

**PUBLIC COMPANY ORLEN LIETUVA**

APPROVED BY

Deputy General Director for Operations

\_\_\_\_\_2021

Order No TV1(1.2-1)-

**BM-4 PROCEDURE  
FOR OPERATION OF PRESSURE PIPELINES**

## **I. PURPOSE**

1. This Procedure defines the requirements for the operation, installation, upgrade and maintenance (hereinafter – operation) of Public Company ORLEN Lietuva (hereinafter – the Company) pressure pipelines (hereinafter – the pipelines).

## **II. APPLICATION**

2. Requirements established herein shall apply to all employees of the Company and of third parties (where provided so by relevant contracts concluded with the Company) involved in the activities of installation, maintenance and operation of pipelines, irrespective of their operating pressure.

3. This Procedure shall not apply to the operation of:

3.1. Vents of pressure vessels and vents downstream of safety valves;

3.2. Pipes and their assemblies, which are an integral part of certain equipment (compressor, pump cooling, lubrication, sealing, instrumentation impulse lines, etc.);

3.3. Piping within the battery limits of pressure vessels, boilers, steam turbines;

3.4. Non-metal piping;

3.5. Main and offshore pipelines;

3.6. Pipelines constituting a piping system or network of piping systems for the supply of any fluid or material to or from an onshore or offshore facility, including the last shutoff device installed in the facility, also including all connected assemblies specifically designed for the pipelines. This exception shall not apply to standard pressure equipment, which may be installed in pressure control stations or compressor houses;

3.7. Pipeline heating, steam and water tracers;

3.8. Heating systems and heating stations of buildings;

3.9. Water supply pipelines and sewers;

3.10. Pipelines subject to the Rules on Installation and Safe Operation of Water Steam and Superheated Water Pipelines as approved by the 10 June 2009 Order No 1-82 of the Minister of Energy of the Republic of Lithuania.

## **III. REFERENCES**

4. This Procedure shall apply in conjunction with the following legal acts (as amended):

4.1. Rules on Operation of Pressure Pipelines as approved by the 3 October 2003 Order No 1-148 of the Minister of Energy of the Republic of Lithuania;

4.2. Technical Regulation for Pressure Equipment as approved by the 6 October 2000 Order No349 of the Minister of Economy of the Republic of Lithuania;

4.3. Regulations of the State Register of Potentially Hazardous Installations as approved by the 9 May 2002 Resolution No 645 of the Government of the Republic of Lithuania;

4.4. Law of the Republic of Lithuania on Supervision of Potentially Hazardous Installations No I-1324;

4.5. Rules on Operating Crude Oil Processing Facilities as approved by the 28 January 2008 Order No 4-27 of the Minister of Economy of the Republic of Lithuania;

- 4.6. Rules on Installation and Safe Operation of Water Steam and Superheated Water Pipelines as approved by the 10 June 2009 Order No 1-82 of the Minister of Energy of the Republic of Lithuania;
- 4.7. API 570. In-service Inspection, Rating, Repair and Alteration of Piping Systems;
- 4.8. API 574. Inspection Practices for Piping System Components.
- 4.9 Company Procedure for Operation of Heat Supply and Distribution Pipelines BTE-1;
- 4.10. Company Procedure for Connection and Disconnection of OSBL Communications Heat Supply Pipelines BTE-3;
- 4.11. Company Procedure for Operation of OSBL Process Pipelines BT-3;
- 4.12. Company Procedure for Blinding and De-blinding of Process Equipment and Piping BM-12;
- 4.13. Company Procedure for Operation of Pressure Gauges BA-1;
- 4.14. Company Employee Mandatory Training Rules;
- 4.15. Company OHS Procedure for High-Risk Works BDS-27;
- 4.16. Company OHS Procedure for Safety and Health Signs BDS-41.

#### IV. ABBREVIATIONS, TERMS AND DEFINITIONS

**Routine maintenance of pipelines** – inspection and repair of pipelines in continuous use and other mandatory actions defined in the applicable legal acts governing pipeline operation and maintenance activities as well as in the relevant manufacturer's technical documents

**Operation staff** – persons involved in the technical inspections and maintenance of pipelines (pipeline maintenance foremen, operators, inspectors, walkers, etc.)

**Manufacturer** – a legal or natural person who designs, manufactures, installs a pipeline and/or its components in accordance with the provisions of the law, as well as carries out conformity assessment procedures.

**Accredited body for inspection of technical condition of potentially hazardous installations** (hereinafter – the accredited body) – legal entity established in the Republic of Lithuania, legal entity or other organization established in another Member State of the European Union or the European Economic Area, or branch thereof established in the Republic of Lithuania or another Member State, recognized by accreditation bodies as competent to inspect the technical condition of potentially hazardous installations.

**Expert** – representative of accredited body for inspection of technical condition of potentially hazardous installations authorized to inspect the technical condition of pipelines.

**Approved standards** – national and international standards (LST, EN, ISO, BS, DIN, ANSI, GOST, etc.) used for calculations, design and operation of pipelines.

**Qualification test** – verification of the employee's knowledge to make sure that it meets the established requirements.

**Walk-around inspection** – a set of actions performed by qualified staff aimed to identify pipeline defects. It involves walking around and inspecting the pipelines.

**Pressure pipeline** – equipment composed of elements, parts, assemblies (pipes, fittings, expansion joints, shutoff and control valves, and safety devices) and other installations connected together for integration into a pressure system, equipped with control, measuring, automatic control and alarm devices and intended for the transportation of fluids.

**Flange connection** – stationary demountable connection of piping made of flanges tightly attached to each other by fixing devices with soft material inserts between them.

**Fitting** – an element or part of a pipe or piping system where the operating medium changes its flow direction is divided or merged, expanded or compressed.

**Nozzle** – an element designed for attaching valves, control and measuring instruments and other devices to a pipeline.

**Thickness measurement locations** – certain locations in the system of pipelines subject to periodic visual inspection and wall thickness measurements.

**Thickness measurement points** – specific points on the surface of a pipeline element for measuring the wall thickness of the pipeline.

**Air and ground interface** – area in a partially buried pipe that may be affected by external corrosion. Corrosion areas may vary in size subject to factors, such as humidity, oxygen content in the soil and operating temperature. This area is usually as large as 30 cm beneath the ground surface and up to 15 cm above the ground surface.

**Repair** – restoration of the pipeline to fit for service condition by either replacing its worn components or performing any other actions (welding, cutting, or grinding) to make the pipeline operation safe and reliable.

**Upgrade** – change/improvement of pipeline operating parameters, layout or technical characteristics of its components specified in the design.

**Nominal value (DN)** – numerical size that is common to all parts of the pipeline system, with the exception of those parts with indicated external diameter or thread size. It is a convenient number for reference purposes and is only loosely related to manufacturing dimensions. DN denotes the nominal value and the number followed usually indicates the inner diameter of the pipe in millimeters.

**Maximum or minimum allowable temperature** (hereinafter –  $T_s$ ) – highest and lowest temperatures for which the pipe is designed.

**Maximum or minimum operating temperature** (hereinafter –  $T_d$ ) – highest and lowest temperatures at which the pipe may be operated. The maximum or minimum temperature may be equal to the maximum or minimum allowable temperature  $T_s$ , or  $T_d$  may not be higher than maximum  $T_s$ , or minimum  $T_d$  may not be lower than minimum  $T_s$ .

**Pipeline valves** – devices installed in pipelines to control streams by changing their cross-section (by means of disconnection, distribution, adjustment, mixing, etc.).

**Safety accessories** – instruments designed to protect pipelines and adjacent installations against exceeding the highest and lowest operating parameters.

**Devices for direct pressure limitation** – safety valves, bursting discs, etc.;

**Limiting devices** – devices that activate control instruments or ensure shutdown or shutdown and interlocking of the unit (pressure switches, shutoff valves, fluid level switches etc.).

**Pressure** – gauge pressure relative to atmospheric pressure. Vacuum is designated by a negative value.

**Maximum allowable pressure** (hereinafter –  $P_s$ ) – maximum pressure for which the pipe or its components are designed.

**Operating pressure** (hereinafter –  $P_d$ ) – maximum pressure at which the pipe may be operated. Maximum operating pressure may be equal to or lower than maximum allowable pressure  $P_s$ .

**Testing pressure** (hereinafter –  $P_s$ ) – pressure at which the pipeline is tested.

**Test (HT or PT)** – checking the strength or tightness of a pipeline by pressurizing it to the specified test pressure.

**Fluids** – gas, liquids and vapors in pure phase as well as mixture thereof. Fluids may contain suspended solids.

**In-service pipeline inspection (ISPI)** – tightness inspection performed for an operating pipeline to verify the operation of its safety and control accessories, measuring devices, to determine the general technical condition of the piping, valves, coating and insulation, to check compliance with the operating instructions and to handle any other pipeline operation issues.

**Thorough pipeline inspection (TPI)** – inspection performed using visual and other non-destructive testing methods to evaluate the technical condition of the piping and its elements as well as to determine the changes in their characteristics that may occur during a prolonged service.

**Medium** – a fluid that fills up the pipeline.

**Basic diagram** – a process flow diagram of the pipeline and other pressure installations within a particular unit with indicated names of installations, valves, instruments or other devices that ensure safe, accurate, prompt and high-quality control of the process.

**Installation, upgrade, repair technology and quality control plan** – action plan providing for technical conditions, quality requirements and quality control procedures applicable to repair works.

**Operation of equipment** – any activity related to equipment (startup, shutdown, use, transportation, repair, upgrade, maintenance, cleaning etc.).

**A group of pipeline elements** – a set of elements or assemblies of the same purpose, material (steel groups according to LST CEN ISO/TR 15608) and nominal size DN, regardless of the design (elbow bending angle, reducers and blind type), standard and element wall thickness (e.g., elbow 90° Ø108x6 GOST17375 st. 20 GOST1050 and elbow 45° 4' S80 ASME B16.9 ASTM A234 WPB belong to one group of elements).

## V. RESPONSIBILITIES

5.1. Maintenance of equipment – a set of mandatory technical services, legal and organizational measures to ensure the safety of equipment in order to avoid harmful effects of such equipment on human life, health, property and the environment, as laid down in the applicable equipment operation rules, legal acts as well as in the relevant manufacturer's technical documentation. Maintenance of equipment is mandatory and is divided into routine maintenance and technical condition inspection.

5.2. Employees of the subdivision operating the pipelines, operation staff (senior process unit operator, process unit operator, pipeline walkers, etc.) are responsible for the routine maintenance of the operated pipelines – daily (shift based) visual inspection, proper and safe operation of pipelines, regular checks of its technical parameters. These persons must be certified in accordance with the established procedure and hold pressure pipeline operator qualification. They shall:

5.2.1. Visually inspect the pipelines in the process unit and monitor their operation during the shift (according to 6.7.8.3 ÷ 6.7.8.11);

5.2.2. Visually inspect the OSBL pipelines or assemblies once a month (according to 6.7.8.3 ÷ 6.7.8.11);

5.2.3. Record all defects identified during visual inspections (according to 5.2.1, 5.2.2) in a shift logbook.

5.3. Routine maintenance, proper and safe operation of the pipeline shall be the responsibility of the head of a relevant organizational unit operating the pipelines or any other qualified engineer-

technician assigned by a decree of the head of the unit or the head of a shop. This person must be certified and hold pipeline maintenance foreman qualification. He shall:

5.3.1. Ensure that persons responsible for the operation of the pipelines are trained and certified in accordance with a program for pressure pipeline operators or maintenance foremen.

5.3.2. Ensure routine maintenance of the pipelines, exercise the relevant control to ensure formalization (recording) of the daily and periodic inspection results in accordance with the established procedure.

5.3.3. Ensure that pressure test is performed after each depressurization, installation, upgrade and repair of the pipeline and that test results are properly formalized (according to 6.7.21.).

5.3.4. Operate the pipelines in accordance with the operation and maintenance requirements and the provisions of the relevant manufacturer's technical documentation (installation and pre-commissioning testing, maintenance, repair and dismantling rules, mandatory safety requirements and procedures).

5.3.5. Develop and update the lists of pressure pipelines of the unit. Specimen list is provided in Annex 1. The lists shall be agreed (with the Head of Operations, Head of Unit, Operations Subdivision Maintenance Manager) and approved by the Deputy Director for Operations. Lists shall be updated annually and in case of any changes they shall be agreed and approved. Pipeline lists are kept in the archive of the Equipment Technical Supervision and Materials Analysis Group as well as in the respective organizational unit (original).

5.3.6. Timely report to the Maintenance Department Mechanical Engineer, Equipment Technical Supervision and Materials Analysis Group Manager and Engineer about any process changes that have occurred in the operation of the pipelines (pipelines or their sections disconnected, removed from service, pipeline used for a different purpose, plans to commission an out-of-service pipeline, etc.).

5.3.7. If any violations of the present Procedure are identified, or pipeline defects are detected which may result in an accident or incident, immediately fix the defects and, if necessary, disconnect the pipeline from the process scheme.

5.4. Technical maintenances of pipelines, i.e. pipeline preparation for evaluation of its technical condition and arrangement of repairs shall be the responsibility of Mechanical Engineer of Maintenance Department (hereinafter – Mechanical Engineer) responsible for maintenance in the assigned organizational units. Mechanical Engineer shall:

5.4.1. Ensure timely and quality inspection of the pipelines.

5.4.2. Develop pipeline inspection-insulation punch lists in a timely and quality manner (according to 6.7.13.1 ÷ 6.7.13.8).

5.4.3. Control activities related to repair, upgrade, installation and maintenance (including cleaning) of the pipelines.

5.4.4. Ensure that installation, upgrade, repair work is done compliant with relevant piping design and that materials used fully conform to their certificates.

5.4.5. Initiate decisions regarding repairs (including repair schedule and scope) of the pipelines required for solve problems indicated in technical inspection reports.

5.5. Development of pipeline inspection-insulation punch lists shall be the responsibility of the Equipment Reliability & Maintenance Planning Department Turnaround and Shutdown Planning Group Planning Engineer (hereinafter – Planning Engineer) (according to 6.7.13.1 ÷ 6.7.13.3).

5.6. Maintenance and technical inspection of pipelines, also evaluation of the quality as well as acceptance of the repair, upgrade and installation works shall be the responsibility of Engineer of Technical Supervision and Material Analysis Group of Mechanical Department (hereinafter – TSG Engineer). Person appointed by a decree of Equipment Technical Supervision and Materials Analysis Group shall:

- 5.6.1. Develop an annual technical inspection schedule of pipelines (hereinafter – the schedule). The schedule shall be agreed with Equipment Technical Supervision and Materials Analysis Group Manager, head of a relevant organizational unit operating the pipeline, Operations Subdivision Maintenance Manager, Chief Mechanical Engineer, Deputy Director of Maintenance, Director of Maintenance, and approved by Deputy General Director for Operations.
- 5.6.2. Submit technical documents of the pipeline to the State Register of Potentially Hazardous Equipment (PHER) for registration.
- 5.6.3. Register the pipelines not to be included in PHER with the Equipment Technical Supervision and Materials Analysis Group.
- 5.6.4. Carry out the technical inspections of the pipelines that have been registered with the Equipment Technical Supervision and Materials Analysis Group.
- 5.6.5. Organize technical inspections of the pipelines registered with PHER.
- 5.6.6. Properly accept, formalize, manage and keep the technical documents and passports of the pipelines.
- 5.6.7. Make timely entries on performed repairs, upgrades and technical inspections of the pipelines.
- 5.7. Organization of maintenance and repairs of pipeline anticorrosion coating, concrete foundation, earthwork (for underground pipelines) and refractory lining (if any) shall be the responsibility of Civil Engineer of Civil Construction Technical Supervision and Maintenance Group (in assigned organizational units).
- 5.8. Organization of maintenance and repair of electrical equipment of pipelines shall be the responsibility of Electrical Engineer of Maintenance Department (in assigned organizational units).
- 5.9. Organization of maintenance and repair of measuring and control instruments of pipelines shall be the responsibility of Automation Engineer of Maintenance Department (in assigned organizational units).
- 5.10. Individuals acting in violation of the requirements set forth herein shall be liable in accordance with the procedure established by the applicable legislation of the Republic of Lithuania and procedures effective in the Company.

## VI. ACTIONS

6.1. Pressure pipelines owned by the Company shall be operated in accordance with the Rules on Operation of Pressure Pipelines, other legislation governing operation and maintenance of equipment, technical documents developed by the designer (manufacturer) as well as the approved standards and requirements of this Procedure.

6.2. Where it is necessary to rerate the pipelines based on parameters other than those provided in the technical documentation for determining their operating potential, this shall be done in accordance with the approved standards provided that such standards are not inferior to the requirements followed by manufacturers in the fabrication of pipelines and their components.

### **6.3. Classification, registration and technical documents of pipelines**

6.3.1. Pipelines are grouped depending on the hazardousness of fluid contained in the pipeline. Pipelines are divided into categories according to their operating parameters (pressure, temperature, diameter) and the groups of hazardous fluids transported in the pipelines.

6.3.2. Pipelines are divided into two groups according to transported fluids (detailed description provided in Article 50 of Technical Regulation for Pressure Equipment):

6.3.2.1 Group 1 comprises substances and mixtures classified as dangerous materials according to the following physical or health hazard classes set out in Parts 2 and 3 of Annex 1 to Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures:

6.3.2.1.1. Unstable explosives or explosives of Divisions 1.1, 1.2, 1.3, 1.4 and 1.5;

6.3.2.1.2. Flammable gases, category 1 and 2;

6.3.2.1.3. Oxidizing gases, category 1;

6.3.2.1.2. Flammable gases, category 1 and 2;

6.3.2.1.5. Flammable liquids, category 3, where the maximum allowable temperature is above the flash point;

6.3.2.1.6. Flammable solids, category 1 and 2;

6.3.2.1.7. Self-reactive substances and mixtures, type A to F;

6.3.2.1.8. Pyrophoric liquids, category 1;

6.3.2.1.9. Pyrophoric solids, category 1;

6.3.2.1.10. Substances and mixtures which in contact with water emit flammable gases, category 1, 2 and 3;

6.3.2.1.11. Oxidizing liquids, category 1, 2 and 3;

6.3.2.1.12. Oxidizing solids, category 1, 2 and 3;;

6.3.2.1.13. Organic peroxides types A to F;

6.3.2.1.14. Acute oral toxicity, category 1 and 2;

6.3.2.1.15. Acute dermal toxicity, category 1 and 2;

6.3.2.1.16. Acute inhalation toxicity, category 1, 2 and 3;

6.3.2.1.17. Specific target organ toxicity – single exposure, category 1.

6.3.2.2. Group 1 also comprises substances and mixtures contained in pressure equipment with a maximum allowable temperature (TS) that exceeds the flash point of the fluid;

6.3.2.3. Group 2 consists of substances and mixtures that are not referred to in Articles 6.3.2.1, 6.3.2.2 of this Procedure.

6.3.3. Pipeline category shall be determined in accordance with the fluid's operating parameters at the pipeline inlet (where it does not have any devices affecting such parameters) and shall be applicable to the entire pipeline irrespective of its length. Where the values of parameters fall under different categories, it shall be classified in the highest category applicable to the individual pipeline.

6.3.4. The category of pipelines for the supply and return of fluids shall be determined on the basis of the maximum possible temperature in the supply pipelines, taking into account the impact of terrain. Category must be specified in pipeline design.

6.3.5. Company pressure pipelines are divided into pipelines subject to registration with PHER and pipelines not subject to registration with PHER (hereinafter – registered/non-registered).

6.3.6. Before commissioning of pipelines, the following pipelines shall be registered with PHER:

6.3.6.1 Pipelines and their components with a pressure higher than 0,5 bar and nominal size (DN) greater than 80 mm, designed for fluids in Group 1, where  $P_s$  multiplied by DN exceeds 3500;

6.3.6.2 Pipelines and their components with a pressure higher than 100 bar designed for fluids in Group 1, irrespective of their size (DN);

6.3.6.3. Pipelines with DN greater than 100 mm for superheated and saturated steam with a pressure above 16 bar;

6.3.6.4. Pipelines with DN greater than 100 mm for superheated water with a temperature above 110°C and pressure above 16 bars.

6.3.7. Company Mechanical Department Equipment Technical Supervision and Material Analysis Group shall keep record of the pipelines that do not meet the criteria referred to in Article 6.3.6 and TSG Engineer shall perform their registration.

6.3.8. Battery limits and tag (ID) number for designed new pipelines shall be set by designer upon agreement with the head of the unit (pipeline maintenance foreman) and TSG Engineer, for old and upgraded pipelines – by the head of the unit and TSG Engineer. Battery limits of pipelines are determined based on their operating parameters – maximum allowable operating pressure (Pd), maximum and minimum allowable temperature (Ts) and exposure to corrosive environment. Maximum operating pressure (Pd) may be equal to or lower than maximum allowable pressure (Ps). The maximum or minimum operating temperature (Td) may be equal to the maximum or minimum allowable temperature (Ts), but it may not be higher than the maximum allowable temperature (Ts), whereas the minimum operating temperature (Ts) may not be lower than the minimum allowable temperature (Ts). It is usually a pipeline that is exposed to the same environment and starts and ends with valves or flange connections.

6.3.9. A pressure vessel passport of established form (Annex 2) shall be developed for each pipeline. Manufacturer (assembler) shall develop passports in the form provided by the Company for manufactured (assembled) pipelines.

6.3.10. Technical files shall be developed for all pipelines. Technical files shall be developed by a contractor that performs installation, upgrade or repairs of pipelines.

6.3.11. The following main data and documents shall be provided in the technical files of pipelines (Annex 2 and 3):

6.3.11.1 Pipeline location, owner and owner's address;

6.3.11.2. Pipeline designer, manufacturer and their addresses, installation date;

6.3.11.3. Pipeline designated purpose, its battery limits, category, media, parameters (pressure (Pd, Ps), temperature (Td, Ts), maximum nominal diameter (DN), and total length);

6.3.11.4. Installation-welding information (installation standard, pipeline steel grade, information on thermal treatment of welds, NDT, positive material identification and pipeline test);

6.3.11.5. Information on appointed pipeline maintenance foreman responsible for safe operation of pipeline.

6.3.11.6. Information on modifications and technical inspections;

6.3.11.7. Pipeline isometric diagram (with all repairs, upgrades if any) (on A3 or A4 sheets) (Annex 4) with the following information:

6.3.11.7.1. Information table with required main data: organizational unit, process unit, pipeline number, parameters (pressure (Pd, Ps, Pb), temperature (Td, Ts, Tb), media, category, steel, insulation and heating information, thermal treatment, battery limits, full name and job position of person that prepared the diagram and person responsible for its correctness.

6.3.11.7.2. Data shown on the diagram: pipeline elements numbered as per list of used materials, layout of welded connections, supports, expansion joints, valves, instrumentation, alarms, automatic control devices, ESD, interlocks (with indicated distances), wall thickness measurement places numbered as per logbook, weld numbers given by welders, connections, passages through access platforms, flooring slabs, walls and other obstacles, monitored sections where due to high temperatures metal creep may occur, layout of creep monitoring markers, pipe nominal diameters, flow direction, names of adjacent pipelines or equipment, operating parameters. Explanations of symbols used in diagrams (legends are provided in Annex 5);

**Note:** Electronic versions of diagrams, material specifications and logbooks of newly installed, repaired and upgraded pipelines shall be submitted by contractors (manufacturers) to TSG Engineer upon completion of works.

6.3.11.8. List of pipeline materials of established form (Annex 6);

6.3.11.9. Pipeline repair, installation and reconstruction quality certificate (Annex 7);

- 6.3.11.10. Copy of certificate issued by the National Energy Regulatory Council for operation (maintenance) of crude oil and petroleum product facilities;
  - 6.3.11.11. Certificates and declaration of conformity to PED 2014/68/EU;
  - 6.3.11.12. Pipeline strength calculations;
  - 6.3.11.13. Pipeline repair, installation and upgrade technology and quality control plan (Annex 8);
  - 6.3.11.14. As-built diagram and list of to-be-procured materials (document required during repair only);
  - 6.3.11.15. Design (document usually provided during installation or upgrade);
  - 6.3.11.16. Welding procedure specification (WPS), welding procedure approval record (PQR, WPAR);
  - 6.3.11.17. Welding logbook;
  - 6.3.11.18. List of welders;
  - 6.3.11.19. Certified copy of welder certificates;
  - 6.3.11.20. Weld thermal treatment conclusions or logbook, diagrams (original) with indicated pipeline tag number and welds;
  - 6.3.11.21. Findings of weld chemical analysis for alloyed elements;
  - 6.3.11.22. Conclusions on the quality of welds;
  - 6.3.11.23. Actual thickness measurements of all newly installed elements (nozzles, pipes, elbows, fittings, etc.) (logbook or conclusions and diagram with indicated thickness measurement points);
  - 6.3.11.24. Deblinding permit (Annex 17);
  - 6.3.11.25. Pipeline repair acceptance, closing statement (Annex 9). Statement is enclosed with diagram with indicated closed flange connections, list of employees having completed the course on flange connection installation, tightening torque table based on which tightening torque was selected for flange connections or calculations;
  - 6.3.11.26. Leveling report and diagram (if leveling required by design);
  - 6.3.11.27. Earthing report;
  - 6.3.11.28. Laboratory test report for water used to hydrotest equipment made of austenitic steel (chloride content);
  - 6.3.11.29. Hidden work report (for underground piping);
  - 6.3.11.30. Insulation, anticorrosion coating (painting) acceptance statement.
  - 6.3.11.31. Incoming material control certificates, passports of used materials (original or certified copies);
  - 6.3.11.32. Valve repair, testing report;
  - 6.3.11.33. Operation manual;
  - 6.3.11.34. Installation statement for expansion joints.
- 6.3.12. In addition to the technical documents required by the Pressure Equipment Directive (PED 2014/68/ES), a technical file shall be compiled for newly constructed process equipment in accordance with Articles 6.3.9., 6.3.10., 6.3.11. hereof, which is the responsibility of a relevant project manager of Project Realization Group.
- 6.3.13. As built pipeline construction and installation designs with indicated (and agreed) modifications done during installation and reconstruction shall be kept in the Company archive of technical documents as well as investment projects IT system. Project manager shall be responsible for transferring the project for safe custody.

## **6.4. Maintenance**

6.4.1. An appropriate number of persons responsible for the routine maintenance, proper and safe operation of the pipelines shall be appointed by a decree of the head of operation subdivision or shop. These persons shall be certified in accordance with the procedure established by the Company and have pressure pipeline maintenance operator or foreman qualification.

6.4.2. Pipeline operation shall immediately be discontinued in the manner specified in the relevant operation manual in the following cases:

6.4.2.1 Pipeline pressure exceeds permissible limits and it is impossible to immediately reduce it;

6.4.2.2. At least one device for direct pressure limitation in the pipeline or in the system of pipelines and related equipment have failed;

6.4.2.3. Pipeline cracks, blisters, leaks or other defects have been identified and it is not possible to safely eliminate them;

6.4.2.4 All pressure and/or temperature meters have failed and it is not possible to immediately restore them or otherwise control the operating parameters of the pipeline.

6.4.3. Emergency shutdown causes shall be determined and documented in the accordance with the Company Incident Investigation Regulations.

## **6.5. Valves, control and measuring instruments, safety devices**

6.5.1. Pipeline valves, pressure, temperature, level and flow rate control and measuring instruments, safety devices, and alarms shall conform to the operating characteristics of the pipelines and shall be maintained and inspected in accordance with the Company procedures and manufacturer's recommendations. All control and measuring instruments shall be verified and/or calibrated.

6.5.2. Safety valves shall have documents proving their origin and quality. Valve bodies or plate attached thereto must have clear inscriptions specifying the manufacturer or trademark, nominal size or DN, nominal or allowable operating pressure, steel grade, flow direction (where one flow direction is possible). CLOSE-OPEN directions must be specified on the valve wheel or next to the manual gear.

6.5.3. Valves that do not have a compliance document but have manufacturer label specifying DN, Ps, and steel grade are allowed to be used in pipelines of all categories with an operating pressure up to 100 bar only after assessing valve condition and performing a pressure test (followed by an inspection report). If main valve data (DN, Ps, steel grade) are missing, positive material identification and strength test shall be performed for the valve and after evaluating its condition an identification number shall be assigned and operational characteristics determined. Main data shall be inscribed on the valve body or the flange edge and an inspection report shall be provided.

6.5.4. Safety requirements for shutoff valves:

Shutoff valves are operated with the help of a wheel, on which the close-open direction is indicated;

6.5.4.2. Hand force is sufficient for normal operation (closing/opening) of shutoff valves. The use of additional tools (hooks, extensions, etc.) due to torque increase is prohibited;

6.5.4.3. Operating positions of shutoff valves are fully open or fully closed. It is prohibited to use shutoff valves for regulating (throttling) the flow rate;

6.5.4.4. Pipeline outlet valves or other product discharge devices shall be operated in a manner that does not create any shock volume. Product shall be drained safely without causing any danger to human health and environment;

6.5.4.5. The following actions are prohibited for shutoff valves:

6.5.4.5.1. Remove valves from pipelines without prior removal of product;

6.5.4.5.2. Dismantle valves on operating pipelines (pressurized and containing product);

6.5.4.5.3. Test pipelines using a pressure that exceeds the test pressure of shutoff valves. When pipelines or their systems are tested with open valves, test pressure shall not exceed 1,5x PN (PN - maximum allowable pressure at 20°C);

6.5.4.5.4. Pressurize pipeline systems to test pressure when their valves are closed;

6.5.4.5.5. Use valves as pipeline supports;

6.5.4.5.6. Use motor operated valves in open places that are not protected against rain (humidity);

6.5.4.5.7. Use valves that have earthing device but are not earthed;

6.5.5. If not otherwise specified by manufacturer, the accuracy class of pressure gauges used in pipelines shall be not less than:

6.5.5.1. Class 2.5 for operating pressure up to 25 bars;

6.5.5.2. Class 1.5 for operating pressure 25 to 140 bars;

6.5.5.3. Class 1.0 for operating pressure above 140 bars.

6.5.6. The body of a pressure gauge shall have a diameter of at least 100 mm when installed at a height of up to 2 m from the access platform and 160 mm if installed higher. Pressure gauge shall be mounted in a vertical position to ensure that it is possible to see its readings. The installation of pressure gauges at a height of more than 3 meters above the platform is not permitted.

6.5.7. Pressure gauge shall have a scale that the operating pressure is shown in the second third of the scale.

6.5.8. Pipeline working pressure value shall be marked either with a red dash on the pressure gauge scale or a red-painted and tightly fitting metal or plastic plate attached to the gauge body or a red strip glued to the body. It is prohibited to mark it on the gauge glass.

6.5.9. Pressure gauges shall be mounted in such a way that allows purging, inspecting and disconnecting them. Pressure gauges and their impulse tubes shall be protected against freezing.

6.5.10. Pressure gauges shall be verified in accordance with the Company Procedure for Operation of Pressure Gauges BA-1.

6.5.11. It is prohibited to operate pressure gauges in the following cases:

6.5.11.1. Pressure gauge (subject to legal metrology) is not marked with an appropriate verification mark or verification has expired;

6.5.11.2. After disconnecting a pressure gauge its pointer does not return to zero position (deviation within zero section is tolerable);

6.5.11.3 Glass face is broken or damaged and this can affect the readings of the gauge.

6.5.11.4. Pressure gauge or its impulse tubes are leaky.

6.5.12. A heat supply pipeline with allowable pressure lower than that of the feeding source shall be equipped with reducing-desuperheating equipment with a pressure gauge and a safety valve (made specifically for lower pressure pipelines such as pressure reducing and desuperheating unit or other reduction equipment).

6.5.13. Pressure reduction and desuperheating unit (for reducing pressure and temperature of the fluid) shall have automated pressure and temperature controls.

6.5.14. Safety accessories to prevent pipelines from exceeding the maximum or minimum operating parameters, if any, shall be adjusted in such a way that the pressure in the pipeline cannot increase further than stated in the report provided by the manufacturer or accredited body.

6.5.15. Safety accessories shall not be used for adjustment/control purposes.

6.5.16. It is permitted to install shutoff valves in front of or behind the safety valve provided that the installation of a lockable shutoff valve is specified in a design agreed with an accredited body and the shutoff valves are locked in an open position during operation of the safety valve.

6.5.17. Fluid discharge pipelines located downstream of safety accessories shall in no way affect the functions of such accessories. Possible pressure build-ups in a fluid discharge pipeline shall be taken into account and condensate shall be removed from the lowest accumulation point.

6.5.18. When unit is in service, safety accessories can be disconnected and verified only when needed to comply with the Pressure Safety Valve Operating Procedure BM-19.

## **6.6. Installation, upgrade and repair of pipelines**

6.6.1. Installation and upgrade of pipelines requires developing a design as established by the provisions of the Company Regulations on Management of Crude Oil Refining Process Related Changes. Design shall be approved in accordance with the procedures established by the Company.

6.6.2. Such design shall include technical requirements for the pipeline installation or upgrade, including the scope and control method of welded seams and quality assessment criteria for pipeline elements. The requirements of the specified technical norms cannot be lower than those by which the pipeline has been manufactured/installed. If this requirement is not met, the difference between technical conditions must be supported by appropriate calculations and/or good engineering practice. Additional requirements of this Procedure shall also be followed.

6.6.3. The scope of pipeline repairs shall be defined based on the pipeline technical inspection report and the action plan for elimination of defects/non-conformities. Repairs that do not require the development of design are performed in accordance with a prepared repair technology and quality control plan.

6.6.4. For execution of repair works, the types and scope of the non-destructive testing shall be defined in accordance with Article 6.6.2 above and additional requirements of this Procedure.

6.6.5. Installation/upgrade/repair of the pipelines may only be performed by the authorized legal entities holding the certificate issued by the State Energy Inspectorate which entitles to operate (repair) crude oil and petroleum product facilities.

6.6.6. In case of pipeline installation, upgrade or repair, a representative of the contractor coordinating the welding work shall hold one of the following qualifications (required under LST EN ISO 14731):

6.6.6.1 Welding engineer EWE/IWE;

6.6.6.2 Welding technologist EWT/IWT;

6.6.6.3 Welding specialist EWS/IWS;

6.6.6.4 Welding quality inspector EWI/IWI.

6.6.7. Welder qualification shall comply with the requirements of LST EN ISO 9606-1, if not otherwise indicated in the design.

6.6.8. Prior to upgrade or repair, TSG Engineer shall submit to the upgrade or repair contractor the pipeline diagram and the list of materials (in sd. or dwg. and xls. or doc format) where the contractor shall make all changes to be done during pipeline upgrade or repair.

6.6.9. Prior to installation, upgrade or repair, the contractor shall develop and agree a repair/installation/upgrade technology and quality control plan in accordance with the sample form provided in Annex 8 hereto.

6.6.10. Materials used during installation or upgrade shall be the same as indicated in the design (materials can be changed only if permitted by the representative of the design company).

6.6.11. Repair materials and technology shall be similar to those used in the fabrication of the pipeline. In case of other materials, they shall be selected based on applicable standards and maintenance procedures and shall have similar mechanical and technological characteristics.

6.6.12. All materials used for installation, upgrade or repairs must have quality certificates. If none is available, materials can be used only after they are tested/analyzed with tests yielding positive results.

6.6.13. Upgrade or repair contractor shall verify the conformity of the certificates of the installed pipe elements with the identification marks on the elements delivered to the installation or repair site and transfer the identification marks on each section of the pipe used (next to welds).

6.6.14. Prior to assembling flange connections, pipeline repair, installation, upgrade or maintenance contractor shall evaluate the condition of connection elements and prepare them for proper assembly. The contractor shall be responsible for the quality of assembled flange connections. Gaskets for flange connections are selected depending on the fluid and its characteristics provided in Table 1.

Table 1

Fluid	Characteristics		Flange type	Gasket Type
	P, bar	T, °C		
Steam condensate, alkaline solutions with concentrations up to 10% Water, process air, steam, lubeoil	<40	<150	1; 2-3; 4-5	Asbestos-free
Hydrocarbons, H <sub>2</sub> S, H <sub>2</sub> , gas	<40	<300	1; 2-3; 4-5	Reinforced graphite gaskets
	<64	>300	1; 2-3; 4-5; 6-7	Spiral wound/Camprofile (except flange type 4/5 – Camprofile), metal rings
Steam	<40	>150	2-3; 4-5	Spiral wound
Hydrocarbon gas, acids, alkalis	<64	Between -45 and 150	1; 2-3; 4-5	Spiral wound/Camprofile
FCC catalyst	<16	Between 0 and 750	1, 2-3	Spiral wound/Camprofile

6.6.15. Types and materials of fittings (studs and nuts) for flange connections shall be selected in accordance with Annex 10.

6.6.16. After pipeline installation, upgrade, repair, depressurization, contractor shall obtain a debinding permit (Annex 17) before closing the pipeline subject to agreement of responsible persons indicated in Annex 17. All assembled flange connections shall be appropriately marked, i.e. Every connection shall have a metal tag with an imprinted name of the contractor, the individual flange connection number of the worker that assembled the connection, and the code of sealing gaskets (P – asbestos-free soft; G – reinforced graphite; M – metal (Camprofile type); Z – ring (oval or octagonal); S – spiral) and tightening torque of studs (Nm).

6.6.17. During the test (hydraulic, pneumatic or visual inspection), the flange connections shall be assembled in accordance with the requirements (6.6.14, 6.6.15)) and attached with tables (6.6.16.), except for temporarily assembled connections which may be located in places of temporary blinding (using temporary gaskets). A red table shall be attached on such flange connection.

6.6.18. In case of installation, repair, reconstruction or upgrade of pipeline systems from steel of grades 4, 5, 6, 7, 8, 9, 10 (according to ISO/TR 15608:2017) or their combinations, chemical composition of all newly installed elements and new welds shall be verified. Verification is performed using appropriate tools such as optic pictographic analyzers, X-ray fluorescent analyzers, etc.

6.6.19. For installed, upgraded or repaired pipeline systems, internal visual inspection (VI) shall be performed for all fillet welds (tie-ins up to DN40). Where VI is not possible, radiographic testing (RT) shall be done instead.

6.6.20. After installation, wall thickness measurements (ultrasonic) shall be performed for all installed new elements (pipes, elbows, reducers, T-joints, spherical and other blinds, nozzles) by measuring one point per element as shown on the sketches of pipe element thickness measurement places (Annex 11) (measurement points: for pipe and nozzle – point No 1, elbow – No 3, reducer – No1 and 3, T-joint – No 1, spherical blind – No 3).

6.6.21. A welding log shall be kept for any welding of pipelines during their installation, upgrade or repair. Thermal treatment logbook shall be kept for thermal treatment of welded connections. Logs shall be filled every shift by a person responsible for the performance of particular work. Logs shall be kept in the technical file for the service period of the pipeline.

6.6.22. During installation, upgrade or repair, the pipelines subject to registration with PHER shall be inspected by an accredited body expert. Pipelines not subject to registration with PHER shall be inspected by TSG Engineer.

6.6.23. Contractor performing installation, upgrade or repair of the pipeline shall draw up and submit a file of all required technical documents described in 6.3.9.÷ 6.3.12. The procedure and order of preparation and presentation of documents in the file (referred to in Annex 3) comprise three stages:

6.6.23.1. Documents necessary before starting the repair/ installation/upgrade of the pipeline;

6.6.23.2. Documents necessary after repair/installation/upgrade of the pipeline, before carrying out II or HT/PT (whichever is planned). Documentation shall be submitted to TSG Engineer or an accredited body expert;

6.6.23.3. After final completion of pipeline repair/installation/upgrade works, contractor shall submit the documentation to TSG Engineer or accredited body expert.

6.6.24. Technical inspection of the pipeline after its installation, upgrade or repair shall be performed in the following sequence:

6.6.24.1 Submission of technical documents to a person that will perform technical inspection. This person shall check if:

6.6.24.1.1. Layout of components, assemblies and pipeline conforms to the design;

6.6.24.1.2. Pipeline installation requirements conform to the standards and technical norms indicated in the design or technical file of the pipeline;

6.6.24.1.3. Measures required by the design have been fully implemented;

6.6.24.1.4. Prepared documents reflect the works performed.

6.6.24.2. Transfer of pipeline for visual inspection;

6.6.24.3 Transfer of pipeline for inspection during its testing (refer to 6.7.15÷6.7.17).

6.6.25. After visual inspection and testing of the pipeline and verification of its technical documentation, TSG Engineer or accredited body expert shall provide a test report to the person responsible for the safe operation of the pipeline and to the contractor with indicated defects and conclusions.

6.6.26. Pipeline shall be considered suitable for operation after fixing all indicated defects.

6.6.27. Mandatory occupational health and safety requirements for production of individual work equipment or their groups and their conformity assessment procedures applicable to any equipment used by an organization performing installation, upgrade or repair works are established in technical regulations or other OHS legal acts. It is allowed to use only work equipment, which is in good technical condition and meets requirements prescribed by occupational safety and health legislation.

Contractor employees must use the work equipment in a safe manner. The requirements for the safe use of particular work equipment is laid down in the documents and instructions which must be supplied by the manufacturer together with the equipment. Contractor must have such instructions in place.

6.6.28. Installation, upgrade and repair contractor shall organize the work in such a way that after completion of the work, prior to commissioning the pipeline or other equipment, there are no irrelevant items left inside the pipeline and the inside of the pipeline is clean.

6.6.29. TSG Engineer shall enter data on the upgrade or repair of the pipeline in the pipeline passport. Pipeline installation, upgrade or repair documents are stored in the Equipment Technical Supervision and Material Analysis Group together with the technical documentation (passport) of the pipeline throughout its lifetime.

6.6.30. After completion of work, contractor shall submit the diagrams of the installed, repaired or upgraded pipeline, the list of materials used and the logbook (in vsd or dwg and xls or doc format) to TSG Engineer. TSG Engineer shall upload these documents to the data management system of the Maintenance Department.

## **6.7. Pipeline technical inspection**

6.7.1. The purpose of the technical inspection is to determine whether pipelines can operate reliably under their current operating conditions until the next inspection, taking into account their degree of corrosive and mechanical wear and the number of working hours (cycles), and to set date for the next inspection.

6.7.2. Pipeline technical inspections:

6.7.2.1. After installation of a new pipeline – external visual inspection, strength and tightness test, in-service pipeline inspection;

6.7.2.2. Extraordinary inspection – after accidents, upgrade or repair that requires welding, lengthy out-of-service periods (more than 12 months) – external visual inspection, strength test, in-service pipeline inspection;

6.7.2.3. Periodically as required under the Rules on Operation of Pressure Pipelines – in-service pipeline inspection and throughout technical inspection (TTI).

6.7.3. The condition of pipelines subject to registration with PHER is inspected by an accredited body expert. The condition of pipelines not subject to registration with PHER is inspected by TSG Engineer. Where necessary, other expert organizations can be invited to inspect the technical condition of the pipeline.

6.7.4. The scope, methods and frequency of inspections of the condition of pipelines shall be determined in accordance with the Rules on Operation of Pressure Pipelines and this Procedure and taking into account experience with the operation of pipelines. The assessment of defects determined during operation shall be carried out in accordance with the normative document according to which the pipeline was installed and operated. Newly fabricated and installed pipelines shall conform to the normative document according to which the pipeline was fabricated. Post-installation defects determined during technical inspection which do not meet the requirements for newly installed pipelines as well as defects that occur during operation (pit corrosion, dents, etc.) shall be allowed to be assessed in accordance with ПД 38.13.004-86, API 579 and a special methodology developed by a specialized engineering organization.

6.7.5. Periodic technical inspections of pressure pipelines shall be carried out within the time limits established by the pipeline manufacturer (designer) or time limits set out in Table 2.

Table No. 2.

Material group	Parameters $P_d \times DN$ (bar×mm)	In-service pipeline inspection (ISPI) frequency		Thorough pipeline inspection (TPI) frequency	
		Corrosion rate > 0.5 mm/year	Corrosion rate ≤ 0.5 mm/year	Corrosion rate > 0.5 mm/year	Corrosion rate ≤ 0.5 mm/year
1	>1000	Once a year	Once in 2 years	Whichever period is shorter: 1. 1/2 of the remaining relative service lifetime 2. Once in 2 years <sup>1</sup>	Whichever period is shorter: 1. 1/2 of the remaining relative service lifetime 2. Once in 4 years <sup>1</sup>
1	≤ 1000	Once in 2 years	Once in 4 years	Whichever period is shorter: 1. 1/2 of the remaining relative service lifetime 2. Once in 4 years <sup>1</sup>	Whichever period is shorter: 1. 1/2 of the remaining relative service lifetime 2. Once in 6 years <sup>1</sup>
2	Irrespective of parameters	Once in 4 years		Whichever period is shorter: 1. 3/4 of the remaining relative service lifetime 2. Once in 6 years <sup>1</sup>	

<sup>1</sup> – Measurements of the thickness of the elements of the pipeline must be carried out at the specified intervals to the extent specified in Table 5.

6.7.6. TPI shall be performed for the Company high-risk pipelines at the intervals indicated in Table 3. It may be performed more frequently, taking into account the results of the last inspection. The list of high-risk pipelines (Annex 12) can be modified subject to corrosion/erosion rate and operating experience. The list of high-risk pipelines must be updated and approved at least once every 4 (four) years. Responsible – Equipment Technical Supervision and Materials Analysis Group Manager.

Table 3

Material group	Parameters $P_d \times DN$ (bar×mm)	In-service pipeline inspection (ISPI) frequency		Thorough pipeline inspection (TPI) frequency	
		Corrosion rate > 0.5 mm/year	Corrosion rate ≤ 0.5 mm/year	Corrosion rate > 0.5 mm/year	Corrosion rate ≤ 0.5 mm/year
1	Irrespective of the product of parameters multiplied by diameter	Once a year	Once in 2 years	Whichever period is shorter: 1. 1/2 of the remaining relative service lifetime 2. Once in 2 years <sup>1</sup>	Whichever period is shorter: 1. 1/2 of the remaining relative service lifetime 2. Once in 4 years <sup>1</sup>

<sup>1</sup> – Measurements of the thickness of the elements of the pipeline must be carried out at the specified intervals to the extent specified in Table 5.

6.7.7. Company pipelines subject to the Rules on Installation and Safe Operation of Water Steam and Superheated Water Pipelines (hereinafter – the Rules) shall be inspected at the intervals set out in the Rules. The scope of thickness measurements is indicated in Table 5.

6.7.8. ISPI are performed for operating pipelines by checking:

6.7.8.1 If the pipeline is maintained by persons with adequate qualification;

6.7.8.2 If defects detected during previous inspections have been fixed;

6.7.8.3 The condition of insulation and coating;

6.7.8.4 Pipeline vibrations. If the vibration of the pipeline is visually observed, vibration measurements shall be carried out and rated according to the amplitude of vibration, depending on the vibration frequencies indicated in Table 4 (according to GOST 32569-2013).

Table 4

Level	Frequency, Hz									
	2	4	6	8	10	20	30	40	50	60
	Pipeline vibration amplitudes, mkm									
I	120	115	100	90	85	60	50	45	40	35
II	250	230	200	180	165	120	95	85	75	70
III	500	450	400	260	330	230	180	145	135	130
IV	1250	1100	950	800	750	500	420	350	320	300

Vibration is divided into four levels:

- I – calculated (*when designing a pipeline*);
- II – allowable (*normal operation of pipeline*);
- III – repair required (*pipeline system upgrade required*);
- IV – emergency.

Accordingly, level I to II – normal operation of the pipeline; II to III – permissible operation, vibration control-prevention required; from III to IV – increased vibration control-prevention, urgent reconstruction of the pipeline system is required; above IV is an emergency situation.

6.7.8.5 Condition (tightness) of pipeline connections and their components in accessible places;

6.7.8.6 Condition of supports, hangers and springs;

6.7.8.7 Condition of expansion joints;

6.7.8.8 Condition of drains and air vents;

6.7.8.9 Condition of valves, control and measuring instruments;

6.7.8.10 Condition of pressure relief or pressure control devices and safety accessories;

6.7.8.11 Condition of temperature drift indicators;

6.7.8.12 If repair, upgrade documents have been duly executed.

6.7.9. ISPI does not require removing insulation and installing scaffolding.

6.7.10. All inadmissible defects that are likely to reduce the strength and tightness of the pipeline must be identified and assessed during a thorough technical inspection (see Article 6.7.4).

6.7.11. Special attention shall be paid to the following potential defects during the thorough inspection:

6.7.11.1 Cracks resulting from atmospheric exposure, metal fatigue, freezing;

6.7.11.1.1. Running cracks;

6.7.11.1.2. Brittle ruptures;

6.7.11.1.3. Metal flaking, blisters, dents, folds, surface scratches and chaps and other mechanical and corrosive defects;

6.7.11.1.4. Welding defects and especially cracks;

6.7.11.1.5. Wall thinning in pipeline elements.

6.7.11.2 During the thorough inspection, sections of the pipelines where defects or corrosion/erosion are most likely to occur shall be checked up:

6.7.11.2.1. Injection points;

6.7.11.2.2. Blinded pipe branches;

6.7.11.2.3. Possible corrosion underneath insulation, coatings and inserts;

6.7.11.2.4. Air and ground interface;

6.7.11.2.5. Spots in the pipelines where due to the technological process the flow changes its direction or which tend to accumulate moist and corrosive materials (elbows, t-joints, drains, blinded or temporary unused sections of the pipeline);

6.7.11.2.6. Possible corrosion spots in points of support;

6.7.11.2.7. Dew-point (temperature) corrosion.

6.7.11.3. Thorough technical inspection shall be carried for the pipeline components that are attached to the top of columns (light fraction discharge line).

6.7.11.4. During TPI, special attention shall be paid to welded joints connecting elements of different steel groups. And for high-temperature, critical pipelines it is necessary to carry out control of such welded joints.

6.7.12. TPI may be done for out-of-service pipelines or for in-service pipelines in combination with ISPI.

6.7.13. NDT methods used for wall thickness measurements during TPI are ultrasonic and radiographic testing, and for base metal and welds – magnetic particle (MT), dye-penetrant (PT), hardness (HT) testing, etc. Taking into account the operating conditions of the pipeline, the requirements of legal acts as well as TPI experience in pipeline wall thickness measurements and NDT the following procedure shall be observed at the Company:

6.7.13.1. A punch list for pipeline inspection-insulation works (hereinafter – punch list, Annex 13) and pipeline isometric diagram with markings (hereinafter - punch list diagram) required for TPI shall be prepared.

6.7.13.2. Responsibility for preparation of punch list and punch list diagram shall lie with:

6.7.13.2.1. Quantification of elements to be inspected and marking in a punch list diagram – Maintenance Department Mechanical Engineer (hereinafter – Mechanical Engineer) for assigned organizational units;

6.7.13.2.2. Selection of NDT method and marking in the punch list diagram – Mechanical Engineer;

6.7.13.2.3. Determination of the places of insulation removal and scaffolding installation, selection of the NTD method and marking them in the punch list diagram – Mechanical Engineer;

6.7.13.2.4. Filling in the punch list (based on data received pursuant to 6.7.13.2.1–6.7.13.2.3) – Planning Engineer.

6.7.13.3. The punch list and the diagram is coordinated and approved in the data management system of the Maintenance Department (hereinafter – IT system) (see Annex 14 for graphical representation of approval process);

6.7.13.3.1. The punch list is signed by Planning Engineer and Mechanical Engineer by approving it in the IT system;

6.7.13.3.2. The punch list diagram is signed by Mechanical Engineer and uploaded to the IT system;

6.7.13.3.3. The punch list and diagram is approved in the IT system by the head of the organizational unit, who is responsible for routine maintenance, proper and safe operation of the pipeline.

6.7.13.3.4. The punch list and diagram is approved in the IT system by Maintenance Manager of respective Operations Subdivision.

6.7.13.4. The scope of pressure pipeline element thickness measurements is indicated in Table 5.

Table 5

Material group	Parameters	Pipeline number in the list of high-risk pipelines	Scope of element thickness measurements
1	High-risk pipelines – oil products that spontaneously ignite when in contact with air	SUT	The scope of measurement of the thickness of elements for each pipeline is indicated separately in the list of high-risk pipelines <sup>1</sup> (from 100% to 5%)
1	High-risk pipelines with operating temperature $T_d \geq 260$ °C and corrosion rate $\geq 0.2$ mm/year.	KG	20% of each group <sup>2</sup> of pipeline elements but not less than 2 pcs. <sup>1</sup>
1	High-risk pipelines – highly toxic product (hydrogen sulphide)	LNT	5% of each group <sup>2</sup> of pipeline elements but not less than 2 pcs. <sup>1</sup>
1	All pipelines, except high-risk pipelines	-	5% of each group <sup>2</sup> of pipeline elements but not less than 2 pcs.
2	All pipelines regardless of their parameters	-	5% of each group <sup>2</sup> of pipeline elements but not less than 2 pcs.

<sup>1</sup> – Annex 12 contains a list of high-risk pipelines with criteria, criterion No and the thickness measurement scopes of the elements specified separately for each pipeline.

<sup>2</sup> – Group of pipeline elements (see Section IV. Abbreviations, terms and definitions).

6.7.13.5. When preparing pipelines for TPI measurements, it is necessary to take into account the possible increased corrosion wear in certain pipeline areas (areas are given in 6.7.11.2. ÷ 6.7.11.4.) and to select the longest operating elements or assemblies under the most difficult operating conditions and with the thinnest walls and, according to the results of previous thickness measurements, with the lowest remaining relative service lifetime.

6.7.13.6. Selection of the wall measuring method (ultrasonic or radiographic):

6.7.13.6.1. For all tie-ins and nozzles up to DN40 of group 1 pipelines, wall thickness measurements are performed by radiographic method (if possible), if radiographic or visual (internal) control was not performed at the time of pipeline installation, upgrade or repair.

6.7.13.6.2. Wall thickness measurements by radiographic method are possible for pipeline elements with diameter up to DN80 and wall thickness up to 8 mm (inclusive).

In exceptional cases, subject to approval of TSG Engineer, radiographic method can be applied to pipeline elements, with diameter up to DN100 and wall thickness - 8 mm (inclusive). This method is applied when the pipeline operating temperature is  $T_d \geq 200$  °C, including high-risk pipelines that are subject to increased corrosion or erosion rate.

6.7.13.6.3. The radiographic method is applied to isolated elements of pipelines and only in areas where adequate access is available:

- The distance freely accessible from at least one side of the controlled assembly must be at least 0.5 m.
- Height limits must be taken into account. The radiography method can be used at scaffolding erection sites up to 6 m high, which are equipped with intermediate platforms, when access to the platform is installed from the inner side of the scaffolding. The radiography method is

not applicable in places accessible by fixed and temporary ladders or scaffolding, where access to the platform is arranged from the outer side of scaffolding.

- The choice of the radiography method must assess the possibility for the persons performing control to move to a safe place.

6.7.13.7. For thickness measurements by ultrasonic method, measuring points of each different element must be prepared as shown on the sketches of pipe element thickness measurement places (Annex 11).

6.7.13.7.1. Wall thickness of reducers, T-joints, elbows, pipes, side tie-ins shall be measured as close as possible to a weld – 5 ÷ 10 mm. Wall thickness measurements for T-joint pressed and stretched spouts of the middle part branch shall not be performed;

6.7.13.7.2. The diameter of the cleaned wall surface to be measured shall be least 30 mm and it shall be cleaned down to the metal ( $R_z$  not < 40).

6.7.13.7.3. For thickness measurements for pipelines containing group 2 fluids, the elements shall be prepared and one point measured for each element (according to the sketches provided in Annex 11: elbow – point No 3, pipe – point No 3, reducer – point No 1 and 3, T-joint – point No 1, before tie-in – point No 1);

6.7.13.7.4. For pipelines with group 2 fluids, the wall thickness of the elements shall be measured taking into account the nature and rate of corrosion/erosion. Potential hazard assessment shall be carried out to determine the necessity of TPI. This assessment shall be performed by TSG Engineer and heads of organizational units (persons responsible for routine maintenance, proper and safe operation of the pipeline) in consideration of the actual pipeline condition and experience in operating pipelines with similar parameters and products. TPI decisions are made by the commission (see 6.8.2.).

6.7.13.7.5. Wall thickness is not measured for nozzles (*Weldolet*, *Thredolet*, *Sockolet*, *Flexolet*, *Latrolet*, *Elbolet*) of the pipelines containing group 1 and group 2 fluids.

6.7.13.8. When performing thickness measurements for insulated pipelines by ultrasonic method, an insulation strip of at least 150 to 200mm must be removed from the surface to be measured.

6.7.13.9. After determining minimum wall thickness in one or several points of the same element which may affect the safe operation of the pipeline the number of wall measurements of these elements or certain assemblies/zones shall be doubled. After repeatedly determining the minimum values of wall thickness caused by the corrosive/erosive environment (whether internal or external), all not previously measured elements or their assemblies/zones shall be checked.

6.7.13.10. Measurements must not be doubled if wall thinning can be attributed to mechanical reasons, i.e. has resulted from rolling, grinding, bending or other mechanical treatment. In such case, all similar or identical elements or their assemblies/zones where recurrent defects are possible shall be checked.

6.7.13.11. Determination of remaining relative service lifetime of pipeline elements:

6.7.13.11.1. The remaining relative service lifetime of the pipeline elements shall be calculated under the below formula:

$$H = \frac{S_{\text{vid.}} - S_{\text{br}}}{KG}, \text{ years (1)}$$

Where  $S_{vid}$  - last-measured average thickness of walls of the pipeline element, mm. If at any point of the element the measured wall thickness is less than 90 % of the calculated average wall thickness for the element, the obtained lowest wall thickness shall be used in the calculation of the remaining relative service lifetime;

$S_{br}$  - pipeline element retiring thickness, mm. Calculation methodology according to PД 38.13.004-86;

KG - pipeline element corrosion rate, mm/year.

The remaining relative service lifetime of the pipeline elements shall be determined for separately for each element based on its calculated corrosion rate. The remaining relative service lifetime of the pipeline is determined based on the element with the calculated shortest relative service lifetime.

6.7.13.11.2. Corrosion rate shall be calculated as follows:

1. When previous thickness measurements are available:

$$KG = \frac{S_{vid.t1} - S_{vid.t2}}{\Delta T \times K}, \text{ mm/year (2)}$$

Where  $S_{vid.t1}$  - average wall thickness of the pipeline element calculated during previous measurement, mm;

$S_{vid.t2}$  - average wall thickness of the pipeline element calculated during the last measurement, mm. If at any point of the element the measured wall thickness is less than 90 % of the calculated average wall thickness for the element, the obtained lowest wall thickness shall be used in the calculation of the remaining relative service lifetime;

$\Delta T$  - time interval between the last and previous thickness measurements, in years;

$K=0.75$  – a factor estimating the difference between the average expected corrosion rate and the guaranteed corrosion rate.

2. When previous measurements are not available (measurement performed for the first time):

$$KG = \frac{S_{nom} + C - S_{vid.t2}}{\Delta T \times K}, \text{ mm/year (2)}$$

Where  $S_{nom}$  - pipeline element nominal wall thickness, mm;

$C = 0.125 \times S_{nom}$  - positive manufacturing tolerance of the pipeline element, mm;

$S_{vid.t2}$  - average wall thickness of the pipeline element calculated during the last measurement, mm. If at any point of the element the measured wall thickness is less than 90 % of the calculated average wall thickness for the element, the obtained lowest wall thickness shall be used in the calculation of the remaining relative service lifetime;

$\Delta T$  - the time difference between the last element thickness measurement and its entry into service, in years;

$K=0.75$  - a factor estimating the difference between the average expected corrosion rate and the guaranteed corrosion rate.

**Note:** if the corrosion rate of the pipeline element is  $KG < 0.01$  mm/year, remaining relative service lifetime of this element shall be calculated at  **$KG = 0.01$**  mm/year.

6.7.14. For pipelines with the expired operating cycles or lifetime set by the designer or manufacturer, also pipelines with defects not permitted by production standards or defects that occurred during the operation of the pipeline, the consequences of which are difficult to assess without further investigation, the accredited body shall make a decision together with TPG representatives and a commission established by the Company on further operation of such pipelines based on the results of their inspections, calculations and tests.

6.7.15. Hydraulic testing of pipelines:

6.7.15.1. Strength and tightness tests are performed after completion of all works provided for in the design: i.e., welding of nozzles and tie-ins, installation of movable and fixed supports (if supports are welded to the pipeline), thermal treatment of welds (if required by the design), pipeline internal cleaning and/or purging with air or inert gas; getting positive NDT results, etc. Tables shall be attached to flange connections (6.6.16. and 6.6.17.);

6.7.15.2. Prior to the test, it is required to develop technical documentation (p. 6.6.23.) and submit pipeline testing diagram with indicated battery limits and blind installation points, also indicate the filling, venting, pressure gauge installation, pressurization, draining points as well as used test liquid. The diagram shall be approved by the head of respective process unit (person responsible for routine maintenance, proper and safe operation of the pipeline) and TSG Engineer.

6.7.15.3 Strength test shall be performed at a design pressure or at the highest of the two values determined by the following formulas:

$$P_b = 1.25 P_s \frac{[\sigma]_{20}}{[\sigma]_t};$$

or

$$P_b = 1.43 P_s$$

Where:  $P_b$  - test pressure (bar);

$P_s$  - maximum allowable pressure (bar);

$[\sigma]_{20}$  - allowable stress at 20 °C;

$[\sigma]_t$  - allowable stress at design temperature.

In any case, strength testing pressure shall be not less than two bars ( $P_b \geq 2$  bar) and tightness testing pressure – same as operating pressure or not less than one bar ( $P_b \geq 1$  bar), unless otherwise specified by the manufacturer (or designer). Given such pressure and test (ambient) temperature, allowable pipeline stress cannot exceed 90 % of material yield strength;

6.7.15.4. The temperature of water or other non-aggressive fluids used for hydrotesting the pipeline shall be within the range of +5° to +40 °C, if not otherwise specified by the pipeline manufacturer.

6.7.15.4.1. At an ambient of fluid temperature below + 5 °C, the hydrotesting pressure shall be recalculated to assess the fragility of the pipeline material. Special non-aggressive and non-freezing (at a test temperature) liquids (e.g. 100% ethylene glycol solution) shall be selected for such test;

6.7.15.4.2. The test liquid must be non-toxic;

6.7.15.4.3. It must not be possible for the liquid to ignite, crystallize, boil or solidify under ambient conditions during the test;

6.7.15.4.4. During the hydrotest, the pipeline walls must be free of any moisture that can occur to a difference in the fluid and air temperature.

6.7.15.5. Air shall be totally removed from the pipeline when filling it with a test liquid: The pipeline supporting structures shall be observed at the time of filling the pipeline with the liquid:

6.7.15.5.1. Pressure shall be controlled during the test by at least two certified pressure gauges of the same type, measuring range, accuracy class and scale. If possible, pressure gauges shall be positioned in places that makes it possible to monitor pressure at both ends of the pipeline;

6.7.15.5.2. The test pressure shall be increased gradually in accordance with the pressure increase recommendations of the manufacturer/designer or in their absence the pressure increase/reduction rate shall not exceed 2 bar per minute and for the pipelines registered in PHER – in accordance with the pipeline testing methodology prepared by the accredited body. It is prohibited to use air or other gases to increase pressure;

6.7.15.5.3. Valves and other flow control devices must be fully open during the test;

6.7.15.5.4. The test pressure in the pipeline shall be maintained for at least 30 minutes, unless otherwise specified by the pipeline manufacturer/designer and then reduced to the maximum allowable pressure. Tightness of the pipeline shall be checked, the surface of the pipeline elements and all demountable and welded joints shall be visually inspected;

6.7.15.5.5. Repair of the defects is permitted only after reducing the pipeline pressure to the atmospheric level. The test shall be repaired after fixing the defects;

6.7.15.5.6. It is considered that the pipeline has passed the hydraulic test if there are no visible pressure drops and leaks, occurrence of moisture, permanent deformation or other defects in the pipeline elements (basic metal, valves and other flow control devices), demountable and welded joints.

6.7.16. When it is not possible to perform a hydrotest because, for example, test loads have not been determined for the supporting structures or when due to specific characteristics of the technology the system must be protected against any moisture, acoustic emission or pneumatic test shall be performed for the pipeline using compressed air or inert gas.

6.7.17. Pneumatic testing of pipelines:

6.7.17.1 Pneumatic testing shall be performed under the same conditions (6.7.15.1; 6.7.15.2; 6.7.15.3; 6.7.15.5.1) as hydrotest. Pneumatic test uses compressed air or inert gas;

6.7.17.2 Strength test is not allowed for pipelines located in the operating process unit, rack or channels, except for operating equipment required for performing the test;

6.7.17.3 It is necessary to establish and mark the safety zone within the battery limits of the tested pipeline: 25 meters for aboveground pipelines and 10 meters for underground pipelines;

6.7.17.4 Test pressure shall be increased at rates recommended by the pipeline manufacturer (designer) and in the absence of such it shall be increased by a maximum rate of 1 bar per minute when  $P_s \leq 2$  bar or 2 bar per minute when  $P_s > 2$  bar, with the pipeline being visually inspected at certain intervals until reaching the test pressure ( $P_b$ ). Pressure increase stages:

6.7.17.4.1. Stage I – increasing pressure to 1bar when  $P_s \leq 2$  bar or to 2 bar when  $P_s > 2$  bar;

6.7.17.4.2. Stage II – increasing pressure to  $0.3 P_b$ ;

6.7.17.4.3. Stage III – increasing pressure to  $0.5 P_b$ ;

6.7.17.4.4. During each intermediate stage it is necessary to temporarily interrupt the supply of the test medium to the system;

6.7.17.5 Test pressure shall be retained in the pipeline for at least 10 minutes if not otherwise specified by the manufacturer (designer) and then reduced to allowable maximum pressure for checking the integrity of the pipeline. Pipeline component and welded joints shall be visually inspected. It is prohibited to hammer the pipeline walls or make any other mechanical impact on the pipeline components during the test. Their tightness is checked using special leak detectors or soap solution. At negative ambient temperatures, special non-freezing leak detections shall be used;

6.7.17.6. It is considered that the pipeline has passed the pneumatic test if there are no visible pressure drops and medium leaks, foaming, permanent deformation or other defects in the pipeline elements (basic metal, valves and other flow control devices), demountable and welded joints.

6.7.18. Strength and tightness tests shall not be performed for pipelines operating without gauge pressure, e.g., bleed lines, lines after pressure relief valves, flares.

6.7.19. When repair or upgrade works, e.g. hot taps, are performed for in-service pipelines the strength test of the taps shall be performed after welding subject to positive NDT results, prior to doing any milling.

6.7.20. Strength test of the repaired pipeline may be skipped if all welded joints undergo NDT (100% radiography and ultrasonic) after the repair or upgrade.

6.7.21. Each depressurization of the pipeline must be followed by tightness test at the operating pressure using operating medium or inert gas. When it is technically impossible to achieve the operating pressure with inert gas, the test shall be carried out in 2 stages:

- Stage I – tightness test is performed using inert gas at the maximum equipment pressure, checking all depressurized points with a special leak detector or soap solution.
- Stage II – tightness test is performed at the operating pressure using the operating medium by visually inspecting all depressurized points. The tests shall be performed by persons responsible for routine maintenance, proper and safe operation of the pipeline. The tests results shall be recorded in the form of reports provided in Annexes 1 and 2 to the Rules of Pre-Startup Process Safety Review.

## **6.8. Pipeline condition inspection**

6.8.1. TSG Engineer shall develop an annual schedule of thorough pipeline inspection (TPI) (hereinafter – the schedule) as required by the Rules on Operation of Pressure Pipelines.

6.8.2. The schedule shall be coordinated with the Company Maintenance of Director, Chief Mechanical Engineer, Heads of Operation Subdivisions, Maintenance Managers of Operations Subdivisions, Equipment Technical Supervision and Materials Analysis Group Manager and approved by the Deputy General Director for Operations. The schedule shall be kept in the Equipment Technical Supervision and Material Analysis Group.

6.8.3. To postpone the pipeline TPI date indicated in the schedule, the person responsible for routine maintenance, proper and safe operation of the pipeline shall submit a reasoned request to the Equipment Technical Supervision and Materials Analysis Group Manager one month in advance. The request shall be coordinated with the Head of the Operations Subdivision operating the particular pipeline, Chief Mechanical Engineer, Director of Maintenance or Deputy General Director of Maintenance and Deputy General Director for Operations. For pipelines registered with PHER, Equipment Technical Supervision and Materials Analysis Group Manager or engineer appointed by him and a notified body expert shall evaluate the technical condition of the in-service pipeline and set another TPI date. For pipelines not registered with PHER, the pipeline condition shall be evaluated by TSG Engineer. TPI dates may be postponed for up to 12 months depending on technical condition of a relevant pipeline.

6.8.4. For pipelines registered with PHER, TSG Engineer shall call an accredited body expert to carry out the technical condition inspection at the date indicated in the passport of the pipeline.

6.8.5. Person responsible for routine maintenance, proper and safe operation of the pipeline and Mechanical Engineer (in the assigned unit) shall coordinate the technical inspection date with TSG Engineer and take measures necessary to prepare the pipeline for the planned technical inspection.

6.8.6. In-service pipeline inspection shall be performed in accordance with Article 6.7.8 herein after the pipeline is placed into service and is part of the normal technological process. TPI shall be performed in accordance with Articles 6.7.10.÷ 6.7.10 herein. Inspection may be done for out-of-service pipelines or for in-service pipelines in combination with ISPI. Pipelines tests shall be performed in accordance with the procedure set out in Articles 6.7.15. ÷ 6.7.21.

6.8.7. After performing the technical inspection of the pipeline registered with PHER, the accredited body expert shall agree the inspection results with TSG Engineer and issue an inspection report in the form established by the accredited body. The original report shall be kept together with the technical documents (passport) of the pipeline for its entire lifetime. TSG Engineer shall perform the technical inspection of the pipelines not registered with PHER and issue a pipeline technical inspection report (Annex 15). Pipeline wall thickness measurements shall be entered into the log, which shall be kept for the entire lifetime of the pipeline. Technical inspection records, conclusions and next inspection dates shall be entered in the pipeline passport.

6.8.8. TSG Engineer shall upload the copies of the technical inspection reports and accredited body conclusions (reports) (in PDF format) to the data management system of the Maintenance Department (hereinafter – IT system). The copies shall be kept in the system for the entire lifetime of the pipeline.

6.8.9. Familiarization with the technical inspection reports and conclusions, initiation of action plans for fixing the indicated defects/nonconformities, coordination and approval thereof are performed in the IT system (see Annex 16 for approval process). The issued reports and conclusions shall be coordinated and approved as well as decisions on pipeline repair, schedule, method and scope shall be made by the commission composed of:

6.8.9.1. Equipment Technical Supervision and Materials Analysis Manager;

6.8.9.2. Chief Mechanical Engineer;

6.8.9.3. Head of process unit, person responsible for routine maintenance, proper and safe operation of the pipeline;

6.8.9.4. Mechanical Engineer (in the assigned unit);

6.8.9.5. Maintenance Manager of Operations Subdivision;

6.8.9.6. Head of Operations Subdivision or Shop;

6.8.9.7. Deputy Director of Maintenance.

6.8.10. Pipelines used for storing or transporting hazardous materials and preparations shall be marked with labels or warning signs in accordance with the Company Procedure BDS-41. A table with a number (the same as in the process flow diagram) shall be attached to the valves.

6.8.11. Company employees involved in the operation of pressure pipelines must be qualified operators for installation and safe operation of steam and superheated water pipelines as well as process pipelines. The HR Department organizes training and certification of these operators in accordance with the Mandatory Employee Training Rules.

6.8.12. Employees assigned by the Equipment Technical Supervision and Materials Analysis Manager as responsible for technical supervision and safe operation of the pressure pipelines shall be certified as pressure pipeline supervision foremen and pass the exam of visual inspection.

6.8.13. This Procedure shall be followed together with other applicable legislation of the Republic of Lithuania when operating and maintaining pipelines.

6.8.14. Company employees responsible for providing and transmitting information shall report pipeline accidents and malfunctions as well as related incidents and damage to the environment and assets to indicated state institutions in accordance with their competence and the nature of incident or inform other employees of the Company immediately or within the period established by applicable legal acts following the provisions of Public Company ORLEN Lietuva Procedure CS-7.

## VII. DOCUMENTS AND RECORDS

7. Entries (records) indicated in Table 6 shall be made when acting under the present Procedure.

Table 6

Entry	Place of storage	Responsible	Storage period
Pressure pipeline passport	Equipment Technical Supervision and Materials Analysis Group	Equipment Technical Supervision and Materials Analysis Manager	For the entire lifetime of the pipeline until its dismantling
Repair, upgrade documentation	Equipment Technical Supervision and Materials Analysis Group	Equipment Technical Supervision and Materials Analysis Manager	Until the dismantling of the repaired or upgraded pipeline section
Logbook for thickness measurements of pipeline components	Equipment Technical Supervision and Materials Analysis Group	Equipment Technical Supervision and Materials Analysis Manager	For the entire lifetime of the pipeline until its dismantling
Pressure pipeline technical inspection report, accredited body's conclusions (report)	Equipment Technical Supervision and Materials Analysis Group	Equipment Technical Supervision and Materials Analysis Manager	For the entire lifetime of the pipeline until its dismantling

## VIII. CONTROL AND DISTRIBUTION OF PROCEDURE

8. The present Procedure shall be controlled and distributed in accordance with the Procedure of Preparation and Control of Management System Documents.

## FINAL PROVISIONS

9. Director of Maintenance shall be responsible for arrangement of periodic reviews of this Procedure and its update, if necessary.

## X. ANNEXES

- Annex 1. A list of pressure pipelines (form).
- Annex 2. Pipeline passport (form).
- Annex 3. List of documents required for repair, installation and upgrade of pipelines.
- Annex 4. Isometric diagram of pipeline (example)
- Annex 5. Legends (for drawings).
- Annex 6. List of used materials (form).
- Annex 7. Repair, installation, upgrade quality certificate (form).
- Annex 8. Repair, installation, upgrade technology and quality control plan (form).
- Annex 9. Pipeline repair (installation, upgrade) acceptance, closing statement (form).
- Annex 10. Selection criteria for pipeline fasteners (studs, nuts).

- Annex 11. Selection of thickness measurement places for pipeline elements.  
 Annex 12. List of high-risk pipelines.  
 Annex 13. A punch list for pipeline inspection-insulation works (form).  
 Annex 14. TPI logbook initiation-preparation and approval process (schematic diagram).  
 Annex 15. Pressure pipeline technical inspection report (form).  
 Annex 16. PHE inspection report and action plan initiation and approval process (schematic diagram).  
 Annex 17. Deblinding permit.

Prepared by:	Equipment Technical Supervision and Materials Analysis Group Senior Engineer		Arūnas Bušma
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Agreed with:	Maintenance Director		Viktor Zapolski
	Director of Production		Rimantas Kontrimas
	Deputy Director of Maintenance		Gražvidas Šakys
	Chief Mechanical Engineer		Dalijus Vozbutas
	Occupational and Process Safety Control Manager		Rolandas Rupšys
	Equipment Technical Supervision and Materials Analysis Manager		Kęstutis Ševeliovas
	Position	Signature	Full name