AB ORLEN LIETUVA PROCESS SAFETY FUNDAMENTALS

1

Never ignore alarm messages and signals

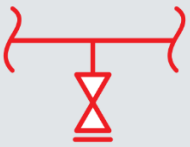
2

Exercise caution when operating process facilities

3

Control the use of maintenance override switches and process override switches

4



Always use energy isolating devices for block valves on drain and vent pipes

5

Check the process scheme (flow circuit) after re-configuration of valves

6

Perform leak tests prior to startup of equipment

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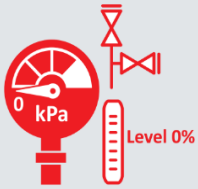

Always make sure that systems are properly prepared before starting maintenance and repair work

8

Never leave an open drain system unattended

9

Use additional protections in case of complete or partial deactivation of interlocks

10

Always adhere to the requirements of process regulations and instructions when starting or shutting down equipment, use equipment pre-start checklists

11

Follow the procedures set out in the Regulations on Management of Changes to implement changes in process units

12

Share your knowledge with your colleagues

AB ORLEN LIETUVA PROCESS SAFETY FUNDAMENTALS

1

NEVER IGNORE ALARM MESSAGES AND SIGNALS

ALARM

The purpose of the alarm is to warn staff to prepare for a potential emergency situation. A specific sound and/or light indication is most often used for warning.

Audible and visible alarms for process control	➢ Emergency shutdown system alarms. ➢ Electric motor (pumps, coolers, compressors) trip alarms. ➢ Fire detection alarms. ➢ Flammable and toxic gas alarms. ➢ Siren testing or emergency drill alarms.
Hazards	➢ Failure to respond to alarm messages or audible signals can endanger the life and health of workers and other persons in process units as well as cause damage to property and environment.
Response to alarms and messages is essential	➢ Criticality and frequency of alarms. ➢ Value/visibility/audibility of audible/visible alarm. ➢ Possibility to respond to alarm messages and signals.
Potential challenges	➢ Importance/criticality and frequency of alarms. ➢ Value/visibility/audibility of audible/visible alarm. ➢ Possibility to respond to alarm messages and signals.
How to ensure that sirens do not cause unnecessary panic and lead to inappropriate actions	➢ Familiarize yourself with the types of alarms and arrangement of sirens in the process unit/refinery. ➢ Familiarize yourself with the instructions/procedures describing the steps to be taken in the event of alarm and follow them. ➢ For projects, analyze and set safety limits for key process equipment and, if necessary, set appropriate values for alarms. ➢ Identify steps to safely restore the process. ➢ Report and discuss the causes of the alarm if you are not sure what caused it.

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2

EXERCISE CAUTION WHEN OPERATING PROCESS EQUIPMENT

Hazards	➢ Release of hazardous substances into the environment, fire, explosion, damage to equipment and injury to workers caused by hazardous reactions.
Things to consider	➢ Deviations from normal process conditions. ➢ Emergency shutdown system messages, alarms, signals during the technological process. ➢ Commissioning, startup and shutdown of equipment. ➢ Process/design changes.
Potential challenges	➢ Undefined or unspecified operating limits. ➢ Operation at minimum or maximum loads. ➢ Non-compliance with change management provisions for technological processes. ➢ Disturbances such as equipment failures, related process equipment control errors.
How to maintain safe operating conditions	➢ Keep the process within the safe operating limits. ➢ Know and understand the critical process parameters and their limits, deviations from which may activate interlocks and local protections. ➢ Make sure that alarms and process safeguards are always switched on. ➢ Know how to return the process to safe operating limits in the event of deviations from the set operating range. ➢ Report and discuss any deviations from the normal operating conditions with co-workers and managers. ➢ Know the risks posed by hazardous substances when in non-standard conditions.

AB ORLEN LIETUVA PROCESS SAFETY FUNDAMENTALS

3

CONTROL THE USE OF MAINTENANCE OVERRIDE SWITCHES AND PROCESS OVERRIDE SWITCHES

Hazards	➢ Disabling of interlocks and local protections (hereinafter – protections) constitutes risks for employees/visitors and assets.
When it is important	➢ In the event of failure or malfunction of emergency shutdown systems (ESD). ➢ When testing protections. ➢ During maintenance and repair of ESD systems. ➢ When starting up or shutting down process units and activating protections. ➢ In the event of external disturbances (electric welding carried out in the vicinity, lightning, sub-zero temperatures).
Things to consider	➢ All consequences of disconnection of protections may not be known. ➢ Whether protections that prevent equipment from starting have been checked. ➢ Whether procedures for disconnection of protections are known. ➢ Ensure timely activation of protections when starting process units.
How to properly operate the ESD system	➢ Familiarize yourself with the ESD cause & effect diagram, know the locations of ESD shutoff valves within the unit. ➢ Prior to using MOS/POS switches, evaluate the potential consequences in the event of incident and take the necessary steps to mitigate risks. ➢ Record the activation of override switches in the ESD status log. ➢ Inform about the active MOS/POS during the shift handover. ➢ In the event of incident and overriden protections, know which equipment need to be stopped/started and which valves need to be opened or closed manually. ➢ When activating the MOS/POS switches, follow the requirements set forth in BMT-3 regarding the duration and informing the management. ➢ When taking over the shift, check that the relevant ESD components have been sealed. ➢ When taking over the shift, check the activated MOS/POS switches. ➢ When taking over the shift, check the entries in the instrumentation log for overriden protections.

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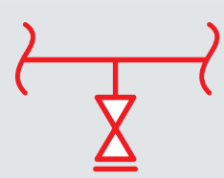

ALWAYS USE ENERGY ISOLATING DEVICES FOR BLOCK VALVES ON DRAIN AND VENT PIPES

ENERGY ISOLATING DEVICE

A valve element or device that blocks the flow of a medium.

Examples of energy isolating devices

- A blocking device – a single shutoff valve.
- A plug, blind, additional isolation valves.

Hazards

- Leak of product from a system or line through an unsealed or damaged drain pipe or vent.
- Fire or explosion hazards, formation of toxic, explosive clouds.
- Loss of containment, contamination of the site, risk to employees' health and life.

Removal of energy isolating devices due to additional technical servicing activities

- Preparation of piping sections for repairs (e.g., steaming).
- Draining of vessels, pipelines.
- Checking the flow capacity of the pipeline.
- Checking the preparedness of the pipeline.
- Temporary supply of medium to the pipeline or vessel.
- Non-standard sampling.

Things to consider

- Drain valves may not have been properly designed for older equipment.
- Use of double block and bleed valves where two closure elements are possible.
- Correct connection of flanges.
- Correct position of valves (closed or open).
- Pipelines or sections of pipelines that are used occasionally – so called ‘dead legs’.
- Installation of transition flanges after completion of works.

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5

CHECK PROCESS FLOW SCHEMES FOR COMPLETENESS AFTER RE-CONFIGURATION OF VALVES

Pipelines/configured valves must be in line with the diagrams provided in process documents (e.g. P&IDs or PFDs).

Cases that require checking completeness and accuracy of the entire process flow scheme

- After pipeline/equipment repairs, scheme changes.
- After a process change implemented for the pipeline/scheme.

Potential challenges associated with checking process flow schemes

- Long and extended systems with limited access.
- Bad weather conditions (snow, ice) and poor visibility at night.
- Valves located in pipelines that are difficult to access.

Things to consider when checking the line/scheme

- Checks should be done against the valid and approved process flow diagrams (PFD) or piping & instrumentation diagrams (PID).
- Start your check from the pump so that you could respond quickly in case of any leak.
- Use isometric drawings in uncertain situations.
- If you notice a leak while checking the system, report it.

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6

PERFORM LEAK TESTS PRIOR TO OPERATION OF EQUIPMENT

LEAK TEST

A leak test consists of increasing pressure inside equipment to a required level and monitoring changes in the pressure over time. If there is pressure drop, appropriate tools are used to locate the leak.

Things to consider

- Make sure that all pipes and fittings are in place before a leak test.
- The tested system must be isolated with blinds.
- Leak tests must be carried out using nitrogen or other safe media such as water.

Leak tests are performed

- Before commissioning of new equipment.
- After repairs of equipment.
- After visual inspection of equipment.

After breakdown/malfunction of equipment.

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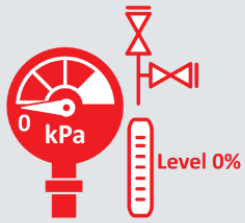
7



ALWAYS CHECK THAT SYSTEMS ARE PROPERLY PREPARED BEFORE STARTING MAINTEINANCE AND REPAIR WORK

MAINTENANCE

Work intended to restore the operability of equipment or its components by upgrading or replacing worn-out parts.

INSPECTION

Inspection makes sure that equipment/system is completely ready for repair. Follow the instructions and checklists provided when carrying out inspections.

Hazards	➢ Uncontrolled release of energy or hazardous substances after opening vessels or pipelines.
When it is important	➢ Opening of vessels. ➢ Opening of flanged connection of vessels and pipelines. ➢ Completion of works.
Things to consider	➢ Make sure that the work is carried out at the exact place on the pipeline or vessel. ➢ Check for possible blockage of vent pipes, sewer pipes and control valves. ➢ Make sure that the vessels, equipment and pipelines are proper sly isolated and blinded.
Steps to be taken	➢ Make sure you have the approved list of EIDs and the basic isolation diagram with indicated EIDs and their locations attached to the list ➢ Drain and steam vessels and pipelines before opening them or removing their flanges. ➢ Before a work permit is issued, a permit issuer must check whether the system has been isolated in line with the energy isolation plan. ➢ If hazardous substances cannot be completely drained from the system, use personal protective equipment and provide suitable absorbents to collect any spilled materials. ➢ Check that the measuring instruments show a safe condition (pressure gauge shows zero pressure, thermometer shows the ambient temperature), that the outlets are open, and make sure you are at the right vessel. ➢ Use the blinds indicated in the pipeline specification, which are included in the list of EIDs for pipelines.

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8

NEVER LEAVE AN OPEN DRAIN SYSTEM UNATTENDED

DRAINING

Removal of a liquid product from equipment into an industrial sewer or a dedicated container.

VENTING

Removal of gas from equipment into a flaring system or atmosphere.

SUPERVISION

Control over conducted process operations.

Hazards

- Drained product may be accidentally released into the environment.

Most common cases of draining or venting into open systems

- Purging of a sampling line.
- Draining in an emergency situation.
- Preparation of a system for repairs.

Potential challenges associated with draining

- Distractions that may affect your ability to focus on the work done.
- Long draining time.
- Bad weather conditions (cold, snow, ice, wind).
- Discharge valve not fully closed.
- Pressure control in the drain system.

How to do it correctly

- Avoid any other activities while draining.
- In emergency situations, finish draining first and then leave the draining place.
- During shift changeover, do not perform any draining or venting to the atmosphere if possible.
- After draining or venting, make sure that you fully closed the discharge valve.

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9

USE ADDITIONAL PROTECTIONS IF INTERLOCKS ARE PARTIALLY OR COMPLETELY DISABLED

LOTO (energy isolation system)

Isolation of equipment using energy isolating devices.

Blinding and deblinding

Physical isolation of a stream.

Use of additional protections

Use of additional protections when MOS or POS is activated and the reliability of ESD is partially reduced.

Maintenance override switch

- It is part of the emergency shutdown system and is used to override some interlocks before commencing maintenance.

Examples of additional protections

- Blocking a part of a process by locking its startup button (e.g. blocking the start of a pump for which the local protection has been disabled).
- Physical isolation (blinding) of pipelines and vessels for which interlocks or safety valves have been disconnected.
- Continuous monitoring of direct and related process indicators in the DCS system.
- Change of process indicators (e.g., temporary reduction of pressure, flow rate or temperature).
- Onsite monitoring of indications (e.g. readings of pressure gauges on vessels and pipelines), with constant communication between senior operator and person staying.
- Inform managers about the deactivated interlocks in accordance with the procedure established by the Company.

Most common cases of losing process protection

- When preparing equipment for maintenance.
- When testing equipment.
- When repairing automation components.
- When servicing the components of operating equipment.

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10

ALWAYS ADHERE TO THE REQUIREMENTS OF PROCESS REGULATIONS AND INSTRUCTIONS WHEN STARTING OR SHUTTING DOWN EQUIPMENT, USE EQUIPMENT PRE-START CHECKLISTS

PROCESS REGULATIONS

The main document establishing the technology, rules and procedure of a specific technological process or separate stages (operations) thereof, and defining the conditions for safe crude refining, crude oil and petroleum product transportation process.

Process regulations and instructions establish requirements for	➢ Preparation for startup. ➢ Unit startup. ➢ Normal operation. ➢ Operating limits (norms). ➢ Sampling. ➢ Unit shutdown. ➢ Preparation of units for maintenance ➢ Special operations. ➢ Emergencies.
Sequence of works	➢ Follow the sequence of operations described in process regulations, instructions and procedures. ➢ For complex works that take more than one shift and where the sequence of operations is important, report the progress of the works to the next shift.
Use of equipment pre-start checklists	➢ Read all the questions in the checklist before preparing for the unit startup. ➢ All actions done as per checklist during the shift should be dated and signed. ➢ Commence unit startup after confirming that all actions indicated the checklist have been done

AB ORLEN LIETUVA PROCESS SAFETY FUNDAMENTALS

11

FOLLOW THE PROCEDURES SET OUT IN THE REGULATIONS ON CHANGE MANAGEMENT WHEN IMPLEMENTING CHANGES IN PROCESS UNITS

CHANGE

Changes made to equipment, feedstocks, chemical substances, process parameters or operating And (or) used by or related to the activities of Company's Operations Subdivisions, Wastewater Treatment Shop, Power Plant, Petroleum Products Loading Shop and Pipelines & Terminal Operations Subdivision.

Change management process steps

- Initiating changes in the Change Management Program.
- Assessing risks.
- Decision making by the Change Management Commission.
- Assigning and executing tasks related to implementation of changes in process units and updating related technical documentation.
- Verifying implemented changes and recording their completion in the Change Management Program.

Examples of documents that require updating after implementing changes

- Process regulations and procedures.
- Process flow diagrams.
- Electrical diagrams.
- Automation and control diagrams.
- Equipment passports.
- Lists of critical equipment.
- Documentation of explosion hazard zones.
- OHS and fire safety documentation.
- Emergency response plans, etc.

Potential consequences of changes implemented without necessary approvals/conclusions

- Insufficient supervision of upgrade / modernization works.
- Failure to identify or improper identification of risks associated with the change (the possibility of overlooking important risks associated with the change).
- Lack of technical information can lead to inadequate improvements (lack of experience in the relevant industry).
- Increase of risks of incident, accident or emergency.

AB ORLEN LIETUVA PROCESS SAFETY FUNDAMENTALS

12

SHARE YOUR KNOWLEDGE WITH YOUR COLLEAGUES

SHARING OF KNOWLEDGE CONTRIBUTES TO IMPROVING SAFETY IN THE REFINERY

Daily conversations about technological processes and safety issues raise employees' awareness and knowledge.

Share the information about the safe working practices, the hazards you have encountered in the course of your daily work, and important details that may have a significant impact on improving your own safety and the safety of other people. This **will contribute to continuous improvement of process safety** in our Company.

Advantages of sharing knowledge with co-workers

- Work experience you have gained over the years can help you and others to carry out the work safely.
- The opportunity to learn from others contributes to creating a positive working atmosphere.
- Sharing knowledge demonstrates a professional approach to work.
- Skills can be developed not only through professional training, but also through interaction with your colleagues.
- Knowledge conveyed from one employee to another helps to accelerate improvement, thereby contributing to the development of the entire organization.
- Knowledge sharing helps to build mutual trust, which influences the quality of the work done.
- Help from others is essential to ensure the Company's compliance with the highest safety standards.
- Sharing knowledge fosters mutual support and understanding.
- The person we have helped can one day help us by sharing his or her experience.