	TECHNICAL SPECIFICATION		Nº: I-ET-XXXX.XX-1200-600-P4X-1BE		
	CLIENT: MASTER DOCUMENT			SHEET 1 of 8	
	JOB:			--	
	AREA:				
SRGE	TITLE: PIG FACILITIES			INTERNAL	
ESUP					

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INDEX OF REVISIONS

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TITLE:

PIG FACILITIES

INTERNAL

ESUP

SUMMARY

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1 OBJECTIVES

1.1 GENERAL

- 1.1.1 This Specification covers the minimum technical requirements and design criteria, manufacture and installation for pigging facilities, for the Unit, which includes FPSO topside pipping and pig launchers and receivers.
- 1.1.2 All the recommendations mentioned in this document shall be followed. This specification shall be evaluated/revise by PETROBRAS with each change generated in Table 15.1.4. Risers Details in the GTD, Riser Balcony Lay-out and in the Operational Philosophy specifications.

2 DEFINITION

2.1 GENERAL

- 2.1.1 "PIG" shall be considered as an apparatus to be passed inside a pipe in order to keep the normal pipeline flow characteristics or integrity monitoring of subsea rigid pipelines.
- 2.1.2 Cleaning "PIG": foam, solid cast and/or multi-size rigid PIGs.
- 2.1.3 Instrumented "PIG": bidirectional monosize or one direction multi-size instrumented PIGs for caliper, metal loss or crack detection.
- 2.1.4 The "PIG" Barrels shall be considered as pressure vessel. Note that in other documents "Barrel" can be named as "Chamber" or "Scrapper Trap".

3 COMPLEMENTARY DOCUMENTS

3.1 GENERAL

- 3.1.1 The following documents are considered complementary and shall be taken into account:
- ABNT NBR 16.381 – Onshore and Offshore Pipelines – Scrapper Trap
 - I-ET-3010.2L-1200-941-P4X-001_A - GENERAL TECHNICAL DESCRIPTION
 - I-DE-3000.00-1500-941-P56-001 - Riser Supports Arrangement Conceptual Design - FPSO Balcony
 - I-ET-3530.00-1200-940-1HA-001 - OPERATION PHILOSOPHY REVIT AB

4 PIG FACILITIES

4.1 GENERAL

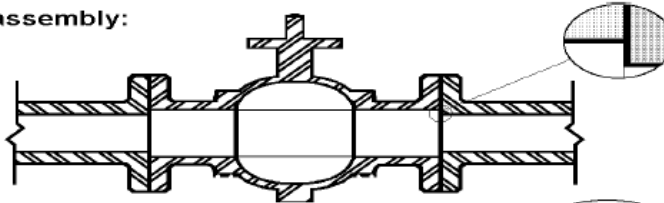
4.1.1 The topside pig arrangement shall be compatible with the use Cleaning and Instrumented PIGs (Instrumented scrapping PIGs). The use of PIG Valve is not allowed.

4.2 PIPING REQUERIMENTS (TOPSIDE PIGABLE PIPELINES)

4.2.1 Topsides Valves shall be full bore full opening; its internal diameter shall be the same as the internal pipeline diameter.

4.2.2 For any internal diameter changes, the maximum slope allowed shall be 1:5, in accordance with Figure 4.2.2.

Wrong assembly:



Right assembly:

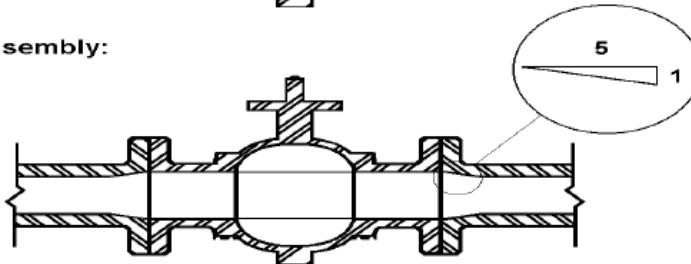


Figure 4.2.2: Internal Diameter Changes

4.2.3 All Wye shall be Piggable. Piggable Wye, can be either symmetric or not, but shall be 30° and convergent type, 2 pipeline arriving in one, in accordance with figure 4.2.3.

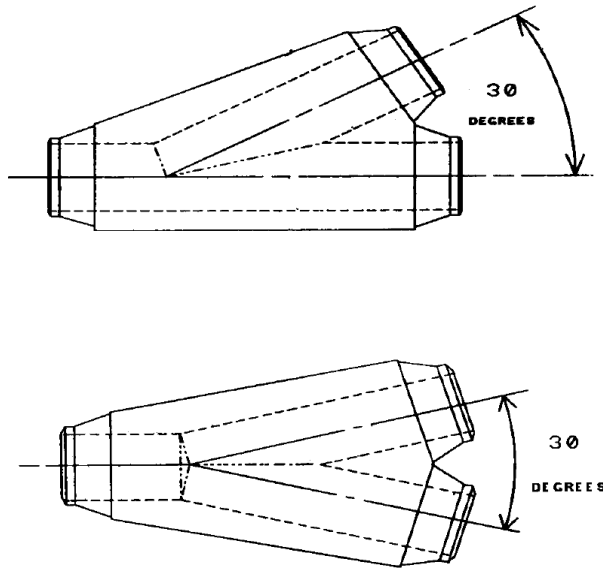


Figure 4.2.3: Piggable Wye

4.2.4 Adjoining bends or any two components or features like Tees, Wyes shall be separated by straight spool pieces of pipe with the same O.D and I.D and at least 3xD minimum, where D is nominal diameter, referenced to the piping centerline long each, in accordance with figure 4.2.4.

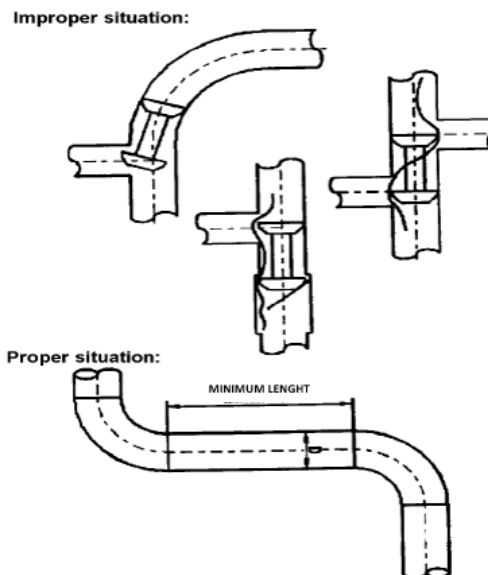


Figure 4.2.4: Minimum Straight Length

4.2.5 All bend radius shall be 3xD minimum, where D is nominal diameter, referenced to the piping centerline, referenced to the piping centerline.

4.2.6 CONTRACTOR shall take care during the design and construction phase to avoid any pigging problems such as protruding welds inside piping or other arrangement that cause risk to the pigging operation.

4.2.7 The allowable internal diameter variations shall be in accordance with the following items, in order to allow compatibility with Table 15.1.4. Risers Details in the GTD:

- i) With regard to Production 1 to Production 4 bundle, topside piping for the service risers, including pig launchers, shall have their internal diameter minimum 4,00" to maximum 6,00".
- ii) With regard to Production 1 to Production 4 bundle, topside piping for the production risers, including pig receivers, shall have their internal diameter minimum 6,00" to maximum 8,00".
- iii) With regard to Production 5 to Production 14 bundle, topside piping for the service risers, including pig launchers, shall have their internal diameter minimum 4,00" to maximum 6,625".
- iv) With regard to Production 5 to Production 14 bundle, topside piping for the production risers, including pig receivers, shall have their internal diameter minimum 4,00" to maximum 6,625".
- v) With regard to MSP-1 bundle, topside piping for the service risers, including pig launchers, shall have their internal diameter minimum 4,00" to maximum 6,00".
- vi) With regard to MSP-1 bundle, topside piping for the production risers, including pig receivers, shall have their internal diameter minimum 6,00" to maximum 8,00".
- vii) With regard to Gas Export pipeline systems, topside piping including pig launcher/receiver, shall have their internal diameter minimum 9,00" to maximum 12,00".
- viii) In addition, CONTRACTOR shall perform pig tests in the yard to demonstrate that the pig can freely (without any damage) pass through each piping:
 - (1) from pig launchers or pig launchers/receivers to the first flange downstream ESDV;
 - (2) from the first flange downstream ESDV to pig receivers.
 CONTRACTOR shall supply the pigs for such tests (low density foam pigs). PETROBRAS will supply pigs to be used during the operation lifetime. Alternatively, for this purpose, CONTRACTOR may demonstrate through 100% boroscopying."

4.2.8 CONTRACTOR shall also consider topside piping sizing (internal diameter) to handle flow rates required.

4.2.9 One pig launcher shall be provided for each gas lift / service riser (Production 1 to Production 14 and MSP-1).

4.2.10 One pig launcher/receiver shall be provided for gas export pipeline systems.



4.2.11 Pig receivers shall be provided for a set of production risers (Production 1 to Production 14 and MSP-1).

4.3 REQUIREMENTS FOR LAUNCHER, RECEIVER AND LAUNCHER/RECEIVER (SCRAPPER TRAP)

4.3.1 For offshore scrapper trap, CONTRACTOR shall comply with the all requirements of the NBR 16381, for instrumented pigging all wells.

4.3.2 The inside diameter of the barrel of launchers and receivers shall be at least 89 mm (3 1/2 inch) larger than the inside diameter of the pipeline;

4.3.3 The design may consider the depressurization through the pig receiver.

4.3.4 The pig launchers, pig receivers and pig launcher/receivers shall be installed in horizontal direction.

4.3.5 The pig launcher/receiver and pig receiver shall have adequate basket inside for proper pigging operation.

4.3.6 A system for collecting drainage from receivers, launcher and launcher/receivers shall be provided.

4.3.7 Space, trolleys, carts or any device suitable for PIG handling shall be part of the CONTRACTOR scope.

4.3.8 Pigging system shall consider pressure indicators in different scale ranges to guarantee accuracy in lower pressure measurements.

4.3.9 CONTRACTOR shall provide safety interlock device for pigging operations, such as key interlock.

4.3.10 All topsides piping, free access areas, launcher and launcher/receiver nominal/internal diameter and length shall comply with the requirements of the NBR 16381 and shall be submitted to PETROBRAS comments/information before placing orders.

4.3.11 A Preliminary General Arrangements representing the required free access areas shall be also submitted to PETROBRAS comments/information

4.3.12 All pig receivers and pig launcher/receiver shall have line to test separator in order to allow receiving fluids from risers after flushing during commissioning and WAG operations.

4.3.13 All the pig launcher/receivers, pig launchers and pig receivers installation implies in providing facilities to inject lift-gas to push the pigs, as well as other fluids required. It means that the topside manifolds shall allow to leak test the risers with water, circulate diesel with or without pigs and push pigs using lift gas also.

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4.3.14 All of those subsea service operations (diesel circulation, leak test, pigging, etc.) shall be done using facilities onboard. CONTRACTOR shall take into account the requirements of those operations, for example, volume control, pressure control, etc.).

4.3.15 The unit shall have facilities and space to allow the injection of nitrogen in risers/subsea system. The NGU (Nitrogen Generator Unit) will be supplied by PETROBRAS (approximately 4 skids of 2.6 x 6.3m demanding air, water and electricity).