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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 regarding designing and manufacture of low and medium voltage electric motors

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.

It shall also be a base for preparation of other detailed specifications and quotations relevant for package units or other equipment deliveries.

The supplier scope of work shall include design, procurement, delivery on site, erection supervision, commissioning, performance tests and guarantee for delivery.

The Contractor is independently responsible for selection of equipment and materials to be purchased on the basis of technical design particularly in relation to instruments and equipment made in explosion – proof execution.

2.1 Deviations

Any deviations from this specification and relevant specifications, standards and documents, including the bidder's proposals indicating a more economic and/or technically better design or solution, shall be submitted in writing for checking and approval by LOTOS Group S.A. No deviation or modification shall be permitted unless confirmed in writing by LOTOS Group S.A.

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

2.2 Exclusions

This specification does not include control stations and intermediate terminal boxes delivered together with motors. Details regarding control stations and intermediate terminal boxes are included in specification 4210.

3 Hierarchy of Documents

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 GL SA
- Data Sheets approved by GL SA
- This Specification
- Other Specifications
- Drawings and other documents
- Standards

4 Definitions and designations

CONTRACTOR: GL SA LOTOS Group Inc./ BUYER

SUPPLIER: BIDDER/ DELIVERER

4.1 Designations

GL SA LOTOS Group S.A.

MV – medium voltage

LV – low voltage

AC – alternate current

DC – direct current

EMC – ElectroMagnetic Compatibility

Shall – Indicate a mandatory requirement

5 Description

5.1 Documentation

The Supplier shall deliver the following documents together with motors:

- list of documents
- Data Sheets filled by the Supplier (refer to p. 5.6.11)
- guarantee card
- dimensional drawings
- characteristics of motors
- terminal connections diagrams
- EC type examination certyficate
- EC declaration of Conformity
- For motors in EX execution additionally documentation required by the requirements of specification 1020-Classification of Explosion Hazard Zones
- Detailed technical documentation for installation/maintenance and safety for delivered device (including motor) in Polish language
- spare parts list

The above-mentioned documentation constitutes indispensable component of delivery; it shall be completed by the Supplier for all motors in package and submitted to LOTOS Group S.A.

5.2 General requirements

The motors shall be equipped with proper quantity of cable inlets for connection of external cables. Quantity of inlets shall be agreed with GL SA Individual, independent junction boxes shall be used for vibration sensors, anti-condensing heaters, temperature sensors and other auxiliary devices.

Electric motors shall be designed and manufactured for 5-year, continuous operation period.

Each motor shall have two earthing terminals, the first on housing, and the second inside main terminal box.

All motors located in Ex explosion hazardous area shall meet requirements of explosion protection and shall feature design prescribed by 94/9/EC directive, by norms harmonized with this directive and the requirements of specification 1020-Classification of Explosion Hazard Zones

Each motor must have permanent, legible and resistant to environment conditions name plate, made of non-corrosive metal, permanently fastened to the motor by means of elements made of the same metal, containing all necessary rating data – power, voltage, frequency, current, start-up current multiplication factor, speed, power factor and efficiency coefficient, insulation class, motor type, serial number, IP protection class and bearings data. Motors fed by inverters must have an additional nameplate that defines the working conditions for cooperation with converters.

It is also required nameplate with basic guidelines for engine lubrication (lubrication intervals,type and amount of of grease).

Additionally for motors in Ex design, the name plates must contain EEx code, t_E value (for motors of reinforced design) and meet the requirements of specification 1020-Classification of Explosion Hazard Zones.

The motors shall work without faults at rated voltage fluctuations of ±5% as well as rated frequency fluctuations of ±5%.

Motors of power above 160 kW shall be manufactured for 6kV or 10 kV depends on GL SA substation. Motors of powers in range of 160 – 320 kW, supplied by inverters or softstarts, may exceptionally be supplied from low voltage electrical network only after individual setting of supply terms, and LOTOS Group S.A. approval.

Installed motors must have a label permanently fixed in a visible place with the technological number.

In any case motor must be accessible and capable of disassembly, assembly of the engine, even when the position of the drive is roofed (for example openings in the roof).

Frequency converters for motor 6 kV,10kV shall be agreed with GL SA.

Motors shall fulfil requirements of EMC Directive , It means that they will properly work in defined electromagnetic environment without creating additional electromagnetic disturbances.

Power saving motors shall be used.

It is allowed to use motors certified to work in +40 ^{o}C/-20°C under conditions that Manufacturer will select and apply consumable materials (e.g. lubricants) to guarantee proper start-up and proper work in -25°C temperature.

5.3 Bearings and lubrication

Motors of power above 1 MW shall be equipped with slide bearings.

Bearings lubrication system shall be selected on the basis of motor manufacturer standard for most difficult working conditions.

Antifriction bearings shall be lubricated with grease.

Motors with bearings requiring periodical grease exchange, shall be equipped with grease nipples along with auxiliary devices for grease release.

Slide bearings lubrication shall be of non-forced type. For motors bigger than than 1 MW forced oil lubrication can be used. In this case, the motor shall have a blockade to prevent “dry” technological start-up and freewheel. For this type of lubrication it is also required security lubrication system,to allow in

case of failure of an external lubrication system components motor can be blockade stopped without antifriction bearing damage.

Oil lubrication system shall include oil tank, oil filling and draining valves, and visible indicator of bearing oil filling level.

Oil draining nozzle shall be led out in a manner enabling safe evacuation of oil.

Bearing type, grease type, its volume, grease exchange period, shall be marked on additional data plate, placed on the motor.

Bearings on the motor end opposite to drive end shall be of electrical isolated type. In case power supply from converter it is obligatory.

Motors designed to drive with a transmission belt shall be fitted with reinforced bearings and bearings shield.

5.4 Ambient conditions

The motors shall be designed for the following ambient conditions:

- Atmosphere — marine, aggressive, industrial, chemical, and dusty
- Ambient temperature (max/min) — +36°C/-25°C
- Average humidity (max/min) — 90%/70%
- Elevation above sea level — 1m
- Wind speed — 26 m/s
- Snow falls — 290mm
- Work conditions — refinery, sea coast

5.5 6kV,10 kV medium voltage electric motors

5.5.1 Supply system data:

Medium voltage — 15kV (LOTOS Railway, North Marine and Przejazdowo Water Supply Point), 3-phase, IT (isolated network)
10.5kV (GPZ3), 3-phase, IT (isolated network)
6kV (GPZ1, GPZ2), 3-phase, IT (isolated network)

- Anti-condensation motor heater supply voltage — 230 V, L+N+PE
- Frequency — 50 Hz, +4%/-6%

5.5.2 Start-up

Asynchronous MV motors shall be adapted for direct star-up with full load and continuous operation.

Squirrel-cage motors shall have possibility of direct start-up.

Rated current multiplication factor on starting-up for MV motors shall not exceed value of their rated current –6xI_N Electric motors shall meet requirements concerning number of start-ups per hour:

Item	Minimum number of start-ups		160 ÷1600 kW	above 1600 kW
1.	Number of start-ups per hour during continuous operation Start-ups from working temperature		3	3
2.	Number of start-up's per hour (the motor must be shut off after each start-up, and rotor stopped)	Start-up from ambient temperature (cold start)	3 next,(+ 1) after 30 ′	3 next, (+ 1) after 30 ′
		Start up from working temperature (hot start)	2 next,(+ 1) after 30 ′	2 next,(+ 1) after 30 ′

The motors shall be adapted for momentary supply decay, lasting up to 1,5s, and automatically restart at full load, without any negative consequences for motor.

5.5.3 Degree of protection provided by housing

According to PN-EN 60529 norm, mechanical protection degree of motors, junction boxes and other devices shall be not worse than IP54. The motors working outdoor shall have equipment adapted for external environmental conditions and exposed to direct sunlight, without any additional protection means.

5.5.4 Explosion protection

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

II 2G Ex e II…	- preferred, with reservation that it is prohibited to use reinforced enclosure with additional forced ventilation
II 2G Ex de II...	- acceptable in case: - Ex d - for motor - Ex e - for junction box
II 2G Ex d II...	- not preferred
II 2G Ex p II…	- high power motors, requires agreement

-

5.5.5 Insulation class

Motor insulation class – F, with temperature rise as for B class.

5.5.6 Anti-condensing heaters

The motor shall be equipped with anti-condensing heater. Connection terminals shall be located in separate box. Supply voltage for heaters: 230V AC, single-phase. The heaters shall be directly supplied and controlled through auxiliary circuits of motor outgoing feeder of 6kV,10 kV switchgear.

5.5.7 Noise level

Maximum noise level must not exceed 85 dB(A), measured at 1-meter distance.

5.5.8 MV motor supply system

Terminal boxes on motors shall be co-ordinated with selected cable and cable fittings. Main terminal box shall be located on right hand side, looking from drive end, and shall enable rotating it by 90º in order to enable connecting of power cable from various sides of the motor. Entrance to main terminal box shall be located by default on right hand side, looking from drive end. Cables supplying motors in explosion hazardous areas shall be selected with 25% spare of long-last load carrying capacity.

The cables shall be selected in a manner ensuring short-circuit requirements and allowable voltage drop.

5.5.9 Requirements in scope of control, signalling and protections

- Control, signalling and protection systems shall take into account functional connections of control and measurement instruments and executing elements (contactors / breaker switches).
- Control and signalling system shall perform necessary, required functions:

- local motor switching on and off from control station
- motor switch on and off from DCS
- local motor emergency switch off by means of local emergency switch off
- emergency shutting down motor or motors group (if such necessity occurs) locally or from DCS

- emergency switch off must be realised by certified systems and relays with possibility for permanent locking of control functions from control station and from DCS
- automatic restart after voltage failure
- Interconnection signal from, to DCS shall be separated from electrical discipline by means of control relays - see requirements of specification 1010 -Interdisciplinary battery limits.
- Control system shall be protected by means of overload circuit breakers.
- Allowable levels of auxiliary voltages are:
  - 110V DC or 220V DC (depend on power supply point) – protection, control and signalling for MV motors
  - 230V AC – for motors anticondensation heaters supply.
- Protection of medium voltage motors shall be designed basing on digital, complex type protections, performing:
  - overcurrent instantaneous protection against external short-circuits
  - overcurent delayed protection against overloads (thermal model)
  - ground-faults protections
  - protection against phase decay or phase asymmetry
  - protection against synchronism loss (only for synchronous motors).
  - protection against stalled rotor (tE time)

  For motors of power 2MW and above, one shall use differential protection (as an option, agreed with GL). In this purpose, the motor must be equipped with separate terminal box for neutral point of windings with current transformers. The current transformers shall be subject of bilateral agreement in order to install identical ones in 6kV,10 kV switchgear.

  Type of protections must to be agreed with Lotos Group before design stage.

- Temperature measurements

  Motors shall be equipped with windings and bearings temperature detectors.

  Temperature detectors shall be used as follows:
  - one double PT100 resistance type detector for each phase of winding – 3 sets (the second sensors are stand-by ones)
  - two PT100 resistance type detectors for bearings temperature measurement on drive end, and the dead end of the machine.
- Preferred settings for temperature protections of bearings and windings in electric motors:
  - Bearings:– signalling at 75ºC , shut down at 95ºC
  - Windings: – signalling at 110ºC, shut down at 125ºC.

- Temperature detectors' wires shall be led out to separate junction box placed on the motor. To junction box shall be led wires from all detectors installed on motor.

All electric motors shall be equipped with vibration monitoring systems, according to Specification N° 2450 „Machinery monitoring system"

5.5.10 Anti-corrosion protection

All external surfaces shall be protected with anti-corrosion coatings, according to the manufacturer standard. Final colour RAL-7035 Light Grey.

5.6 Low voltage electric motors – 0,4 kV

5.6.1 Supply system data

- Supply voltage - 400V AC,±10% 3-phase, or 230VAC, 1-phase, ± 10%directly earthed, TN-S
- Anticondensation (space) heater supply voltage 230V AC ±5%, L + N+PE
- Frequency - 50 Hz +4%/-6%

Caution! The motor of powers in range of 160 – 320 kW supplied by inverters or softstarters, may exceptionally be supplied from low voltage electrical network only after individual setting of supply terms, and LOTOS Group S.A. approval.

5.6.2 Start-up

Asynchronous electric motors up to 1 kV shall be adapted for direct start-up with full load and continuous operation.

The motors shall be adapted for momentary supply decay, lasting up to 3s, and automatically restart at full load, even at full phase opposition of residual voltage.

The motor shall be such designed, that proper start-up is possible at voltage reduced to 80% of rated voltage.

Rated current multiplication factor on starting-up for up to 1 kV motors shall not exceed 8 x I_N value for motors.

Electric motors shall meet requirements concerning number of start-ups per hour:

Item	Minimum number of start-ups		up to 1 kV motors
1.	Number of start-ups per hour during continuous operation Start-ups from working temperature		3
2.	Number of start-ups per hour (the motor must be shut off after each start-up, and rotor stopped)	Start-up from ambient temperature (cold start)	3 next, (+ 1) after 30 ′
		Start up from working temperature (hot start)	2 next, (+ 1) after 30 ′

5.6.3 Degree of protection provided by enclosure

According to Pn-EN 60529 norm, mechanical protection degree of motors, junction boxes and other devices shall be not worse than IP54. The motors working outdoor shall have equipment adapted for external environmental conditions and direct exposed to sunlight, without any additional protection means.

It is recommended to use for motors to 1kV, the simering type seal between the rotating shaft and the body. There is not recommended of use labyrinth seal instead.

5.6.4 Explosion protection

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

II 2G Ex de II... - preferred , motor Ex d, junction Ex e;

II 2G Ex e II … - acceptable

II 2G Ex d II... – not preferred

5.6.5 Insulation class

Motor insulation class – F.

5.6.6 Noise level

Maximum noise level must not exceed 85 dB(A), measured at 1-meter distance.

5.6.7 Supply system of LV motor

Main terminal box shall be located on right hand side, looking from drive end (DE) and must be able to rotate by 90 degrees to allow connect power supply cable from various side of motor.Location at the top is allowed if rule as above is maintained.

.For motor supply shall installed locally intermediate terminal boxes equipped with earthing PE terminal for earthing PE wire and armour of cable.

Motor supply shall be accomplished with flexible OnPd cable from intermediate terminal box.

Cables supplying motors in explosion hazardous areas shall be selected with 25% spare of long-last load carrying capacity.

Anticondensate heaters for LV motors are not required as long as it is not necessary.

5.6.8 Requirements in scope of control, signalling and protections

- Control, signalling and protection systems shall take into account functional connections of control and measurement instruments and executing elements (contactors / breaker switches).
- Control and signalling system shall perform necessary, required functions:
  - local motor switching on and off from control column
  - motor switch on and off from DCS
  - local motor emergency switch off by means of local emergency switch off
  - emergency shutting down motor or motors group (if such necessity occurs) locally or from DCS
  - emergency switch off must be realised by certified systems and relays with possibility for permanent locking of control functions from control station and from DCS (start permission from DCS)

- automatic restart after voltage failure

- Control system shall be protected by means of overload circuit breakers.
- Temperature measurements and vibration system (in DCS)

Necessity for use of windings temperature detectors in LV motors shall be agreed with LOTOS Group S.A.

One double PT100 resistance type detector for each winding phase shall be used.

- Settings for temperature protections of bearings and windings in electric motors:
  - Bearings:– signalling at 75ºC , shut down at 95ºC
  - Windings:– signalling at 110ºC, shut down at 125ºC.

Temperature detectors' wires shall be led out to separate junction box on the motor. To junction box shall be led wires from all detectors installed on motor.

Protection system of low voltage motors shall be designed basing on independent electronic relay protection, featuring options of overcurrent overload delayed protection, protection against excessive increase of bearings and/or windings temperature, as well as overcurrent instantaneous protection against phase asymmetry and excessive starts . Furthermore, the motor must be equipped with overcurrent instantaneous protection against internal short-circuits, performed by fuses.

Type of motor protection shall be agreed with Lotos Group before project stage.

Motor supply and control system shall be implemented : main contactor, fuses (short-circuit protection), electronic motor protection (protection from overloads, locked rotor, multiple excessive starts). It is recommended to use 230 VAC for contactor coil supply voltage, other basic control shall be 24V DC. For anticondensate motor heaters (if exist) 230V AC shall be used.

Electric motors – if required - shall be equipped with vibration monitoring systems provided in accordance to Specification No 2450 „Machinery monitoring system".

5.6.9 Speed regulation

For regulation of drives speed, frequency converters (inverters) shall be used. The inverters shall be installed within Electric Substations as free standing or wall standing cabinets, and they shall be selected and delivered along with the drive. The inverters shall be equipped with adequate input and output filters for electrical network and control and automatics protection against interferences (refer to specification N° 4850). Screened cables shall also be used for this purpose to connect motor with its converter.

The motors installed in explosion hazardous areas shall be adequately selected for co-operation with inverters, and certified for mutual co-operation.

Motors supplied by frequency converters shall have isolated type bearings at least from dead end of machine. .

Motors supplied from converters shall be equipped in PTC winding temperature sensors. There must be foreseen dedicated input (input card) in converter or independent relay to serve with this signal in electrical substation/converter. Both solutions shall fulfill requirements and be certifed in accordance with ATEX Directive requirements. It is special solution which change requirements others specifications for motor control and monitoring scope

5.6.10 Anti-corrosion protection

All external surfaces shall be protected with anti-corrosion coatings, according to the manufacturer standard. Final colour RAL-7035 Light Grey.

5.6.11 Data sheets

The Supplier shall deliver filled data sheets for motors, according to the following pattern:

Manufacturer:			**Motor Tag No:**	
Description			**Required**	**Quoted**
GENERAL DATA				
01	Number of Motors			
02	Driven Machine Name			
03	Drive Machnie Tag No			
04	Codes and Standards			
AMBIENT CONDITIONS				
05	Climate			
06	Ambient Temperature - max.	°C		
07	Ambient Temperature - min.	°C		
08	Relative Humidity at °C	%		
09	Altitude	m		
10	Location		☐ indoor ☐ outdoor	☐ indoor ☐ outdoor
11	Seismic factor			
HAZARDOUS AREA CLASSIFICATION (IEC/CENELEC)				
12	Zone			
13	Group			
14	Temperature Class			
MECHANICAL DESIGN DATA				
15	Ref. Manufacturer Code			
16	Duty			
17	Diration of Rotation Looking at Coupling		☐ CW ☐ CCW	☐ CW ☐ CCW
18	Cooling Method			
19	Coupling Type			
20	Mounting Type			
21	Degree of Protection			
22	Type of Explosion Protection of Enclosure			
23	Enclosure Material (Stator - incl. Terminal Boxes)			
24	Dimensins: Size (Shaft Hight)	mm		
25	Total Height	mm		
26	Total Length	mm		
27	Total Width	mm		
28	Shaft End: Type			
29	Shaft Lenght	mm		
30	Shaft Diameter	mm		
31	Connection to Driven Machine			
32	Total Shaft End Float	mm		
33	Rotor Weight	kg		
34	Rotor Moment of Inertia	kgm^2		
35	Total Weight	kg		
36	Painting - Colour Code			
37	Torque Starting	Nm		
38	Breakdown	Nm		
39	Pull Out	Nm		
40	Max. Sound Pressure Level	dB(A) at 1m		

Manufacturer:			**Motor Tag No:**	
Description			**Required**	**Quoted**
ELECTRICAL DESIGN DATA				
44	Operating Voltage	V		
45	Max. Voltage Variation	%		
46	Frequency	Hz		
47	Max. Frequency Variation	%		
48	Rated Power	kW		
49	Full Load Current	A		
50	Full Load Speed	RPM		
51	t_E Time from Hot	s		
52	t_E Time from Cold	s		
53	Starting Current (% of Full Load Current)	%		
54	Starting Method		☐ DOL ☐ Y/△	☐ DOL ☐ Y/△
55	Variable Speed Drive		☐ Yes ☐ No	☐ Yes ☐ No
56	Allowed Starting Time	s	Cold: Hot:	Cold: Hot:
57	Re-acceleration		☐ Yes ☐ No	☐ Yes ☐ No
58	Allowed Number of Starts in Quick Succession		from Cold	from Cold
59	Allowed Number of Starts in Quick Succession		from Hot	from Hot
60	Thermal Time Constant	s		
61	Insulation Class			
62	Efficiency at 1/2 Load			
63	Power factor at 1/2 Load			
64	Efficiency at 3/4 Load			
65	Power Factor at 3/4 Load			
66	Efficiency at 4/4 Load			
67	Power Factor at 4/4 Load			
68	Locked Rotor Power Factor			
ACCESSORIES - SPACE HEATER				
69	Required		☐ Yes ☐ No	☐ Yes ☐ No
70	Rated Voltage	V		
71	Rated Power	W		
ACCESSORIES - TEMPERATURE MONITORING				
72	Winding Temeperature Monitoring per Phase			
73	Bearing Temeperature Monitoring per Bearing			
74	Cooling Temeperature Monitoring			
ACCESSORIES - MAIN TERMINAL BOX				
75	Location			
76	Main Cable Number of Cores and Section			
77	Main Cable Out Diameter	mm		
78	Main Cable Inlet Thread			
79	Cable Gland included in the Delivery Scope		☐ Yes ☐ No	☐ Yes ☐ No
ACCESSORIES - SPACE HEATER TERMINAL BOX				
80	Location			
81	Feeding Cable Number of Cores and Section			
82	Feeding Cable Out Diameter	mm		
83	Feeding Cable Inlet Thread			
84	Cable Gland included in the Delivery Scope		☐ Yes ☐ No	☐ Yes ☐ No

Manufacturer:		Motor Tag No:	
Description		**Required**	**Quoted**
ACCESSORIES - TEMPERATURE MONITORING TERMINAL BOX			
86	Location		
87	Control Cable Number of Cores and Section		
88	Control Cable Out Diameter mm		
89	Control Cable Inlet Thread		
90	Cable Gland included in the Delivery Scope	☐ Yes ☐ No	☐ Yes ☐ No
ACCESSORIES - BEARINGS			
91	Bearing Type - Coupling Side		
92	Bearing Type - Opposite Side		
93	Lubrication		
94			
95			

Notes:

1. Time tE - time which is needed for the motor winding to reach allowed temperature while the motor rotor is locked.
2. The manufacturer shall complete the all applicable data in the column "Quoted".
3. The document must be completed in English language.

For driven equipment data, please, refer to the document:
Starting and Breake Torque Diagram

4. In case, there are items to be selected marked up with ☐
   the selected item shall be marked up with: ■

6 Relevant documents

- **Ot**her Technical Specifications, shown on delivered List of Technical Specifications for GL S.A

7 Codes and standards

Electric motors shall meet requirements of Polish Standards and norms listed below, as well as their European equivalents IEC, ISO/CENELEC

PKN-CLC/TS 60034-17	Rotating electric equipment. Part 17: Cage induction motors when fed from converters – Application guide (IEC/TS 60034-17:2002 + AC1:2002 +AC2:2003)
PN-E-06741	Rotating electric equipment. Three-phase squirrel-cage induction motors of high efficiency. Requirements and testing methods.
PN-EN 60034-1	Rotating electrical machines. Part 1: Rating and performance
PN-EN 60034-5	Rotating electrical machines-Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code). Classification
PN-EN 60034-6	Rotating electrical machines. Cooling methods (IC code).
PN-EN 60034-7	Rotating electrical machines - Part 7: Classification of types of construction, mounting arrangements and terminal box position (IM code)
PN-EN 60034-8	Rotating electrical machines - Part 8: Terminal markings and direction of rotation.
PN-EN 60034-9	Rotating electrical machines. Part 9: Allowable noise levels.
PN-EN 60034-11	Rotating electrical machines. Part 11: Thermal protection.
PN-EN 60034-14	Rotating electrical machines. Part 14. Mechanical vibration of certain machines with shaft heights 56mm and higher. Measurement, evaluation and limits of the vibration severity
PN-EN 60529	Degree of protection provided by enclosures (IP Code).
PN-EN 60079-0	Explosive atmospheres – Part 0: Equipment –General requirements
PN-EN 60079-1	Explosive atmospheres – Part 1: Equipment Protection by Flameproof Enclosures “d”
PN-EN 60079-7	Explosive atmospheres – Part 7: Equipment Protection by increased safety ‘e”
PN-EN 60079-13	Explosive atmospheres – Part 13: Equipment Protection by Pressurized Room
PN-EN 60079-11	Explosive atmospheres – Part 11: Equipment Protection by intrinsic safety

8 Record of changes

No.	Date	Description	Introduced by
0		This specification entirely replaces the former LOTOS Group S.A. standard No. PR 07 430 with the same title.	J. Bućko
1	07-maj-28	- Voltage change from 6 kV to 6 kV , 10 kV. - Rated current multiplication factor on starting-up for 6kV,10 kV motors shall not exceed value of their rated current – chnges from $4xI_N$ to $6xI_N$.	J. Bućko
2	28.04.2011	Taken review of content standards, a change resulting from the implementation of the proposals P10 +.	J. Bućko M. Chorosz M. Rompa
3	30-11-2013 (rev.3)	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 content changes.	T. Wróbel