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	CLIENT: AGUP		SHEET: 1 of 13						
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	AREA: Búzios 12								
SUB/ES/EDA/EAI	TITLE: <b>DESCRIPTIVE MEMORANDUM – RISER AND HULL INTERFACE</b>		INTERNAL						
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**DESCRIPTIVE MEMORANDUM**

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REV. 0

AREA:

Búzios 12

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TITLE:

**DESCRIPTIVE MEMORANDUM – RISER AND  
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INTERNAL

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**SUMMARY**

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## 1 INTRODUCTION

The purpose of this Descriptive Memorandum is to provide the basis for supplying (including activities of design, construction, assembly, and installation) of the Búzios 12 FPSO (Floating, Production, Storage, and Offloading), regarding to the submarine (SUB) discipline.

## 2 PRIORITY RELATIONS OF DOCUMENTS IN EXHIBIT II

In case of conflicting requirements between documents issued by the BUYER, the decreasing priority order below shall be considered:

- I. MD (Descriptive Memorandum)
- II. ET (Technical Specification)
- III. DE (Drawing)
- IV. LI (List)

The SELLER shall let BUYER know about discovered inconsistencies between documents and shall refer to the BUYER for a final decision in case of conflicts among information not solved by the priority relations.

## 3 REFERENCE DOCUMENTS

Table 1 shows the reference documents, their numbers, and titles.

Table 1 - Reference Documents

Ref.	DOCUMENT NUMBER	TITLE
[1]	I-ET-3D10.12-1350-274-PX9-001	FPSO STRUCTURES AND FACILITIES FOR RISER SYSTEM
[2]	I-ET-3010.00-1500-274-PLR-001	RISER TOP INTERFACE LOADS ANALYSIS
[3]	I-DE-3D10.12-1500-941-P56-001	RISER SUPPORTS ARRANGEMENT
[4]	I-ET-3010.00-1300-279-PX9-002	DIVERLESS BELL MOUTH (BSDL) - GENERAL REQUIREMENTS
[5]	I-LI-3010.00-1300-279-PPC-350	BSDL-SI PART LIST
[6]	I-ET-3010.00-1300-279-PX9-001	UNIFIED DIVERLESS SUPPORT TUBE (TSUDL) - GENERAL REQUIREMENTS

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[7]	I-LI-3010.00-1300-270-P56-001	UNIFIED DIVERLESS SUPPORT TUBE (TSUDL) PARTS LIST
[8]	I-ET-3A36.00-1000-941-PPC-001	METOCEAN DATA
[9]	I-MD-3D10.12-5520-850-PX9-001	DESCRIPTIVE MEMORANDUM – SUBSEA MONITORING SYSTEM FOR FPSO BUZIOS 12
[10]	I-ET-3010.00-1200-200-P4X-012	HARD PIPE - SPECIFICATION
[11]	I-ET-3010.2K-1200-941-P4X-001	GENERAL TECHNICAL DESCRIPTION
[12]	I-ET-3010.2K-1357-962-PX9-001	SPREAD MOORING REQUIREMENTS

## 4 SCOPE OF WORK

The items listed hereafter present the scope on the FPSO DETAILED ENGINEERING DESIGN required to be implemented by the SELLER in the design documents.

It is not scope of this document: subsea control and riser's supports, riser's monitoring systems, positioning and navigation systems, environmental data acquisition system and diving system for risers.

### 4.1 RISER TOP LOADS

According to [1], SELLER shall perform the riser top load analysis in compliance with methodology presented at [2]. Table presents the input required for riser top loads as well as the responsibilities.

Table – Input for riser top load analysis

INFORMATION	BID PHASE	DETAILED DESIGN
Metoccean Data	[8]	[8]
Riser function sequency	[3]	[3]
Riser support system	[1]	[1]
Riser support type per slot	[3]	[3]
Riser support top angle	[3]	[3]
Riser support dimensions	[4], [5], [6] , [7]	[4], [5], [6] , [7]
Riser azimuth	Not applicable	[3]
Riser Data Sheet	[1]	To be confirmed
Reference point Riser Top load results	[1]	[1]
Mooring Analysis (Only upper bound offset)	[12]	[12]
FPSO Riser Support Coordinate	To be provided by SELLER	To be provided by SELLER
Motion RAO	To be provided by SELLER	To be provided by SELLER
Angle for Accidental Condition - FPSO heeled	To be provided by SELLER	
FPSO 2nd Order Roll Motion	To be provided by SELLER	

## 4.2 LOWER RISER BALCONY

Figure 1 shows the main components of the Lower Riser Balcony. The SELLER is responsible for providing the detailed engineering, fabrication, assembly, installation, and commissioning of all components.

Table 3 gives the document references for each of the components, including their dimensions, technical specifications, and painting requirements.

The riser balcony main features are presented in [1].

The quantity and function sequence for each component are shown in [3].

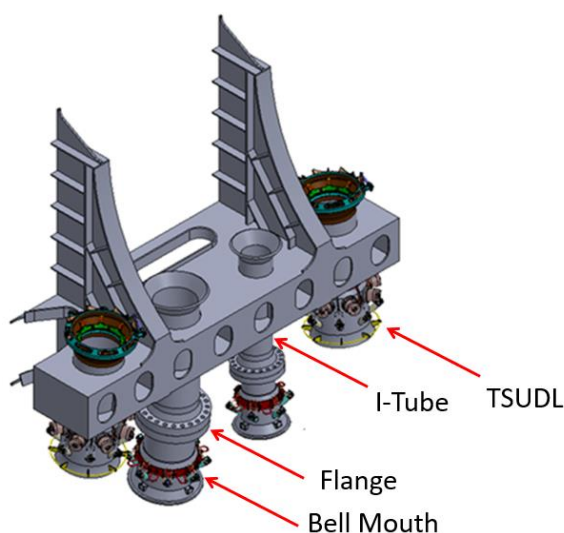


Figure 1 - Lower Riser Balcony

Table 3 – Lower Riser Balcony Scope

COMPONENTS	INFORMATIONS	BID PHASE	DETAILED DESIGN
Bell Mouth	Dimensions	[5]	To be confirmed
	Technical specifications	[4], [9]	
	Painting requirements	[4]	
TSUDL	Dimensions	[7]	To be confirmed
	Technical specifications	[6], [9]	
	Painting requirements	[6]	
BSDL-SI Flange <sup>1</sup>	Characteristics	[5]	[5]
I-Tube	Size	[1]	[1]
All	Components Quantities	[3]	[3]
All	Spare parts	[1]	[1]

<sup>1</sup>SELLER shall provide the ring gaskets, stud bolts, and nuts for all the risers interface flanges.

### 4.3 UPPER RISER BALCONY

Figure 2 shows the main components of the Upper Riser Balcony.

The SELLER is responsible for providing the detailed engineering, fabrication, assembly, installation, and commissioning of all components except the Hang-off split collars detailed engineering and fabrication, which will be provided by BUYER.

Table 4 gives the document references for each of the components, including their dimensions, technical specifications, and painting requirements.

The quantity and function sequency for each component are shown in [3].

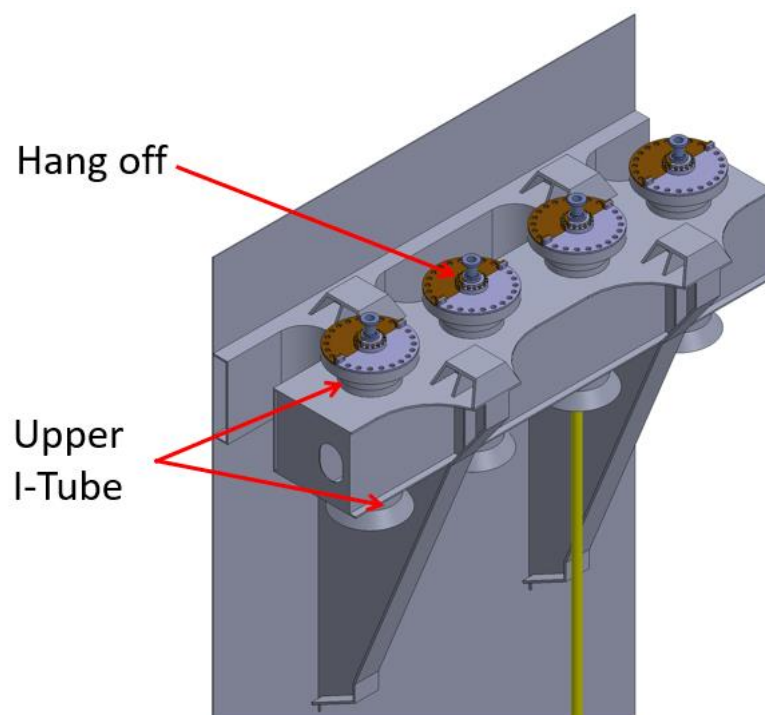


Figure 2 - Upper Riser Balcony

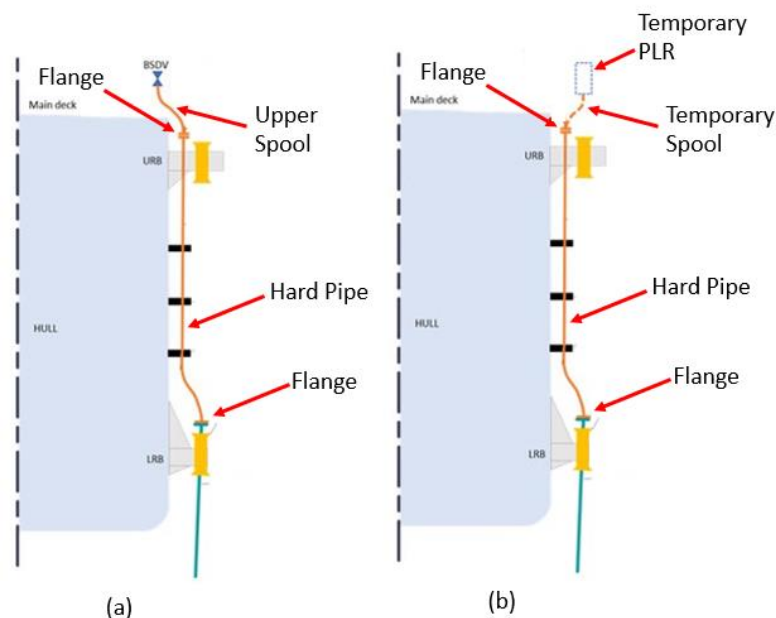
Table 4 – Upper Riser Balcony Scope

COMPONENTS	INFORMATION	BID PHASE	DETAILED DESIGN
Upper I-Tube	Dimensions	[1]	[1]
Hang-off split collars	Design and material	To be provided by BUYER	To be provided by BUYER

#### 4.4 RISER, HARDPIPING AND TOP INTERFACE SPOOL(S) CONNECTIONS AT FPSO

Figure 3 shows the main components of the Rigid Riser Interface and Table 5 gives the document references for each of the components, including their dimensions, characteristics and technical specifications and characteristics.

The SELLER is responsible for providing the detailed engineering, fabrication, assembly, installation, and commissioning of all components, except the temporary detailed engineering and fabrication, which will be provided by BUYER.





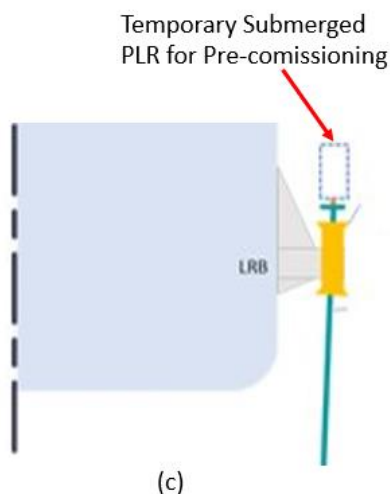


Figure 3 – Rigid Riser Interface (a) in operation, (b) gas exports pre-commissioning (c) production and gas injection pre-commissioning

Table 5 – Riser, hardpiping and top interface spool scope

COMPONENTS	INFORMATION	BID PHASE	DETAILED DESIGN
Upper Spool <sup>1</sup>	Requirements	[10], [11]	
Upper Flange	Requirements	[10], [11]	
Hardpiping	Requirements	[10], [11]	
Lower Flange <sup>2 3</sup>	Characteristics	[1]	To be confirmed
Temporary PLR	Characteristics	Not applicable	To be provided by BUYER
Temporary Spool	Requirements	[10]	
Temporary submerged Pre-commissioning PLR	Characteristics	Not applicable	To be provided by BUYER

<sup>1</sup> For quantities, see references [1].

<sup>2</sup> SELLER shall provide the ring gaskets, stud bolts and nuts for all the interface flanges with risers

<sup>3</sup> For mock-up of rigid riser top connection see reference [7].

Figure 4 shows the main components of the flexible riser interface and 6 gives the document references for each of the components, including their dimensions, characteristics and technical specifications and characteristics.

The SELLER is responsible for providing the detailed engineering, fabrication, assembly, installation, and commissioning of all components.

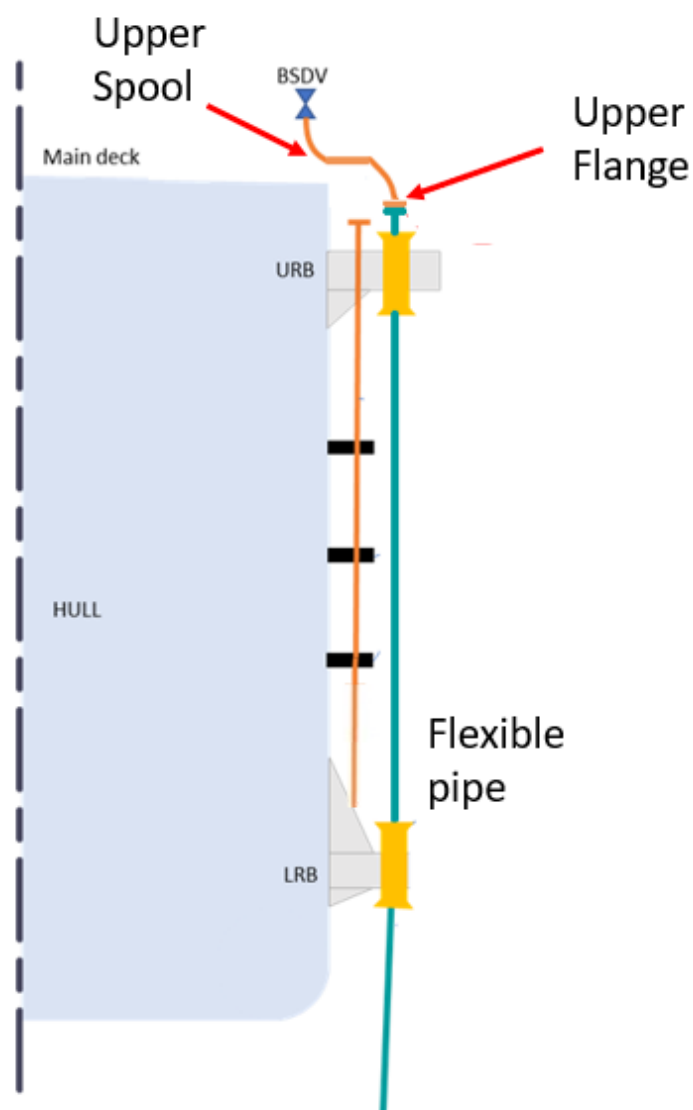


Figure 4 – Flexible riser interface in operation

Table 6 – Flexible Piping Scope

COMPONENTS	INFORMATION	BID PHASE	DETAILED DESIGN
Upper Flange <sup>1</sup>	Characteristics	[1]	[1]
Upper Spool <sup>2</sup>	Requirements	[10], [11]	

<sup>1</sup>SELLER shall provide the ring gaskets, stud bolts, and nuts for all the interface flanges with risers.

<sup>2</sup>For quantities, see references [1].

## 4.5 PULL IN SYSTEM

Figure 5 shows some components of Pull-in System. According to [1] BUYER is responsible for the pull-in rigging. The reference [1] give the preliminaries riser installation and pull-in procedures overview and provisions for pull-in.

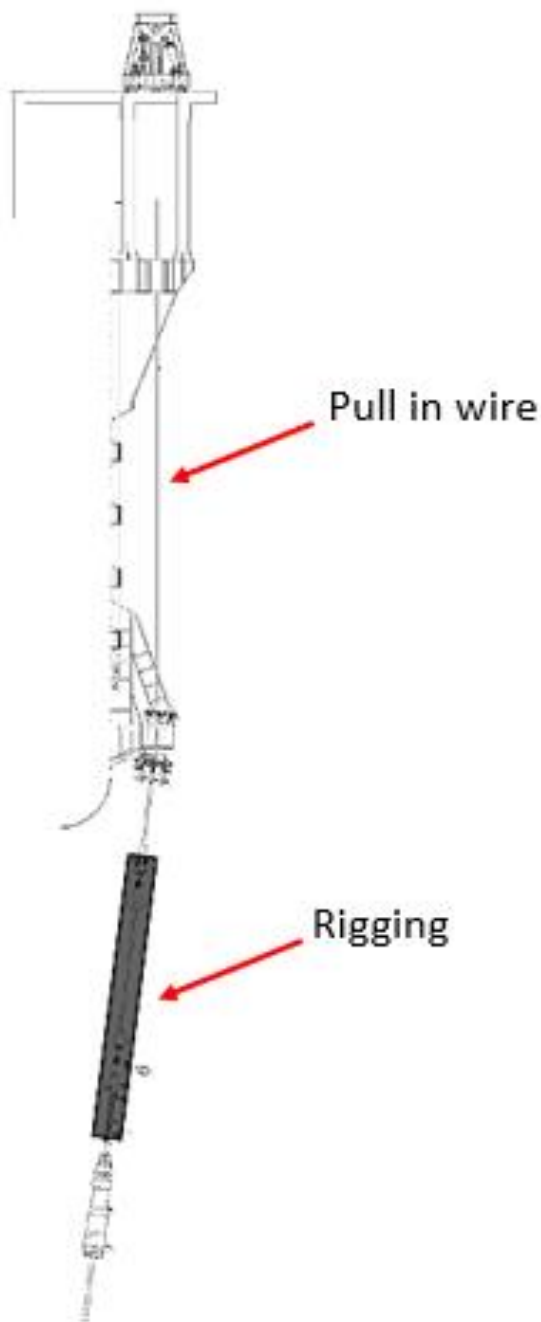


Figure 5 – Pull in system

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Table 7 gives the document/references for each of the information required for pull In/Pull-out operations.

Table 7 – Pull-In/Pull Out Scope

INFORMATION	BID PHASE	DETAILED DESIGN
Pull-In/Pull-Out Requirements	[1]	[1]
Pull-In/Pull-Out Procedure	Not Applicable	To be provided by SELLER