

GENERAL SPECIFICATION

Cost estimating

GS EP EST 001

Documents necessary for Cost Estimating at the end of a Front End or a Basic Engineering Design

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1. Scope

This document defines the Company requirements to be followed by Engineering for the preparation of the cost estimate during the execution of the FEED or the BED.

The information package delivered by Engineering at the end of FEED/BED in term of details and maturity is expected to support a Class 2 Capex cost estimate according to AACE Classification.

This specification lists all drawings, sketches, specifications, quantities summary, assumptions, exclusions, and other deliverables used for the preparation of the cost estimate to ensure that it is as complete as possible and up-to-date.

This specification is applicable for all surface facilities, onshore and/or offshore, that Company intends to build or decommission.

2. Reference documents

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 addendums, is the latest revision published at the effective date of this document.

Reference	Title
Not applicable	

Total Standards

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and addendums, is the latest revision published.

Reference	Title
GS EP ECP 105	Process and Flow Assurance deliverables to be prepared by Contractor during engineering phases
GS EP ELE 001	Electrical Design Criteria
GS EP INS 000	Contractor Documents Requirements
GS EP PLR 001	Documentation requirements
GS EP PLR 100	Submarine pipeline systems
GS EP PLR 104	Onshore pipeline systems
GS EP SPS 001	Subsea Production Systems General Design Requirements
GS EP STR 001	Weight Monitoring and Weighing offshore and onshore units
GS EP STR 100	Offshore steel structure – General

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Reference	Title
GS EP STR 631	Deepwater CALM Buoy Terminals
GS EP STR 651	General principles of a F(P)SO design

3. Abbreviations and Definitions

3.1 Abbreviations:

AACE	American Association of Cost Estimating
BED	Basic Engineering Design
BOM	Bill of Material
BOQ	Bill of Quantities
CAPEX	CAPital EXpenditure
E	Engineering
EPC	Engineering, Procurement and Construction
EPCI	Engineering, Procurement, Construction and Installation
EPCIC	Engineering, Procurement, Construction, Installation and Commissioning
FEED	Front End Engineering Design
ICSS	Integrated Control Safety System
ISBL	InSide Battery Limit
IWOCS	Intervention Work Over Control System
MTO	Material Take Off
OPEX	OPerational EXpenditure
OSBL	OutSide Battery Limit
PEP	Project Execution Plan
POB	Personnel On Board
SOR	Statement Of Requirement
SIMOPS	Simultaneous Operations, i.e. construction (or drilling) and production activities in the same perimeter at the same time
T&I	Transport and Installation
TSF	Temporary Site Facilities
VSD	Variable Speed Drive
WBS	Work Breakdown Structure

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3.2 Definitions

Basic Engineering Design: Engineering phase following the pre-Project studies aimed at reaching a design maturity sufficient to proceed with Project execution phase.

Within Company's referential a BED is as advanced as the end of a Front End Engineering Design (FEED 3 as per AACE definition).

Company: Total or Total in joint venture and in the present case, Total Cost Estimating entities.

Engineering: Engineering Entity or Joint Venture under contract with Company for the FEED or BED.

Contingency: Amount added to an estimate to allow for items, conditions, or events for which the state, occurrence, or effect is uncertain and which experience shows will likely result, in aggregate, in additional costs.

Contractor: Firm under contract with Company for EPC, T&I, and EPCI services of a plant of a development project surface facilities.

Sub-contractor: External firms in contract with Contractor or Engineering (including Vendors).

Engineering (E of EPC or EPCI or EPCIC): Engineering services related to detailed design.

Procurement (P of EPC or EPCI or EPCIC): Refers to the purchasing activities (including the procurement services) of a plant (main equipment, bulk, structural, piping ...).

Construction (C of EPC or EPCI or EPCIC): Construction (including subcontracted activities) at yard or on site (civil works, structural steel, mechanical erection, electricity, instrumentation, painting, insulation works...), site services, precommissioning and commissioning.

Installation (I of EPCI or EPCIC): Offshore transport and installation activities of a plant.

Work Breakdown Structure (WBS): All cost estimates within Company shall be presented according to the WBS as defined at the beginning of the study by the Company project manager.

Pre-Commissioning: Pre-commissioning consists of a comprehensive series of static and de-energized checks and tests to be carried out on each item of the plant in order to ensure that the facilities have been constructed in compliance with project Documents, Specifications and Standards.

Commissioning: Commissioning consists of a comprehensive series of dynamic and energized checks and tests to be carried out in order to demonstrate and ensure that the facilities are ready to operate safely and steadily in compliance with project documents, specifications and standards.

ISBL: InSide Battery Limit; Geographical area where process equipment (columns, exchangers, drums...) are located.

OSBL: OutSide Battery Limit; External parts of ISBL area, corresponding to utilities (generation and distribution) and off sites (storage, product logistics, well pad, manifolds, and remote compressions stations).

Greenfield (or Grass Root): Project is defined as "Greenfield" or "Grass-Root" when works are executed in a free area of a new structure.

Brownfield (or Integration): Project is defined as "Brownfield" or "Integration" when installation works for additional facilities are executed:

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- in a free space inside an existing production facility, requiring safety permits and regulations for construction operations provided by the Contractor under derogation of the Company,
- or directly within the existing production facility, with safety permits and regulations for construction operations provided by the Company (Simultaneous Operations-SIMOPS),
- revamping / debottlenecking / tie-in projects (all concerning modifications on existing units) are particular cases of Brownfield projects.

Material Take Off: Listing of material with specifications and dimensions potentially not summarized. The MTO do not consider any allowance.

Bill of Quantities: MTO, sorted, quantified and summarized according to a specific format including Technical / Design Allowances, resulting in erected quantities.

Bill of Material: MTO, sorted, quantified and summarized according to a specific format. Each MTO will be issued with the corresponding BOM. BOM corresponds to Bill of Quantities plus purchasing allowances.

Direct Productive man-hours: Defined as hours spent by all discipline teams from workers to foreman (i.e. Workforce) for construction of permanent installations and performing the measurable work. Hours related to construction management and hours related to temporary installations (like scaffolding) are excluded (referred as Indirect productive hours). Standard Man-hours are defined as US Gulf Coast or Europe North Sea basis (where local yard productivity is deemed to be equal to 1).

Indirect Productive man-hours: Hours spent in support of the workforce performing the measurable work i.e. construction management, material handling, handling & seafastening (yard), scaffolding, construction equipment maintenance, site cleaning, installation and removal of Temporary Site Facilities (such as laydown areas, temporary roads, parkings, fencing, signs and hazard lights...) and material quality inspection.

Non Productive man-hours: Hours spent by the workforce not directly linked to the physical progress of the work i.e. which result from work interruptions/stand-by, waiting for material, interface problems, waiting on work permits... HSE, subcontractor management, supervision, clerical staff and quantity control, welding qualifications, drivers, housekeepers, operators and medical staff are also non Productive man-hours. On site local commuting and meal time may also be considered as non-productive man-hours depending on the regulation and context.

Site services: are composed of construction supervision & management, vendor's representative, Precommissioning, Commissioning & Licensor representative activities.

Hand over: Plant has been commissioned and the relevant work has been performed, including the provision of final documentation and all systems of the plant have been brought into operational condition (including start-up activities & performance tests).

Productivity:

- During cost estimating phase: Productivity is the ratio between the necessary number of direct productive man-hours for the achievement of the given work on a given site and the necessary number of direct productive man-hours to achieve the same work on the reference site (defined as US Gulf Coast or Europe North Sea basis).

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- During Project phase: Productivity is defined as the ratio between the realized or measured direct productive man-hours and the planned or anticipated direct productive man-hours which takes into account the local productivity.

Note: If the realized productivity is =1 it means that the anticipated local productivity during estimation was correct. If it is <> 1 it means that the local productivity is better or worse.

Allowances:

The different MTO/BOQ allowances (**Known - Unknown**) are:

- **Material Take Off Allowances**: Detail estimates are based on Material Take Offs. It is added as a percentage to the measured quantities to reach erected quantities. This allowance covers required material not included in the net MTOs.

For Onshore and Offshore (including Hull Structure), the Material allowances are given by **GS EP STR 001**.

- **Purchased Allowances (or Cut & Waste allowance)**: Percentage to be added to the erected quantities (take off quantities plus MTO allowances of bulk materials) during the construction phase to take into account the cut and losses.

The Purchased allowances are based on contractor's experience on past projects.

- **Technical or Design Allowance**: Percentage to be added to erected quantities to account for routing variations, lines diameter adjustment, and plot rearrangements during detailed studies....

The technical allowances are based on Engineering's experience on past projects.

All possible identified allowances shall strictly be integrated in the three above groups and not considered elsewhere.

4. List of required documents

All below documents shall be provided to the Estimating entity in charge of the project in order to perform follow-up and comparison with the previous estimates.

4.1 General Project Documents

4.1.1 3D Model Execution Plan

- 3D Model Execution Plan (with measured items), if any

4.1.2 Project General Conditions

- Site data
- Seismic study report, if any
- Geotechnical Site Investigation report, if any
- Topographic report, if any
- Logistics reports, if any
- Split of work between greenfield / brownfield / SIMOPS and shutdown areas
- BED and/or Process Design Criteria
- Meteocean data

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4.1.3 Risk Register

- FEED/BED Engineering risk register, if any

4.1.4 Work Time Schedule

- FEED/BED approved and updated level 2 work time schedule

4.1.5 Documentation Management

- Project Document Numbering Procedure
- Project Master Document Register

4.1.6 Close Out Report

FEED or BED close out report, which will confirm the data of documents received throughout the FEED or BED (if available).

4.1.7 Costs

In the event that Contractor has been requested to quote and to provide budget estimates (from sub-contractors and/or suppliers) to Company for equipment, bulk materials, particular items... at minima the following will be provided:

- Request for Quotation,
- Received Offers (Commercial & Technical parts including exceptions / clarifications & planning),
- Contractor's cost bid tabulation comparison (including and showing any allowances to complete the offer & contingencies, if any).

4.2 Tendering documents

Should the scope of work of the FEED/BED Engineering include the preparation of all or part of the documents for the invitation to tenders, tendering document shall be provided to the Company.

4.2.1 Company Supplied Items

Invitation to Tenders related to the equipment/material(s) which will be or have been purchased by the Company, with all documents.

4.2.2 EPC, T&I, EPCI or EPCIC Tender Documents

The invitation to tenders will be issued to the Company cost estimating entity of the project with all relevant exhibits.

Particular attention shall be paid to:

- The WBS of the contract which will be consistent with the project WBS and all cost deliverables issued by Engineering shall be presented according to the WBS as defined at the beginning of the study by Company Project Manager, in order to have the correct cost attached to the correct item,

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- The scope of work / services requested to the Tenderer, which are normally part of the company scope of work (logistic base, facilities to Company, commissioning / pre-OPEX activities (costs of spare parts for start-up and for two years),
- The interfaces between other contracts and company from Effective Date up to the hand over dates,
- The Temporary Site Facilities.

4.2.3 Local Content

Pre-qualification reports of potential local contractors/subcontractors or participants to the tender, such as yard visits reports, will be provided.

4.3 Technical Documents for all Types of Projects

The documents required at the end of the FEED or the BED to enable the update of the cost estimate shall be issued broken down as per the Project WBS and as complete as possible under the format of the BOQ's attached in the Appendices (each BOQ will be issued with the corresponding MTO), with dedicated explanatory notes or if already specified under the BOQ's format requested in the Company specifications.

If derogations to the existing company specifications have been granted or are being requested with significant quantity/cost impact, the supporting documents shall be provided.

4.3.1 Process

Following the requirements of **GS EP ECP 105** the documents listed hereafter shall be provided in their latest revision in electronic format (pdf issued from native formats or preferably native format) for each building block of the surface facilities relevant to the project:

- Process basis of design and design principles
- Process block flow diagram
- Heat and material balances
- Process Flow Diagrams (PFD's)
- Utilities balances
- Utilities Flow diagrams (UFD's)
- Piping and Instrumentation Diagrams (P&ID's)
- Material Selection Diagrams (Piping Material Classes)
- Critical equipment process data sheets
- Main packages process specification
- Critical instrument process data sheets
- Fluids list
- Lines list
- Process, Utilities and Offsites systems description (Basis of Design)

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- Process operating and control philosophies, if required

4.3.2 Lay out

These documents will be provided in their latest revision.

- Overall Plot Plan (Offshore and Onshore) considering the Safety Distance
- ISBL Units Plot Plan, if any
- OSBL Plot Plan (Well Pads, Manifold Station, Compressions Stations, tank farms, offloading stations, and the like)
- Offshore and Onshore General Arrangement Key Plan, if required
- Plant Road Layout and Details, if any
- Structural Specification for interconnecting pipe rack (Concrete / Structural Steel)
- Structural Specification for modularization, if any
- Typical structural sections (in units and interconnecting areas)
- Sewers and Drainage Construction Specification, if any
- Buildings layouts (if any) and building list (lists with number of floors, elevation, dimensions, specifications blast proof, HVAC and the like)
- Permanent and temporary accommodation details, if any
- Interconnecting roads details, if any
- Piping MTO's & BOQ's
- Piping Material Classes summary
- Modules list, if applicable

4.3.3 Electrical

As per **GS EP ELE 001** the following documents shall be issued

- Electrical Basis of Design
- Single Line Diagram
- Electrical Load Schedule (load list)
- Specification for Electrical Control System
- MTO's & BOQ's (See **Appendix 4** Electrical material summary)
- Black start philosophy, if applicable.

4.3.4 Instrumentation & telecommunication

As per **GS EP INS 000** the following documents shall be issued

- Overall Control and Instrumentation Philosophy

- Telecoms Philosophy
- ICSS Functional & Instrumentation typical loop diagrams Block Diagram
- Telecommunications System Block Diagram
- Instrument MTO's & BOQ's (See **Appendix 5** Instrumentation material summary) (IO's, Control valves, On/Off Valves, Relief Valves, ...)
- Analysers shelters list
- I/O list

4.3.5 Structural

- Structural steel MTO's & BOQ's

4.3.6 Others

- Painting and Corrosion Protection Specification, if any
- Insulation specification, if any
- Fireproofing specification, if any
- Heat and Electrical tracing specification, if any
- Safety Concept
- Security requirements during construction, if any
- Security infrastructure to be built for operational phase, if any
- Subcontracting strategy (site / yard / module)
- Construction philosophy (stick-built / modules)
- Information management requirements
- Third party requirements (class BV/Lloyds/...), verification scheme
- Permitting requirements
- Critical spare parts list (according to Company requirement)

4.3.7 Equipment list

The equipment list of all main equipment by unit for onshore facilities (ISBL or OSBL) and offshore facilities shall be issued, fully populated with the required information in Excel format. Instructions given in **Appendix 1** (the equipment list Excel sheet can be provided upon request).

The definition of main equipment concerns the equipment present in the line of the operations in the fluid(s) processing to reach the required products specifications set in the objectives of the plant processing with the exception of valves, piping, fittings, electrical equipment (distribution) and instruments. The equipment list shall include for main process and utility packages, the auxiliary equipment (i.e. for a compressor, its driver(s), and lube oil console) and all the utilities (i.e. power generation, air instrument, nitrogen generation, waste water and other non-process treatments, cranes,). These equipment lists concern ISBL units but also OSBL units.