

Hazardous Energy Risk Management Standard

Purpose

To effectively risk assess and manage the interactions between people and hazardous energy. Hazardous energy includes, but is not limited to, electricity, rotation/movement, pressurised fluids, compressed air, gravity, heat/cold, steam.

Essential HEI Steps

1. Identify all energy sources
2. Confirm all hazardous energy sources have been isolated, locked and tagged
3. Check there is zero energy and test for residual or stored energy
4. Only remove your isolation if it has been proven safe to do so
 - ✎ And never remove isolations or safety features that aren't yours

Critical Risk Factors

- Prevent the unexpected startup of machinery and/or release of hazardous energy
- Identify all sources of hazardous energy, including stored energy
- Implement an effective means to manage and control hazardous energy
- Ensure workers are trained to the level of competency required to perform isolations
- Ensure contractors are aware of and adhere to Ravensdown's energy isolation processes
- Effectively communicate isolation requirements to all workers

Type of Energy	Where?	Controls
Electrical	<ul style="list-style-type: none"> • Electrical switchgear and power sockets • Batteries and capacitors • Variable Speed Drives (VSD's) 	<ul style="list-style-type: none"> • Electrical isolating switches • Discharge capacitors using a safe Earthing method • Allow VSDs to discharge as per manufacturer's instructions
Rotational	<ul style="list-style-type: none"> • Rotating drums and drive shafts • Rollers • Gears and pulley 	<ul style="list-style-type: none"> • Inspect machinery to ensure parts have stopped rotating • Block, brace, or pin rotating parts
Potential	<ul style="list-style-type: none"> • Inclined conveyors • Compressed or extended springs • Gravity, counter-balanced mechanisms, levers • Residual fluids or gases 	<ul style="list-style-type: none"> • Strap, brace, block or pin parts which could fall or roll • Set up exclusion zone around fall areas • Release/block spring tension • Bleed or vent residual fluid or gases
Kinetic	<ul style="list-style-type: none"> • Moving machinery or vehicles • Equipment/objects on rails eg monorail lifting equipment 	<ul style="list-style-type: none"> • Inspect machinery to ensure parts have stopped rotating • Block, brace, or pin moving parts
Thermal	<ul style="list-style-type: none"> • Hot/cold liquids or materials • Boilers, furnaces, electric heaters • Steam 	<ul style="list-style-type: none"> • Allow time to dissipate heat/cold or, • Provide protective clothing
Pressurised	<ul style="list-style-type: none"> • Pressurised fluids or gases 	<ul style="list-style-type: none"> • Blank or purge vessels/tanks or process lines
Chemical	<ul style="list-style-type: none"> • Chemical reaction or change • Combustion of material 	<ul style="list-style-type: none"> • Steam suppression • Thermology • Remove combustible material prior to hot work • PPE

Summary of Critical Controls

- All machinery must be isolated from energy sources before cleaning, unblocking, servicing or maintenance.
- All hazardous energy supplied to or present in machinery must be identified and measures put in place to control the risk of exposure.

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- Machinery to include an isolating device or devices which must be clearly identified and capable of being locked out.
- Clear information must be provided to indicate which machinery the isolating devices will isolate.
- Securing devices to be made available where an isolating device cannot be locked out by a padlock alone.
- Locking and tagging equipment to be made available so isolated machinery can be locked and tagged out.
- Built-in devices or test points, and methods to be available to ensure the effectiveness of an isolation device can be verified.
- Staff required to isolate machinery should be allocated with a set of RED personal isolation padlocks and information tags.
- Personal isolation padlocks must clearly indicate who the owner is.
- Staff and contractors required to isolate machinery must be competent in the lockout, tagout process.
- All staff required to isolate machinery as part of their role are to be assessed to identify level of competency for performing isolations and provided with adequate training to ensure required levels are met.

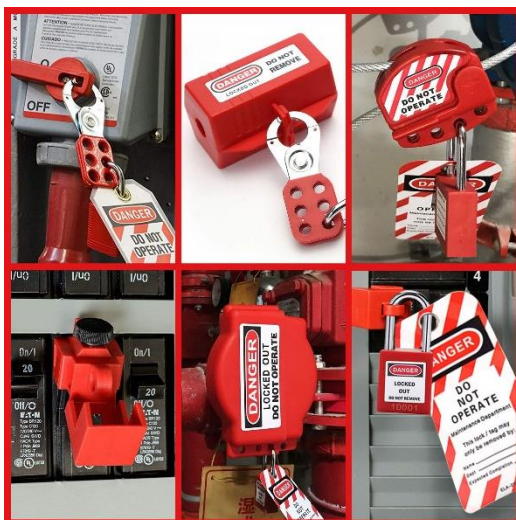
Additional Critical Controls Specific to Works Sites ONLY

- The person in charge of work must apply a BLACK Supervisor padlock to a group lock out device (lock box or hasp) to ensure two party control over an isolation
- The Supervisor padlock is the last lock to be applied to the group lock out device before work begins, and is the last to be removed after the work is completed and the isolations are to be removed
- Supervisor padlocks are to be keyed alike
- When a defined area of machines is to be isolated and locked out, Area isolation padlocks are to be used. Refer to the *Hazardous Energy Isolation Management System Manual* for the padlock colour specified for use in each area
- RED, YELLOW or BLACK padlocks must not be used for Area isolation padlocks
- Each set of Area isolation padlocks are to be keyed alike i.e. a key opens all padlocks in the set
- Isolation checklists to be used on down days and during planned shuts to carry out the isolation of a group of machines within a defined area

Lockout, Tagout (LOTO) Processes

As part of LOTO processes implemented, the following steps must be included to ensure isolation of hazardous energy:

- ALL personnel (includes staff and contractors) who are exposed to working machinery are to place their personal isolation padlock on the isolator. Where there is not enough space on an isolator for multiple padlocks, a hasp should be used
- For group lockouts, personal isolation padlocks must be placed on a suitable group lock box
- Prior to work commencing, ALL systems to be tested for dead and motors bump tested after isolation
- Where work has been ceased for a period of time, such as until the next day or more than one day, isolations must be re-checked to ensure their integrity has remained intact before the work recommences



Lock out, Tag out Equipment

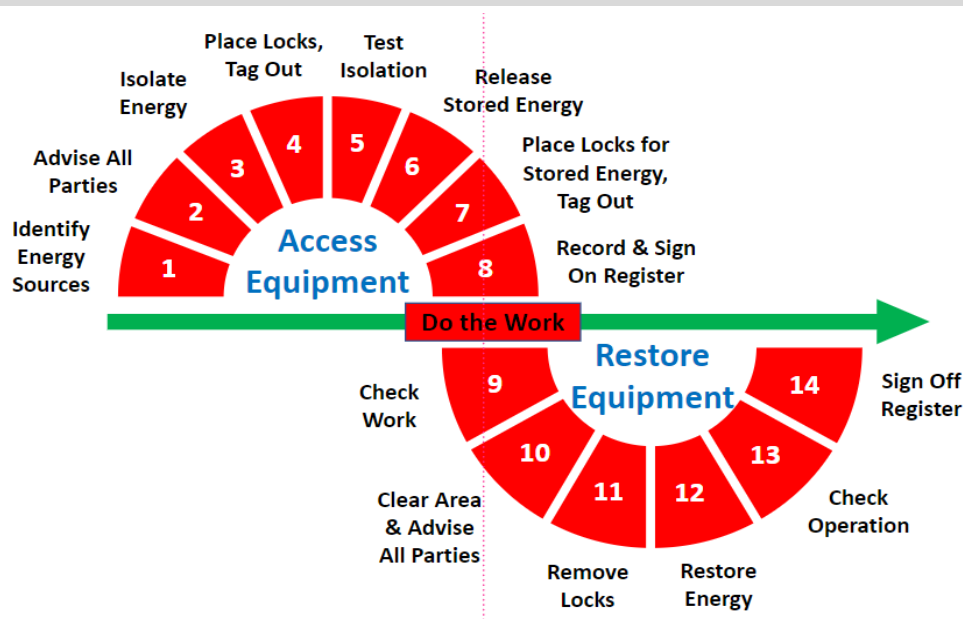
Device	Stores	Lime	Aerowk	Works
Personal Isolation Padlock (Red)	✓	✓	✓	✓
Equipment Padlock (Yellow)		✓		✓
Supervisor Padlock (Black)		✓		✓
Area Padlock (Various)				✓
Hasp	✓	✓	✓	✓
Lock Box		✓		✓
Information Tags	✓	✓	✓	✓

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Work on Operating Machinery

No work is to be carried out on an energised and operating machine unless for the purpose of commissioning, making set up adjustments and/or testing which cannot be done while the machine is de-energised. In such cases:

- The work must be authorised by a manager, or their delegate
- A risk assessed procedure prepared which enables the work to be carried out safely
- A safety watch must be used where there is a danger of a worker getting too close to energised and/or moving equipment
- Where communication is required between multiple persons to perform a task while machinery is energised, an effective communication method must be put in place to prevent miscommunication e.g., such as during inch control when tracking or cleaning
- Tools must be considered as part of the risk assessment, which prevent a worker from coming in contact with hazardous energy when working on energised equipment safer e.g., insulated tools, tools or equipment that allow a worker to do their work from a position of safety. If such tools are available, they must be used. If any 'live' electrical work is undertaken, insulated tools must be used.



Working Near Other Services

All services within the vicinity of the work area, other than the service to be worked on, must be identified and measures put in place to prevent a worker coming into contact with another service while work is carried out nearby. Measures include:

- Isolation of other services within the vicinity of the working area
- Placement of physical barriers to prevent unintended contact with other services

Communication

- Prior to isolating machinery, all workers who are to work on the machinery, or are in the vicinity of the machinery must be informed that the machinery is to be isolated
- Prior to re-energising and restarting machinery, all workers who are working on the machinery, or are in the vicinity of the machinery must be informed that the machinery is to be de-isolated and put back into operation

Emergencies

- Lockout procedures should include instructions for what to do in an emergency - if for example, someone gets caught in machinery or is sprayed by an unexpected fluid release

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Installation of New Machinery

- All new machinery must be designed and installed according to the AS/NZS 4024 Safety of Machinery series.
- Documentation delivered with newly commissioned machinery should include the designer's/manufacturer's instructions for correctly isolating the machinery for when cleaning, servicing and/or maintenance is required

People & Training

- Induction for employees and contractors must include relevant energy isolation management rules for the site
- Staff and contractors required to isolate machinery must be competent in the lockout, tagout process. As a minimum, competencies for all staff who perform energy isolations as part of their role must meet with the requirements of NZQA 25043 *Lockout and reinstate machinery in the workplace*, and additionally for Acid Plant Engineers, NZQA 21457 *Isolate and reinstate a section of an energy and chemical plant*
- All contractors required to perform isolations on a Ravensdown site out of hours, and alone, must be competent in the knowledge of Ravensdown's energy isolation system and use of its processes
- Only registered electricians to gain access inside a Motor Control Centre (MCC) or Main Switchboard (MSB) cabinet or cell for the purpose of electrically isolating equipment/machinery from this particular point of supply. Note! This control does not relate to entry inside an electrical/switch room in which a MCC or MSB is located

Documentation

- The latest revision of the *Hazardous Energy Isolation Management System Manual* is to be referenced where practical detail is required for the implementation of the critical controls listed in this standard
- The Management of Change (MOC) process must be followed prior to making changes that could increase the risks or impact on the effectiveness of energy isolation systems on machinery
- Information which ensures the safe and complete isolation of machinery/mobile plant from hazardous energy must be included in all site procedures (SOPs/SMPs/PMs) relating to cleaning, servicing and/or maintenance of the machinery/mobile plant
- Isolation Checklists at Works sites must be developed and maintained for all machinery which will be isolated from hazardous energy
- Piping & Instrumentation (P&I) diagrams and Electrical drawings for plant should be used when developing SOPs/SMPs/PMs and Isolation Checklists for machinery to ensure the isolation processes are correct and complete
- SOPs/SMPs/PMs must reference the appropriate section(s) in the *HEI Approved Isolation Methods* document to ensure the correct isolation and verification methods are used when energy is isolated, verified for dead, and de-isolated again
- The placement and removal of isolations are to be recorded. Where a Take-5 is used in conjunction with an SOP, the *Isolation Register* document should be used. Where a JSA is required for a task, the *Isolations* table in the JSA document should be used