lock administrator.

8.7 Lost OUT-OF-SERVICE lock key

If an OUT-OF-SERVICE lock key is lost while the lock is being used on isolation, the 'OUT-OF-SERVICE' lock shall be removed by an Isolation Leader in conjunction with the person who applied the lock and replaced with another 'OUT-OF-SERVICE' lock until the associated Equipment or Plant is fully fit for service. The Isolation Leader removing the lock must advise the lock administrator.

8.8 Lost/damaged OUT-OF-SERVICE lock

The Isolation Leader or person in charge in control of the lock must advise the lock administrator.

9 LOCK ADMINISTRATION

Lock administration (Engineering Services) responsibilities include:

Maintaining a lock and key register, containing the following information:

i. lock and key codes for all.
ii. Yellow Isolation locks.
iii. green Isolation Leader locks.
iv. red personal isolation locks.
v. a listing of all issued personal isolation locks and their recipients.

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 key prior to working on site, and that all contractors who complete work on site return their red personal isolation locks.

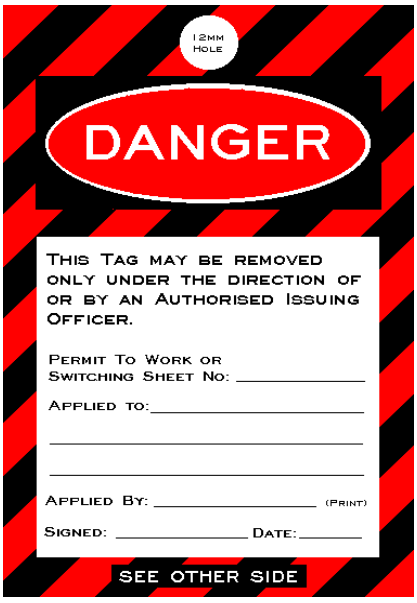
Maintaining a process where locks will only be made available to personnel that have had appropriate training and authorisation

10 ISOLATION AND OPERATIONAL CONTROL TAGS

The principle function of isolation & operational control tags is to identify isolation points upon which people's 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.



A. When do I use this tag?

In conjunction with an Isolation Lock to identify isolation points.

B. 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 schedule of Equipment or Plant operations (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 Isolation Leader.

10.2 'Personal Danger Tag'

No person shall operate equipment to which a 'PERSONAL DANGER TAG' is attached.

A. When to use this tag?

This tag shall be used in conjunction with a personal isolation lock to provide additional information when a personal isolation is applied or where the personal isolation lock is not identified with the person's name and employee number.

B. Application and removal

A personal danger tag shall only be removed by the person who placed it. The only time a personal danger tag may be removed by another person is after a 'Personal Isolation Lock/Tag Removal' form has been completed in full, and signed by either an Authorised Person or his/her delegate (Appendix A - Personal isolation lock/tag removal form).

C. Work is in progress or under test

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

D. Work is not completed

If work on equipment has not been completed and the employee needs to leave the work site, then their personal isolation lock and personal danger tag must be removed. In the case where a personal isolation lock tag is removed from the isolation points or a group isolation board with incomplete work, an 'OUT-OF-SERVICE' lock and a 'CAUTION DO NOT OPERATE' tag which has been completed in full is to be placed on the isolation points or the group isolation board. The person in charge shall leave the 'OUT-OF-SERVICE' lock and 'CAUTION DO NOT OPERATE' tag in place till the work is complete or transferred to another person in charge.

E. Work is completed

When the work on the equipment is completed, each employee shall remove their own personal isolation lock and personal danger tags from the points of isolation or group isolation board.

10.3 'CAUTION DO NOT OPERATE' tag

F. When do I use this tag?

Where there is a danger to people or equipment the isolation points must be locked in the safe position using an OUT-OF-SERVICE lock and 'CAUTION DO NOT OPERATE' tag.

These tags shall be used to provide:

I. a visual warning that operation could be hazardous.

II. advice that operation may still be possible, but caution or restrictions may apply.

III. a visual warning that the normal functioning or operation has been changed.

IV. a warning that there is incomplete work on a device, and it may have defects/restrictions of use.

G. Application and removal

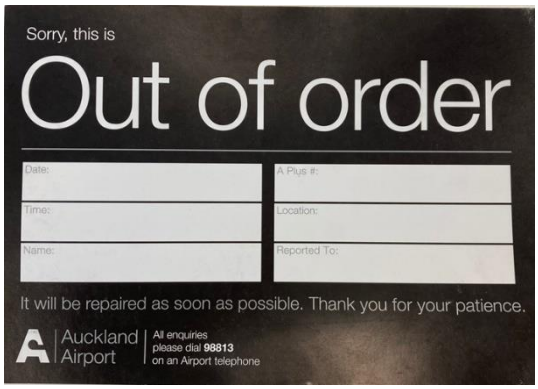
The ***'CAUTION DO NOT OPERATE'*** tag may only be removed by an ***authorised*** and ***competent person*** when:

I. the equipment has been replaced, repaired and restored to its design or 'normal operating' condition.

II. the changed operation or condition of the Equipment has been incorporated into standard operating procedures.

III. the unusual condition no longer exists.

10.4 'Out of order' tag



H. When do I use this tag?

Where there is a danger to people or equipment the isolation points must be locked in the safe position using an OUT-OF-SERVICE locking system, i.e. toilet cubicle door lock and the 'Out of order' tag.

These tags shall be used to provide:

I. a visual warning that operation could be hazardous.

II. advice that operation, may still be possible, but caution or restrictions may apply.

III. a visual warning that the normal functioning or operation has been changed.

IV. a warning that there is incomplete work on a device, and it may have defects/restrictions of use.

I. Application and removal

The ***'Out of order'*** tag may only be removed by an ***authorised*** and ***competent person*** when:

I. the equipment has been replaced, repaired and restored to its design or 'normal operating' condition.

II. the changed operation or condition of the Equipment has been incorporated into standard operating procedures.

III. the unusual condition no longer exists.

11 EQUIPMENT ISOLATION CHECK SHEET (ISOLATION SHEETS)

The purpose of this section is to set the standard to which equipment isolation check sheets are to be compiled / completed and filed, for the operation of Auckland Airport Assets and equipment.

11.1 Responsibilities

A. Isolation Leader

As designated in the permit to work procedure.

B. Authorised person

A person, who has delegated authority to act as the authorised person, shall be able to:

i. compile equipment isolation check sheet.

ii. sign as the 'prepared by authorised person', for equipment isolation check sheet.

iii. carry out duties as designated by the Isolation Leader.

11.2 Standard

A. General

All equipment isolation check sheets shall comply with this procedure.

Isolation Leaders compiling, checking and actioning equipment isolation check sheets must be authorised for the specific site, location and/or the equipment.

This does not preclude persons in training from compiling and actioning equipment isolation check sheets as long as they are acting under the direction of an Isolation Leader and sign as an a*uthorised person*. Persons under training shall not check an equipment isolation check sheet.

11.3 Equipment isolation check sheet

The format of the equipment isolation check sheet shall be as per the form in Appendix C.

A. Compilation

Equipment isolation check sheets can be handwritten, or computer generated.

All equipment isolation check sheets shall be compiled by an Isolation Leader for the location and/or equipment. This does not preclude persons in training from compiling an equipment isolation check sheet, as long as it is co-signed by an Isolation Leader in the prepared by section of the equipment isolation check sheet.

When compiling the equipment isolation check sheet, the Isolation Leader is to review all relevant single line diagrams, schematic diagrams, procedures and/or any other relevant information.

The objectives of the equipment isolation check sheet must be clearly defined prior to compilation as a control measure of the permit to work.

All schedules of planned operations should be written in a logical operational sequence, sub-objectives if used are to be clearly identified.

When using the equipment isolation check sheet for the return to service of equipment it must be checked against, the action items of the equipment isolation check sheet for the equipment's removal from service.

All entries made on equipment isolation check sheet must be legible and clearly defined.

All equipment shall be identified by: location, device type and device number or name:

i. If the operations are to be conducted at one location only, the location identification can be specified in the Equipment Isolation Check Sheet general information.

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

Power system safety approved abbreviations can be used in the compilation of the equipment isolation check sheet.

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 Equipment or 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.

The use of an approved operational procedure as an operational item within an equipment isolation check sheet is allowable provided that all individual isolations are detailed on the schedule of Equipment or Plant operations, and its completion time shall be recorded on the equipment isolation check sheet.

Proving dead before applying earths, shall be recorded as a separate line item.

The application of earths shall be recorded as a separate line item.

The removal of each set of earths shall be recorded as a separate line item.

Work site delineation (where appropriate) shall be specified as an operation on the equipment isolation check sheet.

All permit to work issue (handover) and hand back shall be recorded as a separate line item.

All Assurance information shall be recorded as a separate line item.

Errors in equipment isolation check sheets shall be crossed out with a single line, initialled by a preparing Isolation Leader and confirmed by a checking Isolation Leader. Correction fluid must not be used.

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.

Last Item entry requirements:

The last operational item on the equipment isolation check sheet shall meet the objective of the equipment isolation check sheet, which may include:

i. the number of the permit to work issued; or

ii. assurance information communicated; or

iii. operations are for changed configurations/system switching; or

iv. return to service.

Each handwritten equipment isolation check sheet shall be ruled off after the last operation.

All entries shall be checked for accuracy and completeness before the equipment isolation check sheet is signed by the compiling Isolation Leader.

11.4 Isolations Register

A. Checking and approving equipment isolation check sheets

Equipment isolation check sheets shall be checked to ensure action items meet the required objective.

Equipment isolation check sheets shall be checked, signed and approved by an Isolation Leader, other than the person that compiled the equipment isolation check sheet, before it is actioned.

During the checking process the Isolation Leader should check the equipment isolation check sheet against single line diagrams, schematic diagrams, procedures and/or any other relevant information.

Equipment isolation check sheets can be checked, signed off and approved remotely by means of Email or verbal communication. Where verbal communication is used, all entries/items shall be read back and confirmed prior to signing off. This shall be recorded on the equipment isolation check sheet and shall include the checking officers' name, the time and date.

B. Actioning of equipment isolation check sheets

An equipment isolation check sheet is to be actioned as planned. Where there is more than one operator actioning an equipment isolation check sheet it is allowable to carry out action items concurrently, provided it is operationally safe.

An equipment isolation check sheet 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 equipment isolation check sheet must be amended, checked and re-authorised before work resumes. The re-authorisation of the equipment isolation check sheets 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.

The completion of each action item shall be acknowledged with the actioned time and operators initials on the equipment isolation check sheet.

When the actioning date of the equipment isolation check sheet is different to the compilation date, the actioning date and time is to be recorded in the appropriate line item/s.

When taking over a partly completed equipment isolation check sheet, the contents must be fully understood before continuing.

Any modifications to an approved computer-generated equipment isolation check sheet are to be reflected in the database master, if applicable.

On completion of the equipment isolation check sheet, the authorised person shall:

i. Make appropriate entries in operational log.

ii. The original/copy of the completed equipment isolation check sheet shall be attached to the permit to work; and

iii. Advise PTW office that the schedule of Equipment or Plant operations has been completed and the Equipment or Plant is isolated as per the arranged outage.

C. Return to service of equipment (RTS)

The return to service of equipment can be achieved using an approved:

i. Equipment isolation check sheet.

ii. Commission program.

iii. Operational procedure or checklist.

The use of either is dependent on the level of risk associated with the complexity of the operational activities. However, if the operational activities involve system/network switching, the equipment isolation check sheet shall be used.

The start and completion times of the return to service operations are to be recorded in the operational log sheet's remarks section.

D. Using an equipment isolation check sheet

The return to service equipment isolation check sheet shall be checked against the removal from service equipment isolation check sheet to ensure nothing is overlooked or omitted.

When an equipment isolation check sheet, is the documented process to be used for the return to service of equipment one of the following shall be carried out; (the order of preference is as listed below). Compile a specific return to service, equipment isolation check sheet for the operational requirement and complete as per this standard.

E. Using commissioning programs

Note: The commissioning program shall be developed by the engineer in charge of the commissioning and shall have operational input in its development.

The objective of the commissioning program shall cover the operational aspects as well as the engineering requirements for pre-commission or commissioning of the equipment.

All operational actions within the commission program shall comply with the requirements of an equipment isolation check sheet.

The commissioning program shall be checked by an Isolation Leader against the removal from service equipment isolation check sheet to ensure no operational items are overlooked or omitted.

All operational actions in the commissioning program shall be checked for completeness and accuracy by an Isolation Leader other than the one who compiled it, as per the equipment isolation check sheet before the commissioning program is commenced.

The commissioning program shall be under the control of the commissioning engineer.

The commissioning engineer shall sign off each engineering section/test as acceptable, before moving onto the next section.

The commissioning Isolation Leader shall be in control of all operational activities.

The approved commissioning program shall be actioned as planned by an authorised person and shall only be modified once operations have commenced with the approval of the commissioning engineer and commissioning Isolation Leader.

The commissioning Isolation Leader shall document the completion time of all operational actions on the commissioning program.

F. Using operational procedures and checklists

The operational procedure or checklist shall be approved for use.

The approved operational procedure or checklist shall be checked by the Isolation Leader to ensure it meets the objectives before actioning it.

The approved operational procedure or checklist shall be checked against the removal from service equipment isolation check sheet to ensure nothing is overlooked or omitted.

The approved operational procedure or checklist shall be actioned as planned by an authorised person.

The authorised person is to ensure all tests have been carried out to ensure the Equipment is fit for service, before it is handed over and made available for service.

A copy of the actioned approved operational procedure or checklist shall be attached to the associated operational documentation and permit to work for filing on completion of operations for the return to service of Equipment.

11.5 Routine testing programs

When operations are undertaken during the actioning of routine testing programs there is no need for an equipment isolation check sheet to be used in conjunction with the routine testing program, as long as:

i. The routine testing program has been approved for use.

ii. The routine testing program has been operationally checked as per this procedure.

iii. Completion times of the operational actions and the initials of the actioning operator are documented on the routine testing program.

11.6 Operational terminology

As an aid to develop a common understanding of operational terminology, a list of basic terms and abbreviations that shall be used in operational communications has been developed as an Appendix D. The list is not comprehensive however it will be updated as required by the review process.

Appendix A Personal Isolation Lock/Tag Removal Form

Appendix A Lock/tag removal form

NOTE: Any reference documents related to the lock/tag are to be retained and attached to this form for filing

1. EMPLOYEE AND EQUIPMENT INFORMATION

Employee: (The name that appears on the lock/tag to be removed)	Equipment Name/No. : (What is the lock/tag attached to?)	Type of Lock: Lock Number:

Permit to work # or Work order #

2. LOCK/TAG REMOVAL REASON

Why is it necessary to remove this lock / tag?

☐ Lost key ☐ Lock owner has left site and unavailable ☐ Safety

☐ Impact on other work ☐ OTHER _____

Details:

3. EMPLOYEE CONTACT DETAILS

Has the owner of this lock/tag left the site? ☐ Yes ☐ No

Have you tried to contact the owner of this lock/tag? ☐ Yes ☐ No

Details:

4. EQUIPMENT DETAILS

Has the equipment / plant been thoroughly inspected and tested by a qualified and competent person? ☐ Yes ☐ No

Is it safe to remove the lock/tag and operate or return the equipment to service? **(established by the Duty Manager or Delegate / asset owner or authorised delegate, who must be on site to make the decision)** ☐ Yes ☐ No

What control measure has been put into place to ensure the owner of the lock/tag cannot return to the equipment if it has been returned to service / made live / made operable?

Details:

5. DETAILS OF PERSON COMPLETING THIS FORM

_____ / / :

Name Date Time

6. DECLARATION BY RESPONSIBLE AUTHORISED OR DIRECT DELEGATE (NOTE TIME OF CALL IF AUTHORISATION GIVEN REMOTELY)

Declaration: I have viewed the required evidence of due process and authorise the removal of the lock/tag

_____ / / :

Signature (or details of remote authorisation) Date Time

7. RISK MANAGER DATA ENTRY

Entered into Risk Manager By: _____ Date: / / Time :

Risk Manager Number #

Review the Locking and Tagging out procedure and related procedures with employee:

Equipment Isolation Checksheet

Auckland Airport

Location:		**Affected area:**		**Permit number:**	
Description of work required:					
Equipment Name, number and location:					
Equipment Isolated by:		**Authorised by:**			

Isolation point:	Description:	✓ if tag installed:	✓ if lock installed:	Lock/Tag number:	Date installed:	Initials:	Dated removed:	Initials:
1.		☐	☐					
2.		☐	☐					
3.		☐	☐					
4.		☐	☐					
5.		☐	☐					
6.		☐	☐					
7.		☐	☐					
8.		☐	☐					
9.		☐	☐					
10.		☐	☐					
Comments:								

Appendix C Isolation Check Sheet

	Please tick **Yes**, **No** or **Not Applicable** (NA) – ***All questions must be answered***			
SAFETY CHECK	**YES**	**NO**	**NA**	**COMMENTS**
1. Has the area been isolated?				
2. Are HV isolations required?				
3. If isolations are required have appropriate tags with dates been applied to the equipment?				
4. Does WORKSAFE need to be notified? Particular Hazardous Work Notification Form required.				Ref#
5. Is a separate Traffic Management Plan required?				
6. Is a separate Working at Heights Certificate required?				
7. Is a separate Ground Penetration Certificate required?				
8. Is a separate Hot Work Certificate required?				
9. Is a Fire Impairment Certificate required?				
10. Is a safety observer/spotter required?				
11. Is work being done in a Confined Space?				
12. Is a separate Cranage and Lifting Certificate required?				
13. Is a separate Airside Work Permit required?				
14 Is there any conflicting work happening.				

Notes:

Appendix D Terms and Abbreviations

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
Alternating current	ac	A current that reverses at regularly recurring intervals of time and which has alternately positive and negative values.
Air break switch / Air Circuit Breaker	ACB	An approved switch for breaking current at or below the designed rating.
Ampere	A	Unit of electrical current
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	
Constant Current Regulator	CCR	The adjustable constant current regulator (CCR) is for regulating current in Airfield Lighting circuits.
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.

Term	Abbreviation	Description
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.
Cooling water	C/W	A fluid used to remove heat from rotating machinery or from its components.
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'
Direct current	dc	Uni-directional current, practically non-pulsating current.
Disconnector	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	DB	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.
Feeder line	Fdr	
Generator	G	An electric equipment that converts mechanical power into electric power.

Term	Abbreviation	Description
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.
In		The operational state of an item of equipment, where a function of the equipment is enabled e.g. auto recluse 'In' means that the auto recloser is switched to initiate recluse 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.
Intake gate	I/G	
Isolator	Isol	See disconnector
Junction box	JB	An enclosure for connecting conductors with the use of terminals.
Kilovolt	kV	Unit of electric potential difference and electromotive force ($x10^3$).
Kilovolt ampere	kVA	Unit of 'apparent' power ($x10^3$).
Kilwatt	kW	Unit of 'real' power ($x10^3$).
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 ($x10^6$).
Megawatt	MW	Unit of power ($x10^6$).
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.

Term	Abbreviation	Description
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.
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 that 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 he 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	
Phase	Ø	(pronounced Phi)
Pole	P	
Pole mounted recloser	PMR	
Primary	Prim	Referring to the main power circuits, or energy input side of a transformer.

Term	Abbreviation	Description
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 station 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 Station.
Return to service	RTS	
Road	Rd	
Supervisory control and data acquisition	SCADA	
Secondary	Sec	Referring to auxiliary or control circuits, or energy output side f transformers.
Sensitive earth fault	SEF	An earth fault that is limited by the resistivity of the earth
Equipment isolation check sheet	SOPO	See switching sheet
Station	Stn	
Street	St	
Substation	SubStn	
Switch	Sw	A device used to close or open, or both, one or more electric circuits.
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.
Transformer	TF	A device which, when used, will raise or lower the voltage of alternating current of the original source.
Transmission line	T/L	

Term	Abbreviation	Description
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	VAr	Unit of 'reactive' power.
Watt	W	Unit of 'real' power.
White phase	WØ	