

PUBLIC COMPANY ORLEN LIETUVA

APPROVED BY
29 August 2023
Order No. TV1(1.2-1)-2023-0386 of
Director of Quality, Labor Safety
and Environmental Control

OCCUPATIONAL HEALTH AND SAFETY PROCEDURE BDS-12 USE OF PORTABLE GAS ANALYZERS

I. GENERAL

Purpose and Scope of Application

1. The purpose of Occupational Health and Safety Procedure BDS-12 'Use of Portable Gas Analyzers' (hereinafter, the Procedure) is to define the procedure for use of portable gas analyzers for measurements of hazardous substances prior to proceeding with hazardous works (hot works, depressurization, etc.) and use for personal protection at Public Company ORLEN Lietuva" (hereinafter, the Company).

2. The Procedure shall apply to all employees of the Company as well as employees of contracting organizations (hereinafter, contractors) to the extent required by a relevant contract concluded with the Company, who use portable gas analyzers.

II. REFERENCES

3. This Procedure has been developed in view of the effective revisions of the following legal regulations and other documents:

3.1. Safety Regulations for Employees Working in Potentially Explosive Atmospheres approved by the Minister of Social Security and Labor of the Republic of Lithuania;

3.2. Lithuanian Hygiene Norm HN 23:2011 'Limit Values of Occupational Exposure to Chemicals. General Requirements for Measurements and Exposure Assessments' approved by the Minister of Health and Minister of Social Security and Labor;

3.3. Order of the Minister of Economy and Innovation of the Republic of Lithuania on Approval of the List of Groups of Instruments Covered by Legal Metrology Regulation and Periods between Verifications;

3.4. LST EN 60079-29-2:2008 Explosive Atmospheres. Part 29-2. Gas detectors. Selection, installation, use and maintenance of detectors for flammable gases and oxygen (IEC 60079-29-2:2007);

3.5. Law on Metrology of the Republic of Lithuania;

3.6. ORLEN S.A. Standard S9 – Measurements of hazardous substances;

3.7. ORLEN S.A. Standard S9 T1 Chemical Safety Control Instruments – Principles of Operation.

II. TERMS AND DEFINITIONS

4. Terms used herein are defined as follows:

Portable gas analyzer (hereinafter, **gas analyzer**) – an instrument carried by an employee and designated to measure the concentration of toxic gases (e.g. hydrogen sulphide, carbon monoxide, ammonia, etc.) in the air, and/or lower explosive limit of combustible gases, and/or oxygen concentration, and to give audible and visual alarm when hazardous concentration is reached. Gas analyzers may be used to measure dangerous substances before proceeding with hazardous (hot, depressurization, etc.) works and/or for the purposes of personal safety.

Leased gas analyzer – an instrument for the protection of an employee, which is serviced by the supplier contracted by the Company (for calibration tests, metrological verification, fixing of minor defects and malfunctions).

Lower explosive limit (LEL) or lower flammability limit (LFL) – the lowest concentration of a gas or a vapor in air capable of producing a flash of fire in the presence of an ignition source. LEL is measured in percent by volume and appears in the monitor of gas analyzer as % LEL.

Bump test – periodical functionality check of gas analyzer in accordance with manufacturer's requirements.

Calibration of measuring instruments (hereinafter, **calibration**) – a series of actions to determine, under known conditions, the concurrence or difference between readings displayed by a measuring instrument or measuring system against the readings of traceable reference device.

Verification of measuring instruments (hereinafter, **metrological verification**) – the procedure to verify conformance of a measuring instruments to the set metrological requirements, following which the measuring instrument shall be marked with the verification mark and/or verification certificate shall be issued.

Work environment – space surrounding an employee where exposure to hazardous and/or dangerous factors is likely.

User – an employee of the Company or contractor using gas analyzer in cases and as prescribed by the Company.

Resetting – resetting of gas analyzer sensors to zero using clean air as established by manufacturer's requirements.

Pump test – gas analyzer pump testing in accordance with manufacturer's requirements used to check whether the pump is working properly (e.g. closing the air inlet).

Potentially explosive atmosphere – an atmosphere, which may become explosive due to local or operational conditions. Entries into such territories within the Company are marked with "Ex" signs.

Organizational unit manager – manager of the Company's organizational unit (division, department, group, operations subdivision, complex, shop, process unit, section, etc.) at any managerial level.

IV. DUTIES AND RESPONSIBILITIES OF EMPLOYEES

5. Manager of organizational unit where gas analyzers are used shall be responsible for:

5.1. Identification of the need of required gas analyzers;

5.2. Arranging training of employees on the use of gas analyzers;

5.3. Returning of the leased gas analyzers after expiry of their lease period;

5.4. Arranging delivery of gas analyzers for testing (metrological verification, bump test and/or calibration) and repairs.

6. Process Safety Group shall be responsible for documenting the handover of leased gas analyzers to managers of specific organizational units.

V. REGISTRATION OF HANDOVER-ACCEPTANCE OF LEASED GAS ANALYZERS

7. The leased gas analyzers transferred to the subordinate organizational unit may be handed over by the organizational unit manager to specific subordinate employees by formalizing the handover-acceptance statement (Annex 1). The statement shall be registered in Dok-system at *Registry TV3 of Internal documents of Division of General Director*.

8. Gas analyzers must be returned to the relevant organizational unit manager and/or Process Safety Group after expiry of their lease period by signing the appropriate handover-acceptance statement (Annex 1).

VI. REQUIREMENTS FOR GAS ANALYZERS

9. Gas analyzers shall meet the following requirements:

9.1. Threshold values must be set depending on the type of work performed and hazardous chemicals to be controlled. Usually, the following threshold values are set for alarm activation of gas analyzers: LEL – 2%, UEL – 5%; oxygen lower limit of 19.5%, and upper limit of 23.5%; hydrogen sulphide (H_2S) – 7 mg/m³ (5ppm); carbon monoxide (CO) – 40 mg/m³ (35ppm); ammonia (NH_3) – 14 mg/m³ (20ppm);

9.2. Gas analyzers shall be registered with the Lithuanian Register of Measuring Instruments;

9.3. Gas analyzers shall be metrologically tested;

9.4. Gas analyzers shall conform to the explosive atmosphere requirements (zone 1 IIC T4) and be suitable for outdoor conditions in Lithuanian climate.

VII. REQUIREMENTS FOR USE AND INSPECTION

10. Repairs of gas analyzers used by the Company employees, except for leased gas analyzers, shall be arranged by Critical Equipment Maintenance Group of the Company's Electrical and Automation Department.

11. Metrological verification of gas analyzers in line with the requirements of the applicable legislation of the Republic of Lithuania shall take place every 6 months. Gas analyzers with no sticker showing the effective date of inspection cannot be used. Metrological verification mark on the gas analyzer indicated the date of its last verification.

12. Gas analyzers used by the Company' employees shall be subject to bump test and/or calibration at least once a month.

13. To measure the concentration of specific substances, gas analyzers designed for the relevant substance must be used, e.g. hydrogen concentration measured with a hydrogen gas analyzer, etc.

14. Before measurements, gas analyzer must be turned by the user in a clean work environment (office, control room, outside the limits of a process unit) and reset it as well as perform pump test, if so prescribed by the relevant manual.

15. Use of gas analyzers with visible damages and/or malfunctions (e.g. if body or display is cracked, the readings do not reset to the set values when work environments change, audible or visual alert signals out of order, etc.) is prohibited.

16. User of gas analyzer must make sure that work or personal protective equipment do not cover air suction inlet as well as audible and visual alarms of the analyzer.

17. During sampling, air suction inlet of operated gas analyzer must be protected from entry of liquid petroleum products and water. Furthermore, analyzer must be protected against direct physical impact such as welding sparks, hot surfaces, mechanical impact, etc.

18. After end of use, gas analyzer must be turned off and its battery charged.

19. Analyzer must be kept with battery fully charged therefore it is recommended to keep it in desktop charging station.

VIII. MEASUREMENTS OF HAZARDOUS SUBSTANCES

General requirements for hazardous substance measurements

20. Cases when measurement of hazardous substances for hazardous works are required have been established in the following Occupational Health and Safety (OHS) Procedures of the Company: BDS-5 Cold Repair Works, BDS-6/1 Equipment Depressurization Works, BDS-6/2 Work in Confined Spaces, BDS-7 Hot Works, BDS-8 Sampling, BDS-10 Use of Vehicles, BDS-31 Earthworks.

21. Employees performing measurements must use personal protective equipment indicated on the work permit or Material Safety Data Sheet.

22. Employees who enter or are present in the areas of explosion hazard of the Company's Operations Subdivisions No. 1, No. 2 and No. 3, Power Plant, Waste Water Treatment Shop, railcar preparation rack, Petroleum Product Loading Shop and Pipeline and Terminal Operations Subdivision of Logistics Subdivision must regularly use the gas analyzers to measure the hydrogen sulphide concentration in the ambient air (additional measurement by the gas analyzer of the lower explosive limit of combustible gases and oxygen concentration is recommended).

Entries to such territories are designated with 'Danger Explosive Atmosphere' signs (Fig. 1). Gas analyzer, when used, shall be turned on and its operation as well as readings monitored. Use of gas analyzers is subject to the following exclusions:

22.1. Employees operating the process units (operators of process units, oil product operators, loading operators etc.) are not required to use gas analyzers when entering and leaving Control Rooms at the time of shift changing;

22.2. A single gas analyzer shall be sufficient for the employees or visitors, when together in a single location, as well as a group of contractor employees (e.g. a crew) performing cold repair works in a single location;

22.3. A single gas analyzer to measure LEL of combustible gases, oxygen concentration and hydrogen sulfide concentration in the ambient air shall be sufficient for a group of contractor employees (e.g. a crew) working together in a single location and performing unsealing or hot works, or works in a confined space;

22.4. Contractor' employees providing services in process unit control rooms (e.g., services of premises cleaning, delivery of drinking water, servicing of coffee machines, etc.) are not required to use gas analyzers.



Fig. 1. Ex sign

Requirements for hazardous substance measurements for hot works

23. Before proceeding with hot works:

23.1. At least 11 meter radius around the place of hot works must be checked;

23.2. Concentrations of hazardous substances must be measured in hazardous areas (at flanged connections, drain valves, valve packing glands, industrial sewer wells, etc.);

23.3. For works at height, concentrations of hazardous chemicals must be additionally measured on lower work platforms and at zero level.

24. During sampling operation, employee must stand with back turned to the wind to avoid inhalation of vapors hazardous to health. It is forbidden to perform sampling operations during lightning, to perform sampling from the top of storage tanks, drums during storm (heavy rain or snowfall when wind speed is 20 m/s and higher).

Requirements for hazardous substance measurements prior to issue of permit for depressurization works and works in confined spaces

25. Airborne concentrations of substances in confined spaces must be measured through existing process openings (hatches, air vents, connecting pipes, etc.) without entering the confined space, using for this purpose special gas analyzers with suction and sampling probes.

26. While sampling from confined spaces the construction of the container has to be taken into consideration, e.g., whether there are any parts enclosed with walls where hazardous gases or vapors may accumulate. Additional samples have to be taken from these places.

27. Before and during measurements of hazardous chemicals in a confined space, mechanical ventilation of the confined space (if any) must be shut off for at least 10 minutes prior to measurements.

28. Confined space air sampling prior to commencement of the work shall be made from every hatch.

29. Three (3) vertical samples at least must be taken from the inside: from the bottom of tank/drum, or immediately above the level of liquid in the tankage (approx. 0.5-1 m above the surface), from the middle, and from the top (under the roof) of the tankage. Sampling points have to be as far from existing openings (hatches, air vents, connecting pipes, etc.) as possible.

30. Employee who is responsible for measurements may enter the confined space, if necessary, only if adequate respiratory protection equipment is used.

IX. MAINTENANCE AND SERVICING OF GAS ANALYZERS

31. If gas analyzer gets into water/dirt, falls from height over 1 m on a hard surface or shows incorrect readings, it must be subject to ad hoc inspection (Bump test).

32. Excess gas concentrations (above measurement range) may damage the sensors of gas analyzer. If the process unit (pipeline, vessel, tank, etc.) was not prepared as prescribed by OHS procedures of the Company, and contains a high concentration of hazardous vapors or gases, measurements with gas analyzer are forbidden.

33. When higher than 50ppm for CO and H₂S or higher than 50% LEL concentration is recorded by gas analyzer, measurements must be stopped immediately, analyzer switch off and sensors ventilated in fresh air (reset).

34. If the gas analyzer was not used for longer than one month, gas analyzer battery (at least once a month) must be fully charged.

35. It is prohibited to charge the battery of gas analyzer in a potentially explosive atmosphere.

36. Vapors of silicon, alcohol and other solvents as well as aerosols (e.g., dyes, detergents, lubricants, sealing materials, etc.) have negative effect on the sensors of analyzer. Therefore, it is prohibited to operate and keep gas analyzers in places where such substances are handled or stored. When handling these substances, employees shall use suitable respiratory protective equipment as specified in the relevant Material Safety Data Sheet.

X. ACTIONS IN CASE OF DANGER

37. If alarm of personal protection gas analyzer activates and the work environment becomes hazardous, employee must:

37.1. Suspend the works immediately;

37.2. Notify people nearby of the potential hazard;

37.3. Switch off all electrified, battery-powered or electronic equipment used, turn off the engine/motor of vehicle or any other work machinery;

37.4. Leave the site of work going perpendicularly to the direction of wind;

37.5. Notify of the event in accordance with the procedure established in the Company if you feel unwell.

37.6. Inform immediate superior.

XI. EMPLOYEE TRAINING

38. Employees of the Company performing air measurements for execution of hazardous work must be trained on the use of gas analyzers and performance of air measurements. Training shall be conducted as prescribed by the Company's Employee Mandatory Training Rules in accordance with the approved gas analyzer user program, with periodic, at least every 12 months, knowledge verification by taking e-tests in ORACLE.

39. Users of gas analyzers not mentioned in Par. 38 above, before using gas analyzers for the first time, must get familiar with the requirements for use established herein and prescribed by manufacturers and must comply with such (information on gas analyzers available at: (K) disk → Analizatorių _instrukcijos).

XII. FINAL PROVISIONS

40. The Procedure shall be amended or modified accordingly upon coming into effect or changing of any legislation or the Company's internal regulations, the requirements whereof shall be taken into consideration.

41. Responsibility for periodic review and updating of this Procedure, if needed, shall lie with Director of Quality, Labour Safety and Environmental Control of the Company.

Prepared by
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Jūratė Eikienė

PUBLIC COMPANY ORLEN LIETUVA**GAS ANALYZER HANDOVER-ACCEPTANCE STATEMENT**

_____, 20____, No _____
Juodeikiai Vill., Mažeikiai Distr. Municipality

_____ handed over, and
(organizational unit, position, full name)

_____ accepted the following
(organizational unit, position, full name)

gas analyzers and their chargers:

Item No.	Description	Serial number	Quantity	Comments
1	2	3	4	5
1.				
2				
[...]	[...]	[...]	[...]	[...]

NOTE

Gas analyzers must be returned in the event of employment contract termination.

Handed over by

(position)

(signature)

(full name)

Accepted by:

(position)

(signature)

(full name)

Returned by:

(position)

(signature)

(full name)

Accepted by:

(position)

(signature)

(full name)