Grupa LOTOS S.A.	**TECHNICAL SPECIFICATION**	Spec. nr 1175
	Low temperature protections	

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1 Subject of specification

This specification used in conjunction with standard technical specifications of Grupa LOTOS S.A. establishes the minimal requirements for the design and manufacture of low temperature protections of pipelines and equipment.

2 Scope of validity

This specification applies to the preparation of inquiries and contracts concerning new investments and modernization projects planned by Grupa LOTOS S.A.

It shall also be a basis for preparation of detailed specifications and inquiries for individual and package units supplies.

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 S.A. 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 S.A. or non-compliance with the referred documents / standards and obtain a written explanation from Grupa Lotos SA.

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 GLSA
- Data Sheets approved by GLSA
- This specification
- Other Specifications
- Drawings and other documents
- Standards

4 Definitions and designations

Thermal conductivity –[W/m deg] characterises material from the point of view of thermal protection. The thermal conductivity is the quantity of heat transferred through a unit thickness per unit time and per unit surface area,when the gradient of temperature between material surfaces equals 1 deg.

Steam tracer – a heating pipe, in which the heating medium is steam

5 Protection methods

Low temperatures can cause solidification or thickening of the process medium, which in turn can result in a disruption of the process, damage to equipment and piping or its destruction.

Protections against the effect of low temperature include both specific design solutions and the use of thermal insulation, heating pipes, double-pipe heating jackets and electric tracing cables.

6 Basis for the selection of the protections

The scope of the applied protections shall be determined mainly by the physical and chemical properties of the medium in the possible lowest design temperature of metal.

7 Designing

When designing an installation, in order to prevent the effects of low temperatures, first of all simple and proven methods shall be applied.

7.1 Location of equipment

Machinery and equipment having complicated auxiliary systems, such as lubricating oil systems, a closed coolant cycle etc., shall be as a rule located inside heated buildings or unheated structures having as a minimum a roof and side curtain walls protecting against precipitation and wind.

7.2 Draining of equipment and piping

An installation shall be designed so that easy draining of piping as well as equipment is possible during shutdown.

7.3 Keeping a continuous medium flow

Piping layout (mainly for water and water solutions) shall be designed in a way permitting maintaining continuous flow of the medium during a short shutdown, e.g. by closed circulation. Therefore all valves used to isolate collector branches shall be provided with suitable by-pass piping to maintain the minimum required flow. Pipeline sections isolated in this way shall have suitably located drain valves.

7.4 Underground pipelines

Underground pipelines shall be founded below the ground-freezing depth. If this is impossible or inadvisable for any reason, such pipelines shall be placed in specially designed piping channels and adequately protected against freezing like overground pipelines.

7.5 Protections

When selecting protections against freezing the following criteria shall be followed:

7.5.1 Continuous-flow pipelines

For pipelines, in which in normal conditions and during occasional shutdowns there is sufficient flow of a media, which does not permit over-cooling of this medium (e.g. circulating cooling water) – pipelines may remain unprotected or thermal insulation shall be applied.

7.5.2 Pipelines for easily solidifying media

For pipelines transporting process media that easily solidify or thicken in low temperatures thermal insulation combined with steam or oil tracing or electric tracing shall be used.

Where there is no danger of medium overheating in the pipeline, a suitable and economically reasonable solution shall be the use of steam- or oil tracers. In cases when no flow can result in overheating or boiling of the process medium, electric tracing cables with their maximum operating temperature selected depending on the physical and chemical properties of the medium, or double pipe heating with full automatics maintaining the required temperature must absolutely be used.

7.5.3 Control and measuring systems

Control and measuring systems shall protected by thermal insulation and tracing cables. Measuring converters shall be placed in special protecting boxes heated in the same way. Due to the necessity to ensure proper operation of control and measuring systems, the criterion for the selection of the operating temperature is very important in this case. Protection of the systems by steam tracers is permitted only for media that boil in high temperatures.

7.5.4 Process analyzers

Process analyzers shall be located in specially designed and air-conditioned containers ensuring the same working conditions in summer as well as in winter.

8 Thermal insulation

Pipelines shall be covered with one or more layers of insulating material to protect them against heat exchange with the environment.

Thermal insulation must be adjusted to specific process requirements. When deciding on the type of the insulating material and the way of applying the insulation one shall take into account the necessity to obtain the best thermal efficiency of the pipeline, i.e. to reduce its heat losses. At the same time insulation of the most economical thickness shall be used, i.e. such that a further increase in the insulation thickness is no more reasonable. The thickness of the insulation, the type of the insulating material and of auxiliary materials must comply with the technical conditions of design and fabrication of thermal insulation described in Specification No.1191.

9 Tracing

Pipelines as well as apparatuses fitted with tracing shall be marked on P&I diagrams. Pipeline tracing means that all piping elements such as valves, special parts, instrument fittings together with conduits leading to them shall also be traced.

Tracing of apparatuses shall be considered individually.

9.1 Steam and oil tracing

9.1.1 Steam tracing

Steam used for tracing can have different pressures depending on the required temperature of the heated medium. Condensate generated during the heat tracing process shall be evacuated to the condensate collector. The method of condensate collection depends on the pressure of the steam used.

Every steam tracer, even if several steam tracers are used to heat the same pipeline, shall be a separate pipeline leading from the steam collector to the condensate collector, with the flow direction opposite to the direction of flow of the medium in the traced pipeline. The steam tracer must be fitted with a cut-off valve both at the steam collector and the condensate collector. It shall be routed avoiding depressions (so called „pockets") and installed without vents, drains and dead ends. When it is not possible to avoid a „pocket", a drain nozzle blanked off with a flange shall be installed.

Vertical arrangement of steam and condensate collectors is recommended to save installation space.

Materials required to supply steam and to collect condensate shall be included in the specification of materials.

The technical conditions for steam tracing systems have been given in Specification No.2600. Examples of application can be found in Specification No.2020.

9.1.2 Oil tracing

Oil can be used as the heating medium instead of steam.
Also in this case every tracer shall have a cut-off valves at the supply and discharge collectors. It shall be routed without vents, drains and dead ends, avoiding „pockets".

Examples of oil tracing can be found in Specification No.2020.

9.2 Electric tracing

Heat tracing is realised using special electric tracing cables laid along the heated surface of the pipeline or wound around it.

The technical conditions for the design and fabrication of electric tracing systems can be found in Specification No.4700.

9.3 Double-pipe tracing

For particularly easily solidifying media, such as sulphur or asphalt, double-pipe tracing is used on long distances. Tracing of this type consists in enveloping the heated pipeline in another pipe and supplying a heating medium, steam or oil, to the inter-pipe space. The temperature of the conveyed medium is controlled by means of instruments controlling the flow and temperature of the heating medium. Because of the danger of solidification, the pipeline shall be constructed of short pipe sections connected by means of flanges. Such design of a pipeline makes it possible to restore flow by unclogging the congestion. The length of a piping section depends on the conveyed medium and, for example, it is 6 m for sulphur.

The technical conditions have been described in Specification No.2020.

10 Relevant documents

- Any “Technical Specification” issued by GRUPA LOTOS S.A. listed in Contract Files.

11 Record of changes

No.	Date	Description	Introduced by
0		This specification substitutes in whole the previous Grupa LOTOS S.A. standard No PR 07 125 identically titled.	B. Kowalewski
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 contents changes.	T. Wróbel