



TECHNICAL REQUIREMENTS

AUTOMATION AND INSTRUMENTATION

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ANALYZERS

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1. SCOPE

This Specification covers requirements for analyzers.

2. REFERENCES

The latest editions of the following publications are to be used with this Specification as applicable:

LST EN 60079	<i>Electrical apparatus for explosive gas atmospheres. Elektriniai aparatai, naudojami potencialiai sprogiose atmosferose</i>
ANSI/NACE MR0175 / ISO 15156	<i>Petroleum and Natural Gas Industries - Materials for Use in H₂S-containing Environments in Oil and Gas Production - Parts 1, 2 and 3</i>
API-RP 555	<i>Recommended Practice for Process Analyzers</i>
ASME B1.20.1	<i>Pipe Threads, General Purpose (inch)</i>
ASME B16.11	<i>Forged Fittings, Socket – Welding and Threaded</i>
ASME B16.5	<i>Pipe Flanges and Flanged Fittings</i>
Directive 94/9/EC	<i>Equipment and protective systems in potentially explosive atmospheres (ATEX)</i>
Directive 97/23/EC	<i>Pressure equipment (PED)</i>
ISO 7005-1	<i>Metallic Flanges – Part 1: Steel flanges</i>
LST EN 60529	<i>Degrees of protection provided by enclosures (IP code) (IEC 60529)</i>
LST EN 61285	<i>Industrial process control. Safety of Analyser Houses (IEC 61285)</i>
LST EN 62382	<i>Electrical and instrumentation loop check (IEC 62382)</i>
LST EN ISO 12944-2	<i>Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 2: Classification of environments (ISO 12944-2)</i>
NAMUR NE 43	<i>Standardization of the Signal Level for the Failure Information of Digital Transmitters (NAMUR NE 43)</i>
OL-TR-GR-000	<i>General Requirements</i>
OL-TR-IR-000	<i>Automation and Instrumentation. General</i>
OL-TR-IR-020	<i>Automation and Instrumentation. Data Sheets for Instruments</i>

3. TERMS AND DEFINITIONS

For terms and definitions see:

OL-TR-IR-000 *Automation and Instrumentation. General*

4. ANALYZERS

The OL shall review all analyzer proposals.

All analyzers shall be chosen in accordance with the obligatory standards and the following requirements:

- 4.1 Analyzers shall in all cases be based on technology that can reliably and robustly support the business application;
- 4.2 Shall be equipped with correct sampling system;
- 4.3 All components exposed to the process shall be resistant to the specified process fluid;
- 4.4 Analyzer response time cannot be longer than time resulting from the process requirements;
- 4.5 Used sample shall be returned to the process or, when it is impossible, to the blow down network;
- 4.6 All analyzers / chromatographs shall be equipped with the self-diagnostic system. Alarm signal shall be transmitted to DCS system in case of software or hardware failure. Dry contact of the transmitter shall be used for signal transferring;
- 4.7 Each chromatograph shall have (optionally) minimum four output signals. The timing circuit shall control the valve sequence for automatic calibration and for switching-over on another sample stream;
- 4.8 Detectors of pH and conductivity analyzers shall be designed for dismantling for checking, cleaning or calibration during normal operation. Direct in-line installation (without sampling line) in the process lines is recommended;
- 4.9 If an external maintenance interface device is required, this shall be included in the scope of supply of the analyzer, including all necessary software.
- 4.10 If any calibration gases or fluids for calibration of analyzers are required, this shall be included in the scope of supply of the analyzer, including all necessary equipment;
- 4.11 Analyzers and other equipment in local analyzer houses shall be electrically heated;
- 4.12 Signals from analyzers will be transmitted to DCS system using the series transmission (redundant one in cases when the signals are used for control purposes). It can be the analogue signals in justified cases.
- 4.13 Standard analogue signal: 4-20mA, galvanic isolated, minimum load of 500 Ohms. Signal of series transmission shall be used for monitoring of the analyser operation. The Modbus RTU transmission protocol. Optical fiber cable shall be used for distances exceeding 600m.

5. CONTINUOUS EMISSIONS MONITORING (CEM)

CEM system should be provided if necessity is according EU requirements and other documents requirements:

- 5.1 Rules on air pollutant treatment units registration and operation approved by Order No. 528 of the Minister of Environment of the Republic of Lithuania issued on 15 December 2000;
- 5.2 Emission Limits for Large Combustion Plants approved by Order No.712 of the Minister of Environment of the Republic of Lithuania issued on 24 December 2003 (includes the requirements set in Directive 94/9/EC);
- 5.3 LAND 86:2007 Stationary Sources of Environment Air Pollution. Automated measuring and analysis methods approved by Order No.D1-654 of the Minister of Environment of the Republic of Lithuania;
- 5.4 Standard LST EN 14181:2004 (requirements set for automated measuring systems quality and their legalization).
- 5.5 CEM system shall meet additional requirements in para. 4.
- 5.6 CONTRACTOR is responsible for QAL2 certification (according LST EN 14181) of installed CEM systems. Certification of CEM systems should be performed and certificates obtained before final transmission of installed systems to OL.

6. ANALYZERS HOUSE

- 6.1 Samples preparation equipment, analyzers and equipment required for service and maintenance works are located in Analyzer House. Location of Analyzer House should assure to obtain the results of measurements in time not exceeding maximal answering time including the time required for receiving of fresh samples from their sampling points. The analyzer house should assure proper operating conditions for analyzers operation as per standards and requirements.
- 6.2 Requirements for instrument container electrical equipment:
 - 6.2.1 Properly selected instrumentation equipment should be made as explosion proof which should be confirmed by the proper Ex certificates in accordance with explosion hazards zones classification as per OL requirements and reference standards, as follows:

94/9/EC - ATEX 100a	<i>Directive for unification of EU member states regarding the equipment and systems for operation in explosion hazardous zones</i>
LST EN 61285:2005	<i>Industrial process control. Safety of Analyser Houses (IEC 61285:2004)</i>
LST EN 60079-2:2008	<i>Electrical apparatus for explosive gas atmospheres. Part 2: Pressurized enclosures "p"</i>
IEC 60079-16:1990	<i>Electrical Apparatus for Explosive Gas Atmospheres Part 16: Artificial Ventilation for the Protection of Analyzer(s) Houses</i>

- 6.2.2** On Ex equipment, particularly EEx"p" and Eex"d" category warning plates as per LST EN 60079-0:2009 (item 29.11 - table 14), should be fixed to these equipment, for example "WARNING – AFTER DE-ENERGIZING, DELAY „Y" MINUTES BEFORE OPENING" („Y" being the value in minutes of the delay required).
- 6.2.3** Particularly and attention should be focused on the following items:
- a) Minimal dimensions: 2.5m x 2.5m and 2.3m high;
 - b) Flushing signal lamp located inside;
 - c) Flushing signal lamp located outside;
 - d) Signal buzzer located outside;
 - e) Automatically closed doors;
 - f) Safety rail which could enable door to be open from inside even when they are locked;
 - g) Flammable gases detectors;
 - h) Oxygen detectors;
 - i) Fire detectors;
 - j) Toxic gases detectors (if required).
- 6.2.4** The requirements regarding container safety in case of emergency:
- a) The container should be equipped with Safety System (for example based on PLC controller) which can support controlling of alarms in case in emergencies. In case PLC controller is used for this purpose then this controller should be installed inside fireproof casing which (casing and controller) should be certified b or these elements should be Ex protected by the other means.
 - b) The protection system should function locally in the container and DCS system should be informed only about emergencies if appeared. For safety reasons it is not acceptable if DCS system will not start acoustic and sound signals.
 - c) Analyzers and container vendors with auxiliary equipment should propose the final solution for container protection during emergencies.

All suggestions regarding alarm systems should be consulted with OL (E&A).

7. DESCRIPTION OF SYSTEM ELEMENTS FUNCTIONING

7.1 Draft Fan

- 7.1.1** Draft fan (and / or air conditioner) located inside container should operate following logic:
- a) Switch on in case of the following events:
 - Exceeding of maximum allowable temperature inside the container (thermostat set point);
 - Actuating any of the sensors for HC, H₂ (if required) or O₂, toxic gases on the first alarm level and this signal must be transferred parallel to DCS system;
 - Failure or vanishing of container ventilation system and this signal must be transferred to DCS system.
 - b) Switch off in case of the actuating of the fire detectors.

7.1.2 Other requirements acc. LST EN 54.

7.2 Acoustic and Lighting Signals

- 7.2.1** Acoustic and lighting signals located outside near container entrance must be switched on in the following cases:

- a) Actuating any of the sensors for HC, H₂ (if required) or O₂, toxic gases and fires detectors on the first alarm level and this signal must be transferred parallel to DCS system;
- b) Failure or vanishing of container ventilation system and this signal must be transferred to DCS system.

7.2.2 Furthermore operating manual for the user (operators) of DCS system that describes detailed procedures for emergency or dangerous cases should be prepared.

7.2.3 The signals informing about container ventilation system failure, gas detectors failure and fire detectors failure should be connected to the system.

7.3 Technical Documentation

7.3.1 CONTRACTOR shall deliver documentation in Lithuanian and English Languages.

7.3.2 CONTRACTOR shall prepare and deliver “as-built” documentation to OL. CONTRACTOR shall prepare “as-built” documentation and deliver it to OL.

7.3.3 The loop diagrams shall be prepared for all measuring and signaling loops and for signals from electric substation.

7.3.4 Prior to undertaking the design works, CONTRACTOR shall obtain acceptance of typical loop diagrams by OL.

7.3.5 Field calibration procedure and a list of any special equipment and materials required for calibration.

7.3.6 Calibration curve.

7.3.7 Complete parts list showing, and corresponding to, the model and serial number of the actual analyzer, and including any ancillary components.

7.3.8 Recommended spare parts list for two years of operation.

7.3.9 Factory inspection data, in electronic format, including repeatability data on a specified material agreed upon between Vendor and user.