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1 Subject of specification

This specification used in conjunction with ohther technical specifications of LOTOS Group S.A. establishes the minimum requirements and standard practices for the design, performance services, supply, installation, commissioning and acceptance of Electrical Heat Tracing System.

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.

Design office is fully responsible for elaboration of entire and final design documentation of electrical heat tracing system.

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 deviation from this specification and the relevant specifications, standards and related documents including proposals, which the bidder claims to be economically and / or technically superior solutions must be submitted in writing for review and approval by Grupa LOTOS SA. Non-approved exceptions are not acceptable by Grupa Lotos 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 contain requirements for power and control cables. They are included in specification no.4400 - “Cables and wires”.

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

4.1 Definitions

GL SA – Grupa LOTOS S.A.

SN – medium voltage

DC – direct current

IT – electrical network with isolated neutral point

SZR – Auto Transfer Switching system

PPZ – Scheduled Supply Switching-over

DOL – Direct online Motor Start-up

CSNiM – Central Monitoring and Supervision System

KiA – Control Systems and Instrumentation

EMC – Electromagnetic Compatibility

PURCHASER: LOTOS Group S.A.

DESIGN OFFICE: Bidder / Contractor of documentation

SUPPLIER: Bidder / Supplier of equipment/ Contractor of works

Shall – Indicate a mandatory requirement.

5 5. Description

5.1 General Design Requirements

5.1.1 Documentation

Documents to be supplied by Bidder with the quotation:

- Complete price sheets. The quantities on the price sheets shall be accepted as basic quantities. Additionally required quantities and materials shall be offered on separate sheets.
- List of documents (contents)
- Selection table of heating cables (with consideration given to periodical steam-purging of pipelines)
- Detailed data of all heating cables
- Detailed data of boxes, connection sets and other accessories
- Copies of the Certificates of Conformity, Declarations of Conformity EC, EX certificates, according to ATEX directive.

The following documents have to be supplied for acceptance, after contract has been awarded:

- List of documents (contents)
- Dimensional drawings of junction boxes

- Calculations of heating circuits
- Plan of heating circuits system, prepared on the grounds of isometric drawings or P&ID, etc.
- Heat balance for the complete heat tracing system
- One line diagrams of heat tracing circuits and detailed schematic connections diagrams for heat tracing circuits
- Layout drawings of installation (arrangement of junction boxes and power cables on the plant)
- Equipment list / parts list
- Installation, operating and maintenance instructions
- Manufacturer test certificates, type tests certificates
- Set of certificates (Explosion Protection Certificates according ATEX Directive).

5.1.2 General requirements

Electrical Heat Tracing System shall be used for vessels and pipes, instrumentation impulse lines, instrument equipment, as shown in the attached documents:

- List of piping / vessels to be heated
- List of instrument equipment to be heated
- Isometrics for pipe tracing
- Hook ups for instrument impulse lines
- Layout drawings with marked location of the heat tracing piping, instrument equipment and vessels

This specification is to be a concise summary of the requirements and the general framework for the supplies and services.

The bidder shall indicate all deviations from this Specification in his bid. For the contract to be awarded all deviations must be approved in writing by the client or his representative.

If no deviations are indicated, the specification shall be regarded as duly agreed.

This specification used in conjunction with the purchase documents, data sheets, and/or drawings establishes the minimum requirements for the design and construction of electrical heat tracing. Reference to other industrial standards for compliance shall be interpreted as an integral part of this specification.

5.2 Basic design data

5.2.1 Environmental conditions

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

5.2.2 Electrical data

- Medium voltage — 15kV (LOTOS Railway, North Marine and
- 6000V,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)
- Frequency — 50Hz with +4%/-6% allowable tolerance
- Low voltage — 400V, TN-C/S with +/-10% allowable tolerance
- Low voltage (lighting, heating) — 230V, TN-S
- Low voltage (emergency lighting) — 110V DC
- Alternate current control voltage — 230V, 1-phasee
- Direct current control voltage — 110V DC. 220V DC (for GPZ1,S7 and S9)

5.3 Enclosures

Type of enclosure shall be at least: IP 65 acc. to IEC 144 for outdoor use

Outdoor equipment shall be suitable for installation and operation without additional environmental protection and for exposure to direct sunlight. The Bidder shall provide additional protection if required.

5.4 Minimum size of cables and terminals

The minimum size of cables shall be:

- – 2,5 mm^2 for control cables
- – 2,5 mm^2 for power cables.

Size of power cables and terminals shall be selected in accordance with the applicable Polish standards, codes and regulations, while taking into consideration:

- Fast switching off (electrical shock protection) – fulfilled independently by means of two protections: current differential protection and overcurrent protection. Required switching off time is 0.4 s. The following solutions are allowable: integrated overcurrent circuit breaker with current differential module, or application of separate instruments: overcurrent circuit breaker and current differential circuit breaker.
- Upstream protection settings (e.g. fuses, MCB tripping)
- Permissible voltage drop (5% at the consumer terminals in steady-state operating conditions)
- Applicable de-rating factors for long-term load, considering cable laying conditions

5.5 Identification

All electrical equipment shall be identified by waterproof, non-corrosive nameplates showing the identification number of the equipment. Nameplates shall be attached to detachable parts of the equipment (covers, terminal boxes, door).

All cables and wires shall be identified at both ends by an approved type of permanent marking such as ferrules. It is not allowed to use potential method or other to labelling circuits. Apparatus terminal strips shall be clearly identified to avoid connection errors.

The markings shall correspond to the identifications shown on the drawings.

The identification has to be done in accordance with specification N° 6120 – "Process Identification System. Identification and Numbering System of Electrical Equipment".

5.6 Reference marking

Inscriptions for operating elements shall be in Polish language. Text shall be stipulated by the Supplier and submitted to GL SA for approval.

5.7 Painting

Factory painting standards for specified, harsh environmental conditions shall be used, final colour (RAL) however they shall require formal confirmation of GL SA

5.8 Preferred vendors

Vendors for electrical components shall be selected according to Vendor List approved by GL SA

Supplier shall submit a supplementary vendor list to GL for approval for other equipment, which is not listed in the official Vendor List,

6 Design and supply requirements

6.1 General requirements

The heating system for each tracing point shall be selected to the following criteria:

- to the requirements of the safety analyses,
- according to specification of pressure vessels, and others, containing flammable materials, checked against requirements of Polish Standards
- according to process requirements.

The design and supply shall be based on the specific requirements of the P& I Diagrams. All electrical equipment shall be located with adequate access for convenient operation, cable connection and maintenance.

All equipment and materials shall be corrosion-proof or provided with an effective corrosion protection by hot dip galvanising, cadmium plating or painting.

Materials that are highly persistent, toxic or environmentally hazardous (e.g. PCBs – polychlorinated biphenyls, asbestos etc.) cannot be used. Hygroscope insulating materials shall not be used without special approval (mineral insulated cables may be used).

All equipment and materials shall be new, unused and of good proven quality.

All cable entries to equipment shall be done from bottom wherever possible. Side entry may be used besides, with special precautions to prevent the ingress of water, including drip loops in cables. Cable entry from top in outdoor application is prohibited.

6.2 Hazardous areas classification

All equipment located within a hazardous area shall be verified by an appropriate CENELEC approved testing laboratory, and shall be completely suitable for the application in explosion hazard areas. Certificates of conformity shall be provided for all such equipment, and the equipment itself shall be labelled in accordance with the standards and ATEX directive.

All trace heating cables, junction boxes and all control equipment for constant resistance cables shall be suitable for hazardous area Zone 1. Flameproof enclosures shall be produced for explosive group IIC.

Test certificates / certificates of conformity **according IEC / EN**, issued by authorized testing authorities, shall be supplied for all explosion-protected equipment and material.

Manufacturer certificates **will not** be accepted.

Equipment classifications shall be as follows:

- Local switches: II 2 G EEx ed IIC T4 (as minimum)
- Switchgear boards: II 2 G EEx ed IIC T4 (as minimum)
- Junction boxes: II 2 G EEx e IIC T4 (as minimum)
- Temperature Sensor (PT 100): II 2 G EEx d IIC T4 or EEx e IIC T4 (as minimum)

The hazardous area classifications (zones and temperature classes) will be shown on either data sheets or drawings, provided to the Supplier. Minimum requirements regarding temperature classes should be each time verified with documentation of explosion hazard areas classification. In case of requirements more stringent than T4 (T5 or T6), equipment should be selected according to requirements of document "Classification of explosion hazard zones".

6.3 Power supply and switchgear

The Electrical Heat Tracing systems in each unit shall be supplied from MCC outgoings located in electrical substation, generally dedicated to feeding of heat tracing circuits.

Heat tracing circuits' supply may originate directly from the MCC heat tracing outgoings. Circuits may be either single phase with neutral and protective, or three phase with neutral and protective wire.

The voltage drop on the supply cable (from the MCC to the most distant heat tracing cable connection box) shall not exceed 5% at the minimum temperature conditions and should be divided as follows:

- 4% from MCC (Substation) to Heat Tracing Terminal Box

and

- 1% from Heat Tracing Terminal Box to heating cable Connection Junction Box (connection kit).

Supply cables shall be sized for the worst case conditions i.e. considering combination of supply voltage variation, cable temperature rise and connected with it change of electrical parameters, as well as temperature dependent load imposed by the self limiting heat tracing cable (see section 5.5.).

Power supply cables shall be selected for 0.6/1 kV, with copper conductors of minimum size 2.5 mm².

Power supply and distribution system of heat tracing system, both in scope of design and delivery, have to be agreed with GL SA in detail.

6.4 Signalling of heat tracing circuits operation failure

It is necessary to provide signalling of heating circuits supply failure in each case. Depending on foreseen supply system, two solutions can be used:

a) Heat tracing circuits fed from MCC, 1-phase, protected with overcurrent circuit breakers together with current differential modules (or with sets: system switch + current differential circuit breaker), no local Switchgear Panel on unit

All devices protecting heating circuits should be provided with auxiliary contacts, signalling position of main contacts. Common failure signal should be implemented by series connection of all auxiliary contacts. Common failure signal shall be sent to superior system.
In case when pipes, equipment and instrument equipment are fed from single MCC, then two independent failure signals should be led out:

- for pipes and equipment heat tracing circuits
- for instrument equipment

b) Heat tracing circuits fed from MCC, 3-phase, protected with fuse disconnectors, local Switchgear Panels arranged on the unit with 1-phase outgoing feeders protected with overcurrent circuit breakers along with current differential modules (or sets: system switch + current differential circuit breaker)

Each heating outgoing feeder in MCC should be furnished with auxiliary voltage relay with contact signalling voltage presence on outgoing feeder. Common failure signal should be implemented by series connection of all auxiliary contacts. Common failure signal of heat tracing circuits shall be sent to superior system.

Single-phase protections in local switchgear panels of heat tracing on specific unit should be equipped with auxiliary contacts, and similarly as in point a), connected in series. Common failure signals (separately for heat tracing circuits of pipes and equipment, and for instrument equipment) should be led out from each local Switchgear Panel to MCC, and then to superior system.

6.5 Heat tracing circuits

If possible, heating consumers should be individually protected, so that potential short circuits would not bring about switching off of large number of heating circuits, and that damaged heating circuits would be easy to locate. This principle applies in each case to critical circuits, where freezing of heated equipment can cause emergency shutdown of whole unit.

Heat tracing circuits shall be simultaneously distributed and grouped logically in order to minimize the number of heat tracing supply MCC outgoings, number of connection boxes and power supply cables required.

In installations where the process flow can follow different routes (for example manifolds and A/B pump lines), each independent part of the system shall be supplied from a separate circuit, if possible.

The maximum rating of outgoing circuit breakers for self limiting cables shall be **16 A**.

Short circuit calculation shall generate maximum fault clearing time at the end of the heat tracing cables in accordance with regulations.

6.6 Elements of heat tracing circuits

Electrical heat tracing should be implemented by means of self-limiting heat tracing cables, or tape for seasonal anti-freezing heating, or heat tracing cables of constant output for process related permanent heating.

Each heat tracing circuit shall consist of the following components:

- Overcurrent circuit breaker with current differential module rated to trip at an earth fault current of **30 mA** . Application of independent apparatuses is allowable.
- Power supply cable, with protective conductor
- Heat Tracing Termnal Box
- Branches of heat tracing circuits, 3-wire cables with protective conductor (1-phase circuits)
- Cold Junction Boxes
- Connection Junction Boxes (connection kits) and end seal
- Insulation entry kit
- Self-limiting heat tracing cable(s)
- Mounting and accessory materials.

6.6.1 Self-limiting heat tracing cables

The self-limiting heat tracing cables vary the power output in response to the cable temperature change at each point of the surface. As the temperature rises, the heat output shall be reduced automatically and vice-versa. The cable shall be completely self-protecting, so that it would not be damaged due to overheating as a result of overlapping, irrespective of the laying method.

The maximum length of each self limiting heat tracing cable shall be such, so that the current rating of the heat tracing cable conductors is not exceeded at the supply end, and the heating performance at the passive end would be ensured.

The maximum lengths of the heating loops may only be 80% of the maximum lengths recommended by the manufacturer.

The heat tracing tapes may only be used as approved for the individual temperature ranges.

Additional temperature limiters must not be used.

Requirements for self-limiting heat tracing tapes:

Resistance to steam purging up to (at supply switched off): min.180°C

Resistance to permanent temperature up to: 120°C

6.6.2 Terminal Box or Switchgear Panel of heat tracing circuits

Heat Tracing Terminal Boxes shall be located in field close to heated pipes, apparatus and instrument impulse lines.

Heat tracing designer should determine exact Heat Tracing Terminal Boxes location on attached layout drawings of electrical heat tracing circuits.

In case of complex and extensive heat tracing circuits, it is necessary to use local Switchgear Panels of heat tracing circuits, equipped with protections, (overcurrent circuit breakers together with current differential module) for individual outgoing feeders.

Electrical heat tracing system should be supplied exclusively with 1-phase circuits. The only exception can be the first Switchgear Panel on process plant.

The above does not apply to situation, where only junction boxes are used. In such case, feeding circuits should be already led as 1-phase starting from station.

In case when junction boxes or Switchgear Panels are to be installed in explosion hazard zone, requirements of point 5.2 should be fulfilled.

Cold Junction Boxes shall be used for dividing supply branch circuit cables to sub-branch circuits (if any) and later through Connection Junction Boxes (connection kits) for connection of heat tracing cable(s).

Supplier of heat tracing system supplies Cold Junction Boxes.

6.6.3 Connection Junction Boxes (connection kits)

Connection Junction Boxes (connection kits) shall be used for connection between the supply branch cables to the heat tracing cable(s).

Connection Junction Boxes shall contain terminals in quantity sufficient for all connections to be made, and shall be sized such that connections may be made with ease. Terminals shall be of clamp type mounted on DIN rails. Not more than two conductors shall be connected to each terminal – one (1) to each side.

Earthing terminals or an earth bar shall be provided in each junction box, to connect the metal braid of self-limiting heat tracing cables to the protective conductor in the supply cable.

Supplier of electrical heat tracing system supplies Connection Junction Boxes (connection kits).

In case when junction boxes are to be installed in explosion hazard zone, requirements of point 5.2 should be fulfilled.

6.7 Grounding of Metal Enclosed Equipment and Structures

The Supplier shall provide sufficient number of connection grounding lugs on metal enclosures and steel structures, suitable for screws with 10 mm diameter for the connections to underground grounding system.

6.8 Power supply cable selection for electrical heat tracing

Design Office has to select power supply cables from MCC outgoings to heat tracing circuits junction boxes, as well as branch cables from heat tracing junction boxes to connection boxes, basing on heat tracing circuits data specified by Supplier.

Cables supplied by the supplier and cable routes execution shall be in accordance with the applicable Polish Standards, Codes and Regulations, as well as specification GL 4400 “Cables and conductors”.

All incoming / outgoing cables shall be clearly identified in the engineering documents and after installation in the cables routes (both ends and in proper intervals on the route).

All cables shall have tag name with use addressable method. Not allowed to use is potential method or other to labelling circuits.

7 Scope of design

After acceptation of engineering documentation of Supplier, Design Office shall deliver the complete documentation of equipment necessary for supply and installation of electrical heat tracing system, as described below, including:

- Electrical heat tracing circuits
- Heat tracing cable types, their sizes and power output
- Heat tracing outgoings of MCC (installed inside electrical substation)
- Terminal Boxes or Switchgear Panels of heat tracing circuits
- Cold Junction Boxes - if they are required
- Connection Junction Boxes (connection kits)
- Branch power cables from heat tracing Terminal Boxes to Cold Junction Boxes (if they are required), or to Connection Junction Boxes of heating circuits
- All necessary installation material
- Required approvals and certificates, such as explosion protection certificates, according to ATEX
- Spare parts (for start-up and commissioning) and special tools,
- Technical documentation and manuals for construction, maintenance and troubleshooting as shown in chapter 4.1.1
- Other equipment not listed here, but considered by supplier as necessary for erection.

Supplier shall also to furnish all data required to perform short circuit and load flow calculations to specify relay settings and co-ordinate protective devices.

The earthing system shall also show all connection points to the main earthing system i.e. to earthing bars in the soil.

8 Scope of supply

8.1 The Supplier Scope of Supply

The Supplier shall supply complete electrical equipment and installation material for the electrical heat tracing system as described, including:

- Heating cables
- Branch power cables,
- Cold Junction Boxes of heat tracing circuits - if they are required
- Connection Junction Boxes (connection kits)
- All necessary installation material
- Required approvals and certificates, such as explosion protection certificates,
- Spare parts (for start-up and commissioning) and special tools,
- Technical documentation and manuals for construction, maintenance and trouble shooting as
- shown in chapter 4.1.1
- Other equipment not listed above, but considered necessary by Supplier for erection.

If some equipment has not been mentioned above, it is the duty of the Supplier, for smooth and uninterrupted service, to explain that and to add the necessary equipment to his supply.

Only Vendors selected from attached "LOTOS GROUP S.A. approved vendor list" may deliver installation electrical materials and electrical heat tracing equipment.

8.2 Exclusions from the Supplier Scope of Supply

Unless otherwise decided, the Supplier shall not supply:

- MCC outgoings for heat tracing circuits supply
- Upstream power supply cables from upstream MCC outgoings to Electrical Heat Tracing Terminal Boxes
- Electrical Heat Tracing Terminal Boxes
- Earthing system installed in the soil

9 Battery Limits for Design and Supply

9.1 Completeness of Supplies and Services

It is assumed that after accepting of order by the supplying company, fulfilment of supplies and services not described in detail, but necessary from technical point of view, is included in the Supplier's scope of supplies and services for his account.

The supplier cannot maintain that the documentation submitted to him is not clear or faulty or that individual supplies and services pertinent to the scope in accordance with trade custom are not expressly stated, unless the faults in the documentation were of type not to be recognized in the process of proper contract fulfilment, even in the case of factual and careful checking.

9.2 Notification of Insufficiencies by Supplier

The Supplier is obliged to notify in proper time necessary revision to the basic data required or information non-stipulated in specifications, that design and/or technical documentation is unreasonable or to be supplemented in a view of new technological knowledge or market specification components.

The Supplier is obliged to transfer information regarding scope of his quotation extension.

9.3 9.3 Installations

The Supplier shall install the complete equipment necessary for operation of the heat tracing system as described, including:

- Branch power cables from Heat Tracing Terminal Boxes to Cold Junction Boxes (if they are required) or to Connection Junction Boxes of heating circuits / heating points
- Cold Junction Boxes (if they are required)
- Connection Junction Boxes (connection kits) of heating circuits / heating points
- Heating cables
- All necessary installation materials

9.3.1 Preliminary conditions

Prior to commencing the installation of heat tracing cables, Subcontractor of erection shall:

- Identify the pipeline to be traced, check that is completed, terminated, tested and has been accepted by the GL SA
- Check the conformity of the pipeline with the isometric projection used to determine the heat tracing requirements.
- Confirm that the surfaces of the piping are sound, free of burs and corrosion and clean.
- Check that the piping is externally dry.

9.3.2 Power cables

The installation of power cables (branch circuits from junction boxes) shall comply with Supplier design and installation standards that should be approved by GL SA

9.3.3 Heat tracing cables

Heat tracing cables shall be installed according to Supplier design and installation standards.

During installation the Supplier shall avoid twisting or applying excessive tension to the cable and shall ensure that thermal and mechanical stresses (e.g. welding, crushing) to the cable do not occur.

In case of constant wattage system, heating cable crossings are absolutely forbidden and in the case of self-limiting heating cables it should be avoided as far as possible.

All cables shall be fixed in such a manner, so as to ensure close and permanent contact with the surface to be heated. The cables shall be secured in place using adhesive aluminium or glass fibre tape suitable for the piping and the temperatures.

All cable installations shall include provision for subsequent servicing, handling and dismantling of the pipeline and heated equipment without disconnecting or damaging the heat tracing cables.

Special care shall be taken to avoid damage to the cable due to contact with sharp edges or rough surfaces.

Connections or branching shall not be made in locations, which will be covered by thermal insulation. All connections shall be made in Connection Junction Boxes (except cold junction connections).

Where cables pass through thermal insulation, entry kits shall be used which shall ensure securing of the cable and weatherproofing of its entry point.

The passive (un-powered) ends of the heating cables shall be fitted with terminations appropriate to the area classification, providing the correct degree of sealing and insulation.

9.3.4 Heat tracing junction boxes

Heat tracing junction boxes shall be located in central, easily accessible positions such that the length of outgoing supply cables would be minimised, but they shall be installed on the base of documentation provided by Supplier.

9.4 Testing and acceptance

9.4.1 Factory tests

No.	Test to be carried out	On each Equipment	On selected Equipment
1.	Visual inspection		
1.1	Equipment dimensions		X
1.2	Heat tracing cables		X
1.3	Connection Junction Boxes, Controllers, Limiting equipment		X
1.4	Material certificates	X	
1.5	Painting		X
1.6	Rating plates	X	
2.	Acceptance Tests		
2.1	Voltage test (where required)		X

GL SA. also reserves the right to perform inspections in the manufacturing workshops on free of charge base and shall be informed ahead of schedule about testing plans.

Certified test data, documents and the like shall be submitted for Purchaser's review.

Supplier shall specified testing method, if more than one testing method will be used. Supplier shall prepared detailed tests and during control procedures. Test result shall be submitted to GL SA

9.4.2 Testing on site

Prior to installation, each length of heat tracing cable shall be checked for conductor continuity and insulation resistance.

The insulation resistance shall be greater than 1MΩ during proof DC voltage 1000V and circuit voltage above 500V testing (acc to code no PN-HD 60364-6).

After installation, and prior to the application of thermal insulation, the heat tracing cables shall be checked for conductor continuity and insulation resistance as above once again.

After application of thermal insulation, (by other contractors), the following tests shall be conducted:

- Visual inspection for compliance with the specification and the approved drawings, including enclosure selection, labelling and marking.
- Measurement of insulation resistance for each circuit.
- Verification of current differential protections
- Calibration of controllers (if applied).

10 Relevant documents

- Other Technical Specifications, shown on delivered List of Technical Specifications for GL SA

11 Codes and standards

Electrical heat tracing system of piping and pipelines have to be done in accordance to Polish standards listed below and equivalent European standards IEC, ISO/CENELEC.

PN-EN 60079	Electrical apparatus for explosive gas atmospheres.(All parts)
PN-EN 60947	Low voltage switchgear and controlgear
PN-EN 60439	Low voltage switchgear and controlgear assemblies
PN-IEC 60364	Electrical installations of buildings. (All parts)
PN-EN 60529	Degrees of protection provided by enclosures (IP code)
94/9/WE	ATEX Directive

12 Attachments

- Attachment No.1, Technical Data Sheet – Electrical Heat Tracing

13 Record of changes

No.	Date	Description	Introduced by
0		This specification entirely replaces the former LOTOS Group S.A. standard No. PR 07 422 with the same title.	J. Bućko
1	30-11-2013 (rev.1)	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