

High-risk management standard

CONTROL OF HAZARDOUS ENERGY





The aim of this standard is to prevent injuries from the unexpected start-up or release of any energy source, during the maintenance service of machines or equipment.

The lock-out/tag-out (LOTO) is the best method for isolating plants, machines or equipment from hazardous energy sources. This standard specifies the minimal requirements to be used in providing a system of energy isolation and testing (lock-out/tag-out) to ensure the safety of personnel, prior to starting work, where a hazardous energy source is identified.

SCOPE:
This document applies to all activities and sites of Veolia. Contractors of Veolia must also comply with this standard. It provides practical guidance for persons conducting a business or undertaking on how to manage the health & safety risks associated with hazardous energy sources.

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1.0 > Definitions

Energy is the power that surrounds any person and when unexpected it may become hazardous. Hazard for a worker comes by energization, release of stored energy or start-up of machinery and equipment during service or maintenance activities.

Hazardous energy is defined as any **chemical, electrical, gravitational, hydraulic, mechanical, pneumatic, radiation, thermal**, or other energy that, if not controlled, is of such magnitude that it is capable of causing harm to a person or loss of resources.

Chemical energy is the energy released when a substance undergoes a chemical reaction. The energy is normally released as heat, but could be released in other forms, such as pressure. A common result of a hazardous chemical reaction is fire or explosion.

Electrical energy is the most common form of energy used in workplaces. It can be available live through power lines or it can also be stored, for example, in batteries or capacitors. Electricity can harm people in one of three different ways:

- By electrical shock.
- By secondary injury.
- By exposure to an electrical arc.

Gravitational potential energy is the energy related to the mass of an object and its distance from the earth (or ground). The heavier an object, the further it is from the ground, the greater its gravitational potential energy. For example, a one-kilogram (kg) weight held two metres above the ground will have greater gravitational potential energy than a one-kilogram weight held only 1 metre above the ground.

Hydraulic potential energy is the energy stored within a pressurized liquid. When under pressure, the fluid can be used to move heavy objects, machinery, or equipment. Examples include: automotive car lifts, injection moulding machines, power presses, and the braking system in cars. When hydraulic energy is released in an uncontrolled manner, individuals may be crushed or struck by moving machinery, equipment or other items.

Mechanical energy (also known as kinetic energy) is the energy contained in an item under tension. For instance, a spring that is compressed or coiled will have stored energy which will be released in the form of movement when the spring expands. The release of mechanical energy may result in an individual being crushed or struck by the object.

Pneumatic potential energy is the energy stored within pressurized air. Like hydraulic energy, when under pressure, air can be used to move heavy objects and power equipment. Examples include spraying devices, power washers, or machinery. When pneumatic energy is released in an uncontrolled manner, individuals may be crushed or struck by moving machinery, equipment or other items.

Radiation is the energy from electromagnetic sources. This energy covers all radiation from visible light, lasers, microwave, infrared, ultraviolet, and X-rays. Radiation energy can cause health effects ranging from skin and eye damage (lasers and UV light) to cancer (X-rays).

Thermal energy can occur in high or low temperature systems. Some of the sources of thermal energy include heated water, steam, mechanical work and/or radiation.

It is important to understand that all of these energy types can be considered as either the primary energy source, or as residual or stored energy (energy that can reside or remain in the system). Primary energy source is the supply of power that is used to perform work. Residual or stored energy is energy within the system that is not being used, but that can cause work to happen when released.

For example: when you close a valve on a pneumatic (air) or hydraulic (liquid) powered system, you have isolated the system from its primary source of energy. However, there is still residual energy stored in any air or liquid that remains in the system. In this example, removing the residual energy would include bleeding out the liquid, or venting out the air. Until this residual energy is removed from the system, work can occur, whether on purpose or inadvertently.

Not properly assessing and dissipating stored energy is one of the most common causes for workplace incidents that involve hazardous energy. Control of hazardous energy includes isolating the system both from its primary power sources and residual energy.

Activities of service or maintenance where a risk of unexpected start-up or release of hazardous energy may be identified:

- Adjustment.
- Cleaning.
- Commissioning and decommissioning.
- Inspection.
- Installation.
- Maintenance.
- Repair.
- Sampling.
- Testing.
- Any other identified by a risk assessment.

The risk of hazardous energy can involve:

- Employees.
- Contractors.
- Visitors.
- Or any other person on site or in the vicinity.



2.0 > Main health & Safety hazards

Hazardous Energy presents different health hazards through exposure to the unintended or inadvertent release of energy.

Hazardous energy threatens when:

- A service or maintain equipment could start or move unexpectedly.
- Working near equipment while it's being serviced.
- Removing or working behind machine guards.
- Working on simultaneous activities.

- Working handover and shifting handover.
- Failing to follow established energy control procedures.

There are 8 principal types of hazardous energy. Depending on the circumstances, all types might be more or less dangerous to human life with severity reaching to fatalities. The following table shows the injuries that can result from different sources of hazardous energy.

Hazardous Energy	Description	Example	Example of potential hazard (non exhaustive)	Example of potential effects on the human body (non exhaustive)
Chemical	Energy created through the interaction or reaction of non compatible substances or environments.	Hazardous chemicals, fuel.	Chemical reaction with body tissues, fire, explosion (blast pressure and radiation, spills and projectiles).	Burns, hearing loss, injuries by projectiles, inhalation, ingestion, or by skin contact with chemicals.
Electrical	Energy in the form of an electrical current that runs from a power source through wires or cables.	Power lines, electric circuits, batteries, capacitors, electric transformers.	Electrocution, electrification by arc and by contact.	Electric shock, burns, neurological damage or death.
Gravitational	Energy created by moving parts that may move or fall when not under pressure, these need to be chocked or locked into position.	Suspended, elevated or coiled materials, waste water networks.	Something that might fall (moved to a lower level of energy).	Crushing injuries by moving machinery or equipment.

Hydraulic		Liquid in pipes or hoses that produces energy through pressure.	Hydraulic cylinders, automotive lifts, injection, moulding machines, power presses, hydraulic accumulators, water networks.	Pressure (fluids and projectiles), flooding.	Lacerations, injection injuries and crushing injuries, drowning, thoracotomy.
Mechanical		Energy that is stored or has built up in components of a mechanical system as a result of motion or position.	Springs, winches, rotating machine, hoses.	Moving machinery or equipment.	Crushing injuries and lacerations.
Pneumatic	Positive Pressure	Compressed air or pressurised steam or gas that provides energy through pressure.	Spraying devices, pressure vessels, pneumatic accumulators, power washers.	Pressure (fluids and projectiles).	Lacerations, burns, hear loss and crushing injuries.
	Negative Pressure	Energy can rapidly increase in case of breach to an enclosed space from which air has been partially removed (resulting in a lower pressure than the surrounding atmosphere).	Closed vessels, vacuum air systems and aspiration systems, high-pressure pumps.	Vacuum, implosion.	Lacerations, burns and crushing injuries.
Radiation		Energy that radiates from the source via waves, either electric or magnetic, and is absorbed by another object/body.	Lasers, UV, light, X-ray, electromagnetic fields, microwaves.	Radiation. Unexpected movement of metallic objects.	Cancers, genetic modifications, nephrotoxicity, burns, interference with pacemakers and implants.
Thermal		Energy that is transferred from one body to another as the result of a difference in temperature.	Boilers, heat exchangers, furnaces, cooling systems.	Heat, cold.	Burns.



3.0 > Risk management - Hierarchy of control

3.0.1 Risk assessment and risk control

A risk assessment must be conducted to evaluate any potential risks resulting from hazardous energy. Records must be maintained and updated.

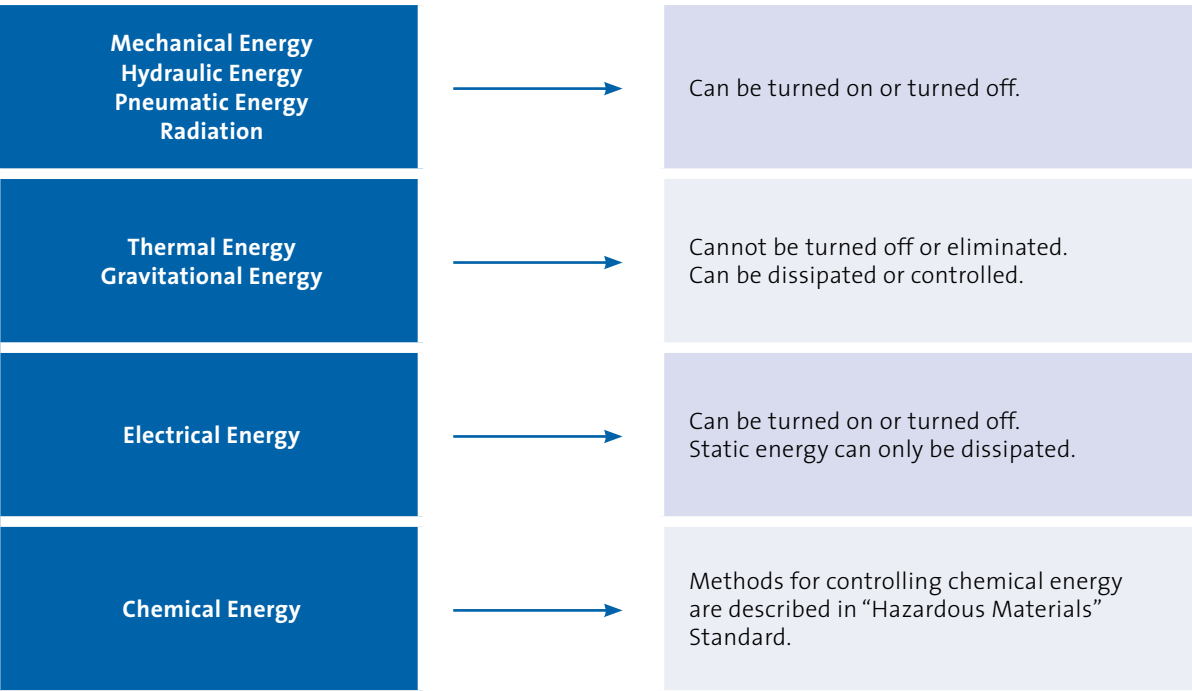
The risk assessment needs to be updated once a year or whenever necessary (in case of the introduction of a machinery or equipment into the workplace, accidents or near-misses,

implementation of new control measures, if process or plant is modified etc.).

One must always aim to **eliminate a hazard**, which is the most effective control. If it is not reasonably practicable to do so, the risk must be minimised to the lowest level as reasonably practicable by one, or a combination, of the following:

HIGHEST	ELIMINATION	Can hazardous materials be totally eliminated?	MOST
Health and Safety Protection ↑	SUBSTITUTION	Can the hazardous material be replaced for a less hazardous material?	Reliability of control measures ↑
	ENGINEERING	Can a mechanical system be used to keep personnel remote from the equipment?	
	COLLECTIVE PROTECTIVE EQUIPMENT	Can the hazardous materials operations be guarded or barriers put in place to remove people from the hazard?	
	ADMINISTRATIVE CONTROLS	Can training, increased supervision, procedures, rotation and signage minimize exposure?	
LOWEST	PERSONAL PROTECTIVE EQUIPMENT	Can PPE protect the person from the hazard or risk?	LEAST

Each type of energy has its specificity of control. As we can see on follow Figure, not every type of energy can be turned on or off; so the process of control should be adapted to the form of energy.





3.0.2 Lock-Out/Tag-Out (LOTO) process

To control hazardous energy you must apply a process which prevents energy from being transmitted from its source to the equipment that it powers. Lock-out/tag-out

Procedures in each workplace may vary in detail because of differences in machines, equipment, power sources, hazards and processes. However, an effective lock-out/tag-out program should include the following steps in the specified order.

Isolation / Prepare for shutdown	Return to service / Safe start-up
<div>1</div> <div>Detail the procedures for the machine / equipment:<ul style="list-style-type: none">- Making sure you've identified the equipment correctly and accurately, including its specific location.- Determine the correct procedure for shutting down and restarting the machine / equipment.- Detail that procedure, step by step, in a written record.- Consider all the energy sources that may be connected to the machine / equipment.- Be very specific, because ambiguous language could lead to an incorrect or even dangerous action.</div>	<div>1</div> <div>The work area must be inspected to ensure that all tools, parts, etc. have been removed from the machine or the equipment.</div>
<div>2</div> <div>Notify all affected workers that a lock-out is required and the reason for the lock-out:<ul style="list-style-type: none">- Inform them about the timing of the work, and how long the machine / equipment may be unavailable.- If the unavailability of the machine / equipment requires a change in work processes, make sure they are familiar with the steps to take.</div>	<div>2</div> <div>Replace all safety guards.</div>
<div>3</div> <div>Identify energy sources, circuits and energy-isolating devices.</div>	<div>3</div> <div>Ensure all personnel are notified and located safe off the machine or equipment (including during steps 4 to 8).</div>
<div>4</div> <div>Shut down the machine following normal stopping procedure (e.g. depress stop button, open toggle switch, close valve):<ul style="list-style-type: none">- Explain the shutdown process in detail.- It is not enough to say something like "disconnect the machine."- To ensure everyone's safety and reduce the potential for damage, the shutdown instructions should be detailed.- Spell out the exact actions to be taken and the correct sequence for performing those actions.</div>	<div>4</div> <div>Remove all lock-out and tag-out devices.</div>

<div>5</div> <div>Isolate or disconnect the machine or equipment from all its energy sources and secure them in a safe position.</div>	<div>5</div> <div>Ensure the normal operating controls (e.g. switch button, etc.) are in "Off" position.</div>
<div>6</div> <div>Lock-out energy-isolating devices with assigned individual locks.</div>	<div>6</div> <div>Turn "On" the energy source to restore power.</div>
<div>7</div> <div>Release any residual energy: stored energy, such as that in capacitors, springs, elevated machine members, rotating fly wheels, hydraulic systems, and air, gas, steam or water pressure, must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down.</div>	<div>7</div> <div>Switch the machine or equipment "On" and check for proper operation.</div>
<div>8</div> <div>Apply the tag-out of all energy-isolating devices.</div>	<div>8</div> <div>Inform all affected employees that the machine or equipment returned to normal operation.</div>
<div>9</div> <div>Verify the isolation of the machine or equipment:<ul style="list-style-type: none">- Check the zero-energy state (voltmeter, manometer, etc.).- Operate the push button or other normal operating controls to make sure the machine or equipment will not operate.- Check the zero-energy state (voltmeter, manometer, etc.).- Return operating controls to neutral (OFF) position after the test.<div>CAUTION: If there is possibility of re-accumulating, verification must be continued until the service or maintenance is completed.</div></div>	
<div>The equipment is now lock-out and tag-out and the work on the machine or equipment can begin.</div>	<div>The machine or equipment is ready for operation.</div>
<div><div>NOTE: Keep it in force during shift changes.</div><div>The equipment must remain in lock-out/tag-out condition across shift changes, so that workers arriving at the site are aware that the equipment is OUT OF SERVICE.</div><div>If individual locks or tags are used, the individual responsible for designating the lock-out/tag-out and the individual responsible for it during the next shift must both be present as the locks or tags are switched.</div></div>	



When LOTO devices are temporarily removed from the energy-isolating device, so that the machine, equipment or component can be reenergised for adjustment or positioning, the following sequence of eight actions on the left side of the following table must be taken.

When the LOTO-Authorized person who applied a LOTO device is not available to remove it, that device may be removed by their Supervisor if it is safe to do so, and only after the emergency removal procedure on the right side of the following table has been implemented.

Temporary Removal of LOTO Devices	Emergency Removal of LOTO Devices
1 Notify the affected employees and Supervisor.	1 The Supervisor must verify that the LOTO-Authorized person who applied the lock-out/tag-out is not at the plant.
2 2. Clear the machine / equipment of tools and materials.	2 The Supervisor must make every reasonable effort to contact the LOTO-Authorized person who applied the lock-out/tag-out. These efforts must be documented (email, voicemail, telephone memo, etc.).
3 Remove all employees from the machine / equipment area and ensure that required tools are safely and properly positioned.	3 If the LOTO-Authorized person who applied the lock-out/tag-out is contacted, the Supervisor must inform him/her that their LOTO devices are being removed.
4 Remove all repositioning and blocking devices and return vents and valves to their normal operating positions.	4 The Supervisor must obtain the approval of the area manager.
5 Remove all grounding / shorting conductors, hooks, or wands.	5 The Supervisor must verify that it is safe to remove the LOTO devices.
6 Put on any required personal protective equipment (PPE) and ensure that all personnel in the work area are protected against sudden release of energy, chemicals, steam, radiation, etc.	6 The Supervisor must then cut off the lock, or have it cut off by a new designated LOTO-Authorized person.
7 Energize and proceed with testing or positioning.	7 Before the LOTO-Authorized person who applied the lock-out/tag-out returns to any work duty, the Supervisor must ensure that he/she is informed of the reasons for the emergency removal.
8 De-energize all systems and reapply lock-out/tag-out procedure to continue the servicing, maintenance, or modification in the machine / equipment.	8 The emergency procedure must be duly recorded in the LOTO registers and signed by the Supervisor and the LOTO-Authorized person that applied the lock-out/tag-out.
The equipment is now locked-out and tagged-out and the work on the machine or equipment can restart.	The emergency removal is performed.

4.0 > Requirements

Application

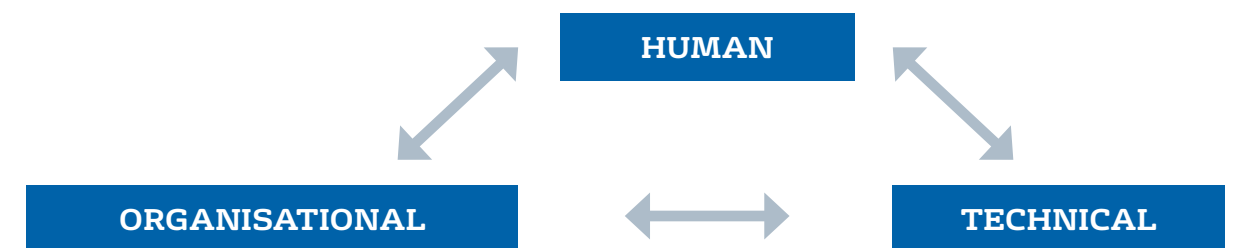
This Standard applies to all managers, employees, contractors, visitors or any other person working on the scope of Veolia business undertakings and operations.

This Standard applies in addition to requirements prescribed by prevailing legislation, Codes of Practice, international standards and health & safety recommendations from manufacturers and risk prevention organisations and bodies.

Preliminary requirements

Use of the word “**must**” within this standard means a requirement is mandatory.

Use of the word “**should**” within this standard means the primary intent is that the requirement is mandatory but specific circumstances may mean implementation of the requirement is not reasonably practicable.



4.0.1 Human requirements

1. A competency-based training program for contractors, employees and Supervisors must be in place. An approved examiner should assess the competence of trainers performing such training.
2. Training must include: identification of hazardous energy sources, identification of methods to control the energy sources, using isolation procedure.
3. Training must be recorded, maintained and periodically renewed every 5 years or whenever there is a change in the procedure.
4. A worker must be a LOTO-Authorized person to apply a lock or tag to control hazardous energy.
5. Suitably qualified person must be involved in the planning and supervision of energy isolation.
6. The roles and responsibilities of personnel engaged in energy isolation must be defined clearly.
7. A competent person must perform inspections of isolations.
8. Behaviour-based observations must be performed and any need for additional specific training must incorporate the results of these observations.
9. Supervisors are required to ensure that personnel are trained and competent in the energy isolation activities that they are to undertake.

4.0.2 Organisational requirements

1. Purchase and design of equipment (including hired and contracted equipment) must meet the requirements of this standard.
2. Plant and equipment isolation design must be considered and risk assessments undertaken prior to acquisition or to plant start-up or equipment put into service.
3. Any modification to the equipment that affects the integrity of the isolation process must be subjected to the original equipment manufacturer's approval and to a rigorous safety change management process.
4. Before starting any LOTO procedure, the LOTO-Authorized person performing the work must physically locate and identify all isolation devices (switches, valves, etc.) which apply to the machine or equipment to be locked out. Any questionable identification of energy source (electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational) must be resolved by the LOTO-Authorized person with their Supervisor before proceeding.
5. All workers affected by the lock-out should be notified.
6. The work area must be clean and safe.
7. Site schematics must identify energy sources and isolation points and must be kept up to date.
8. Risks associated with energy isolation, equipment condition and site and environmental conditions must be assessed as part of the pre-job risk assessment process.
9. Documented Isolation Procedure(s) must be developed and implemented.
10. Documented Isolation Plans must be developed and implemented for all complex isolations.
11. Isolation Plans must include a written sequence in checklist form for equipment access, lock-out/tag-out, clearance, release and start-up.
12. Isolation Procedures must include requirements for controlling emergency keys for LOTO locks and removal of individual locks/tags by a LOTO-Authorized person other than the one who applied the lock-out/tag-out.
13. Isolation procedures and isolation plans must be kept up-to-date – Equipment and operating procedures tend to change over time, and your lock-out/tag-out program needs to reflect those changes.
14. Isolation Procedures must require that isolations are verified prior to the commencement of work.
15. A LOTO Permit to Work system must be implemented for all lock-out/tag-out procedures.
16. LOTO Permit to Work must be documented and signed by the LOTO-Authorized person and their Supervisor.
17. LOTO Permit to Work registers must be kept.
18. A register of all machines and equipment used for isolations must be maintained. This should include:
 - The equipment's unique identification number.
 - Documentary evidence of all inspections.
 - Certifications.
 - Maintenance.
 - Modifications and tests.
19. All accidents and incidents caused by failure to properly isolate that occur on a work site, or in relation to Veolia activities in any location must be reported, recorded and investigated.
20. Emergency response procedures for each site must be detailed in the Site Emergency Response Plan and must be accessible to all personnel.
21. Isolation Procedures can only be used by a competent person. For electrical systems, the competent person must be a qualified electrician.

4.0.3 Technical requirements

1. All machine and equipment must be provided with the means of isolation or block.
2. Once turned off, the energy-isolating device will be operated in such a manner that the machine or equipment will be isolated from the energy sources.
3. Designated isolation points must be clearly marked to identify the circuit or system over which they have direct control.
4. The use of control circuitry and devices such as push buttons, toggle switches and emergency stop switches, not being specifically designed as primary isolation points for the purpose of personal lockable protection, must be prohibited for the purpose of energy isolation.
5. LOTO must be performed at each identified hazardous energy control point by each LOTO-Authorized person who works on the equipment.
6. Isolation devices and isolation tags must be personal.
7. Personal locking devices must be highly visible and:
 - Be uniquely keyed.
 - Not be combination locks.
 - Not have a master over ride key.
 - And be kept under the exclusive control of the owner and not transferred.
8. Personal isolation tags must be highly visible and contain the following information in indelible ink:
 - Isolation description (warning notice: DO NOT OPERATE, DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, etc.).
 - And name, signature and date.
9. Locks and tags must be durable enough to withstand the environment in which they are exposed for the maximal time exposure is expected.
10. Information on the locks and tags must remain legible.
11. Locks must be substantial enough to prevent removal without the use of destructive force.
12. Locks and tags used for control of hazardous energy must be unique in design and colour and must not be used for any other purpose.
13. Tags must be substantial enough to prevent accidental or inadvertent removal.



Examples of tag-out tags

14. If more than one worker is working on the same piece of equipment at the same time, each one must lock-out the equipment, by placing a personal lock and tag on the group lock-out device when he/she begins work, and should remove those devices when he/she stops working on the machine or equipment.
15. Complex isolations must include the use of “Group Isolation Boxes” that must be unique in appearance and clearly identifiable.
16. Group isolation boxes must be constructed in such a way as to permit multiple individual LOTO locks to be attached to the outside of the enclosure, preventing them from being opened except by removal of every individual LOTO locks.

5.0 > Glossary

Affected person:

An employee who performs the duties of his or her job in an area in which the energy control procedure is implemented and servicing or maintenance operations are performed.

LOTO-Authorized person:

One who has completed the required LOTO training program and is authorized by the Supervisor to lock-out or tag-out machines or equipment in order to perform servicing or maintenance on that machine or equipment.

Blocked:

A condition where a mechanical device is inserted into an energy path to physically prevent movement, most commonly used with mechanical machinery or fluid filled lines.

Competent person:

One who has acquired the knowledge and skills to carry out the task through training or experience. Competency is a combination of these attributes that enables a worker to identify both the risks arising from a situation and the measures needed to deal with them.

Eliminated hazard:

A hazard is “eliminated” when the hazard is removed.

Energised:

Connected to source of energy or containing residual or stored energy.

Energy-Isolating Device:

A mechanical device that physically prevents the transmission or release of energy, including, but not limited to the following:

- Manually operated electrical circuit breaker.
- Manually operated disconnect switch.
- Manually operated switch by which the conductors of a circuit can be disconnected from all underground supply conductors, and, in addition, which no pole can be operated independently.
- Manually operated valve, blind flange, or other mechanical device used to block or isolate energy.

Equipment:

Material (supplies or tools) designed, manufactured and used for its intended purpose during operation.

Group Isolation Box:

Means a single isolation device that is locked by more than one person. Individual LOTO locks are placed on the group isolation box by each LOTO-Authorized person.

Hazard:

Any source of potential damage, harm or adverse health effects on something or someone.

Hazardous energy control:

The process of systematically implementing mechanical means to prevent hazardous energy from flowing to a person.

Individual Lock:

A lock issued to an LOTO-Authorized person for which no other employee has the key or means of opening without using destructive force.

Isolation:

The action of severing or disconnecting a machine and/or equipment from all sources of energy, process services and materials. A condition where all sources of hazardous energy have been controlled by physically stopping the energy path so that the energy cannot flow to workers.

LockOut – TagOut:

The method of applying a mechanical lockout device and tag on an energy-isolating device by a LOTO-Authorized person, in accordance with established written procedure, in order to control hazardous energies and prevent the machine or equipment from being operated until the lockout device and tag are removed.

Lockout Device:

A mechanical device that utilizes a positive means such as a lock, with key or combination type, to hold an energy-isolating device in the safe position and prevent any unexpected energizing or re-energizing of a machine and/or equipment.

Qualified person:

One who is BOTH competent AND in possession of a recognized degree, certificate, or professional standing.

Risk:

The likelihood that a person will be harmed if exposed to a hazard.

Risk Assessment:

Process of evaluation the risk arising from a hazard, taking into account the adequacy of any existing controls and deciding whether or not the risk is acceptable. (Ref.: OHSAS 18001: 2007)

Residual energy:

One (electrical, mechanical, hydraulic, pneumatic, chemical, radiation, thermal, gravitational, etc.) that may remain in a system and present a hazard.

Tagout:

The placement of a tagout device on an energy-isolating device by a LOTO-Authorized person, in accordance with established written procedure, to indicate that the energy-isolating device and the machine or equipment being controlled may not be operated until the tagout device is removed. Using tagout alone as a form of hazardous energy control is not a positive means of controlling hazardous energy.

Tagout Device:

A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy-isolating device in accordance with an established procedure, to indicate that the energy-isolating device and machine or equipment being controlled may not be operated until the tagout device is removed. This Device must include at least the following information: “DANGER” and “DO NOT OPERATE”, Date, and Name of the person who affixed the tag.

Work area:

Any physical location in which work-related activities are performed under the control of Veolia (Ref.: OHSAS 18001: 2007).



APPENDIX 1 > Applicability and compliance Assessment check-list

> REQUIREMENTS	C	NC
HUMAN		
1. A competency-based training program for contractors, employees and Supervisors must be in place. An approved examiner should assess the competence of trainers performing such training.		
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6. The roles and responsibilities of personnel engaged in energy isolation must be defined clearly.		
7. A competent person must perform inspections of isolations.		
8. Behaviour-based observations must be performed and any need for additional specific training must incorporate the results of these observations.		
9. Supervisors are required to ensure that personnel are trained and competent in the energy isolation activities that they are to undertake.		
ORGANISATIONAL		
1. Purchase and design of equipment (including hired and contracted equipment) must meet the requirements of this standard.		
2. Plant and equipment isolation design must be considered and risk assessments undertaken prior to acquisition or to plant start-up or equipment put into service.		
3. Any modification to the equipment that affects the integrity of the isolation process must be subjected to the original equipment manufacturer's approval and to a rigorous safety change management process.		
4. Before starting any LOTO procedure, the LOTO-Authorized person performing the work must physically locate and identify all isolation devices (switches, valves, etc.) which apply to the machine or equipment to be locked out. Any questionable identification of energy source (electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational) must be resolved by the LOTO-Authorized person with their Supervisor before proceeding.		
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19. All accidents and incidents caused by failure to properly isolate that occur on a work site, or in relation to Veolia activities in any location must be reported, recorded and investigated.		
20. Emergency response procedures for each site must be detailed in the Site Emergency Response Plan and must be accessible to all personnel.		
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TECHNICAL		
1. All machine and equipment must be provided with the means of isolation or block.		
2. Once turned off, the energy-isolating device will be operated in such a manner that the machine or equipment will be isolated from the energy sources.		
3. Designated isolation points must be clearly marked to identify the circuit or system over which they have direct control.		
4. The use of control circuitry and devices such as push buttons, toggle switches and emergency stop switches, not being specifically designed as primary isolation points for the purpose of personal lockable protection, must be prohibited for the purpose of energy isolation.		
5. LOTO must be performed at each identified hazardous energy control point by each LOTO-Authorized person who works on the equipment.		



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