

# GENERAL SPECIFICATION

## INSTRUMENTATION

### GS EP INS 109

#### Instrument cabinets

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|------|---------|------------------------------------|
|      |         |                                    |
|      |         |                                    |
|      |         |                                    |
|      |         |                                    |
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## 1. Scope

This Specification defines the minimum requirements for the hardware design, manufacture, testing and supply of instrument cabinets used for both onshore and offshore oil and gas installations.

## 2. Reference documents

The equipment shall satisfy the requirements and regulations of the country of installation and specific standards referred to in this specification.

Where national regulations exist, their provisions and those of the standards and codes to which they refer shall apply, supplementing or amending the provisions of this document.

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

### 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                                                                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ISA 71.04         | Environmental Conditions for Process Measurement and Control Systems: Airborne Contaminants                                                                                                 |
| Directive 94/9/EC | European Directive 94/9/EC (23/03/94) on the approximation of the laws of the Member State concerning equipment and protective systems intended for use in potentially explosive atmosphere |
| IEC 60079-14      | Explosive atmospheres - Part 14: Electrical installations design, selection and erection                                                                                                    |
| IEC 60227-3       | Polyvinyl chloride insulated cables of rated voltages up to and Including 450/750 V - Part 3: Non-sheathed cables for fixed wiring                                                          |
| IEC 60228         | Conductors of insulated cables                                                                                                                                                              |
| IEC 60297         | Dimensions of panels and racks                                                                                                                                                              |
| IEC 60332         | Tests on electric cables under fire conditions                                                                                                                                              |
| IEC 60364-5-54    | Low-voltage electrical installations - Part 5-54: Selection and erection of electrical equipment - Earthing arrangements and protective conductors                                          |
| IEC 60529         | Degrees of protection provided by enclosures (IP code)                                                                                                                                      |
| IEC 60754         | Test on gases evolved during combustion of materials from cables                                                                                                                            |
| IEC 61000         | Electromagnetic compatibility (EMC)                                                                                                                                                         |
| IEC 61034         | Measurement of smoke density of cables burning under defined conditions                                                                                                                     |

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| Reference   | Title                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------------|
| IEC 61131-2 | Programmable controllers - Part 2: Equipment requirements and tests                                                 |
| IEC 62262   | Degrees of protection provided by enclosures for electrical equipment against external mechanical impacts (IK code) |
| IECEX       | IEC System for Certification to Standards relating to Equipment for use in Explosive Atmospheres (IECEX System)     |

**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 COR 350 | External protection of offshore and coastal structures and equipment by painting |
| GS EP ELE 001 | Electrical design criteria                                                       |
| GS EP ELE 079 | Electrical apparatus for potentially explosive gas atmospheres                   |
| GS EP ELE 137 | Distribution boards                                                              |
| GS EP INS 101 | Instrumentation Design                                                           |
| GS EP INS 102 | Instrumentation identification                                                   |
| GS EP INS 106 | Instrument Installation                                                          |
| GS EP INS 108 | Instrumentation for the design of plant rooms and control rooms                  |
| GS EP INS 110 | Instrumentation for package units                                                |
| GS EP INS 115 | Instrument Earthing                                                              |
| GS EP INS 116 | Instrument Cables                                                                |
| GS EP INS 134 | Design and supply of integrated control and safety system                        |
| GS EP INS 135 | Cyber Security requirements for design and supply of ICSS and Package Systems    |
| GS EP INS 158 | I/O Assignment Principles                                                        |
| GS EP SAF 221 | Safety rules for buildings                                                       |
| GS EP SAF 261 | Emergency Shutdown and Emergency De-Pressurisation (ESD & EDP)                   |
| GS EP TEC 007 | Obsolescence and Lifetime Cycle Management                                       |

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### 3. Terminology and Definitions

#### 3.1 Definitions

There are five types of statements in this specification, the “shall”, “should”, “may”, “can” and “must” statements. They are to be understood as follows:

|                   |                                                                                                                                                                                          |
|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Shall</b>      | Is to be understood as mandatory. Deviating from a “shall” statement requires derogation approved by Company.                                                                            |
| <b>Should</b>     | Is to be understood as strongly recommended to comply with the requirements of the specification. Alternatives shall provide a similar level of protection and this shall be documented. |
| <b>May</b>        | Is to be understood as permission.                                                                                                                                                       |
| <b>Can</b>        | Is to be understood as a physical possibility.                                                                                                                                           |
| <b>Must</b>       | Expresses a regulatory obligation.                                                                                                                                                       |
| <b>Company</b>    | TOTAL E&P or any TOTAL E&P subsidiary.                                                                                                                                                   |
| <b>Contractor</b> | Any Party that has signed a Contract with Company for the Engineering, Procurement, Construction, and Installation in part(s) or in full of a project.                                   |
| <b>Vendor</b>     | The package Vendor sub-contracted by the Contractor or by Company.                                                                                                                       |
| <b>Supplier</b>   | The Party that manufactures or supplies equipment, either individually or as a Packaged unit for the project.                                                                            |

#### 3.2 Abbreviations

The following terms and abbreviations will be used in this document.

|             |                                                                       |
|-------------|-----------------------------------------------------------------------|
| <b>DIN</b>  | Deutsches Institut für Normung (German Institute for Standardisation) |
| <b>EMC</b>  | Electro Magnetic Compatibility                                        |
| <b>ESD</b>  | Emergency Shut-Down (SIS)                                             |
| <b>EWS</b>  | Engineering Work Station                                              |
| <b>FGS</b>  | Fire and Gas System (SIS)                                             |
| <b>FTA</b>  | Field Termination Assembly                                            |
| <b>FTB</b>  | Field Terminal Block                                                  |
| <b>HIPS</b> | High Integrity Protection System                                      |
| <b>HMI</b>  | Human Machine Interface                                               |
| <b>HVAC</b> | Heating Ventilation Air Conditioning                                  |
| <b>ICSS</b> | Integrated Control and Safety System                                  |
| <b>IMS</b>  | Instrument Management System                                          |
| <b>I/O</b>  | Inputs/Outputs                                                        |
| <b>IE</b>   | Instrument Earth                                                      |

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| <b>IP</b>    | Ingress Protection                          |
| <b>IPE</b>   | Instrument Protective Earth                 |
| <b>ISE</b>   | Intrinsically Safe Earth                    |
| <b>ITR</b>   | Instrument Technical Room                   |
| <b>KVM</b>   | Keyboard Video Mouse                        |
| <b>LED</b>   | Light Emitting Diode                        |
| <b>MCB</b>   | Miniature Circuit Breaker                   |
| <b>MCC</b>   | Motor Control Center                        |
| <b>OS</b>    | Operating System                            |
| <b>OWS</b>   | Operator Work Station                       |
| <b>PCS</b>   | Process Control System                      |
| <b>PDS</b>   | Process Data Server                         |
| <b>PLC</b>   | Programmable Logic Controller               |
| <b>PSS</b>   | Process Safety System (SIS)                 |
| <b>SIE</b>   | Enterprise Information System               |
| <b>SII</b>   | Industrial Information System               |
| <b>SIL</b>   | Safety Integrity Level                      |
| <b>SIS</b>   | Safety Instrumented System                  |
| <b>SVTS</b>  | Smart Valve Test System                     |
| <b>OWS</b>   | Operator Work Station                       |
| <b>UCP</b>   | Unit Control Panel                          |
| <b>UPS</b>   | Uninterrupted Power Supply                  |
| <b>VTMS</b>  | Vibration and Temperature Monitoring System |
| <b>VAC</b>   | Voltage Alternating Current                 |
| <b>VDC</b>   | Voltage Direct Current                      |
| <b>VESDA</b> | Very Early Smoke Detection Alarm            |

## 4. General Requirements

ICSS and package Unit Control Panels (UCP) shall generally be supplied within instrument cabinets. The hardware requirements of the cabinets themselves are defined within this specification. The requirements of the actual systems are defined within the equipment system specifications:

- **GS EP INS 134** for ICSS
- **GS EP INS 110** for package Unit Control Panels.

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Instrument cabinets will generally be located indoors within technical rooms which have an HVAC controlled environment. Such technical rooms are designed such that they can be considered as non-hazardous areas.

Alternatively, outdoor cabinets using remote I/O principles, as defined within [GS EP INS 101](#) may be considered on a case-by-case basis. Such cabinets shall be considered as “smart junction boxes”.

#### 4.1 Environmental Conditions

Cabinets and their electrical and electronic equipment shall be suitably rated for the environmental conditions defined by the project and, in addition, by the selected Classification Society for floaters.

In addition to the site environmental conditions, the following scenarios shall also be taken into account:

- Continued cabinet operation in case of loss of HVAC for up to 48 hours
- Cabinet operation at yard/worksites where the environmental conditions may be more severe than at site
- Cabinet storage and installation under yard / worksite environmental conditions
- Cabinet preservation / operation during transportation from yard / worksite to site and then hook up.

The project shall define requirements for cabinets and their associated equipment to be tropicalised particularly in the case of outdoor cabinets which may be subject to a corrosive atmosphere (salt laden air, H<sub>2</sub>S...). Equipment within outdoor cabinets shall be suitable for severity level G3 as defined within [ISA 71.04](#) unless specified differently by the Project Specification.

#### 4.2 Ingress Protection

Depending on the location of the cabinet, the following enclosure minimum “degree of protection”, as described in [IEC 60529](#), shall apply:

- Indoor: IP21
- Indoor with water mist: IP54
- Outdoor: IP65, or IP66 if subject to marine classification.

#### 4.3 Protection against Electromagnetic and Radio Frequency Interference

Electrical distribution and protection circuits and electrical and electronic apparatus shall comply with the regulations in the country of installation.

All instrument cabinets and their equipment shall meet the current applicable levels of “emission” and “immunity” as detailed in [IEC 61000](#).

As a minimum, type test certificates shall be provided.

If any equipment installed in a cabinet is not compliant with the EMC “immunity” requirements of [IEC 61000](#), then the cabinet itself shall be of the EMC type.

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The cabinet equipment shall be immune to interference from communication devices such as walkie-talkies operated next to the cabinet.

#### 4.4 Hazardous Area Protection

The following Instrument cabinets installed out-with technical rooms shall be certified for use in Zone 1 hazardous areas:

- All cabinets installed in a Zone 1 hazardous area
- All cabinets associated with the ICSS (F&G, ESD, PSS, PCS)
- All cabinets associated with emergency or vital equipment (refer to [GS EP SAF 261](#), e.g. firewater pumps)
- Remote I/O cabinets
- Any other outdoor instrument cabinets which need to remain energised on ESD1 / outdoor gas detection, as specified by the project.

Outdoor instrument cabinets which are not certified for Zone 1 hazardous areas and not listed above shall as a minimum be certified for use in Zone 2 hazardous areas. As required by [GS EP SAF 261](#), they shall subsequently be electrically isolated upon gas detection

Use of the purge / pressurised protection method Ex p alone for outdoor instrument cabinets is generally unsuitable due to automatic de-energisation of all non certified components on loss of pressurisation. Selection of Ex p cabinets shall therefore be subject to specific study and subject to Company approval.

[Directive 94/9/EC](#) shall strictly apply in European Countries and associated countries (e.g. Norway, Iceland). [Directive 94/9/EC](#) or [IECEx](#) standards shall apply in other countries.

Certified instrument cabinets shall be stamped on a permanent plate with its ATEX/IECEx marking according to the protection and the relating code and shall be delivered with a conformity certificate issued by a Notified Body. For ATEX category 3 equipment, certification by manufacturer is not accepted.

Documentation and marking shall meet the requirements of [GS EP ELE 079](#). It shall not be assumed that the packaging of individually certified components makes a certified unit. A third party certification must be provided by a Notified Body approved by Company.

#### 4.5 Lightning Protection

The design of the Cabinets and their equipment shall be protected against the direct and indirect effects of lightning. The design shall, as a minimum, be in accordance with [GS EP INS 101](#) which may require the fitting of pluggable anti-surge protection devices on inputs and outputs, earthing of spare conductors, etc.