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	CLIENT: MARLIM LESTE E SUL		SHEET: 1 de 9
	PROGRAM: BASIC DESIGN – REVIT I		
	AREA: MARLIM LESTE E SUL		ESUP
	TITLE: REQUIREMENTS FOR RIGID EXPANSION JOINTS (DRESSER TYPE)		INTERNAL

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1 SCOPE

2.1 This technical specification defines the minimum requirements for design, fabrication, inspection, testing and delivery of rigid expansion joints for hull, and whenever applicable to topside and modules of offshore projects.

2.2 The requirements herein listed are applicable to all players performing such related activities within the scope of this unit, including manufacturers, packagers, suppliers, sub suppliers, integrators, constructors, and all technical personnel involved. Within the scope of this document, they are all referred to as being a SELLER.

2.3 In addition to the requirements of this technical specification, SELLER shall follow all the requirements of the Exhibit I (SCOPE OF SUPPLY), as well as Exhibit III (DIRECTIVES FOR ENGINEERING EXECUTION), Exhibit IV (DIRECTIVES FOR CONSTRUCTION AND ASSEMBLY), Exhibit V (DIRECTIVES FOR PROCUREMENT), Exhibit VI (DIRECTIVES FOR PLANNING AND CONTROL), Exhibit VII (DIRECTIVES FOR QUALITY MANAGEMENT SYSTEM) and Exhibit VIII (DIRECTIVES FOR COMMISSIONING PROCESS).

2 ABBREVIATIONS AND DEFINITIONS

In addition to general definitions set in reference \1\, the following abbreviations are used in this specification.

2.1 ASME: American Society of Mechanical Engineers.

2.2 Coupling: The same as sleeve.

2.3 CS: Classification Society.

2.4 Dresser joint or Dresser type joint: see Rigid Expansion Joint and Rigid Expansion Joint with flanges.

2.5 Gasket: see sealing ring.

2.6 Hydraulic Tie Rods: Tie rods installed on Rigid Expansion Joints with flanges to resist the design or pressure test thrust forces and to avoid the pipe to detach from the sleeve.

2.7 NDT: Non-destructive testing.

2.8 NPS: Nominal Pipe Size.

2.9 Pipe: the pipe between the flanges of the rigid expansion joint.

2.10 Pipe length: It is the length of the pipe welded to the flange on one side in Rigid Expansion Joint with flanges.

2.11 Rigid Expansion Joint: a type of joint like a sleeve with two rubber rings for sealing and screwed rods to press the rubber rings to seal. The sealing does not avoid axial movements from pipes in both sides. Pipe displacements occurs inside the sleeve without detaching.

2.12 Rigid Expansion Joint with flanges: Same as Rigid Expansion Joint, but with one pipe segment welded on a flange coupled into the inlet of the sleeve and another one coupled at the outlet of the sleeve. To keep the assemble and the face-to-face dimensions, the kit is supplied with transport rods. Transport rods shall be unlocked after installation.

2.13 RT – radiographic testing.

2.14 Screwed Plug: placed at the sleeve on the bottom position at the centerline and entering the gap between pipes to act as a stopper. The screwed plug is supplied with parallel thread and gasket (ring). Three gaskets for each rigid expansion joint shall be supplied for replacement with the same specification as the original.

2.15 Sealing Rings: Rings made from rubber, designed by manufactures. It may be triangle format, square format or any format designed by manufacturer. Six sealing rings for each coupling rigid expansion joint shall be supplied for replacement with the same specification as the original.

2.16 Sleeve length: It is the minimum acceptable sleeve length. It shall be as minimum equal to 1 time the external diameter of the pipe plus 100 mm (lower values are not acceptable).

2.17 Slip-on expansion joints: see Rigid Expansion Joint and Rigid Expansion Joint with flanges.

2.18 Transport Tie Rods: Tied rods installed on Rigid Expansion Joints with flanges to keep the face-to-face dimensions of the rigid expansion joint assembly during transportation and installation.

2.19 UT: Ultrasonic testing.

3 NORMATIVE REFERENCES

The following standards and documents include provisions, which, through reference in this text, constitute requirements of this technical specification. Latest issue of the references shall be used unless otherwise agreed. Other recognized standards may be used provided it can be shown that they meet or exceed the requirements of the standards referenced below.

3.1 Classification Rules

3.1.1 SELLER shall perform the work in accordance with the requirements of the Classification Society. Refer to Project General Conditions and Data Specification for nominated Classification Society.

3.1.2 SELLER is responsible to submit to the Classification Society the documentation in compliance with stated Rules. SELLER´s responsibilities include documents submission to the certifying authority as described in the latest edition of their rules for equipment on offshore facilities.

3.1.3 Classification Society rules may only be waived upon the formal approval from the Classification Society itself and from BUYER.SELLER's responsibilities include documents submission to the certifying authority as described in the latest edition of their rules for equipment on offshore facilities.

3.2 Codes, Standards and Regulations

In addition to rules and regulations set forth in reference \2\, the following codes and standards are applicable to the expansion joints. The latest issue of the references shall be used unless otherwise agreed.

- ASME B31.3 – Process Piping.
- ASME B16.5 - Pipe Flanges and Flanged Fittings: NPS 1/2 through NPS 24, Metric/Inch Standard.
- ASME B16.47 – Large diameter steel flanges: NPS 26 through NPS 60, Metric/Inch Standard NPS 26 through NPS 60.

3.3 Governmental Regulation

3.3.1 Brazilian Government regulations are mandatory and shall prevail, if more stringent, over the requirements of this specification and other references herein.

3.4 Reference Documents

The following documents are cited within this technical specification and therefore constitute requirements for the rigid expansion joints.

Ref. #	Doc. No.	Doc. Title
/1/	I-ET-3010.00-1200-940-P4X-002	General Technical Terms
/2/	I-MD-3010.2C-1200-940-P4X-027	Descriptive Memorandum – Hull Systems
/3/	I-ET-3010.2Q-1200-200-P4X-201	Requirements for Piping mechanical Design and Layout
/4/	I-ET-3010.2Q-1200-200-P4X-202	Requirements for Piping Flexibility and Stress Analysis
/5/	I-ET-3010.00-1200-956-P4X-002	General Painting
/6/	DR-ENGP-I-1.15-R6	Color Coding
/7/	I-ET-3010.00-1000-970-P4X-004	Non-Destructive Testing Requirements for Metallic and Non-Metallic Materials
/8/	I-ET-3010.00-1200-970-P4X-003	Requirements for Personnel Qualification and Certification
/9/	I-ET-3010.00-1200-956-P4X-003	Thermal Spray Coating Application of Aluminum
/10/	I-ET-3010.00-1200-200-P4X-116	Requirements for Bolted Joints Assembly and Management

Ref. #	Doc. No.	Doc. Title
/11/	I-ET-3010.00-1200-200-P4X-115	Requirements for Piping Fabrication and Commissioning
/12/	I-ET-3010.2C-1250-200-P4X-101	Piping Specifications for Hull
/13/	I-ET-3010.00-1200-251-P4X-001	Requirements for Bolting Materials

3.5 Conflict Requirements

In case of conflicting requirements between this technical specification and other cited references, the most stringent shall prevail. If necessary, the SELLER may revert to BUYER for clarification.

4 DESIGN CRITERIA

4.1 The design of rigid expansion joints shall comply with ASME B31.3, manufacturer requirements, CS and design requirements presented on /3/, /4/ and /12/.

4.2 Rigid expansion joints shall be supplied with hydraulic tie rods.

4.3 Figure 1 presents a schematic draw of the rigid expansion joint parts.

4.4 Rigid expansion joint shall be supplied with pipe and flanges. The flanges of rigid expansion joints shall be according ASME B16.5 or ASME B16.47 standards.

4.5 If the hydraulic tie rod support is welded to the pipe, it is not allowable to weld in the pipe length.

4.6 The gap between external diameter of pipe and internal diameter of sleeve shall be kept as a minimum and shall not be higher than 2 mm. SELLER may propose different value for BUYER APPROVAL.

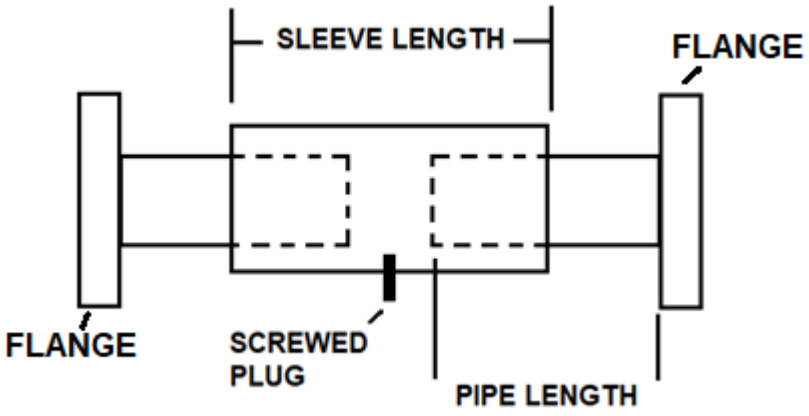

Figure 1 – Rigid expansion joint schematic draw

4.7 Pipe length shall be at least 1.5 times the external diameter of the pipe plus 100 mm, and always greater than sleeve length, allowing gaskets replacement with rigid expansion joint installed in piping system. Each rigid expansion joint shall have 2 pipe parts (Figure 1).

4.8 The minimum sleeve length shall be equal to 1 external diameter of the pipe plus 100 mm.

4.9 The minimum sleeve length informed on item 4.8 may not be commercially available for some diameters, for these cases it may be changed subject to BUYER approval.

4.10 The sleeve shall be centralized between flanges and the screwed plug at the center of sleeve.

4.11 The sealing ring material shall be compatible with the service, fluid, temperature, pressure, and project design life.

4.12 The specified sealing ring shall be indicated on the documentation with dimensions, material information, hardness requirements and commercial identification.

4.13 Each coupling shall be supplied with at least 4 extra kits of sealing rings for replacement with the same specification as the original.

4.14 The pipe supports type and distance shall follow rigid expansion joint manufacturer recommendation. If not contraindicated by rigid expansion joint manufacturer, the first support shall be a rest plus guide plus hold-down and the distance between the first support downstream and upstream and the rigid expansion joint flange face shall be minimum of 200 mm and maximum 800 mm, to guarantee the rigid expansion joint alignment and centralization.

4.15 The rigid joint shall be designed for the design pressure and, the correct pressure shall be verified on the piping design. The rigid expansion joint shall be supplied and tested flanged and equipped with tie rods.

4.16 Rigid expansion joint shall be assembled and hydraulically tested in the factory. Tie rods must be capable of resisting thrust forces from hydraulic tests up to 1.5 times the design pressure. After installation tie rods shall be released for proper expansion joint operation, but not removed.

4.17 Rigid expansion joint shall be tested in factory with final flanges. Tests shall be in accordance with ABS SVR item 4-6-2/5.9, ASME B31.3 and CS requirements.

4.18 Since the rigid expansion joint is supplied with hydraulic tie rods those may be used as substitute for transport tie rods, but it must be capable of keeping the face-to-face dimensions during transport and installation. It must be unlocked from transport tie rods after installation, according to manufacturer recommendations. Attention: transport tie rods may not support thrust forces (due internal pressure).

4.19 Transportation bar or any other component that must be removed prior operation shall be identified on documentation and on rigid expansion joint shall be yellow painted.

4.20 Manufacturer shall issue an installation manual to guarantee correct installation. The manual shall have at least information about aligning, gasket positioning, installation and maintenance, torque for the sleeve positioning.

4.21 The design fatigue life of each rigid expansion joint shall comply with the project life and cycles number. The design life cycles for these components shall be clearly indicated on documents.

4.22 For the stress and flexibility analysis the reference /4/ shall be followed.

4.23 For rigid expansion joints to be installed inside ballast tanks, the GRP VENDOR shall provide the design for the specific condition to BUYER for comments and approval. Design that may be applied includes GRP as base material and the use of double o´ring.

4.24 All requirements from classification society for rigid expansion joints shall be followed, including tests and any imposed limitation or restriction. The details and tests of the rigid expansion joints are to be submitted by the manufacturer for Classification Society approval during the review of the detail design phase.

5 DESIGN CERTIFICATION

5.1 Fire endurance test certification is required and also a type approval from classification society.

5.2 Material certificates for sleeve, pipe, flanges, rods, gaskets to be included in data book.

5.3 The manufacture shall perform a pressure test for integrity verification (hydrotest). The manufacture shall issue certificates for this pressure tests. The pressure test shall record the pressure and be attached to the certificates. Two blind flanges with pressure connectors and manometers shall be installed on both ends, to test the gaskets and the hydraulic tie rods 1.5 times design pressure. The certificates must be included in Databook.

5.4 The welds shall be 100% RT or UT and the reports of all NDT performed shall be included in Databook.

5.5 NDT shall be according to the Design Code and reference \7\.

5.6 Personnel qualification and certification shall be in accordance with reference \8\.

6 PAINTING

6.1 For painting and coating requirements see /5/ and /6/.

6.2 The rigid expansion joints shall be supplied fully TSA thermal spray aluminum according to project specification /9/. Rods and nuts shall be AISI 316, preferrable, or Zn Ni coated plus PTFE coated according to project specification /13/ as alternative.

6.3 For rigid expansion joints installed inside structural tanks the materials shall be selected and/or coated so that they remain suitable for the intended service. CONTRACTOR shall propose alternatives for each intended case (CRA material or coating).

7 DOCUMENTATION ISSUED BY VENDOR RIGID EXPANSION JOINT

The vendor shall issue and present for BUYER approval at least the following documents:

7.1 Rigid expansion joint supplied by manufacturer list with rigid expansion joint identification, TAG, diameter of rigid expansion joint, overall length and drawing number associated.

7.2 Certified dimensional drawings with scale.

7.3 Exploded 3D view with parts identified.

7.4 Gaskets dimensions, material information, hardness requirements and commercial identification.

7.5 Datasheets.

7.6 Inspection and test Plans according to contract.

7.7 Data-book according to contract.

7.8 Spare parts list with commercial identification.

7.9 Tests Reports.

7.10 Installation manual.

7.11 Maintenance manual.

7.12 Certificates from classification society.

All documentation shall be presented in editable file and in readable and searchable pdf format.

8 ADDITIONAL ITEMS

For each rigid expansion joint shall be supplied, as additional item, 3 kits which contain at least:

8.1 One gasket for the plug with the same specification as the original.

8.2 Two sealing rings with the same specification as the original.

When using rigid expansion joint it is not allowable to operate with any kind of leakage through seal rings or gaskets to atmosphere. To make possible a safe operation, it is necessary to have at least three sets of replacement kits. These parts are not considered a simple spare part and shall be available on board and identified.