TO 003 CLOSED OR CONFINED SPACES

Contents

1 Purpose and scope of application

These general instructions are intended for situations in which work is performed in closed or confined spaces, where danger can be caused by the conditions, content or other special reasons.

Outokumpu employees, contractors and visitors are not allowed to enter closed or confined spaces without another person who is securing and guarding outside the space and a rescue plan. This is Cardinal Safety Rule No. 9. (Cardinal Safety Rules).

A rescue plan refers to a plan that describes the rescue of a person working in a tank or a confined space in exceptional situations when the person is unconscious, for example.

Risk assessment must be performed about the work to be performed in a closed or confined space and a written work permit must be obtained before work is started.

In a closed/confined space, both entry and exit are restricted, dangerous changes in air quality or physical changes may occur, there is no continuous ventilation and the spaces are not designed for a prolonged stay. Such spaces include tanks, chambers, furnaces, funnels, shafts, silos, pipes, ducts, sewers, wells and pits.

Permanent closed/confined spaces must be marked with a warning sign.

- Danger! Closed/confined space
- Access denied without a written work permit

Note! A space may also be temporarily closed or confined. For example, structural changes during shutdowns, new excavations, unplanned maintenance work in a confined crawl space.

Work to be performed in closed or confined spaces requires a written work permit. A work permit is issued, and a hazardous work permit form is filled in for such work.

The obligations and responsibilities are defined in guideline TO 009 Work permit practices. Working in a confined conductive space is specified in guideline TToSä 013 Working in process spaces and confined conductive spaces.

2 Actions before starting the work

- **Communication:** All parties concerned are informed about the work electronically (Note: partners, other departments, control rooms).
- **All actions regarding prevention of unexpected start-up of machines and equipment must be done.**
- **A person standing and guarding by the hatch is a securing person** who ensures the safety of persons working in a tank / confined spaces (does not accept other work or take a break until the persons working in the tank / confined spaces have left the work site). The person standing and guarding by the hatch must have the same equipment as those working in the closed/confined space. The person must have a continuous opportunity to call for help.
- **Electricity has been switched off / locked**; pumps, mixers, heaters/coolers, level measurement, sources of radiation related to the work site etc.
- **Blinding or isolation has been carried out**; supply and outlet pipelines.
- **Tank/pipeline has been cleaned**: The tank/pipeline is cleaned by either pressure rinsing or nitriding before work is started.
- **Gas measurement has been performed**: Measurements are done daily before starting the work: is the oxygen content adequate (19,5% - 22,5%), are there explosive gases (LEL0%) or are there other gases presence in the work environment.
- **Mechanical ventilation**: The work site is ventilated before work is begun and during work (exhaust of the gases generated).
- **Unobstructed access**: Order and cleanliness of the work environment, unobstructed access ways.
- **Measurements during work**: Gas contents must be measured during work. The air quality must be measured with a multi-gas detection device; oxygen content must be sufficient during work (19.5%–22.5%); explosive gases LEL=0; and it also must be measured that are there other gases in the work environment.
- **Warning signs have been attached**: Warning signs are attached to the work site and the work environment to warn persons not involved in the task being performed of the work in progress.
- **Fall protection system**: The need of a fall protection system (a rope and a harness/vest) is determined. For example, in confined spaces it must be possible to lift an injured person from the confined space. Remember: in situations where there is a risk of falling, appropriate fall protection measures must be taken to prevent falling. See item 3.
- **Anchor line**: See the fall protection system.
- **Protective separation transformer**: A protective separation transformer must be used with handheld tools and measuring devices in confined spaces. The transformer must be outside the conductive space. Only one device can be connected to the secondary coil of the protective separation transformer unless the transformer is equipped with a separate secondary coil for each device.

- **Fault current protection**: In process spaces, handheld tools, luminaires and measuring devices must be equipped with a 30 mA group-specific fault current protection. New distribution boxes for worksites must always be equipped with fault current protectors. Electrical outlets installed for handheld tools when performing operation or maintenance work on steel platforms or on the steel structures of the line must be equipped with fault current protection. Permanent fault current protection can be installed in existing electrical outlets or a separate fault current protection system intended for temporary use should be used. Electrical outlets equipped with fault current protection are marked with a label indicating the use of fault current protection. In addition, it is recommended that protectively insulated tools be used in process spaces.
- **Lighting**: Lighting in confined and conductive spaces must be sufficient. Hand-held luminaires must be supplied by an ungrounded SELV circuit (a protective separation transformer or equivalent is being used to produce an AC voltage of a maximum of 25 V or a DC voltage circuit of a maximum of 60 V which is protected against contact and reliably isolated from other circuits) or a fluorescent light supplied by protective exta-low voltage which has a built-in transformer to increase the voltage. Only one device can be connected to the secondary coil of the transformer unless the transformer is equipped with a separate secondary coil for each device.
- **Additional precautions**: A risk assessment carried out about the work may produce additional precautions, which the responsible person for the work should define.
- **Compressed-air breathing apparatus:** If a sufficient oxygen content (19.5%–22.5%) cannot be guaranteed for the duration of work, a compressed-air breathing apparatus must be used.
- **Depressurized pipeline:** the gas or chemical pipeline of the work site must be depressurized (energy should be rendered to 0). Ensure that all valves of the work site supply pipeline are closed and locked/tagged out and the pressure accumulators have been isolated from the pipeline.
- **Non-sparking tools:** In ATEX spaces, ATEX-compliant tools must be used.
- **Personal Protective Equipment:** In work involving chemicals, the personal protective equipment are defined on the basis of department-specific risk assessment in accordance with the chemical. Generally, the personal protective equipment required by the departments: protective clothing, safety helmet, safety shoes, hearing protection, protective gloves (whenever working with sharp objects, gloves protecting against cuts should always be worn), safety glasses/visor. These protective equipment are worn in work that does not involve chemicals and gases.
- **Personal Protective Equipment against chemicals:** Used in, for example, the maintenance and repair tasks of depressurized tanks and pipelines containing mixed acid/product acid/ process liquid. The equipment includes rubber boots, chemical protection gloves, chemical protection overalls, gas mask / pressurized mask.
- **Special Personal Protective Equipment against chemicals:** Used in the repair and maintenance tasks involving hydrofluoric acid and nitric acid lines. The equipment includes: chemical protection overalls, compressed air apparatus or a compressed air apparatus with a long hose. Note: only persons with special training are allowed to use compressed air apparatus.

3 Rescue plan

- A written rescue plan describes the rescue operations in the case a person must be rescued from a confined space or a tank.
- Before work is begun, the work site must be equipped with supplies that make it possible to rescue a person in a confined or closed space. It must be kept in mind that nobody is able to alone lift a person hanging on a rope from a confined or closed space.
- The rescue plan is documented in a written work permit.
- The rescue plan must be reviewed with the team members.

- The rescue plan should include the following, for example:
  - The rescue method, assistive tools, participants and communication.
- A person can be rescued, for example, as follows:
  - A rescue team member enters the space in question from the top using an anchor line and safety harness or a retractable fall arrester (a rescue winch). The person can be rescued by using a winch, for example.
  - By using a rescue hoist designed and manufactured for hoisting (e.g. tripod DOC4260 FALL DEP4P DuraHoist Tropod GBk).
  - The rescuer lowers themselves to the person and attaches a hoisting cable/rope to the person and the person is lifted to safety.
  - The factory's emergency number is being called and the rescue services arrive to rescue the person.

4 Other safety instructions for working in a confined and closed space

- Note the temperature of the work environment.
- Gas bottles, with the exception of gas containers needed for breathing apparatures, are not allowed in confined or closed spaces.
- Working platforms to be built in a confined or closed space must be constructed in accordance with the relevant instructions.
- Work in a confined or closed space must not be assigned to persons under 18 years of age (with the exception of work for which a notification has been submitted to the occupational safety and health authority overseeing the workplace).

5 Finishing the work

- Work supervisor and the person who performs the work ensure that the confined or closed space is clean, and all extra items have been removed from the space.
- Hatches and doors are closed. Measures to prevent unexpected start-ups are removed.
- After work check-out procedure is done according to the work permit.