



Exploration & Production

GENERAL SPECIFICATION

INSTRUMENTATION

GS EP INS 000

Minimum Contractor Document Requirements

00	01/2012	First issue
Rev.	Date	Notes

Owner: DEV/TEC	Managing entity: DEV/TEC/INS
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1. Purpose

The purpose of this document is to assist project teams in the definition of instrumentation documents to be provided during the different project stages.

2. Scope

This document shall be considered as a minimum for the development of the document deliverables to be prepared by the contractor during the following engineering phases:

- Conceptual stage¹
- Pre-project stage¹
- Basic engineering stage
- Detailed engineering stage.

3. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

Standards

Reference	Title
Not applicable	

Professional Documents

Reference	Title
Not applicable	

Regulations

Reference	Title
Not applicable	

Codes

Reference	Title
Not applicable	

¹ Conceptual and Pre-project documents are more often developed by Company

**Other documents**

Reference	Title
Not applicable	

Total General Specifications

Reference	Title
GS EP INS 101	Instrumentation engineering, supply and construction general requirements
GS EP INS 131	Standard Functions and Functional Analysis Development Requirements
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 SAF 260	Design of High Integrity Protection systems (HIPS)
GS EP SAF 261	Emergency Shutdown and Emergency De-Pressurisation (ESD & EDP)
GS EP TEC 007	Obsolescence and lifetime cycle management

4. General

Any deviation to the Instrument general specifications shall be subject to Company approval.

All documents shall have a date, a revision number and a clear explanation of the revision (issued for comment, issued for review, etc.).

The revised portion of the document shall be highlighted.

All documents shall be in a standardized format, the recommendation is ISO A0, A1, A2, A3 and A4.

Native files format shall be as per project requirements.

Units shall be from SI.

On all drawings, a legend shall give a clear explanation of all symbols and marking used.

5. Abbreviations

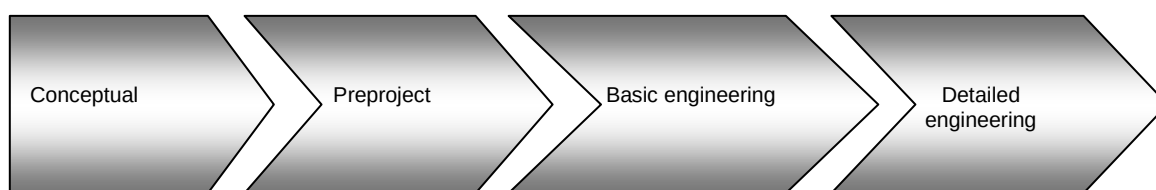
DVT	Design Validation Test
ESD	Emergency and Shutdown
EWS	Engineering Work Station
FAT	Factory Acceptance Test
F&GS	Fire and Gas system



FCW	Full Control of Wells
HIPS	High Integrity Protection System
ICSS	Integrated Control and Safety System
I/O	Input / Output
IFAT	Integrated Factory Acceptance Test
ITR	Instrument Technical Room
ETR	Electrical Technical Room
OCWR	Overall Control of Wells and Risers
OTS	Operator Training Simulator
OWS	Operator Work Station
PCS	Process and Control System
PDS	Process Data Server
PSS	Process Safety System
PLC	Programmable Logic controller
SIL	Safety Integrity Level
SOR	Statement of requirements
WHCP	Well Head Control Panel

6. Instrumentation Project Engineering Cycle

The main stages during engineering studies of an instrumentation project can be illustrated as follows:



Each stage shall be considered as a technical basis for the next one.

Stage	Objectives
Conceptual stage	Define a concept and provide an overview of the project design in term of instrumentation and control systems. Highlight specific points that shall be carefully addressed. Select the Instrumentation-related utilities. Manage the obsolescence issue in close cooperation with the Affiliate in case of brown field. Identify and propose alternative solutions. This phase is based on SOR document, screening study if available.

Stage	Objectives
Pre-project stage	Consolidate the conceptual phase study. Determine what is required, what will be needed. The study has to be flexible and adapted to the local context. Determine a clear understanding of the vision of the instrumentation, control and safety systems. Define an overview of the ICSS architecture principles. Identify the impact on the production in case of ICSS upgrade or extension. Preliminary estimations of I/O, power consumption, ... Pre-project study is also based on Operating philosophy and Safety concept of the global project, site survey results (typically for extension and revamping projects).
Basic engineering stage	Definition and clarification of standards, codes, laws and relevant documents that shall be followed by the project. Definition of specifications: • Design, sizing, manufacturing, testing, packing criteria of instruments and systems • Installation, operation and maintenance requirements • Numbering system • Data management system • Etc. Definition of drawing and layouts, data sheets, lists. Definition of requirements of specific dossiers (Obsolescence, HIPS, Cyber security, etc.). Technical clarifications with Contractor.
Detailed engineering stage	Finalize the basic engineering study. Continuous updating process of basic documents study. Detailed specification of the equipment, instruments and systems. Develop detailed plans to tie-in to existing facilities and utilities when applicable. Requisitions, Technical bid analyses.

7. Type of documents

Instrumentation and Control systems philosophy	This document describes the basic requirements for the instrumentation, the control and safety systems overview of the project. The Instrumentation and Control philosophy shall be completed, updated and detailed by Contractor during basic engineering stage.
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Architecture and Interface principles	This document shows, in a block diagram format, the main components of the ICSS and interfaces with the other systems. The document shall also identify where each component is physically located (Control room, ITR, ETR, etc.) Hardwired and communication links between the different components shall be clearly specified.
Specifications	Specifications define the technical and quality requirements, the applicable codes or standards to be used to design, manufacture, test and install equipment. Specifications shall be in accordance with Company General Specifications. These documents include also deviations and/or amendments to the Company General Specifications. Specifications shall be subject to Company approval.
Functional Analysis	It describes the functionalities to be performed by systems such as: • PCS and PSS for the process part corresponding to an equipment, subsystem or package • ESD and F&G systems • HIPS • Packages. The following information shall be provided as a minimum: • Simplified diagrams of the process & utilities system or equipment • Brief description of the functions to be performed • List of inputs/outputs and associated typicals • PACKAGES interfaces. Package process detailed description shall be provided by the relevant vendor. Refer to GS EP INS 131 for more details.
Drawings and layouts	Derived directly from plant facility plans, layouts define the optimal placement of junction boxes, instruments, cabinets, etc. Drawings define also the general arrangements of a system components.
Data sheets	The data sheets present the engineering data for the instrument requisition. They shall be completed by Contractor to provide sufficient details to allow a vendor to select and propose the appropriate instrument or equipment. Data sheets shall be approved by Company before Purchase Order.
Lists	Documents that make an inventory of I/O, instruments, cables etc and generally present data on table format.



Requisitions	Requisitions or purchase enquiries are formal written requests intended to Vendor. Specifications shall be included in requisitions.
Technical Bids	The bid evaluation sheet shall include the technical characteristics of the instrument and all the vendor deviations to the specifications.
Dossiers	List of documents required by specific systems (e.g. HIPS), or issue (e.g. Cyber security, Obsolescence)

8. List of documents

A schedule of instrumentation documents shall be prepared by Contractor for each engineering stage and submitted to Company for approval.

Documents shall be updated periodically.

The following list is not exhaustive and must be adapted / reduced / extended as per specifics of the project which can be:

- A complete new plant (onshore plant, FPSO, FPU, ...)
- A simple extension of existing facilities
- A revamping of an existing plant
- etc.

Document	Conceptual design	Pre-project design	Basic design	Detailed design
Overall Instrumentation & control system philosophy	*	*	*	
Architecture and Interface principles				
Electrical/Instrumentation interface principles		*		
ICSS architecture		*	*	*
I/O segregation principles			*	
Packages/ICSS interface principles		*	*	
HVAC/Addressable fire detection system/ICSS interface principles			*	
Subsea system / ICSS interface principles		*	*	
External systems / PDS / PCS interface principles		*	*	
Telecom/Instrumentation interface principles		*	*	
Specifications				
Annulus Vent Gas monitoring system (VGS)			*	*
Condition Monitoring Management System			*	*

Document	Conceptual design	Pre-project design	Basic design	Detailed design
Control valves specification			*	*
Critical service valves specification (e.g. Anti Surge, Chokes...)			*	*
Deluge & foam valves specification			*	*
Early Smoke Detection Specification			*	*
Earthing principles specification			*	*
FCW functional specification			*	
Fire & gas detectors specification			*	*
Fire Extinguishing System specification			*	*
Flow measurements & Metering principles			*	*
Functional analysis specification			*	
Functional design specification				*
Gas Fiscal Metering specification			*	*
HIPS specification			*	*
Hull Tank Gauging specification			*	*
Human Machine Interface (HMI) Specification (including ESD pushbutton panels, FGS matrix panels and fire water pump panels)			*	*
Hydraulic power Unit specification			*	*
ICSS (PCS, PSS, ESD, F&G) I/O allocation and sizing specification				*
ICSS Execution plan			*	*
ICSS specification			*	*
ICSS Standard Functions specification (PCS, PSS, ESD, F&G, System interface)				*
Instrument cables specification			*	*
Instrument data base & Administration specification			*	*
Instrument Management System			*	*
Instrument Power distribution specification			*	*
Instrument tubing & fittings specification			*	*
Instrumentation & control systems for packages			*	*
Instrumentation and Control Systems identification & numbering specification			*	*
Instrumentation design and installation specification			*	*



Document	Conceptual design	Pre-project design	Basic design	Detailed design
Intrusion/Theft detection system			*	*
Junction box specification			*	*
Leak and shock detection system specification			*	*
Level measurements principles			*	*
Marshalling, Instrument, power distribution cabinet specifications			*	*
Multiphase flow meter specification			*	*
OCWR functional specification			*	
Offloading Terminal Specification			*	*
Oil Fiscal Metering specification			*	*
On/off valves and local control panels specification			*	*
On-line Analysers specification			*	*
OTS specification			*	*
Overall Control of Cargo Tanks (OCCT)			*	*
Overall flow Metering System specification			*	*
PDS specification			*	*
Riser Monitoring System (RMS)			*	*
Safety relief valves specification			*	*
Specific systems specification (e.g.: erosion monitoring...)			*	*
Wash Tank Level Measurement specification			*	*
WHCP specification			*	*
Lists				
Instruments data base				*
I/O list			*	*
Instrument cable list			*	*
Instrument list			*	*
Instrumentation deliverables list		*	*	
Instrumentation Package list			*	*
Recommended Vendors List			*	
Subcontractor and Integrator list			*	

Document	Conceptual design	Pre-project design	Basic design	Detailed design
Diagrams				
ICSS Functional Block diagram	*	*	*	
Instrumentation trouble shooting loop diagrams				*
Instrumentation typical loop diagrams			*	
Junction box wiring diagram				*
Marshalling cabinets wiring diagrams				*
Power supply distribution for instrumentation and Control systems				*
Layouts				
Control Room layout				*
Engineering room layout				*
Fibre optic layout				*
Hull Technical rooms layout				*
Instrument & junction boxes location				*
Instrument cables routing				*
Instrument hook-up				*
Instrument Technical room layouts				*
Main cable routing			*	*
Marshalling, control and safety system cabinets arrangement				*
Typical Instrument Hook-up			*	*
Procedures				
Design Validation Test procedure				*
ICSS Black start procedure				*
ICSS Factory Acceptance Test procedure				*
ICSS Integrated Factory Acceptance Test procedure				*
ICSS Standard Function Acceptance Test procedure				*
Multidisciplinary documents				
Actuator datasheet				*
Alarm Management specification			*	*
Analyser shelter specification			*	*
CCR ergonomic study				*

Document	Conceptual design	Pre-project design	Basic design	Detailed design
ESD Block Logic Diagrams (inputs from process, safety, electrical, HVAC)			*	*
F&G Cause and Effect Matrix			*	*
Fire & gas detection layouts			*	*
Heat dissipation and electrical consumption				*
HIPS dossier				
SIL assessment Report			*	
SIL assignment Report (for all Safety Instrumented Functions and package interface)			*	
Utilities Balance (electrical power, hydraulic, instrument air etc)				
Data sheets				
Anti-surge / recycle valves datasheet				*
BSW / Water cut meter datasheet				*
Choke valves data sheet				*
Control valves data sheet				*
Cryogenic Service Control valves datasheet				*
Deluge & foam valves data sheet				*
Differential pressure transmitter datasheet				*
Direct-operated Self acting pressure regulator data sheet				*
Electromagnetic flow meter datasheet				*
Fire & gas detectors data sheet				*
Flow element & restriction orifice data sheet				*
Flow element and restricted orifice datasheet				*
Intrusion/Theft detection data sheet				*
Level gauge datasheet				*
Level transmitter datasheet				*
Mass flow meter datasheet				*
Moisture analyser datasheet				*
Multiphase flow meter data sheet				*
Oil in water analyser datasheet				*
Oxygen analyser datasheet				*
Pilot-operated Self acting pressure regulator data sheet				*

Document	Conceptual design	Pre-project design	Basic design	Detailed design
Pressure gauge datasheet				*
Pressure safety valves data sheet				*
Pressure transmitter datasheet				*
Radar level datasheet				*
Rotameter datasheet				*
Severe Service Control valves datasheet				*
Special design Control valves specification				*
Tank level gauge datasheet				*
Temperature gauge datasheet				*
Temperature transmitter datasheet				*
Turbine flow meter datasheet				*
Ultrasonic flow meter datasheet				*
Vortex flow meter datasheet				*
Requisitions				
Actuated on/off valves requisition				*
Analysers requisition				*
Bulk & accessories requisition				*
Choke valves requisition				*
Control valves requisition				*
Deluge & foam requisition				*
Flow element & restriction orifice requisition				*
ICSS requisition				*
Instrument cable requisition				*
Instrument requisition				*
Intrusion/Theft detection requisition				*
Multiphase flow meter requisition				*
OTS requisition				*
PDS requisition				*
Pressure safety valves requisition				*
Specific systems requisition (e.g.: erosion monitoring...)				*
Wellhead control panel requisition				*



Document	Conceptual design	Pre-project design	Basic design	Detailed design
Technical bids Evaluation				
Technical BID evaluation actuated on/off valves				*
Technical BID evaluation analysers				*
Technical BID evaluation bulk & accessories				*
Technical BID evaluation choke valves				*
Technical BID evaluation control valves				*
Technical BID evaluation deluge & foam valves				*
Technical BID evaluation fire & gas detectors				*
Technical BID evaluation flow element & restriction orifice				*
Technical BID evaluation ICSS				*
Technical BID evaluation instrument				*
Technical BID evaluation instrument cable				*
Technical BID evaluation intrusion/theft detection				*
Technical BID evaluation multiphase flow meter				*
Technical BID evaluation OTS				*
Technical BID evaluation PDS				*
Technical BID evaluation pressure safety valves				*
Technical BID evaluation specifics systems				*
Technical BID evaluation wellhead control panel				*
Dossiers				
Cyber security dossier				*
Obsolescence dossier				*
Obsolescence Plan				*
Obsolescence strategy development				*
Other Documents				
Cv calculation note			*	*
Engineering Close out Report				*
ICSS Contract Exhibit (A, B, C, D, J, K..)			*	
ICSS integration principles and Tie-in works			*	*
ICSS Subcontractor Scope of work				*
Intrinsic safety Calculation note				*



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Rev: 00

Document	Conceptual design	Pre-project design	Basic design	Detailed design
Level devices Sketch				*
PSV calculation note			*	*
Responsibilities Battery Limits			*	
Site survey scope of work		*	*	
Site survey report		*	*	
Thermowell stress calculation note			*	*



Appendix 1 ICSS architecture

This document shows the main components of the ICSS and interfaces with the other systems. These components include:

- Marshalling cabinets
- PCS, PSS, ESD and FGS
- PDS and IMS
- EWS
- OWS
- Gateways
- Firewalls
- Routers
- Switches
- Servers
- Etc.

The document shall also identify where each component is physically located (Control room, ITR, ETR, etc.).

Cable wiring and communication links between the different components, packages and other external systems shall be clearly specified.

ICSS requirements and interface principles shall be based on [GS EP INS 134](#), [GS EP INS 135](#) and [GS EP SAF 261](#).



Appendix 2 Functional design specification

This document describes in detail the design of the ICSS software and hardware including communication interfaces.

FDS shall be issued at early stage of the detailed engineering phase.

FDS shall be submitted to Company approval prior to any procurement or software work.

Refer to **GS EP INS 134** Appendix 5 for further details.



Appendix 3 Instrumentation deliverables list

List of Instrumentation, control and Safety System documents to be issued by Engineering Contractor.

Engineering Contractor shall submit, at each engineering phase, a deliverable list to be approved by Company.



Appendix 4 Instrument vendors list

This document, issued by Project Basic Engineer, contains the list of the different instrument and equipment vendors.

It is the responsibility of Project Basic Engineer to ensure that vendors are accepted and approved by Company.

The vendors list shall be submitted to Company for approval.



Appendix 5 Cyber Security Dossier

This document shall present all aspects related to the industrial network security.

The following information shall be outlined:

- The data and control networks security
- Protection of access to the control and safety systems
- Etc.

Refer to **GS EP INS 135** for additional requirements.



Appendix 6 HIPS Dossier

The installation of a new HIPS shall be agreed upon by Company and supported by a preliminary HIPS dossier.

The content of Preliminary HIPS dossier and Final HIPS dossier shall be as per **GS EP SAF 260** requirements.



Appendix 7 Obsolescence Dossier

This document defines the obsolescence management strategy.

Refer to [GS EP TEC 007](#) and [GS EP INS 101](#) for further details.



Appendix 8 Engineering Close out report

The purpose of this document is to present a list of findings on both technical and execution issues during the whole engineering phase.

This report is a feedback of lessons learnt during the engineering activities.

It is the Engineering Contractor responsibility to develop and issue this document.



Appendix 9 Instrument Data base & Administration specification

This document shall specify at minimum:

- The instrument data base management software tool to be used
- The administration procedure (access levels and rights, responsibilities...)
- The instrument data base completion rules
- Rules of exchanges of data base extracts between the different vendors
- etc.