



Exploration & Production

GENERAL SPECIFICATION

SUBSEA SYSTEMS

GS SPS 012

Documentation requirements for subsea stations

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Rev.	Date	Notes



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1. Scope

This specification defines the minimum requirements for the supply of documentation and database to the Project.

This specification covers all project phases: engineering, construction, installation, operation and maintenance.

2. 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	

Other documents

Reference	Title
Not applicable	



Total General Specifications

Reference	Title
GS SPS 001	Design philosophy and requirements for subsea production system
GS SPS 011	Mechanical completion for subsea equipment
GS EXP 203	Maintenance preparation during a project phase - Documentation
GS EXP 305	Process documents to be prepared during engineering phase

3. Introduction

3.1 Abbreviations

DL	Document List
SDL	SUPPLIER Document List
FAT	Factory Acceptance Test

3.2 Responsibilities

Deviations from any of the requirements defined herein shall be treated as non-conformances in accordance with COMPANY procedures.

It is the responsibility of anyone who applies this specification to ensure compliance with all relevant statutory requirements.

4. Requirements

4.1 General

All documents shall be available on electronic format.

All documents and drawings shall have COMPANY document number, system code, area code, and revision code according to COMPANY's coding manuals.

CONTRACTOR shall provide COMPANY with paper copies of documents as well as an electronic version of them.

COMPANY will reserve the right to inspect and/or review completed or partly completed technical documentation and drawings whether submitted or under preparation.

Updated documentation that reflects the current design of all items shall always be available to COMPANY, and shall be issued at least every three months or when significant changes are made.

4.2 Document list

All documentation required during all phases of a field development (project, installation, operation and maintenance) shall be identified in a Document List. The DL shall be structured in accordance with the Work Breakdown Structure (WBS) to enable COMPANY to find all documentation related to one component in one section of the DL.

CONTRACTOR shall, during the project phase, submit on request any other document not originally identified in the DL, in order for COMPANY to plan and perform tasks during the project phase. Such tasks can be to verify, test, install, operate and maintain equipment and/or systems. Documentation prepared to verify and document the quality of the deliveries shall be submitted on request (such as welding procedures, calculations, material certificates, etc.).

The document list shall include:

- Initially planned issue
- Revised issue date
- Final issue date.

The document list status shall be issued on a weekly basis highlighting:

- Documents issued during the week
- Documents to be issued the following week
- Documents delayed with revised issue date.

4.3 Document delivery schedule

The DL shall identify the period in time when documents shall be prepared, submitted and completed for their intended purpose. The documentation shall be developed progressively during execution of the Project work as required to complete engineering, fabrication, test and handover activities.

The DL shall be developed and agreed with COMPANY not later than four weeks after commencement of the Project work. CONTRACTOR shall provide a draft during the bid phase.

Administrative documents such as the Quality Plan, Audit Plan, QS-plan, Safety Health and Environmental Program, Contract Schedule Baseline, Contract Document Schedule, Procurement Milestone Plan, Mobilisation Schedule and Progress Monitoring System shall be issued during the first weeks of the Project.

The dispatch dossier shall be complete no later than two weeks before delivery of the applicable equipment.

Documentation necessary for planning and/or execution of offshore installation work shall be completed 8 weeks prior to start of the first well completion or offshore installation.

All documents required for testing (test procedures, functional descriptions, software listings, etc.) shall be issued for construction at least two weeks before the actual testing.

4.4 Document requirements

4.4.1 Descriptions

4.4.1.1 System description

System descriptions shall provide a description of design, function and limits of the main equipment within a system, to give an understanding of the relevant system. It shall also describe how the system or main equipment interfaces with other systems or main equipment of these.

4.4.1.2 Technical description

Technical descriptions shall be provided for main equipment or assembled equipment which is defined by the system description.

Technical descriptions shall contain main data such as pressure rating, overall dimensions, etc. Any functional or operational restrictions shall be specified (e.g. temperature limitation or limitation on differential pressure over in-line valves).

The technical description shall also include specification of volumes in all lines potentially exposed to well or injection fluids. This includes the total volume and all volumes between in-line valves.

4.4.1.3 Data sheet

Data sheets shall be provided for all equipment and relevant components on this equipment.

The data sheets shall be linked to the relevant tag/item number they apply to.

4.4.2 Design specifications

4.4.2.1 System design specification

System design specifications shall provide a complete system overview and system design specification for the total system. The specification shall include (but not be limited to) functional requirements, design basis for operational range, limits of operation. Special attention is drawn to the adequacy of the foundation systems with the actual soil conditions.

4.4.2.2 Equipment design specification

Equipment design specifications shall provide the detailed design specifications for the equipment in question. The specification shall include (but not be limited to) detailed functional requirements, operational requirements and range, specification of interface to other systems.

4.4.2.3 Software design specification

Software design specifications shall provide a complete system overview of the software system to be delivered and the design specification for all application software included in the scope of supply. The specification shall include (but not be limited to) design basis, detailed functional requirements, operational requirement, specification of interfaces to other systems, operators interfaces.

4.4.2.4 Software function block definition

Software function block definitions shall provide a description of the functionality of all software function blocks including standard processing function blocks and special application function blocks applied in the delivered software system.

4.4.2.5 Interface specification

Interface specifications shall provide a complete overview of all interfaces to the system in question and detailed specifications and methods of interfacing. These shall include all type of interfaces between the equipment in question and surrounding systems.

4.4.2.6 Interface signal lists

Interface signal lists shall provide a list of transfers of data through a data communication interface and a detailed description of how they are handled.

4.4.2.7 Communication protocol specification

Communication protocol specifications shall provide a description of communication protocol applied between main operating systems included in the scope of supply, i.e. between control systems as well as between instrumentation and control systems.

4.4.3 Procedures

4.4.3.1 Operator manual

Operator manuals shall be provided for all systems having an operator interface (i.e. control systems, instrumentation systems, hydraulic systems, remote operated tools, etc.).

The operator manual shall present all operator interfaces (e.g. VDU picture or operator panels) and in detail describe the operators input and the system output. Operational procedures shall be described step by step. All systems functions and input/output data shall be defined and described.

Operator manuals shall describe in detail the function and system configuration parameters and define default values for this. Procedures for start up, maintenance and diagnostic functions shall be described. This shall include black start-up of systems, reconfiguration of system and process parameters, upgrades/new software, inspection of diagnostic data, use of separate maintenance tool (programming tool, terminal, PC, etc.) and procedure for diagnostic and restart in case of system failure. Included shall also be alarm and message handling, operating control modes, interlocks, etc.

4.4.3.2 Handling procedures

Handling procedure shall be provided for main equipment or assembled main components.

Handling procedures shall contain all relevant information for the various handling of the equipment. This includes all handling both onshore and offshore in order to move the equipment, to hook up with other equipment or when locating/transferring the equipment.

The procedures shall include necessary information concerning weight and where to attach lifting appliances/equipment, and operational limitations such as vessel movements (heave, roll, pitch and drift). Drawings or sketches to illustrate the actual operation with relevant information shall be incorporated or referred to.

4.4.3.3 Installation and retrieval procedures

Installation procedures shall be provided to describe, step by step, all relevant actions to install and verify correct installation of the equipment or software into all systems in which the equipment or software is meant to function (e.g. X-mas tree to wellhead/test stump, control pod to X-mas tree, manifold to structures, etc.). The procedures shall be co-ordinated with corresponding running procedures for the tool to be used for installation of the equipment. Interfaces with this equipment shall be defined and described.

The procedures shall also be co-ordinated with corresponding handling procedures.

All relevant data such as in air and submerged weight of equipment, necessary status of functions, pressures, volumes, special attentions, etc. shall be included in the relevant step in

the procedure. Drawings or sketches illustrating the sequence of installation with status/position of each functions shall be included or referred to.

Retrieval procedures shall be provided for permanently installed subsea equipment, which is expected to be pulled to surface for repair during the field life. All relevant actions to retrieve/pull this equipment shall be described step by step. Recommended post-operational actions, preservation and preparation for shipment activities (before demobilisation, overhaul and/or storage onshore) shall be included in the procedures. The removal procedures shall be co-ordinated with corresponding running procedures for the relevant tool to be used to remove the equipment. Interfaces with this equipment shall be defined and described.

All relevant data as in air and submerged weight of equipment, required state of functions, pressures, volumes, special attentions, etc. shall be included in the relevant step in the retrieval procedure. Drawings or sketches illustrating the different sequences of the retrieval/pulling, with status/position of the functions on the equipment, shall be incorporated or referred to.

Necessary contingency procedures shall be incorporated in these procedures or provided as separate documents.

4.4.3.4 Running procedures

Running procedures shall be provided for main equipment being a part of an intervention system/tool.

The running procedures shall describe step by step all relevant actions needed to operate the equipment. Procedures shall be prepared for all possible configuration in which the equipment is meant to function. The running procedures shall be co-ordinated with corresponding installation procedures for the interfacing equipment. Interfaces with this equipment shall be defined and described.

The running procedures shall describe step by step all actions needed to install/retrieve (run) subsea equipment. This shall include:

- Installation and preparation of the system's components on vessel/rig
- Hook-up of the system and system function tests
- Pre-deployment tests and "equipment readiness verification check-outs" prior to launching equipment to sea. Interfacing equipment shall also be included
- Necessary action to get access to area to install, retrieve or operate relevant equipment or components
- Launching, transfer/guide/connect on relevant equipment/system
- Operation of relevant functions, disconnect and recovery to deck
- Post operational actions/preservation recommended between operations and actions needed to prepare equipment/system for shipment.

The procedures shall, by means of appropriate sketches, drawings, etc., illustrate all sequences or individual steps in the procedure with regard to individual positioning, connection, status and limitations. Data concerning operation (such as pressures, volumes, turn and torque for manual operated valves, etc.) and/or special equipment which need special attention shall be described. Equipment limitations such as maximum landing speed, maximum flex joint angle, maximum tension, etc. shall be included. Both normal limitations during normal operation and extreme limitations during emergency operations (i.e. max. loads before damaging the equipment during emergency operations such as emergency pull on stuck equipment) shall be included.



Necessary contingency procedures shall be incorporated in these procedures or provided as separate documents.

4.4.3.5 Operational/Function test procedure

Operational/function test procedures shall be provided to describe step by step the procedures to verify correct operation of all functions on the equipment. (e.g. using workover control system, production control system or hotlining during maintenance). This means successive steps through start-up, steady operation and controlled shutdown of equipment/systems. All operating limitations and precautions shall be reflected.

Necessary contingency procedures shall be incorporated in these procedures or provided as separate documents.

Data concerning operation (e.g. pressures, volumes, turn and torque for manual operated valves, etc.) and/or special equipment which need special attention shall be specified.

The procedures shall include a brief summary of the technical description indicating the structure of the main equipment units and principles of operation.

Function test procedures shall be provided for all modes of operation. This may be prior to or as part of mobilisation, prior to installation, in service or as part of demobilisation before storage.

For control systems the operational/function test procedures shall include the following:

- Demonstration and verification of all specified functions (as per System Specification, Software Specification, Cause & Effects/SCD, Interface Signal Lists, Communication Protocols, etc.)
- Demonstration of hardware capacity - to adhere to timing and response requirements, Input/Output requirement, spare capacity (memory, I/O, etc.), interface compatibility, etc.

4.4.3.6 Contingency procedures

Contingency procedures shall be provided for all defined emergency and contingency operations. The procedure contents requirement is the same as for installation and running procedures.

4.4.3.7 Pressure test procedures

Pressure test procedures shall be provided for pressure testing of bores/body, hydraulic lines and functions on the equipment, as step by step descriptions of all relevant actions.

Pressure test procedures shall be provided for all modes the equipment may be in. This may be prior to or as part of mobilisation, prior to installation, in service or as part of demobilisation before storage.

If an identical procedure may be used in different modes, the title of the procedure must indicate this.

In-line valves shall be tested up stream and down stream. Specification and preparation of necessary utility equipment and description of hook-up for pressure testing the individual bore/body, line or function shall be included.

Test data such as test pressure, time to hold pressure, acceptance criteria for test, etc. shall be specified for each individual test. Relevant information such as max. working pressures, loop limitations, lists of equipment, safety precautions, etc. shall be included.



Drawings or sketches to illustrate the different tests with regard to test set-up, status of all valves, where to hook-up test lines and areas exposed by the pressure, etc. shall be included or referred to.

4.4.3.8 Abandonment/Decommissioning procedures

Abandonment/decommissioning procedures shall be prepared for all permanently installed subsea equipment which will normally not be pulled for repair during the field life. Templates and protection structures are examples of this.

Necessary decommissioning to be performed prior to any disconnection and/or lifting, including flushing of lines, valve positions, etc. shall be described.

All relevant data as in air and submerged weight of equipment, required state of functions, pressures, volumes, special attentions, etc. shall be included in the relevant steps of the abandonment procedure. Drawings or sketches illustrating the different sequences of the abandonment, with status/position of the functions on the equipment, shall be incorporated or referred to.

Necessary contingency procedures shall be incorporated in this procedure or referred to as a separate document.

4.4.3.9 Maintenance procedures

Maintenance procedures shall be provided for all equipment or assembled equipment which are handled as stand-alone components being subject to onshore storage, in order to keep the equipment fully operational at all times without reduction in quality.

Maintenance procedures shall be provided for all modes the equipment may be in. This may be prior to or as part of mobilisation, prior to installation, in service or as part of demobilisation before storage.

If an identical procedure may be used in different modes, the title of the procedure must indicate this.

Preventive maintenance can be periodic and/or based on condition monitoring, as recommended by SUPPLIER. Procedures describing corrective maintenance and procedures in order to handle unexpected corrective maintenance shall also be provided.

Corrective maintenance procedures shall clearly state the procedures for troubleshooting, repair and assembly of parts and components.

Procedure for disassembly and assembly of components shall be detailed step by step. Special tools, applied forces, use of lubricates, etc. shall be described.

Maintenance procedures shall describe cleaning, inspection, preservation, lubrication and circulation/operation of functions and controls due to public regulation, etc. The procedures shall specify areas, components, etc. that need special attention. Drawings or sketches to illustrate the different maintenance tasks shall be incorporated or referred to. Flushing, pressure testing, function testing, disassembling of components or other elements in the procedure covered by separate documents, shall be referred to.

4.4.3.10 IMR procedures

IMR (Inspection, Maintenance, Repair) procedures shall be provided in order to monitor and keep the equipment fully operational at all times when in use (subsea).



IMR procedures shall describe inspection routines and relevant repair/change out routines, providing necessary information to perform the identified tasks. Step by step procedures shall describe the performance of the tasks.

4.4.3.11 Flushing procedures

Procedures for cleaning and flushing of hydraulic components and systems prior to and after assembly shall be established in accordance with contract specifications and industry standards. The procedures shall describe where and how to clean, to which standard (NAS class), and in which sequence the cleaning shall be performed. The procedures shall further describe methods of sampling and documentation of the hydraulic fluid cleanliness of all relevant equipment.

Flushing procedure shall be provided for main equipment or assembled main components.

Flushing procedures shall be provided for all modes the equipment may be in. This may be prior to or as part of mobilisation, prior to installation, in service or as part of demobilisation before storage.

The procedures shall, step by step, describe all relevant actions to flush all hydraulic lines and functions on the equipment. Specification and preparation of necessary utility equipment and description of hook-up for flushing the individual line or function shall be included.

Relevant information such as data concerning pressures and flow rates, equipment safety precautions, etc. shall be included. Drawings or sketches to illustrate the different flushing configurations shall be incorporated or referred to.

4.4.4 Drawings

4.4.4.1 Scope of supply drawing

Scope of supply drawings shall be provided to give an overview of all the main equipment within the scope of supply and (if applicable) the connection (physical or functional) between the equipment. The main equipment defined on these drawings is the main elements in a delivery.

All relevant assembly drawings must be referred to.

4.4.4.2 General drawing

Field overview drawings shall be generated and covered Topsides to downhole SPS equipment. They shall include as a minimum:

- Field layout
- PFDs
- Electrical One line diagrams
- Hydraulic and electrical distribution diagrams
- Communication diagrams.

4.4.4.3 Assembly drawing/diagram

Assembly drawings/diagrams shall be provided for main equipment defined by the scope of supply drawing.



Assembly drawings shall give an overall view of the equipment and illustrate, how the main equipment is assembled. The assembly drawings/diagrams must be complete with tag/item numbers (when this is part of the installation specific documentation), sizes (L/H/D) and weight.

All protruding equipment such as piping, anodes, valves, etc. shall be identified in order to provide access and clearance information, necessary for ROV intervention and inspection.

Assemblies shall be illustrated in the various layouts they are intended to be used/installed, showing interfaces/measurement references to other part of the subsea systems. Assemblies shall also be illustrated in the various sequences of operation, illustrating status of valves, fluids in individual bores, etc.

Assembly drawings may as an additional option for information/educational purposes are requested as layout illustrations prepared in colour and/or as wall charts.

4.4.4.4 Stack-up/Sequence drawing

Stack-up drawings shall be provided for main equipment installed permanently or temporary, on or into the wellhead, wellhead related equipment and/or extensions including dedicated interventions tools.

Stack-up drawings shall illustrate assembled equipment installed on the subsea wells. The drawings shall, with reference to wellhead datum, give all vertical measurements to the individual equipment landing point/disconnection points and to components such as cutting valve, holding valve, areas where BOP RAM close (horizontal tree), etc.

Minimum inner diameter in bores shall be identified and specified.

Stack-up drawings shall be provided for all modes/sequences of an installation, intervention or contingency operations.

4.4.4.5 Arrangement drawing with content list

Arrangement drawings with content list shall be provided for all main equipment or assembled equipment, which have incorporated other stand-alone components, defined by item- or tag number.

The content list shall provide information for equipment identified on the drawing, and information for replaceable parts. The content list shall, where possible, be included on the drawing.

The following information shall be provided on the drawing:

- Parts list with position number as applicable
- Quantity
- Description
- Part name
- Technical data and references to standards
- CONTRACTOR's part number
- MANUFACTURER's part number and serial number
- Details of all types of equipment and components.

All components shall be identified by model/type and/or tag/item number.

4.4.4.6 Sectional drawing/MANUFACTURER's standard illustration with part list

Sectional drawing/MANUFACTURER's standard illustration with parts list shall illustrate the equipment and identify all replaceable parts on the equipment. As a minimum, all replaceable parts shall be identified with MANUFACTURER's part number in the part list.

The part list, including spare part recommendation, shall contain information for all identified parts, and be listed on the drawing.

4.4.4.7 Equipment marking drawing

Equipment marking drawings shall be provided to describe the equipment and component marking. In addition the location, the type of label and the content of the marking, must be identified.

4.4.4.8 Hydraulic drawing/diagrams

Hydraulic drawings/diagrams shall be provided for all systems, relevant main equipment or assembled main equipment.

Hydraulic drawings/diagrams shall contain necessary information in order to hook-up systems and equipment. Information on system and equipment troubleshooting shall be provided. All individual parts shall be identified.

The part list, including spare part recommendation, shall contain part information for all identified parts, and be listed on the drawing.

The following specific drawing/diagrams are required:

- Equipment hydraulic schematic drawings.
- System hydraulic schematic drawing.

4.4.4.9 Electrical drawing/diagram

Electrical drawings/diagrams shall be provided for all systems, relevant main equipment or assembled main equipment.

Electrical drawings/diagrams shall contain necessary information in order to hook-up systems and equipment. Information in order to troubleshoot in the system and units in order to detect component errors shall also be included. All individual parts shall be identified.

The part list, including spare part recommendation, shall contain information for all identified parts, and be listed on the drawing.

The following specific drawing/diagrams are required:

- Equipment electrical schematic drawings
- System electric schematic drawing.

4.4.4.10 Interface drawing

Interface drawings shall be provided for all equipment and systems within the scope of supply and for all mechanical and electrical interfaces of the equipment in question. As far as possible, other drawings described above shall serve as interface drawings.

Interface drawings shall contain the necessary information to carry out the interfacing to surrounding equipment. This shall include all type of interfaces between equipment and systems, also towards equipment and systems from other SUPPLIERS.

4.4.4.11 Block diagram/System topology diagram

Block diagrams/system topology diagrams shall be provided showing the configuration of systems and subsystems to give a functional understanding for both electrical and hydraulic/pneumatic systems (i.e. overall system block diagram).

Typical content shall be:

- All related systems and subsystems represented by blocks
- Location
- Interface and wiring between blocks shall be indicated
- Function of each block.

4.4.4.12 Interconnection diagram

Interconnection diagrams shall be provided for hydraulic/chemical distribution systems and for signal/power distribution systems.

Interconnection diagrams shall give a total system overview. The diagram may be considered as a single line drawing for a complete system compressed on one drawing.

Full signal listing and functional description of the interface towards the topside facilities shall be provided.

Signal/Power interconnection diagram shall include:

- Complete loop for signal/power, starting from the originator (SCU/SPCU), via topside junction boxes, service umbilical, subsea distribution unit, electrical jumpers to the end-user (SCM)
- All relevant interface information and markings. This includes topside marking of modem/power channel, cable and wire marking, marking of JB terminal rails, service umbilical lines, SDU lines, etc. for a unique identification for the individual loops
- Tag/Item numbers where applicable.

Hydraulic/Chemical interconnection diagram shall include:

- Complete loop for hydraulic and chemical distribution, starting from the originator (HPU/chemical dosing panel), via topside tubing, isolation valves and terminations, service umbilical, subsea distribution unit, hydraulic/chemical jumpers to the end-user (SCM/XT)
- All relevant interface information and markings. This includes topside marking of tubing (identification), interface details for topside connection to service umbilical lines, SDU lines, etc. for a unique identification for the individual loops.

4.4.4.13 SCU detailed functional specification

CONTRACTOR shall prepare detailed functional specification for the Subsea Control Unit (SCU) as described in project specific SCU functional requirements document.

4.4.4.14 Process diagram

Process diagrams shall be provided describing the process systems. The process diagrams shall describe the process piping including all valves, instrumentation, safety systems, control system, etc.

References to lists with information of part no., manufacture, pressure ratings, calibration data, set-point, etc. shall be made.

References to other relevant drawings shall be included.

The content list shall contain equipment information, and be listed on the drawing.

4.4.4.15 Circuit diagram

Circuit diagrams (switchgears/-boards) shall be provided for all feeders and control circuits.

These shall include:

- All internal connections for control, alarms, protection, interlocks, trip functions, monitoring, etc.
- Range of timers, thermal overload and protection relays
- Internal wire numbers
- Terminal numbers
- External wire and cable numbers
- Content list for inline, control and protection components
- Switchgear/-board tag/item number
- Cubicle number
- Consumer tag/item number
- Type of consumer (if not identified through tag/item syntax) spare cubicles or part of cubicles to be registered as such (type: spare)
- Consumer cable number
- Termination details - consumer cable number
- Type of external signals (fire and gas trip signal, etc.)
- Power and current rating
- Reference drawings
- Component identification.

4.4.4.16 Logic diagram

Logic diagrams shall be provided for control functions and control system.

Logic diagrams shall be provided as graphical diagrams or as program-listing.

The mode of operation of modes like starting, shut down, alarm and trip functions shall be indicated in the diagram.

4.4.4.17 Cause and effect information diagram

Cause and effect information diagrams (tables) shall be provided either as graphical report from the control systems indexes or as 2D CAD drawings.

4.4.4.18 Wiring diagram

Wiring diagrams shall be provided for all relevant systems, part of systems or equipment.

Wiring diagrams shall be provided as termination diagrams for external connections, and shall include:

- Terminal block/socket number
- Terminal/pin number (including spares)
- External cable numbers with pair and core colour details
- Destination for external cables
- Earthing details
- Equipment and equipment connections
- Component Identification.

4.4.4.19 Hard wire input/output schedule

Hard wire input/output schedules shall be provided identifying all hard-wired input/output signals interfaced to control systems. All I/O signals shall be identified with tag/item. No., function, type of signal, alarms set points, etc.

4.4.4.20 Anode drawing

Anode drawings shall be provided for all relevant systems, part of systems or equipment with anodes included.

Anode drawings shall illustrate location of anodes on subsea components including specification of the individual anode.

4.4.5 Other documents

4.4.5.1 Risk analysis report

Risk analysis report for the manufacture/transport/installation of the subsea production system.

4.4.5.2 Dependability studies report

This document shall comprise:

- FMECA and RAM studies including agreed sensitivity cases
- Fully documented assumptions
- Conclusions focussing on sensitive areas and associated actions.

4.4.5.3 Analysis, tests and calculations

Analysis, tests and calculations shall be provided describing performance, characteristics and functional parameters by analysis, calculations, curves and tables for maintenance and operations of systems.

Test reports for equipment and systems shall be provided. Where it is important for calibration, control measurements or troubleshooting purposes.

4.4.5.4 Certification documentation

Listing of certification documentation and delivery corresponding of all necessary certificates shall be provided by CONTRACTOR for the subsea station.

Typical documents, which should be included, are as follows:

- Statutory certificates for cranes
- Lifting equipment and lifting devices certificates
- Weight certificates
- Calibration certificates
- PSV certificates
- Explosion prove certificates
- Pressure test certificates
- Third party verification certificates.

CONTRACTOR shall submit a list of all chemical substances, which are part of the deliverables, or used to assemble and complete the subsea station, and submit data sheets on all substances that may be hazardous to personnel or the environment.

4.4.5.5 Verification management documentation

This document describes the strategy and control of verification/qualification/acceptance for the complete subsea station.

This document shall comprise as a minimum:

- A verification Matrix of equipment
- A flow chart showing all control activities during qualification/test/FAT/EFAT/IT/Shallow water test precommissioning/commissioning phases.

4.4.5.6 Verification documentation

Verification documentation shall include the following documents:

- Factory Acceptance Test (FAT) report
- Extended Factory Acceptance Test (EFAT) report
- Integration test report
- Shallow water test report.

Qualification documentation, which for subsea/down hole equipment/instruments shall typically include:

- Qualification/Verification matrix
- Acceptance test specification, for mechanical / electrical / hydraulic / environmental (temperature, pressure, vibration, stress, fluid ingress/leakage, electrical/hydraulic continuity, material compatibility, etc.) testing
- Testing of equipment in a realistic test set-up

- Accelerated life cycle testing, and verification of all relevant mechanical / electrical / hydraulic / environmental analysis.

Procedures for all types of proof testing and performance verification testing (Factory Acceptance Testing, Qualification Testing, etc.) shall be prepared and agreed with COMPANY prior to commencement of the respective tests. The procedures shall identify the scope of each test, the stepwise procedure, and the corresponding acceptance criteria. The procedures and associated test records will be used by the MC system to establish the status of equipment prior to delivery, and shall form part of the as-built documentation.

4.4.5.7 ROV access verification

ROV access verification shall be provided to document and demonstrate adequate ROV access to perform all required tasks.

4.4.5.8 Equipment list

A Main Equipment List (MEL) containing all individual items of each contract shall be prepared. The list shall include special tools required for assembly and/or maintenance of the equipment, and shall contain the necessary information for purchasing special tools.

4.4.5.9 Operating and maintenance manuals

4.4.5.10 DFI résumé

The DFI (Design, Fabrication, Installation) résumé shall be provided. It shall contain the most relevant data from the design, fabrication and installation phase, and a general description of the installation at the start of the operational phase.

4.4.5.11 Educational compendium

Educational compendium shall be provided in order to carry out theoretical and practical courses concerning the equipment and system.

It shall be organised so that it covers testing, operation and installation of the subsea stations.

4.4.5.12 List of installation and intervention tools

4.4.5.13 Master document list

Master document list shall be provided for the complete scope of supply, including all documents prepared by the SUPPLIER for engineering, manufacturing, testing, etc. of the equipment and systems delivered.

This list shall also include retained documentation.

4.4.5.14 SUPPLIER Document List (SDL)

SUPPLIER Document List (SDL) shall be provided for the complete scope of supply, listing all documents to be delivered for the equipment/system delivery.

4.4.5.15 Tag/Item index/Master equipment list

Tag/Item index shall be provided for the complete scope of supply, listing all tag/item numbers in the delivery.

4.4.5.16 Equipment preservation documentation

4.4.5.17 Photos and videos

As-built photos shall be provided for main equipment or where applicable be provided for assembled main components as part of a system description, in order to identify the equipment itself.

When relevant, photographs in electronic format shall be provided to illustrate useful operational information equipment such as: Indicators, marking, ROV operated valves, ROV operated handles, etc.

Each equipment delivery shall be documented with at least:

- One photo from each side
- One photo from above
- One photo showing the equipment in perspective.

CONTRACTOR shall provide two sets of video tapes/CDs covering the shallow water test.

4.4.5.18 Spare part lists

Spare parts list shall be produced for the subsea stations for start up and maintenance activities.

Spare parts interchangeability lists.

4.5 As-built documentation

As-built documentation shall comprise six sections:

- Section 1 Design
- Section 2 Certification
- Section 3 Operation
- Section 4 Maintenance
- Section 5 Manufacture
- Section 6 As-built photos and videos/CDs.