

LOCKOUT

**Verifying
the content
of lockout
programs**

RF-635



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LOCKOUT



PREFACE

This simple and practical tool provides companies with a means of verifying the content of a lockout program. It is neither a writing guide, nor a guide for implementing such a program.

When it is used, it is important to consider all of the major themes that are presented in it and to carry out a procedure based on the company's reality in order to determine whether the points presented are adapted to the context. Risk assessment is a means of achieving this.

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CONTENT

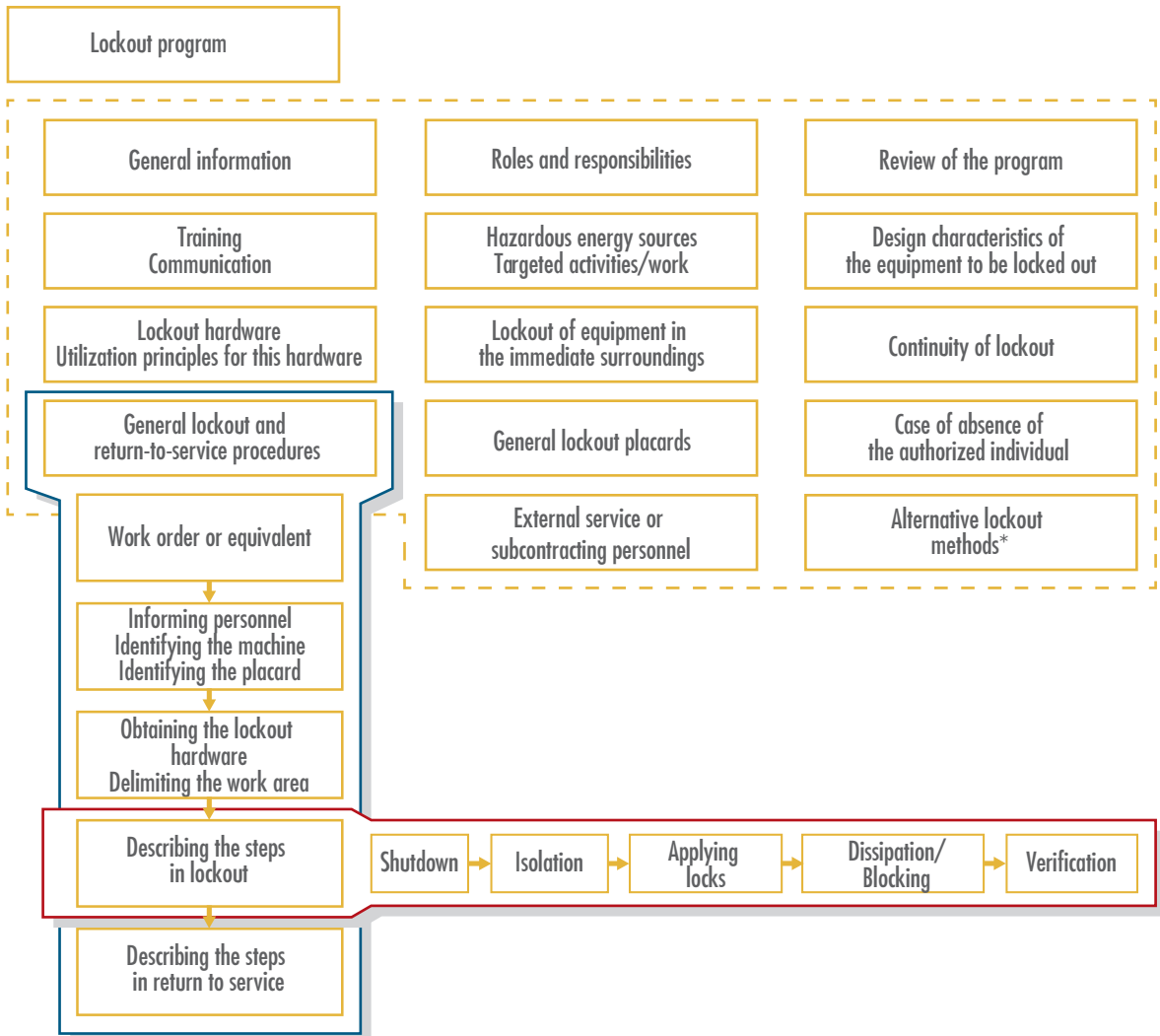
The content of this document, which addresses the major themes of a lockout program, is based on the results of the IRSST's research activity:

Comparative analysis of lockout programs and procedures applied to industrial machines (R-575, available on the site www.irsst.qc.ca).

The references mentioned are based mainly on the Act Respecting Occupational Health and Safety (AOHS) and the Regulation respecting occupational health and safety (RROHS) of Québec, as well as the Canadian standard CSA Z460-05, *Control of Hazardous Energy - Lockout and Other Methods*. Note that this standard has no regulatory value in Québec.

ROLE AND DIAGRAM OF A LOCKOUT PROGRAM

A company's lockout program establishes the lockout policy. Its writing, management and application are the responsibility of the company manager whose personal interest and involvement are necessary elements.



* In contrast to the other themes, "the alternative methods" are not developed in this document. This theme requires a specific study not yet carried out by the IRSST.

MAJOR THEMES OF A LOCKOUT PROGRAM

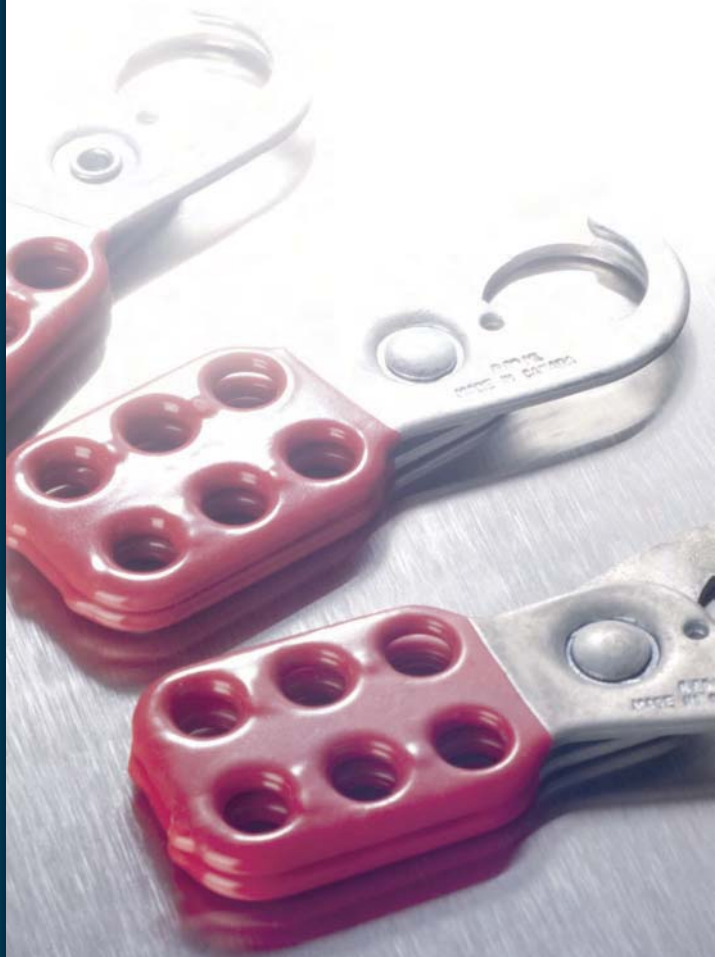
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1

General information

Information of a general nature must be written in the lockout program in order to:

- ▲ identify the program's objectives
- ▲ follow the evolution of the program
- ▲ designate the people who are responsible for it



General information

1.1	Determine the objectives of the lockout program.			
1.2	Specify whether the lockout program is supported by a general company policy.			
1.3	Indicate the measures to be applied when an employee does not comply with the guidelines of the lockout program.			
1.4	Mention the regulatory obligations and the rules of practice that apply to your company regarding lockout.			
1.5	Supply a glossary of the terms used.			
1.6	Enter the names and duties of the writers of the lockout program.			
1.7	Specify the approval date of the lockout program.			
1.8	Specify the updating date of the lockout program.			
1.9	After each update of the lockout program, indicate the most recent changes that have been made to it.			
1.10	Have the lockout program signed by the people responsible for it (e.g., management, workers, etc.).			

NOTES

2

Roles and responsibilities

A lockout program's implementation, effectiveness and pursuance are first and foremost the responsibility of the manager of the company where the work is being carried out.

However, during its application, the lockout-related roles and responsibilities are divided between several groups of people:

- ▲ company manager
- ▲ supervisors of operations
- ▲ facilitators
- ▲ authorized individuals



Roles and responsibilities

Company manager				
2.1	Ensure that the lockout program is correctly developed and applied.			
2.2	Determine, in a general way, the activities and work targeted by the lockout program.			
2.3	Ensure that all the equipment is designed or modified in such a way that all the hazardous energy can be controlled.			
2.4	Supply the lockout hardware.			
2.5	Train and inform the personnel involved about the lockout program and its application.			
2.6	Review and evaluate the conformity of the program, the lockout placards and the application of the placards, periodically and as needed.			
2.7	Manage the nonconformities identified during the program review, the lockout placards and the application of the content of the placards.			
2.8	Designate the groups of employees and determine their responsibilities for complying with the specifications of the lockout program.			
Supervisors of operations				
2.9	Participate in the development and validation of the lockout program and procedures.			
2.10	Ensure the proper application of lockout by the authorized individuals.			
2.11	Ensure that the authorized individuals have the necessary knowledge.			
Lockout facilitators (other designations: coordinator, aide, etc.)				
2.12	Participate in the development of the lockout program and procedures.			
2.13	Coordinate the application of lockout on a daily basis.			
2.14	Manage the storage locations for the lockout hardware.			
Authorized individuals				
2.15	Participate in the development of the lockout procedures.			
2.16	Apply the lockout and return-to-service procedures according to the established rules.			
2.17	Report any problem relating to the implemented procedures.			

Remarks:

The company manager must name people to manage the lockout program.

The responsibilities of these individuals are, for example:

- ▲ to write the lockout program,
- ▲ to review the lockout program,
- ▲ to write, validate and manage the lockout placards,
- ▲ to review the lockout placards and their application,
- ▲ to follow up on the modifications related to lockout and the lockout program,
- ▲ to manage training and communication,
- ▲ to purchase and manage the lockout hardware,
- ▲ to maintain continuity of lockout,
- ▲ the procedure for the return-to-service in the event of absence of the authorized individual who has left his padlock,
- ▲ relations with external service or subcontracting personnel.

NOTES

3

Review of the program

Reviews must be planned at regular intervals and as needed in order to verify the conformity and effectiveness of lockout. These verifications and possible corrections must target:

- ▲ the lockout program
- ▲ the lockout placards
- ▲ the application of these placards



Review of the program

Reviewing the program				
3.1	Establish the means to be implemented in order to monitor, measure and evaluate the elements in the lockout program.			
3.2	Document the results of the review of the lockout program.			
Reviewing the lockout placards and their application				
3.3	Establish the means to be implemented in order to monitor, validate and evaluate the lockout placards as well as their application.			
3.4	Document the results of the review of the lockout placards and their application.			
Managing nonconformities				
3.5	Establish the means to be implemented in order to correct and manage the nonconformities identified during the different reviews.			

NOTES



4

Training

The host company must offer training on its lockout program to the personnel involved.



Training

- | 4.1 | Ensure that all authorized individuals are trained in relation to the requirements of the lockout program. | | | |
|-----|---|--|--|--|
| 4.2 | Adapt the training in relation to the responsibilities and tasks of the person to be trained. | | | |
| 4.3 | Evaluate the participants' understanding at the end of the training. | | | |
| 4.4 | Determine for what reasons and the frequency that retraining is necessary (e.g., following an audit that reveals deficiencies in the application of lockout, during equipment changes, etc.). | | | |
| 4.5 | Evaluate the effectiveness of the training given, and update the content as needed. | | | |
| 4.6 | Document the training activities given within the company (e.g., register of trained personnel, date, evaluations, etc.). | | | |

NOTES

5

Communication

The employees must be informed about lockout in the company. This objective can be coordinated by means of a communication plan.



Communication

- | | | | | |
|-----|--|--|--|--|
| 5.1 | Establish the reasons why communication on lockout is necessary (e.g., the changes made to the lockout program, the incidents that occurred that were related to lockout, feedback, or even the results of the reviews). | | | |
| 5.2 | Determine the means to be implemented for communication on lockout. | | | |
| 5.3 | Target the people to be informed. | | | |

NOTES

6

Hazardous energy sources

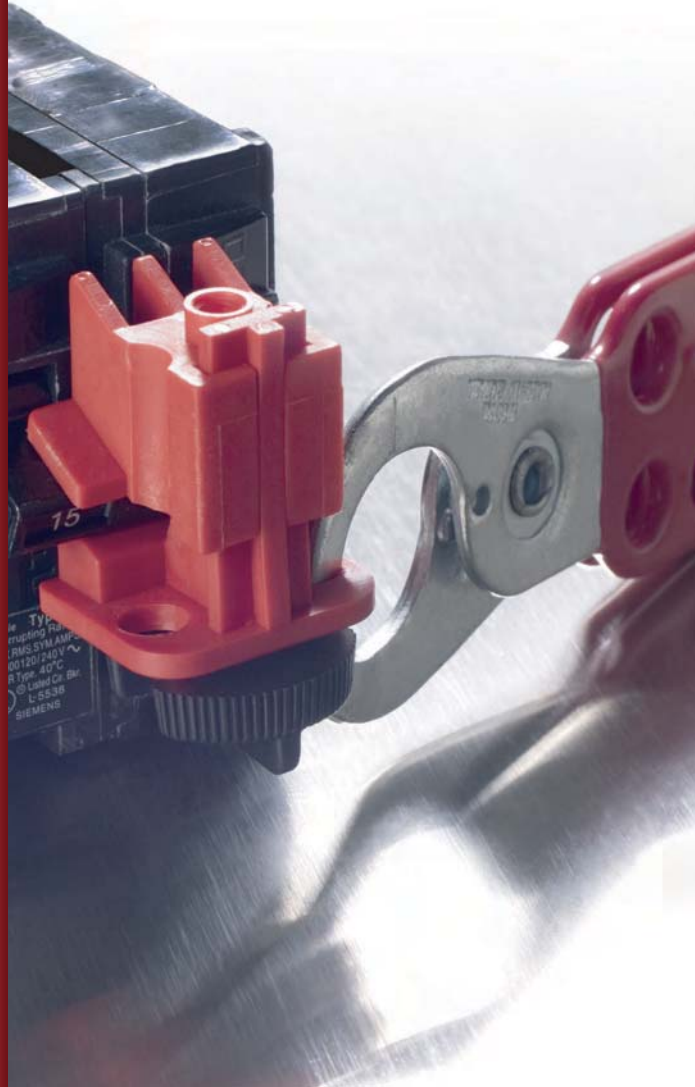
The lockout program must identify, in a general way, all the types of energy present on the equipment that can cause harm to one or more people.



Hazardous energy sources

6.1	Electrical energy, including static.			
6.2	Mechanical energy (e.g., mechanical potential energy [objects at heights, spring] and kinetic energy).			
6.3	Hydraulic energy (e.g., accumulator, fluid under pressure).			
6.4	Pneumatic energy (e.g., gas, compressed air, vacuum).			
6.5	Chemical energy (e.g., toxic, contaminants, flammable products).			
6.6	Thermal energy (e.g., convection, conduction, radiation).			
6.7	Radiation (e.g., nuclear and radioactive energies, electromagnetic waves).			
6.8	Combination of energy (e.g., vapour).			
6.9	Other energies (e.g., wind, extreme noises).			

NOTES



Equipment design characteristics

All equipment must be designed or modified in order to allow lockout to be applied.

These design requirements involve both manufacturers and company managers.

Equipment design characteristics

7.1	Ensure that all sources of energy present in a piece of equipment and that are hazardous can be shut off.			
7.2	Ensure that all sources of energy present in a piece of equipment and that are hazardous can be isolated.			
7.3	Ensure that all sources of energy that accumulate in a piece of equipment and that are hazardous can be dissipated or blocked.			
7.4	Ensure that all the cutoff, isolation, dissipation and blocking points are: <ul style="list-style-type: none"> ▲ coded in a uniform way in the entire establishment, ▲ able to be locked out, ▲ distinctive and accessible, ▲ in positions of state (open, closed) visible by means of an indicator. 			
7.5	When equipment is purchased, ensure that its design characteristics allow lockout to be performed.			

Remarks:

Making adaptations to equipment by taking into account the lockout procedures that will be applied can greatly facilitate the application of lockout (e.g., installing a device to simultaneously activate the switches for several electrical motors).

NOTES

8

Lockout hardware

The lockout hardware supplied by the host company includes all the equipment necessary for lockout to be applied, mainly including:

- ▲ lockout devices (e.g., personal padlocks, keys, etc.)
- ▲ accessories (e.g., lockout box, lockout jaw, hasp, valve cover, chain, etc.)
- ▲ the means of information to be associated with the lockout devices (e.g., tag, coding, etc.)
- ▲ the means for tracing the history of the lockout work



Lockout hardware

- | | | | | |
|-----|---|--|--|--|
| 8.1 | Organize access to all of the lockout hardware (e.g., lockout station). | | | |
| 8.2 | Provide distinctive lockout hardware adapted to the conditions to which it will be exposed. | | | |
| 8.3 | Supply personalized padlocks. | | | |
| 8.4 | Provide means of information that will be associated with the lockout hardware, as needed (e.g., tag, coding, etc.). | | | |
| 8.5 | Provide a register for the lockout hardware (e.g., list of padlocks, keys, numbers, etc.). | | | |
| 8.6 | Implement the means for tracing the history of the lockout work (e.g., archiving of placards after use, register, results of the lockout application review, etc.) and define their retention period. | | | |

NOTES

9

Lockout hardware utilization principles

Some basic rules must be respected during the use of the lockout hardware in order to ensure the safety of the participants.

The use of a lockout device on a control system is not considered as lockout. A combination lock should not be used.



Lockout hardware utilization principles

Basic rules for all authorized individuals

- | | | | | |
|-----|--|--|--|--|
| 9.1 | Use the padlocks that have been assigned to you and associate them with a means of information, as needed. | | | |
| 9.2 | Ensure that other employees can install their padlocks on the isolating devices by means of a hasp, or an equivalent means, as soon as there is only one hole available. | | | |
| 9.3 | Ensure your own safety by installing your own personal padlocks. | | | |
| 9.4 | Ensure that the key for your own personal padlock remains in your possession. | | | |
| 9.5 | Authorize only the person who has installed his personal padlock to remove it. | | | |

Rules of a general nature

- | | | | | |
|-----|--|--|--|--|
| 9.6 | Specify that lockout must be achieved by means of a solid mechanical device such as a padlock (a means of information alone does not constitute a lockout device). | | | |
| 9.7 | Reserve the use of the lockout hardware solely for lockout. | | | |
| 9.8 | Keep the register of the lockout hardware that is in use in the establishment up to date. | | | |

Remarks:

Only one key per padlock

The basic principle for the use of padlocks is:

- ▲ One padlock, with a single key, for one authorized individual.

Or even:

- ▲ A series of padlocks, with the same lock and a single key, for one authorized individual.

NOTES

10

Targeted activities and work

Lockout applies during any work where there is a risk of energy being released that can have negative consequences on the well-being of the workers in contact with this equipment.



Targeted activities and work

10.1	Maintenance (e.g., servicing, cleaning, lubrication, etc.).			
10.2	Repair.			
10.3	Unjamming.			
10.4	Installation and removal (e.g., erecting, assembly, setting up, construction, dismantling, demolition, modification, replacement, etc.).			
10.5	Adjustment (setting), and tuning.			
10.6	Troubleshooting (e.g., verification, investigative work and fault finding, etc.).			
10.7	Stoppage (e.g., shutdown for stocking, production stoppage, prolonged stoppage, etc.).			
10.8	Inspection of the equipment.			
10.9	Other.			

NOTES



General lockout procedure

The aim of this section is to propose a general sequence on which the lockout procedure for each task will be developed.

Generally, the steps follow one another as described in the table opposite. However, there can be other specific measures to be considered, depending on the task, the equipment and the immediate surroundings.

General lockout procedure

Sequence of steps			
11.1	Issue a work order, or the equivalent, which determines the task, and the equipment to be locked out.		
11.2	Read the lockout placard associated with the task to be performed.		
11.3	Determine the necessary lockout hardware by referring to the lockout placard.		
11.4	Identify the equipment targeted by lockout, and inform the personnel (including the operator).		
11.5	Delimit, if necessary, the location of the work to be performed by erecting a safety perimeter.		
11.6	Shut down the equipment according to the usual safety methods.		
11.7	Isolate the hazardous energy sources (e.g., opening the electrical switches, dosing a valve, etc.).		
11.8	Apply locks (e.g., padlocks) to the energy isolating devices and, if required, establish a means of information.		
11.9	Dissipate, confine and block the residual energies.		
11.10	Apply locks (e.g., padlocks) to the dissipating, confining and blocking devices for the residual energies and, if required, establish a means of information.		
11.11	Verify the absence of energy by using the most reliable and safest means possible (e.g., start-up test).		

Remarks:

Precautions must be taken regarding electrical energy. Only people qualified to operate the electrical equipment can carry out the isolation step for this energy. These qualifications will mainly depend on the voltage present.

Reminders:

- ▲ Low voltage [30 V - 750 V] / High voltage [> 750 V].
- ▲ The precautions to be taken when a switch is opened are presented in the *Lockout* document of the Industrial Accident Prevention Association (IAPA):
 “Remember when disconnecting switches stand clear of the box, to one side, and face away while operating the switch with your left hand. This is to minimize risk of injury should the switch explode due to arcing. When opening the main disconnect, a quick step to the right should be taken, as the knives disengage or when closing the main disconnect, the knives engage.
 If the machine is of a different configuration with the disconnect switch on the opposite side, reverse your position and use your right hand to operate the switch. Any difficulties should be reported to supervision.”

NOTES



12

Locking out equipment in the immediate surroundings

A lockout procedure may involve several pieces of equipment. Depending on the task to be carried out, the equipment in the immediate surroundings can also be a source of danger.



Locking out equipment in the immediate surroundings

12.1 When a lockout procedure related to a task is being developed, take into consideration the equipment present in the immediate surroundings.

Remarks :

Examples of lockout of equipment in the immediate surroundings:

- ▲ The lockout of production equipment associated with input and output conveyors:
To ensure worker safety during work on the equipment to be locked out, the conveyors upstream and downstream must also be locked out.
- ▲ Changing of ballast in a workshop where there is an overhead crane:
If, when ballast is being changed, the overhead crane can hit the worker, he must then apply the lockout procedure for the overhead crane, in addition to controlling the energies related to ballast changing.

NOTES

13

General return-to-service procedure

A return-to-service procedure, or unlocking, is the logical next step to the lockout procedure.

The aim of this section is to propose a general sequence on which the return-to-service procedures will be developed.

Generally, the steps will be in the reverse order to the lockout procedure. However, there may be other specific measures to be considered, depending on the task, the equipment and the immediate surroundings.



General return-to-service procedure

- | | | | | |
|------|---|--|--|--|
| 13.1 | Inform the designated person (e.g., operator) about the intention to return the equipment to service. | | | |
| 13.2 | Read the lockout placard that contains the return-to-service procedure. | | | |
| 13.3 | Check that no one is near or in the equipment danger zones. | | | |
| 13.4 | Check whether the work has in fact been completed and whether the guards have been put back in position. | | | |
| 13.5 | Ensure that the padlocks have been removed by each of the authorized individuals who worked on the equipment. | | | |
| 13.6 | Reenergize the equipment in accordance with the established instructions. | | | |
| 13.7 | Ensure that the equipment has been returned to service and its proper operation verified by the designated person (e.g., operator). | | | |

NOTES



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14

General lockout placards

The program must propose a basic structure on which the lockout placards will be developed.



General lockout placards

- | | | | | |
|------|--|--|--|--|
| 14.1 | Plan for a lockout placard for each task to be performed (several tasks can be grouped on the same placard). | | | |
| 14.2 | Ensure that each placard complies with the lockout program. | | | |
| 14.3 | Ensure that the placards are easily understandable by the users (e.g., diagrams, photographs, etc.). | | | |
| 14.4 | Validate the lockout placards before their first use. | | | |

Content of a lockout placard

- | | | | | |
|------|--|--|--|--|
| 14.5 | Ensure that each placard contains, if required: | | | |
| | ▲ a distinct identification code, | | | |
| | ▲ identification and location of the equipment to be locked out, | | | |
| | ▲ the list of the energy isolating devices and the corresponding lockout points | | | |
| | ▲ the list of the necessary lockout hardware and the total number of elements to use, | | | |
| | ▲ the list of personal and collective protective equipment (e.g., falls from heights, confined space, etc.), | | | |
| | ▲ the sequence of the equipment lockout procedure, | | | |
| | ▲ the sequence of the equipment return-to-service procedure, if necessary, | | | |
| | ▲ the specifications regarding the procedures for verifying the isolation of energy sources, | | | |
| | ▲ a means for following the state of advancement of the procedure, | | | |
| | ▲ a section for the authorized individual to enter information, | | | |
| | ▲ a section for the authorized individual to sign the lockout placard, | | | |
| | ▲ the name of the person who validated the placard before its first use and the validation date, | | | |
| | ▲ the revision dates. | | | |

Remarks:

Certain points detailed in part 14.5 apply to mobile lockout placards. These "mobile" placards are placards that must be collected, completed and returned to the individuals in charge of lockout.

However, other types of lockout placards exist, namely the fixed placards installed directly on the equipment.

NOTES

15

Continuity of lockout

Continuity of lockout must be ensured at all times. The situations for which it must be planned are, for example:

- ▲ changes in shift of the authorized individuals involved
- ▲ lockout work lasting several days
- ▲ work in which the authorized individuals involved change during the same work shift



Continuity of lockout

- | | | | | |
|------|--|--|--|--|
| 15.1 | Determine the situations in which continuity of lockout must be ensured. | | | |
| 15.2 | Describe the method and means to be implemented to ensure continuity during these situations (e.g., department padlock, means of information). | | | |

Remarks:

1. One method consists of ensuring continuity of lockout by means of a supervisor of operations who places a department padlock on each of the lockout devices or on the lockout boxes until the work has been completed. Nevertheless, this method does not rule out the fact that each person involved in the lockout procedure must place his own padlock and do his own verifications.
2. Another method consists of placing coded seals on the lockout boxes, with their number or identification written on the lockout placard. Thus, continuity of lockout continues to be valid, as long as the numbered seal is on the box.

NOTES

16

Case of absence of the authorized individual

A procedure must be planned for the safe removal of the lockout devices in the absence of the authorized individual who installed them.



Case of absence of the authorized individual

16.1 Determine the circumstances that require the application of the procedure for removal of the lockout device in the absence of the authorized individual.

The procedure may specify that you must:

16.2 Attempt to communicate using all possible means with the authorized individual who has forgotten his padlock and, insofar as possible, have him return to the workplace.

In the case where the person cannot return:

16.3 Recover the related lockout placard and follow the required instructions.

16.4 Inspect the equipment before returning the equipment to service.

16.5 Ask for a witness to be present when the lockout devices are removed.

16.6 Have the designated person fill out a report planned for this purpose in order to maintain a written trail of the removal of the lockout device.

16.7 Communicate with the authorized individual involved after the removal of the device and, if possible, before his return to work.

Remarks:

Regardless of the method chosen for removing the padlock forgotten by an authorized individual, the important thing is that its implementation must be clearly defined and rigorously managed.

NOTES



External service or subcontracting personnel

If the external service or subcontracting personnel are exposed to risks related to energy control, the host company will have to inform them and establish with them the measures to be taken.

External service or subcontracting personnel

17.1	Define the role and responsibilities of the host company and external services/subcontractors regarding lockout.			
17.2	Establish coherence and dovetailing between the programs of the host company and that of the external service or subcontracting personnel.			
17.3	Know the designated representative of the subcontractor, or the external service, and warn him of any hazard to which his personnel could be exposed (e.g., using the host company's lockout placards).			
17.4	Before the work starts, validate the competence of the external service or subcontracting personnel regarding the lockout procedures (e.g., training, examination...).			
17.5	Ensure that the equipment used by the external service or subcontracting personnel has identification planned for this purpose.			
17.6	Establish a communication plan between the host company and the external service or subcontractor.			

NOTES

Glossary

Able to be locked out: Possibility of placing a padlock when the isolating device is in a cutoff, dissipation or blocking position.

Accessible: That allows easy access from the workstation, without going through narrow spaces, between piles of material, behind or between equipment.

Activity and work: All of the human actions and operations with a determined goal (more general than task).

Authorized individual: Person who is qualified to engage in hazardous energy control because of his knowledge, training and experience, and has been assigned to engage in such control.

Coded: Identified according to a logical organization. For example, energy isolating devices can be coded by numbering them according to their location and the type of energy with which they are associated.

Company manager: Person in charge of the personnel and the place where the work is being carried out.

Continuity of lockout: The uninterrupted presence of the padlocks on the isolating devices, including the energy source dissipation and blocking devices, from the beginning to the end of the work.

Distinctive: Easily identifiable by colour, shape, a sign and other permanent means.

Energy: Work carried out by a force. This force can be of diverse origin: mechanical, electrical, hydraulic, pneumatic, chemical, thermal, radiant, etc.

Energy-isolating device: Mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: manually operated electrical circuit breaker, disconnect switches, line valves, blocks and other devices used to block, dissipate or isolate energy (push-button selector switches and other control-type devices are not energy-isolating devices).

Equipment: To make the text easier to read, equipment encompasses the terms machine, installation, tool and process.

Guard: Physical barrier that prevents access to areas of a machine, equipment or a process where a hazard exists.

Hardware register: Document in which the lockout hardware and its characteristics are listed.

Hazard: Potential source of physical injury or damage to health.

Host company: Owners of the facilities or manager of the establishment where the work is done.

Intervention zone: Space where an authorized individual operates. The limits of this space are defined according to the impact that the neighbouring hazards can have on the authorized individual. These limits dictate whether the equipment in the immediate surroundings must be locked out in addition to the equipment on which the authorized individual will work.

Lockout: All of the actions that allow, in accordance with an established procedure, the energies present in the intervention zone to be controlled, such that a release of energy is impossible during the work. This hazardous energy control is achieved through a sequence of actions: shutting down the equipment, isolating the hazardous energy sources, applying identified padlocks to the energy isolating devices, dissipating or blocking the accumulated energies, and verifying the absence of energy on the equipment.

The release of energy in returning the equipment to service must be the result of voluntary actions, according to an established procedure, by each of the authorized individuals involved. This method of prevention is guided in its entirety by a program.

Lockout accessory: Element used with a lockout device (e.g., hasp, lockout box, valve cover, chain, etc.).

Lockout device: Element used to maintain an isolating device for energy sources in a position that prevents the presence of energy in the intervention zone (e.g., padlock).

Lockout facilitator: Designated authorized individual who possesses the necessary competency to ensure that lockout is properly organized and carried out in the company (other possible designations: coordinator, aide, assistant, etc.).

Lockout hardware: Any material element that is useful during the application of lockout, including lockout devices, accessories, means of information, means for following the history of the procedures applied, hardware register and others.

Lockout placard (and return-to-service placard): Placard related to a task that contains all the necessary information for the application of lockout. It mainly describes the procedures to be followed regarding lockout and a return to service.

Lockout procedure: Sequence of steps to be carried out to control a piece of equipment's hazardous energies.

Lockout program: Written document that establishes a company's complete lockout policy.

Means for following the history of the lockout work: Element or method that allows the history of the application of the lockout procedures to be tracked.

Means of information: Element used together with the application of a lockout device that indicates, as needed, the nature, purpose and time of lockout as well as the identity of the authorized individual involved.

Operator: Person responsible for operating a piece of equipment or components of a piece of equipment.

Personnel from an external service: Personnel from a department or an establishment other than that in which the work is being carried out.

Retraining: Additional training in order to maintain an appropriate knowledge level.

Review of the lockout placards and their application: Evaluation, at regular intervals, of the compliance, effectiveness and application of the lockout placards and the established lockout procedures.

Review of the lockout program: Evaluation, at regular intervals, of the conformity and effectiveness of each element in the program.

Risk assessment: a comprehensive evaluation of the probability and degree of possible injury or damage to health in a hazardous situation, undertaken to select appropriate safeguards.

Subcontractor: Person (or groups of people), employed by a third company, who is (are) responsible for part of the work contracted out by the host company.

Supervisor of operations: Person who directs, guides and validates work, an activity.

Task: Specific activities carried out by one or more people on one or more pieces of equipment.

Training: Instruction given to an employee; this instruction provides him with the knowledge and competency necessary for carrying out his regular duties.

Valve cover: Lockout accessory that covers the valve actuation mechanism.

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