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	CLIENT: E&P ÁGUAS ULTRA PROFUNDAS		SHEET: 1 de 8
	JOB: DEVELOPMENT OF THE SOUTHEAST AND NORTHWEST BUDIAO FIELD PRODUCTION SYSTEM (SEAP-2)		-
	AREA: SEAL		DR22387
-	TITLE: **SEAP-2 – TECHNICAL ADMISSIBILITY REQUIREMENTS FOR RIGID PIPELINES**		EDA/EDR
			-

INDEX OF REVISIONS

REV.	DESCRIPTION AND/OR REVISED SHEETS
0	ORIGINAL

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E
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1. INTRODUCTION

1.1. PROJECT DESCRIPTION

The Sergipe Deep Waters Project (SEAP) – Module II aims at the production of gas and oil from the Moita Bonita and Poço Verde fields, which are located approximately 80 km off the coast of Sergipe State.

The development of production from these two fields will be carried out through a FPU (Floating Production Unit) of the FPSO spread moored type to be anchored in a WD of 2,500 m.

The Poço Verde field is located in WD between 2,400 m and 2,600 m and the Moita Bonita field is located in WD between 2,300 m and 2,800 m.

The drainage pattern planned for the project provides for the drilling, completion and interconnection of sixteen (16) wells to the FPSO SEAP-II for production of oil (Poço Verde) and non-associated gas (Moita Bonita) and injection of gas and water. Figure 1 illustrates the reservoirs to be exploited and the layout of the export gas pipeline.

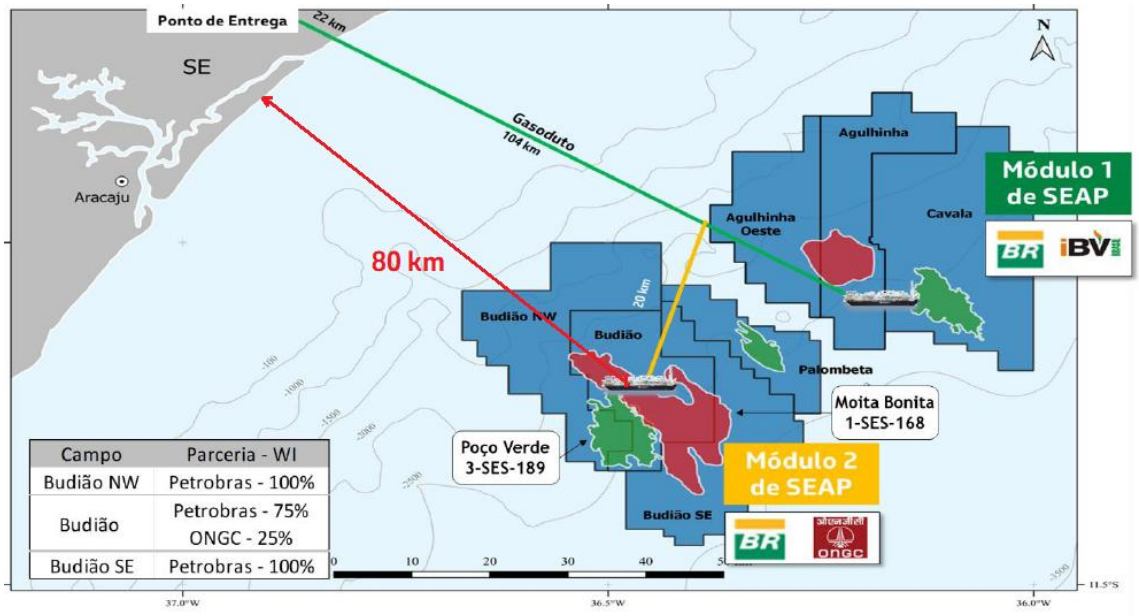

Figure 1 – Poço Verde and Moita Bonita location

Of all the wells in the project, only wells MB-P09, MB-P06 and SES-178 will be interconnected with rigid pipelines. Well MB-P09 will be connected as a satellite well to the platform, while wells MB-P06 and SES-178 will have a trunkline configuration, meaning they will be connected to a subsea PLEM-CHOKE that will gather the production from these two wells and direct it through a trunk line to the platform.

For the FPSO of SEAP-II, a processing capacity of 120 kbpd of oil, compression of up to 12.0 MM sm^3/d of gas and export of 10.0 MM m^3/d is designed. The FPSO contracting model is FPSO BOT (Build-Operate-Transfer). The natural gas production from the Project will be transported through a shared pipeline, connecting the future FPSO to the coast. The pipeline will be shared between the platforms of Module 1 and Module 2 of SEAP, each exporting, respectively, up to 8.0 MM sm^3/day and up to 10.0 MM sm^3/day. Oil export will be by oil tanker.

The rigid pipelines will be composed by SLWRs and its associated flowlines, as in Figure 2.

The SLWRs will be directly connected to FPSO riser balcony, through a Flexible Joint (FXJ) at the TSUDL. DRS will connect the SLWR's associated flowline PLET to the WCT.

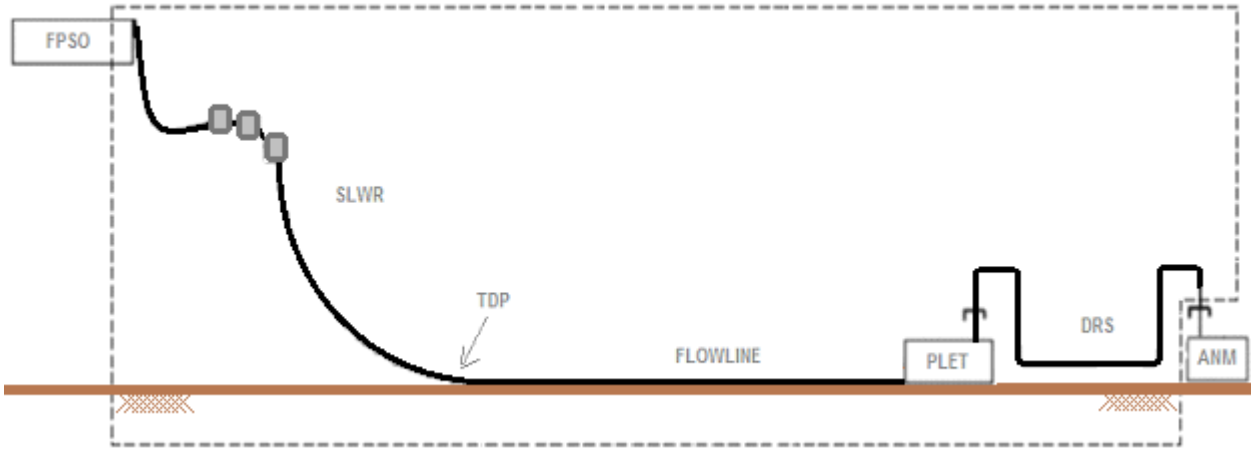

Figure 2 – Rigid Pipeline Solution Concept

NOTE: The figure above is only a general representation of the applicability of this document. The applicability and scope of work are detailed along this document. In case of conflict between the figure presented above and the statements along this document, the statements along this document shall prevail.

1.2. TERMS AND ABBREVIATIONS

1.2.1. The terms and abbreviations used in this Technical Specification are according to [C1] and [C2].

1.2.2. Additional terms and abbreviations are used as presented in Table 1.

Table 1 – Terms and Abbreviations

A&R	Abandonment and Recovery.
BIDDER	Company participating in the tender process.
EPCI	Engineering, Procurement, Construction, and Installation.
PLET	Pipeline End Termination.
RAO	Response Amplitude Operator.
THIRD PARTY	Independent company responsible for verification that an activity, a product or a service is in accordance with the specified requirements.

1.3. REFERENCES

1.3.1. For last revision of references presented herein, refer to [A1].

1.3.2. PIPELINE DATA AND CONTRACT ANNEXES

[A1] CONTRACT – ANNEX 1, *MEMORIAL DESCRITIVO DOS SERVIÇOS CONTRATADO*;

[A2] I-ET-3273.00-1519-940-P9U-001, SEAP-2 – ENGINEERING, PROCUREMENT, CONSTRUCTION AND INSTALLATION OF RIGID PIPELINES, REV.C;

[A3] I-FD-3273.00-1519-940-P9U-004, SEAP-2 – PIPELINE DATA SHEET FOR BID, REV. 0.

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1.3.3. TECHNICAL SPECIFICATIONS

[B1] I-ET-0000.00-0000-966-P9U-001, INSTALLATION ANALYSES, REV. 0;

[B2] I-ET-0000.00-0000-966-P9U-002, TECHNICAL SPECIFICATION FOR PRE-LAY, WET STORAGE AND RECOVERY, REV. 0.

1.3.4. CODES, STANDARDS AND RECOMMENDED PRACTICES

[C1] DNV-ST-F101, SUBMARINE PIPELINE SYSTEMS, 2021-08, AMENDED 2021-12;

[C2] DNV-ST-F201, DYNAMIC SYSTEMS, 2020-01, AMENDED 2021-10;

[C3] DNV-SE-0475, VERIFICATION AND CERTIFICATION OF SUBMARINE PIPELINES, 2017-07.

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2. OBJECTIVE AND SCOPE OF WORK

2.1. OBJECTIVE

2.1.1. This technical specification establishes the minimum requirements for technical admissibility of proposals for the EPCI of SEAP-2 rigid subsea pipelines.

2.1.2. All requirements presented in this document shall be fully met by BIDDER for acceptance of the technical proposal.

2.2. SCOPE OF WORK

2.2.1. BIDDER shall be responsible for contracting a THIRD PARTY to verify the technical admissibility of the proposal.

2.2.1.1. THIRD PARTY selected for the verification service shall be a recognized company with experience in certifying subsea pipeline design. The THIRD PARTY shall present a track record of certifying at least five similar subsea pipeline projects.

2.2.2. THIRD PARTY shall issue a Statement of Conformity and a Verification Report. Verification Reports containing any caveat or constraint will not be accepted.

2.2.3. THIRD PARTY shall perform a verification service as defined in Section 1.1.3 of [C3] (Verification Service), considering a “medium” level of verification involvement in accordance with Section 2.2.4 of [C3] (Risk-differentiated levels of verification involvement).

2.2.3.1. The verification scope shall comprise all requirements defined in Section 3.

2.2.3.2. BIDDER shall supply for THIRD PARTY all information defined in Section 3.

2.2.3.3. If necessary, BIDDER shall supply any other information required by THIRD PARTY and not specified within this document.

2.2.4. THIRD PARTY shall verify the analyses provided by BIDDER and confirm they are in accordance with [B1] and that the vessel is able to lay the pipeline based on PETROBRAS’ technical data and schedule supplied.

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3. TECHNICAL ADMISSIBILITY REQUIREMENTS

3.1. LIST OF VESSELS

3.1.1. BIDDER shall provide the explicit list of vessels considered essential for the accomplishment of the scope of SEAP-2 Project, in accordance with the proposal supplied by BIDDER.

3.1.1.1. All vessels shall comply with requirements defined in item 4.3 of [A2].

3.2. POSITIONING SYSTEM

3.2.1. BIDDER shall supply the specification of the positioning system, which shall be in accordance with Section 10.4.5 of [C1] (Dynamic positioning).

3.2.2. BIDDER shall provide the dynamic positioning capacity, documented by capability plots, in accordance with Section 10.4.5 of [C1] (Dynamic positioning).

3.3. VESSEL INSTALLATION CAPABILITIES

3.3.1. BIDDER shall supply data sheets and general arrangement drawings of the vessel with dimensions and all necessary pipelaying equipment to perform the scope of work.

3.3.2. BIDDER shall provide the layout of pipelaying equipment, including all pipelaying auxiliary devices. Scaled drawings with main dimensions shall also be provided.

3.3.3. BIDDER shall provide the specification of tension machine, clamp and A&R winch and valid certificates issued by an internationally recognized Certification Company.

3.3.4. BIDDER shall provide a description of the pipelaying tension monitoring system confirming that tension is monitored and recorded continuously.

3.4. VESSEL RAO

3.4.1. BIDDER shall provide the vessel RAOs for wave incidence angles from 0 to 360 degrees and wave frequencies from 0.1 to 2.0 rad/s in table and graph format. The RAOs shall be provided for both maximum and minimum operational drafts used during pipelaying operations. The maximum incidence angle increment shall be 22.5 degrees, and the maximum frequency increment shall be 0.05 rad/s, i.e. at least 16 directions and 39 frequencies for each RAO.

3.4.2. BIDDER shall provide the reference system for the vessel RAOs, showing the compatibility with the reference system used in the dynamic analysis. Scaled drawings showing the center of motion, the center of gravity and the reference system for the RAOs shall also be provided.

3.5. PIPELAYING ANALYSIS

3.5.1. BIDDER shall perform pipeline installation analysis, considering 2830 m water depth, the 6.5in ID Gas Production convertible to Gas Injection and 8in ID Gas Production pipelines presented in [A2], the proposed configuration, and fulfill the requirements defined in [B1] for “normal pipe lay”, normal pipe lay of the floating section (i.e. SAG&HOG or HUMP of the SLWR) and “platform transfer and pull-in” operations. The analysis shall also include the installation of the PLET and 800 m radius curves within a lay corridor tolerance defined in [A2].

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3.5.1.1. For SLWR SAG&HOG deployment, two different percentages shall be evaluated: 50% and 100% of total net buoyancy submerged.

3.5.1.2. For this installation analysis, the total start-of-life buoyancy upthrust and the length of the proposed SLWR buoyancy module section shall be considered.

3.5.1.3. BIDDER shall provide the INPUT and OUTPUT of the analysis.

3.5.1.4. BIDDER shall issue an installation analysis report.

3.5.2. If pre-lay, wet storage and recovery scenario is required in [A1], they shall be included in the pipeline installation analysis and also fulfill the requirements defined in [B2] for recovery operations.

3.5.3. BIDDER shall clearly state the pipeline installation condition (empty or flooded) to be adopted and consider the defined condition in the aforementioned installation analysis.

3.5.3.1. In case of empty pipeline installation, BIDDER shall demonstrate that in case of accidental flooding, the integrity of the pipeline is not jeopardized, and the vessel is capable of supporting the pipeline.

3.5.4. BIDDER shall present the maximum significant wave height (Hs) for the proposed vessel considering the following conditions: 16 wave directions equally spaced with respect to vessel axis, starting at 0 degrees (vessel bow) clockwise direction, in a range of wave spectrum peak period (Tp) from 5 to 15s (for each second).

3.5.5. BIDDER shall provide an installation schedule to confirm compliance with PETROBRAS' activities milestones.

3.6. DETAILED DESIGN AND EXECUTIVE PROCEDURE

3.6.1. If BIDDER does not expect to perform Detailed Design and Executive Procedures with its internal resources, a Service List with the potential SUBCONTRACTORS to perform that service shall be submitted for THIRD PARTY evaluation.

3.6.1.1. BIDDER shall also submit a Track Record List of each SUBCONTRACTOR proposed.

3.6.1.2. In addition, BIDDER shall submit the Service List and Track Record List to PETROBRAS with the proposal.

3.6.1.3. The potential SUBCONTRACTORS shall have a track record of execution in the last 5 years of at least one similar service to the SEAP-2 project.

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4. DELIVERABLES

4.1. BIDDER shall present the following deliverables for PETROBRAS, issued by THIRD PARTY:

4.1.1. Statement of Conformity, in accordance with Section 4.2.2 of [C3] (Statement of Conformity).

4.1.2. Verification Report, in accordance with Section 4.2.3 of [C3] (Verification Report).

4.1.3. Statement of Conformity or Verification Report containing any caveat or constraint will not be accepted and will exclude BIDDER from the process.

4.2. The Verification Report shall be in the following format:

4.2.1. Repeated description of each one of the items of Section 3 of this document;

4.2.2. Declaration that for each item:

4.2.2.1. BIDDER supplied all information required;

4.2.2.2. BIDDER fulfills all the technical requirements.

4.3. In case PETROBRAS identifies any deviation regarding the requirements herein specified, then BIDDER will be considered NOT classified.

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