

TO 001 PREVENTION OF UNEXPECTED START-UP

Contents

TO 001 PREVENTION OF UNEXPECTED START-UP	1
1 Definition.....	1
2 Operating procedures and management of safety interlocks.....	2
2.1 Work order /work permit (a written or verbal work permit)	2
2.2 Check-in in accordance with the area's check-in practice	2
2.3 Making a work site safe	3
2.4 Trial start-up	3
2.5 Performing work	4
2.6 Temporary tests	4
2.7 Stopping work and removing lockouts	4
2.8 Reporting to control room, returning lockout supplies.....	4
3 Isolation principles for various forms of energy.....	5
3.1 Electrical energy	5
3.2 Flowing agent	6
3.3 Hydraulics and pneumatics	6
3.4 Mechanical energy	7
3.5 Measurement devices	7
4 Exceptional situations	8
4.1 Troubleshooting.....	8
4.2 Situations in which complete isolation from energy is not possible	8

1 Definition

These instructions apply to the Kemi-Tornio plant area. The instructions should be followed in all cleaning, service and maintenance tasks performed on machines and equipment. Working or moving in the danger zones of machines and equipment is prohibited until unexpected start-up has been prevented.

The purpose of the instructions is to protect personnel from the unexpected start-up of a machine or equipment when working in the danger zone of the machine or equipment, or from the release of dangerous energy.

The instructions and operating method of preventing unexpected start-up (LOTOTO=Lock Out, Tag Out, Test Out) must be adhered to at all times throughout the day. Machines/equipment must be isolated from all sources of energy before service, maintenance or cleaning. The requirement applies to all Outokumpu employees, contractors and visitors. This will help prevent unexpected start-up of the machine and prevent the dangerous situations and accidents caused by it. This is Cardinal Safety Rule No. 7. (Cardinal Safety Rules).

Unexpected start-up refers to a start-up caused by, for example,

- malfunction of the control system,
- returning supply of energy or
- accidental start-up command (including the start-up of an adjacent machine)
- the release of a flowing agent (e.g. chemicals) to the work site
- a normal start-up of the automation system may also be unexpected from the point of view of the person present at the work site.

The work site should be rendered to a safe zero-energy state before starting work. Rendering the work site safe covers the entire working environment.

These instructions cover the key hazards related to unexpected start-ups, prevention thereof, operating procedures and management of safety interlocks as well as action in various exceptional situations.

2 Operating procedures and management of safety interlocks

2.1 Work order /work permit (a written or verbal work permit)

- The work site is defined verbally, in a work order, standard operating procedure (SOP) or in a work permit.
- The responsible supervisor or work supervisor is obligated to ensure that the person who performs the work knows how to render the work site safe (the measures required to render the work site safe may be described in the interlock card, in a work order, standard operating procedure (SOP) or in a work permit).
- If several teams work at the same work site, work coordination and the LOTOTO measures must be agreed jointly.

2.2 Check-in in accordance with the area's check-in practice

- **The persons who perform the work** are required to check-in at the area's control room. A person who performs the work must ensure that operational personnel is notified of the work performed in the area.
- **A personal check-in** is entered in the control room log book or other system, which can be later accessed for the verification of the information (name, telephone number, work site, date and time), if needed.
- Starting of work is always agreed with the area's responsible supervisor / work supervisor as well.

- The check-in involves reviewing the measures to make the work site safe.

2.3 Making a work site safe

- It is a responsibility of a person who performs the work to isolate the energies, lockout and tagout. If the person doesn't know how to do that, the person must seek help from the foreman/supervisor.
- The person who performs the work ensures that the isolation and lockout of energies are entered in the lockout list (e.g. by or with the assistance of the operator).
- Removing fuses is also recorded in a separate fuse list.
- Specified safety locks and, if needed, safety hasps or other lockout supplies should be used in lockout procedures. In addition, a safety tag ("Do not start, work in progress") is attached to the item to be locked out. Each person participating in the work must have their own personal locks for all required lockout procedures with the principle "One person, one lock".
- When isolating energies, lockout cards, separate instructions or a checklist to be printed with the KUTI task should be used.
- A longer-term lockout performed by the operator is entered in the lockout list with the title of the operator's position. Works that last over shifts, for example morning shift leaves and evening shift begins, locks and tags are borrowed from control room. These locks and tags may be removed by an Outokumpu personnel with same operator position who receives keys in a shift hand over process.
- A lockbox should be used in more extensive locking needs.
- Working in a process area that is in automatic mode is prohibited. When working in fenced automated areas, the gate to the area must be locked in the Open position with a locking clasp and a safety lock.
- In exceptional situations or problems, contact your supervisor or the area's responsible supervisor.

2.4 Trial start-up

- After the isolation measures and lockouts have been carried out, the person who performs the work should ask the operator to perform a trial start of the item rendered safe (whenever possible). The trial start is entered in the lockout/fuse list (e.g. by or with the assistance of the operator).
- When new employees arrive to work with equipment already rendered safe, the trial start-up attempt is not performed unless there is a special reason to do so. However, if the trial start-up is performed in any case, the danger zone must be clear of people. Once the isolation measures and the trial start-up have been performed and it has been verified that the work site is in a safe mode, work may begin.

2.5 Performing work

- Work is performed in a safe manner in accordance with instructions. In problem situations, contact your supervisor or the area's responsible supervisor / work supervisor.

2.6 Temporary tests

- The person who performs the work is obligated to agree with the supervisor or the area's responsible supervisor / work supervisor on all temporary removals of isolations and lockouts. (For example, if temporary tests or start-ups of equipment are needed during work).
- Correspondingly, if another party needs to have isolations and lockouts temporarily removed, the matter must be agreed separately with the area's responsible supervisor / work supervisor
- The area's supervisor responsible / work supervisor is obligated to inform the required parties of situations in which isolations and lockout need to be temporarily removed.
- In exceptional situations or problems, contact your supervisor or the area's supervisor responsible / work supervisor.

2.7 Stopping work and removing lockouts

- As a rule, a lockout may only be removed by the person who set it.
- Isolation lockouts entered under the title of the operator position may be removed only by another person working in the same position when they have been authorized to do so by their supervisor or another person in an equivalent supervisory position.
- In an exceptional situation (e.g. the person who set the lockout cannot be reached), the area's responsible supervisor may remove lockouts and inform the supervisor of it by phone and/or via e-mail, for example.

2.8 Reporting to control room, returning lockout supplies

- Once the work is completed, you should report to the area control room and acknowledge your exit from the work site by entering it in the control room log book or other system.
- Return the plates and lockout supplies. Work completion is also communicated to the person responsible for the area / the work supervisor.

Shutdowns

In shutdowns, separate shutdown-specific instructions can be followed (including a deviation from the reporting procedure). The instructions must result in at least the same level of safety as is provided by the operating model described in these operating instructions.



Monitoring compliance with the operating model

Compliance with the operating model is monitored through the daily monitoring carried out by supervisors. In addition, SBO rounds are performed in the factory area to contribute to monitoring compliance with the operating model.

3 Isolation principles for various forms of energy

3.1 Electrical energy

Instructions to prevent unexpected start-up of the most general electrical equipment.

An electrical device with a safety switch (isolation switch of the main circuit):

- Check the area of impact of the safety switch (visual connection, name of device or position)
- Switch the device off; if needed, place a Do not use tag on the operating panel or in the control room
- Lock the safety switch to position 0 and tag with a DO NOT SWITCH ON tag; write your name and the isolation date on the tag
- Verify isolation with a trial start-up, if possible
- Determine other hazards related to work and the work environment

An electrical device or a group of electrical devices with no isolation switches:

- Define the device carefully (e.g. the position) for isolation
- Switch the device off; lock the switch/connector and place a Do not use tag on the operating panel or in the control room (if possible)
- Lock and tag the control current inhibitor switch to position 0 (if the device is equipped with one)
- An electrician removes the fuse or opens the safety coupling and places the Do not use tag and, when exiting the electric equipment room, ensures that the door locks.
- Verify isolation with a trial start-up, if possible
- Determine other hazards related to work and the work environment

Electrical work performed by electricity sector professionals should comply with the electrical safety standard (SFS 6002), the safety instructions issued by Outokumpu Stainless as well as the related legislation.



3.2 Flowing agent

Agents classified as flowing include gases, chemicals, liquids and vapors. These instructions describe rendering a work site safe in general terms. Determine the more detailed instructions that are task-specific or based on the classification of the agent.

Isolating a flowing agent from the work site:

- Determine if the work requires a special permit (e.g. tanks, chemical pipelines, carbon monoxide or natural gas lines)
- Switch off pumps and other equipment that generate pressure. Lock and tag them out.
- Depressurize the work site, empty and clean (pressure rinse) it in an appropriate manner.
- Close the isolating shut-off valve(s) with an appropriate locking device and tag it (them). Note! Having only one active shut-off valve while working is prohibited.
- If necessary, add isolation plate and tag it. (Isolation plate tag, a plastic one in stock MAKO: 674845)
- When opening a pipe/device, protect against potential bursting of agent (PPEs, first opening the flange from the opposite side of the pipe).
- Determine other hazards related to work and the work environment

3.3 Hydraulics and pneumatics

Rendering a work site safe during the maintenance of the hydraulics and pneumatics systems and while removing process disturbances (NOTE! Maintenance work related to hydraulic systems may only be performed by persons with adequate competence in hydraulic systems.)

- I. Reliably switch off the electricity from all actuators and motors, if possible. Lock and tag them out.
- II. Depressurize pressure accumulators, tanks or pipelines or isolate them reliably and test/measure the success of isolation.
- III. Lower the loads lifted with hydraulics only or support them in a reliable manner. Movements should be prevented by means of a fixed or temporary locking/support. Tag the locking with a plate.
- IV. Determine other hazards related to work and the work environment

Rendering the area of impact of hydraulic or pneumatic devices safe:



- I. The movements of hydraulic or pneumatic devices are locked by means of fixed mechanical lock. Tag the lock
- II. Determine other hazards related to work and the work environment

Rendering the area of impact of hydraulic or pneumatic devices safe if there is no fixed mechanical locking in the work site:

- I. Lower the loads lifted with hydraulics only or support them in a reliable manner.
- II. Depressurize pressure accumulators, tanks or pipelines or isolate them reliably and test/measure the success of isolation.
- III. Close the shut-off valves in the work site (lock, if possible) and attach a "Do not open valve" tag equipped with the name of the person who shut them off.
- IV. Determine other hazards related to work and the work environment

Do not go under a load that remains up on hydraulics alone in any situation!

3.4 Mechanical energy

Items containing mechanical energy include motors, conveyors, overhead doors, springs and cams, piled-up loads, feed screws, plungers and tires of large vehicles. Isolating mechanical energy from the work site:

- I. Reliably switch off the electricity from all actuators and motors.
- II. Switch off the energy supply by removing belts/chains or by releasing the clutch
- III. Lock the machine component causing a potentially hazardous movement by means of a brake, latch or mechanical locking pin (locking pins are yellow). Tag the locking.
- IV. Determine other hazards related to work and the work environment

3.5 Measurement devices

Measurement devices causing hazards include laser sensors, radioactive radiation sources and X-ray devices. General instructions for rendering a measurement device safe (determine the device-specific instructions):

- I. Determine the danger zone of the device
- II. Render the measurement device safe in the way agreed for the device (device-specific instructions)

- III. Verify or otherwise determine the completion of rendering the measurement device safe (e.g. radiation measurement)
- IV. Determine other hazards related to work and the work environment

4 Exceptional situations

4.1 Troubleshooting

A separate procedure is in place for troubleshooting activity in the danger zones protected by safety-related systems. It is described in guideline TO 120 Vianetsintä turvallisuuteen liittyvien järjestelmien suojaamalla vaara-alueilla (Troubleshooting in the danger zones protected by safety-related systems)

4.2 Situations in which complete isolation from energy is not possible

To render safe work performed by operators and, for example, the condition monitoring personnel which requires production to be on, is described in separate work instructions and related risk assessments. These work instructions are reviewed by the production manager or maintenance manager and approved by the department director.

In other situations, in which the energies of a machine/equipment or installations cannot be completely isolated, a written work permit procedure is applied to ensure safety.

Most significant updates to previous version

Section	Change
2.1	Specified documents which describe procedures ensuring safety of the working area: Interlock card, in a work order, standard operating procedure (SOP) or in a work permit.
2.3	Clarified instruction who has the responsibility to isolate/lockout/tagout and what to do if a person doesn't know how to do that: It is a responsibility of a person who performs the work to isolate the energies, lockout and tagout. If the person doesn't know how to do that, the person must seek help from the foreman/supervisor
2.3	Updated instruction of procedure when longer-term lockout is performed by an operator: Works that last over shifts, for example morning shift leaves and evening shift begins, locks and tags are borrowed from control room. These locks and tags may be removed by an Outokumpu personnel with same operator position who receives keys in a shift hand over process.