INFORMATION

MANAGING OCCUPATIONAL SAFETY AND HEALTH RISKS BY PREVENTION AND CONTROL MEASURES APPLIED TO WORK ACTIVITIES

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The Company is registered in the Commercial Register kept by the Regional Court in Ústí nad Labem, Section C, File 24484

1. Isolation of technological equipment

Mechanical isolation

- An equipment on which any work is to be performed and which poses a risk of leakage of hazardous substances and threat to the health of workers must by isolated by mechanical means.
- Designated employees of the production team are responsible for ensuring that the equipment on which the work is to be carried out is free of hazardous substances! In cases where this cannot be ensured the contractor must be alerted to the possibility of hazardous substances presence and advised of conditions for the safe execution of the work as specified in the relevant permit for work.
- It shall be ensured that individual production units or production assemblies are mechanically isolated at their battery limits, i.e. physically separated (by inserting blank flange/s) from the surrounding technological assemblies before any work is started.
- To reduce the likelihood of contamination while increasing workers safety, the apparatus or parts of the equipment will be additionally blanked at all inlets and outlets in the following circumstances in particular:
  - before entering a confined spaces such as fully enclosed vessels,
  - when working with open fire,
  - when performing work where neighbouring workgroups may be affected.
- Designated employees of the production team shall be responsible for preparing blanking plans.
- A shut-off facility must be doubled where there is a risk of hazardous substances presence posing a threat to workers and where the provided isolation is only by means of inserting blank flange(s) or by closing relevant valves.

Sources of risk	Measures
Specific apparatuses not blanked off.	Based on orders a list of apparatuses that must be mechanically isolated is to be handed over. **Responsible: Production team (VT), Maintenance technician, Project engineer**
Incorrect blanking (blank flange installed at unsuitable place)	Blanking plans are to be prepared showing in detail places to be blanked off. **Responsible: VT**
Injury as a result of leakage of dangerous substances during blanking off or when the isolation is provided only by means of closed valves.	Depending on the type of facility and the operating medium perform one or more of the following operations - depressurize, rinse, drain, purge by steam. **Responsible: VT** Close the inlet and outlet valves. The sealing facility must always be doubled (applicable only to hazardous substances)! Describe in detail within the blanking flange plans which are to be shut-off to implement the blanking off. If duplication cannot be done, it is necessary to convene a commission to specify additional measures. **Responsible: VT** Isolating the valves accordingly **Responsible: VT** When isolating only by means of valves prevent their use by chain and lock. **Responsible: VT**
Injury during assembly and dismantling work	Start work only when the facility is isolated, i.e. the valves are shut-off and the blank flanges marked with tags. **Responsible: Contractor** Verify that the dismantled device is released from pressure; apply safe procedures for dismantling the equipment according to the regulations of the main contractor - Gradually loosen flange bolts, tap the flange body after each release, stand on the opposite side; in case of the risk of acid or alkali burn use a face shield and gloves against chemical hazards. **Responsible: Contractor**
Leakage of substances	Immediately interrupt work. Inform operator. Secure a drip tray

during disassembly of machine parts.	**Responsible: Contractor**
Unlocking the facility after one activity when other activities are still in progress	Putting down all mechanical requirements for all activities into the "Mechanical Locking" book, placing the appropriate number of tags on the isolating / locking elements. **Responsible: VT**

Electrical isolation

The electrical isolation is necessary in the following cases:

- ✓ When the machinery is driven by an electric motor (e.g. rotary machines) and it is necessary to prevent inadvertent start or activation by a local or remote switch.
- ✓ When the work is carried out directly on electrical equipment (LV, MV and HV), constituting a hazard by electric shock.

Sources of risk	Measures
Electric shock - burns, loss of consciousness, heart arrest Injury from rotating parts of power-driven equipment.	Create a list of devices that are required to be electrically isolated for the work to be done. **Responsible: VT** Secure the means of electrical isolation on the switchboard according to the list. Write down the safety steps taken in the substation Switching log book. **Responsible: Contractor** Mark in the list the isolated device (e.g. by attaching a stamp, electrician's signature). **Responsible: Contractor** Mark the isolated devices in the operating sets (switches, circuit breakers) according to the list, using labels; before doing so check the integrity and correctness of the isolation (closing the switch locally). **Responsible: VT** Do not start work if the device (switch) is not marked with a label indicating that the device is isolated! **Responsible: Contractor** When dismantling motors, use a different means of isolation (e.g. once disconnected from the terminal box short the wires and cover them by insulating tape, etc). **Responsible: Contractor** All work on electrical equipment must only be carried out by a person with an appropriate electrotechnical qualification (according to Decree No. 50/1978 Coll.). **Responsible: Contractor**

2 Work at heights and scaffolding erection

Work at heights is considered to be any activity if it is performed at a height of 1.5 m above the surrounding terrain level, or if the free depth below the work area exceeds 1.5 m (hereafter referred to as work at heights).

Ensuring safety during work at height is one of the basic LSRs (Life Saving Rules). In case of violation, the Sanction rules of the Client will be followed.

The erection, dismantling and modifications of scaffolding will be carried out according to valid legislation and standards. Scaffolding erection shall be carried out only by suitably qualified persons.

In the course of the works, the following tasks are assumed to be work at heights:

- ✓ Scaffolding work
- ✓ Work on scaffolding or other stable or mobile working platforms
- ✓ Work over the free depth – entries to facilities
- ✓ Industrial climbing work

General rules

Applies to all groups of work at heights listed above.

Sources of risk	Measures
Unacceptable health condition of workers working at heights.	Work to be done exclusively by fit persons. Workers check before the start of the work and during the work. **Responsible: Senior worker of the Contractor** Reject work at height or interrupt it if one does not feel right at a given moment to do the job. **Responsible: Workers of the Contractor**
Falling objects from height	Ensure the space under work at heights is protected and safe so that people under the workplace cannot get injured – provide scaffolds with screening or containment sheeting for safety. Enforce use of tethered tools. Store materials and small items in sacks, containers or boxes, etc. **Responsible: Contractor**
Overloading the load bearing capacity of scaffolding floors and other work platforms. .	Burden the floors only up to the maximum permissible load bearing capacity indicated on the scaffold or other working platform label. Storing material on scaffolding working platforms or structures is forbidden. **Responsible: Contractor**
Risk of falling from height.	Before commencing any work at height, evaluate the risks of the activity being performed and set up measures to minimize the risk of falling; preference is to be given to collective protection against personal protection measures (PPE/OOPP). When using a harness, the anchor points are to be determined by a responsible worker who must demonstrably acquaint all the workers who will work at heights with these points. All workers shall be trained for work at height (the training certificate must not be older than one year). **Responsible: Contractor**

Scaffolding work

Sources of risk	Measures
Injury sustained from falling from height of workers erecting and dismantling scaffolding.	Harness with two chords to be used at work, each ending with a carabine. At least one of them must be tacked at any given moment. Always anchor as high as possible above the harness position. **Responsible: Contractor**
Erection, modification and dismantling of scaffolding by inadequately qualified workers.	Installation and disassembly of the scaffolding shall be carried out exclusively by staff holding a scaffolder card. Also applies to any modifications to existing scaffolding. **Responsible: Contractor**
Scaffolding entered by other than scaffolding workers during its erection or dismantling.	All scaffoldings will be marked at the time of construction with an informative scaffolding table. Red = ENTRY PROHIBITED **Responsible: Contractor** All scaffolding will be marked with an informative scaffolding table on the status of the scaffolding upon its completion. The tables shall be obtained by the contractor of the scaffolding according to the prescribed pattern, who will also protect the tables against degradation due to climatic conditions (plastic cover, etc.). Red = ENTRY PROHIBITED Green (in-use record) = ENTRY ALLOWED Yellow = ENTRY ALLOWED WITH LIMITATIONS (PPE/OOPP or other measures are to be used to eliminate the risk of falling)

	Responsible: Contractor Before placing a green or yellow table each scaffolding must be inspected and its condition approved for use. **Responsible: Contractor**
Scaffolding defects occurring during its use.	Regular inspections are to be carried out at the required periods according to the type of scaffolding. Scaffolding with load capacity up to 200 kg/m^2 - 14 days Scaffolding with load capacity above 200 kg/m^2 - 7 days **Responsible: Contractor**

Work on scaffolding or other stationary or mobile work platforms

Sources of risk	Measures
Entering stationary platform which is not safe to use.	Enter the scaffolding or platform only when an information table on the working platform at the entrance indicates: Green (in-use record) = ENTRY ALLOWED Yellow or additional marks = ENTRY ALLOWED WITH LIMITATIONS (PPE/OOPP are to be used against falling or other measures to eliminate the risk of falling) Do not enter a scaffolding or platform marked with an informative table: Red = ENTRY PROHIBITED **Responsible: Contractor** Enter the scaffolding or platform only if the date of the last inspection is not earlier than the deadline for its implementation. **Responsible: Contractor** Enter the scaffold only when it has all the following safety features: - proper entry and exit, undamaged floors, - skirting boards on the working floors, - two-rod guiderail for floors 2 m higher than level 0, - an information plate indicating the entry onto the scaffolding under the conditions specified therein. **Responsible: Contractor** Check that the scaffolding does not show any obvious defects that may have occurred during previous work and as a result of inclement weather: - inclined, - incomplete or apparently shabby floors (loose flooring, damaged, broken) **Responsible: Contractor**
Injury due to a fall from a height.	When at work and the collective protection cannot be used (or not fully), use a harness with two chords, each with a snap-ring, with at least one hitched at any moment of time. Always anchor as high as possible above the point of the harness position. Anchor to points with sufficient load bearing capacity. **Responsible: Contractor**

Work using the industrial climbing technique

Sources of risk	Measures
Unqualified persons.	Work to be carried out only by fit and competent workers (fit and competent for work at heights pursuant to the Government Decree no. 362/2005 Coll., including rope access work). **Responsible: Contractor** Perform only if using another safer way (using scaffolding, platforms, etc.) is definitely ruled out. **Responsible: Worker of company requiring work to be**

	performed A Job Hazards analysis (JHA) is to be compiled as background information for preparing the work permit. Anchor points must be defined. **Responsible: Contractor**

Work above free depth

Sources of risk	Measures
Accident as a result of falling into a hole in a walking area.	Secure the holes with a firm barrier. **Responsible: Contractor** When handling work near the holes, ensure the safety of workers against falling into the free depth. **Responsible: Contractor** Close the perforations between the scaffolding floors, if this is possible. Pay extra caution at other scaffoldings. **Responsible: Contractor** Close access openings between the scaffolding floor levels. **Responsible: Contractor**

3 Work in a hazardous area (in confined spaces and under terrain)

Work in confined spaces such as parts of production technology (tanks, columns, furnaces, reactors, etc.) and work below ground level (sewerage, shafts, wells, excavations, etc.) is one of the most risky work of all, as it poses dangers that generally do not occur anywhere else. The basic categories of hazards arising from work in confined spaces are as follows:

- ✓ Dangerous oxygen concentration (below 19% and above 23.5% by volume)
- ✓ Increased concentrations of toxic and harmful substances
- ✓ Increased concentrations of flammable and explosive substances
- ✓ In-fall or sinking/flooding
- ✓ Other mechanical or electrical hazards
- ✓ Temperature above 50 ° C

For all the activities carried out in these areas, it is absolutely necessary to strictly comply with all the specified Measures, or to act even better than required by these Measures, taking into account the available options! Before entering the confined spaces the contractor is responsible for setting up work supervision in confined spaces.

The Contractor is responsible for ensuring that the given supervisor:

- ✓ will be proficiently trained in knowledge of supervising activities,
- ✓ Be familiar with the risks of the work and with all the Measures to minimize them,
- ✓ will record the movement of workers within the confined space (from collected ID cards / training cards)
- ✓ have a functional system set up for communicating with workers inside a confined space throughout the work
- ✓ Will not perform any other activities outside the supervision of work within the confined space
- ✓ Be familiar with the rescue plan and supervision activities in an emergency situation

Sources of risk	Measures
Insufficiently assessed work risks	Develop risk analysis as a basis for preparing work permits and conditions for rescuing people. **Responsible: VT, Contractor**
Occurrence of hazardous gaseous substances in the facility (toxic, flammable, inert)	Shutdown and mechanical isolation **Responsible: VT** De-ventilation of equipment during work according to specified risks: - ventilate the facility for sufficient time before entering, - use chimney effect, wherever possible, - use additional ventilation (air handling equipment)

	Responsible: Contractor, VT
Occurrence of hazardous solid and liquid substances in the facility	Prepare facilities to enable contractors to work inside the space (rinse, clean, ventilate or take other necessary steps to minimize the risks associated with substances in the facility) **Responsible: VT** Perform cleaning the interior of the vessel by a specialized company, remove solids from the facility **Responsible: VT, Contractor**
Injury due to intoxication after entering a confined space.	Perform monitoring of the working atmosphere before entering the vessel (using a rigid or flexible probe)! If this is not possible, enter the space for the first measurement using SCBA/IDP. **Responsible: VT, Contractor** Perform ambient air monitoring at specified intervals. **Responsible: Contractor**
Handling of unconscious body hindered by restricting conditions inside a vessel in the event of an emergency event.	Determine and observe the provisions of the Rescue Plan. Equip all workers entering the confined spaces with harnesses. In assessing the risks, decide on the use of a rope and a tripod or a temporary scaffold structure with a pulley etc. **Responsible: Contractor, VT**
Unsatisfactory health condition of workers working in confined spaces.	Check the workers before and during work. **Responsible: Senior worker of the Contractor (receiver, acceptee)** Reject doing the work or interrupt it if one does not feel fit to do the job at the time. **Responsible: Workers of the Contractor** Set safety breaks for workers working inside hazardous areas according to prevailing influences (temperature, atmosphere, equipment, etc.) **Responsible: Contractor, VT**
Entry of unauthorized persons into vessels out of the working time.	. Place a rigid barrier on all other entrance openings in the handed over workplace that do not serve as access to the dangerous area and close the entrance used with a firm barrier each time before leaving the workplace. **Responsible: Contractor**
Electric shock.	Do not use electrical equipment with a voltage greater than 50 V without using a safety isolation transformer or an earth leakage relay. **Responsible: Contractor**
Entry of the Company's employees if a Contractor works in the vessel	Each employee of the Company must communicate with the supervisor of the work in the given dangerous space about permission to enter and learn about the terms of the work permit and all relevant attachments. **Responsible: Company's employee entering the given space**
Entry of Company employees if nobody else works in the vessel	Work must be done in compliance with conditions set forth in S 465. **Responsible: Company's employee entering the hazardous space.**

4 Work with open fire

Open fire operations are all activities that may cause a fire (in particular welding, sparks producing implements and tools or heating of a workpiece to a temperature that could ignite when touched by a flammable substance).

It is necessary to strictly adhere to all the specified measures arising from the risk assessment of specific activities.

Sources of risk	Measures
Launch open-fire work at a	Do not allow open fire work until the measures have been

time when the facility is not yet fully emptied	determined through PfW/PkP (Permit for work). **Responsible: VT**
Occurrence of flammable gaseous substances in or near the facility on which open-fire work takes place.	Before starting any open fire work (and also in the course of such work) carry out measurements of the concentration of flammable gases and vapours of combustible liquids - following the measures laid down in the permit for work. **Responsible: Contractor** Check the tightness of the surrounding device; cover the shafts and the channels according to the conditions in the permit for work. **Responsible: Contractor / VT** Responsibility: Contractor / VT Remove from the workplace and its surroundings flammable, combustion and explosive substances according to the conditions in the permit for work. **Responsible: Contractor / VT**
Flying off hot particles when working at elevations above the places to be protected from the effects of such work.	Establish a protective zone within the distance per permit for work. Before starting remove flammable materials to required distance or provide protection against the effects of hot particles to required distance. **Responsible Contractor / VT** Prevent the flying off of the hot particles using non-flammable barriers. **Responsible: Contractor**
Fire breakout during open-fire work.	Provide workplace with fire protection equipment (bucket with water, DpE/PHP – Dry powder Extinguisher etc.) in compliance with the permit for work, set up fire surveillance (designated employee of the Contractor with written rights and obligations applicable to the surveillance appointment). **Responsible: Contractor**
Fire breakout after completion of open-fire work.	Perform fire surveillance at specified intervals according to the permit for work. **Responsible: Contractor / VT** After the end of welding, place the welding machine outside the production unit. **Responsible: Contractor**
Changing conditions over those in which work was allowed or the occurrence of MU (leakage of matter from the facility).	Interrupt work, remove source of open fire, and cool down hot spots with water. **Responsible: Contractor**
Lack of knowledge of the employees of the conditions of carrying out open fire work.	Before starting work, make sure that all workers concerned are allowed to work by checking the permit for work. **Responsible: Contractor**
False EFA/EPS – Electrical Fire Alarm when working with open fire.	Disable the relevant EFA/EPS sensors for the time necessary to carry out the work. **Responsible: VT**

5 Work in area at risk for the presence of hydrogen sulphide

Hydrogen sulphide (H_2S or also sulphide) is a highly toxic and extremely flammable gaseous substance that is formed during the refining of petroleum fractions as one of the intermediates, from which pure sulphur is then produced. Based on the hydrogen sulfide content in the production facility, the operating units are grouped into one of three areas with a hydrogen sulphide risk:

- ✓ Low risk of occurrence — the facility does not contain any H_2S
- ✓ Medium risk of occurrence — the H_2S content in the facility is up to 10 thou. ppm (1 % vol.)
- ✓ High risk of occurrence — the H_2S content in the facility 10 thou. – 1 mil. ppm (1 – 100 % vol.)

Due to the emptying of most production facilities during shutdowns all areas (with exceptions) fall for H_2S under the **low risk** areas. This does not apply to normal operation, for the period prior to the commencement of the shutdown and after the start of putting the production units into operation after the end of the shutdown.
The inclusion of workplaces into the low risk of occurrence of H_2S category is announced by responsible workers of Unipetrol Company only after the production facility has been completely emptied. Until then it is essential to observe the following basic safety measures applicable to work in areas with the risk of occurrence of H_2S:

Sources of risk	Measures
Workers unfamiliarity with the H_2S risks	Organisationally provided H_2S risk awareness training for all workers of contractors working on the company premises. **Responsible: Unipetrol Company**
Late identification of H_2S leak in the air	Provide all personnel to work in a medium or high risk area of H_2S by personal detectors (of their choice). **Responsible: Contractor** Equip the work group with RDS for work in area with high risk occurrence of H_2S for continuous communication with operational staff. **Responsible: Contractor**
H_2S poisoning	Equip all workers for work in area with medium to high risk occurrence of H_2S with escape breathing masks against H_2S effects (according to their choice). **Responsible: Contractor**
Evacuation in the wrong direction (into the toxic cloud)	Before starting work in a medium or high risk area of H_2S familiarize yourself with the location of windbags to determine the wind direction, always escape perpendicularly to the wind direction. **Responsible: Contractor**

6 Work on equipment containing H_2S

Such work includes, in particular, the opening or closing of equipment that contains or may contain H_2S, or when there is a risk of contamination of the surrounding atmosphere and the threat to people in the vicinity. The basic measures for this type of work are:

Sources of risk	Measures
H_2S poisoning during work	Work to be performed strictly only with the use of SCBA/IDP or SCRA/DDP respiratory equipment. **Responsible: Contractor**
Entry of unauthorized persons into the area where work is carried out on equipment containing H_2S	Identify a hazardous zone and secure it against the entry of unauthorized persons by marking it (e.g. using warning tape)
Insufficient risk assessment of work.	Compile a JHA (Job Hazard Assessment) for any work of this type, including the determination of the surveillance duties, the way of controlling the workers carrying out the risk activity, the way of communication between the supervisor and the working group, etc. **Responsible: Contractor**
Early non-recovery of emergency assistance.	Work to be carried out with a minimum of two workers. **Responsible: Contractor** Provide supervision by a third person who will be equipped with an SCBA/IDP in a standby mode for immediate use (IDP deployed and carried on the back). Supervision is performed from a secure zone from such a position that shall ensure visual contact (if it cannot be ensured, follow the JHA) **Responsible: Contractor**

Spontaneous ignition of sulphide compounds (occurring in a facility containing H_2S)	Continuously spray sulphides with water, avoid contact with dry air. **Responsible: Contractor**

7 Lifting equipment and cranes

Each operation of a lifting equipment/crane requires that a system of safe work (hereinafter referred to as SSW/SBP) is worked out and adhered to whether it is a single hoisting operation or a number of recurrent hoisting operations, an integral part of which is also the crane siting plan, showing the position of the crane on the site, including the crane outrigger floats positions and its swing radius and boom reach.

Sources of risk	Measures
Inappropriately chosen lifting technique (selection of crane, binding means, etc.).	Compile a safe work system for each hoisting and follow the provisions described therein. **Responsible: Contractor**
Inappropriate / inadequate siting of the crane (risk of infall).	Prepare the siting plan sufficiently in advance of the work commencement. **Responsible: Contractor**
Failure to create a siting plan because the map background data were not received.	Send the contractor providing the crane work cross-sections of the general development plan showing the underground infrastructure positions. To be sent sufficiently in advance. **Responsible: Senior worker of the Company**
Incorrect (inaccurately drawn) position of the crane in the siting plan.	Check the outriggers / siting plans (correctness of the crane position drawn in the siting plan). **Responsible: Senior worker of the Company**
Incorrect positioning of the crane (not in accordance with the siting plan).	Check the position when handing over the workplace. **Responsible: VT**
Entry of unauthorized persons into the hoisting area (entry under suspended loads)	Secure the workplace against unauthorized entry (bordering, guarding, etc.) **Responsible: Contractor**
Insufficient identification of the binder for the crane operator during the hoisting	Ensure the binder wears easily visible yellow identification marks (arm band, vest, etc.) **Responsible: Contractor**
Incompetent personnel	The crane operator must have a license entitling it to manipulate the type of crane used. A list of crane operators including a copy of the proof of their qualifications should be handed over before work commences. **Responsible: Contractor** Binding should only be carried out by workers who are in the possession of a valid binder certificate and are authorized to do so. List of binders including a copy of the proof of their qualification is to be handed over before each event. **Responsible: Contractor**

Fall of a load: - a sling slips out of the hook	Use only hooks with a secured load-lifting system. **Responsible: Contractor**
- a sling snaps / breaks	Do not use damaged or otherwise inadequate binding means; check their condition before each hoisting. **Responsible: Contractor**
- a lifting lug unscrewed / ripped out of the body of the load	The threaded bolt of the lifting lug must always be screwed in by its entire length into the body of the load up to the bearing surface and firmly tightened against spontaneous loosening caused by the movement of the load. Perform visual checks of the integrity of these suspension products prior to their use. **Responsible: Contractor**
- dangerous swing of the load due to strong wind	Do not do hoisting if the speed of the wind is greater than10 $m.s^{-1}$ **Responsible: Contractor**
The crane tips over	Hoisting is to be done only with fully extended outriggers. **Responsible: Contractor** Use load distribution pads under outriggers on non-reinforced surfaces. **Responsible: Contractor** Do not overload the lifting equipment in excess of its safe load carrying capacity. **Responsible: Contractor**
Dangerous handling of the load during hoisting	Use guide rope for all handling of the load during hoisting. The load must not be handled directly by hands! **Responsible: Contractor**
Injury caused by fallen load	Observe the prohibition of movement under a suspended load - this is a violation of Rule no. 5 LSR **Responsible: Contractor**
Collision of two or more cranes	A crane coordinator shall be appointed to control hoisting work. **Responsible: Contractor**

Binder obligations:

The binder is responsible for binding and unbinding loads and for the proper installation and use of suitable lifting devices in accordance with the proposed handling procedure. He or she must always be demonstrably familiar with the lifting and binding devices uses and conditions for their correct use. Familiarization must be carried out either under a guidance of a specialist or by the manufacturer's instructions for use or the supplier of lifting or binding equipment.

Hoisting work of two or more cranes:

If it is necessary to carry out work with multiple cranes and there is a risk of collision, this work will always be handled by the responsible person - the crane coordinator. However, the condition is that the work will be identical in scope and character, and a number of batching plans with a drawing of the cranes will be attached to the "work permit", which will take into account all the crane dismantling / mounting positions as described in the "work permit". A common "lifting plan" or a safe work system for a specific "work permit", will then state the number of mandatory attachments - "siting plans" that will be numbered and each time the crane is moved to a new or another position an approval of such new working position of the crane by the operator of the unit shall be recorded in the "work permit" in the "extension" column. **It is not permissible to start the work using the crane(s) without the approval of the changed position of the crane by the responsible employee of the company!**

8 Radiography

Radiography is used to perform non-destructive defectoscopy to find hidden internal or surface defects. Radiography is based on the ability of X-rays to penetrate metallic materials. For the safe execution of X-ray work the following precautions must be observed.

Sources of risk	Measures
Entry of unauthorized persons to locations where X-ray imaging is being performed	Demarcate workplaces at a sufficient distance from the workplace itself, mark with warning signs. **Responsible: Contractor** Carry out X-rays imaging mainly outside the main working hours on the basis of a valid work permit determining the day and hour of the start time. **Responsible: Contractor**
Unawareness of other workers of X-ray imaging being performed	Inform through other responsible workers of the company of the x-ray imaging being performed, including place of work and the starting date of each X-ray imaging executed always at least 1 day before the start of these activities. **Responsible: Contractor**
Outages of level gauges when performing X-ray imaging at the time of start up or after units' start up	Report execution of the x-ray imaging to the shift manager on a CV (via telephone) and carry out the tests after his or her approval. **Responsible: Contractor**
Incompetent personnel	X-ray imaging is to be performed only by persons authorised to do this type of measurement. **Responsible: Contractor**

9 Using portable electrical equipment

Electrical equipment is considered to be both hand-held power tools and all temporary electrical equipment such as extension cables, portable distribution boards used on building sites and electrical equipment of mobile building cells. The use of electrical appliances is subject to the following rules:

Sources of risk	Measures
Electric shock due to equipment damage	Use only portable electrical equipment and mobile distribution boards complete with a valid test result and inspection certificate. Use them always in accordance with the manufacturer's instructions. Check the appliance condition before starting work. **Responsible: Contractor**
Electric shock due to water entering the equipment	Use only portable electrical equipment suitable for the environment for which it was made (corresponding degree of protection to IP classification, certified products). **Responsible: Contractor**
Short circuit, fire, electric shock as the result of too long extension cable.	Use extension cables with a maximum length of 50 m. **Responsible: Contractor**
Tripping over cables, damage to cables	All electrical equipment cabling is to be suspended (using hangers, tripods - do not use bare wires!), covered, or buried (run in suitable protecting sleeves) so that it does not interfere with pedestrian traffic movement on foot bridges or communication corridors (cables must not be travelled over by mobile devices or vehicles, must not lie on sharp gravel or on roads). **Responsible: Contractor**
Handling of building site distribution boards by unqualified persons	Isolate building sites' distribution boards so as to prevent access it interference with them by unqualified persons (lockable door of the d/board, using padlock etc). Installation, connection, transfer and changes may only be carried out by a qualified electrician. Equipment provided with earthing terminal must be properly earthed (earthing conductor with pressed eyelets). **Responsible: Contractor**

All building site distribution boards must bear the name of the owner/operator, the registration number,

information how to contact the responsible person, must be enclosed, earthed and properly secured against overturning and equipped with accessible main isolator for quick shutdown.
There will be a portable dry-powder fire extinguisher provided for every building site distribution board.

10 Pressure cylinders

When using, handling and storing pressure cylinders, the rules laid down by normative requirements (e.g. ČSN 07 83 04, Flammable liquefied hydrocarbon gases - Manufacturers and warehouses and TPG 200 00 Storage, sale and transport of pressure vessels with liquefied hydrocarbon gases, etc.) must be observed. The most basic precautions for handling cylinders are as follows:

Sources of risk	Measures
Damage and gas leakage as a result of a cylinder falling	Store only in a vertical position, secure against falling, overturning and rolling (using chain, etc). Provide protection against impact during transport; protect the valves with protective caps. **Responsible: Contractor**
Fire/explosion when working with open fire.	Use only 5 m connecting hoses (without extending hoses with the use of couplings) equipped with a flash back arrestor safety valve. **Responsible: Contractor** Ensure a minimum distance of 3 m between the steel cylinder and the open flame. **Responsible: Contractor** Ensure a minimum distance of 3 m between the cylinders used (welding, burning, heating) and other cylinders used. **Responsible: Contractor**
Incorrect storage of pressure cylinders	Mark stored cylinders with safety signs. Store separately empty and full cylinders. **Responsible: Contractor**

11 Tightness and pressure tests

All sealing and pressure tests represent a high risk of injury to all people moving in close proximity to the facility due to the possible accumulation of large energy potential in the plant. Tightness and pressure tests are performed on the basis of legal requirements and on the basis of internal company regulations for reliability verification.

Pressure test (LTO) with water

The prescribed pressure is applied to the dedicated pressure/gas device to verify the strength of the casing and the assembled parts - always in the presence of a technician with authorisation and valid competency certification.

Pressure test (LTO) with inert gas (nitrogen)

The prescribed pressure is applied to the dedicated pressure/gas device to verify the strength of the casing and the assembled parts and is used wherever a water pressure test cannot be carried out because the water could not be completely removed from the device after the test, or the device could not be fully flooded for the preceding type of pressure test - always in the presence of a technician with authorisation and valid competency certification

Tightness test (LT) of equipment

The test is conducted using several types of media - water, inert gas, steam and is carried out on the production plant as a whole – i.e. after removing all the blanking plates inside of the unit that served as a safety separation of the equipment during repair, cleaning, inspection and other activities inside the equipment or “pressure tests (LTO)”. The flange connections of the specified pressure/gas equipment that were dismantled during a given repair/shutdown are inspected by a technician with authorisation and valid competency certification. Other dismantled connections are checked by the authorized worker(s) of the contractor - the general contractor of the repair contract. It is recommended that not disassembled

accessible flanges are checked by the workers of the operation, alternatively checked by the contractor's workers on a contractual basis.
For the above reasons, the following measures are adopted for all types of tests:

Water pressure test (LTO)

Sources of risk	Measures
Injury to operator(s) or persons in the vicinity due to rupture of a pressurized device or device used to perform a tightness test.	A device which will be subjected to a watertight pressure test must be completely degassed/flooded (by compressing the gas volume, an unintended energy charge could occur in the device). **Responsible: Contractor** Demarcate the workplace using warning signs and informative tables on work done. **Responsible: Contractor** Work must be done exclusively by personnel who is familiar with safe procedures for performing a pressure test - monitoring the pressure build-up over time (in the case of a faultless flooding the pressure build-up must be almost instantaneous – water incompressibility) **Responsible: Contractor** Pressure applied in the device must not exceed the test pressure specified on the device label – or must be according to the documentation of this device! **Responsible: Contractor** Attach the jig using a full number of screws/bolts of the appropriate length and cross-section. **Responsible: Contractor** Use fittings/flanges of a design pressure higher than the pressure to perform the pressure test. **Responsible: Contractor** Do not use motex tapes to couple hoses, do not use damaged pressure hoses. **Responsible: Contractor**

Gas pressure test (LTO)

It is used wherever it is required by national legislation or the company's internal regulations. It is also always used wherever the perfect removal of water from the device would not be possible and it is therefore used as an alternative medium.

Sources of risk	Measures
Injury to operator(s) or persons in the vicinity due to rupture of the equipment.	Notification or decision to carry out gas pressure test **Responsible: Maintenance technician (inspection), Contractor** Determine the pressure plan – time duration of pressure increase (pressurising speed). Determine the number of pressurising interruptions (reaching the check pressure limits) and time delays between applying further pressures to check the equipment. (All recorded in the pressure test plan). Determine procedures and measures when detecting leakage(s). **Responsible: Contractor and maintenance technician (inspection)** *Application of the JHA, which is at the end of this chapter.* **Responsible: Contractor and maintenance technician (inspection), VT** Determine the time when the pressure test will be carried out (with regard to the ongoing work - usually after the end of normal working hours - the night hours) **Responsible: Responsible worker of the group - Head**

	Demarcate the workplace using warning signs and informative tables on work done. **Responsible: Contractor** Work must be done exclusively by personnel who are familiar with safe procedures for performing a pressure test. **Responsible: Contractor** Pressure applied in the device must not exceed the test pressure specified on the device label – or must be according to the documentation of this device! **Responsible: Contractor** Attach the jig using a full number of screws/bolts of the appropriate length and cross-section. **Responsible: Contractor** Use fittings/flanges of a design pressure higher than the pressure to perform the pressure test. **Responsible: Contractor** Do not use motex tapes to couple hoses, do not use damaged pressure hoses. **Responsible: Contractor**

Tightness test of facility (LT)

Sources of risk	Measures
Injury to operator(s) or persons in the vicinity due to rupture of the equipment	Notification or decision to carry out pressure test **Responsible: Contractor +Maintenance technician (inspection)** Determine the pressure plan – time duration of pressure increase (pressurising speed). Determine the number of pressurising interruptions (reaching the check pressure limits) and time delays between applying further pressures to check the equipment. (All recorded in the pressure test plan). Determine procedures and measures when detecting leakage(s). **Responsible: Contractor a Maintenance technician (inspection)** Determine the time when the pressure test will be carried out (with regard to the ongoing work - usually after the end of normal working hours - the night hours) **Responsible: Senior worker of the company** Demarcate the workplace using warning signs and informative tables on work done. **Responsible: Contractor** Work must be done exclusively by personnel who are familiar with safe procedures for performing this type of pressure test. **Responsible: Contractor** Pressure applied in the device must not exceed the test pressure specified on the device label – or must be according to the documentation of this device! **Responsible: Contractor** Attach the jig using a full number of screws/bolts of the appropriate length and cross-section. **Responsible: Contractor** Use fittings/flanges of a design pressure higher than the pressure to perform the pressure test. **Responsible: Contractor** Do not use motex tapes to couple hoses, do not use damaged pressure hoses. **Responsible: Contractor**

Additional procedures and risks are specified for each pressure test separately.

12 Blasting

Blasting is the operation of forcibly propelling a stream of fine abrasive particles against a surface under high pressure to smooth a rough surface, roughen a smooth surface, shape a surface or remove surface contaminants. For this reason, it is necessary to protect the workers who carry out the work and the persons moving in the vicinity of the work before being hit by an abrasive jet or from inhaling the abrasive particles. Accordingly, the following measures must be observed:

Sources of risk	Measures
Injury by flying abrasive particles	Use suitable PPE/OOPP - protective suit, head and face protection, gloves. **Responsible: Contractor** Isolate the work area against contact of abrasive parts with people moving around the work area. **Responsible: Contractor**
Carcinogenic disease	Do not use silica sand without respiratory protection. Do not use silica sand without providing space to protect people moving around. **Responsible: Contractor**
Inhalation of abrasive particles during work	Use suitable PPE/OOPP based on risk assessment – face sheet, respirator, half-mask or full face mask in combination with suitable filter. **Responsible: Contractor**
Noise	Use suitable PPE/OOPP – hearing protectors (earplug or ear muffs according to the noise level). **Responsible: Contractor**
Work in hazardous spaces (in enclosed vessels)	See Chap. 5.4.

13 Pressurized water cleaning

A high-pressure water jet is used when cleaning with pressure water. For this reason it is necessary to protect workers who carry out the work and people working in the vicinity of the work performed before being hit by a water jet or by inhalation of dangerous substances which can be released during cleaning. Accordingly it is necessary to observe the following measures

Sources of risk	Measures
Damaging parts of the body with water jets or flying particles released from the cleaned surface	Use suitable PPE/OOPP – waterproof protective suit, head and face protection, gloves. **Responsible: Contractor** Isolate the work space against unauthorized entry. **Responsible: Contractor**
Release of dangerous substances into the air after their release from the cleaned surface.	On the basis of the risk assessment of the specific work, carry out workplace air monitoring, or use respiratory protection at work. **Responsible: Contractor**
Noise	Use suitable PPE/OOPP – hearing protectors (earplug or ear muffs according to the noise level). **Responsible: Contractor**
Difficulty in breathing in confined spaces due to water vapour or aerosol in air.	See Chap. 5.4. **Responsible: Contractor**
Scalding (when using water heater)	Use suitable PPE/OOPP – protective suit, head and face protection, gloves. **Responsible: Contractor**
Work in hazardous spaces (in enclosed vessels)	See Chap. 5.4.

14 Occupational hygiene

Contractors are required to comply with the conditions laid down by the Government Decree No. 361/2007 Coll., as amended, which sets forth additional health protection conditions at work.

Heat and cold stress – protective beverages

Sources of risk	Measures
Worksite temperature below 4 °C	Provide protective beverage as a protection against the effects of cold, PPE/OOPP and rest breaks. **Responsible: Contractor**
Heat stress	Provide sufficient quantity of protective beverage as a protection against the effects of heat containing less than 6.5% sugar, less than 1% alcohol by weight and mineralized according to the classification of the work. **Responsible: Contractor**
Entering facility with high internal temperature.	Do not enter facility in which the temperature is higher than 50 °C. **Responsible: Contractor** On the basis of the temperature in the facility (30-50 °C) and the category of work, the longest working periods of work must not exceed those specified in Part B of Annex No. 1 to the Government Decree No. 361/2007 Coll. Keep safety breaks. **Responsible: Contractor**
Ingestion of HCHandM / NCHLaS (Hazardous Chemicals and Mixtures) instead of a protective beverage	Prohibition of eating and drinking in production areas. Set up a refreshment point (near the workplace), where the beverages will be stored in a marked crate, box, etc. **Responsible: Contractor**

Noise

Contractors are responsible for assessing the risks of the actual work in terms of protecting workers from the effects of noise.

Sources of risk	Measures
Noise level above 80 dB.	Provide workers with adequate hearing protection. **Responsible: Contractor**
Noise level above 85 dB	Ensure that the hearing protection is used. **Responsible: Contractor**
Noise caused by technological processes (e.g. starting steam using/driven facility, etc.)	Inform sufficiently in advance all concerned of the technological processes associated with excessive noise emissions. Organise the work with respect to noise levels. **Responsible: VT / Contractor**

The exception is at the time of all production facility shutdown. There is therefore no risk of noise created on the part of the company.

Asbestos and other mineral fibres

Some production facilities might contain asbestos due to their advanced age. In case of its detection or suspicion of occurrence, the following measures must be applied immediately:
The measures must be applied also in cases of work with insulations of unknown origin, i.e. when it is not possible to verifiably prove the properties / composition of the material used.
For example, it could be a mineral wool containing asbestos mixed with glass fibres or a pure ceramic fibre wadding insulation.
These materials are dangerous because of the creation of short fibres during handling that are freely dispersed into the atmosphere and which can be inadvertently inhaled.

Sources of risk	Measures
Ignorance of asbestos hazards and of materials that release short fibers when working with them	The work will be performed exclusively by workers demonstrably familiar with the risks of work with this material and safe working practices. The contractor will furnish proof of the competence of its staff. **Responsible: Contractor** Prepare a written procedure for working with asbestos or generally with materials that release short fibres and enter the human body through inhalation. **Responsible: Contractor**
Inhalation of fibres (risk of asbestosis, silicosis)	Use a suitable PPE/OOPP – single-use protective clothing worn over a work wear, closed glasses, PVC or rubber gloves, filtration half face mask with suitable filter (classification P3). **Responsible: Contractor**
Threat to the environment and other work groups	Prevent other workers from entering the workplace; designate the area on which this type of dangerous material will be handled by means of marking, a warning tape or supervision. **Responsible: Contractor**
Improper handling of asbestos waste and of materials that release short fibres when working with them	Collect and put the waste insulating material immediately after its removal from the equipment into sealed and for this purpose designated containers, marked according to the Waste Act and have an identification sheet of the relevant hazardous waste available near the collecting containers. When considering the reuse of the insulation material, take measures to prevent the possible spread of the insulation material or parts thereof around the environment. **Responsible: Contractor**
Spreading of dangerous fibres (short fibres) into space	Do not perform the work under windy conditions that could result in the dangerous substances being blown to distant locations from the place of the work. Do not remove the insulation forcibly and do not throw it down from heights. **Responsible: Contractor**

15 Order in the workplace

Every contractor is responsible for maintaining cleanliness and order in its workplace. Work will be stopped if it is observed that the workplace untidiness may endanger its workgroup or other workgroup(s) working in the neighbourhood. The permission to continue with the work will not be given until the deficiencies will have been redressed.
Responsibility – rests with the senior employees of the contractors.

Sources of risk	Measures
Unremoved material and parts of equipment lying round (including connection accessories)	Store the material close to the equipment (it belongs to) in containers or plastic bags and mark it properly.
Unremoved equipment and tools – hoses, cables, etc.	Coil up and store welding cables or hoses, take the welding cylinders to a safe place remote from the process equipment
Spilled products or cleaning preparative	Immediately clean or flush into oily water sewer - in the case of leaked out product it is necessary to stop the work and immediately request clean-up operation from the production unit
Fall of unsecured material from workplaces located at heights	The disassembled material and / or the material to be assembled should be stored in special sealable containers and / or sealable bags secured against displacement and fall.

Deviations from normal operation
No deviations from standards used in normal operation are defined in the cleaning area.