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1 Subject of specification

This specification used in conjunction with other technical specifications of LOTOS Group S.A., establishes minimal requirements concerning classification of explosion hazard zones, requirements regarding preparation and form of documentation for classification of explosion hazard zones, as well as requirements regarding equipment and devices located in explosion hazard zones.

2 Scope of validity

This specification shall be used when preparing both quotations and Purchase Orders concerning planned LOTOS Group S.A. new investments and modernizations, and constitutes base for preparation of explosion hazard zones within LOTOS Group S.A. area. It shall also be a base for preparation of other detailed specifications and quotations for delivery of specific equipments and package units.

The contractor is independently responsible for selection of equipment and materials purchased by him/her on the base of technical design, and in particular in relation to explosion – proof equipment and instruments.

2.1 Deviations

Any deviation from this specification and the relevant specifications, standards and related documents including proposals, which the bidders claims to be economically and / or technically superior solutions must be submitted in writing for review and approval by Group LOTOS S.A. Non-approved exceptions are not acceptable by Group LOTOS S.A.

The supplier must report in writing any ambiguity in this or any other specifications of Group LOTOS S.A. or non-compliance with the referred documents / standards and obtain a written explanation of Group Lotos SA.

2.2 Exclusions

Scope of this specification does not cover:

- Classification of explosion hazard zones connected with occurrence of combustible dusts or fibres
- Classification of explosion hazard zones connected with processing and production of explosives
- Classification of explosion hazard zones in rooms used for medical purposes
- Explosion proof equipment classified for group II „D", designed for using in explosive atmosphere caused by dust.

3 Documents hierarchy

In case of conflicts existing between this specification and other documents, the following order of precedence shall govern:

- The current Polish legislation,
- Terms of purchase order / contract and other requirements agreed in writing with GLSA,
- Data Sheets approved by GLSA,
- This specification,
- Other specifications,
- Drawings and others documentations,

- Standards.

4 Basic information

4.1 Ambient conditions

- Atmosphere: marine, aggressive industrial, chemical, dust
- Ambient temperature (max/min): +36 °C/-25 °C,
- Relative humidity (max/min): 90 % / 70 %,
- Ground elevation : 1m above sea level,
- Wind speed: 26 m/s,
- Operating conditions: rafinery, seaside,
- Prevailing wind directions: from South and South-West.

4.2 Definitions

Below given concepts shall be applied in this specification. Their definitions are based on standards:

- PN-EN 1127-1:2011(E) – Explosive atmospheres. Explosion prevention and protection. Part 1: Basic concepts and methodology (orig.),
- PN-EN 60079-0: 2011 – Explosive atmospheres. Part 0: Equipment. General requirements (orig.),
- PN-EN 60079-10-1:2009 – Explosive atmospheres. Part 10-1: Classification of areas. Explosive gas atmospheres (orig.),
- PN-EN 60079-11:2012 – Explosive Atmospheres. Part 11: Equipment Protection By Intrinsic Safety 'I' (orig.).

- **Gaseous explosive atmosphere** – mixture of combustible substances in form of gas or vapour with air, in atmospheric conditions, in which combustion spreads on the whole not yet combusted mixture after ignition.
- **Explosion hazard area** – the area, where gaseous explosive atmosphere is present, or where it can be expected to occur in such volumes, that special precautions regarding structure, installation and use of apparatus are required.
- **Area free of explosion hazard** – the area, where gaseous explosive atmosphere is not expected to occur in such volumes, that special precautions regarding structure, installation and use of apparatus would be required.
- **Zones** – the explosion hazard areas are classified into zones according to frequency and time of gaseous explosive atmosphere occurrence, in the following way:
  - Zone 0 – the area, where gaseous explosive atmosphere is present permanently or in long periods,
  - Zone 1 – the area, where gaseous explosive atmosphere appearance is likely in normal operating conditions,

- Zone 2 – the area, where in normal operating condition appearance of gaseous explosive atmosphere is not likely to happen, but should it actually appear, then it can only happen rarely and for short period of time.

- **Source of emission** – the point or place, from which combustible gas, combustible vapour or combustible liquid can release in such a way, that creation of explosive atmosphere is possible.
- **Degrees of emission** – three degrees of emission are distinguished, ranged according to diminishing likelihood of gaseous explosive atmosphere occurrence:
  - Continuous emission – the emission that is present permanently, or which occurrence can be expected in long periods of time,
  - The first degree of emission – the emission, which occurrence during normal operation can be expected only periodically or occasionally,
  - The second degree of emission – the emission, which occurrence during normal operating conditions cannot be expected, but should it actually appear, it appears only rarely and only for short periods of time.
- **Capacity of emission** – volume of combustible gas or vapour, released in unit of time from source of emission.
- **Normal operation** – the situation, in course of which equipment operates within its rated parameters' range.
- **Ventilation** – displacement of air and its exchange for fresh air in effect of wind action, existence of temperature differential or mechanical forcing (e.g. with use of fans or air extractors).
- **Low Explosive Limit (LEL)** – the concentration of combustible gas or vapour in air, below which the gaseous atmosphere is not explosive.
- **Upper Explosive Limit (UEL)** – the concentration of combustible gas or vapour in air, above which the gaseous atmosphere is not explosive.
- **Relative density of gas or vapour** – the density of gas or vapour in relation to density of air at the same pressure and at the same temperature (in case of air equal to 1.0).
- **Combustible material** – the material which is combustible on its own accord, or is able to generate combustible gas, combustible vapour or combustible mist.
- **Combustible liquid** – the liquid that is able to generate combustible vapour in arbitrary predictable operating conditions.
- **Combustible gas or combustible vapour –** the gas or vapour, which after being mixed in some proportions with air, create explosive gaseous atmosphere.
- **Combustible mist** – droplets of combustible liquid, atomized in air in such a way, that explosive atmosphere is created.
- **Flash point** – the minimum temperature, at which in specific conditions of test, combustible gas or combustible vapour is released in the volume sufficient for immediate ignition with use of effective ignition source.
- **Boiling point** – the temperature, in which at 101.3 kPa (1013 mbar) ambient pressure, boiling of liquid proceeds.
- **Vapour pressure** – the pressure exerted in balance state of solid or liquid against it own vapour.

- **Minimal flash point of explosive atmosphere** – selfignition temperature of flammable gas or flammable liquid vapours, or minimal selfignition temperature of dust clouds in specified research conditions.
- **Intrinsic safety** – the kind of the explosion-proof protection based on the limitationof the available electrical and thermal energy in the device and its wiring, to such low level, that ignition of the hazardous atmosphere cannot occur neither as result of the scintillation or warming.
- **Intrinsically safe apparatus** – the electrical apparatus, in which all circuits are intrinsically safe
- **Intrinsically safe circuit** – the circuit, in which any scintillation, or warming, created in conditions specified in this norm (PN-EN 60079-11), including normal state and specified conditions of damages, is unable to bring about ignition of defined explosive gaseous atmosphere.
- **Intrinsically safe system** – hardwired system of apparatuses, where circuits, or part of circuits predestined for application in explosion hazard zone, are intrinsically safe.
- **Simple device** – the electric element or the connection of simple construction elements with univocally determined electric parameters which are in conformity with intrinsically safe parameters of the circuit in which is applied.

5 Classification of explosion hazard areas

The purpose of this chapter is:

- Standardization of Hazardous areas classification,
- Standardization of documents relating to Hazardous area classification (tables, drawings, descriptions).

5.1 Introduction

Determination of explosion hazard areas is part of broad range of activities, called explosion protection.

The procedure, as well as exclusions of explosion hazard consists of the following steps:

- Explosion hazard assessment,
- Determination of measures that prevent or limit generation of gaseous explosive atmosphere,
- Determination of measures preventing the ignition of gaseous explosive atmosphere,
- Determination of measures that limit effects of explosion to acceptable level.

5.1.1 Assessment of explosion hazard

An explosion arises in result of explosive mixture ignition, i.e. mixture of gases, vapours or mist with air (or other oxidizing gas), of concentration in range between lower and upper explosive limit, causing violent increase of temperature and/or pressure. Therefore simultaneous occurrence of adequate volume of explosive mixture and ignition source is necessary. Assessment of possibility of explosive atmosphere occurrence is a base for classification of explosion hazard zones. The classification is base for undertaking the measures precluding presence of ignition sources in endangered area, explosion-proof equipment selection, performing of the explosion risk assessments and the preparation of the "Explosion protection" report.

5.1.2 Determination of measures preventing or restricting creation of explosive gaseous atmosphere

Preventing or restricting the possibility for creation of explosive gaseous atmosphere is possible by undertaking the following measures:

- Ensuring air-tightness of apparatus,
- Application of inert gas blankets inside the apparatus,
- Application of intensive ventilation,
- Controlling of explosive concentrations and process interlocks.

5.1.3 Classification of explosion hazard zones

The base for classification of explosion hazard zones is the likelihood of explosive gaseous atmosphere occurrence. Definition of zones 0, 1 and 2 were given in p. 4.2.

5.2 Principles for classification of explosion hazard zones

Classification of explosion hazard zones proceeds in the following order:

- Definition of pure combustible materials as well as mixtures of combustible materials, which are present in process, and determination of their physical – chemical properties,
- Defining of areas and rooms that might be the subject for classification,
- Definition of combustible materials emission sources,
- Preparation of document: „List of classified rooms and areas" – refer to Attachment Nº 1,
- Preparation of document „List of dangerous substances in terms of explosiveness" – refer to Attachment Nº 2,
- Preparation of document „Conditions of explosion hazard" – refer to Attachment Nº 3,
- Determination of explosion hazard zones – refer to Attachment Nº 4,
- Approval of explosion hazard zones – refer to Attachment Nº 5,
- Preparation of technical description,
- Preparation of drawings – plans and cross sections of explosion hazard zones,
- Completing and issuing document entitled „Classification of explosion hazard zones".

5.2.1 Definition of pure combustible materials as well as mixtures of combustible materials, which are present in process, and determination of their physical – chemical properties

All combustible materials / substances occurring in technological process must be defined.

Specific data should be acquired from the following documents:

- The priority document is latest revision of „Substances and semi-finished products properties list which are present in GKGL S.A." valid in LOTOS Group S.A.
- In case where specific substance is missing in the above stated document, then material safety data sheets of dangerous substance and professional literature should be used.Class of specific substance, depending on its flash point, should be determined according to document: Minister of Infrastructure order of 21 November, 2005, concerning technical conditions to be fulfilled by oil base and stations, oil transport pipelines and petroleum

products, their location (Journal of Laws No 243, pos. 2063, of 14 December 2005, as amended).

5.2.2 Definition of explosion hazard conditions

All equipment and apparatus containing combustible materials, that might be the potential source of emission should be recognized and presented in the document „Explosion hazard conditions" – according to Attachment Nº 3.

5.2.3 Determination of explosion hazard zones

Prepare in accordance to Attachment Nº 4 of this specification.

- The priority document is PN-EN 60079-10-1:2009 Explosive atmospheres. Part 10-1: Classification of areas. Explosive gas atmospheres,

One should additionally make use of the following documents:

- Minister of Infrastructure order of 21 November, 2005, concerning technical conditions to be fulfilled by oil base and stations, oil transport pipelines and petroleum products, their location (Journal of Laws No 243, pos. 2063, as amended),
- Standard American Petroleum Institute (API) Recommended Practice 505 (latest revision),
- Standard Institute of Petroleum – Area Classification Code for Petroleum Installations Part 15 (IP15) (latest revision),
- National Fire Protection Association 497 - Recommended Practice for the Classification of Flammable Liquids, Gases,or Vapors and of Hazardous (Classified) Locations for Electrical Installations in Chemical Process Areas (latest revision),
- Settlements of Commission for Explosion-proof Protection of LOTOS Group S.A., concerning:

1. The sewage system – defining explosion hazard zones with the explosion for the overall refinery sewage system the following rules was used:

   Inside of all valvular wells and sawege wells, located below the ground level, being placed in explosion hazard zones **1** or **2** resulting from other source, shall be classified as explosion hazard zones **0**.

   For wells and catch basin of the oil-polluted sewage system and the tank farm rainwater sewage system which are located outside of explosion hazard zones from other sources, the explosion hazard zones **1** is applied inside wells and the zone **2** is applied within the radius of 1,5 m from the edge of these wells. Sewages within the sewage system can create the continuous source of the hazardous area.

   Note: all wells of the oil-polluted sewage system and tank farm rainwater sewage system located on the road must be hydraulic sealed. The inside of all wells and catch basin of draining sewage system and clean rainwater sewage system, located outside of explosion hazard zones, shall be classified as explosion hazard zones **2** explosion group IIA and temperature class T3.

   Sealed wells shall be not clasifed as source of explosion hazard zones, providing that well cover prevent agaist migration of gases between well inside and outside. In case then Sealed well is equipped in vent, the vent shall be classified as source of explosion hazard zone. Sanitary sewage system should be classified as non-explosive zone. In case when wells will be located inside explosion hazardous zone created by other sources (e.g. zone

of the process installation or oil-polluted sewage system or tank farm rainwater sewerage system) it is required to implement/apply tight covering of the sanitary sewage system wells.

2. Piperacks – taking into account good natural ventilation of the interconnection (OSBL) piperacks and main technological pipelines containing explosion hazardous media, zone **2** is applied with the radius R=1,5 m on full length of piperack due to possibility of occurance of potencial emission sources from fittings and flanged connections).

   Within explosion hazard zone the group of the explosiveness **IIA** and the temperature class **T3** shall be applied. Within explosion hazard zone causes by occurrences of pipelines with gas containing hydrogen, the group of the explosiveness **IIC** and the temperature class **T3** is applied.

   Guide for determining shape of ezplosion hazard zones for OSBL (with zone not to ground, even in case of presence hydrocarbons heavier then air) and ISBL (zone to the ground in case of presence hydrocarbons heavier then air) piperack are shown in Attachement 10.

3. Pipetrench – taking into account good natural ventilation, explosion hazard zones **2** is applied in whole pipetrenches space, up to ground level.

   From the valves, fittings and flanged connections on process pipelines located in pipetrenches and on the ground level the explosion hazard zone **2** is applied within the radius of 1,5 m - in vertical and horizontal directions, including the direction down to the ground level. Due to difficult ventilation under road-culverts the explosion hazard zone **1** is applied, in whole culverts space where process pipelines are located.

4. Fired furnaces – following unification is required:

1) Fired furnace cannot be located in explosion hazard zone created from other source or devices.

2) On inlet and outlet of process pipelines containing flamable media, within 5 m distance from furnace contour following rules must be applied:

- spiral or metal gaskets applied on flanged connections,
- blow-down of fuel gas must be routed to blow-down system or to the safe location to prevent creating of explosion hazard zone at the furnace,
- all electric and control equipment located around the furnace must be "Ex" certified.

5.2.4 Preparation of drawings – plans and cross sections of explosion hazard zones

Remarks relating to preparationof explosion hazard zones drawings (plans and cross sections):

1) In general, two types of drawings should be prepared for a new designed plant:
   - plans of explosion hazard zones ranges,
   - cross sections of explosion hazard zones,
   - number and type of drawings should be adapted each time to specification of the new designed installation.
2) Plans of existing process instalations, as well as existing sewage system plans should be each time acquired from LOTOS Group S.A. (General Plan Workroom).

3) Scales of drawings should correspond to scales of the instalations plans and cross sections, delivered by department / organisational unit of tenderer, dealing with plans of instalation. Depending on size of designed or modernised plant, the scales 1:500, 1:250 or 1:100 are preferred.
4) On plans of the plant one should specify list of all designed and existing process apparatuses or equipment, along with their process designations.
5) Determination of explosion hazard areas should be adopted basing on Attachment Nº 6. Part A) presents the basic determinations for areas of explosion hazard zones.

   If it is necessary to increase the number of symbols (e.g. considering various requirements regarding explosive group or temperature class for individual areas) additional symbols shall be used. Hypothetical graphical symbols were presented in part B) of Attachment Nº 6. All symbols concerning explosion hazard zones (a legend) must be placed on each drawing of explosion hazard zones.
6) In case where explosion hazard zones from neighbouring plants are reaching the area of the plant under consideration, they should be showed on the drawings.

5.2.5 Technical description

The technical description should contain:

1) Study base.
2) Study objective and scope.
3) Equipment location.
4) Information about process.
5) Assessment of explosion hazard and zones range.
6) General / final notes.

5.2.6 Completion and submission of document entitled „Classification of explosion hazard zones"

The complete document „Classification of explosion hazard zones" consists of the following parts:

- title page (adequate for specific project),
- technical description,
- tables 1÷5 (refer to Attachment Nº 1, 2, 3, 4,5),
- plans and cross section of explosion hazard zones.

6 Requirements for equipment and apparatus intended to be used in explosion hazard zones

6.1 Electrical discipline

6.1.1 General requirements

6.1.1.1 Groups and categories of equipment

According to p. 2.2, only IIG group equipment is the subject of this specification (equipment dedicated for using in areas other than mining facilities, endangered with explosion of vapours, gases or mists).

Category	Group II of equipment
1G	Devices designed to be able to function in compliance with parameters specified by the manufacturer, assuring very high level protections. Devices within this category: a) are intended to the use in places were gaseous explosive atmospheres are continuously present or often for a long periods; b) assure the required protection level, even in case of seldom failure and are equipped with such a safeguards that: - either, in the event of failure of one means of protection, at least an independent second means provides the requisite level of protection. - or, the requisite level of protection is ensured in the event of two faults occurring independently of each other.
2G	Devices designed to be able to function in compliance with parameters specifiedby the manufacturer, assuring high level protections. Devices within this category: a) are intended to be useed in places where the occurrence of gaseous explosive atmospheres is probable; b) are equiped with the explosion-proof protection, assuring the required protection level even in case of frequent disturbances or failure of devices, which are taken under consideration
3G	Devices designed to be able to function in compliance with parameters specifiedby the manufacturer, assuring normal level protections. Devices within this category: a) are intended to be useed in places where the occurance of gaseous explosive atmospheres is unlikely, and if will occure - only for short period; b) the required protection level is assured during normal operation of those devices

6.1.1.2 Application of equipment in explosion hazard zones:

1) In zone 0, only equipment within 1G category can be used.
2) In zone 1, equipment within 1G and 2G categories can be installed.
3) In zone 2, equipment of the following categories can be used:
   - for electric apparatus / equipment: 1G and 2G (equipment of 3G category is not allowed),
   - for control and automatics instruments: 1G, 2G and 3G (after prior agreement and written acceptance of LOTOS Group S.A.).

6.1.1.3 Alternative (however not preferred) method for classification of explosion hazard zones according to Equipment Protection Level – EPL

Equipment Protection Level is base for determination equipment capability for use in specific zone.

Gases (equipment group II)

EPL Ga – equipments suitable for use in explosive atmosphere created of combustible liquid vapours and gases with air. Protection level is "very high", which will not become ignition source during normal operation and in case of expected and rare failures.

EPL Gb – equipments suitable for use in explosive atmosphere created of combustible liquid vapours and gases with air. Protection level is "high", which will not become ignition source during normal operation and in case of expected failures.

EPL Gc – equipments suitable for use in explosive atmosphere created of combustible liquid vapours and gases with air. Protection level is "increast", which will not become ignition source during normal

operation. Due to the possibility of fire risk occurance during expected failures (e.g. lamp damage) additional equipment protection is implemented. Typical equipment is Exn.

Relations between Equipment Protection Level and Hazardous Area Classification are listed in below table:

Equipment Protection Level (EPL)	Hazardous Area Classification (HAC)
Gas mixtures	
Ga	0
Ga, Gb	1
Ga, Gb, Gc	2

6.1.1.4 Equipment protection types and the scope of its application as per explosion hazard zone

General requirements regarding application of explosion-proof design equipment depending on zones, in LOTOS Group S.A.:

Enclosure type	Usage znes			Additional requirements
Pressurized enclosure „p”		1	2	Continuous control of overpressure
Flameproof enclosure „d”		1	2	IIA, IIB and IIC groups should be taken into account
Increased safety „e”		1	2	Degree of enclosure protection at least IP54
Encapsulation „m”		1	2	
Oil Filling Enclosure „o”		1	2	
Powder Filling Enlosure „q”		1	2	
Intrinsic safety „i” and intrinsically safe systems	0	1	2	*Note 1*
’n’ – type protection” design			2	

Note 1 – Detailed requirements regarding intrinsic safe systems design are included in chapter 6.2 – Control and Automatics Department.

6.1.1.5 Temperature range and temperature classes

Electrical equipment must be adapted to be able to operate at ambient temperatures in range from - 25 ºC to + 40 ºC. Additional marking is required on data plate (considering fact that required temperature range is extended in relation to basic one).

The temperature class must not be worse than requirements listed in document „Classification of explosion hazard zones”.

Temperature classes	Maximum temperature of surface
T1	450ºC
T2	300ºC
T3	200ºC

Temperature classes	Maximum temperature of surface
T4	135ºC
T5	100ºC
T6	85ºC

6.1.1.6 Equipment Marking

Each equipment must be marked in legible and non-removable way (dataplate). Minimum data, to be included on the dataplate are:

1) Manufacturer Name and address.
2) CE marking (with reference number of notified body controlling Quality Management System of manufacturer, or approving specific equipment).
3) Series or type of the protection equipment and system.
4) Serial number, if exists.
5) Year of manufacturing.
6) Special marking of explosion-proof protection  including the group and equipment category.
7) For group II equipments the letter „G" should be applied for gases, vapours or mists explosive atmospheres or the letter „D" for dust explosion atmospheres.
8) Temperature range.
9) Nominal electrical data, such as:
   - Power,
   - Voltage,
   - Current,
   - Capacitance,
   - Inductance,

   and additionally for engines:
   - starting current to nominal current ratio I_A/I_N
   - starting time t_E for feinforced design engines, or
   - reaction time t_A of temperature monitoring for thermal protection

Furthermore, where indispensable – all information important from safe usage point of view should be given.

6.1.1.7 Instructions

Each equipment and system must be followed by instructions, giving at least the following information:

1) Brief statement of data, which the equipment or protection system is marked with (excluding serial number), together with any appropriate additional information to facilitate the maintenance (e.g. address of importer, service centre, etc.)
2) Safety instructions:
   - Start-up,
   - Usage,
   - Erection and dismantling,
   - Maintenance (operating and emergency repairs),
   - Installation,
   - Adjustment,
3) Where necessary an indication of dangerous areas in front of pressure-relif devices.
4) Where necessary, training instructions.
5) Details which allow a decision to be taken beyond any doubt as to whether an item of equipment or a protective system in a specific category can be used safely in the intended area under the expected operating conditions.
6) Electrical and pressure parameters, maximum surface temperatures or other allowable values.
7) Where necessary, special conditions of use, including information of possible misuse which experience has shown might occur.
8) Where necessary, the essential chracteristics of tools which may be fitted to the equipment or protective system.

For devices and protective systems which were introduced to the trade, the manufacturer or his authorized representative prepares and adds **the instruction** in one of languages of member states of the European Union**, in language of the country in which the device and protective systems will be used** and in language of the country of production.

The instructions must contain drawings, diagrams and descriptions necessary for putting into service, maintenance, inspection, checking of correct operation and where appropriate, require, repairs of the equipment or protective system, together with all useful instructions, in particular with regard to safety.

Documentation describing equipment or protection system must not contradict the instructions with regard to safety aspects.

6.1.1.8 Quality assurance (certificates, declarations)

The manufacturer or his authorized representative is obliged to perform necessary procedures of Conformity Assessment according to the document: Directive 94/9/EC of European Parliament and Council of 23 March 1994, on approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres (ATEX).

It is required to submit the following documents along with equipment being delivered:

1) For equipment **of the group II the category 1:**

- copy of the EC Type examination certificate issued by notyfied body,
- the declaration of EC conformity issued by the manufacturer,

- **the instruction** in one of languages of member states of the European Union, in language of the country in which the equipment and protective systems will be used and in language of the country of production,
- in case of the use of Conformity Assessment procedure **the verification of the individual equipment,** the manufacturer or his authorised representative will deliver on demand issued by notified body **the certificate of conformity** with requirements of the directive, concerning of performed tests for the single copy of the device.

2) For equipments **of the group II the category 2:**

- copy of the EC Type examination certificate issued by notyfied body,
- the EC declaration of conformity isuued by the manufacturer,
- **the instruction** in one of languages of member states of the European Union, in language of the country in which the device and protective systems will be used and in language of the country of production.

3) For equipment **of the group II the category 3:**

- the EC declaration of conformity isuued by the manufacturer,
- **the instruction** in one of languages of member states of the European Union, in language of the country in which the device and protective systems will be used and in language of the country of production.

6.1.1.9 Confirmation of execution conformity

All equipment that will be installed in explosion hazard zones must be adequately certified, and delivered with documents according to requirements given in p. 5.1.1.8.

Engineering company shall deliver a list of all designed Ex equipment and apparatus according to `Attachment No 7, wherein column 5 of the Attachment should remaining unfilled (EC-Type Examination certyficate Number, EC Declaration of Conformity – from nameplate). This should be complemented on site after the equipment delivery according to data contained on data plates.

The same list (after complementing and introduction of possible changes, according to actual state), should be delivered as element of as-built documentation, after completion and commissioning of the plant.

6.1.2 Detailed requirements

All explosion-proof equipment should be certified for operation in Zone 1.

The point not listed below requires each time a written agreement with LOTOS Group S.A.:

- types of electric apparatus
- types of enclosures for individual groups of equipment, different than proposed

6.1.2.1 10kV and 6kV electrical motors

Types of preferred explosion-proof casings for motors and junction boxes:

Ex II 2G Ex e II	- preferred
Ex II 2G Ex de II	- acceptable in cases:
	- Ex d – motor
	- Ex e – junction boxes

Ex II 2G Ex d II - not preferred

Ex II 2G Ex p II - high-power motors, requires agreement

The determination of the minimal requirements (explosive group and temperature class) should be basing on the „Classification of explosion hazard zones" document.

6.1.2.2 Up to 1kV electrical motors

Types of preferred explosion-proof casings for motors and junction boxes:

Ex II 2G Ex de II - preffered in case of: motor "d", junction box "e"

Ex II 2G Ex e II - accepted

Ex II 2G Ex d II - not preffered

The determination of the minimal requirments (explosive group and temperature class) should be basing on the „Classification of explosion hazard zones" document.

6.1.2.3 Control boxes, intermediary boxes, utility boxes, distribution boxes

Active parts of equipment operating in explosion hazard zones should be protected with flameproof Ex d enclosures.

1) Junction boxes, terminal boxes, intermediary boxes, should be of reinforced Ex e design.

The determination of the minimal requirments (explosive group and temperature class) should be basing on the „Classification of explosion hazard zones" document.

2) Control boxes
   - required enclosure: Ex II2G Ex de II
   - terminal strips: Ex e II
3) Intermediary boxes, utility boxes, distribution boxes
   - required enclosure Ex II2G Ex e II
   - terminal strips: Ex e II

6.1.2.4 Sets of repair sockets

- Required design: Ex II 2G Ex de II

The determination of the minimal requirments (explosive group and temperature class) should be basing on the „Classification of explosion hazard zones" document.

NOTE: type of the set – according to specification No 4211 „Repair sockets system"

6.1.2.5 Lighting fittings, lighting connectors

Active parts of equipment operating in explosion hazard zones should be protected with flameproof Ex d enclosures.

Junction boxes, terminal boxes, intermediary boxes, should be of reinforced Ex e design.

Application of equipment, which active parts are of „i" or „m" design is allowable in justified cases.

The determination of the minimal requirments (explosive group and temperature class) should be basing on the „Classification of explosion hazard zones" document.

1) Lighting fittings

- Required design: Ex II 2G Ex de II or Ex II 2G Ex d II

2) Lighting connectors

- Required design: Ex II 2G Ex de II

6.1.2.6 Motor operated gate valves (MOV)

Active parts of equipment operating in explosion hazard zones should be protected with flameproof Ex d enclosures.

Junction boxes, terminal boxes, intermediary boxes, should be of reinforced Ex e design.

- Required design: Ex II 2G Ex de II or Ex II 2G Ex d II

The determination of the minimal requirments (explosive group and temperature class) should be basing on the „Classification of explosion hazard zones" document.

6.1.2.7 Electric heating

Active parts of equipment operating in explosion hazard zones should be protected with flameproof Ex d enclosures.

Junction boxes, terminal boxes, intermediary boxes, should be of reinforced Ex e design.

The determination of the minimal requirments (explosive group and temperature class) should be basing on the „Classification of explosion hazard zones" document.

1) Feeder boxes in Ex zones

- Required design: Ex II 2G Ex de II

2) Measuring sensors

- Required design: Ex II 2G Ex de II or Ex II 2G Ex e II

3) Utility boxes, distribution boxes

- Required design according to p. 5.1.2.3

4) Heating cables

- Required design: Ex II 2G Ex e II

6.1.2.8 Cable glands

All cable glands should be certified for operation in Zone 1.

Cable glands should be selected according to Attachment Nº 8.

6.2 Control and Automatics discipline

6.2.1 Basic design of instruments

NOTE: The requirements contained in p. 6.1.1.1 up to 6.1.1.8 of this specification, are valid for of Control and Automatics equipment as well.

Supplementary requirements for p. 6.1.1.1 up to 6.1.1.8, specific for Control and Automatics equipment, are given below.

General principle is application of intrinsically safe (Ex ia or Ex ib) equipment and circuits as a measure of protection in explosion hazard zones.

Equipment in flameproof (Ex d) or reinforced (Ex e) enclosures should be used for:

1) The apparatus that are not produced as intrinsically safe.
2) Solenoid valves.
3) Sensors of dangerous gases concentration.
4) Analysers (excluding internal circuits of analysers, which can be of Ex i type), mixed „d" and „e" enclosures are allowed.

Gas pressurized type of protection (Ex p) must be used for analyser kiosks, larger cabinets installed in the field, as well as local control rooms located in explosion hazard areas.

6.2.1.1 Confirmation of execution conformity

All equipment that will be installed in explosion hazard zones must be adequately certified and delivered together with documents (according to requirements of p. 6.1.1.8), excluding simple equipment used in intrinsically safe circuits. In case of simple equipment, manufacturer declaration stating permissibility of its application in intrinsically safe circuits, as well as appropriate equipment marking are required.

Engineering company shall deliver along with the design the calculations confirming that requires parametrs for intrinsically safe circuits are maintained, specified in the equipment documets.

Engineering company shall deliver a list of all designed Ex equipment and apparatus for intrinsically safe, flameproof, and other, approved by LOTOS Group S.A., according to Attachment N° 7, wherein column 5 of the Attachment remaining unfilled (Ex data and CE certificate from nameplate). This should be complemented on site after delivery of the equipment, according to data contained on data plates.

The same list (after complementing and introducing of possible changes, according to actual state), should be delivered as element of as-built documentation, after completion and commissioning of the plant.

6.2.2 Additional requirements

6.2.2.1 Field apparatus

- Zone 0

Installation of electrical and instrumentation equipment in Zones 0 of explosion hazard should be avoided.

Where necessary, e.g. in sink basins or sewers (transmitters, level signalling devices), or in weighbridge channels (strain gauges), the equipment must fulfil requirements for 1G category equipment according to Directive 94/9/EC (ATEX).

Junction boxes should absolutely be installed outside of Zone 0.

- Zone 1 and Zone 2

It is allowed to use the gas pressurized „p" protection for analysers' kiosks and local control rooms on condition that requirements necessary for this type of protection will be fulfilled.

The hermetic sealing of „m" type is allowed only for equipment, for which this type of protection is used as basic solution (standard one), e.g. coil of solenoid valve.

Enclosure of „n" type is allowed only for special cases and on written approval of LOTOS Group S.A.

Application of protection different than intrinsic safety (Ex i) and flameproof enclosures (Ex d), requires acceptance of LOTOS Group S.A.

In zone 1 and 2 of explosion hazard, all cable glands should be certified for operation in Zone 1, accordingly to assumed protection type.

In Zone 1 of explosion hazard, equipment of 2G and 1G categories can be used.

In Zone 2 of explosion hazard, equipment of 3G, 2G and 1G categories can be used (on condition that requirements of p. 5.1.1.2 for 3G category equipment are met).

6.2.2.2 Control room equipment

- Separators/ Zener barriers

For separation of field equipment installed in explosion hazard zones, from control systems installed in safe zones, galvanic separators are preferred. Zener barriers can be used where this is required from technical point of view. When using Zener barriers, it must be ensured that the resistance of connection to earthing system should not exceed 1Ω.

- Intrinsically safe power supplies

Separate intrinsically safe power supplies should be foreseen for equipment, which require intrinsically safe power supply from outside the control systems.

6.2.2.3 Cables

- Cables of intrinsically safe circuits

Cables of intrinsically safe circuits must fulfil requirements given in specification GL 3120. Cables of intrinsically safe circuits must be separated from cables of non-intrinsically safe circuits and power cables, and they must be installed accordingly to requirements of GL 3110 and 3020 specifications.

- Cables of non-intrinsically safe circuits

Cables of non-intrinsically safe circuits must fulfil requirements given in specification GL 3120. Cables of non-intrinsically safe circuits must be separated from cables of intrinsically safe circuits and power cables, and they must be installed accordingly to requirements of GL 3110 and 3020 specifications.

Cable glands should be selected according to Attachment Nº 9.

6.2.2.4 Optional solution: field instruments and equipment operating in Profibus PA network

The apparatus operating in Profibus PA network, as well as Profibus PA network itself (according to IEC 61158, IEC 61784), should be designed on the base of intrinsically safe FISCO idea (Fieldbus Intrinsically Safe Concept) according to Directive 94/9/EC (ATEX) along with later amendments IEC 60079-27 (FISCO).

6.2.2.5 Low-current systems (intercom, fire signalling system, CCTV)

Active parts of equipment operating in explosion hazard zones should be protected with flameproof Ex d enclosures or of intrinsically safe Ex i design.

Junction boxes, terminal boxes, intermediary boxes, should be of reinforced Ex e design.

The determination of the minimal requirments (explosive group and temperature class) should be basing on the „Classification of explosion hazard zones" document.

6.3 Machines and equipment (Mechanical discipline)

All machinery and other mechanical equipment (pums, compressors, blowers) intended for use in potentially explosive atmospheres must comply with Directive 94/9/EC (ATEX).

Full responsibility for determination if particular equipment is the subject to ATEX Directive requirements and fulfilment of these requirements takes the equipment's manufacturer or the company that introduce goods to European Union.

Manufacturers are obligated to design and test components in a way preventing or minimising the risk of explosion when operating in explosive atmospheres. Manufacturers must consider every possible electrical or non-electrical source of ignition.

The equipment intended for work in potentially explosive zone shall be subject to assessment of conformity to basic safety requirements by recognized Notified Body, and marked with „CE" sign as well with specific explosive protection 'Ex' hexagon mark.

Directive 94/9/EC (ATEX) specifies, when protection for equipment working in "explosion hazard zones is necessary and divides non-electrical equipment intended to operate in the explosion hazard zones into groups and categories.

All electrical equipment as well as instruments installed on equipment shall fulfil requirements relevant for respective zone.

Fans inlets and air compressors with forced draught shall be located outside the explosion hazard zone.

It is required to submit the following documents along with equipment being delivered,:

1) For devices **of the group II the category 1:**

- copy of EC Type examination certificate issued by notyfied body
- the EC declaration of conformity isuued by the manufacturer
- the instruction in one of languages of member states of the European Union, in language of the country in which the device and protective systems will be used and in language of the country of productionin case of the use of Conformity Assessment procedure the verification of the individual equipment, the manufacturer or his authorised representative will deliver on demand issued by notified body the certificate of conformity with requirements of the directive, concerning of performed tests for the single copy of the device.

2) For devices **of the group II the category 2:**

- the EC declaration of conformity isuued by the manufacturer
- **the instruction** in one of languages of member states of the European Union,in language of the country in which the device and protective systems will be used and in language of the country of production.

3) For devices **of the group II the category 3:**

- the EC declaration of conformity isuued by the manufacturer
- **the instruction** in one of languages of member states of the European Union, in language of the country in which the device and protective systems will be used and in language of the country of production.

Types of the protection for non-electrical devices are described in PN-EN 13463 standard listed in the point 8.2.

6.4 Apparatus and furnaces

Mechanical construction of equipment / furnace is not a subject to requirements for equipment located in explosion hazard zones.

Furnaces should be located outside the explosion hazard zone. It is assumed that the zone can occur only during furnace stop, and zone is created by equipment suppling burners with fuel, and possibly created by process medium. During furnace operation, the Zone does not exist.

Electrical equipment and instruments installed on the equipment / furnace should fulfil requirements for specific zone, to which it is classified. The Zone should be determined with consideration given to process medium type, fuel type, and possible hydrogen injection (in case of furnaces).

It is required that location for air fans' suction towers of furnace burners with forced draught must be outside of explosion hazard area.

6.5 Buildings

Distances between ZL buildings, and process engineering buildings and objects are determined by separate regulations, related to technical conditions that bases and stations of liquid fuels should adhere to (…) and technical conditions that buildings and their location should adhere to.

If a room endangered with explosion is located in at least one of the buildings, then distance between their outer walls should not be less than 20 m.

If for the sake of type of works being performed, or type of equipment being used, explosion hazard may exist, then roofs, ceilings and walls of rooms in the buildings should be made according to safety requirements for that type of works, or equipment located in there, as well as according to construction technical regulations.

- Buildings in explosion hazard zone

In the buildings including control room, switchhouse and technical rooms, located within process area covered by explosion hazard zones, the following should be foreseen:

- the object structure resistant to effects of explosion (such that meets conditions described below),
- entrance locks,
- air-tight cable entrances / inlets,
- automatic maintaining of constant positive pressure, with monitoring of its parameters,
- inlet of fresh air (from safe zone) designed for maintaining the positive pressure with monitoring of its quality using dangerous gases sensors.

- Rooms under explosion hazard

The room endangered with explosion should be located on the highest floor of a building (this requirement does not apply to closed areas).

The room endangered with explosion should be covered with lightweight structure roof made at least, of non-flammable materials, of weight not exceeding 75 kg/m^2, calculated without the elements of the roof supporting structure such as binders, roof trusses and beams.

The above requirement does not apply to room, in which the total surface of explosion-proof devices, such as diaphragms, flaps and openings glazed with ordinary glass, is greater than 0.065 m^2/m^3 of the room cubature.

The walls, separating explosion-endangered room from other rooms, should have the pressure resistant of 15 kN/m^2 (15 kPa).

In low (N) and medium-height (SW) building, containing a room under explosion hazard, staircases should be encased and closed with fire doors, as well as equipped with smoke prevention devices or smoke removing devices.

Length of evacuation routes in a room endangered with explosion (from the most remote place where a personel is present to evacuation exit, to other fire zone or outside the building), cannot exceed 40 m.

An evacuation exit doors from the room endangered with explosion should open towards outside of the room.

Evacuation exits from the room endangered with explosion on evacuation route, should lead through fire vestibules.

In rooms, where occurrence of explosive mixtures of combustible vapours, dusts or gases with air is possible, floor surfaces should be made of material that do not cause mechanical sparkling or electrostatic discharges.

6.6 Static Electricity

According to standard PN-EN 1127-1, one of potencial ignition source is static electricity.

For static electricity safety requirements please refer to point 5.4.8 of Technical Specification No 4500

7 Relevant documents

Any "Technical Specification" issued by GRUPA LOTOS S.A. listed in Contract Files.

8 Standards and requirements

8.1 Electrical, Control and Automatics discipline

Classification of explosion hazard zones, as well as selection of electrical apparatus operating in explosion hazard zones must be performed according tho below listed regulations and norms.

8.1.1. Minister of Infrastructure order of 21 November, 2005, concerning technical conditions to be fulfilled by oil base and stations, oil transport pipelines and petroleum products, their location (Journal of Laws No 243, pos. 2063, of 14 December 2005, as amended).

8.1.2. Minister of Internal Affairs and Administration order of 7 June 2010, concerning building fire protection, other structures and areas (Journal of Laws No 109, pos. 719).

8.1.3. Minister of Economy, Labour and Social Policy order of 8 July 2010, on minimum health and safety requirements related to the work places with the possibility of explosive atmosphere appearing (Journal of Laws No 107, pos. 1004 as amended Journal of Laws No 138, pos. 931).

8.1.4. Schedule of dangerous substances in terms of explosiveness, valid in Gdansk Refinery S.A. starting from 04.04.2005.

8.1.5. Directive 94/9/EC of European Parliament and Council of 23 March 1994, on approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres (ATEX).

8.1.6. Directive 1999/92/EC of the European Parliament and of the Council of 16 December 1999 on minimum requirements for improving the safety and health protection of workers potentially at rist from explosive atmospheres (15th individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)

8.1.7. Regulation by the order of the Minister of the Economy issued 21 December 2005 concerning the fundamental requirements on equipment and protective systems intended for use in potentially explosive atmospheres – Dz. U. No. 263 pos 2203 (transposes the Directive 94/9/EC).

8.1.8. Minister of Infrastructure order of 21 December 2005, concerning principal requirements for personal protective equipment.

8.1.9. PN-EN 1127-1 Explosive atmospheres. Explosion prevention and protection. Part 1: Basic concepts and methodology.

8.1.10. PN-EN 60079-0 Explosive atmospheres. Part 0. Equipment. General requirements.

8.1.11. PN-EN 60079-1 Explosive atmospheres. Part 1: Equipment protection by flameproof enclosures “d”.

8.1.12. PN-EN 60079-2 Explosive atmospheres. Part 2: Equipment protection by pressurized enclosures „p”

8.1.13. PN-EN 60079-6 Explosive atmospheres. Part 6: Equipment protection by oil immersion "o"

8.1.14. PN-EN 60079-7 Explosive atmospheres. Part 7: Equipment protection by increased safety „e”

8.1.15. PN-EN 60079-10-1 Explosive atmospheres. Classification of areas. Explosive gas atmospheres.

8.1.16. PN-EN 60079-11 Explosive atmospheres. Part 11: Equipment protection by intrinsic safety "i"

8.1.17. PN-EN 60079-14 Explosive atmospheres. Part 14: Electrical installations design, selection and erection.

8.1.18. PN-EN 60079-18 Explosive atmospheres. Part 18: Equipment protection by encapsulation "m".

8.1.19. PN-EN 60079-25 Explosive atmospheres. Part 25: Intrinsically safe electrical systems.

8.1.20. IEC 60079-27 Explosive atmospheres. Fieldbus industrially safe concept (FISCO)

8.1.21. PN-EN 61158 Industrial communication networks. Fieldbus specifications.

8.1.22. PN-EN 61784-1 Industrial communication networks. Profiles. Part 1: Fieldbus profiles.

8.1.23. American Petroleum Institute (API) Recommended Practice 505

8.1.24. Institute of Petroleum – Area Classification Code for Petroleum Installations Part 15

8.2 Machines and equipment (Mechanical discipline)

8.2.1. 98/37/EC – European Machinery Directive (MAD).

8.2.2. Directive 94/9/EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres (ATEX).

8.2.3. Regulation by the order of the Minister of the Economy issued 22 December 2005 concerning the fundamental requirements on equipment and protective systems intended for use in potentially explosive atmospheres – Dz. U. No. 263 pos 2203 (transposes the Directive 94/9/EC).

8.2.4. PN-EN 13463-1 Non-electrical equipment for use in potentially explosive atmospheres. Part 1. Basic method and requirements.

8.2.5. PN-EN 13463-2 Non-electrical equipment for use in potentially explosive atmospheres. Protection by flow restricting enclosure "fr".

8.2.6. PN-EN 13463-3 Non-electrical equipment for use in potentially explosive atmospheres. Protection by flameproof enclosure "d".

8.2.7. PN-EN 13463-5 Non-electrical equipment for use in potentially explosive atmospheres. Protection by constructional safety "c".

8.2.8. PN-EN 13463-6 Non-electrical equipment for use in potentially explosive atmospheres Part 6: Protection by control of ignition source "b".

8.2.9. PN-EN 13463-8 Non-electrical equipment for use in potentially explosive atmospheres - Part 8: Protection by liquid immersion "k".

8.3 Equipment and furnaces

8.3.1. 2009/105/CE – Simple Pressure Vessels Directive (SPVD).

8.3.2. 97/23/EC – Pressure Equipment Directive (PED).

8.4 Civil discipline

8.4.1. Minister of Infrastructure order of 21 November, 2005, concerning technical conditions to be fulfilled by oil base and stations, oil transport pipelines and petroleum products, their location (Journal of Laws No 243, pos. 2063, of 14 December 2005, as amended).

8.4.2. Minister of Internal Affairs and Administration order of 7 June 2010, concerning building fire protection, other structures and areas (Journal of Laws No 109, pos. 719).

8.4.3. Minister of Infrastructure order of 12 April 2002, on technical conditions, that buildings and their location should adhere to (Journal of Laws No 75, pos. 690, as amended).

8.4.4. Minister of Labour and Social Policy order of 26 September 1997, on general health and safety at work (uniform text in Journal of Laws No 169 of 2003, pos. 1650).

8.4.5. Specification No 5200 – Buildings.

8.4.6. Specification No 5210 – Internal systems and connections to external systems.

9 Attachments

Attachment No. 1 – Table „Schedule of classification rooms and areas".

Attachment No. 2 – Table „Schedule of dangerous substances in terms of explosiveness".

Attachment No. 3 – Table „Conditions of explosion hazard".

Attachment No. 4 – Table „Determination of explosion hazard zones".

Attachment No. 5 – Table „Approval of explosion hazard zones".

Attachment No. 6 – Graphical designations on plans of explosion hazard areas.

Attachment No. 7 – Table „Schedule of installed Ex equipment and apparatus" (the table contains hypothetical schedule of equipment).

Attachment No 8 – Table "Schedule of recivers, apparatus with cables and cable glands".

Attachment No 9 – Table "Schedule of control recivers, apparatus with cables and cable glands".

Attachement No 10 – Guide for determining shape of explosion hazard zones for OSBL and ISBL piperack.

10 Record of changes

No.	Date	Description	Introduced by
1		This specification entirely replaces the former LOTOS Group S.A. standard No. PR 07 410 with the same title.	J. Bućko
2	28.04.2011	General revision after Program 10+ completion.	St. Nowak M. Rompa
3	8.12.2011 (rev. 3)	Change at 4.2.3 point 4 – according to Protocol of EX Commision (Komisja ds. Zabezpieczeń Przeciwwybuchowych) dated 15.11.2011.	T. Wróbel
4	30. 11.2013 (rev. 4)	Review, update, standardize and changes to the Standard within scope of order No. OK/990/2012.	Editorial board coordinated by T. Wróbel
-	31-08-2015	Page layout corrections, no contents changes.	T. Wróbel
5	7.04.2018	Sealed well issue added in p. 5.2.3. Attachment 10 added. Attachment 5 updated.	T. Wróbel

Grupa LOTOS S.A.	**ATTACHMENT No. 1**	Spec. nr
	Schedule of classification rooms and areas	1020

SCHEDULE OF CLASSIFICATION ROOMS AND AREAS

No.	Name	Drawing No.	Type of room 1/	Level	Area	Height	Additional data
				m	m^2	m	
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*

1/ Z – close Po – semi-opened
Pz – semi-closed O – open

Arch. No.	Area	Sub-area	Doc. No.	Rev. No.	Issue Date	Page	Pages
19242	**90**	**00**	**PR 01004**	**2**	**30.11.2013**	**A1-1**	**1**

SCHEDULE OF DANGEROUS SUBSTANCES IN TERMS OF EXPLOSIVENESS

No.	**Substance**	Vapour density in relation to air	Explosive limit		Temperature			Temperature class	Explosive group	Room number according to Table 1
			LEL [%V/V]]	UEL [%V/V]]	Boiling or smoulding /1 [°C]	Ignition [°C]	Auto-ignition /2 [°C]			
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**

1/ boiling for liquid, smoulding for dust

2/ auto-ignition for gas, vapours or dust

CONDITIONS OF EXPLOSION HAZARD

Number of room or area according to Table 1	Emission source		Hazard counteraction measures					Notes
	Process engineering equipment	Type of emission /1	Ventilation		Process and electrical interlocks	Signalling		
			Type /2	Capacity or multiplication factor		Type	Location of alarm	
1	2	3	4	5	6	7	8	9

1/ degrees of emission
C – continuous
P – primary
S – secondary

2/ Bw – lack of ventilation
N – natural ventilation
S – artificial ventilation

Sn – pressure ventilation
Sw – exhaust ventilation
Snw – pressure-exhaust ventilation

DETERMINATION OF EXPLOSION HAZARD ZONES

Room or outer area	**Dangerous substance**		**Type of zone**	**Dimensions of explosion hazard zones in [m] /1**				**Notes**
Name or number acc. to Table 1 / **Emission source acc. to Table 3**	**Name or number acc. to table 3**			**Characteristics of zone**	**H**	**h**	**R**	
	Explosive group	**Temperat u-re class**						
1	**2**		**3**	**4**	**5**	**6**	**7**	**8**
				at source				
				farther to source				
				at source				
				farther to source				
				at source				
				farther to source				

1/ H – range of zone upward
h – range of zone downward
R – horizontal range of the zone

2/ The zone measured from source
3/ The zone measured from zone boundary closer to source dz – to earth
4/ Height of the zone above ground
5/ The zone measured from roof

Approval of explosion hazard zones

CLASSIFICATION COMMISSION

Signature

Chairman:

Grzegorz Orzeszko _____

Secretary:

Tomasz Klawikowski _____

Members:

Jan Biedroń _____

Edmund Monkiewicz _____

Marcin Rompa _____

Tadeusz Surawski _____

Tadeusz Wróbel _____

Approved:

stamp and signature

Gdańsk, date

Grupa LOTOS S.A.	**ATTACHMENT No. 6**	Spec. nr 1020
	Graphical designations on plans of explosion hazard zones	

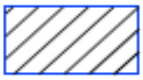
A) BASIC GRAPHICAL SYMBOLS



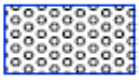
ZONE 0 – EXTERNAL ZONE



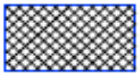
ZONE 1 – EXTERNAL ZONE



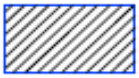
ZONE 2 – EXTERNAL ZONE



ZONE 0 – SEWER



ZONE 1 – SEWER



ZONE 2 – SEWER

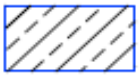
B) EXAMPLES OF ADDITIONAL GRAPHICAL SYMBOLS



ZONE 2 IIA T3



ZONE 2 IIB T3



ZONE 2 IIC T3

Grupa LOTOS S.A.	**ATTACHMENT No. 7**	Spec. nr
	Schedule of installed Ex equipment and apparatus – example	1020

Nº	Manufacturer Data						Explosion Zone Data				Acceptance
	Technological number	Rated data	Manufa-cturer	EC-Type Examination certyficate Number, EC Declaration of Conformity – from nameplate	No. and/or date of Ex and CE Certyficate	Temperature Range (on the basis of EC-Type Examination Certificate or EC Determination of Conformity)	Explosion zone	Explosion Group and Temperature Class	Closed or Open Area	Quan tity	Opinion Yes / No
1	2	3	4	5	6	7	8	9	10	11	12
1	0920-MP12	Type of motor M3KP1600MLA2 11kW, 19,5A, 400VAC	ABB	Ex II 2G Ex deIIC T4 LCIE 00ATEX6023 CE 0081	Cert. No. 430/Ex/2009	-25°C ÷ +40°C	Zone 2	IIC T4	Open	5	
2	0920-MS-MP-12	Control station 8146/5071	STAHL	Ex II 2G Ex de IIC T5 PTB 01 ATEX 1024 CE0 158	Cert. No. 818/32	-25°C≤Ta≤ +55°C	Zone 2	IIC T4	Open	97	
	0920-MX- MP-12	8146/1061	STAHL	Ex II 2G Ex e II T5 PTB 01 ATEX 1016 CE 0158	Cert. No. 551/2009	-25°C≤Ta≤ +55°C	Zone 2	IIc T4	Open	30	
3	0920	Cable bushing 8163/2-E1FW M25x1,5 19,9 – 26,2	STAHL	Ex II 2GD Ex e II/d IIC SIRA 06 ATEX 1188X CE 0158	Cert. No	-60°C ÷ +130°C	Zone 2	IIC T4	Open	58	

Specification performer	Investor supervisor Checked acc.to the actual conditions	Tasks performer Assembly of the equipment and cables glands – correct
..... (Stamp and signature)	..... (Stamp and signature)	..... (Stamp and signature)

Grupa LOTOS S.A.	**ATTACHMENT No. 8**	Spec. nr 1020
	Schedule of recivers, apparatus with cables and cable glands (Electrical discipline)	

Schedule of recivers, apparaturs with cables and cable glands

Lp	Tag Number / Odbiór	Cable/Kabel				Junctio Box, Skrzynka / Control Station, Kaseta			Flexible cable / Kabel giętki				Motor, Silnik / Consumer ,Odbiór			
		power/control zas. / ster.	diameters/średnice [mm]		thickness of armour/ grubość pancerza [mm]	Cable gland in / dławik wej.	Manafacturer/Producent, markup/ oznaczenie type/typ	Cable gland out /dławik wyj.	type / typ	średnice [mm]		thickness of armour/ grubość pancerza [mm]	Cable gland in / dławik wej.	dane		
			external / zewn.	Under armour / na powł. pod panc.		Manafacturer, producent type/ typ range/zakres [mm] Ex Data /dane Ex		Manafacturer, producent type/ typ range/zakres [mm] Ex Data /dane Ex		external / zewn.	under armour / na powł. pod panc.		Manafacturer, producent type/ typ range/zakres [mm] Ex Data /dane Ex	Power/Moc [kW]	Voltage / nap.[kV]	type of consumer / rodzaj
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	0120-MP1A	2XSEYRY 3x120/50	78.8	65.1	4	- - - -	- - -	- - - -	-	-	-	-	EMIT - 76,0-79,0 Ex e	450	10	silnik
2	0120-EH MP1A	2XYRY 3Gx2,5	14.8	9.4	0.9	CMP 8163/2-20-E1FW-M20 12,5-20,9 II 2 GD Ex d IIC / Ex e II	STAHL TB8 8146/1041	HUMMEL HSK-K-MZ-Ex M20x1,5 6,0-12,0 II 2 G EEx e II	OnPd 3Gx2,5	11.6	-	-	PFLITSCH U2 UNI M32x1,5 11,5-15,5 II 2 G/D Ex e II	0.25	0,23W	grzałka
3	0120-MS MP1A	2XYRY 14Gx2,5	23.9	17.1	1.6	CMP 8163/2-25-E1FW-M25 18,2-26,2 II 2 GD Ex d IIC / Ex e II	STAHL CB8 8146/5071	- - - -	-	-	-	-	- - - -	-	-	kaseta
4	0120-MP1B	2XSEYRY 3x120/50	78.8	65.1	4	- - - -	- - -	- - - -	-	-	-	-	EMIT - 76,0-79,0 Ex e	450	10	silnik
5	0120-EH MP1B	2XYRY 3Gx2,5	14.8	9.4	0.9	CMP 8163/2-20-E1FW-M20 12,5-20,9 II 2 GD Ex d IIC / Ex e II	STAHL TB8 8146/1041	HUMMEL HSK-K-MZ-Ex M20x1,5 6,0-12,0 II 2 G EEx e II	OnPd 3Gx2,5	11.6	-	-	PFLITSCH U2 UNI M32x1,5 11,5-15,5 II 2 G/D Ex e II	0.25	0,23W	grzałka
6	0120-MS MP1B	2XYRY 14Gx2,5	23.9	17.1	1.6	CMP 8163/2-25-E1FW-M25 18,2-26,2 II 2 GD Ex d IIC / Ex e II	STAHL CB8 8146/5071	- - - -	-	-	-	-	- - - -	-	-	kaseta

Grupa LOTOS S.A.	**ATTACHMENT No. 8** **Schedule of recivers, apparatus with cables and cable glands (Electrical discipline)**	Spec. nr 1020

7	0120-MP2A	2XSEYRY 3x120/50	78.8	65.1	4	- - - -	- - -	- - - -	-	-	-	-	EMIT - 76,0-79,0 Ex e	800	10	silnik
8	0120-EH MP2A	2XYRY 3Gx2,5	14.8	9.4	0.9	CMP 8163/2-20-E1FW-M20 12,5-20,9 II 2 GD Ex d IIC / Ex e II	STAHL TB8 8146/1041	HUMMEL HSK-K-MZ-Ex M20x1,5 6,0-12,0 II 2 G EEx e II	OnPd 3Gx2,5	11.6	-	-	PFLITSCH U2 UNI M32x1,5 11,5-15,5 II 2 G/D Ex e II	0.5	0,23W	grzałka
9	0120-MS MP2A	2XYRY 14Gx2,5	23.9	17.1	1.6	CMP 8163/2-25-E1FW-M25 18,2-26,2 II 2 GD Ex d IIC / Ex e II	STAHL CB8 8146/5071	- - - -	-	-	-	-	- - - -	-	-	kaseta

NOTE: Table content is only an example

Nr arch.	Obszar	Podobszar	Nr dokumentu	Nr rew.	Data wydania	Strona	Stron
19242	**90**	**00**	**PR 01004**	**2**	**30.11.2013**	**A7-2**	**1**

Grupa LOTOS S.A.	**ATTACHMENT No. 9**	Spec. nr 1020
	Schedule of control recivers, apparatus with cables and cable glands (Control and automotion discipline)	

Cable and Cable Gland Selection

Wykaz odbiorników, aparatury wraz z kablami i dławikami kablowymi

Reference drawing, version rev.A

	tag name of item	control / signal cable type	diameter/średnica [mm]		thickness of armour/ grubość pancerza [mm]	Cable gland in / dławik wej.	Junction Box Manafacturer/Producent, markup/ oznaczenie type/typ	Cable gland out /dławik wyj.	type of intermediate cable/ typ kabla	diameter/średnica [mm]		thickness of armour/ grubość pancerza [mm]	Cable gland in / dławik wej.	Consumer parameters/Dane odbiornika		
			external / zewn.	under armour / na powł. pod panc.		Manafacturer, producent type/ typ range/zakres [mm] Ex Data /dane Ex reducer		Manafacturer, producent type/ typ range/zakres [mm] Ex Data /dane Ex reducer		external / zewn.	under armour / na powł. pod panc.		Manafacturer, producent type/ typ range/zakres [mm] Ex Data /dane Ex reducer	Power/Moc [kW]	Voltage / nap.[kV]	type of consumer / rodzaj odbiornika
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
1	020AH_001	D3 - 12x2x1 Ex-d											-	-	-	Analyzer panel
2	020LCP_001	E2 - 6x2x2,5				M25 Ex-d IIB T3		M32 Ex-d IIB T3	D3 - 12x2x1,0				-	-	-	Panel sterownaia palnikami/ Burner LCP
3	020LCP_002	E2 - 6x2x2,5				M25 Ex-d IIB T3		M32 Ex-d IIB T3	D3 - 12x2x1,0				-	-	-	Panel sterownaia palnikami/ Burner LCP
4	020LCP_003	E2 - 6x2x2,5				M25 Ex-d IIB T3		M32 Ex-d IIB T3	D3 - 12x2x1,0				-	-	-	Panel sterownaia palnikami/ Burner LCP
5	020LCP_004	E2 - 6x2x2,5				M25 Ex-d IIB T3		M32 Ex-d IIB T3	D3 - 12x2x1,0				-	-	-	Panel sterownaia palnikami/ Burner LCP
6	020LCP_005	E2 - 6x2x2,5				M25 Ex-d IIB T3		M32 Ex-d IIB T3	D3 - 12x2x1,0				-	-	-	Panel sterownaia palnikami/ Burner LCP

NOTE: Table content is only an example

Grupa LOTOS S.A.	**ATTACHMENT No. 10** **Graphical designations on plans of explosion hazard zones**	Spec. nr 1020

