

GENERAL SPECIFICATION

ELECTRICAL

GS EP ELE 331

Tape trace heating

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General Specification		GS EP ELE 331
Tape trace heating		
Rev.: 03	Effective date: 10/2012	Page: 2 of 17

Contents

1. Scope	3
2. Reference documents.....	3
3. Environmental Conditions.....	4
4. Technical Requirements.....	4
4.1 Design	5
4.2 Heat transfer calculations.....	5
4.3 Control	6
4.4 Trace Heating Elements (Trace Heat Tapes)	6
4.5 Junction Boxes.....	7
4.6 Distribution Boards.....	7
4.7 Thermostats	7
4.8 System Tagging	8
5. Installation	8
6. Inspection and Testing	8
7. Documentation	8
8. Other references	9
Appendix 1 Typical one line diagram.....	10
Appendix 2 Installation of heating cable - Horizontal piping.....	11
Appendix 3 Installation of heating cable - Elbows.....	12
Appendix 4 Installation of heating cable - Flanges	13
Appendix 5 Installation heating cable - Valves and cocks	14
Appendix 6 Installation heating cable - Non insulated pipe supports	15
Appendix 7 Installation heating tape - Tape insulation exit	16
Appendix 8 Installation heating cable - Junction box support/connection	17

General Specification		GS EP ELE 331
Tape trace heating		
Rev.: 03	Effective date: 10/2012	Page: 3 of 17

1. Scope

This specification defines the minimum technical requirements for the design, the construction, the manufacture, the supply, the installation, the inspection and the testing (FAT and pre-commissioning) of an electrical trace heating tape system for installation on Company facilities located onshore or offshore.

The Trace Heating system shall include the transformers and distribution boards, together with all necessary heating elements (trace heat tapes), junction boxes, cable glands, thermostats, fixing materials, labels, markers and associated documentation.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

Design and engineering shall conform as a minimum requirement to the current edition of the following in preference order:

- Applicable laws, and regulations of the country in which the system will be operated. In cases where no "local" regulations exist, the French laws and regulations shall be used
- Company Particular Specifications and data sheet (if any)
- Company General Specifications
- Applicable International Electro-technical Commission (IEC) Standards
- Applicable CENELEC Standards.

Applicable recognised standards and codes (e.g. UTE-NFC, BSI, VDE, etc.) where IEC publications have not yet been issued.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
IEC 60050	International Electrotechnical Vocabulary
IEC 60071-1	Insulation co-ordination - Part 1: Definitions, principles and rules
IEC 60079 (Parts 30-1; 30-2)	Explosive atmospheres - Parts 30-1; 30-2
IEC 60332-3-22	Tests on electric and optical fibre cables under fire conditions - Part 3-22: Tests for vertical flame spread of vertically-mounted bunched wires or cables-Category A
IEC 60519-10	Safety in electroheat installations - Part 10: Particular requirements for electrical trace heating systems for industrial and commercial applications
IEC 60529	Degrees of protection provided by enclosures (IP code)

General Specification		GS EP ELE 331
Tape trace heating		
Rev.: 03	Effective date: 10/2012	Page: 4 of 17

Reference	Title
IEC 60706	Guide on maintainability of equipment
IEC 61000 (All Parts)	Electro Magnetic Compatibility (EMC) - All Parts
IEC 62262	Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code)
IEC 62395 (All Parts)	Electrical resistance trace heating systems for industrial and commercial application - All Parts

Total General Specifications

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP ELE 079	Electrical apparatus for potentially explosive gas atmospheres
GS EP ELE 137	Distribution boards
GS EP ELE 141	Power transformers
GS EP ELE 161	Electrical cables
GS EP ELE 221	Electrical Control System (ECS)
GS EP INS 110	Instrumentation for package units

3. Environmental Conditions

The equipment installed outdoor shall be designed to operate in an ambient temperature corresponding to the maximum outside temperature of the site of installation as defined in the project specific environmental data.

The minimum degree of protection of enclosures shall comply with the following (according to [IEC 60529](#)):

- Indoor equipment IP 21
- Outdoor equipment IP 55
- Exposed decks IP 56.

The minimum degree of protection against external mechanical impacts shall be IK08 (according to [IEC 62262](#)).

Selection of electrical apparatus for hazardous areas shall be done in accordance with the Company Specification [GS EP ELE 079](#).

4. Technical Requirements

Detailed design shall be performed by Manufacturer including all installation requirements.

General Specification		GS EP ELE 331
Tape trace heating		
Rev.: 03	Effective date: 10/2012	Page: 5 of 17

4.1 Design

The trace heating systems shall be suitable for installation and operation as defined in the hazardous area classification drawings.

The 230 V - 50 Hz, 3-phase, 4-Wires tracing system shall have a neutral earthed and distributed (TT system).

TNS system 400 V/230 V - 50 Hz, 3-phase, 5-Wires may be considered.

When required, the heat tracing system shall be split into two systems, one supplied by the normal network and the other supplied by an essential network.

The size, length, process/fluid and thermal insulation data of each pipe requiring trace heating will be given in the P&I Diagrams, Piping G.A. and Isometric Drawings.

Sufficient length shall be provided to allow for pipe expansion and contraction.

Thermal insulation to the trace heat pipes will be carried out by others.

Critical instrument impulse lines (small diameter lines from piping tapping points to the instrument) shall be double traced with a redundant power supply (two breakers, two wirings, etc.).

Two types of trace heating systems shall be considered:

- Winterisation Protection
- Maintained design temperature (according to Process requirements):
 - Minimum temperature
 - Range of temperature (minimum and maximum).

4.2 Heat transfer calculations

The selected heat tracing system shall provide the thermal output greater than the maximum heat loss calculated at the minimum design temperature for all traced equipment. The calculation shall be performed without the use of heat transfer cement.

The heat density shall be such that the temperature limits for pipe insulation are not exceeded.

Heat loss from pipes shall be calculated from insulation Manufacturer's specification tables using a minimum of 115% of the calculated required watts to cover the assumptions made, normal wind factor and a safety margin.

Manufacturer's computer programs based on job data shall be used for heat transfer calculations.

Thermal performance of the heat tracing system shall be achieved with a $\pm 10\%$ voltage variation of the power supply with regard to the rated voltage.

Minimum design temperature to be maintained in heat-traced piping is the temperature shown on the flow diagrams for process piping.

A clear definition of the heating zone/ circuits shall be performed inside the calculation note.

General Specification		GS EP ELE 331
Tape trace heating		
Rev.: 03	Effective date: 10/2012	Page: 6 of 17

4.3 Control

4.3.1 Local control

The trace heating control requirements shall be satisfied by using self-regulating type heating elements (trace heat tape). The heating element terminal boxes shall be fed from trace heating distribution boards. Other solutions are subject to Company approval.

Pipe which might contain flowing and non-flowing products shall not be traced by the same heating circuit or combined under control of a single thermostat.

Pipe which is located indoors and outdoors and/or above and below grade shall not be combined under the same heating circuit or controlled by a single thermostat.

The feed to each winterisation trace heating distribution board and/or trace heat element will be controlled by a frost thermostat supplied by the Manufacturer.

4.3.2 Control system

When required by project, electrical heat tracing will have its own control system. The system will ensure the energisation of heating cables as well as their control and monitoring (voltage, current, temperature, ground fault, etc.).

The heat tracing system will be considered as a package P3 type (refer to [GS EP INS 110](#) Instrumentation for package unit).

Depending on the location and the power to be fed, the system may be centralised or distributed.

In case of distributed system, a central controller will be located in each technical room, collecting all information and allowing the control and the modification of the distributed systems on site by means of a HMI (Human Machine Interface) or equivalent.

The controllers located in each technical room will communicate with a central supervisory system located in the CCB (Central Control Building) or preferably will interface with ECS system.

4.4 Trace Heating Elements (Trace Heat Tapes)

The tape, when installed in hazardous areas, shall have a tinned copper overbraid as per [IEC 60079-30-1 § 4.1](#) and an overall flame retardant outer sheath.

Mineral insulated cables shall be used only with Company written approval.

Fiber-wrap heating cable technology shall not be used in hazardous areas.

Electric heat tracing circuits, which could reach or exceed 80% of the tape temperature class under conditions of failure of piping, equipment, or control failure, shall be equipped with a separate, dedicated over-temperature thermostat.

This thermostat shall be of manual reset type and when operated shall de-energise the heating elements and initiate an alarm. The thermostat shall be in compliance with the requisitions of [IEC 60079-30-1 § 4.4.3](#).

Heating cables longer than 100 m for winterization protection and 60 meters otherwise shall be fabricated in multiple sections with cold junction splices made in an accessible junction box.