Date of printing: 10. 12. 2024

Scope of validity:
ORLEN Unipetrol RPA s.r.o. (without branches)

BASIC REQUIREMENTS FOR THE IMPLEMENTATION OF THE LOCKING AND TAGGING SYSTEM - LOTO

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Valid from:	14/06/2024
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List of changes

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Notice: The change management of this document is carried out according to Directive 821.

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1 Purpose

This document describes general procedures of securing systems of hazardous energy before servicing and / or maintenance of machinery and equipment, where unexpected introduction of energy and / or release of stored energy and / or start-up of machinery and equipment could damage the health of employees and other service/maintenance personnel. The implementation of the LOTO system is based on the SAFETY program + the ORLEN capital group and ensures the implementation of Standard 2 of the Safe separation of energy sources. This document was elaborated for the purpose of a general description of the LOTO system and its easier implementation into the ORLEN Unipetrol RPA s.r.o. Company (without branch plants).

The reason for the application of the LOTO system are cases of extraordinary events, or rather serious and fatal accidents at work around the world and the application of modern safe procedures for the prevention of emergencies.

Any violation of the Directive may result in penalties and claims for damages, even for damage to the health of employees, in accordance with statutory provisions.

2 Scope of Validity

The Document is valid in the following marked companies/branches:

☒ ORLEN Unipetrol RPA s.r.o. ☐ BENZINA, odštěpný závod

☐ POLYMER INSTITUTE BRNO, odštěpný závod

The issue replaces Directive 416 „Basic requirements for the implementation of the locking and labelling system - LOTO“, 1st issue of 13/04/2020.

The document applies in full to units where the implementation of the LOTO system has already been implemented, it applies to a corresponding extent to other units according to the degree of implementation. With regards to the units where the implementation of the LOTO system is still in plan, it applies to the security of hazardous energy before servicing and maintenance of machines and equipment, the relevant internal regulations, work procedures, manuals, standards, etc. apply to. (e.g. work permission directives, sealing plans).

This document is binding for all employees and external persons who are entrusted with the operation and maintenance of operating equipment and are lawfully present or perform work activities on the basis of the relevant contract or one-time order for the Company.

The Directive is available to employees of other organisations (contractors and subcontractors) at: http://www.unipetrolrpa.cz/CS/sluzby-areal/chempark-zaluzi/Stranky/zavazne-normy-a-informace.aspx

3 Terms, Definitions and Abbreviations

Authorized person	A qualified person who disconnects, secures and locks the equipment. These are usually the operator and the electrician. This person must be trained and be able to use LOTO elements correctly. There must always be only one authorized person (operator) for one work on the equipment, who organizes the shutdown process. Only an authorized person can lock, unlock and otherwise manipulate the isolation points and the prescribed signing.
Lock-Out	Locating the locking mechanism on the energy isolation point (e.g. valve, switch, etc.) in accordance with the established procedure that ensures that the isolation point and the isolated machine /

	equipment cannot be put into operation until the locking mechanism is removed.
LOTO box	Lockable box, for storing the keys to the locks used to secure power from one device.
LOTO instructions	Written instructions (supplemented by photographs) for securing the machine / equipment, which is part of the controlled operating documentation. See Annex A for a model.
LOTO element / aid	Enables locking of the isolation points; the most commonly used elements are cable closures.
LOTO station	A place where LOTO elements, locks and tags are stored.
Master key	A key that can be used to open each lock used in the LOTO procedure
ZES	Zero energy state - no kind of energy enters the device.
The affected person	Any person working on or near the equipment during work.
Tag-Out	Placing the sign on the energy isolation point (e.g. valve, switch, etc.) in accordance with the established procedure to indicate that the energy isolation point and the isolated machine / equipment must not be put into operation until this sign has been removed.
Work permission	A set of technical and organizational measures for securing the equipment before repair / service / maintenance specified by means of binding forms indicated in the regulation of the work permission system.
UNIRPA / Company	ORLEN Unipetrol RPA s.r.o. (without branches)
UBEZ	Health & Safety Division
Tag	The tag identifies the affected employee who placed the lock on the latch or LOTO box. Alternatively, it is a label of the isolation point if the locking mechanism cannot be used to disconnect it.

4 LOTO

4.1 Implementation

The relevant directors are responsible for the implementation of the LOTO system, including the provision of financial resources for implementation (operating expenses - OPEX), inspection and evaluation of implementation. In the case of using the services of an external supplier for the implementation of the system, the work contract for the given operation is created in cooperation with the UBEZ and the Purchasing Department.

UBEZ is responsible for methodical supervision of the implementation of the LOTO system.

When modernizing or building new equipment, such a design is required that allows the isolation points of hazardous energies to be locked directly by a lock or an available LOTO component.

4.2 Procedures / specifications

When repairing / setting / adjusting / maintaining and cleaning machines and equipment, there are often situations where it is necessary to disconnect supplies of hazardous energies in order to carry out work on the equipment safely so that persons working on the machine / equipment are not endangered by these energies. In each such case, it is necessary

to secure all of these energies through an appropriate procedure of separation and ensuring separation. The LOTO system is a part of mechanical and electrical security.

LOTO must always be used if a LOTO instruction has been created for the device, see Chap. 4.12.3.

If the instruction is not created or if it is not possible to shut down the equipment exactly as instructed, this information shall be entered in the Work Permission form and appropriate risk minimization measures shall be established.

4.3 Identification of hazardous energies

It is necessary to identify and secure various types of hazardous energy as part of the LOTO system:

1) electric,
2) gravitational,
3) hydraulic,
4) chemical,
5) mechanical,
6) pneumatic,
7) thermal,
8) radiation,
9) other.

4.4 General procedures for locking isolation points

Switches / fittings / flanges (isolation points of hazardous energies) must be locked either directly with a lock or a suitable LOTO element must be used. If no LOTO element or other locking method can be used, it is necessary to use a tag (sign) and fasten it with a cable tie as close as possible to the isolation point (switch, fitting, etc.).

4.4.1 Locking of isolation points by one person

In case one person needs to lock one or more isolation points, he/she takes the required number of locks and LOTO elements and locks the isolation points.

4.4.2 Locking the isolation points by more than one person

If more than one person is working on the device and it is necessary to lock only one isolation point, a latch can be attached to the valve or the main switch, or the LOTO element, which will be locked by all persons working on the device. If it is not possible / suitable to use the latch, a LOTO box must be used.

4.4.3 Locking multiple isolation points by multiple people

A LOTO box is used to lock more isolation points. The keys to all locks that lock the isolation points (fittings / main switches) are stored in the LOTO box and the LOTO box is locked by an authorized person. The LOTO box is then ready and can be locked with a lock by all persons working on the device - if there is at least one lock on the LOTO box, the LOTO box cannot be opened.

4.5 Persons (roles) in the LOTO system

4.5.1 Authorized persons

Qualified persons who disconnect, secure, lock, verify and reconnect machines / equipment. These are usually the operator and the electrician. This person must be trained and be able to use LOTO elements correctly.

Only an authorized person can lock, unlock and otherwise manipulate with the isolation points.

4.5.2 Affected persons

Persons who may be involved in repairing, setting, adjusting, maintaining and cleaning. They come to work on the machine/equipment when it is already separate and safe and only place their lock on the LOTO box or latch. These are also external persons.

4.5.3 Other persons

These are persons who do not participate in repairing, setting, adjusting, maintaining and cleaning, or in the securing of machinery/equipment. These persons must not manipulate with the LOTO elements or locks.

4.6 Isolation point

The isolation points mentioned in the instructions for the specific device are, in the case of all energies except electrical, tagged by a red metal sign with the name of the device and a description of the isolation point. The physically attached sign, attached by a stainless steel tape, clearly identifies the machine/equipment designation and the isolation point designation and reduces the risk of mishandling when preparing the equipment for repairing, setting, adjusting, maintaining and cleaning.

If it is necessary to temporarily remove the tagging of the isolation point from the device, the authorized person (operator) must keep the sign and then place it back on the device at its original place. If a fallen label is found, it is necessary to proceed according to its back side and take the label to the designated building. The representative of the operation then places the sign back on the described isolation point.

4.7 LOTO elements

To secure the isolation points (fittings / main switches / circuit breakers) that cannot be locked directly by a lock against unintentional tampering, it is necessary to use the appropriate LOTO element and lock it with a lock.

4.7.1 Cable lock

This is a universal element that should be used to lock most fittings.

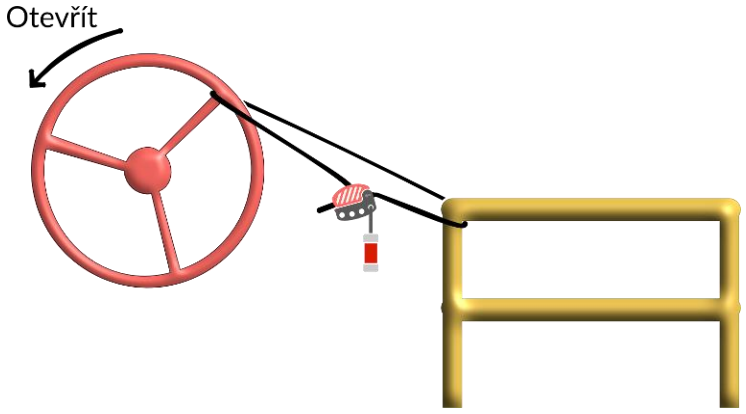


Figure 1: ideal use of cable lock

If the cable lock cannot be used easily, it is possible to drill a hole in the valve lever and pass the cable through it. If the hole is not drilled, then a circuit breaker securing element can be used to hold the cable.

4.7.2 Pin-in, pin-out

LOTO elements that can be used to secure a pole circuit breaker - almost all types. The universal type can always be used, but it is necessary to screw, while the second type is easier to use, but cannot always be used.

Figure 2: universal type (left) and the second type easier to use

4.7.3 Plastic moulding

The plastic moulding can only be used for motor protection.

Figure 3: plastic moulding

4.7.4 Folding closure

It can be used on a wide range of fittings - but it is necessary to choose the right size.

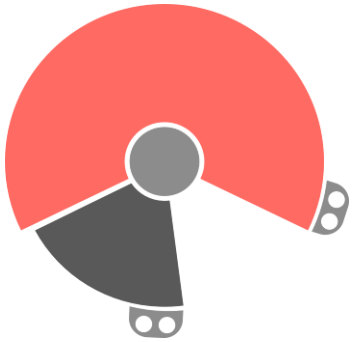


Figure 4: folding closure

4.7.5 Element for securing circuit breakers

This element can be used on pole circuit breakers with a large switch. If necessary, it can be used to create an eye for the use of a cable lock.

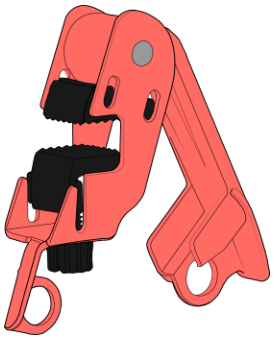


Figure 5: element for securing circuit breakers

4.7.6 Flange securing element

This element can be used on flanges to secure the plug between the flanges. It ensures that the plugs cannot be removed unintentionally.

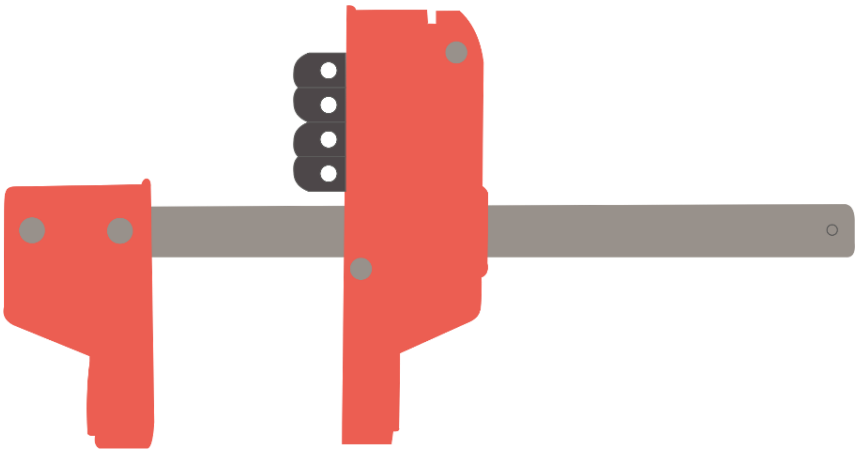


Figure 6: element for securing the plug between the flanges

4.7.7 Insulating plug and screwdriver

This element is mounted in place of a ceramic fuse in the cabinets with the help of a special screwdriver.

Figure 7: insulating plug and screwdriver

4.8 Use of locks

4.8.1 Locks, keys and tags

Authorized persons and affected persons have their locks, keys and tags. The issuer of the work permission will lend the locks (black), keys and tags to external persons working on the company's premises only once, directly at the place where the work permission is issued. A lock with a tag or a tagged lock is used to clearly identify the person who locked the lock. The rule of **one lock per one key** applies to locking isolation points.

4.8.2 Colours and locks labelling

For locking in the LOTO system, colour- and text-marked locks are used, see Appendix C.

Table 1 – Colours of locks and their meaning

Red locks		used by operators (authorized persons) for their own security of non-electric energy. These are single key locks.
Yellow locks		used by electricians (authorized persons) for their own security of electricity. These are single key locks.
Green locks		used by issuer of permission (authorized persons) for locking LOTO boxes. It is a set of locks with several keys that can open all the locks in the set. The green lock can always be replaced by a red lock - but not the other way around.
Orange locks		used by electricians (affected persons) to lock the LOTO box. These are single key locks.
Purple locks		used by MaR (affected persons) for locking the LOTO box. These are single key locks.
Blue locks		used for machine maintenance (affected persons) for locking the LOTO box. These are single key locks.
Black locks		used by people who do not have their own locks (affected people), for locking the LOTO box. These are single key locks. These may be external companies entering the premises for the first time or other professions that have not received a lock within the LOTO system.

If necessary, it is possible to add other colours of locks, for special purposes, in cooperation with UBEZ.
The locks of authorized persons are sufficiently tagged and it is clear who locked them and who can unlock them, and no tagging is required.

4.8.3 Labelling the lock with a tag

Locks intended for locking LOTO boxes must be supplemented by a tag placed on the lock calliper.

The model used by the Company is shown in Figure 8. A marker is used for filling in, and after finishing the work it is necessary to clean the tag so that it is ready for further use.

This tag can fully replace labelling with a tag reading “Caution – danger! Do not tamper with the equipment!” (see Annex 406/C of Directive No. 406 “Electrical Securing of Equipment for Mechanical Repair” for a model of the tag), drawing attention to the actual condition of the equipment and bearing a tag reading “Caution – danger! Do not tamper with the equipment!” (see Annex 406/C to Directive No. 406 “Electrical Securing of Equipment for Mechanical Repair” for a model of the tag), drawing attention to the actual condition of the equipment, the obligation for which is laid down in Directive No. 407 “Mechanical Securing of Equipment in the Litvínov and Kralupy Refinery Units”.

Figure 8: Tag

4.9 LOTO stations

It is used for clear storage of locks, tags and LOTO elements for securing the device. The best location of the LOTO station is the place where the work permission (WP) is issued and the substation location. Suitable LOTO components and the number of locks are determined during the implementation of the LOTO system according to the specifics of operation.

4.10 Specific situations in the LOTO system

4.10.1 Decommissioned equipment

In the case of a canned (long-term non-operational) equipment or equipment intended for removal, all sources of hazardous energy entering / leaving it must also be separated.

Isolation points on canned equipment or equipment intended for removal may be secured and locked where practicable, especially when working on such equipment. However, the device must always be marked "out of service", "for removal", etc.

In the case of equipment in cold reserve (where this equipment must be ready for immediate start-up), the separation of isolation points does not have to be performed by the LOTO system, except in cases where work is performed on this equipment.

4.10.2 Stop work

In the case of stop work, individual production units and parts must be mechanically secured at least at their boundaries (battery limits), i.e. physically separated (by inserting blanking plugs) from the surrounding technological units.

To reduce the probability of adverse events and increase the safety of workers, equipment or parts of equipment at all inputs and outputs will be additionally blinded for selected types of activities. These are in particular:

- entrances to dangerous areas,
- work with open fire,

- work where other work groups in the area may be affected.

When securing by inserting a blanking plug or when working with securing only with fittings where there is a risk of leakage of a hazardous substance and persons may be endangered, the closing device must be doubled.

Electrical protection is necessary in the following cases:

- The device is driven by an electric motor (e.g. rotary machines) and it is necessary to ensure that during the work performed there is no spontaneous start, or start by remote or local switch.
- Work directly on electrical equipment (LV and HV), where there is a risk of electric shock.

4.10.3 Removal of the tag indicating the isolation point

In case of a situation where the device that serves as an identified isolation point (fittings, etc.) is dismantled from the position, for example, for inspection, repair or replacement, it is necessary to temporarily remove the red metal tag. The authorized person must keep the removed tags in a safe place so that the tags can be re-installed when the separation device is returned.

4.10.4 Unlocking the lock

If it is necessary (e.g. for operational reasons, loss of key, etc.) to unlock the locked lock, the following points must be followed:

- Contact the person who locked the lock on the LOTO box - according to the information on the tag / lock:
  - Ask the person to end their work and unlock their lock.
  - Notify the person who locked the lock that the lock will be unlocked/removed.
  - In both cases, it is therefore not possible to perform the work for which the lock was locked and can be continued only after approval of the issuer of the work permission and re-locking of the lock (including ZES verification).
- Inspect the equipment and make sure / no one is working on it.
- Remove the lock. If it is a master-keyed system, the lock can be unlocked with the master-key.

4.10.5 Removing the lock

If the system is a master-keyed system, the lock can be unlocked with a master key.

Securing only by tagging.
For some types of equipment (fuse-switch-disconnectors), which cannot be safely secured and locked with a lock, it is always necessary to use tags. For these types of devices, a replacement for a type of device equipped with locking elements is recommended.

Tags are a warning tool, they are attached to the isolation point. Tags do not provide a physical barrier against releasing / activating energy and are therefore not as effective as locking.

If the tag is hung, it means that it must not be removed by anyone other than the authorized person who placed the tag (or replaced the original authorized person). The location of the tags must be unambiguous and understandable for all. The presence of the tag does not replace the use of warning signs (e.g. "Work is carried out on the device"; "Out of service", etc.).

4.10.6 Fittings with pneumatic or electric drive

If this type of valve is an identified isolation point, it is recommended to disconnect it from the drive source, but it is not necessary to lock it. Locking it using available equipment and technical knowledge would be very complicated.

4.10.7 Device with plug and mains cable

The device is secured when the plug is unplugged from the power cord and is under the constant supervision of the worker involved in the work or a LOTO element is used to lock the plug. Pulling out this plug will disconnect it from the electricity - the condition for safe securing is that the only dangerous energy on the device is electricity (supplied by the cable with the plug).

4.10.8 Work on the device without disconnection from hazardous energies

Work on non-separated parts of the device is only permitted in specific cases:

a) Diagnosis and troubleshooting - only the parts that are examined may stay not disconnected. If work on the device continues, the device must be disconnected and secured after diagnostics.

b) In case of emergency situations - if there is an urgent danger of delay due to an emergency situation, when in the interest of safety and health of persons, protection of the environment or property or operational resumption of production, security without immediate use of the LOTO system must be accepted - all known safety measures to minimize risks to human health must be accepted.

4.11 Master key

The existence, handling and control of its use is the responsibility of the relevant head of the operating unit.

The relevant head of the operating unit may delegate their responsibilities for the use of the master key to a designated person. This person must be designated using Annex G. The completed designation must be sent to the head of the process security.

The master key must not be freely accessible (it is recommended that it should be placed in lockable security lockers in an appropriate place designated by the head of the operating unit).

4.11.1 Rules for the use of the master key

- It may only be used in exceptional situations (e.g. loss of a key).
- Its use is only permitted with the approval of the relevant head of the operating unit or a designated person.
- Its use is only permitted by authorized persons.
- It may only be used under the condition that the affected persons are not put in danger.
- All handling must be recorded and a record of its use must be kept with the master key.

If all the requirements laid down in 4.10.4 are not met, the use of the master key shall be prohibited.

4.12 LOTO documentation

4.12.1 List of equipment

Each operation must have a compiled list of equipment that must be disconnected and secured and defined how. This list identifies all devices for which a LOTO instruction with all isolation points must be processed.

4.12.2 List of isolation points

Each operation must have an updated list of identified (tagged) isolation points.

4.12.3 LOTO instructions

The LOTO instruction is a document that is accessible to all participants at the workplace.

The rules in the instruction set out how a particular device is brought into a safe state with zero energy and how it is ensured that it remains in this state.

Simple devices, in which electricity is the only source of hazardous energy, can be processed by general instructions for all these devices within one type.

In the case of securing energy sources using blanking plugs (or end caps) for flange joints, a blanking plug plan must be maintained. A blanking plan may be included in this instruction.

Instruction content:

a) A description of the activities or isolation sites, including the manner and procedure by which the equipment is isolated.
b) Description of the energy that is isolated.
c) Unique identification of the isolation point (s).
d) Method of securing the isolation point (s).
e) Alerts to device elements that remain connected to backup sources and are active during separation.
f) Identification of possible energy sources where hazardous energy may accumulate and a description of how to release this energy.

For a sample instruction see Annex A of this document. For a detailed description of the instruction see Annex B of this document.

The instructions are designed for the ideal condition of the equipment and do not take into account all the manipulations that need to be performed to secure the equipment if it is not in ideal condition. In the instructions, the separating fittings are always described, and their functionality and tightness are a prerequisite. If, during securing, it is found, for example, that the separating valve is undercut, it is necessary to continue securing so that the device can be safely shut down and prepared for repair / service / maintenance. This can mean closing another fitting or shutting down other equipment.

For devices that are technically identical, it is also possible to process a general instruction. However, isolation points must be specified there.

To secure, for example, the piping of media vessels, a general LOTO instruction can be processed, which describes how to secure the device.

4.12.4 Operational LOTO documentation

Individual operating units ensure the issuance of binding operational and technical documentation, managed and administered in accordance with **Directive 842** *"Operating regulations, operator's manuals and technology cards / regulations"* and **Directive 824** "*Procedures - working, laboratory, and calibration".* This operational and technical documentation contains the general procedures and procedures (LOTO instructions) developed in accordance with point 4.11.3.

5 Application of the LOTO system in ORLEN Unipetrol RPA s.r.o.

5.1 Scheme of system application

The scheme of the system application consists of the following points:

- Identification of energy sources and preparation of equipment
- Separation of equipment from sources of hazardous energy
- Securing and locking isolation points
- Verification of zero energy state (ZES)
- Commencement and execution of work
- End of work
- Reconnection of the machine / equipment
- Hand over of shifts

5.1.1 Identification of energy sources and preparation of equipment

For work on the equipment, the authorized (competent) person must identify the relevant sources of hazardous energy, see 4.3. The authorized person defines the methods / requirements for disconnection and securing (locking) of identified energies (isolation points), the method of releasing residual hazardous energies and the methods of ZES

verification (see further chapters). When preparing the device for repair / service / maintenance, work instructions for locking and tagging are used. These requirements are part of the Work Permission system.

The use of the LOTO system is linked to the Work Permission system in the form of a box in the work permission form, annex, etc. It should be noted that in all cases of disconnecting and securing equipment, which is performed for safe securing of equipment, the disconnection procedure itself may be of high-risk because it involves opening an equipment that contains or has contained hazardous chemicals (toxic, corrosive, extremely or highly flammable, etc.) and / or pressurized substances. Therefore, it is always necessary to take this danger into account before each such work and to provide appropriate measures in the work permission conditions to eliminate and / or reduce the risk to an acceptable level for safe disconnection and securing of the equipment (may be part of the risk analysis).

5.1.2 Separation of equipment from sources of hazardous energy

The authorized person must ensure the separation of all sources of hazardous energy (through identified isolation points) and the removal / release of hazardous energies that may remain accumulated. Energy must be disconnected, released, or suppressed to ensure safe operation.

It is important to make sure that:

- all moving parts of the device have really stopped,
- all raised parts have been lowered to the neutral position or are blocked against unwanted movement,
- the device has been depressurized (measured),
- the electrical potential has been discharged (short circuit), the device has cooled down to an acceptable limit, etc.

Other hazards must not be activated by disconnecting the device.

If there is a possibility of re-accumulation of stored energy to a dangerous level, permanent verification of the ZES must be carried out until the work on the equipment is completed or until such accumulation of stored energy is no longer threatened.

Details on the method of separation and securing are given in Chapter 5.2.

5.1.3 Securing and locking isolation points

After the device has been separated, the authorized person must secure the isolation points against unauthorized manipulation by locking the lock / LOTO element with a lock. The locks must bear the identification of the person who performed the locking. The identification is the colour and text marking of the lock.

An authorized person (operator) separates the equipment from hazardous energy (e.g. by closing the valve, switching off the switch, etc.), or ensures disconnection and locks the isolation points (by locking all hazardous energy by systems with red locks) (except electrical energy at the substation).

If it is necessary to lock the power supply at the substation, the authorized person (electrician) disconnects / switches off the power supply. Energy and locks the yellow isolation points on the substation with yellow locks.

When locking the isolation points, authorized persons (beyond the usual procedures) follow the instructions and this document. The keys to the used locks will be placed by the authorized person (s) in the LOTO box at the place where the work permissions are handed over. This LOTO box is then locked by an authorized person (operator) with a green lock. There are several keys to a set of green locks for individual operations. The issuers of work permissions at work shifts have this key and are able to unlock any LOTO box at their workplace.

Methods of securing and locking the isolation point are in the LOTO instructions. If another isolation point was used during securing, this point must also be tagged and locked.

5.1.4 Zero Energy State Verification (ZES)

After the device has been disconnected, secured and locked, the authorized person will test in an appropriate manner whether the energies (pressure, voltage, speed, presence of media, etc.) have actually been disconnected / separated and these energies are no longer accumulating. The inspection may only be carried out by a person who is familiar with the operation of the device and has the relevant expertise. Work on a device cannot be started without ZES verification!

Examples of ZES verification:

a) pressure indication on pressure gauges or on remote pressure measurement in the control system (CS),
b) level indication on level meters or on remote level measurement in the control system (CS),

c) temperature indication on thermometers or on remote temperature measurement in the control system (CS),
d) control of drain valves / drainage / deaeration / drains - medium does not flow (liquids) or does not blow out (vapours, gases),
e) inspection of flange connections - medium does not leak (liquids) or does not blow out (vapours, gases),
f) pressing all START buttons, drive buttons, verifying start remotely or from another control point, so-called START TEST.

5.1.5 Commencement and execution of work

If there is no residual energy at the verified sites and if all the previous steps are properly performed, the operator of the facility may give consent to start work on the specific device within the scope of the work permission.

The head of the working group carrying out the work on the equipment (the affected person) must be equipped with padlocks. After the preparation of the equipment (separation, or disconnection, securing, tagging, verification of the state without dangerous energy) by an authorized person, the head of the working group will lock the LOTO box with own lock. This will ensure the safety of the working group in case of unexpected device unlocking. The group leader is always the holder of a work permission and must not unlock the lock from the LOTO box until the whole working group has finished its work on the device. This means that if the working group (or part of it) is working on the device, the LOTO box is locked. If no one from the work group is working on the device, e.g. an interrupted work permission, the LOTO box is not locked by this working group. In the case of work of several working groups, the above applies to each working group. After the end of the working group's stay at the workplace, their lock must be removed from the isolation points or the LOTO box, optionally the group will ask for the device to be put into operation or for the purposes of a functional test. Storing or removing the keys of the working groups (affected persons) placed on the LOTO box is fully in the competence of the affected person.

The head of the working group of an external company that does not perform regular work at workplaces can borrow a lock with a tag from an authorized person (operator) in the place where the work permission is issued.

During work on the equipment, it may be necessary to temporarily connect a power supply or circuit to change the position or to test the equipment or part of it. In this case, the authorized person may temporarily unlock the necessary energy and (partially) put the equipment into operation. No one may work on the device before starting the functional tests - the LOTO box must be unlocked and the operator must check that no one is working on the device. Persons carrying out functional tests may then start working on the device. At the end of the functional test, the authorized person shall lock all energies according to points 5.1.3 and verify the ZES according to point 5.1.4 and it is possible to continue working on the equipment.

If work on the equipment continues through other shifts, it is necessary to proceed according to point 5.1.8.

5.1.6 End of work

In the event that the work group ends work on the equipment (e.g. at the end of a work shift), the group leader must unlock his lock from the appropriate LOTO box. This can only be done once it is clear that no one in this group is working on the device and everyone has left the workplace.

5.1.7 Reconnect the machine / equipment

After finishing work on the device, the following steps must be performed before starting an operation:

a) workplace inspection - no excess things and clutter (tools, spare parts, etc.) can be left here,
b) equipment inspection - equipment completeness inspection after repair / service / maintenance,
c) no part of the device must be damaged - including barriers and safety features,
d) before removing LOTO elements, all security features must be checked, or fixed,
e) checking that the mechanical and electrical locking elements can be safely removed,
f) removal of all LOTO elements must take place in the correct order,
g) final visual inspection of the workplace - the workplace must be clean and there must be no people in the danger area.

If it is necessary to reconnect the power supply to the equipment before the work on the equipment is completed, it is necessary to inform and notify all persons involved in the work on the equipment and proceed according to point 5.1.5.

Only after meeting the conditions a) - g) can the authorized person reconnect the device. Putting the machine/equipment back into operation is carried out in the prescribed manner (manufacturer's manuals, operational and technical documentation, etc.).

5.1.8 Shifts hand over

If the work on the equipment exceeds the length of one shift, the following rules apply:

- the authorized person becomes the person who replaces the original authorized person on the shift:
  - if a green lock is used to lock the LOTO box, the replacing person has a key from it,
  - if a red lock is used to lock the LOTO box, they must hand over the key;
- the affected person becomes the person who replaces the original affected person on the shift:
  - affected persons who are ending work on the equipment take their lock off the LOTO box,
  - affected persons who are starting work on the equipment put their lock on the LOTO box.

5.2 Methods of separation and securing of equipment

The method and procedure of separation and securing of equipment from individual types of hazardous energy is governed by internal regulations, operating instructions, LOTO instructions and relevant standards and other safety instructions.

A mechanical safety device. It is considered to be secure if:

a) all pipes connected to the dismantled equipment / equipment under repair are separated by a plug on the flange joints, in accordance with the pipe class.

b) The connecting pipes are dismantled and end flanges are installed at the open ends of the equipment under security (e.g. in the case of pump dismantling, etc., it is necessary to install an end plug at the beginning of the discharge and end of the suction pipe). Blinding of the spiral housing of the rotary machine is also acceptable.

c) In exceptional cases, under the conditions set out below, a procedure may be used where the valves at the inlet and outlet of the equipment are closed, or other fittings at other inlets to the device (e.g. heating, flushing, etc.). In this case, all fittings must be in a safe position and secured/ locked and libelled.

In order to be able to safely perform the mechanical locking according to points a) and b) above, the device must be depressurized (with a release valve) before this implementation, or the mechanical security according to point c) must be applied.

The method described in Chapter 5.2 point a) is considered to be reliable and safe securing of the equipment. This method of securing always has priority, regardless of time and cost.

Authorized persons must be acquainted with the use of individual elements for securing the equipment and with the procedures described in the relevant LOTO instructions.

Equipment in which after disconnection from sources of dangerous energy and shutdown all or some parts may move due to positional, residual energy or other causes must be brought into such a position before disconnection and shutdown to avoid subsequent unintentional movement of the equipment or its parts.

Pipelines leading to the work site must be shut down from the operating equipment and secured. The medium (steam, hot water, chemicals, etc.) must not enter it during work. Venting and drainage fittings must be open and connected to the open atmosphere while working on the equipment. Methods of ensuring mechanical separation according to industrial practice are given in Annex E.

An electrical safety device is considered to be secure if:

- all switching devices which have been used to disconnect the electrical equipment for working on it are secured against being switched on again, preferably by locking the mechanism it is equipped with.
- If the device is not lockable, appropriate measures must be taken in accordance with local conditions to prevent it from being switched on again.
- If an auxiliary power supply is used to control the switching device, it must be disconnected.

- If a remote-controlled switching device is used, care must be taken to ensure that it cannot be switched on again.
- Parts of the electrical equipment that remain charged after the mains has been completely disconnected, such as condenser and cables, must be discharged by suitable means.

5.3 Training

Initial training of operations representatives and external persons (users) from the LOTO system application is provided by the contractual supplier (where it is supplied contractually) or by the operation / operation team representative.

Initial training of external persons is carried out by the operation / operation team representative through training of the responsible representative of the external supplier (contractor). The responsible representative shall subsequently train all their staff (including those of their subcontractor). A record of the training (e.g. attendance sheet) must be given by the responsible representative to the operation / operation team representative who shall keep this document stored.

Periodic training is provided by representatives of individual units or UBEZ. The training period is at least once every 3 years.

5.4 Ensuring the functionality of the LOTO system

Ensuring the functionality of the LOTO system can be divided into the duties and activities of representatives of operational teams, operations and representatives of UBEZ.

Responsibilities of the responsible representatives of the operation / operations team:

- Check the status of LOTO elements and locks at least once a month. In particular, the numbers and usability.
- Find out and ensure the needs of LOTO system users - purchase of LOTO components, updating / creation of LOTO instructions, demand for new types of LOTO components, new possibilities of securing, etc, see Annex F.
- Perform a random check of the functionality of the LOTO system.
- Check the correct use of the LOTO system.

Duties of shift managers:

- Perform a random check of the functionality of the LOTO system.
- Check the correct use of the LOTO system.
- Check the tagging of the isolation points.

Duties of UBEZ:

- Methodical guidance in the implementation and use of the LOTO system.
- Checking compliance with LOTO standards.
- Modification of the LOTO methodology.
- Checking the correct use of the LOTO system.

6 Responsibilities

The responsible persons in the individual sections are representatives of operations, representatives of operations teams.

Table 2: Matrix for implementation of the LOTO system in ORLEN Unipetrol RPA s.r.o.

Activity	Unit Director	Purchasing section	UNIRPA Security Division	PKN security department	External contractor / designated employee	Article no.
Approval of implementation strategy	R/A	C	C	I	I	4.1
Securing resources for implementation	R/A	C	C	I		4.1
Implementation initiation	A	R	C	I	I	4.1
Securing the contractual relationship (order, SOD)	A	R	C	I		4.1
Implementation	A		C	I	R	4.1
Creating LOTO documentation	A		C		R	4.11
Inspection of implementation	A		R	R	I	4.1
Evaluation of implementation	R/A		C	I		4.1
Training	A		C	I	R	5.3
Coordination in the PKN capital group		R	C	A	I	1

Notes:
R - RESPONSIBLE „The responsible"
A - ACCOUNTABLE „Bears full blame for non-performance"
C - CONSULT „Included in the process"
I - INFORM „Keep informed"

RACI matrix with comment (according to the Policy of "Efficiency Improvement of Processes and their Optimisation")

Table 3: Matrix of application of the LOTO system when working on the device

Activity	Authorized person	The affected person	External supplier	Security department	Shift manager	Operations Representative / Operations Team	Article no.
Identification of energy sources and preparation of equipment	R/A	I					4.1
Separation of equipment from sources of hazardous energy	R/A	I					4.1
Securing and locking isolation points	R/A	I					4.1
Zero Energy Verification (ZES)	R/A	I					4.1
Commencement and execution of work	A	R					4.1
End of work	A	R					4.11
Reconnect the machine / equipment	R/A						4.1
Shifts hand over	A	R	R				4.1
Training				R		A	5.3
Ensuring functionality	R	I		R	R	A	1
Update of LOTO operating documentation	I	I		C	R/C	R/A	

Notes:
R - RESPONSIBLE „The responsible"
A - ACCOUNTABLE „Bears full blame for non-performance"
C - CONSULT „Included in the process"
I - INFORM „Keep informed"

RACI matrix with comment (according to the Policy of "Efficiency Improvement of Processes and their Optimisation")

7 List of related documents

Directive 465	Permit to Work (valid in ORLEN Unipetrol RPA s.r.o. with the exception of Refinery Units)
Directive 435	Permit to Work (valid in Refinery Units)
Directive 406	Electric Isolation Procedure for Rotating Equipment Repairs
Directive 407	Mechanical Securing of Equipment for Refinery Unit
Act No. 262/2006 Coll.	Labour Code
Government Regulation No. 378/2001 Coll.	Detailed requirements for safe operation and use of machines, technical equipment, devices and tools
ČSN EN ISO 14118	Safety of machinery - Prevention of unexpected start-up
OSHA 29 CFR 1910.147	Hazardous energy inspection (locking / tagging).
Standard S2 (ORLEN)	Isolation of energy sources

8 Appendices

Annex A Sample instruction

	LOTO instructions for securing the device	ORLEN Unipetrol RPA s.r.o.
Device name:		

Instruction mark:		Date	
Secured energy:		Version:	
Part of device:		Author:	

Description of securing the device:

Sec. No.	Type of security	Tag of isolation point	Location	Description of shutdown	Performed by	LOTO elements
1						
2						
3						
4						
5						

no. 1 – Tag of isolation point 1

no. 2 –Tag of isolation point 2

no. 3 –Tag of isolation point 3

no. 4 – Tag of isolation point 4

no. 5 – Tag of isolation point 5

Description of securing the device:

Sec. no.	Type of security	Tag of isolation point	Location	Description of commissioning	Performed by	Notes
1						
2						
3						
4						
5						

Annex B Detailed description of the instruction

The LOTO lock instruction consists of three parts, the header, and description of the equipment security and photographs of the isolation points.

LOTO instruction header

JRK – P3 PS 2414	LOTO instrukce pro zajištění zařízení	ORLEN Unipetrol
Název zařízení:	**Čerpadlo P01**	

Označení instrukce:	LOTO/JRK/P3/059	Datum:	12.10.2019
Zajišťované energie:	Elektrická energie, benzín	Verze:	1
Část zařízení:	-	Zpracoval:	Daniel Spáčil

The LOTO instruction header contains several important information that identifies the instruction and the device to which it applies.

The identification information is located in the top line.

Description of equipment security

Popis zajištění zařízení

Poř. č.	Druh zajištění	Označení izolačního bodu	Umístění	Popis odstavení	Provede	LOTO pomůcky
1	E	-	V blízkosti čerpadla	Vypnout čerpadlo na místním ovládacím panelu.	Operátor provozu	-
2	M	Sání benzín	V blízkosti čerpadla	Zavřít uzavírací armaturu.	Operátor provozu	Kabelový uzávěr
3	M	Výtlak benzín	V blízkosti čerpadla	Zavřít uzavírací armaturu.	Operátor provozu	Kabelový uzávěr
4	M	Bypass - ZK	V blízkosti čerpadla	Zavřít uzavírací armaturu.	Operátor provozu	Kabelový uzávěr
5	E	RHM3/FR12 C	Rozvodna 2454	Vypnout hlavní vypínač 2414 - PM 01.	Elektroúdržba	Zámek

This part of the instruction consists of a table with the following columns:

1. **Sequence number**

Determines the recommended order of secured energies. The sequence number in the list corresponds to the photo below the description of the device security.

2. **Type of security**

It can be filled in as "E" or "M". "M" is a mechanical security and is always performed by the relevant operator (authorized person). "E" is an electrical security and can be either a switch-off on the unlocking box and / or a security on the substation and is always performed by the relevant authorized person.

3. **Tag of isolation point**

The text in this box should correspond to the appropriate line on the red metal tagthat is located on the fitting or equipment itself. This text is also at the photo below the description of the device security.

In the case of electrical energy, this should include tagging of the circuit breaker, engine, control, blade fuses, etc., which must be secured for work on the equipment.

4. **Location**

Specifies the location of the isolation point. In the case of substations, this means tagging of the substation and switchboard, for equipment / fittings, its approximate position.

5. **Description of shutdown**

Here you will find information on the condition of the isolation point after the device has been shut down. The procedure should be described in as much detail as possible. Some terms from this box are explained below.

6. Performed by

This box indicates who must perform the locking. In reality, any superior of that person can perform the securing.

7. LOTO elements

If this field is filled in, it is necessary to use the specified LOTO element (aid) when closing this isolation point. If the field is empty, it is not necessary to lock or it is not possible to lock.

Examples of the most frequently used LOTO elements are given in chapter 4.7.

Photo of isolation points

To make it easier to identify the isolation points, the instructions include photographs where the fitting and the metal red sign with the device label and a description of the isolation point must be visible.

The photographs correspond to the sequence number in the description of the device security.

Description of device unlocking

The table can be filled in with the text: *"Unlock locked isolation points after the end of work on the equipment and put the technological equipment into condition according to the needs of operation*" or a specific unlocking of the equipment can be described for safe commissioning of the equipment after the end of work on the equipment.

Annex C Basic information about the LOTO system

Základní informace k systému

Lock-Out Tag-Out

PROČ?

Protože chceme zvýšit úroveň bezpečnosti během oprav

KDO?

Autorizované osoba (AO) – zavírá a uzamyká energie
AO (operátor) – zamyká armatury a připravuje LOTO box
AO (elektrikář) – zamyká elektrickou energii
Ovlivněné osoby – zamykají LOTO box
(jedná se o vedoucí pracovních skupin)

JAK?

Klíče od zámků, které zamykají energie jsou uložené v LOTO boxu a ten zamkne operátor a ovlivněné osoby pracující na zařízení

KDY?

Během většiny oprav a situací, kdy je nutné vypnout energie a osoba, která se opravy účastní nemá energii pod kontrolou - tedy není vyloučeno náhodné spuštění nebo aktivace

POSTUP:

- Operátor odstaví zařízení a uzamkne všechny neelektrické energie dle instrukcí
- Elektrikář vypne přívody elektrické energie
- Klíče od zámků uzamkne operátor do LOTO boxu zeleným zámkem
- Ovlivněné osoby (vedoucí pracovních skupin) po vypsání PkP uzamykají LOTO box svým zámkem
- Po ukončení prací na zařízení ovlivněné osoby odemykají zámky z LOTO boxu
- Po ukončení opravy odemyká operátor LOTO box (jako poslední) a pomocí klíčů z LOTO boxu odemyká všechny energie (ve spolupráci s elektrikářem)

LOTO PRVKY:

LOTO box

Uzamykatelná krabice, do které se umisťují klíče od zamčených energií

Zelený zámek

Používá operátor (autorizovaná osoba) pro uzamčení LOTO boxu

Červený zámek

Používá operátor (autorizovaná osoba) pro uzamčení energií

Žlutý zámek

Používá elektrikář (autorizovaná osoba) pro uzamčení energií

Oranžový zámek

Používá elektrikář (ovlivněná osoba) pro uzamčení LOTO boxu

Modrý zámek

Používá strojní údržba (ovlivněná osoba) pro uzamčení LOTO boxu

Fialový zámek

Používají MaR (ovlivněná osoba) pro uzamčení LOTO boxu

Černý zámek

Používají ovlivněné osoby, které nemají vlastní zámek pro uzamčení LOTO boxu

Visačka

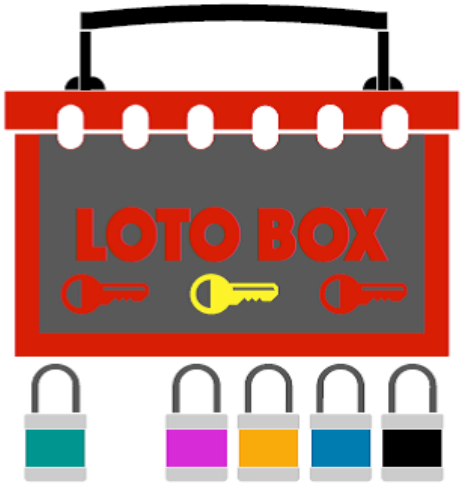
Používají ovlivněné osoby pro označení zámku svým jménem (+ firmou) a kontaktem

Základní informace k systému

Lock-Out Tag-Out

DŮLEŽITÁ PRAVIDLA:

- Pokud je nutné zařízení vypnout (nebo uzavřít energie do něj vstupující), pak je nutné vypínače a armatury zamknout
- Pouze operátor smí zamykat a odemykat červené a zelené zámky
- Pouze elektrikář smí odemykat žluté zámky
- Pouze autorizované osoby mohou zamykat a odemykat zámky uzamykající energie (žluté, červené a zelené)
- Fialové, modré, oranžové a černé zámky smí z LOTO boxu odemykat pouze osoba, které je na LOTO box zamkla
- Nikdo nesmí svévolně odstraňovat zámky, od kterých nemá klíč
- Ovlivněné osoby musí na pracoviště přijít s vlastním zámkem odpovídající barvy
- Ovlivněná osoba musí vždy použít se zámkem visačku, kterou umístí na třmen zámku
- Pokud je použita visačka, musí na ní být vyplněny minimálně tyto údaje: **jméno a příjmení, firma, kontakt** (telefonní číslo)
- Pokud není vyplněno PkP a uzamčen LOTO box, nesmí nikdo z pracovní skupiny pracovat na zařízení
- Pokud je nutné sundat červenou cedulku označující izolační bod (např. ventil apod.), musím ji předat odpovědné osobě na pracovišti (např. operátor) a ten ji uschová a po ukončení prací znovu instaluje



Petlice
Spona pro uzamčení pouze jedné energie více zámky (nepraktická pro více energií)

Zelený zámek
Používá operátor (autorizovaná osoba) pro uzamčení LOTO boxu

Červený zámek
Používá operátor (autorizovaná osoba) pro uzamčení energií

Žlutý zámek
Používá elektrikář (autorizovaná osoba) pro uzamčení energií

Oranžový zámek
Používá elektrikář (ovlivněná osoba) pro uzamčení LOTO boxu

Modrý zámek
Používá strojní údržba (ovlivněná osoba) pro uzamčení LOTO boxu

Fialový zámek
Používají MaR (ovlivněná osoba) pro uzamčení LOTO boxu

Černý zámek
Používají ovlivněné osoby, které nemají vlastní zámek pro uzamčení LOTO boxu

Visačka
Používají ovlivněné osoby pro označení zámku svým jménem (+ firmou) a kontaktem

Annex D Basic rules of safe work on equipment in connection with LOTO

☑ What to do:

- **Always** use personal protective equipment.
- **Secure** loose clothing so that it does not get caught or torn.
- **Keep** a safe distance when operating the system / equipment under voltage.
- **Take extra care** of high hydraulic pressure when working near cranes or other lifting equipment.
- **Take extra care** when working in places where there is a risk of energy release (joints, seals…)
- **Use** two calibrated gauges for ZES verification.
- Before starting work on the device, **check** the disconnection of all elements from the voltage.
- **Make sure** that all required pipes have been disconnected, blinded and closed.
- **Make sure** the device is properly grounded.
- **Make sure** that all rotating or sparking parts, as well as pressure systems, are physically disconnected, insulated and locked.
- **Communicate** clearly and intelligibly and make sure you understand.
- **Work** only on safely separated parts of the device.
- **Be aware** of the danger of arcing when working on electrical equipment.
- **Prefer** hydrostatic tightness and pressure tests to pneumatic ones.

☒ What not to do:

- **Do not start work** until all conditions for safe work have been met.
- **Do not enter** the device without prior inspection.
- **Do not stay** in places where you may be hit by an unexpected energy leak.
- **Don't rely on** verbal assurance - check everything in person, referring to LOTO instructions / separation plans.
- **Do not enter** containers unless completely cooled.
- **Do not start** working on unknown devices without the assistance of experienced personnel.

Annex E Methods of ensuring mechanical separation according to industrial practice

When preparing the equipment for repair / service / maintenance, two phases of separation can be determined:

- initial separation; and
- final or complete separation.

Initial separation is a separation (usually provided by fittings) with a relatively short duration, which allows a positive separation after the required preparation has been performed on the equipment before starting work.

Final separation protects those who carry out work on the equipment and those who could also be affected by the release of hazardous energy from the equipment during their work.

The level of protection provided by the selected final separation method should correspond to the severity of the potential hazard (medium, pressure, temperature, etc.). The choice of the final separation method should be based on a risk assessment. If safer separation can be made and if reasonably practicable, it should be done (except where this would not reduce the risk).

It is good practice to use positive separation for work in confined spaces, for equipment containing toxic media and for long-term separation. A key requirement during the initial separation is to verify that the fittings used for the separation are secure and ensure a tight seal.

Mechanical separation of equipment and piping can be obtained by using one of the following methods stated in descending order of the safety level of the department:

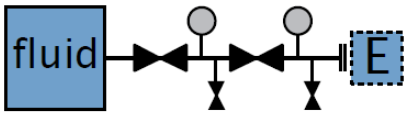
1. **Positive separation**

Positive separation is the safest way of separation. This is the complete separation of the equipment to be worked on from other parts of the system or separation of this equipment by means of fittings and plugs. The installed blanking plugs must be dimensioned to withstand the maximum potential pressure. Flange connections must be tightened and sealed in accordance with good engineering / maintenance practice after assembly and disassembly of the blanking plug or end piece.

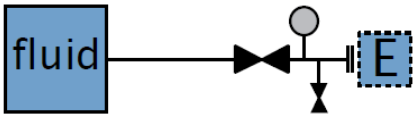
These are:

Physical separation - removal of part of the pipeline

Two isolating fittings, drains and plug



One isolating fitting, drain and plug

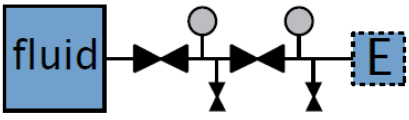


2. **Provable separation**

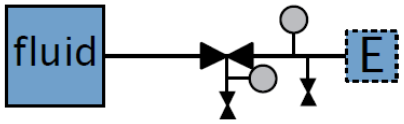
Separation of the device by means of fittings, in which the tightness of the fitting can be proven by opening the drain behind the separating fitting.

These are:

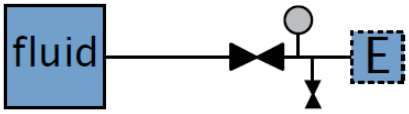
Two isolating fittings and a drain (DBB)



One isolating fitting with double seal and drain



One isolating fitting and drain (SBB)

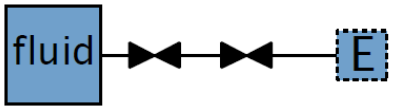


3. Unprovable separation

Separation of equipment using fittings. The tightness of the valve cannot be proven in any way.

These are:

Two isolating fittings (DB)



One isolating fitting (SB)

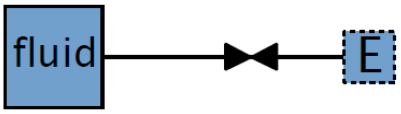


Table 4: Explanations

fluid	Live part (medium)
E	Equipment
	Separating fitting (closed)
	Drain valve (drain)
	End cap, blanking plug
	Pressure gauge

Two isolating fittings and a drain (DBB) are considered safe if the functionality of the drain valve (free drain) is demonstrated. This method should not be used for flammable or toxic liquids and gases. If used, flammable or toxic liquids and gases must be discharged to a safe area.

In general, a single separation fitting and drain (SBB) should not be used as a final separation method for work on equipment containing hazardous substances. However, there may be circumstances in which the use of SBB is justified. SBB should only be used if the risk has been assessed as acceptable for this type of separation.

Unprovable separation can only be used in case of separation from media such as water or air at low pressure and low temperature, if the expected leaks cannot pose a danger behind the separation valve.

9 Separate annexes

The following Annexes F and G are stored together with this Directive in DOK-SYSTEM.

Annex F LOTO Component Catalogue (only in Czech)

In order to unify the LOTO system and the purchasing process within the Company, it is recommended that purchases are made using the LOTO Component Catalogue.

Annex G Authorization (only in Czech)

Authorization of the person responsible for the use of the Master Key.