

High-risk management standard Control of hazardous energy

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on
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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.



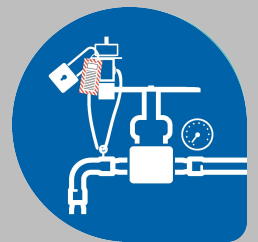
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LIFE SAVING RULES

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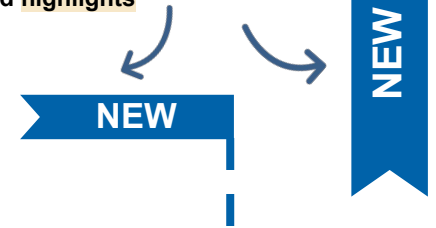


CONTROL OF HAZARDOUS ENERGY

I lock, tag and ensure zero state (mechanical, chemical, electrical, hydraulic, etc...) before any operation.

New information

is easy to find with markers and highlights



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1.0 > Definitions

Energy is a capacity to modify a state, to produce work resulting in movement or generating power which, if unexpected or uncontrolled, can become dangerous.

NEW

For an person, the risk comes from energization, the release of stored energy or the start-up of a system during servicing or maintenance.

For this standard, a system may contain one or more circuits, pipes, plants, machinery, equipment, and/or installations including at least one of a hazardous energy source.

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.

NEW

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 o 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 wate networks.	Something that might fall (moved to a lower level of energy).	Crushing injuries by moving machinery or equipment.



Hazardous energy	Description	Example	Example of potential hazard (non exhaustive)	Example of potential effects on the human body (non exhaustive)
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.
Mechanic	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.
Pneumatic 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.

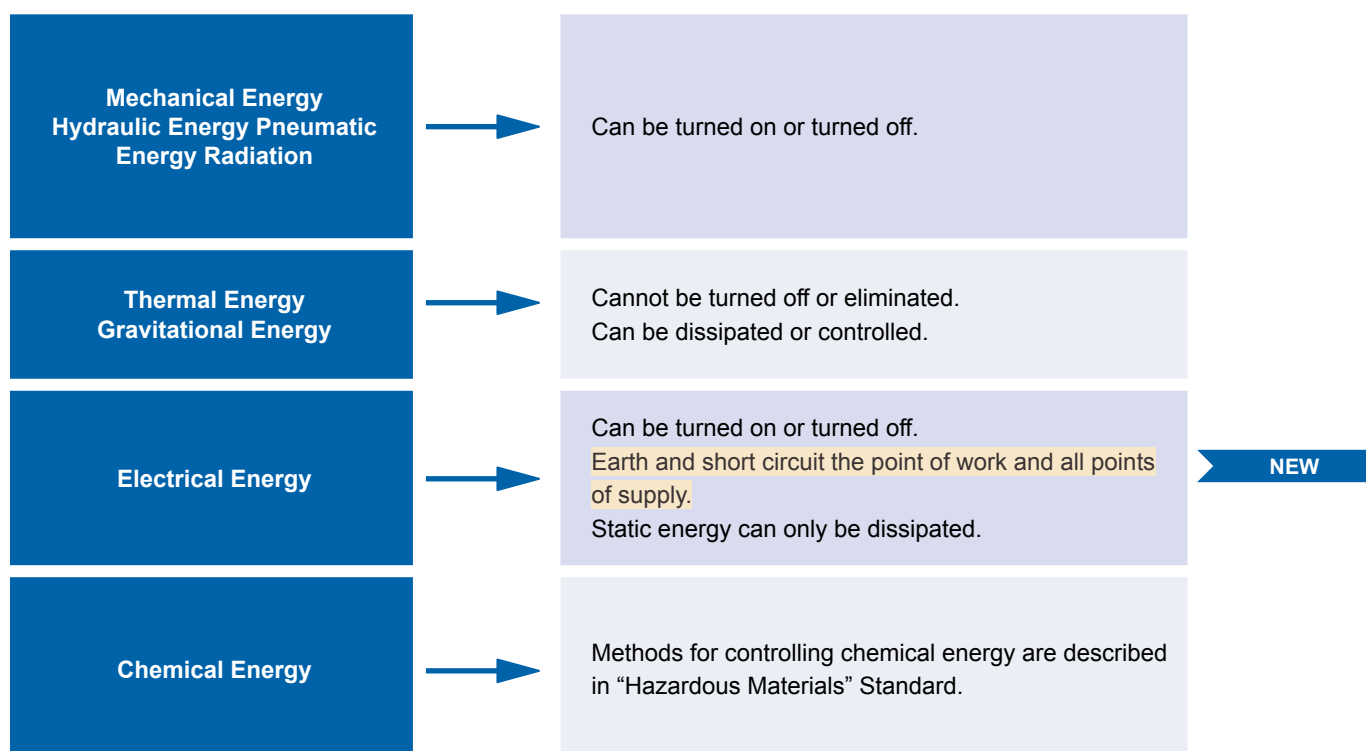
If it is not reasonably practicable to do so, the risk must be minimised to the lowest level as reasonably practicable by one, or a combination, of the following:

HIGHEST	ELIMINATION	Can an hazardous energy be totally eliminated? It is impossible to find a system without a primary supply source.	MOST
Health and safety protection ↑	SUBSTITUTION	Can the hazardous energy be replaced for a less hazardous energy? e.g.: reducing the nominal pressure of a process.	Reliability of control measures ↓
	ENGINEERING	Can a mechanical system be used to keep personnel remote from the equipment? e.g.: Light barriers to control energy sources.	
	COLLECTIVE PROTECTIVE EQUIPMENT	Can the hazardous energy operations be guarded or barriers put in place to remove people from the hazard? e.g.: Locking and tagging out part of the system.	
	ADMINISTRATIFS CONTROLS	Can training, increased supervision, procedures, rotation and signage minimize exposure? e.g. : Permit to work.	
LOWEST	PERSONAL PROTECTIVE EQUIPMENT	Can PPE protect the person from the hazard or risk? e.g.: wear a helmet with face shield.	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 different systems, power sources, hazards and processes.

Therefore, an effective lock-out/tag-out program should include the following steps in the specified order.

	Isolation / Prepare the shutdown	Return to service / Safe start-up
1	<p>Detail the procedures for the machine / equipment:</p> <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 system. • Detail that procedure, step by step, in a written record. • Consider all the energy sources that may be connected to the system. • Be very specific, because ambiguous language could lead to an incorrect or even dangerous action. 	<p>The work area must be inspected to ensure that all tools, parts, etc. have been removed from the system.</p>
2	<p>Notify all affected workers that a lock-out is required and the reason for the lock-out:</p> <ul style="list-style-type: none"> • Inform them about the timing of the work, and how long the system may be unavailable. • If the unavailability of the system requires a change in work processes, make sure they are familiar with the steps to take. 	<p>Replace all safety guards.</p>
3	<p>On site, identify primary and residual energy sources as well as the energy-isolating devices.</p>	<p>Ensure all personnel are notified and located safe off the system (including during steps 4 to 8).</p>
4	<p>Shut-down the system following normal stopping procedure (e.g. depress stop button, open toggle switch, close valve):</p> <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. 	<p>Remove all lock-out and tag-out devices respecting priorities.</p>

	Isolation / Prepare the shutdown	Return to service / Safe start-up
5	Isolate or disconnect the system from all its energy sources and secure them in a safe position.	Ensure the normal operating controls (e.g. switch button, etc.) are in “Off” position.
6	Lock-out and tag-out energy-isolating devices with assigned individual locks using suitable devices.	Turn “On” the energy source to restore power.
7	Release any residual energy: stored energy, such as that in capacitors, springs, elevated machine members, rotating flywheels , hydraulic systems, and air, gas, steam or water pressure, must be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding down.	Switch the system “On” and check for proper operation.
8	Apply the lock-out and tag-out process for others energy-isolating devices as per group Isolation Boxes and signaling with appropriate signs.	Inform all affected employees that the machine or equipment returned to normal operation.
9	<p>Verify the isolation of the system:</p> <ul style="list-style-type: none"> • Verify the absence of residual or stored energy and check the test device before and after verification. • Operate the push button or other normal operating controls to make sure system will not operate. • Return operating controls to neutral (OFF) position after the test. <p>CAUTION: If there is possibility of re-accumulating, verification must be continued until the service or maintenance is completed.</p>	
	The system is now lock-out and tag-out and the work can begin.	The machine or equipment is ready for operation.

NOTE: Keep it in force during shift changes.

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.

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.



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

NEW

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.	The Supervisor must verify that the LOTO-Authorized person who applied the lock-out/tag-out is not at the plant.
2	Clear the system of tools and materials.	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 system area and ensure that required tools are safely and properly positioned.	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.	The Supervisor must obtain the approval of the area manager.
5	Remove all grounding / shorting conductors, hooks, or wands.	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.	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.	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.	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 system is now locked-out and tagged-out and the work can restart.	The emergency removal is performed.

4.0 > Requirements

Application

This high risk management standard applies to all interventions/activities related to Control of Hazardous Energy, exceptions made when stricter requirements must be complied (such as national regulations, international standards, clients requirements, codes of practices...).

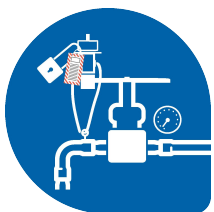
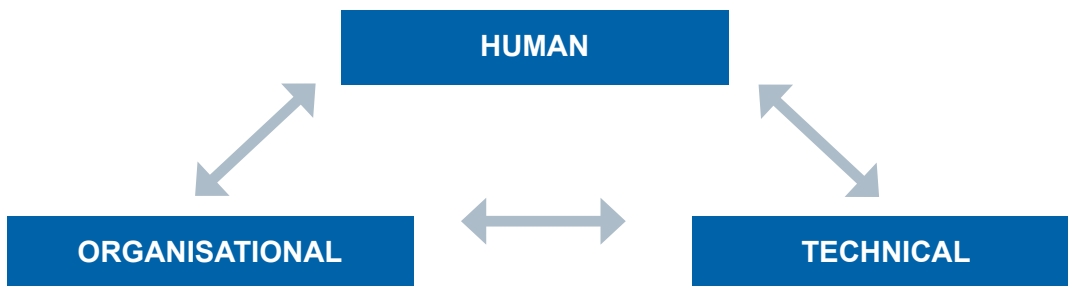
NEW

This standard applies to all Veolia entities and to all acting under their responsibility, such as managers, employees, contractors, suppliers, visitors or any other person acting in the name of a Veolia entity.

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.



I lock, tag and ensure zero state (mechanical, chemical, electrical, hydraulic, etc...) before any operation. (Life-Saving Rules)

NEW

4.0.1 – Human requirements

1. The **Life-saving Rule** relating to this standard should be deployed to all employees and subcontractors.
2. All persons involved in Control of Hazardous Energy operations (procurement, sales, design & engineering, operators, managers, contractors, etc.) must follow the e-learning module of this standard. The e-learning must be refreshed every 3 years.
3. All authorised workers, including those supervising the operations, must receive specific training on both Control of hazardous energies instructions and all kinds of energy sources that they have to isolate including any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, radioactive or other energy by a competent trainer or through an approved digital program. The requirement also applies to workers from permanent or regular contractors that are involved in LOTO operations. Training must be recorded, maintained and periodically renewed every 5 years or whenever there is a change in the procedure.
4. Workers from irregular contractors that are involved in LOTO operations must receive a specific LOTO awareness training adapted to the work situation and the risks.
5. Assign only trained, qualified and authorised persons to perform lockout/tagout.
6. The roles and responsibilities of personnel involved in energy isolation must be assigned to qualified and competent persons.
7. In order to ensure that this standard is properly applied to all LOTO works, observations (such as safety visits, audits, etc.) must be carried out regularly.
8. Observations (such as safety visits, audits, etc.) carried out during LOTO works must take into account the behaviour of those observed.
9. Observations must lead to:
 - the activity being stopped until compliance is restored in case of deviations from critical requirements of this standard;
 - immediate remediation and/or corrective action plan in case of deviations from requirements of this standard others than critical;
 - recognition of existing good-practices through sharing and "copy & ad

4.0.2 – Organisational requirements

1. Purchase, design, installation and assembly of plants and 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 (such as Pre-Start Safety Review) undertaken prior to acquisition or to plant start-up or equipment put into service. Any change must keep appropriate energy isolating devices. The energy control procedures, P&ID and drawings must be updated.
3. A management of change procedure must be implemented. It should address:
 - Any modification to the equipment that affects the integrity of the isolation process (this must be subjected to the original equipment manufacturer's approval).
 - An update of the isolation procedures if they are impacted by those changes.
4. Before starting any LOTO works, the authorized person must identify on the P&ID or site schematics all the isolation points of all energy sources (electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, radioactive). These drawings shall be used as a checklist to physically locate and isolate with appropriate devices (switches, valves, etc.) the system to be locked out.
5. Any issues arising during the isolation phase should be reported to the works Supervisor and resolved before proceeding and indicated on the site schematics for update.
6. All affected workers must be notified that a system is going to be Locked-out/Tagged-out and the work to be done.
7. The work area must be clean and safe.
8. Documented Isolation Procedure(s) must be developed and implemented. These procedures must include:
 - The steps to be followed to de-energise and re-energise any system;
 - The requirement that isolations are verified prior to the commencement of work;
 - Test instructions and the identification of the type and magnitude of energy;
 - Requirements for removal of individual locks/tags by a LOTO-Authorized person other than the one who applied the lock-out/tag-out.
 - The requirement that 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 they begin the work, and should remove those devices when they stop working on the system.
9. Documented Isolation Plans must be developed and implemented for complex isolations, which means, when a number of separate isolations are required to allow work to be completed safely. Those plans must include a written sequence in a form of a checklist for equipment access, lock-out/tag-out, clearance, release and start-up.
10. Complex isolations must include the use of "Group Isolation Boxes" that must be unique in appearance and clearly identifiable.

11. After completion of works, a request for testing can be asked by the works supervisor. In such cases, a testing Supervisor must be appointed, his role being to ensure that testing is done in a safe manner (steps, PPE, communication...).
12. A LOTO Permit to Work system must be developed and implemented for all isolation procedures. It must include but not be limited to:
 - The identification of the kind of energies to be checked prior to commencing works.
 - A Job Safety Analysis (JSA) to be performed before any isolation procedure.
 - The verification that stored energy is purged, dissipated or blocked prior to commencing works.
 - The verification of absence of residual energy using suitable equipment or process adapted to the systems.
 - Repositioning of all guards, interlocks and safety devices with notification to all affected persons that the work is finished must be completed before unlock and return to service of the equipment,
 - Each Personal Tag Identification shall be removed personally by the owner of the Personal Tag Identification prior to reenergizing the equipment.
 - The verification of emergency preparedness.
13. LOTO Permit to Work must be documented and signed by the LOTO-Authorized person and the works supervisor.
14. LOTO Permit to Work registers must be kept for at least 3 years.
15. 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.
16. Emergency response procedures for LOTO activities must be detailed in each Site Emergency Response Plan and be accessible to all personnel.
17. Isolation Procedures can only be used by a qualified LOTO authorised person.

4.0.3 – Technical requirements

1. All systems must be provided with the means of isolation or block. When there is none (old equipments), additional control measures must be implemented to ensure safe LOTO.
2. All equipment necessary to ensure that the stored energy has been dissipated, purged or blocked must be available. For vertical movement due to gravity, mechanical ram blocks shall be provided when relevant.
3. Once turned off, each energy-isolating device will be operated in such a manner that the system will be isolated from the energy source.
4. Designated isolation points must be clearly marked and visible to identify the circuit or system over which they have direct control.

5. 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..
6. Each authorised person must be issued with individual padlocks and tags.
7. Personal locking devices must be highly visible and and:
 - Be uniquely keyed;
 - Not be password padlocks;
 - 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.);
 - Name and phone contact.

One-time use tags are strongly recommended.
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 beyond maintenance work.
13. Tags must be substantial enough to prevent accidental or inadvertent removal.
14. LOTO group isolation boxes must 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.

Examples of tag-out tags



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.

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.

Complex isolations: when a number of separate isolations are required to allow work to be completed safely.

NEW

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 undergrounded 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 system 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.

NEW

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.

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.

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 system.

NEW



Primary energy source: is the supply of power that is used to perform work.

NEW

Qualified person: one who is BOTH competent AND in possession of a recognized degree, certificate, or professional standing.

Residual or stored energy: one (electrical, mechanical, hydraulic, pneumatic, chemical, radiation, thermal, gravitational, etc.) that may remain in a system and present a hazard.

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)

System : any circuits, pipes, equipment, machinery, installations and/or plants including at least one of a hazardous energy source.

NEW

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	Criticality
HUMAN			
1. The Life-saving Rule relating to this standard should be deployed to all employees and subcontractors.			1: Critical
2. All persons involved in Control of Hazardous Energy operations (procurement, sales, design & engineering, operators, managers, contractors, etc.) must follow the e-learning module of this standard. The e-learning must be refreshed every 3 years.			2: Important
3. All authorised workers, including those supervising the operations, must receive specific training on both Control of hazardous energies instructions and all kinds of energy sources that they have to isolate including any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, radioactive or other energy by a competent trainer or through an approved digital program. The requirement also applies to workers from permanent or regular contractors that are involved in LOTO operations. Training must be recorded, maintained and periodically renewed every 5 years or whenever there is a change in the procedure.			1: Critical
4. Workers from irregular contractors that are involved in LOTO operations must receive a specific LOTO awareness training adapted to the work situation and the risks.			1: Critical
5. Assign only trained, qualified and authorised persons to perform lockout/tagout.			1: Critical
6. The roles and responsibilities of personnel involved in energy isolation must be assigned to qualified and competent persons.			2: Important
7. In order to ensure that this standard is properly applied to all LOTO works, observations (such as safety visits, audits, etc.) must be carried out regularly.			2: Important
8. Observations (such as safety visits, audits, etc.) carried out during LOTO works must take into account the behaviour of those observed.			2: Important
9. Observations must lead to: <ul style="list-style-type: none"> • The activity being stopped until compliance is restored in case of deviations from critical requirements of this standard; • Immediate remediation and/or corrective action plan in case of deviations from requirements of this standard others than critical; • Recognition of existing good-practices through sharing and "copy & adapt". 			1: Critical

C: Compliant

NC: Non compliant

P: Priority as defined

1: Critical = Requirement that is fundamental to be deployed to avoid serious incidents.

2: Important = Requirement that is essential and should be implemented to the extent possible to avoid incidents.

3: Useful = Requirement that has an effective role in strengthening prevention

> REQUIREMENTS	C	NC	Criticality
ORGANISATIONAL			
1. Purchase, design, installation and assembly of plants and equipment (including hired and contracted equipment) must meet the requirements of this standard.			1: Critical
2. Plant and equipment isolation design must be considered and risk assessments (such as Pre-Start Safety Review) undertaken prior to acquisition or to plant start-up or equipment put into service. Any change must keep appropriate energy isolating devices. The energy control procedures, P&ID and drawings must be updated.			1: Critical
3. A management of change procedure must be implemented. It should address: <ul style="list-style-type: none"> • Any modification to the equipment that affects the integrity of the isolation process (this must be subjected to the original equipment manufacturer's approval). • An update of the isolation procedures if they are impacted by those changes. 			1: Critical
4. Before starting any LOTO works, the authorized person must identify on the P&ID or site schematics all the isolation points of all energy sources (electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, radioactive). These drawings shall be used as a checklist to physically locate and isolate with appropriate devices (switches, valves, etc.) the system to be locked out.			1: Critical
5. Any issues arising during the isolation phase should be reported to the works Supervisor and resolved before proceeding and indicated on the site schematics for update.			1: Critical
6. All affected workers must be notified that a system is going to be Locked-out/Tagged-out and the work to be done.			1: Critical
7. The work area must be clean and safe.			2: Important
8. Documented Isolation Procedure(s) must be developed and implemented. These procedures must include: <ul style="list-style-type: none"> • The steps to be followed to de-energise and re-energise any system; • The requirement that isolations are verified prior to the commencement of work; • Test instructions and the identification of the type and magnitude of energy; • Requirements for removal of individual locks/tags by a LOTO-Authorized person other than the one who applied the lock-out/tag-out. • The requirement that 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 they begin the work, and should remove those devices when they stop working on the system. 			1: Critical

> REQUIREMENTS	C	NC	Criticality
ORGANISATIONAL			
<p>9. Documented Isolation Plans must be developed and implemented for complex isolations, which means, when a number of separate isolations are required to allow work to be completed safely. Those plans must include a written sequence in a form of a checklist for equipment access, lock-out/tag-out, clearance, release and start-up.</p>			1: Critical
<p>10. Complex isolations must include the use of “Group Isolation Boxes” that must be unique in appearance and clearly identifiable.</p>			1: Critical
<p>11. After completion of works, a request for testing can be asked by the works supervisor. In such cases, a testing Supervisor must be appointed, his role being to ensure that testing is done in a safe maner (steps, PPE, communication...).</p>			1: Critical
<p>12. A LOTO Permit to Work system must be developed and implemented for all isolation procedures. It must include but not be limited to:</p> <ul style="list-style-type: none"> • The identification of the kind of energies to be checked prior to commencing works. • A Job Safety Analysis (JSA) to be performed before any isolation procedure. • The verification that stored energy is purged, dissipated or blocked prior to commencing works. • The verification of absence of residual energy using suitable equipment or process adapted to the systems. • Repositioning of all guards, interlocks and safety devices with notification to all affected persons that the work is finished must be completed before unlock and return to service of the equipment. • Each Personal Tag Identification shall be removed personally by the owner of the Personal Tag Identification prior to reenergizing the equipment. • The verification of emergency preparedness. 			1: Critical
<p>13. LOTO Permit to Work must be documented and signed by the LOTO-Authorized person and the works supervisor.</p>			1: Critical
<p>14. LOTO Permit to Work registers must be kept for at least 3 years.</p>			3: Useful
<p>15. 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.</p>			1: Critical
<p>16. Emergency response procedures for LOTO activities must be detailed in each Site Emergency Response Plan and be accessible to all personnel.</p>			2: Important
<p>17. Isolation Procedures can only be used by a qualified LOTO authorised person.</p>			1: Critical

> REQUIREMENTS	C	NC	Criticality
TECHNICAL			
1. All systems must be provided with the means of isolation or block. When there is none (old equipments), additional control measures must be implemented to ensure safe LOTO.			1: Critical
2. All equipment necessary to ensure that the stored energy has been dissipated, purged or blocked must be available. For vertical movement due to gravity, mechanical ram blocks shall be provided when relevant.			1: Critical
3. Once turned off, each energy-isolating device will be operated in such a manner that the system will be isolated from the energy source.			1: Critical
4. Designated isolation points must be clearly marked and visible to identify the circuit or system over which they have direct control.			2: Important
5. 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.			1: Critical
6. Each authorised person must be issued with individual padlocks and tags.			1: Critical
7. Personal locking devices must be highly visible and: <ul style="list-style-type: none"> • Be uniquely keyed; • Not be password padlocks; • Not have a master over ride key; • And be kept under the exclusive control of the owner and not transferred. 			1: Critical
8. Personal isolation tags must be highly visible and contain the following information in indelible ink: <ul style="list-style-type: none"> • Isolation description (warning notice: DO NOT OPERATE, DO NOT START, DO NOT OPEN, DO NOT CLOSE, DO NOT ENERGIZE, etc.); • Name and phone contact. One-time use tags are strongly recommended.			2: Important
9. Locks and tags must be durable enough to withstand the environment in which they are exposed for the maximal time exposure is expected.			2: Important
10. Information on the locks and tags must remain legible.			1: Critical
11. Locks must be substantial enough to prevent removal without the use of destructive force.			1: Critical
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 beyond maintenance work.			2: Important
13. Tags must be substantial enough to prevent accidental or inadvertent removal.			2: Important
14. LOTO group isolation boxes must 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.			1: Critical

