

Technical Requirement for Diagnosing of Rust Protection System of the Tank Farm and Utilities at Ilukste LPCS (Diagnosing)

1. Diagnosing Purpose

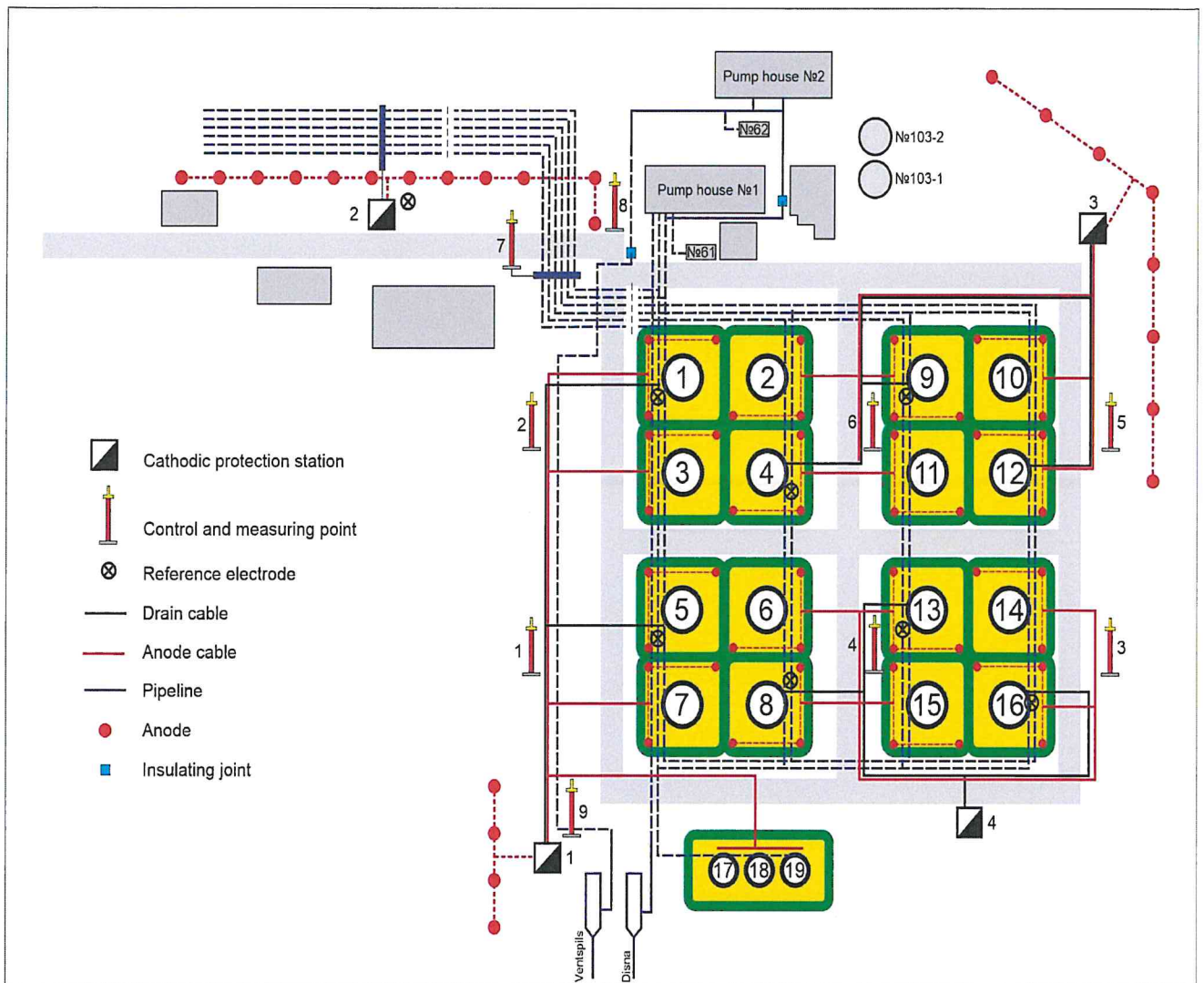
- 1.1 Inspection of the tank farm rust protection system and corrosion condition of the process pipelines:
 - Inspection of insulation coating (determination of insulation coating resistance, places of its discontinuity, and changes in physical and mechanical properties);
 - determination of electrochemical protection efficiency;
 - localization of rust protection equipment location and connection after reconstruction of process facilities;
 - clarification and classification of sections of various corrosion risks.
- 1.2 Preparation of technical report with recommendations as follows:
 - on operation reliability enhancement, and on electrochemical protection equipment reconstruction when needed;
 - on insulation coating repair having detailed sequence of repairs.

2. Description of Diagnosing Object

- 2.1. Vertical steel reservoirs (VSR) for diesel fuel storage at Ilukste LPCS:
 - reservoirs No. 1 - 16, type VSR-10000, operational commissioning in 1972-1973;
 - reservoirs No. 17 - 19, type VSR-700, operational commissioning in 1973.
- 2.2. Horizontal steel reservoirs (HSR) for spills collection at Ilukste LPCS:
 - reservoirs No. 61 and 62, type HSR-25, operational commissioning in 2004 and 2017;
 - reservoir No. 0, type HSR-13, operational commissioning in 2003.
- 2.3 Fire water vertical steel reservoirs No. 103-1 and 103-2, type VSR-400, operational commissioning in 1998.
- 2.4 Clean-up and diagnostic facility (CDF) at the 147th km of the Polotsk - Ventspils trunk oil product pipeline (MOPP) commissioned in 1972, together with pig launcher for the oil product loop-line commissioned in 2005.
- 2.4 Ilukste LPCS underground and aboveground metal utilities consist of the below structures:
 - process pipelines predominantly 426 mm and 530 mm across, of total length of 9.71 km, 4 protective housings of D = 720 mm installed under the roads;
 - aboveground fire pipelines of VSR-10000 sprinkler system and water-based fire-fighting with 47 connecting points (hydrant);
 - aboveground fire pipelines of foam extinguishing system with 12 connecting points (hydrant).

The process and fire pipelines have a galvanic binding (coupling).

- 2.5 The rust protection system of Ilukste LPCS tank farm and utilities consists of the below structures and equipment:
 - four cathodic protection stations (CPS-1, 2, 3, 4), type NHDS 48/80, produced by *Corrocont* (Hungary);
 - four anodic protections consisting of 69 surface and 5 deep FeSi anodes, and 16 wells along the perimeter and behind the fencing of the LPCS;
 - 10 drains with reference electrodes and 9 test (control and measuring) stations, 3 (three) *B3K-50* blocks and 2 insulating joints are installed.
- Facility inspection area is 25 hectares.



3. Scope of Diagnosing Works

3.1 Analysis of design, turnover (as-built), and operating documentation.

3.2 Inspection of corrosion condition and condition of the process pipeline insulation coating by the trailing electrode method (intensive measurements), criteria for protectability by cathodic polarisation under the *LVS EN 14161+A1:2015* standard "Petroleum and Natural Gas Industries. Pipeline Transportation Systems".

3.3 Inspection of cathodic protection units.

3.4 Soil-to-pipe potential measurement at the reservoirs, process lines, fire hydrants, test stations, with cathodic protection stations on and off, under the *LVS EN 13509-2003* standard "Cathodic Protection Measurement Techniques".

3.5 Detailing of abnormal sections.

3.6 Determination of location and connection of the CPS No. 2 due to reconstruction of the process pipelines:

- Location of cathodic protection station and connection point to the process lines;
- Location of anode beds.

3.7 Determination of presence or absence of:

- hazardous cross-effect on fire-fighting system pipelines;
- hazardous impact of circulating currents or high-voltage lines.

- 3.8 Determination of soil corrosivity by measuring the soil resistivity at measurement interval not less than 50 m.
- 3.9 Determination of soil geological cross-section by the method of vertical electrical sounding (VES) so as to choose an optimal place for anode bed (grounding).
- 3.10 Efficiency inspection for the active anode beds having determined anode bed type, place, and depth.
- 3.11 Determination of protectability level, recommendations on the process lines of the mainline pump house No. 2 separated by electrical insulating joint.
- 3.12 Engineering status assessment and optimization of operating modes for electrochemical protection equipment.
- 3.13 Analysis of inspection materials, development of recommendations.

4. Requirements to Work Performance and Technical Report Content

- 4.1 The works shall be performed respecting the following requirements:
 - 4.1.1 Latvian Cabinet Regulation No. 164 dated 23.04.2002 “Requirements to Trunk Pipelines and Trunk Pipelines Engineering Supervision Procedure”;
 - 4.1.2 *LVS EN 15589-1:2018* standard “Petroleum, Petrochemical, and Natural Gas Industries. Cathodic Protection of Pipeline Systems. Part 1. On-Land Pipelines”;
 - 4.1.3 *LVS EN 12954:2019* standard “General Principles of Cathodic Protection of Buried or Immersed Onshore Metallic Structures”;
 - 4.1.4 *LVS EN 13509:2003* standard “Cathodic Protection Measurement Techniques”;
 - 4.1.5 *LVS EN 14161+A1:2015* standard “Petroleum and Natural Gas Industries. Pipeline Transportation Systems”;
 - 4.1.6 Safety regulations for contracted works at LatRosTrans SIA facilities, dated May 10, 2019, available at: www.latrostrans.lv
- 4.2 The contractor shall have a personnel with expertise level 1 to 4 in the sector of on-land metallic structures, certified in compliance with the *EN ISO 15257:2017* standard “Cathodic Protection - Competence Levels of Cathodic Protection Persons - Basis for a Certification Scheme”, or shall pass competence assessment with accredited inspecting institution having an accreditation certificate in line with the *LVS EN ISO/IEC 17020* “General Criteria for the Operation of Various Types of Bodies Performing Inspection”.
- 4.3 The measuring equipment shall be able to keep records in meters and have internal or external GPS-device coordinating the measurements (WGS-84 coordinate system). GPS coordinates, as well as referencing to test stations and process machinery shall be performed using operating company’s meterage.
- 4.4 In course of the diagnosing, it is required to mark the location of all objects that can affect the corrosion condition assessment (defects, crossings with natural and artificial barriers/obstacles).
- 4.5 Measurement tolerance:
 - 4.5.1 GPS coordinates measurement accuracy – not less than 1 m;
 - 4.5.2 Pipeline depth measurement interval – at least 20 m;
 - 4.5.3 Pipeline axis determination accuracy ± 0.5 the diameter (265 mm);
 - 4.5.4 Pipeline depth measurement accuracy ± 5 cm.

- 4.6 The contractor takes responsibility for maintaining good order at the facility where the works to be performed, and for collection of waste resulted by the works.
- 4.7 The final engineering report shall be provided in electronic and paper form (3 hard copies) and include as follows:
- 4.7.1 Findings on diagnostic of cathodic protection units and anode beds;
 - 4.7.2 The results of measurements on the reservoirs, process lines, fire hydrants, test stations;
 - 4.7.3 The results of soil resistivity measurements;
 - 4.7.4 Vertical electrical sounding data interpretation results;
 - 4.7.5 The list of detected insulation defects;
 - 4.7.6 Identification and classification of the sections for mandatory repair or insulation replacement;
 - 4.7.7 Report with recommendations on scope and deadline for worn coating restoration;
 - 4.7.8 Action plan for bringing the pipeline rust protection in line with the statutory condition.

5. Requirements to Commercial Offer

- 5.1 The commercial offer estimation shall include all costs (including taxes, travel allowance, overhead costs, transportation costs).
- 5.2 The commercial offer shall include:
- a time schedule;
 - a list of equipment required for work execution;
 - information on personnel expertise and experience.
- 5.3 The commercial offer shall be valid during 90 days.

LatRosTrans SIA Operations and Maintenance Director



A. Yelinski