PUBLIC COMPANY ORLEN LIETUVA
DIRECTOR OF QUALITY, LABOUR SAFETY AND ENVIRONMENTAL CONTROL

ORDER
REGARDING APPROVAL OF OCCUPATIONAL HEALTH AND SAFETY PROCEDURE BDS-42 FOR EMPLOYEES WORKING IN POTENTIALLY EXPLOSIVE ATMOSPHERES

29 October 2020, No TV1(1.2-1)- 551
Juodeikiai Village, Mažeikiai Distr. Municipality

1. Pursuant to authorization granted by General Director's Order No TV1(1.2-1)-327 of 27 September 2017, I hereby a p p r o v e the Occupational Health and Safety and Procedure BDS-42 for Employees Working in Potentially Explosive Atmospheres (attached).

2. E s t a b l i s h that the Procedure approved hereby shall come into effect on 16 November 2020.

3. A s s i g n the managers of organizational units of the Company listed in the distribution index hereof to hold additional indoctrination for concerned employees on the Procedure approved hereby before 15 November 2020.

4. C o n s i d e r Order No TV1(1.2-1)-76 of 28 February 2013 by the Company's Director of Quality, Labor Safety and Environmental Control, as well as the *Occupational Health and Safety Procedure BDS-42 for Employees Working in Potentially Explosive Atmospheres* approved with the Order to be no longer effective.

5. A s s i g n the responsible employee of Executive Office to distribute this Order to the managers of organizational units of the Company listed in the distribution index hereof.

Director of Quality, Labor Safety and Environmental Control Saulius Pocevičius

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2020-10-

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2020-10-

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PUBLIC COMPANY ORLEN LIETUVA

APPROVED BY
Public Company ORLEN Lietuva
Director of Quality, Labour Safety and
Environmental Control
on 29 October 2020
by Order No. TV1(1.2-1)-551

Occupational Health and Safety Procedure for Employees Working in Potentially Explosive Atmospheres BDS-42

I. PURPOSE AND SCOPE

1. Familiarize employees with hazards identification and risk assessment at potentially explosive atmospheres, also with general explosion prevention and protection measures, safety requirements at potentially explosive atmospheres, assuring protection of environment and property as well as occupational health and safety.

2. The requirements of the Procedure shall be binding to all the employees of AB ORLEN Lietuva (hereinafter – Company) and, as established in the provisions of certain contracts, to contractors working in those areas of the Company where an explosive atmosphere is likely to form.

II. REFERENCES

3. This Procedure has been developed with the account of 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 Technical Regulation on Equipment and Safety Systems Operated in Potentially Explosive Atmospheres approved by the by Minister of Economy of the Republic of Lithuania;

3.3 General Regulations on Usage of Work Equipment approved by the Minister of Social Security and Labor of the Republic of Lithuania;

3.4 General Regulations on Establishment of Work Places approved by the Ministry of Social Security and Labor of the Republic of Lithuania and the Ministry of Health Care of the Republic of Lithuania;

3.5 API Recommended Practice 505, Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone O, Zone 1, and Zone 2;

3.6 Directive 94/9/EC of the European Parliament and the Council on the Approximation of the Laws of the Member States Concerning Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres;

3.7 LST EN 60079-10-1 Explosive Atmospheres. Part 10-1. Classification of zones. Explosive gas atmospheres;

3.8 LST EN 60079-10-2 Explosive Atmospheres. Part 10-2. Classification of zones. Combustible dust atmospheres;

3.9 LST EN ISO/IEC 80079-20-1 Material Characteristics for Gas and Vapor Classification. Test methods and data;

3.10 LST EN 1127-1 Explosive Atmospheres. Explosion prevention and protection. Part 1. Basic concepts and methodology;

3.11 *Rules for Operating Crude Oil Processing Facilities* by the Minister of Economy of the Republic of Lithuania.

III. ABBREVIATIONS, TERMS AND DEFINITIONS

4. The terms used herein shall be defined as follows:

Explosion – a sudden reaction of oxidation and decomposition resulting in the increased temperature, pressure or simultaneous increase of both.

Fire - a combustion process releasing heat and combustion products usually followed by smoke, flame, and glow or all together.

Potentially explosive atmosphere (hereinafter - **PEA**) – an atmosphere which may become explosive due to local or operational conditions. Potentially explosive environment encompasses a term of potentially explosive atmosphere indicated in the standards listed in Chapter 3.

Explosive gas atmosphere – a mixture of air and flammable substances in the form of gas, vapor or mist under atmospheric conditions in which, after ignition, the combustion spreads throughout the whole unconsumed mixture.

Explosive dust atmosphere – a mixture of air and flammable substances in the form of dust or combustible flyings under atmospheric conditions in which, after ignition, combustion spreads throughout the unconsumed mixture.

Source of release – a point or location from which flammable substances may be released building explosive atmosphere.

Flammable substances (gas, vapor, dust and combustible flyings) – materials which, in certain proportions mixed with air, may produce explosive atmosphere. Flammable substance encompasses a term of combustible and explosive substances specified in the standards listed in Chapter 3.

Explosion protection measures - all and any measures designated to protect against formation of explosive atmosphere, prevent from ignition of explosive atmosphere or minimize the consequences of explosion.

Equipment – machines, apparatuses, stationary or portable devices, their control systems and measuring instruments as well as sensors/detectors or prevention systems which, either separately or together, are intended to produce, transmit, accumulate, measure, control, transform energy and/or process materials, and which can cause explosion because of ignition sources found in them.

Gas temperature class – a classification unit of gas, vapor or mist determined on the basis of their ignition temperature.

Dust temperature class – a classification unit of dust or flyings determined on the basis of their ignition temperature.

Lower explosion limit (hereinafter – **LEL**) – the lowest airborne concentration of highly flammable material, below which the atmosphere becomes non-explosive. Lower explosion limit encompasses a term of lower flammable limit indicated in the standards listed in Chapter 3.

Upper explosion limit (hereinafter – **UEL**) – the highest airborne concentration of highly flammable material, over which the atmosphere becomes non-explosive. Upper explosion limit encompasses a term of upper flammable limit indicated in the standards listed in Chapter 3.

Flash point - the lowest temperature of flammable substance at which, under certain conditions indicated in the standard, if there is a source of ignition, such substance gives off gas and vapor at a rate such as to induce ignition of gas/vapor and air mixture for a short time but not continuously.

Ignition (auto-ignition) temperature – the lowest temperature at which (auto) ignition (without any source of ignition) of flammable substances may occur.

Flammability point – the lowest temperature at which the substance emits enough combustible gas or vapor and ignites immediately if exposed to a source of ignition.

Source of ignition – source of energy that may cause combustion.

ATEX (Atmosphere Explosive) – classification system of potentially explosive atmospheres and equipment regulated by EU Directives (94/9EC and 99/92/EC) and relevant LR legislation and standards.

Layout plans of potentially explosive atmospheres – a plan where locations of potentially explosive atmospheres are indicated.

IV. RESPONSIBILITY

5. Manager of organizational unit / process facility, where potentially explosive atmosphere is present, is responsible for the fulfillment and control of the requirements provided in this procedure.

V. EXPLOSION HAZARD IDENTIFICATION

6. Source of release is described as a point or location from which flammable substances may be released into the atmosphere. (Fig. 1.) Source of release by its frequency and duration are classified into:

continuous (when the concentration of flammable substances in the atmosphere is evidenced 1000 or more hours per year), e.g.: inside tanks, wells, truck tanks and etc.;

primary (when the concentration of flammable substances in the atmosphere persists from 10 to 1000 hours per year), e.g.: sampling points, tank breathers, flares, drains, ducts, etc.;

secondary (when the concentration of flammable substances in the atmosphere persists for less than 10 hours per year), e.g.: flanged connections of pipes or tanks.

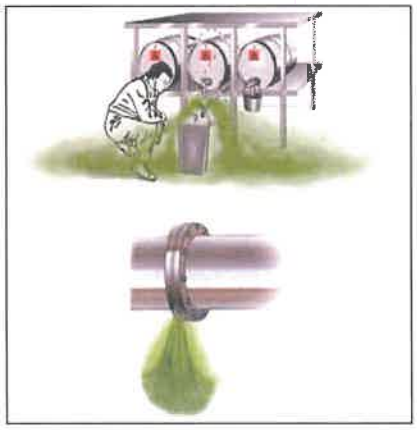

Fig.1 Potential sources of release.

7. Examples of typical ignition sources (Fig. 2 and 3):

7.1. hot bearings of electric motors or other equipment;

7.2. hot surfaces of pipelines, heat exchangers, pre-heaters, pumps, compressors, turbines;

7.3. failures of electrical and automation equipment;

7.4. mechanically generated sparks related to specific design (rotating, friction parts);

7.5. sparks from static electricity discharge;

7.6. failures of batteries of diagnostics or mobile communications means;

7.7. chemical (exothermic) reactions, self-igniting materials;

7.8. Vehicles (internal combustion engines, batteries, braking drums, exhaust pipes);

7.9. Repair tools, welding equipment;

7.10. inadequate (negligent) human behavior (smoking in places not designated for smoking, misuse of lighters, matches, mobile phones, photo cameras, etc.);

7.11. Uncontrollable natural phenomena (lightning, lensing sun rays through glass).

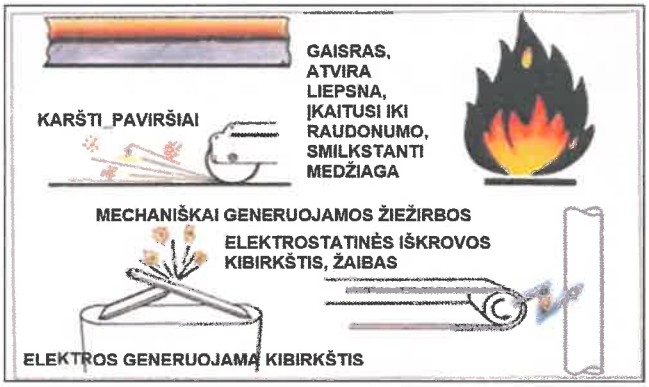

Fig.2 Examples of sources of ignition.

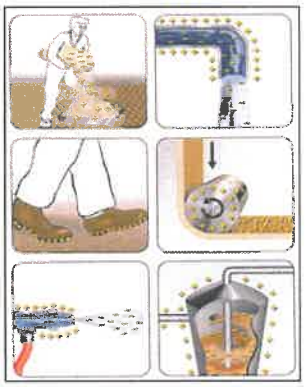

Fig.3 Static electricity discharge.

8. An explosion occurs when the concentration of flammable substance once it is mixed with air (i.e. sufficient amount of oxygen) reaches the lower explosion limit (but does not exceed the upper explosion limit) and when there exists a source of ignition in the environment. (Fig. 4.)

9. In case of explosion, employees face the danger of uncontrolled exposure to flame and pressure wave, radiation of heat, shooting debris, hazardous reaction products and depression of oxygen content in ambient air.

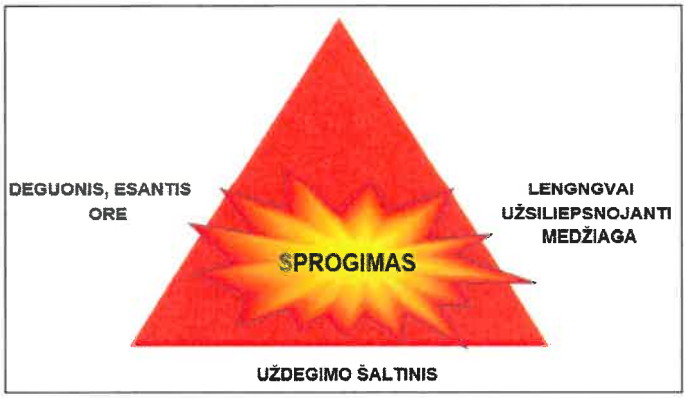

Fig.4 Explosion triangle – required conditions for explosion to occur

VI. CRITERIA FOR ASSESSMENT OF RISK OF EXPLOSION

Assessment of potentiality of explosive atmosphere formation

10. Each technological object that contains highly flammable substances must have potentially explosive zones identified and explosion risk assessed in accordance with the Company's procedures.

VII. POTENTIALLY EXPLOSIVE ATMOSPHERE CLASSIFICATION

11. Classification of potentially explosive atmospheres is required to identify the size of hazardous areas and hazard level thereof. Classification is executed on the basis of hazard, substances and temperature class.

Classification of potentially explosive atmospheres by hazards

12. Potentially explosive gas and vapor atmospheres are classified into zones **0**, **1** and **2**. An example of potentially explosive gas and vapor atmosphere classification is shown in figure 5.

12.1. **Zone 0:** an area in which an explosive atmosphere consisting of a mixture of flammable substances with air in the form of gas, vapor or mist is present continuously or for long periods or frequently. Examples of this zone may be areas inside vessels, towers, sewer wells, etc.;

12.2. **Zone 1:** an area in which occasionally an explosive atmosphere consisting of a mixture of flammable substances with air in the form of gas, vapor or mist is likely to occur during normal operation. This zone occurs at the sampling points, near draining systems, breathers, pumps, valve packings, etc.;

12.3. **Zone 2:** a place in which an explosive atmosphere consisting of a mixture of flammable substances with air in the form of gas, vapor or mist is not likely to occur during normal operation but, if it does occur, it will persist for a short period only (areas around Zone 0 and Zone 1).

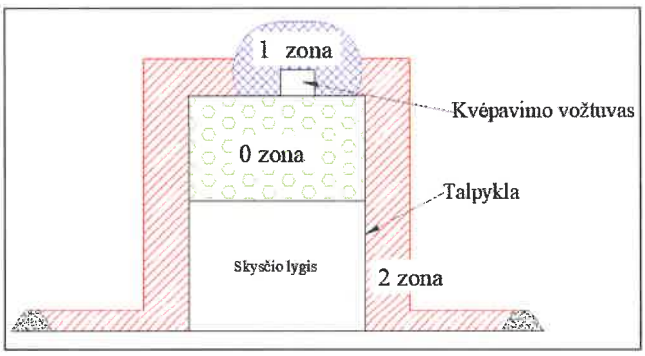

Fig.5 An example of zones around a vessel containing a highly flammable liquid.

13.Groups of potentially explosive dust atmosphere:

13.1. **Zone 20:** a place in which an explosive atmosphere in the form of a cloud of combustible dust or flyings in the air is present continuously, or for long periods or frequently.

13.2. **Zone 21:** a place in which occasionally an explosive atmosphere in the form of a cloud of combustible dust or flyings in the air is likely to occur during normal operation.

13.3. **Zone 22:** a place in which an explosive atmosphere in the form of a cloud of combustible dust or flyings in the air is not likely to occur during normal operation but, if it does occur, it will persist for a short period only.

Classification of potentially explosive atmosphere by substances

14. There are three types of potentially explosive gas and vapor atmosphere groups: IIA, IIB and IIC. Examples of substances of these groups are provided in Table 1.

Table 1

Group of potentially explosive gas and vapor atmosphere	Substances forming the atmosphere
IIA	Crude oil, gasoline, kerosene, propane, etc.
IIB	Hydrogen sulphide, ethanol, etc.
IIC	Hydrogen, acetylene

15. The most hazardous gas and vapor atmosphere group posing a risk of explosion is group IIC, and the least hazardous is IIA.

16. There are three types of potentially explosive dust and flyings atmosphere groups: IIIA, IIIB, IIIC. (Table 2) These groups are determined by the size of flammable solids and their electrical conductivity.

Table 2

Group of potentially explosive dust and flyings atmosphere	Environment
IIIA	Highly combustible flyings
IIIB	Non-conductive dust
IIIC	Conductive dust

17. The most hazardous dust and flyings atmosphere group posing a risk of explosion is group IIIC, and the least hazardous is IIIA.

Classification of potentially explosive atmosphere by ignition temperature

18. Class of highly flammable substances is determined by their auto-ignition temperature. Classification of gas and vapor by self-ignition temperature is shown in Table 3.

Table 3

Gas and vapor temperature class	Gas, vapor self-ignition temperature, °C
T1	Above 450
T2	From 300 to 450
T3	From 200 to 300
T4	From 135 to 200
T5	From 100 to 135
T6	From 85 to 100

19. Dust temperature class is marked by specifying its auto-ignition temperature, e.g., T – 135 °C.

VIII. POTENTIALLY EXPLOSIVE ATMOSPHERE MARKING

ATEX marking for potentially explosive gas and vapor atmosphere on the plans

20. Potentially explosive gas and dust or vapor and flyings atmospheres are marked on the plans according to the requirements of standards. Marking examples are provided in Fig.6 and 7.

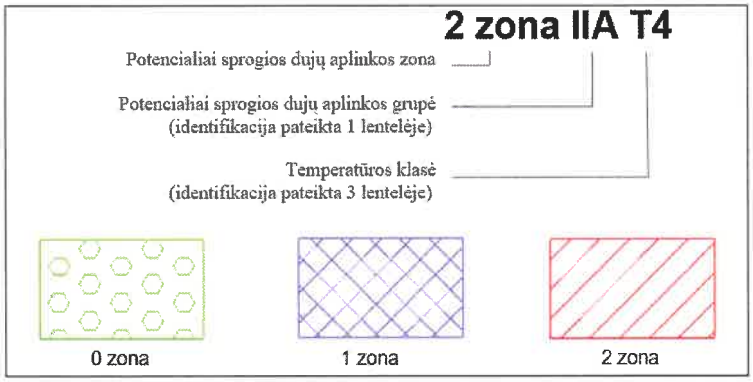

Fig.6 Marking for potentially explosive gas and vapor atmosphere on the plans.

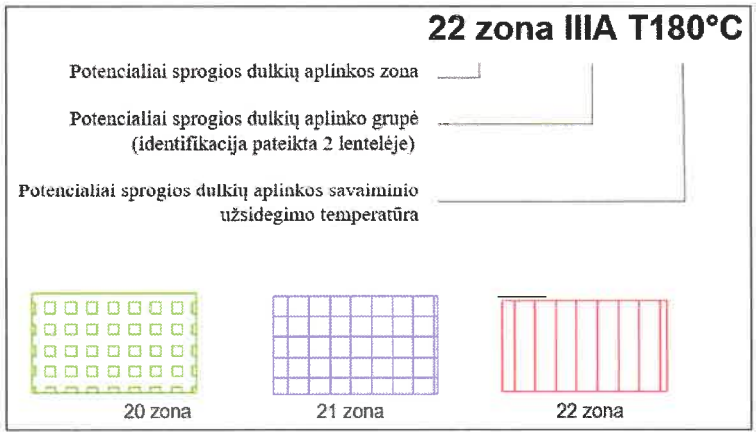

Fig.7 Marking for potentially explosive dust or combustible flyings atmosphere in the plans.

Potentially explosive atmosphere marking at work places

21. Entrances to the areas of potentially explosive atmosphere must be marked with the warning sign as shown on Fig.8.

Fig.8 Warning sign about potentially explosive atmosphere.

22. Other warning, guidance or prohibitive signs may be used together with this warning sign.

IX. PREVENTIVE EXPLOSION PROTECTION MEASURES

Usage of substitutes for highly flammable substance

23. Formation of potentially explosive atmosphere may be prevented by rejecting to use or limiting the use of flammable materials. For example, flammable solvents and cleaning agents may be substituted with water based solutions.

24. Avoid dust formation; if impossible to avoid, wet them. Use grease-type product when possible.

Limiting of concentration

25. Flammable gas or dust in the air is explosive only at certain concentrations. Therefore, it is preferable to use flammable substances when their explosive mixtures exceed UEL or are below LEL.

26. Highly flammable substance may explode only when there is an ignition source and when it is used above its flash point. Where possible, the substance must be used below its flash point.

27. The concentration of explosive atmosphere may be altered by diluting/displacing the explosive mixture by inert gas or water steam. Inert gas is highly effective in confined spaces, inside process vessels. Using of inert gas for expelling the explosive atmospheres from premises is prohibited.

28. Ventilation must be used to eliminate the explosive atmosphere from premises. Air intake of induced draft ventilation cannot be installed in potentially explosive atmosphere zone 0 or 1. Air must be supplied from non-explosive atmosphere.

29. Air to the ventilation equipment may be taken from zone 2, if it will be supplied to zone 1.

30. Formation of explosive atmosphere in premises may be prevented by creating overpressure with the help of air supplied from a non-explosive area. Settled dust must be regularly removed to prevent dust explosion.

31. All highly flammable substances released and/or formed, which are likely to explode, must be adequately routed to safe location or eliminated, or, if impossible – collected and disposed of in some other safe appropriate manner.

32. Locations involving potentially explosive dust atmosphere shall be subject to cleaning schedule to prevent dust explosion.

33. Wet cleaning or vacuum cleaning for combustible non-metallic dust shall be applied to avoid dust concentration increase in atmosphere.

34. Wet cleaning for light metal dust is prohibited (hydrogen is likely to form).

Preventive explosion protection measures

35. For protection against explosion, technical and organizational measures at the Company must be in place.

36. Examples of technical protection measures: personal and stationary gas analyzers, grounding of electrical and mechanical equipment, lightning rods, antistatic clothing, equipment designed with protection against explosion, video surveillance, etc.

37. Organizational preventive protection measures: explosion safety training, safety indoctrinations, equipment maintenance, work permit system, etc.

X. POTENTIALLY EXPLOSIVE ATMOSPHERE CLASSIFICATION PLANS

38. Each facility containing potentially explosive zones shall be provided with Plans of Potentially Explosive Atmospheres.

39. Operators working at a process facility must be acknowledged with PEA plans and know where they are stored. At the Company, PEA classification plans are stored on K:/ drive in the folder 'Ex_zonos'.

40. When implementing changes within the facilities, modifying process variables or replacing process fluids with others, the potentially explosive atmospheres must be revised and, in case necessary, changes made in Plans of Potentially Explosive Atmospheres.

XI. SAFETY REQUIREMENTS AT POTENTIALLY EXPLOSIVE ATMOSPHERES

41. Storage and usage of personal belongings, which are likely to become the sources of ignition or leakage initiating fire or explosion, in the area of production premises and territories shall be prohibited.

42. Storing and keeping of containers either empty or filled with flammable substances, rags or other textiles soaked with petroleum products shall be prohibited in the area of production premises and territory, except for places designed for the particular purpose and marked with appropriate warning signs. Such textiles shall be collected into special containers or tanks marked with appropriate inscriptions and handled in accordance with the requirements provided for by legal acts regulating waste disposal.

43. At production premises, warehouses, facilities, other environments – places constantly present with employees or designed work places – highly flammable and combustible substances shall be stored in compliance with the norms indicated in Table 4.

Table 4

Threshold limit values upon exceeding which the atmosphere becomes dangerous and has to be classified into potentially explosive atmospheres			
	Highly flammable gas (gas volume calculated per 1 bar pressure)	Liquefied flammable gas	Flammable liquids
Indoors	50 litres	5 litres	25 litres
Outdoors	1000 litres	100 litres	200 litres

44. Entrances into premises or buildings where flammable substances are stored shall be provided with a clearly visible list of materials stored, the quantity of such materials and an emergency evacuation plan.

45. Prior to using flammable substances, employees shall be familiarized with a safety data sheet of each substance to be used.

46. Substances having no certificates or documents of origin, whose explosiveness or combustibility is not known or has not been researched into shall not be used for technological processes and shall not be warehoused together with other materials.

47. Gas detection instrument readings shall be monitored. Accuracy of detector indications shall be ensured during the entire course of operation. In case a failure of such detector is suspected, the failure shall be immediately reported to appropriate repair services.

48. Indications of process instrumentation shall me monitored, because a unit may start leaking, overheat, self-ignite or explode.

49. Further operation shall be prohibited in case of faulty automation equipment, deactivated monitoring instruments and safety devices, except for the cases described in Emergency Shutdown System Operating Instructions, i.e. when such devices have been deactivated to undergo certain repairs, or in case of technological necessity upon a written instruction given by a head of the subdivision (shift) and upon additional measures taken for ensuring safe operation of the facilities.

50. Windows, doors of buildings and other structures located in potentially explosive atmospheres shall be tightly closed (unless otherwise specified in technical documentation), and the tightness shall be periodically checked. Self-closing doors shall be in good operating condition.

51. The area of potentially explosive atmospheres and the surrounding area within the radius of 30 m shall be appropriately and timely cleaned from bushes, trees, mowed grass, soil contaminated with oil products, grease-soaked clothes and other items which may become sources of leakage or combustion of flammable substances.

52. Pipelines, process units and containers containing flammable substances must be leak-proof. Hot surfaces of pipelines and installations shall have thermal insulation.

53. Pursuant to valid technical requirements, pre-treated or impregnated wood or other combustible and non-combustible surfaces, structures and fabrics after the term of their pre-treatment expires or after they are no more fire-resistant due to some other reasons, shall be replaced or appropriately re-treated. Fire resistance of such surfaces shall be checked periodically.

54. Wall partitions of buildings and other structures are subject to periodical inspections. Upon noticing openings, cavities or leaks in wall seams (connection places), decks and partitions of various engineering process communications, their repairs shall be organized.

55. During the work shift, a person in charge shall periodically inspect the premises, structures, installations, measures of grounding and lightning protection, gas sensors, and instrumentation. The inspection results shall be recorded in respective logbooks.

56. Access to a potentially explosive atmosphere and working in it is allowed only while wearing work clothes and footwear issued with certificates proving that they do not build electrostatic charge and have no parts or components likely to cause sparkling.

XII. USE OF WORK EQUIPMENT IN POTENTIALLY EXPLOSIVE ATMOSPHERES

57. Process unit operating personnel (operators, instrumentation and electrical technicians) may perform the works in potentially explosive atmosphere using mechanical work measures (screw drivers, wrenches, hammers, etc.) only having a verified and operational portable gas analyzers for explosive gas concentration measurements in the atmosphere of work performance area. During the performance of works, the analyzer shall always be turned on, its operation and/or readings monitored.

58. Portable or mobile work measures, having autonomous power supply, may be used for work performance in accordance with occupational health and safety procedure Use of Work Equipment in Potentially Explosive Atmospheres BDS–10.

59. During maintenance works, unsealing works, works in confined spaces, hot works performed at the Company (except Power House) it is allowed to use work measures in accordance with occupational health and safety procedures: Works Without Unsealing BDS–5, Equipment Depressurization and Maintenance Works BDS–6/1, Works in Confined Spaces BDS–6/2 and Hot Works BDS–7.

60. Work measures used at the Power House may be used in accordance with the Safety Rules for Operation of Heating Facilities approved by the Minister of Energy of the Republic of Lithuania.

XIII. FINAL PROVISIONS

61. Organizational and technical preventive measures other than provided herein as well as their procedure of application are regulated by OHS Procedures, Technical Regulations, Rules for Explosion Risk Assessment and Classification of Potentially Explosive Atmospheres approved in the Company.

62. Director of Quality, Labour Safety and Environmental Control shall be responsible for arrangement of periodic reviews of the Rules and their update, if necessary.

Prepared by
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2020-10-