ISOLATION OF PLANT STANDARD

SCOPE

This standard applies to all staff, students and contractors and visitors using or working with plant, that may cause personal injury or death due to uncontrolled or accidental re-activation of hazardous energy sources, as part of activities under the management and control of Monash University.

For the purpose of this Standard, references to 'the University' include activity at Monash University Australia, Monash University Malaysia, Monash University Indonesia, Monash Suzhou, the Monash University Prato Centre, Monash College Pty Ltd and World Mosquito Program Ltd (and its subsidiaries), unless indicated otherwise.

The purpose of this standard is to set out the requirements for:

- The identification, management and safe isolation of hazardous energy sources resulting from plant and associated systems;
- Providing information related to the isolation and management of plant using Lock Out/Tag Out (LOTO) processes and associated equipment.

1. When is Plant Isolation Required

This standard must be followed when:

1.1 Damaged, malfunctioning or faulty plant is identified – (see Section 5 - Removing Plant from Service)

1.2 Completing activities such as:

- Testing, commissioning, installing or altering plant;
- Routine or ad-hoc maintenance, including replacing consumable items internal/external to the plant (cutting blades, filters, dangerous goods gas cylinders, etc.);
- The repair of damaged or faulty plant, sub systems and peripherals;
- Cleaning and inspection activities;
- Decommissioning and removal (including disposal) of plant.

1.3 The above activities should be considered, identified and evaluated via a documented plant specific or work activity risk assessment. If there is an identified risk of hazardous energy causing harm, the isolation process must be adhered to.

2. Requirement for Plant Specific Isolation Procedures

2.1 Where documented plant specific or work activity risk assessments identify the potential for accidental re-energisation or the release of uncontrolled hazardous energy, the Responsible Officer for the plant must develop specific pre-determined instructions for isolation, de-energising, and re-activation activities. These must be included as part of the safe work instructions (SWI) and overall safety management of the plant.

2.2 Procedures for isolation of specific equipment must be located in proximity to the plant and/or readily available. Plant specific isolation procedures must include:

- The situation under which the isolation procedure is to be implemented;
- The identification of all hazardous energy sources and controls;
- The identification of all isolation points;
- The means and sequence by which the isolation will be achieved;
- The checks that are to be performed prior to the commencement of work;
- Name/position of persons authorised to perform the work; and

- Any other special requirements for the isolation or re-energisation and return to service of the plant.

2.3 The procedure should include photographs and sufficient information showing the location and details of various isolation components, such as physical isolation points, switches and other sources of hazardous energy. Designer/manufacturer information (schematics, technical drawings, instructions and servicing manuals) or engagement and consultation with subject matter experts (SMEs) can assist with identification of hazardous energy sources and the development of procedures.

2.4 An example template for a plant specific isolation procedure is provided in Section 12 - Tools. Areas should modify or develop alternative templates to accommodate their specific plant and isolation management needs.

3. Process for Safe Isolation

Isolation must be completed by individuals with competence, knowledge and understanding of the plant's hazardous energy sources, operating complexity and any associated plant specific isolation procedures. This may be the Responsible Officer for the plant, technical staff (laser/radiation Safety Officers) or SMEs (electricians, etc.). Where procedures do not exist, they should be developed to ensure safety and the appropriate management of risk.

Safe isolation of plant can be achieved via the following steps:

3.1 Shut down plant

This may be as simple as turning off the plant from its main energy source or for more complex plant, initiating a defined shutdown sequence.

3.2 Identify all hazardous energy sources and other hazards

Sources of hazardous energy include:

- Electrical (mains, solar power, Uninterruptible Power Supplies (UPS), batteries, capacitors, etc.);
- Thermal (Heat and cold);
- Kinetic, potential, and stored mechanical energy (compressed springs, flywheels, etc.);
- Liquids, chemicals and gases under pressure;
- Gravity; and
- Radiation.

Other hazards may be identified and require mitigation to ensure the completion of safe work. Examples include work in confined spaces, risk of falls from height and contact with hazardous substances such as greases, lubricants, solvents, etc.

3.3 Identify all isolation points

Locate the plant's isolation points, which should be clearly identifiable and enable the determination of the energy being isolated. Emergency stop devices are not sources of isolation as:

- They are not designed for the application of LOTO devices or intended for isolation purposes; and
- They may allow control circuits to remain live within the plant.

3.4 Isolate all energy

Commence hazardous energy isolation via the identified isolation points (closing valves, switching off actuators, etc.).

3.5 De-energise all stored energies

Residual and stored hazardous energy may exist after isolation and require additional consideration and management. Examples of stored/residual energy and control methods are detailed in Appendix 1 – De-energise all Stored Energies. Further information is available from the WorkSafe Victoria Guidance Note: *Isolate, De-energise, Lock Out and Tag Out of Plant*

3.6 Lock out all isolation points

Apply appropriate and purpose designed LOTO devices to prevent the reactivation of plant:

- One person, One Lock – if more than one person is completing works, each person working on the plant must secure their own individual lock on each identified isolation point. Appropriate LOTO devices (such as hasps or 'lock box' work systems) should be used in these scenarios;

- One Lock, One Key – an individual's locks are to be uniquely keyed from other personnel completing works, with the key maintained by the individual who applied the lock. Master or duplicate keys are only permitted when their access is managed and controlled, such as by the Responsible Officer for use in events such as an emergency.

3.7 Tag plant controls, energy sources and other hazards

A completed personal danger tag must accompany a lock applied to isolation points/LOTO devices. More information is noted in Section 8 - Use of Tags.

3.8 Test and validate the isolation of plant

Ensure that no one is at risk and validate isolation/test for zero energy with appropriate test instruments followed by attempts to re-activate or energise the plant. Work may commence if isolation is achieved and validated by all parties working on the plant.

4. Removing Plant from Service

4.1 If plant is considered or identified as being ***unsafe*** (damaged, malfunctioning, requires calibration or repair, etc.), it must be removed from service in consultation with the plant or area's Responsible Officer via the following process:

- Shut down and/or cease use of the plant;
- Where possible, isolate main energy sources and apply LOTO devices to ensure the item is no longer able to be operated/used;
- If the plant cannot be easily isolated at the main energy source, then it must be cordoned off, signposted and suitably trained/experienced trade personnel (electricians, plumbers, technicians) must be engaged to isolate/de-energise the plant.
- Complete and secure an out of service tag/s to the associated isolation points and prominent operator controls;
- If the plant has the potential to cause harm to a person, complete a Safety and Risk Analysis Hub (SARAH) report notifying of the issues and communicate the reasons for isolation with relevant personnel, users and stakeholders;
- Ensure the plant remains unused until repair or associated works are completed to return the plant back to its original safe operating state.

4.2 Unsafe plant unable to be repaired (non-financially viable, no longer serviceable, etc.) must be removed from the work area and appropriately disposed of. The tags placed on the item's operator controls, isolation points or prominent visual positions must remain during disposal to prevent accidental entry back into service.

5. Returning Plant to Service

Plant must be returned to service in accordance with the requirements identified in Section 3 - Requirement for Plant Specific Isolation Procedures. Returning plant to service should be performed in consultation with the area's Responsible Officer, ensuring works are completed, all energy sources are safe for re-energising and that any removed guarding or disabled interlocks have been re-instated and checked for functionality.

6. Service Providers Working on Plant

The repair, maintenance or other work activities on plant may involve the use of external service providers such as trades, contractors or Original Equipment Manufacturer (OEM) service technicians. The area's management and plant's Responsible Officer has the primary responsibility to ensure hazardous energy sources and associated risks are managed. This includes:

- Ensuring any engaged service providers are technically competent to complete the associated works;
- Where available, provide information related to the plant's hazardous energy sources (instructions, service manuals, manufacturer technical documentation, etc.) to assist with hazard identification and risk control of hazardous energy sources;
- Providing any locally derived plant specific isolation procedures, or when they do not exist, ensuring the service provider develops a procedure/process for the safe isolation of hazardous energy prior to the commencement of works;
- Ensuring isolation procedures/processes are implemented and monitored;
- For work involving multiple service providers, multiple tags and equipment must be used. All parties must remove their own tags or locks on completion of the work and notification to the plant's Responsible Officer.

7. Use of Tags

Tags must accompany LOTO devices and be secured with string or by the isolation lock. Written information on the tag must be clear, legible, permanent, dated and signed and tags must be used as follows:

- Personal danger tags and out of service tags must not be used simultaneously on the same item of plant as they relate to different circumstances;
- Until all tags are removed by their respective issuer, the equipment must remain unused and out of service. Tags are to be destroyed and disposed of once work is completed; and
- Tags and LOTO devices are not to be used for any other purpose other than those directed in this standard.

7.1 Use of 'Out of Service' Tags

Out of service tags must be accompanied by a LOTO device on plant that presents a high risk to safety unless there are no hazardous energy sources (internal, external or peripheral) associated with the plant's operation (such as with the use of a ladder, push trolley, hand held test instruments, etc.).

7.2 Out of service tags must remain on plant unless:

- Replaced with personal danger tags and LOTO devices by competent persons completing repair or works; and
- Until the plant is validated as safe, fully functional, and ready to be returned to service by the Responsible Officer. This may require an out of service tag and LOTO device to be re-instated immediately after the completion of work and removal of danger tags.

7.3 Out of service tags may be removed by appropriate service people, technical staff, or supervisors after the completion of works and in consultation with the plant's Responsible Officer.

7.4 Use of Personal Danger Tags

- All personnel conducting work on the plant must securely attach an individually completed personal danger tag and LOTO device to each of the plant's isolation points:
- Individuals must remove their personal danger tags prior to leaving the area or at the end of day. If isolation is still required (such as during ongoing works, awaiting the arrival of parts, etc.), out of service tags and LOTO devices must replace all danger tags at each of the plant's isolation points.
- Danger tags must only be removed by the person who applied and signed the tag.

7.5 Failure to remove danger tags

7.5.1 If a danger tag and/or LOTO device has been identified on the plant and the issuer is no longer conducting work or has left the area, the Responsible Officer must:

- Make all reasonable attempts to contact the person and have them return to site to remove the tag and LOTO device;
- If the individual has been contacted but is unable to return to site, the Responsible Officer must establish:
  - The operational and safety status of the plant;
  - Why the tag and LOTO devices were not removed; and
  - If the plant is safe to be returned to service.

7.5.2 In all other instances, plant must remain isolated until contact is made with the tag issuer. For additional information, please contact Monash HS&W.

7.6 Unauthorised or accidental removal of tags and LOTO Devices

The deliberate removal of another individuals' tag or LOTO devices is a serious offence that has the potential to cause fatal injury to those working on the plant.

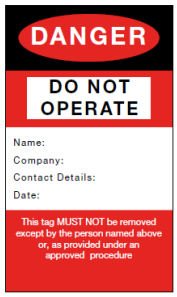
- Unauthorised or accidental removal of an isolation tag or LOTO device must be rectified immediately. This requires replacing the tag or LOTO device and the immediate notification to the tag issuer and the plants Responsible Officer;
- A completed tag found detached from plant should be treated as current and re-instated unless otherwise confirmed via immediate communication with the issuer.

8. Training

Additional staff training may be required to ensure the correct, appropriate and safe management of plant isolation. LOTO Basic Principles Training (online) is available via myDevelopment. Tailored training for specific plant can be provided by external training organisations. This can be coordinated through Monash University HS&W.

9. Isolation Devices

The following table identifies a common list of devices associated with LOTO. Additional information is provided to assist areas and Safety/Responsible Officers identify and plan for the purchase of equipment required to conduct LOTO activities.

Out of Service tag  	• Used to indicate out of service plant that requires repair; • Must include information such as name/organisation of the issuer, phone number, date of issue and reason why the plant is out of service; • May be removed by authorised persons as per 8.1.3, if the plant is safe to return to service and after consultation with the plant's Responsible Officer; • Not to be used in conjunction with Danger tags; • Tagged equipment must not be used/operated/energised;
Personal Danger tag  	• Used to alert people of the danger to personnel working on the plant; • Must include information such as name/organisation of the issuer, phone number, date of issue; • Multiple tags must be used; one for each individual working on the plant at each point of isolation; • May **only** be removed by the person who placed and signed the tag after the completion of work. • Tagged equipment must not be used/operated/energised;
Isolation pad locks 	• Used in conjunction with tags to lock out and isolate hazardous energy sources; • Multiple locks (one for each individual at each isolation point) must be used. Personal locks are independently keyed from others working on the plant; • May **only** be removed by the personnel who placed the lock after the completion of works.
Isolation hasps and lock boxes 	• Used when multiple parties are working on plant, in conjunction with multiple tags and LOTO devices; • Each lock on a hasp/lock box represents a person conducting work; • May **only** be removed by the person who placed the lock and signed the tag. To be removed once equipment is deemed safe or the individual has completed their task.

LOTO devices 	• Enables the source of hazardous energy to be locked out and isolated; • Multiple types of devices are available, depending on the source of hazardous energy; • Prevents energy sources on plant from being activated during works.

10. Responsibility for Implementation

A comprehensive list of Health, safety and Wellbeing (HSW) responsibilities is provided in the document HSW Roles, Responsibilities Standard. A summary of responsibilities with respect to this standard is provided below.

10.1 **Head of Academic/Administrative Unit**: The head of academic/administrative unit must:

- Ensure this standard is implemented and adhered to;
- Ensure local procedures for plant isolation are developed, maintained and periodically reviewed;
- Ensure resources are available for the provision of safe plant isolation, including training, equipment, isolation devices, etc.;
- Ensure Responsible Officers are appointed to assist with the safe management of plant and LOTO.

10.2 **Safety Officer:** The Safety Officer must:

- Ensure training and education related to any locally derived LOTO procedures is provided to relevant persons, contractors and staff;
- Ensure the correct LOTO equipment (hasps, locks, tags, etc.) are available for the types of plant and hazardous energy in their area;
- Monitor the implementation of this standard in their area and rectify any identified issues;
- When required, ensure any local LOTO procedures and equipment accommodate for parties (such as multiples of staff and/or service providers) conducting simultaneous works on plant in their area.

10.3 **Plant Responsible Officers:** The Plant's Responsible Officer must:

- Coordinate plant isolation activities in accordance with the requirements of this standard;
- When required, develop plant specific isolation procedures in consultation with users, Safety Officers and applicable staff, prior to implementation;
- Ensure the correct LOTO equipment (hasps, locks, tags, etc.) are used for the plant being isolated;
- Ensure that Service Providers are inducted and adhere to the isolation requirements noted in this standard, in addition to any area specific processes;
- Understand the types of hazardous energy associated with their area's plant, the way in which hazardous energy can be isolated or controlled and the work being undertaken that requires LOTO to ensure safe isolation and tagging requirements;
- Ensure that plant isolation points associated with hazardous energy are identified and are able to be isolated via the isolation process;
- Ensure that people who undertake any repair/service work are suitably qualified to carry out the work; and
- Supervise the operational reactivation of the equipment ensuring that guarding, interlock devices, and other safety mechanisms are in place and are operating adequately.

10.4 **Personnel Undertaking Repair, Service or Maintenance Work:** The personnel undertaking repair, service or maintenance work must:

- Be qualified and competent to perform the work;
- Be aware of any plant specific hazards and any potential hazardous energy sources that could exist;

- Complete and verify isolation of plant according to any locally devised procedures;
- When isolation procedures are not available, devise procedures or processes in consultation with the areas Responsible Officer for the work they are completing;
- Report any safety issues or concerns resulting from plant isolation to the Responsible Officer;
- Follow this standard; and
- Replace all safety mechanisms before returning the equipment to service if they have been removed/disengaged during the work.

11. Tools

The following tools are associated with this standard.

LOTO Plant Isolation Template

LOTO Basic Principles Training (online) via myDevelopment

12. Records

For HSW Records document retention please refer to the University's: Information Governance and Recordkeeping Procedure

13. Appendix 1 – De-energise All Stored Energies

Each hazardous energy source must be purged or de-energised. The following guidance provides information and suitable controls for sources of stored energy:

- Ensure all electricity sources are isolated, some equipment may have independent electricity sources;
- For programmable logic devices use local isolating switches as the means to achieve secure and safe isolation;
- Do not rely on the controls of any programmable logic controller (PLC) devices for the isolation of equipment, unless the device is certified as a safety PLC which isolates equipment by activating its controls;
- A competent person such as an electrician should isolate and disconnect the electricity supply to an item of plant, unless the plant is connected to an electrical supply via a plug and socket;
- If a line must be blocked where there is no valve, use a blank flange;
- Block parts in hydraulic and pneumatic systems that could move from the loss of pressure;
- Block or brace parts that could fall because of gravity;
- Install grounding wires when static electricity is likely to build up and create a hazard;

DEFINITIONS

Key word	Definition
Out of Service Tag	An Out of Service Tag is a yellow and black tag that is used to indicate out of service equipment. The tag may be removed by appropriate service people, technical staff, or supervisor after consultation with the Responsible Officer once the equipment is deemed safe for use and is able to be returned to service.
Personal Danger Tag	A personal danger tag is a personal red, white and black tag that is ***restricted*** to personnel working on equipment. Personal danger tags are used to indicate the equipment is unsafe and that operation may endanger or harm the individual/s working on the equipment. It can only be removed by the personnel who placed and signed the tag.
Hazardous Energy Sources	Forms of sufficient energy that have the potential to damage property, injure or kill personnel. This may include electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, radiation, and other forms of stored or kinetic energy.

Lock Out/Tag Out - (LOTO)	Lock Out/Tag Out (LOTO) is the process of isolation and safe removal of energy sources from an item of plant in such a way as to prevent the possibility of inadvertent energising of the whole or specified section of the equipment. LOTO is achieved by the use of isolation devices, lock and tags on plant to ensure the safe management of hazardous energy during work and maintenance activities.
Isolation Devices	Isolation devices are used to prevent energising equipment during repair and servicing. They include (but are not limited to) locks, clasps, tags, closing and blanking devices, removal of mechanical linkages, blocks, slings, isolation valves, etc.
Plant	Plant is a general term defined in the Occupational Health and Safety Act 2004 that encompasses any machinery, equipment, appliance, implement, tool and any associated components, fittings or connections required for operation. Examples of plant include (but are not limited to) pressurised and powered fixed and mobile equipment, hoists, lasers, turbines, powered tools, scaffolds, welding equipment and temporary access equipment. These items may be situated in offices, laboratories, studios, workshops and plant rooms.
Responsible Officer	The Responsible Officer is the laboratory, workshop or studio manager, area supervisor or designated staff member responsible for the overall management of plant in their workplace, area or location. The Responsible Officer has specific responsibilities related to LOTO and plant safety.

GOVERNANCE

Parent policy	HS&W Policy
Supporting documents	**Monash HSW documents** Development of Safe Work Instructions Guidelines HSW Roles, Responsibilities Standard HSW Risk Management Standard
Supporting schedules	N/A
Associated documents	**Australian and International Standards** AS/NZS 4024.1:2019 Safety of Machinery AS/NZS 4836:2011 Safe working on or near low-voltage electrical installations and equipment ISO 45001:2018 Occupational Health and Safety Management Systems **WorkSafe Victoria documents** Compliance Code: Plant, 2019 Machinery and Equipment Safety – an Introduction, WorkSafe Victoria edition 2, 2017 Guidance note: Isolate, de-energise, lockout and tagout plant – WorkSafe Victoria 2021
Related Legislation	Occupational Health and Safety Act 2004 (Vic) Occupational Health and Safety Regulations 2017 (Vic)
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DOCUMENT HISTORY

Version	Date Approved	Changes made to document
1.0	2026	Administrative changes due to: ● Conversion of Procedure to a HSW Standard ● Transition Procedure out of University Policy Bank on to HSW website