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	AREA: ATAPU 2 AND SÉPIA 2									
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1 INTRODUCTION

- 1.1 This technical specification describes minimum requirements comprising BUYER's teams training on all FPSO's Operational Systems (SOP) subject of this contract.
- 1.2 This technical specification complements what is required in other Exhibits of Contract, as EXHIBIT I SCOPE OF SUPPLY, EXHIBIT V DIRECTIVES FOR PROCUREMENT, EXHIBIT VIII DIRECTIVES FOR COMMISSIONING.

2 REFERENCE DOCUMENTS

- EXHIBIT I SCOPE OF SUPPLY
- EXHIBIT V DIRECTIVES FOR PROCUREMENT
- EXHIBIT VIII DIRECTIVES FOR COMMISSIONING

3 SCOPE OF SUPPLY

- 3.1 SELLER shall provide to BUYER's operational and maintenance teams training comprising all FPSO's Operational Systems (SOP) subject of this contract.
- 3.2 SELLER shall forward this technical specification for all equipment/packages and system suppliers to give them knowledge of all requirements related to training associated to their scope of supply.
- 3.3 All training related costs shall be included in the Lump Sum price.

4 TRAINING CONTENT, PROGRAM AND SCHEDULE

- 4.1 The training program shall cover all topics related to Operation and Maintenance subject of each operating system. Minimum hours of training listed in [Annex I](#) of this technical specification - I-ET-3010.2D.1200-919-P4X-001 - REQUIREMENTS FOR TRAINING CONTENT AND PROGRAM - shall be complied.
- 4.2 The training program content and its minimum hours may also be adjusted by **BUYER**, through comments on Commissioning Management Plan (Package 2) phase as stated on Exhibit VIII – Directives for Commissioning, based on the specific features of each equipment/system.
- 4.3 **BUYER** may adjust and confirm to SELLER, along the procurement phase through comments on Procurement Plan, the list of equipment/systems to be included in the training program.
- 4.4 SELLER shall integrate the training program and content for each operating system, considering all supplied equipment packages, outside vendors packages process plant and loose items, e.g. instruments, PLCs, or any other device included into the system considered necessary, according to complexity and performance criticality.



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- 4.5 The following content shall be included into Training Program for all associated equipment/package disciplines (process, mechanical, electrical, piping, instrumentation, automation, and control):
- ✓ General and detailed functional equipment and system description, features and lay-out presentation;
 - ✓ System/ Equipment start-up procedures and cautions;
 - ✓ Main Operational parameters to be monitored,
 - ✓ Cause & effect matrix alarms and trips;
 - ✓ Emergency and normal shut-down procedures and cautions;
 - ✓ Operational routines and checking, troubleshooting, and maintenances;
 - ✓ Preventive maintenance activities schedule, procedures, applicable consumables, tools, and cautions;
 - ✓ Corrective maintenance assembly and dismantle procedures, torques, adjustments and gaps, applicable consumables, tools, and cautions;
 - ✓ Recommended and complete spare parts and consumables list presentation.
- 4.6 All training programs for all operating systems shall be detailed for theoretical and practical classes.
- 4.7 Each training program shall be submitted to **BUYER**, together with Commissioning Management Plan (Package 2) phase, for content verifications, comments, and final approval.
- 4.8 Special attention shall be paid by SELLER to specific electric, automation and/or control devices inside or outside vendors packages that shall be covered into training program content.
- 4.9 SELLER shall forward to **BUYER** a complete and updated set with all electronic files that is subject of all operational systems and vendors training presentation files 7 (seven) days before its respective training day.
- 4.10 SELLER shall provide approved training program and didactic material in HD, pen drive, SD, or other electronic storage media. Regardless of the files format, a PDF copy of these files shall also be delivered.
- 4.11 All training sessions shall be recorded by SELLER and provided in electronic video file to **BUYER**.
- 4.12 SELLER shall present to **BUYER** to comment and approve the training program schedule for all systems, together with Commissioning Management Plan (Package 2) phase, to allow BUYER Teams schedule planning. Training program schedule



shall be conceived in a way to avoid training’s superpositions. When it is not possible, training superpositions shall be presented to **BUYER** for approval.

4.13 Doubts and additional explanations shall be cleared out along theoretical class.

4.14 All system training completion shall take place according to “phase for training” presented on Annex I of this technical specification.

5 TRAINING PLACE

5.1 System training shall be applied at the SELLER’s integration job site and/or onboard the UNIT.

5.2 If the SELLER identifies that some specific training is not possible to be performed in the integration site or onboard the unit or will be necessary a more complex infrastructure to perform it, the SELLER shall indicate this fact to the **BUYER** when presenting the training program in the Commissioning Management Plan. The SELLER shall explain why it is not possible to perform the training in the integration site, the benefits to the **BUYER** of changing the training site and the new proposed site. The **BUYER** will evaluate this information to accept or decline the SELLER ´s proposal.

5.3 Training shall take place in theoretical and practice.

5.4 Theoretical content shall be presented in classroom with all necessary resources, as example, but not only, in air conditioning room, sufficient desks chairs for attendees, and data-show for complementary presentations. Complementary issues and raised doubts shall be discussed and cleared out in classroom.

5.5 Practice content shall be presented in the FPSO systems area/plant or also into the shipyard or FPSO workshops, as applicable and necessary. Raised doubts shall be cleared out along the training session.

6 INSTRUCTOR KNOWLEDGE AND SKILLS

6.1 SELLER and respective vendors and sub-vendors instructors shall have necessary skills and experience with corresponding system/equipment/package, as well with training activity and shall also provide all required documentation and materials to carry out the training program (including "As-Built"/last revision issued documentation, maintenance and operating manuals, brochures, catalogues, presentations, video-recorded medias, software applications, etc.).

6.2 All necessary electronic data shall be available for data show presentation in classroom.

6.3 SELLERs, vendors and sub-vendors instructors shall have extensive knowledge of operation and maintenance subject in all equipment and system scope of supply.



7 TRAINING CLASS GROUPS

- 7.1 For each Operational System (SOP) subject of the contract, SELLER shall prepare training classes groups to attend thirty (30) BUYER’s attendees. As training classes shall cover maintenance and operation aspects. If necessary, SELLER shall segregate the training in two (2) different groups – one for maintenance and other for operation team. In this case, the sum of the two trainings cannot extrapolate forty attendees.
- 7.2 BUYER could transmit the training session online to a remote classroom. SELLER shall provide an 100Mbps internet wireless link at the training classroom.
- 7.3 Attendees shall be awarded with training vendors certificates, upon completion of the course. Certificates shall be handed over to BUYER representative, not to attendees.
- 7.4 Training shall be performed in Brazilian Portuguese language or in English with translation to the Brazilian Portuguese language.

8 TRAINING EXAMS RECORD

- 8.1 SELLER, Vendors, and sub-vendors shall provide a comprehensive list of questions to be applied as an exam for training attendees. It is expected a list with, at least, twenty questions. This list of questions shall cover extensive aspects that show the attendee got sufficient knowledge about equipment and systems features, procedures and care. This list shall be handed over to BUYER representative with corresponding answers to be used as exam. BUYER may request the training instructor to apply such exam and evaluate the answers.
- 8.2 BUYER may additionally record the practical training sessions and shall have the right to use all materials for future BUYER internal trainings.

ANNEX I

Operation and maintenance training systems list

Note:

- 1- Minimum total training hours is based in 8 training hours per day.

	System	Examples of Equipment that shall be covered	Minimum total training hours expected	Phase for Training
1212	CRUDE OIL AND GAS METERING	<ul style="list-style-type: none"> ○ OIL AND GAS METERS AND FMS PANELS 	40h	Before TAP-1
1223	PETROLEUM PROCESS	<ul style="list-style-type: none"> ○ SEPARATORS ○ OIL DEHYDRATORS 	16h	Before TAP-1
1225	VAPOR RECOVERY		24h	Before TAP-1
1231	GAS PROCESSING		40h	Before TAP-1
1233	GAS DEHYDRATION		16h	Before TAP-1
1235	CO2 Removal		32h	Before TAP-1
1238	HYDROCARBON DEW POINT		20h	Before TAP-1
1244	WELL PIG LAUNCHERS		4h	Before TAP-1
1251	WATER INJECTION	<ul style="list-style-type: none"> ○ SEA WATER INJECTION PUMPS ○ DEAERATOR ○ SULPHATE REMOVAL UNIT ○ ULTRAFILTRATION 	24h 12h 24h 4h	Before TAP-1
1252	GAS INJECTION		40h	Before TAP-1
1254	CO2 COMPRESSION		40h	Before TAP-1
1261	CHEMICAL INJECTION FOR OIL AND GAS		8h	Before TAP-1
1262	CHEMICAL INJECTION FOR OILY WATER		8h	Before TAP-1


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1263	CHEMICAL INJECTION FOR INJECTION WATER / SEA WATER		8h	Before TAP-1
1357	MOORING	<ul style="list-style-type: none"> ○ MOORING SYSTEM WITH HPU 	16h	Before Sail Away to final location
1358	CARGO TANKS, CARGO PUMPS AND VOID SPACES	<ul style="list-style-type: none"> ○ OIL EXPORTATION PUMP ○ TANK LEVEL AND STABILITY SYSTEM 	24h	Before TAP-1
1359	OFFLOADING AND TELEMETRY	<ul style="list-style-type: none"> ○ OFFLOADING SYSTEM WITH HPU 	24h	Before TAP-1
5111	SEA WATER	<ul style="list-style-type: none"> ○ SEA WATER PUMPS. ○ HYPOCHLORITE GENERATOR 	24h 24h	Before TAP-1
5115	FRESH WATER		24h	Before TAP-1
5121	POTABLE WATER e MARINE GROWING PROTECTION SYSTEM (MGPS)		32h	Before TAP-1
5122	FRESH WATER MAKER FOR OIL DILUTION		24h	Before TAP-1
5133	DIESEL	<ul style="list-style-type: none"> ○ WELL SERVICE PUMP ○ DIESEL OIL PURIFIER 	24h 16h	Before TAP-1
5134	COMPRESSED AIR	<ul style="list-style-type: none"> ○ AIR COMPRESSORS 	24h	Before TAP-1
5135	FUEL GAS	<ul style="list-style-type: none"> ○ STRUCTURAL TANKS GAS RECOVERY COMPRESSOR HC BLANKET 	32h	Before TAP-1
5139	HYDRAULIC POWER UNIT	<ul style="list-style-type: none"> ○ HYDRAULIC POWER UNIT FOR TOPSIDE ○ HYDRAULIC POWER UNIT FOR SUBSEA ○ HYDRAULIC POWER UNIT FOR VALVE ACTUATION 	40h 40h 16h	Before TAP-1
5140 5143 5145 5148	ELETRICAL NORMAL ELECT. DISTRIBUTION NORMAL LIGHTING	<ul style="list-style-type: none"> ○ INTERFACE WITH ELECTRICAL AUTOMATION SYSTEM 	136h	Before TAP-1



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5149	ESSENTIAL ELECT. DISTRIB.			
5263	ESSENTIAL LIGHTING EMERGENCY LIGHTING			
5147	ELECTRICAL TURBOGENERATOR AND PMS	<ul style="list-style-type: none"> ○ TURBOGENERATORS AND PMS 	64h	Before TAP-1
5241	INERT GAS	<ul style="list-style-type: none"> ○ PROCESS/FARE IGG ○ CARGO TANKS IGG ○ O2 ANALYZERS 	16h 40h	Before TAP-1
5252	VENTILATION, 5254 AIR CONDITIONING AND 5255 EXHAUST		32h	Before TAP-1
5261	ELECTRICAL EMERGENCY GENERATOR	<ul style="list-style-type: none"> ○ EMERGENCY GENERATION UNIT 	32h	Before TAP-1
5262	ELECTRICAL AUXILIARY GENERATOR	<ul style="list-style-type: none"> ○ ELECTRICAL AUXILIARY GENERATOR 	48h	Before TAP-1
5265	DIRECT CURRENT AND UPS	<ul style="list-style-type: none"> ○ BATTERY CHARGER, UPS 	32h	Before TAP-1
5266	CARGO HANDLING	<ul style="list-style-type: none"> ○ CRANES ○ PRESENTATION OF MODULES AND CRITICAL EQUIPMENT HANDLING PLANS DEVELOPED BY SELLER ○ DECK TROLLEY 	40h 40h	Before TAP-1
5267	CATHODIC PROTECTION		24h	Before TAP-1
5268	PULL IN / PULL OUT STATION		40h	Before TAP -1 or load test, whatever comes first
5310	SEWAGE		16h	Before TAP-1
5331	PRODUCED WATER TREATMENT	<ul style="list-style-type: none"> ○ HYDROCICLONES ○ FLOTATION EQUIPMENTS ○ OIL IN WATER ANALYSER 	32h	Before TAP-1



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5412	FLARE AND RECOVERY SYSTEM		24h	Before TAP-1
5423	FIREFIGHTING WATER	<ul style="list-style-type: none"> ○ FIRE FIGHTING PUMPS ○ DELUGE SYSTEM 	40h	Before TAP-1
5424	FIREFIGHTING FOAM		16h	Before TAP-1
5425	FIREFIGHTING INERT GAS (CO2)		16h	Before TAP-1
5431	LIFE SAVING	<ul style="list-style-type: none"> ○ LIFE-BOATS ○ RESCUE BOATS 	32h	Before Sail Away to final location
5511	TELECOMMUNICATION SPECIALIZED		8h	Before TAP-1
5512	TELECOMMUNICATION TRANSMISSION		8h	Before TAP-1
5514	CLOSED-CIRCUIT TELEVISION (CCTV)		8h	Before TAP-1
5515	OPERATIONAL RADIO		8h	Before TAP-1
5516	TELECOMMUNICATION VOICE		8h	Before TAP-1
5517	TELECOMMUNICATION DATA		8h	Before TAP-1
5518	PUBLIC ADDRESS AND GENERAL ALARM (PAGA)		8h	Before TAP-1
5521	ENVIRONMENTAL MONITORING		8h	Before TAP-1
5522	FIRE AND GAS DETECTION	<ul style="list-style-type: none"> ○ FLAME AND GAS DETECTORS 	32h	Before TAP-1
5523	AUTOMATION / SUPERVISION AND OPERATION CONTROL	<ul style="list-style-type: none"> ○ CSS - AUTOMATION SYSTEM CONFIGURATION - PLC ○ CSS SYSTEM MAINTENANCE ○ CSS - COMMUNICATION NETWORK SYSTEM ○ ALARM ○ CLOTS ○ SOS ○ AMS 	220h	Before TAP-1

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		○ CARGO LOAD CALCULATOR		Before Sail Away
5524	SUBSEA / RESERVOIR MONITORING		8h	Before TAP-1
5529	RISER MONITORING		8h	Before TAP-1
5535	BALLAST SYSTEM		16h	Before TAP-1
5537	POSITIONING		8h	Before TAP-1
5591	AUTOMATION NETWORK		32h	Before TAP-1
5336	SLOP SYSTEM		24	Before TAP-1
5271	CARGO TANK CLEANING AND RECIRCULATION		16	Before TAP-1

TAP – Performance Acceptance Test