PETROBRAS	TECHNICAL SPECIFICATION	N°: I-ET-3000.00-1519-29B-PZ9-009	
	CLIENT: -		SHEET: 1 of 5
	JOB: -		-
	AREA: -		-
-	TITLE: DESIGN SCENARIOS FOR SUBSEA UMBILICAL PROJECTS		SUB/ES/EDA/EDF -

INDEX OF REVISION

REV.	DESCRIPTION AND/OR REVISED SHEETS
0	Original
A	Inclusion of Scenario 3

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E
DATE	29/11/2022	20/08/2024				
EXECUTION	CJME	CJME				
CHECK	UPOV	BWWJ				
APPROVAL	BEIW	UPOV				

CONTENTS

1 Scope

PETROBRAS adopts the standardization of subsea umbilical structures, i.e., the same umbilical structure is applied and shall be capable to operate on different projects. Thus, PETROBRAS defines hypothetical scenarios for installation and operation, with conservative parameters, for which the umbilical structures shall be designed for depending on the required DWD. These hypothetical scenarios of operation are designated as **Design Scenarios** and are defined by ranges of DWD.

This specification defines, for each Design Scenario, the project requirements for the design of subsea umbilical structures.

2 References

For the documents referenced on this section, SUPPLIER shall adopt the revision indicated on project-specific documentation.

[1] I-ET-3000.00-1519-29B-PZ9-004 Rev. B, *Load-effect analysis of subsea umbilicals*

[2] I-ET-3000.00-1000-941-PPC-001 Rev. E, *Metocean data*

[3] I-ET-3A26.00-1000-941-PPC-001 Rev. F, *Metocean data*

[4] I-ET-1400.00-1000-941-PPC-001 Rev D, *Metocean data for design of offshore systems*

[5] I-ET-3010.00-1500-960-PPC-002 Rev. H, *Service life – fatigue analysis*

[6] I-ET-3A26.00-1500-960-PPC-001 Rev. D, *Flexible risers and umbilicals – fatigue analysis*

[7] I-ET-3274.00-1500-960-PPC-002 Rev. A, *Flexible risers and umbilicals – fatigue analysis*

[8] RL-3010.68-1350-940-ABU-003 Rev. C, *Modelo de Movimentos (PETROBRAS 54)*

[9] I-ET-3010.90-1350-960-PPC-005 Rev. B, *RAO Data*

[10] I-RL-3010.00-1350-960-P4X-003 Rev. 0, *Reference RAO B*

[11] I-ET-3000.00-1500-941-PZ9-001 Rev. 0, *PLSV 550 ton – technical data and RAO curves*

3 Terms, abbreviated terms and definitions

3.1 Terms and definitions

bellmouth angle
angle between the bellmouth center axis and the FPU perpendiculars

damaged condition
mooring system with one mooring line broken

departure angle
angle between the umbilical longitudinal axis and the vertical plane when the FPU or the installation vessel is on its neutral position

metocean
meteorologic and oceanographic

must
verbal form used to indicate requirements strictly to be followed in order to conform to this specification

neutral position
analysis condition where the FPU or the installation vessel is on its intermediate draught with no offset, no current and no waves applied

shall
verbal form used to indicate requirements strictly to be followed in order to conform to this specification

3.2 Abbreviated terms

DC	damaged condition
DWD	design water depth
FPU	floating production unit
IC	intact condition
RP	return period
STU	umbilical with metallic tubes in its bundle
TPU	umbilical without metallic tubes in its bundle

4 Design Scenarios

The Design Scenarios and their respective project requirements described in Table 1 must be considered for the design of subsea umbilical structures, according to the required minimum DWD.

Table 1 - Design Scenarios and respective project requirements

Project Requirements				Design Scenarios		
				Scenario 1 DWD ≤ 2,000 m	Scenario 2 2,000 m < DWD ≤ 2,500m	Scenario 3 DWD > 2,500 m
Water depth to be considered on simulations				2,000 m	2,500m	3,000 m
Load effect analysis				As per [1]		
Metocean data				As per [2]	As per [3]	As per [4]
Fatigue analysis data				As per [5]	As per [6]	As per [7]
Minimum design life				90 years for TPU and 300 years for STU		
Soil friction coefficients				0.35 (longitudinal) and 1.07 (lateral)		
FPU data	Vessel Properties(1)			As per [8]	As per [9]	As per [10]
	Heading(2) (deg)			190	190	335
	Slot 1	Coordinates(3)	X (m)	115.38	81.00	103.30
			Y (m)	29.75	29.60	-32.50
			Z (m)	2.35	3.60	1.50
		Bellmouth angle(4) (deg)		7.0	7.0	7.0
		Departure angle(4) (deg)		7.0	5.5	5.8
		Line azimuths		According to Figure 2 of [1]		
	Slot 2	Coordinates(3)	X (m)	209.85	227.70	240.80
			Y (m)	29.75	29.60	-32.50
			Z (m)	2.35	3.60	1.50
		Bellmouth angle(4) (deg)		7.0	7.0	7.0
		Departure angle(4) (deg)		7.0	5.5	5.8
		Line azimuths		According to Figure 2 of [1]		
	Total offset values for extreme-load analysis		1-yr RP, IC	7.0% of DWD		
			1-yr RP, DC	7.5% of DWD		
			100-yr RP, IC	9.0% of DWD		
			100-yr RP, DC	9.5% of DWD		
Installation vessel data				As per [11]		

(1) Dimensions and drafs with respective RAO information

(2) clockwise, relative to True North

(3) considering the following coordinate system:

X – origin at aft perpendicular, positive forward
Y – origin at centerline, positive portside
Z – origin at baseline, positive upwards

(4) where the departure angle is different from the bellmouth angle, it means that there is a static deflection on the bend stiffener when the system is in its neutral position due to the angular difference between the bellmouth axis and the umbilical line. This static deflection shall be taken into consideration to perform extreme-load and fatigue analyses