PS PLANT & EQUIPMENT ISOLATIONS & LOCKOUTS

PURPOSE AND SCOPE

The intent of this primary standard is to outline the requirements for the effective isolation of static and mobile plant and equipment prior to the work being carried out at Laing O’Rourke workplaces, including isolation from hazardous materials to eliminate or minimise the risks of serious events and fatalities. This Primary Standard must be referenced with local laws, and client’s safe systems of work if available. This standard shall be used as the minimum standard.

In many instances Laing O’Rourke does not directly provide isolations for works undertaken and instead rely on third parties such as subcontractors, clients and infrastructure operators to undertake isolations and issue permits. The requirements of this primary standard are still to be observed and the third party entity’s controls and procedures are to be audited to ensure compliance with Laing O’Rourke Primary Standards.

Refer to PS General Electrical Safety and PS Energisation of New Plant & Equipment for instruction on work around live electrical services.

Refer to PS Permits to Work for work requiring isolation permits.

CRITICAL CONTROLS

- All potential harmful energy sources requiring isolation and appropriate isolation methods are to be identified by competent persons
- Isolation (LOTO) training and competency system in place
- Isolation procedures are specific to the needs of the worksite, as determined by the risk assessment
- Roles are appointed - Authorised Isolator, Permit Issuer and Permit Holder
- Unless tested for dead, all wires and equipment are to be considered and treated as live
- Isolation permits are in place
- Isolation integrity includes physical try test (check for dead)
- Restricted Access Controls are in place where equipment cannot be fully isolated to zero energy
- Isolations are in place for servicing and maintenance work

ADDITIONAL LOCAL CONTROLS

- Suitable isolation devices, locks and equipment are readily available
- System in place to manage complex isolations
- Stored energy is safely released / discharged prior to work commencing

REQUIREMENT FOR ISOLATION

During routine operations, personnel will normally be protected from contact with significant sources of energy associated with plant and equipment by established controls (separation, guarding, and other engineering controls and administrative controls), or because the source of energy is contained within the plant or equipment.

Where guards, interlocks and other safety devices may have to be removed or by-passed, or there are tasks which may involve exposure of personnel to hazardous materials or energy sources, isolations must be used. The most common situations for using isolation are when:

- Carrying out maintenance of plant or equipment
- Removing, cleaning or repairing equipment
- Modifying equipment
- Breaking into pipes or lines
- Carrying out electrical wiring
- Fault and / or problem finding
- Commissioning
- Equipment is found to be faulty
- Working on or near equipment with energy sources, i.e. work on potentially moving parts
- Any other task that may involve exposure of personnel to any hazards or stored energy

In some instances it is unavoidable to work 'live' i.e. testing and commissioning. These instances must have appropriate controls in place within the SWMS or work procedure and be signed off by the project / workplace leader.

ISOLATION PERMIT

For isolations identified as low risk i.e. one person and one energy source, the requirement for an isolation permit shall be determined in consultation with the Permit Authority at the workplace / project. If more than one energy source or more than one person is involved in the isolation then an Isolation Permit must be completed. Refer to PS Permit to Work.

For a work group that has multiple workers on one energy source. One permit may cover several work members working on the one energy source that feeds the plant or equipment provided that the isolation point has been placed by a Company Appointed, Competent Person (CA, CP). The (CA, CP) proves the energy source is dead, isolates and holds the permit and isolation lock to the energy source at all times. The (CA, CP) is also responsible for all the work members, all the work within the permit and that the works are safe to do so. After all works are complete only the (CA,CP) can then release their locks. Once the permit is closed.

HAZARD IDENTIFICATION AND RISK ASSESSMENT

A Safe Work Method Statement (SWMS) must have been completed prior to the works commencing and cover the entire activity from preparation to work until return to service has occurred. The SWMS shall:

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- Identify all hazardous energy sources that may potentially re-activate the plant or equipment. These may include:
  - Electrical (electrical power supply, static charges, batteries, capacitors)
  - Mechanical (mechanical drives, moving and rotating machinery)
  - Pressure (compressed air, vacuum, hydraulics)
  - Gravitational (counterweights, vehicle runaways, hung-up material, etc.)
  - Potential (springs, structural strain)

- Identify all isolation points referencing manufacturers, suppliers, designers or importers instructions and diagrams. If original diagrams of plant and equipment installations are not available, new information (e.g., diagrams, photographs etc.) shall be sourced or developed that show isolation points, switches, valves, energy lines, pipes, power sources and control points.

The SWMS shall identify other permits that may be required for the work to be carried out. These include, for example permits for hot work, confined space work, excavations near buried utility lines, etc.

**ISOLATION PRACTICE AND DEVICES**

**USE OF PADLOCKS**

Prior to commencement of work on any plant or equipment that requires isolation, and prior to removal from service of any equipment regarded as unsafe, it is essential that thorough consideration be given to how the isolation is to be carried out and the means by which the effectiveness of the isolation can be proved.

**ISOLATION EFFECTIVENESS**

Isolation of plant and equipment may typically involve:

- The operation of electrical switches, removal of fuses or battery terminals, and the disconnection of active conductors by withdrawal of plugs from electricity supply sockets
- Closure of service or process valves, and the blanking of pipelines
- Securing of hatchways, manholes and other entries to confined spaces
- The provision of restraints, chocks, locking pins and other fastening devices
- Erection of barriers and other safeguards

Conventional emergency stop buttons (E-Stops), conveyor lanyards, and other similar control circuit devices are not suitable for use as a primary means of isolating electricity supplies. In general, electrical systems should be isolated by operating main switches, circuit breakers, de-contactors, or other devices that provide a positive break in the main supply conductors.

Having selected and affixed isolating devices, it remains to prove that the devices have functioned correctly. This may be accomplished by visual inspection, opening drain valves, attempting to start or operate the equipment, and can be supported by observing indicator lamps, use of test instruments or other appropriate means. Proving the effectiveness of an isolation is essential, many injuries have resulted from defective isolators, incorrect labeling, and by switching off the wrong isolator.
LOCKING OF ISOLATION POINTS

Use of DANGER, OUT OF SERVICE or DO NOT OPERATE tags should be regarded as an additional safeguard which is supplementary to isolation padlocks and under no circumstances should tags or notices be used in place of or as a substitute for isolation padlocks.

Scissor locks or multi-locks allow any number of padlocks to be fitted to one isolation point.

Photo 1, personal danger lock (PDL)  
Photo 2, multiple attachment scissor lock

TYPES OF ISOLATIONS

To cover the varied range of plant and equipment, three examples of isolation process are provided:

- Working alone isolation – Only used by authorised or competent fitters, who apply their own Personal Danger Lock (PDL) to secure an isolation point
- Simple isolation – this system is used when five or less personnel are working under one isolation point
- Group isolation – the group isolation is used when more than five personnel work under a permit system or a number of isolation points. All isolations for Group Isolations shall be carried out by Authorised Isolator(s) as required to effectively isolate all sources of potential energy. The keys to the General Isolation Locks shall be placed in the Group Isolation Board/Box and the Authorised Isolator/s shall also place an Isolation Tag and General Isolation Lock on the Group Isolation Board/Box to prevent access to the key/s. All personnel required to work on the isolated equipment shall then place their own Personal Danger Tag and Personal Isolation Lock on the Group Isolation Board/Box.

Photo 3, electrical circuit lock  
Photo 4, typical ball valve lock

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PURPOSE OF PERSONAL (RED) DANGER LOCKS (PDL)

Personal (red) Danger Locks have three main purposes as follows:

- **Isolation:** Personal Danger Locks are to be used for the isolation of plant or equipment that may otherwise place an individual at risk of being injured when in the confines of a machine or working on live plant and equipment. Personal Danger Locks are for personal use only.

- **One person, One lock:** If more than one person is working on the same plant, each person should attach their own lock to prevent the isolator being opened before all locks have been removed or opened.

- **Ensuring Continued Energy Supply:** Personal Danger Locks may also be used on an individual basis to ensure continued energy supply in situations in which a loss of supply may endanger an individual or cause a risk of injury or plant damage. Regardless of which of the two uses are employed, the same requirements exist for the placing and removal of Personal Danger locks.

ATTACHING A PERSONAL DANGER LOCK

Each person working on a piece of plant or equipment must attach their own Personal Danger Lock. Each lock must display the name and contact details of the person placing it.

The individual is then responsible to check that there is not more than one source of power/energy to the isolated work area or equipment where they intend to work. If the person has any doubt, the Supervisor or nominated delegate must be asked to identify the correct isolation points.

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REMOVAL OF PERSONAL DANGER LOCK

A Personal Danger Lock may only be removed by the individual who placed it on the isolation point. Personal Danger Locks must be removed when the work is completed or at the end of the shift before the person leaves site. Under exceptional circumstances and only by Workplace / Project Leader approval the E-T-8-0963 Authority to Remove Tag and Lock may be implemented to allow removal of a lock of an individual when:

- The individual inadvertently left their lock on the isolation point, has left site and is unable to return; and
- It is critical that the isolation is removed to allow for safe operation of the isolated equipment.

If the plant or equipment is still in a hazardous condition at the end of a shift or when the person is leaving the site, they must ensure that an "Out of Service" tag is in place and then inform their Supervisor that work on the equipment is not complete.

SINGLE AND MULTI-POINT ISOLATIONS

A single point isolation is one that requires only one isolation point, for example a single valve on pipe work or a single circuit breaker on a switch board. Several people can lock off for single point isolations by way of a scissor lock or lock box. The isolating officers install the isolation and a lock on the isolation point. All other personnel then sign on the permit and then install their locks and tags as required. Only once the permit has been signed off and the all locks and tags removed can the permit be removed.

A multi-point isolation is an isolation that requires several points of isolation. Several people can lock off on a multi-point isolation by way of a lock box provided:

- The isolating officers install the isolation at several isolating points. All keys are placed in a lock box.
- The isolating officer installs their lock and tag stipulating the permit number etc.
- All other personnel sign on the permit and then install their locks and tags as required
- Only once the permit has been signed off and the all locks and tags removed can the permit be removed

RESPONSIBILITIES

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SUPERVISOR
Ensure that all energised areas of work are isolated and Personal Danger Locks (PDL’s) are applied.
Verify the (CA, CP) permit and isolations are audit works in and around the area of works permit.

MECHANICAL AND ELECTRICAL FITTERS
Ensure that all plant and equipment that is to be worked on is isolated and made safe, devoid of power and energy, which could trap, burn or crush if released pressure is applied during maintenance or breakdown activities.
Fitters are to apply their own PDL’s at E-Stop or isolation locations.

OPERATORS
Trained in the use of tagging, testing and lockout of the plant and equipment they operate
Place their own Personal Danger Tags prior to commencing work on any isolated equipment, including individuals who assist or enter the mechanical confines of plant or equipment
Remove their own Personal Danger Tags when the work is complete or prior to leaving the site, including at the end of each shift, and not remove any other person’s Personal Danger Tag

REGULATIONS AND CODES
Work Health and Safety Regulation: Chapter 5; Plant & Structures
Occupational Safety and Health Regulations 1996; Part 4 Plant (WA)
SafeWork Australia Code of Practice Managing Risks of Plant in the Workplace

TEMPLATES & FORMS
E-T-8-0963 Authority to Remove Tag and Lock
E-T-8-0987 Service Isolation Permit

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