Isolation of Equipment Procedure

Scope
This procedure applies to all staff, relevant contractors and students. It applies to all work carried out by Monash University. It covers any repair, service or maintenance work on equipment, which has the potential to cause injury through stored energy sources or inadvertent reactivation of the equipment.

Purpose
The purpose of these procedures is to set out the process for:

- the isolation of and removal of service of unsafe equipment; and
- ensuring that all relevant energy sources for equipment undergoing repair, service or maintenance work are removed and isolated during this process.

Furthermore, to ensure that staff and students at Monash University are aware of the process and their responsibilities with regard to unsafe equipment and equipment undergoing repair, maintenance and servicing.

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1. **Definitions**

A comprehensive list of definitions is provided in the Definitions tool. Definitions specific to this procedure are provided below.

**Caution Tag:** A caution 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 once the equipment is deemed safe and fit for purposes.

**Danger Tag:** A danger tag is a red, white and black tag that is used to warn people of the danger to an individual working on the equipment. It can only be removed by the personnel who placed and signed the tag.

**Energy Sources:** An energy source is any form of energy that has the potential to damage property, injure or kill personnel. Energy sources may be in the following form: electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, radiation, and other forms of stored or kinetic energy. Isolation of energy source is preferred both locally and at the source of the energy where practicable.

**Equipment:** For the purposes of this document, equipment is defined as a system or device for doing work together with a power source and any associated auxiliary equipment. This includes pressure equipment, powered equipment, hoists, powered mobile plant, lasers, turbines, explosive-powered tools, scaffolds and temporary access equipment in laboratories, studios and workshops.

**Equipment Isolation (Lock Out):** Equipment isolation is the isolation and safe removal of the energy sources from an item of equipment in such a way as to prevent the possibility of inadvertent energising of the whole or specified section of the equipment.

**Isolation Devices:** Isolation devices are used to prevent energy from re-entering equipment during repair and servicing. They include locks, clasps, tags, closing and blanking devices, removal of mechanical linkages, blocks, slings, and removal from service.

**Responsible Officer:** The responsible officer is the staff member responsible for the equipment on a day-to-day basis.

2. **Removing Equipment from Service**

If the condition of the equipment is considered unsafe it must be removed from service to prevent injury to staff, student and contractors. The following process should be followed to remove equipment from service:

- If safe to do so, stop equipment and isolate each energy source according to SWI or isolation documentation for the equipment;
- Physical isolation, e.g. locking devices, cutting power cords, removal from service, must be put in place for equipment that presents a high risk to safety if used;
- A yellow & black, ‘Caution’, isolation tag must be completed, signed and secured to each isolation device at a prominent position. The laboratory/studio/workshop supervisor or responsible officer must be notified of the equipment failure and isolation;

<table>
<thead>
<tr>
<th>Caution tag:</th>
<th>Yellow and black tag:</th>
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<tbody>
<tr>
<td><img src="image" alt="Caution Tag" /></td>
<td>- Used for out of service equipment.</td>
</tr>
<tr>
<td></td>
<td>- May be used by any person to indicate a fault in equipment.</td>
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<tr>
<td></td>
<td>- Tagged equipment must not be used.</td>
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<tr>
<td></td>
<td>- May be removed by appropriate service people, technical staff, or supervisor after consultation and once equipment is deemed safe for repair and testing purposes.</td>
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</tbody>
</table>
- It is good practice to communicate to relevant personnel that the equipment is out of service and why; and
- The 'Caution' tag must remain on the equipment until equipment is fully repaired and ready to be re-energized.

3. Requirements for Isolation of Equipment

3.1. When to Isolate

This isolation procedure must be followed when there is risk of:
- Re-energising equipment; or
- Stored energy

That has the potential to cause injury to personnel performing maintenance or repair on the equipment, where these is a likelihood that the equipment could be inadvertently re-energised.

3.2. Safe Work Instructions

Where energy sources are present with significant risk, managers or supervisors must develop instructions for the isolation, de-energising, and re-activation of equipment. These must be included in the safe work instructions (SWI) for the equipment.

SWI for isolation of equipment must include:
- The situation under which the isolation procedure is to be implemented;
- 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 of equipment or re-energisation; and
- These instructions can incorporate photographs showing location and details of various plant components, isolation points, switches, valves, energy lines, pipes, power sources, and control points (including computers) can be included as part of the SWI isolation procedures.

3.3. Hierarchy of Control

- When isolating or removing equipment from service a preference must be given for isolation devices in combination with tags.
- A tag is not an effective isolation device. A tag acts only as a means of providing information to others at the workplace and a lock should be used in combination with a tag.

3.4. Identification of Energy Sources

Each significant energy source must be identified. Consider the following energy sources:
- Electrical (mains);
- Electrical (battery, capacitor);
- Heat;
- Cold;
- Stored mechanical energy;
- Liquids and gases under pressure;
- Gravity; and
3.5. **Identification of Isolation Points**

Identify all isolation points on the equipment.

3.6. **Isolation of Energy Sources**

Each significant energy source must be purged or de-energised. Complete the following steps:

- 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 the programmable logic devices for the isolation of equipment, unless the device is certified as a safety PLC which isolates equipment by activating its controls;
- Except in the case of equipment connected via a plug and socket, a competent person such as an electrician should isolate and disconnect the electricity supply to an item of plant;
- 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
- **Do not** rely on emergency stops as an isolation source, as they cannot always be locked out and therefore may allow energy to be inadvertently re-activated. They may also allow control circuits to remain live within the equipment.

3.7. **De-Energise Energy Sources**

Each significant energy source must be physically isolated at each isolation point along the energy source route where practicable. Complete the following steps:

- Take steps to remove all energy left in the equipment after it has been isolated from its energy sources;
- Release the tension on springs, or block the movement of spring-driven parts;
- Relieve trapped pressure;
- Bleed the lines and leave vent valves open;
- Drain process piping systems and close valves to prevent the flow of hazardous material;
- Purge reactor tanks and process lines;
- Dissipate extreme cold or heat, or provide protective clothing; and
- Inspect the plant to make sure all parts have stopped moving.

3.8. **Lock Out All Isolation Points**

- Lockout all isolation points.
- If stored energy can re-accumulate, monitor it to make sure it stays below hazardous levels.
### 3.9. Isolation Devices

<table>
<thead>
<tr>
<th>Danger tag:</th>
<th>Red, white and black tag:</th>
</tr>
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</table>
| ![Danger tag](image-url) | - Used to alert people of the danger to personnel working on the equipment.  
- Multiple tags must be used; one for each individual and for each energy source.  
- Tagged equipment must not be used.  
- May only be removed by the personnel who placed and signed the tag. To be removed once equipment is deemed safe or the individual has completed their task.  
- Hierarchy of control level - Administrative |

<table>
<thead>
<tr>
<th>Locking device:</th>
<th>Isolation pad locks:</th>
</tr>
</thead>
</table>
| ![Locking device](image-url) | - Used to protect personnel and equipment in conjunction with tags.  
- Multiple locks must be used; one for each individual.  
- May only be removed by the personnel who placed and signed the tag. To be removed once equipment is deemed safe or the individual has completed their task.  
- Hierarchy of control level - Engineering |

<table>
<thead>
<tr>
<th>Isolation Clasps:</th>
<th>Isolation Clasps:</th>
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| ![Isolation Clasps](image-url) | - Used in conjunction with multiple locks and tags.  
- Each lock on a clasp represents each individual.  
- Hierarchy of control level - Engineering |

<table>
<thead>
<tr>
<th>Physical restraint devices</th>
<th>Physical restraint devices</th>
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</table>
| ![Physical restraint devices](image-url) | - Used in conjunction with clasps locks and tags.  
- Use to reduce the likelihood of misuse of equipment or accidental energising.  
- Hierarchy of control level - Engineering |
3.10. **Isolation and Danger Tags**

- Personnel must securely apply a completed and signed red, white and black 'Danger' tag and isolation device to each isolated energy source.
- Each person must check the isolation of the equipment and use individual tags and isolation devices on each of the isolation points along the route of the energy source.
- A 'Danger' tag may only be removed by the person who applied and signed the tag, unless in an emergency.
- Personal danger tags and out of service tags must not be used together on the same item of equipment as they relate to different circumstances. An out of service tag should be removed when a personal danger tag is added, and vice versa.
- Until all tags are removed, the equipment must remain out of service. Once removed, any tags must be destroyed and not reused.

3.11. **Multiple Parties Working on Equipment**

Typically the repair, service or maintenance work on a piece of equipment may involve different groups, service providers or organisations.

- The group that is responsible for the day-to-day operations of that equipment has the primary responsibility for the safety and safe operation of the equipment.
- If the repair, service or maintenance work is undertaken by another group or contractor, the laboratory/studio/workshop supervisor or responsible officer must ensure that appropriate isolation procedures are being followed and that the other group or contractor is competent in the work they are expected to carry out.
- For work involving a second party, a two-tag isolation system must be used. This involves the use of tags or locking devices for the work location and a separate tag and locking device for the group undertaking the work. In this case both parties must remove their own tags or locks on completion of the work.

3.12. **Test Isolation**

Ensure that no one is at risk and test the isolation by trying to re-energise the machinery. If isolation has been done correctly the equipment will remain safe.

3.13. **Conduct the Work**

Conduct the required maintenance or repair work on the equipment.

3.14. **Removal of Isolation Tags or Devices**

- Unauthorised and accidental removal of the isolation tag or device must be rectified immediately. This requires placing an isolation tag or device of your own on the equipment and the immediate notification of the removed isolation tag directly or to the laboratory/studio/workshop supervisor or responsible officer.
- Isolation tags and devices are not to be used for any other purpose other than those directed in this procedure.

3.15. **Reinstating Equipment**

- Re-energising of the equipment or section must be performed according to the reactivation procedure of the equipment or under the supervision of the laboratory/studio/workshop supervisor or responsible officer, ensuring all energy sources are clear, safe to activate and that protective guarding or interlocks are operational.
4. Responsibility for Implementation

A comprehensive list of OHS responsibilities is provided in the document OHS Roles, Responsibilities and Committees Procedure. A summary of responsibilities with respect to this procedure is provided below.

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

- Ensure this procedure is implemented and adhered to in their academic/administrative unit;
- Ensure local safe work instructions for equipment are developed and maintained, incorporating isolation instructions where necessary;
- Ensure training in mechanical is provided;
- Ensure that isolation devices are available to staff; and
- Ensure that local isolation procedures are periodically reviewed.

Safety Officer: The Safety Officer must:

- Ensure that OHS training is provided for relevant persons, contractors and supervisors in local isolation procedures; and
- Ensure lock out and tag out isolation system is available, including multiple systems so that isolation can be carried out by more than one person, where required.

Laboratory/Studio/Workshop Supervisor or Responsible Officer: The laboratory/studio/workshop supervisor or responsible officer must:

- Ensure safe work instructions for relevant equipment (which include isolation instructions) are developed, maintained and available to staff and students;
- Ensure that contractors are inducted in these procedures and their use, where relevant;
- Understand the work being undertaken and isolation and tagging procedures;
- Ensure that isolation points are identified and implemented if necessary, which can be locked or tagged out, along the route of each potential energy source, where practicable;
- Ensure that isolation devices and tags are prominently displayed and staff and students are aware of their location;
- 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.

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 hazards associated with equipment and any potential energy sources that could exist;
- Follow this procedure; and
- Replace all safety mechanisms before returning the equipment to service if they have been removed/disengaged during the work.
5. Records


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<tr>
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<tr>
<td>Approval Body</td>
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<tr>
<td>Legislation Mandating Compliance</td>
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<td>Plant (Code of Practice No.19, 1995)</td>
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<td>OHS Roles, Responsibilities and Committees Procedure</td>
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<td>OHS Risk control program</td>
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6. Document History

<table>
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<th>Date of Issue</th>
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<td>2</td>
<td>May 2009</td>
<td>Procedures for the Isolation of Equipment, v.2</td>
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<td>May 2011</td>
<td>Updated records section</td>
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<td>2.2</td>
<td>July 2015</td>
<td>Updated hyperlinks throughout to new OH&amp;S website.</td>
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<td>3</td>
<td>November 2015</td>
<td>1. Added compliance sections</td>
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<td>2. Moved compliance related matters out of the purpose</td>
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<td>3. Deleted some redundant definitions</td>
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<td>5. Deleted superfluous and redundant information and requirements</td>
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<td>6. Deleted flowchart</td>
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<td>7. Reduced responsibilities for safety officer.</td>
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<td>8. Separated out of service information from isolation information.</td>
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<td>9. Reordered information for better flow of document.</td>
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<td>10. Included appendix information in core of document.</td>
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<td>August 2017</td>
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<td>2. Updated OHS Regulations to 2017</td>
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