

 <b>PETROBRAS</b>	<b>TECHNICAL SPECIFICATION</b>		Nº: <b>I-ET-0000.00-0000-966-P9U-002</b>			
	CLIENT: -		SHEET: 1 de 5			
	JOB: -		-			
	AREA: GENERAL		-			
-	TITLE: TECHNICAL SPECIFICATION FOR PRE-LAY, WET STORAGE AND RECOVERY		EDD/EDR			
<b>INDEX OF REVISIONS</b>						
<b>REV.</b>	<b>DESCRIPTION AND/OR REVISED SHEETS</b>					
0	Original					
	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E
DATE	14/07/2023					
EXECUTION	CSOE					
CHECK	ER48/BF6J					
APPROVAL	CLZ2					
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## 1. INTRODUCTION

### 1.1. PURPOSE

1.1.1. The purpose of this technical specification is to define the main requirements necessary to pre-lay and wet store pipelines on the seabed and to later recover it.

### 1.2. REFERENCES

- [A1] I-ET-0000.00-0000-966-P9U-001, INSTALLATION ANALYSES;
- [A2] I-ET-0000.00-0000-940-P9U-001, CATHODIC PROTECTION DESIGN;
- [A3] I-ET-0000.00-0000-940-P9U-002, RIGID PIPELINE ON-BOTTOM ROUGHNESS AND FREE SPAN DESIGN;
- [A4] I-ET-0000.00-0000-940-P9U-004, ON-BOTTOM STABILITY ANALYSIS;
- [A5] I-ET-0000.00-0000-275-P9U-001, PIPELINE AND CABLE CROSSINGS;
- [A6] I-ET-0000.00-0000-274-P9U-001, SLWR DETAILED STRUCTURAL DESIGN REQUIREMENTS;
- [A7] I-ET-0000.00-0000-278-P9U-001, TECHNICAL SPECIFICATION FOR VORTEX SUPPRESSORS – STRAKES;
- [A8] I-ET-0000.00-0000-250-P9U-002, MINIMUM REQUIREMENTS FOR BUOYANCY MODULES FOR FLOWLINES AND SLWRS;
- [A9] I-ET-0000.00-0000-290-P9U-003, FLEXIBLE JOINT DESIGN & FABRICATION;
- [A10] I-ET-0000.00-0000-290-P9U-004, TITANIUM STRESS JOINTS SPECIFICATION;
- [A11] I-ET-0000.00-0000-290-P9U-001, FLEXIBLE JOINT QUALIFICATION;
- [A12] I-ET-0000.00-0000-290-P9U-002, TITANIUM STRESS JOINT QUALIFICATION;
- [A13] I-ET-0000.00-0000-290-P9U-006, HANG-OFF ADAPTOR SPECIFICATION.

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## 2. TECHNICAL REQUIREMENTS

### 2.1. GENERAL

- 2.1.1. Pre-lay, wet storage, and recovery overview shall be described in the design premises documents.
- 2.1.2. All vessels involved in the pre-lay, wet storage, and recovery of pipelines shall be verified to guarantee riser integrity and the operation's viability.
- 2.1.3. Pipelines shall be wet stored and filled with fluid defined in the project's technical documentation.
  - 2.1.3.1. Pipelines pre-laid empty may be wet stored empty.
- 2.1.4. Pipelines shall be designed for the period of time defined in project's technical documentation.
  - 2.1.4.1. If this information is not available, at least one year in wet stored conditions shall be considered.
- 2.1.5. Pipeline pre-lay, wet storage, and recovery shall not cause interference with adjacent subsea structures and Floating Production Unit (FPU).
- 2.1.6. Risks associated with pre-lay, wet storage, and recovery shall be properly addressed in specific risks assessment such as a Failure Mode, Effects and Criticality Analysis (FMECA).

### 2.2. PRE-LAY, WET STORAGE, AND RECOVERY ANALYSES

- 2.2.1. Pre-lay and recovery operations shall be performed following [A1].
- 2.2.2. Pre-lay, wet storage, and recovery shall comply with all requirements pertaining to pre-lay, wet storage, and recovery present in [A2], [A3], [A4], [A6], [A7], [A8], [A9], [A10], [A11], [A12] and [A13].
  - 2.2.2.1. Wet storage condition evaluation shall be included as an additional case in each of CONTRACTOR's specific technical reports.
- 2.2.3. Near to existing subsea structures or geohazards, the minimum lateral sliding safety factor of 1.5 shall be considered.
- 2.2.4. Pipeline embedment considering soil vertical time-dependent consolidation settlement period shall be evaluated.
- 2.2.5. Soil resistance to pipeline uplift shall be considered, including resistance by backfill deposition or collapse of the side walls of the trench.
- 2.2.6. For Vortex-Induced Vibrations (VIV) fatigue analysis, the following definitions apply:
  - 2.2.6.1. Spans arising from the influence of buoyancy modules and not soil bathymetry shall comply with the riser methodology described in [A6].
  - 2.2.6.2. Spans arising from the soil bathymetry, regardless of the presence of buoyancy modules, shall comply with the flowline methodology described in [A3].

### 2.3. PRE-LAY, WET STORAGE, AND RECOVERY ROUTE

- 2.3.1. A pre-lay and wet storage subsea layout shall be submitted for PETROBRAS' approval.

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- 2.3.1.1. Restrictions regarding PETROBRAS' pre-lay sequence shall be identified and properly reported.
- 2.3.1.2. Restrictions regarding PETROBRAS' pull-in sequence shall be identified and properly reported.
- 2.3.1.3. Restrictions regarding PETROBRAS' FPU mooring lines pre-lay and wet storage shall be identified and properly reported.
- 2.3.2. Wet storage subsea layout shall consider dropped objects risk near que platform mooring line fairleads' future location.
- 2.4. PROCEDURES
- 2.4.1. Crossings between pre-laid pipelines shall be performed per [A5] to confirm viability.
- 2.4.2. All accessories needed for pipeline pre-lay, wet storage, and recovery shall be described in a specific procedure.
- 2.4.3. Before recovery and immediately after the wet storage period, the pipeline shall be visually inspected by Remotely Operated Vehicle (ROV), mainly the hog section and pipe embedment. Any additional risks shall be addressed and approved before recovery start.