



Exploration & Production

GENERAL SPECIFICATION

FIELD OPERATION

GS EP EXP 153

Requirements for Production Operating Manuals
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1. Applicability

This specification applies to all projects managed by Total E&P, its operating affiliates and to companies of which Total is a shareholder and which have decided to apply the Total E&P general specifications.

This specification applies to new projects, field development or plants. It is not retroactive but applies to major modifications of existing installations.

2. Scope

This General Specification defines the contents and the presentation of Field Production Operating Manuals.

3. Purpose

The purpose of the Field Production Operating Manuals is to provide understanding of how the FACILITIES operate in detail, and to guide the production personnel in their operations.

The Operating Manual may also be used as a support for training the production teams before first start-up, in the context of participation in commissioning operations or for induction training for new personnel arriving on SITE. It must be written with the maximum of legibility, precision, accuracy, illustrations and drawings.

4. 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 EP EXP 103	Pre-commissioning and commissioning specification
GS EP EXP 501	Equipment and piping numbering
GS EP INS 134	Design and supply of integrated control and safety system

5. Definitions

The terms used in this Specification shall have the following meanings (for the acronyms, refer to **Appendix 1**):

- **COMPANY** means TOTAL or a TOTAL Subsidiary in charge of operating the production facilities on a (several) particular SITE(s).
- **FACILITIES** means the existing or new installations for which the Operating Manual is produced.
- **OPERGUID™** means the TOTAL Corporate methodology for producing operating Procedures. OPERGUID™ is a proprietary registered trademark of TOTAL.
- **PROJECT** means the **COMPANY** organisation in charge of developing new **FACILITIES** on behalf of **COMPANY**.
- **CONTRACTOR** means the service Contractor in charge of producing the Operating Manual.
- **SITE** means the location or the **FACILITIES**.
- **SITE OPERATIONS** means the **COMPANY** entity in charge of operating the **FACILITIES**.
- **WORK** means the work to be performed by **CONTRACTOR** for producing the Operating Manual.
- **VENDOR** means supplier of materials/equipment used in the construction of **FACILITIES**.

6. General Overview of the Operating Manual

6.1 Contents and users

The Operating Manuals are intended in particular for:

a) Any member of field production in charge of the operation, control and monitoring the FACILITIES, who shall find in it:

- The general description of the FACILITIES;
- The description of the safety systems, their logic and their configuration;
- The procedures to be followed to start up and shut down all or part of the FACILITIES;
- The parameters to be monitored in operation;
- The parameters of the safety settings;
- The design characteristics of all equipment in place on the FACILITIES.

b) Anyone who wishes to obtain general information on the relevant FACILITIES, including:

- geographical and geological situation,
- development history,
- essential characteristics of the processes and equipment installed.

Note: the Field Production Operating Manuals do not cover the maintenance activities to be performed by the maintenance teams.

6.2 Structure

6.2.1 Breakdown into “books”

The Operating Manual shall always be divided into at least two books:

- Book 1: Description of the FACILITIES (c.f. section 7.1);
- Book 2: Operation of the FACILITIES (c.f. section 8.2).

Each book is structured in parts and chapters according to the same plan corresponding to the functional breakdown of the FACILITIES.

6.2.2 Breakdown according to general FACILITIES layout

For large FACILITIES the Operating Manual shall be split into parts, corresponding to geographical (layout) and / or functional considerations, such as:

- On shore / off shore FACILITIES;
- Platforms, or groups of platforms;
- Different SITES;
- Topsides, Hull and Subsea for a FPSO.

The breakdown into parts is specific to the FACILITIES. The scope of each part shall be defined or approved by COMPANY at the beginning of the WORK.

6.2.3 Breakdown into Chapters

Each part is broken down into chapters corresponding to the functional breakdown of the FACILITIES.

The title and numbering of chapters shall be the same for all the books, even if some chapters for Books 2 chapters are to be left void.

In addition Book 1 shall contain introductory chapters as follows:

- One general introduction for the whole Operating Manual;
- One introduction for each part.

The table titled "System and sub-system codes" in Appendix 2 of specification GS EP EXP 501 "Equipment and piping numbering" gives a typical breakdown of functions into systems and sub-systems. It shall serve as a reference for organising the breakdown into chapters (for the definition of systems and sub-systems, refer to specification GS EP EXP 103 "Precommissioning and commissioning specification", section 6).

For large systems, it shall be useful to split them into several chapters (e.g.: the oil production system that can be usefully split further: Wells, Separation, Metering and Export).

Depending on the size and complexity of the various systems comprising the FACILITIES, chapters may correspond to: several systems,

- one system,
- one sub-system,
- an even to particular pieces of equipment.

Note: The systems, sub-systems and equipment are listed in specification GS EP EXP 501 Appendix 2. Those that do not exist in the FACILITIES shall be omitted from the Operating Manual.

The breakdown into Chapters shall be validated by the production COMPANY representative.

Operating Manual formats

The Operating Manual shall be presented in two formats:

- Paper format;
- Interactive format.

6.3 Paper format

The paper format shall be presented in folders, with at least one folder for each book. It shall include in addition to the text the following lists, as a minimum:

- the drawing list,
- the main equipment list,
- the PSV, Safety shutdown and blowdown valves lists.
- the safety threshold list,
- the safety logics.

For the paper format, it is recommended, that the Operating Manual drawings be presented in a separate drawing book, in order to facilitate the simultaneous reading of the text and drawings.

However, COMPANY may decide to include the drawings with books 1 and 2. In that case, the drawing shall be duplicated.

See **Appendix 2** for the recommended standard of presentation of the paper format.

The paper format shall be accompanied with the corresponding electronic files, for its full contents (text and drawings) under two formats:

- non modifiable, but printable format, such as “Acrobat”,
- native modifiable files, under “Word” for the text and “Autocad”, “Microstation” or “Toolbook” for the drawings.

The electronic files shall be supplied on CD-ROM or DVD supports.

6.4 Interactive format

6.4.1 Contents

The Interactive Operating Manual shall comprise as a minimum all the elements included in the paper format.

- the pages of text, including the general table of contents, and the section summaries;
- the drawings;
- the lists.

The interactive Operating Manual shall, unless decided otherwise by COMPANY, include the following additional elements that are not included in the paper format:

- Photographs,
- ICSS workstations screens,
- PIDs and PDFs;
- Training modules, in relation with the contents of the Operating Manuals, such as: working principles with fundamentals and theory; technology and application to particular pieces of equipment and their operation (refer to Appendix 3 for a list of possible training modules).

CONTRACTOR shall check with COMPANY the list of training modules to be included if any.

6.4.2 Functional requirements

The main functional requirements are as follows:

- **Hypertext links**

The pages for the table of contents, the section summaries, the lists, the text, and the drawings shall be linked as appropriate through hypertext links. They shall all contain active zones that produce a programmed action when the user triggers them, such as:

- display of a drawing, chaining from one drawing to another one,
- display of a pop-up window with data on particular pieces of equipment,
- jump to a particular part of the text...

The triggered links shall be highlighted by flashing or other means.

It shall be possible to view the drawings as they stand, on screen and to read the text at the same time.

In the text, any equipment or instrument tag shall be linked to a drawing.

- **Simulation**

The Interactive version shall include the simulation of the Process and Emergency Shutdowns, with the consequences shown on both the Safety Logic Diagrams and on the Process drawings in a similar way as on the ICSS workstations.

- **Detailed requirements**

The requirements for the interactive version are given in **Appendix 4**.

- **Mock-up**

A mock-up of the interactive format, implementing the functional requirements shall be supplied to COMPANY for approval at the start of the production of the interactive format.

6.4.3 Mode of access and packaging of the Interactive format

COMPANY shall decide on the modes of access to the Operating Manuals by the users, and on the corresponding packaging, as follows:

- **CD-ROM interactive format.**

CD-ROM shall work on users' personal workstations. They shall be auto start and shall not require any installation procedure.

- **Network interactive format.**

The Network interactive format is installed on COMPANY servers by its IT personnel. Access rights to the Network Operating Manuals is decided by COMPANY.

It is strongly recommended to integrate as many documents as possible of the Operating Manual within the Electronic Data Management System (EDMS) of COMPANY.

In addition the Operating Manual shall be structured in such a way that specific links shall be available to call up the active and most up to date documents used by SITE OPERATIONS (eg: P&ID's, ESD diagrams, ... etc).

- **Intranet / WEB interactive format.**

The Intranet / WEB interactive format is installed by COMPANY on its intranet WEB servers by its IT personnel. Access to the Operating Manual on the WEB is granted in accordance with COMPANY policy, and implemented by COMPANY IT personnel.

Note: the Network / Intranet / WEB interactive format(s) shall be packaged by the CONTRACTOR, by use of a packaging software to be approved by COMPANY.

The CONTRACTOR shall, at the start of the WORK, clarify with COMPANY the packaging format(s) to be implemented.

6.4.4 Updating

The interactive format of the Operating Manual shall be such that updating of minor modifications can be done by COMPANY.

Refer to **Appendix 7**.

7. Contents requirements

7.1 Book 1 - Description of the FACILITIES

7.1.1 Book 1 Contents

The contents and structure of book 1 chapters depend on their purpose or on the nature of the systems described. The following chapter / system typology is considered:

- Introduction chapters: the general introduction and the parts introduction, if applicable;
- Process and utility chapters;
- Other chapters as listed in section 7.1.4 below.

The general contents of the various chapters is given in the following sections.

7.1.2 Introduction chapters

- **General introduction**

The general introduction shall contain basis data and information:

- Geographical location;
- Description of the interfaces, if any, with other installations and/or other fields outside the Operating Manual battery limits;
- Development history;
- Reservoirs;
- Summary description of the FACILITIES;
- Operating philosophy, main "Safety Concept" topics and derogations granted to the project.

- **Installation layout breakdown (parts) introductions**

For FACILITIES broken-down into several parts for the purpose of the Operating Manual, each part shall contain a specific introduction including:

- the location,
- the list and summary descriptions of the systems,
- the process links with the other parts.

7.1.3 Process chapters

For the chapters corresponding to the process sub-systems, other than those listed in section 7.1.4 hereafter, the following points shall be covered (refer to Specifications GS EP EXP 103 for the definition of systems and sub-systems and to GS EP EXP 501 for the overall list of systems and sub-systems):

- **Location:** position of the system on a plot plan,
- **Objective(s)**
- **Criticality** of the system or subsystem, based on the estimation of the consequences of its failure on Production and on HSE.
- **Description** of the system or subsystem, including:
 - An overall description;
 - For each piece of equipment comprising the system or subsystem: the description of the design and/or process, the description of the fluid circulation, the description of the safety loops, the corresponding protections;
 - For wells: the section, the completion, well bore-formation interface, drilled levels, well heads, safety control panels.
- **Description** of the control systems and integration of the functional analyses key points;
- **Data tables** for each piece of equipment:
 - For equipment: manufacturer, type, weight, material, calculation conditions, operating conditions, characteristic curves, efficiency;
 - Command control equipment: inventory of remote indicators and meters, Control loops, control valves, Remotely operated valves (ROV, HCV, MOV)
 - Safety equipment: inventory of transmitters, safety valves, pressure safety valves, together with their technical data (with their level of availability and reliability if specified in the design).
- **Reference documents:** list of the documents (number, revision, title) of the documents that have been used for writing the chapter.

Note: a full consistency shall be insured between the text and the Operating Manual drawings. Any equipment or instrument tag mentioned in the text shall be found in the drawings and reciprocally.

7.1.4 Other Chapters

The following chapters (listed below as per their order in GS EP EXP 501, Appendix 2), have each a particular contents and organisation. The following detail the typical contents for each of them:

- Safety/Evacuation equipment:

Description of the fire and radiation zones, escape ways. Location and description of the escape systems, eye washing stations, breathing apparatuses.

- ESD and Fire & Gas; Subsea/surface Control & Supervision:

Description of the fire, smoke, flame, inflammable gas and toxic gas detectors; location per zones, detection and voting principles, safety shutdown levels.

- Control system for the topsides and submarine facilities and equipment:

Description of the ICSS (Integrated Control and Safety Systems), PCS (Process Control System) and SSS (Safety Control System).

- Specific control systems such as:

OCWR (Overall Control of Wells and Risers).

- Emergency power generation / distribution; Auxiliaries Power generation/distribution (UPS, 48/24/12 Vcc):

Location and description of the emergency power generators, their drivers (turbines, diesels...) with the corresponding fuel supply systems (diesel, gas) and utilities (lubrication, cooling, seals, ventilation...). Description of the corresponding start-up and shutdown sequences.

Location and description of the UPS, 48/24/12 Vcc and corresponding distribution systems.

- Communication/Telecom:

Location and description of the various telecommunication systems, including PA/GA and CCTV systems.

- HVAC:

Location and description of the HVAC unit(s) and distribution systems, and corresponding utilities (cooling water, drains...).

- Main Power Generation; Power distribution (HV, MV, LV), Lighting, Earthing:

Location and description of the main power generators and their drivers (turbines, diesel engines...) with the corresponding fuel supply systems (diesel, gas) and utilities (lubrication, cooling, seals, ventilation...). Description of the corresponding start-up and shutdown sequences (grafcets).

Description of the HV, MV, LV, essential distribution and switchboards, synchronising, load sharing, load shedding, source transfer, start-up scenarios, Power Distribution Control System. Location and description of the electrical sub-stations.

- Navaid:

Navaid lighting, fog horns, batteries.
- Lifting equipment:

Location and description of the cranes, gantry-cranes, rails... and corresponding utilities.
- Insulation/Trace Heating:

Description of the Trace Heating subsystems (electrical, steam,...)
- Laboratories; Living quarters/Offices; Technical rooms; Workshops/warehouses:

Plot plans and plans of accommodations and offices, technical rooms; workshops and warehouses. Description of corresponding utilities and equipment.
- Cathodic Protection:

Description of the active Cathodic Protection systems.

7.1.5 Level of details for book 1

The standard level of details for Operating Manuals covers the following:

- The process principles shall be explained in details.
- The fluid circulation description, for the process / utility chapters shall be comprehensive, and shall cover all lines (main and secondary), with the description of the control, safety, blow down valves, pressure safety valves and other elements (Restriction Orifices, check valves), and the corresponding explanations;
- The control systems shall be fully described, including the control systems for the packages supplied by VENDORS;
- The Utility systems for main machinery, such as lube and cooling oil, water and air cooling, seal systems, fuel gas and liquid fuel, burner arrangement for turbines, compressors, main electrical motor,... shall be described;
- The main machinery start-up and shutdown logic charts (Grafcets) shall be supplied and shall be accompanied with a descriptive explanation of the purpose of the main steps and branches shown on the corresponding logic charts.

COMPANY may decide to relax on some of the above requirements.

7.2 Book 2 - Operation of the FACILITIES

7.2.1 Operating Procedures format

The procedures that constitute Book 2 shall be written in accordance with the “OPERGUID™” methodology. OPERGUID™ is the name of the TOTAL methodology related to the Operating Procedures. OPERGUID™ is a proprietary registered trademark of TOTAL. The Guide GM EP EXP154 describes this methodology. Subject to the signature of a Licence Contract, it shall be transmitted to CONTRACTOR to enable him producing procedures that comply with the methodology requirements.

The procedure shall be produced at the “Ready for SITE validation” status in terms of the “OPERGUID™” methodology. Their level of detail shall be 2 (or 3 for packages and complex systems), as defined in the same methodology.

Note: the level of criticality of a system or subsystem, based on the estimation of the consequences of its failure on Production and on HSE shall be reminded within the Operating Procedures

7.2.2 Reminders on the OPERGUID™ methodology

The following reminders covering the basic principles of the OPERGUID™ methodology are given for information only and shall not, in any way, replace the contents of the Guide: OPERGUID™ methodology – Operating procedures.

- **Notion of a steady state**

A steady state corresponds to an intermediate operating technical stage defined as follows:

“State of the installation fulfilling the conditions for maintaining the safety of the installation throughout the transient phases of start-up, ramp-up and shut-down. The notion of a steady state corresponds to a sustainable equilibrium of all the installation’s process parameters, such that only minimum surveillance interventions are required.”

The OPERGUID™ methodology is based on the **progressive transition, in secured steps, from one steady state to another steady state.**

The “Initial State” (starting point of the procedure) and “Final State” (end point of the procedure) are steady states describing the state of the installation at the beginning and end of the procedure.

In the event of an incident that prevents the subsequent target steady state from being attained, the procedure provides for return to a specified previous steady state, as a an intermediate “fallback” position, before resuming execution of the procedure. In some simple cases, there is no intermediate steady state between the initial state and the final state.

- **Notion of Operating Procedure**

The operating procedure describes a series of sequential operations and operations for taking the installation from a characterised Initial State to a characterised Final State. This transition may proceed through steady states duly described in the procedure.

At each stage, the actual steady state is checked for conformity with the required steady state before proceeding.

- **Notion of Action**

This is the elementary task performed by the Operator.

OPERGUID™ distinguishes three types of actions:

- Simple Actions: this type of action has no particular specificity, such as open or close a valve.
- Verification Actions: this type of action is designed to check the status of a piece of equipment or the proper execution of a prior action, before pursuing the operation.
- Safety Actions: any specific action pertaining to the safety of personnel or equipment.

- **Notion of Operation**

An operation is a combination of associated elementary actions. It is characterised by a title.

For the sake of clarity or simplification, an Operation may be broken down into sub-operations.

Each operation is allocated a 3-digit number.

Operations are numbered in logical sequence, based on a series of steady states. As the first digit designates the **target** Steady state, the relevant Operation combines all the actions that must be performed **before** that Steady state is reached.

Numbering can be illustrated as follows:

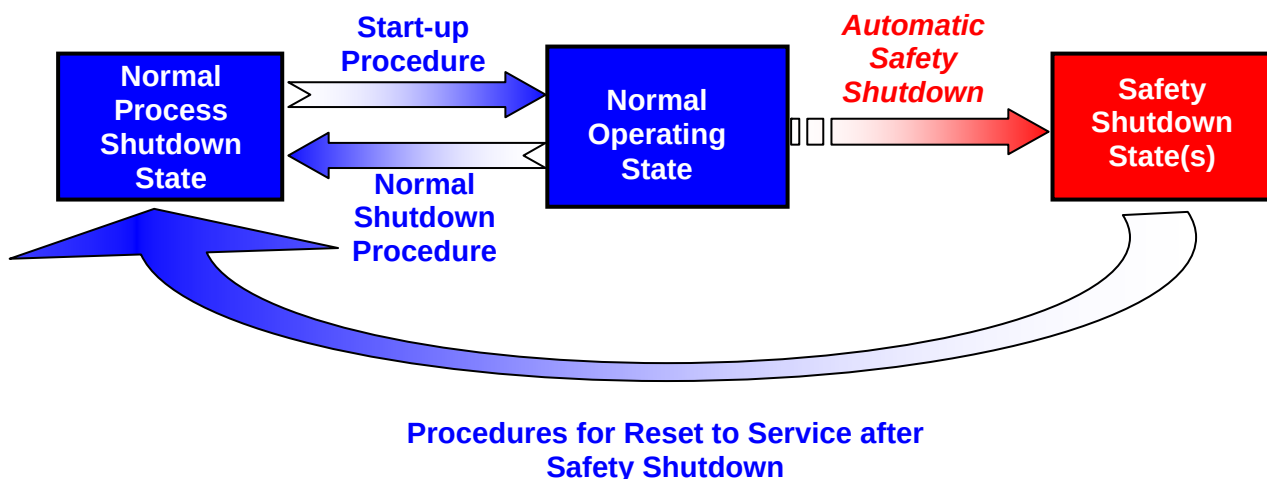
- Operation 100 (all actions to be performed before reaching Stable Sate 1); may be broken down into sub-operations 110, 120, 130... (where sub-operation 110 may in turn be broken down into 111, 112, ...) etc.
- Operation 200 (all actions to be performed before reaching Stable Sate 2); may be broken down into sub-operations 210, 220, 230... (where sub-operation 210 may in turn be broken down into 211, 212, ...) etc.

7.2.3 Book 2 Contents

Book 2 chapters shall include the start-up and shutdown procedures and the other particular routine procedures listed hereafter.

- **Procedures related to Shutdown and Start-up**

Schematically speaking, command-control of the FACILITIES consists in managing three characteristic states and four major transitions that are either automated or subject to procedures, as per the diagram below.



Book 2 chapters shall include the following sections, when applicable:

- Start-up procedure** from normal shutdown state.
- Normal shutdown procedure** from normal operating state.
- Reset to service procedures** from safety shutdown states.

Note: the procedures related to the first start-up of the FACILITIES are not to be included in the Operating Manual.

The Operating Manual shall contain detailed individual procedures for the equipment and overall procedures for the systems, e.g., on the oil production system:

- detail equipment procedures: start-up of a well, start-up of a separator, of a transfer pump, etc...
- overall procedures: start-up of the whole oil chain (including first well, separators, transfer pumps...).

- **Mandatory other procedures (for production personnel) to be included into Book 2:**

In addition to the Start-up and shutdown procedures, Book 2 chapters shall include the mandatory other procedures related to the following operations, when applicable:

- Pigging.
- Safety tests: Subsurface valves (operating and integrity tests), Surface valves (operating and integrity tests), Process security systems (safety devices).
- Monitoring and operation of well annular.
- Fluid sampling.
- **Optional special procedures (for production personnel):**
 - Regular operating tasks: Monitoring of cathodic protection, Nozzle change-outs.
 - First level maintenance: Lubrication, Purges, Oil top-ups, Maintenance of fire-fighting equipment.
 - Occasional tasks: Vessel spading, first level Maintenance operation procedures, Hand-over of a well for minor well operations (wire-line).

The decision on whether or not to include any of these options shall be made by the field operations representative.

The structure of the Operating Manual shall allow the inclusion of optional procedures at any time.

Prior to any implementation, the procedures contained in the Operating Manual shall all be compulsory validated and amended by the SITE OPERATIONS.

Book 1 chapters shall have a corresponding Book 2 chapter except for:

- the introductory chapters;
- the chapters listed as “other chapters” under section 7.1.4, unless specified otherwise by COMPANY.

7.3 Drawings

7.3.1 Types of drawings

The drawings considered in this section, and referred to as “Operating Manual Drawings” shall be presented:

- on a full A4 page separate from the text for the paper version,
- and fully across the screen (horizontally) for the interactive version.

Note: In addition to these Operating Manual Drawings, some small drawings or charts (basically of less than a quarter of page) may be inserted into the text itself for illustration or explanation purpose. They are not covered by the present section.

The Operating Manual Drawings are of different types, as follows:

- **Process and Utilities description drawings**, including:
 - Process and Utilities Flow drawings as specified in **Appendix 5**,
 - Overview Flow diagrams: based on the **PFD** as specified in **Appendix 5**;
 - Overview block diagrams (main equipment represented with rectangles);
 - Electrical Key One Line Diagrams, for power and UPS distribution;
 - Layout drawings and geographical location maps.
- **Shutdown Logic diagrams** (similar to the corresponding ICSS views)
- **Detail drawings**, including:
 - Wellhead safety cabinets;
 - Equipment detail drawings, to show internals of main vessels (separators, dehydrators...), of columns (gas dehydration, deaeration...), or particular details of equipment packages (turbo compressors, heaters...);
 - Elevation drawings;
 - Field reservoir(s);
 - Well completions;
 - Buildings, Control Room, Electrical rooms, Instrumentation rooms, Accommodations, Workshop, Laboratory;
 - Telecommunication and data network schematic diagrams;
 - Location of Fire / Gas / Heat / Smoke / H₂S and toxic gas detectors.

7.3.2 Graphic Specification for drawings

Refer to **Appendix 5**, for the detailed graphic specification.

The main principles are recalled below:

- **Process and Utility description drawings and Safety Shutdown Logic diagrams**

These drawings shall be self explanatory documents not requiring other documents for their interpretation. They shall have a presentation similar to that of the ICSS displays.
- **Other drawings**

Some drawings found in the documentation supplied by COMPANY can be used as such (scanned, for example) with or without modification.

When this is not possible, the required drawings shall be drafted specifically for the purpose of the Operating Manual.

- **Zooming**

On the interactive version, the Operating Manual Drawings should be entirely and directly legible on the screen without having to zoom on them.

In case the original P&ID and/or PFDs (that are not Operating Manual drawings) are included as additional elements, a specific zooming function shall be available.

7.4 Similar systems

In some cases, the FACILITIES include similar systems that are identical except for the tag numbers, e.g. identical processing trains working in parallel or similar platforms.

In such as case, unless specified otherwise by COMPANY, the following shall apply to the text chapters, the drawings and the simulation:

- Text: only one of the similar systems shall be fully described and the other similar systems shall only be mentioned in the introductions, but not further dealt with.
- Drawings:
 - The Process Description drawings and the Shutdown Logic diagrams shall all be available both in the paper and interactive versions, with all equipment and instrumentation tags for all systems, including the duplicated ones.
 - The equipment detail drawings, for identical pieces of equipment shall not be duplicated.
- Simulation (interactive format): the simulation of the Process and Emergency Shutdowns shall cover all systems, including the duplicated ones.

7.5 Documentation Requirements

The documents that are required for producing the Operating Manual shall be transmitted by COMPANY to CONTRACTOR.

Refer to **Appendix 6** for a typical list of documents.



8. Planning Constraints

For new FACILITIES resulting from a development PROJECT, the Operating Manual must be available for the Project Technical Review (PTR 4), at least in paper format.

The Operating Manual shall be reviewed by the commissioning and operating teams during the commissioning phase, before start-up of the FACILITIES. An updated revision of the Operating Manual incorporating the possible modifications to the FACILITIES and the possible corrections shall be issued and validated after Start-up, to be available within one year after Start-up.

Appendix 1 Glossary of the acronyms used in this specification

Acronym	Meaning
CCTV	Closed Circuit Television
CD-ROM	Compact Disk Read Only Memory
DCS	Distributed Control System
DVD	Digital Video Disk / Digital Versatile Disk
EDMS	Electronic Data Management System
FGS (F&G)	Fire and Gas System
FPSO	Floating Production Storage and Offloading
HSE	Health, Safety and Environment
HV, MV, LV	High, Medium, Low Voltage
HVAC	Heat Ventilation and Air Conditioning
ICSS	Integrated Control and Safety System.
IT	Information and Telecommunication
OCWR	Overall Control of Wells and Risers
PA/GA	Public Address / General Alarm
PCS	Process Control System
PDCS	Power Distribution Control System
PFD	Process Flow Diagram
PID (P&ID)	Piping and Instrumentation Drawing
PSV	Pressure Safety Valve
PTR	Project Technical Review. PTR 4 is performed at the end of construction, while pre-commissioning and commissioning tests are carried out. PTR 5 is performed after more than 6 months of operation.



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Appendix 1

Acronym	Meaning
SSS	Safety Shutdown System
UFD	Utility Flow Diagram
UPS	Uninterruptible Power Supply

Appendix 2 Requirements for the paper format

Text and drawings in the paper format version shall be in colour. The drawings shall be on a white background.

The paper version shall be presented in lose-leaf folders, with different folders for book 1 and book 2 chapters.

Each folder shall contain:

- one front page with the title of the manual and the contents and reference of the folder.
- the general table of contents for the Operating Manual,
- the contents (book 1 chapters, book 2 chapters or drawings) organised per chapters and separated by dividers with tag labels.

In case COMPANY decides to include the drawings within book 1 and book 2 folders, there shall be no specific drawing folders. The drawing shall then be duplicated and incorporated into books 1 and 2 folders at the end of each chapter.

The first folder for book 1 shall contain in addition the various lists included in the manual:

- Drawing list,
- Equipment list,
- Pressure Safety valve list,
- Safety Valve (SDV, BDV) list,
- Remote Operated Valve (XV, ROV, MOV) list if applicable,
- Photographs, if applicable,
- DCS views, if applicable,
- Other lists, if applicable.

The template to be used for the text shall be supplied by COMPANY.

Book 2 chapters shall be presented on a tabular format according to the OPERGUID™ specification GS EP EXP 154.

The drawings shall comply with the graphic Specification for drawings as per **Appendix 5**

Appendix 3 List of information modules

The following is a non exhaustive list of possible information modules that may be considered for inclusion into the interactive version.

The information modules may cover:

- working principles with fundamentals and theory,
- technology and its application to particular pieces of equipment and how to operate them.

- **Fundamentals and theory**

- Oil reservoirs
- Separation principles
- Dehydration
- Desalting
- Hydrates
- Reverse Osmosis
- Electrotechnics

- **Technology**

- Pumps
- Compressors
- Gas Lift
- Liquid Metering
- Gas Metering
- Water treatment
- Diesel Engines
- Control systems...

Appendix 4 Requirements for the interactive format

1. General requirements

A splash screen shall be displayed during loading of the Operating Manual.

The Operating Manual shall open in full screen.

A user control panel shall be accessible on every pages of the Operating Manual.

All active zones (hypertext links) in text or summaries in the Operating Manual shall be highlighted.

Indication of the full references of the text (Part, book and/or chapter) shall always be displayed.

2. Entry screens

The following points shall be displayed on the first entry screen:

- the title of the Operating Manual, with identification of the FACILITIES,
- the revision and date.

Active zones shall give access to the content of the Operating Manual.

3. Text

3.1. Common requirements to all text pages

The text shall be structured according to the structure of the paper version, in books, parts, chapters, section summaries, sections and paragraphs.

Pages of table of contents, section summaries, lists, text, and drawings are linked through hypertext links.

The following navigation functions shall be available at any time:

- Previous page
- Next page
- Return to the text or list previously displayed (after activation of a hypertext link)
- Access to summaries.

3.2. Specific requirements for tables of contents

The interactive table of contents of a book shall give the corresponding list of chapters, to enable the user to select a particular one.

Selection of a chapter shall open the corresponding chapter summary, i.e. the list of sections and sub-sections for the chapter. Selection of a section or sub-section displays the corresponding text.

3.3. Specific requirements for the text of chapters

- references to other sections/chapters in the text shall display the corresponding section/chapter,
- any equipment or instrument tag shall be linked to a drawing,
- simultaneous reading of text and drawing shall be possible,
- the triggered tags in the text and in the drawing shall be highlighted.

3.4. Specific requirements for lists

All the lists are interactive: each item shall be linked to the display of the selected object (drawing, photos, etc.)

- Drawing list;
- Main equipment list;
- PSV list;
- Safety valve list.

Optionally the following lists may be available:

- List of Photographs;
- List of ICSS Screen views and / or list of P&IDs.

Note: icons shall be used to identify the buttons callings for the various lists, preferably to text captions.

4. Drawings

Drawings contain active zones, which can trigger several types of actions.

There are two types of active zones:

- Active zones which activate chaining links with other drawings, mainly for the fluid lines or the

instrumentation signals:

- The continuation of the line on the chained drawing shall be highlighted (blinking tag or otherwise) at the corresponding end of the line on the destination drawing.
- When several drawings have been successively displayed, it shall be possible to go back to the preceding drawing, or to the first drawing displayed in the chain.
- Active zones on equipment or instrument tags which display supplementary information or trigger the simulation:
 - display of the set points for pressure safety valves,
 - display of a data sheet for equipment, valve, controller or safety level,
 - display of a photograph (optionally) and/or a detail of the equipment,
 - jump to the corresponding safety logic diagram,
 - trigger of the safety shutdown simulation.

5. User Control panel

The User Control Panel shall contain permanent functions that are always available and others that are available depending on the context.

- Navigation buttons:
 - Access to the different summaries;
 - Access to the different lists;
 - Return to initial page (text or drawing);
 - Preceding/Following Page;
 - Full page.
- Text Search (the search function shall allow finding any specific portion of text, including equipment tags, through the whole text of the manual).
- Print: drawing or text, black & white or colour.
- Instructions for Use/Help (that is to say a descriptive guide of the different functionalities of the Operating Manual and how to handle them), with possibility to print a copy of it.
- Minimise (equivalent to the Windows minimise function).
- Exit from the Operating Manual application.

6. Safety shutdown simulation

The simulation of the safety shutdown shall be triggered from the safety tags on the Process drawings and on the Safety Logic Diagrams.

The effect of the safety trip(s) shall be shown on all process drawings and on all Safety Logic Diagrams (and not only on the Process drawing or Safety Logic Diagrams where the trip is triggered).

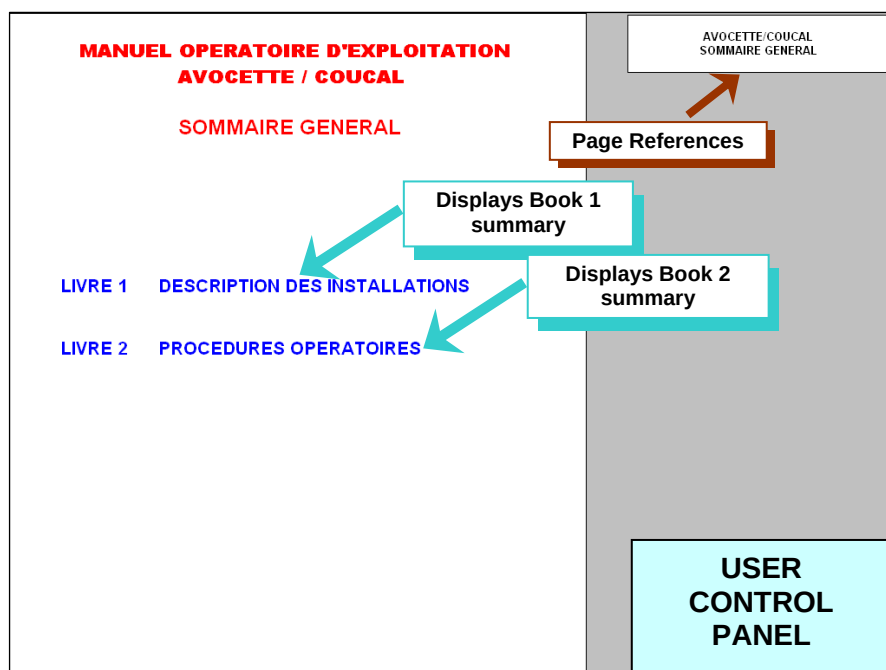
Navigation between Process drawing and the Safety Logic diagrams corresponding to the same equipments shall be possible.

The system shall allow the simulation of several independent trips simultaneously.

7. Main Interactive screens

The following screens are given as illustration for implementation of the main requirements for the interactive version.

General Summary



Text Page

2. SEPARATION MP

2.1 LOCALISATION - SEPARATION MP
Voir Localisation de l'unité de séparation.
Voir Schéma C-01.2

2.2 DESCRIPTION - SEPARATION MP

2.2.1 Objectif et criticité
L'arrivée d'huile chaude en provenance du réchauffeur 10 FA 300 A est renvoyée vers la ligne de sortie d'huile du séparateur 10 DS 301 B.

10 DS 301 B est un séparateur biphasique il a pour objectifs :

- de séparer les phases huile/eau et gaz des effluents du puits après réchauffage,
- de retourner l'eau, l'huile et le gaz vers le système normal de production.

Les instruments du séparateur sont calorifugés.
La disponibilité du séparateur de production 10 DS 301 B est essentielle.

2.2.2 Procédé et circulation des fluides
Voir schéma C-05.1.

-Compartment Huile
Ce compartiment dispose d'une sortie d'huile de 6" allant au séparateur 11 DS 306.
Cette sortie d'huile est équipée d'un ensemble comptage avec filtre et by-pass.
Cette ligne reçoit aussi l'huile du réchauffeur 10 FA 300 A, du bassin API 10 TA 900, de la cuve de purges 10 DA 920, du ballon de reprise d'huile 11 DA 407 et des purges du traitement de Fuel Gas. En effet le séparateur atmosphérique 10 DS 302 A qui recevait ces effluents est isolé.
Ce compartiment possède une purge d'huile de 4" avec vanne de sectionnement. Sur cette ligne de purge viennent se rajouter les lignes en provenance des séparateurs FWKO 11 DS 312 et 10 DS 313.
Le tout est envoyé vers la cuve de purge 10 DA 920.

-Compartment Eau
L'eau arrive du ballon d'eau de gisement de Coucal grâce aux pompes 11 GX 403 A/B par une ligne de 2"
Le compartiment Eau dispose d'un piquage de 4" avec vanne de sectionnement pour sa vidange et d'une sortie de 6" qui se réduit à 3" avec un ensemble de comptage, un by-pass et un clapet de non retour 3" sur la ligne qui expédie l'eau huileuse vers le décanteur à plaques 11 ID 410.

-Sortie Gaz
La sortie de gaz s'effectue par une ligne de 4" comprenant :
- un ensemble de comptage encadré par deux vannes manuelles.
- un by-pass avec vanne de sectionnement.
Cette ligne repasse en 8" et se divise en trois branches avec vannes de sectionnement pour permettre au

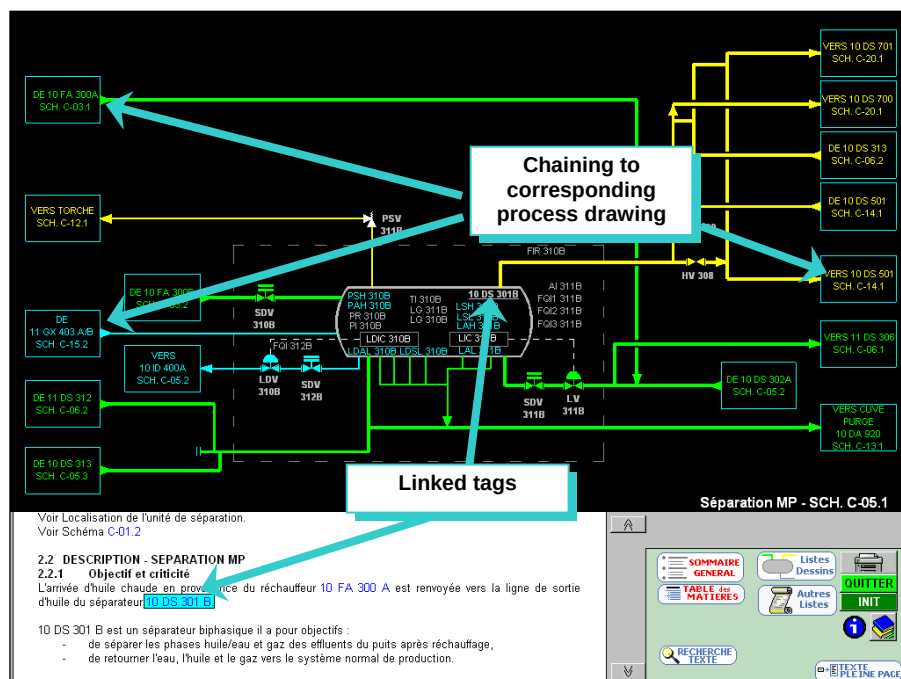
COUCAL/AVOCETTE - LIVRE 1
C-05 TRAITEMENT D'HUILE -
SEPARATION COUCAL

Page References

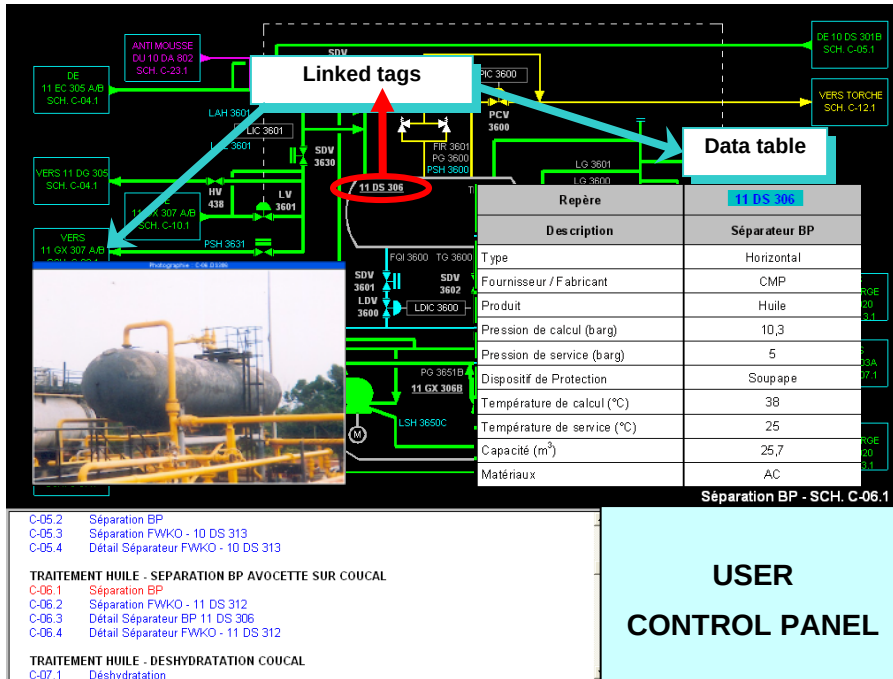
Active zone, displays the corresponding drawing

USER CONTROL PANEL

Process Flow Drawing



Equipment Pop-up data window



Linked tags

Data table

Repère	11 DS 306
Description	Séparateur BP
Type	Horizontal
Fournisseur / Fabricant	CMP
Produit	Huile
Pression de calcul (barg)	10,3
Pression de service (barg)	5
Dispositif de Protection	Soupape
Température de calcul (°C)	38
Température de service (°C)	25
Capacité (m³)	25,7
Matériaux	AC

Séparation BP - SCH. C-06.1

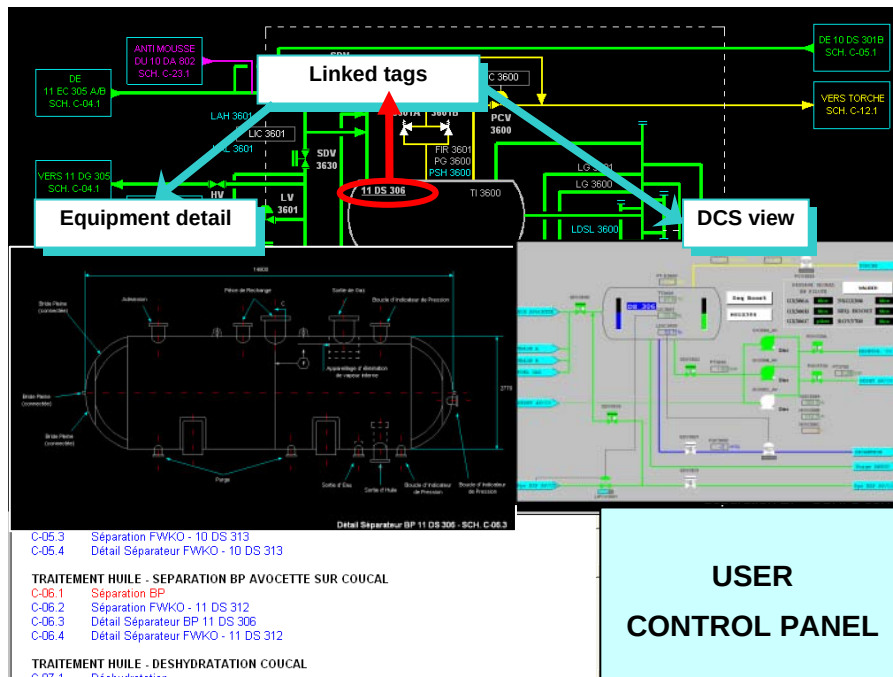
USER CONTROL PANEL

C-05.2 Séparation BP
C-05.3 Séparation FWKO - 10 DS 313
C-05.4 Détail Séparateur FWKO - 10 DS 313

TRAITEMENT HUILE - SEPARATION BP AVOCETTE SUR COUCAL
C-06.1 Séparation BP
C-06.2 Séparation FWKO - 11 DS 312
C-06.3 Détail Séparateur BP 11 DS 306
C-06.4 Détail Séparateur FWKO - 11 DS 312

TRAITEMENT HUILE - DESHYDRATATION COUCAL
C-07.1 Déshydratation

Equipment Pop-up data window



Linked tags

Equipment detail

DCS view

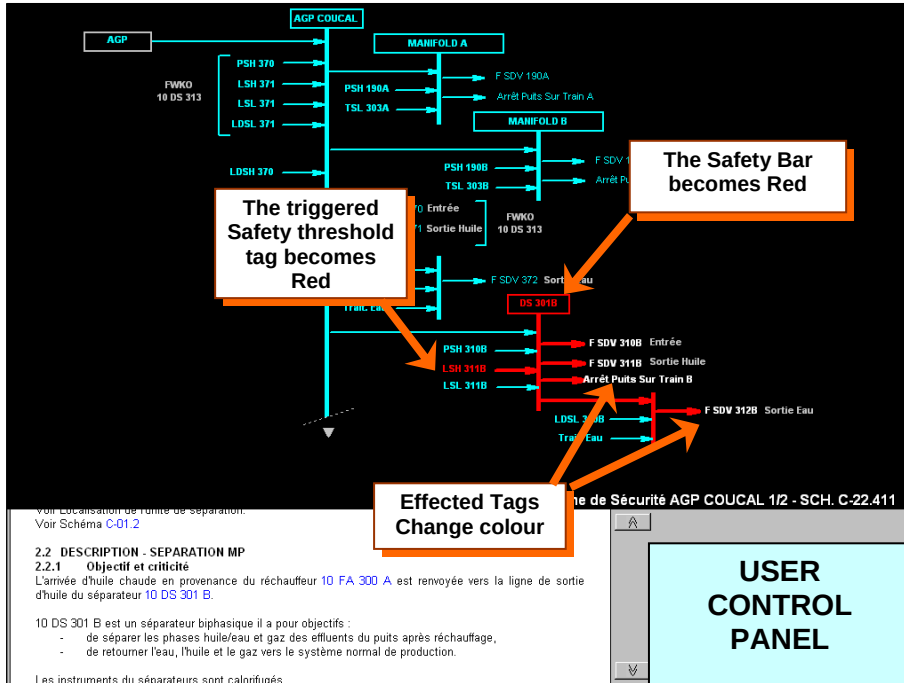
USER CONTROL PANEL

C-05.3 Séparation FWKO - 10 DS 313
C-05.4 Détail Séparateur FWKO - 10 DS 313

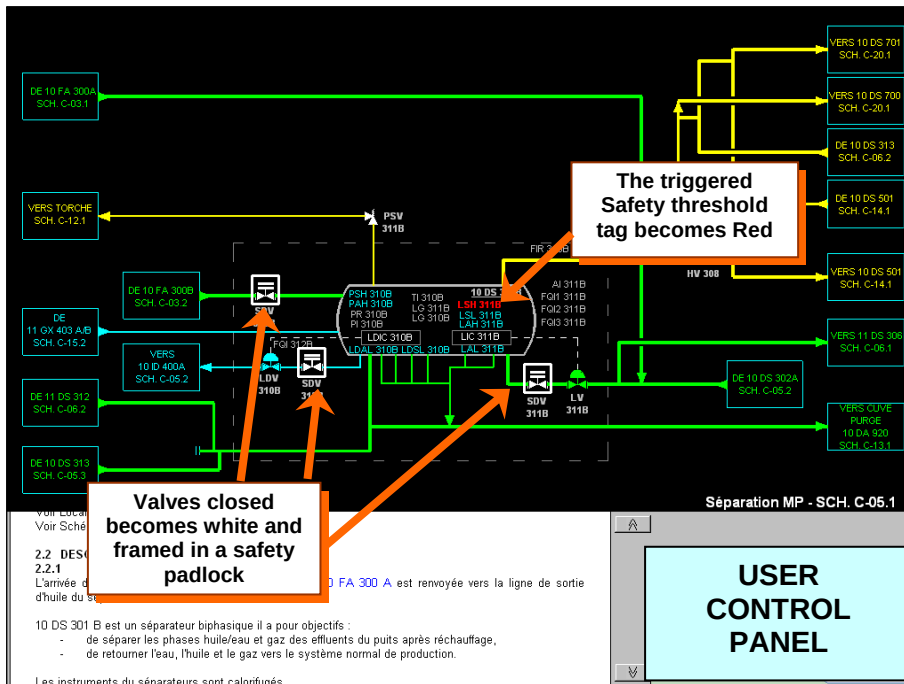
TRAITEMENT HUILE - SEPARATION BP AVOCETTE SUR COUCAL
C-06.1 Séparation BP
C-06.2 Séparation FWKO - 11 DS 312
C-06.3 Détail Séparateur BP 11 DS 306
C-06.4 Détail Séparateur FWKO - 11 DS 312

TRAITEMENT HUILE - DESHYDRATATION COUCAL
C-07.1 Déshydratation

Simulation of safety level on Safety Logic Diagram



Simulation of safety level on Process / Utilities Flow Drawings



Appendix 5 Graphic specification for drawings

1. General presentation

Drawings shall all be the same size:

- for the paper version they shall fit with the A4 format, landscape orientation, in colour on white background,
- for the interactive version they shall have a horizontal length equal to that of the screen, in colour on black background.

Text and objects on drawings shall always have the same size.

2. Particular graphic specification for Process and Utilities Flow drawings

General Specification GS EP INS 134 "Design and supply of Integrated Control and Safety System" shall be also applicable to the design of the Operating Manual Process Flow and Utilities flow drawings. However, the requirements here below are additional ones that are not specified in GS EP INS 134:

- **Source**

The source for the Operating Manual Process and Utilities Flow drawings are the Engineering PID and ICSS views.

The split as per the engineering drawings and/or ICSS views shall **not** be followed strictly. In particular:

- Pieces of equipment and instruments shall be shown once, i.e. in one Operating Manual Process and Utilities Flow drawing only, which is not necessarily the case for the ICSS views (they may however also be shown in the overall flow diagrams and block diagrams);
- Engineering P&IDs are not always split according to the logic of the process, whilst the Operating Manual drawings shall;
- Interconnection engineering drawing for package shall not be represented as such, but completed as required with the Package VENDOR drawings.

- **Fluid Lines:**

- Main lines and secondary lines shall be identified by different thickness (secondary lines to be thinner).

Note: for the purpose of the Operating Manual drawings, secondary lines are the following:

- Chemical injection lines,
- Drain and flare lines,
- Recycle lines, and particular lines used only for specific operations or specific purpose explained in the text,
- Utilities lines on Process Flow drawings (but not on Utilities flow drawings).
- Line numbers shall not be indicated, but line diameters shall.
- Arrows shall indicate the circulation flow.
- Check valves shall be indicated when required for understanding of the process; pumps check valves shall not be shown.
- Restriction orifices shall be shown.
- The fluid circulation shall be from left to right for the main lines. Some exceptions shall however be accepted: e.g. cooling / heating medium of exchangers...

- **Vessels:**

- Internals shall be shown when they are required for understanding the process and the fluid circulation.
- The size of the vessel on the drawings shall be adjusted to also cater for the representation of the instrumentation.

- **Instrumentation:**

- Transmitters shall not be shown on the drawings, except for complex regulation when required for understanding.
- Signal line: arrows shall indicate the information flow.
- Safety thresholds shall be indicated on the drawings and in the text, but not the Process Alarm.
- Local Instrumentation shall not be shown except if specifically mentioned in the text.
- Instrumentation tags shall be represented on one line each, without any particular symbol.
- For vessels, instrument tags shall be represented inside the vessel.

- **Drawing to drawing chaining:**

- The link designation shall be framed in a box, and shall include tag and the function of the associated piece of equipment (e.g. recycle pumps and not just their tag).

- As a general rules, the links shall be placed at the left or right sides of the drawing, and in some instances at the top or bottom (e.g. subsea). However it shall be possible to have link boxes in the middle of the drawing in some case for simplification purpose.
- **Collection / distribution networks** (Flares, Open Drain, Closed Drain, Air...): drawing(s) shall be simplified to only show the collection or distribution zones.
- **Operating Manual drawing numbering:** numbering shall be consistent, in the natural order, with no gaps.

3. Particular Graphic specification for the Overview Flow diagrams

The Overview Flow diagrams are based on the PFD.

They shall be included only for complex systems, in addition to the Process and Utilities Flow drawings, in order to help the user to get an overall view of the flow circulation.

4. Particular graphic specification for the Safety Logic Diagrams

The general specification GS EP INS 134 shall be applicable, except for the valve discrepancies, acknowledgements, fugitive faults, and inhibitions that shall not be compulsorily represented.

5. Colour code

The colour code to be used shall correspond to the colour code as indicated in General Specification GS EP INS 134.

Additional colour shades, to be approved by COMPANY, shall be used to better differentiate the circuits on drawings (e.g.: water, air, chemicals, electrical lines).

6. Animation of mimic elements

Refer to General Specification GS EP INS 134 for the animation principles to be used for the simulation in the interactive version.

Note: For the paper version, the objects on the drawings shall always be represented not triggered, and without any safety padlock.

Appendix 6 Documentation

The table here below give the list of main documents that are required for producing the Operating Manuals, to be transmitted by COMPANY to CONTRACTOR.

Nature of documents	Comments
PFD / PID / SLD	PFD / UFD / P&ID / Electrical Single Line Diagrams (One Line Diagrams), including symbols.
Safety Logic Diagram	Process and Emergency Shutdown diagrams, F&G detection diagrams.
Hazop's	
Derogation files	
ICSS views	Operator Workstation views and mimic panel if applicable.
Data and telecommunication network	Functional analysis, Drawings.
Process / System descriptions	
Functional Analyses	Per system, including control systems.
Data Sheets	Technical data on relief valves, vessels; drums, columns, pig receiver and launchers and miscellaneous mechanical pieces of equipment. Technical data on machinery (pumps, motors, compressors, engines, and other).
VENDOR's documentation	- VENDORS P&ID, - Functional Description, and control systems, - Equipment data and drawings, - VENDOR operating manuals when available.
Start-up and shutdown logic charts (grafcets)	Start-up and shutdown logic charts for the main machinery.

Nature of documents	Comments
Layouts	Plot plans, Office layouts, Elevations, Location of fire / gas / smoke detectors.
Operating procedures	Existing operating procedures and instructions, start-up, shut down, normal operation and downgraded states. Particular procedures (e.g. black start procedure,...).
Settings and set point	Safety levels, Main alarm levels, PSV settings. Normal operation and downgraded states settings.
Operating and Safety philosophy, Safety Concept	Operating philosophy, Safety philosophy and Status of Requirements (SOR).
Electrical philosophy	Electrical network philosophy, PDCS, design basis, multiplexing.
Wellheads	Well details. Wellhead safety cabinets (including views and schematics).
Operating Manuals	Existing Operating manuals (if available).
General information	Geographical and location maps. Data on the field and reservoirs, well status. Field development data (past, future).

As the case may be other available documents can be required by the CONTRACTOR.

Appendix 7 Updating of the Operating Manual

After start-up, during their operational period, modifications are made to the FACILITIES, requiring the regular updating of the Operating Manual.

COMPANY may decide to update the Operating Manual by itself, or to request assistance from CONTRACTOR.

1. Updating by COMPANY

- **Paper version**

The paper version can be updated by COMPANY from the native files for the text and the drawings.

- **Interactive version**

As stated in section 6.4.4, the format of the interactive version of the Operating Manual shall be such that updating of minor modifications can be done by COMPANY.

Upon request from COMPANY, a specific training of the person(s) in charge of this activity within COMPANY shall be organised by CONTRACTOR for that purpose.

2. Updating by CONTRACTOR

COMPANY requires that the Operating Manual be developed by a CONTRACTOR who is able to provide future maintenance and updating services for the Operating Manual.

It is recommended that a specific maintenance contract shall be passed with CONTRACTOR for updating the Operating Manual. Two forms of contract can be considered as follows:

- **Technical assistance contract**

In the case, COMPANY shall prepare the mark-up of the modifications on the latest paper version, and forward them to the CONTRACTOR for updating both the paper and interactive versions.

- **Full delegation contract**

In the case, COMPANY shall forward to the CONTRACTOR all the engineering documents related to the modification (i.e.: updated P&IDs, logic diagram, functional descriptions, etc.).



From these documents and possibly a specific mission on SITE, CONTRACTOR shall identify and perform all the modifications required on both the paper and interactive versions.

3. Revision index

The index of revision for the whole Operating Manual shall be incremented each time a modification is made, including the parts (text, drawings...) that have not been modified.

A revision table shall be produced to list the modifications that have been made.