

Guideline

Equipment isolation (Lock out / tag out / try out)

Scope:	Group
Author:	Group HR/ Group H&S
Issued:	04/2013
Re-issued	12/2016
Version	2.0



Table of contents

1	Purpose	3
2	Objective	3
3	Scope	3
4	Roles and responsibilities	3
5	Definitions	3
6	General principles	5
6.1	Preparation / Information / Coordination	5
6.2	Risk assessment (Job safety analysis)	5
6.2.1	Recommended procedure:	5
6.3	Safe work procedures	6
6.4	Tools	6
7	Equipment isolation process (LOTOTO)	6
7.1	Energy disconnection	6
7.1.1	Responsibilities	7
7.2	Securing against restarting (lock out)	7
7.2.1	Locks	7
7.3	Tagging (tag out)	8
7.4	Checking the effectiveness (try out)	8
7.5	Restarting	8
8	Purchasing of new equipment	9
9	Contractors / External companies	9
10	Competence of involved persons	9
10.1	Training	9
11	Emergency Response	10
12	Implementation process and control	10
13	Additional information/ further applicable documents	10

1 Purpose

This guideline provides the responsible line managers with general guidance and sets up minimum requirements regarding equipment isolation. The remarks regarding equipment isolation in the machine safeguarding guideline are being deepened and developed in this guideline.

Local measures have to be implemented to comply with this guideline. Any measures taken have to comply with all applicable laws and regulations as well as with HeidelbergCement site standards and guidelines. Whenever a discrepancy occurs between local laws / regulations and these minimum requirements, operations shall comply with the more stringent of the two.

2 Objective

The objective of this document is to minimize the risk of accidents arising from different operations at equipment by proper isolation processes.

By creating or optimizing compatible technical, organizational and personal measures the operations are made as safe as possible for people and material goods.

3 Scope

This guideline is applicable at all locations and operations in which the HeidelbergCement Group exercises management control (HeidelbergCement sites).

The obligation to establish proper isolation processes applies to already installed as well as new processes planned.

“Shall-, should- and can-” requirements are recommendations that need to be implemented unless there are equivalent measures in place.

4 Roles and responsibilities

The local HeidelbergCement line management is responsible for implementing this Group guideline and to arrange its translation into local language.

Local line management must ensure that appropriate and effective measures (general and equipment – specific) are in place and complied with. It is responsible to ensure that all relevant persons are made familiar with these equipment isolation regulations and that they are trained accordingly.

By means of contractual regulations, it must be ensured that contractors are obligated to follow this guideline and must be informed about it to be able to implement the general and equipment specific isolation procedures. It has also to be ensured that it is the responsibility of the contractors to ensure compliance with this guideline. Furthermore the HeidelbergCement Group guidelines “Visitor and Contractor Safety” and “Machine safeguarding” have to be considered.

5 Definitions

Energy Examples for the various energy types are:

- Electric energy
- Pneumatic / hydraulic energy
- Electromagnetic energy
- Chemical energy
- Radioactive energy
- Steam energy / heat
- Gravimetric energy
- Hot and freezing surfaces

- Mechanical energy
- Potential / kinetic energy

Equipment is a systematic compilation of machines or units, which might be interconnected through their function, control or safety measures. For example:

- Pneumatic systems
- Process engineering systems
- Grinding, mixing plants
- Electrical wiring systems
- Air cannons
- Switchgears in energy supply systems
- Conveyors
- Crushers, screen decks, wash bins, hydraulic elevators
- Hoists

Within this guideline, all other systems where hazards can occur during operations are also considered equipment. For example:

- Yellow machines
- Trucks
- Transport mixers, concrete pumps

Equipment Isolation is the process that protects personnel, who perform service, maintenance, and other work on equipment from injuries that could result if equipment is unexpectedly energized, started, or set in motion by their energy supply or by the release of potential and stored energy.

Hazard Area is an area that entry has the potential to cause harm.

Interlocks protect from accidental injuries, by, for example, stopping the machine when a person or a person's body part enters a hazard area. Devices include light barriers, electric or magnetic contacts and pressure sensors.



Caution: The interruption of operational procedures of equipment by an interlock does not replace the isolation process!

Lock is every mechanical acting device that is intended to prevent a release without using the right key. Within this guideline, electromechanical and electronic closing appliances have the same function as a lock and are addressed with the word lock.

LOTOTO is the equipment isolation procedure is also called "lock out – tag out- try out" process (LOTOTO), mentioning some of the main steps of the process.

Multi-locks are devices at isolation points of equipment that enable to mount two or more locks. They are intended for workers to mount their personal locks.

Scissor adapters are devices that look like scissors. At isolation points, they are used as adapters to enable the mounting of two or more locks if multi-locks are not present in a sufficient number.

System	System, in this guideline, means: the equipment, the people involved, their tasks, the organization and the environment as a whole.
Tasks	Includes duties such as but not limited to maintenance, housekeeping, inspections, etc.

6 General principles

6.1 Preparation / Information / Coordination

Operational procedures are often affected by equipment isolation processes. Therefore it is necessary to plan any equipment isolations in advance and to inform personnel involved.

- The mode of communication between involved persons must be defined and made known to all involved
- Equipment isolation tasks must be supervised and carried out in as safe a way as it is reasonable practicable
- General and specific emergency and rescue plans must be established beforehand considering the specific risks of the planned tasks
- Special attention must be given to the coordination of work in case several (internal and/ or external) parties are involved in the work



Caution: Equipment isolation always has to be performed if danger may occur to people working. Even if a task seems to be easy, like moving a product in the right position on a conveyor, necessary safety measures have to be implemented.

If the equipment isolation process implies a reasonable risk of injury occurring or a high risk that isolation process will cause an extended stoppage in operations, a work permission system has to be implemented.

6.2 Risk assessment (Job safety analysis)

A risk assessment is mandatory before conducting the equipment isolation process and has to be repeated/ revised in regular intervals and properly documented, at least annually.

A new risk assessment must be done if the system changes, e.g. new system equipment or parts of it, equipment is made to perform differently or otherwise alters the system, site management changes, or in response to incidents (accidents or near-hits) that have occurred regarding the system.

The risk assessment has to consider the frequency and level of exposure as well as the severity of any potential incidents. Existing risk control measures are to be taken into account.

The findings of the assessment have to be translated into appropriate planned measures (technical, organizational, or personal) and safe work practices before an equipment isolation process is conducted.

The risk assessment has to consider any information from the supplier of equipment (e.g. manuals) and should consider what has been learned from the experience of the working personnel.

Similar equipment can be assessed group wide.

6.2.1 Recommended procedure:

- Definition of the system including adjacent and interfering equipment
- Identification, and analysis of hazards and assessment of their risks

- Analysis of the present-state
- Definition of target-state
- Identification of possible alternatives and options to reduce gap between present-state and target-state
- Set up of necessary action plan with responsibilities and due dates including the development of necessary safe work procedures
- Check measures to ensure measures are operational
- Documentation

Before the beginning of every equipment isolation process and in preparation to receive the work permit the responsible line manager and the worker(s) have to check whether the conditions are as assumed in the risk assessment or assess actual conditions that need to be considered as well. This can be various weather conditions, defect switches, etc., which requires a different way of proceeding to ensure safety.

6.3 Safe work procedures

Safe work procedures have to be derived from the risk assessments and documented to define who has what responsibilities and in which order tasks are completed during the equipment isolation process.

The safe work procedure has to be provided in an appropriate language and mode to all affected employees.

If parts of the affected work force do not understand the local language the safe work procedure has to be translated into a language that is understandable by the work force and effectively communicated to the workers.

Violations of the safe work procedures or safety rules are to be treated with disciplinary actions in accordance to the local rules and regulations.

6.4 Tools

All equipment which is necessary to isolate machines, plants, etc. from energy sources and to perform necessary tasks has to be properly maintained in accordance with the manufacturer's instructions and applicable laws and regulations and in good working order. It must be readily available to all workers in a sufficient number.

Necessary inspections, such as visual or periodic ones, are to be conducted and properly documented through a competent person according to the manufacturer's specifications and applicable laws and regulations.

7 Equipment isolation process (LOTOTO)

7.1 Energy disconnection

The first step is to disconnect or otherwise isolate the equipment from all its supplies of energy.



Caution: The simple turning off of any equipment through switches, emergency buttons or interlocks does not replace a proper equipment isolation process

Energy that remains in the system (stored energy) and could lead to harm has to be eliminated. If this is not possible or unwanted due to the operations, the saved or potential energy that could lead to harm has to be secured against unintentional release.

If the isolation of stored energy is not possible due to the system, an additional risk assessment is necessary in order to implement further measures.

7.1.1 Responsibilities

The person that performs tasks at the equipment and enters the hazardous area needs to be in complete control of all switch mechanisms of this particular equipment by appropriate means of isolation. If this is not possible, measures have to be implemented to ensure no harmful energy can be released.

Every conceivable effort must be made to allow the person(s) performing the required tasks on the system to be able to personally disconnect or isolate the energy. Such personal involvement provides for the highest level of controlling risks.

If the disconnecting of energy cannot be performed by the person that will do the required tasks (such as maintenance or housekeeping) him/ herself, a reliable communication has to be established to another person that is isolating the equipment from the energy supply. Communication signs and verbal instructions must be clear and known to all involved persons before starting the task. A written permit process is necessary for these cases to ensure proper isolation.

It is essential, that the person performing any tasks like maintenance or housekeeping double-checks the effectiveness of the equipment isolation before taking any further action.



Caution: Presetting a time for the state “out of energy” is strictly forbidden.

If the equipment isolation process is of a complex nature or has a high risk potential the isolation process is to be documented to guarantee traceability.

7.2 Securing against restarting (lock out)

The equipment, including adjacent and interfering equipment must be secured against restarting. The safety measures have to ensure the prevention of accidental restarting by someone else (possible safety measures are locks).

If any kind of equipment needs to be isolated over a longer period (more shifts / days) additional measures are to be installed to prevent unintentional restarting.



Caution: The simple turning off of any equipment through switches, emergency buttons or interlocks does not replace a proper equipment isolation process.

In case equipment has multiple switches, all sources of a potential unauthorized restart must be secured.

Access to the hazardous area shall be limited to involved persons. Appropriate measures such as barriers, signage, posted guards are to be used to limit access and protect the safety of workers as well as these non-involved persons.

7.2.1 Locks

The use of locks is an additional measure to increase safety. The company has to provide enough locks to enable workers to perform proper equipment isolation processes.

Locks are to be clearly tagged, so that the owner can be easily identified and contacted.

If several people are operating at the same equipment over a certain time period, every person must use his / her personal lock. While operating, each worker must have exclusive access to his / her personal lock in order to guarantee his / her safety.

If padlocks are used only one key must be in circulation for each individual padlock, which needs to stay with its user at all times.

If a back-up-key exist, it has to be secured and can only be used as a fallback option. The only person with permitted access to the back-up-key is the superior who knows about the ongoing tasks and has the responsibility. A safe work procedure dealing with “forced isolation lock removal” has to be implemented to address this process.

Multi-locks have the advantage to install several locks at once. Scissor adapters are an appropriate low-price alternative.



Caution: Combination locks, cable ties (binder), wires or similar are strictly forbidden.

7.3 Tagging (tag out)

Equipment isolation spots in use are always to be tagged. Tags must be placed easily visible, signal-colored, and provide information like: “Danger, equipment locked out” or similar.

Further parts of the equipment where hazards for people could arise are also to be tagged, as a warning and to and point out the special state of the equipment.



Caution: Tags do not replace proper equipment isolation processes!

7.4 Checking the effectiveness (try out)

Before conducting any tasks, all relevant switch mechanisms of the equipment are to be checked to ensure proper deactivation. During that process nobody is permitted in the hazardous area, ensuring no one can be harmed by a faulty equipment isolation process.

The state of “lack of energy” as well as the successful removal and / or securing of all dangerous potential and stored energy needs to be checked (especially current conducting equipment has to be checked for the presence of power).

Furthermore, the proper use of locks and their function has to be checked.



Caution: Even if the equipment is isolated correctly switch mechanisms should be left in the “off”-position to prevent an unintentional startup during the restarting process.

Caution: Emergency buttons must be in the operation “on” position when the isolator switch is turned off and isolated and the isolation is checked for effectiveness (try out). If the button remains in the “off” position, the isolation check is checking the control circuit and not the power supply isolation

7.5 Restarting

The person (s) isolating a piece of equipment is / are the only person (s) allowed to remove his / her / their isolation lock (s) and restarting it.



Caution: If this is not possible, a process has to be implemented which guarantees that the owner of this specific lock is out of the danger zone before the equipment is restarted. A first action must be the contacting of the lock owner.

If the lock was removed by somebody other than the owner, the owner has to be informed about the removal prior to re-start his / her work (a possible situation might be that this person forgot to re-start the equipment before the workday ends and is not available).

The restarting process has to be conducted in reverse order to the equipment isolation process:

- All separation and machine safeguarding devices that have been dismantled have to be re-fixed
- A visual inspection has to be done to ensure that the equipment is in an orderly condition
- It has to be checked that nobody is still located in the hazardous area, warning signals as flash lights or audio warnings may be used in addition, e.g. at long conveyor systems
- All locks are to be removed by their owners
- The equipment is to be restarted
- Proper operating conditions are to be checked
- Tags and barriers are to be removed

If this given order cannot be followed, another risk assessment has to be performed and the resulting measures thereof are to be implemented.

Even in cases where the equipment needs to be restarted and isolated several times, it is absolutely forbidden to short-cut the described equipment isolation process by not following the single steps for isolation and restarting. The only exception is if the testing can be conducted without creating any hazards.

8 Purchasing of new equipment

Prior to the purchase of new equipment, a risk assessment has to be done, in which the supplier and the appointed health & safety adviser are to be involved as early as possible.

From a technical point of view, the equipment must enable isolation safely.

9 Contractors / External companies

If contractors, subcontractors or any third party are directly or indirectly engaged in the equipment isolation process, it is crucial that all technical, organizational, and personal responsibilities are clearly regulated, controlled and documented to ensure safe working conditions for all involved persons.

For more details, see the group guideline "Visitor and Contractor safety".

10 Competence of involved persons

Only persons, designated by the company, are permitted to perform equipment isolation and restarting processes.

Designated persons must have an appropriate competence through education and related work experience before conducting an equipment isolation process.

The required competence must be defined and checked by the company or its representative prior to assigning any equipment isolation process.

10.1 Training

Local site management has to define and implement an appropriate equipment isolation training program. Appropriate training has to be provided at the specific working location before a worker conducts his/ her first equipment isolation process

Training regarding equipment isolation processes have to be conducted on a regular basis, but at least annually for all involved persons. Especially if changes exist, such as new or different tasks,

equipment, personal protection equipment (PPE) or hazards, additional training must be conducted before starting work. Training must be properly documented.

Training needs to be applicable to the employees work area and must include instructions on how to wear the appropriate PPE.

Further persons who could be affected by the equipment isolation process need to be trained on right behavior, in order to avoid accidents.

It is the responsibility of the line management to assure the trained employees are competent to complete the assigned task by appropriate means.

11 Emergency Response

Effective arrangements for raising the alarm and carrying out rescue operations in an emergency situation with regards to equipment isolation tasks are essential. Emergency plans must depend on the nature of the equipment to be isolated and the risks identified.

12 Implementation process and control

A gap analysis against new requirements due to the revision must be performed within 3 months after publication of the revised version of this guideline. In order to fill any identified gaps, an action plan with responsibilities and due dates must be set up immediately and implemented within the given time frame.

The implementation and compliance with this guideline has to be checked in the future through appropriate measures, such as H&S Management system audits.

13 Additional information/ further applicable documents

Additional information (e.g. training material, good practice examples) is provided at the Group H&S homepage or can be requested at the following address:

H&S Homepage http://unite.grouphc.net/wok/hs/Pages/HSGuideline_Training_en-US.aspx

Further applicable documents are the group H&S Policy and applicable Group guidelines such as "Machine safeguarding", "Visitor and Contractor safety", "HC Group minimum training standard".

Policy and guidelines are available on UNITE: <http://unite.grouphc.net/wok/hs/Pages/default.aspx>

Contact and further information:

Dr. Klaus Hormann

Group H&S Manager

Group Human Resources

Phone: +49 6221 481 32007

klaus.hormann@heidelbergcement.com