

PETROBRAS	TECHNICAL SPECIFICATION	Nº	I-ET-3000.00-1300-941-PEH-002
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	UNIT:	OFFSHORE PRODUCTION UNITS	SEP:
DP&T / SUB-OPSUB / MIS	TITLE: DIVING SYSTEM FOR RISERS, MOORING, HULL AND JACKET OF OFFSHORE PRODUCTION UNITS		

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1- GENERAL

This document treats of diving systems for operations in risers, mooring, hull and jackets of offshore production units. It establishes the minimum requirements to be followed by the CONTRACTOR, as well as provide data for the design and procurement of equipment and also installation of diving spread.

It replaces the document I-ET-3000.00-1300-941-001.

2 – DIVING AREAS

For all diving areas, the CONTRACTOR shall respect the following items:

- a) The diving areas location shall be proposed by the designer and submitted to Petrobras for approval;
- b) They shall make possible the diver's access to all unit structure;
- c) During daily operations, until 30m depth, the maximum horizontal distance reached by divers is 60m. If deepness is bigger than 30m or in diving operations at night (at any deepness), in accordance with NR-15 and NORMAM-15 (Brazilian standards for diving operations), the maximum horizontal distance allowed for divers to reach is 33m;
- d) The crane of the platform must be used wherever possible to the operations of mobilization and demobilization of all diving system equipments. When not possible, the resource for it must be defined. The Contractor shall do the transfer of all diving equipments from lay-down area to the diving area, as well as make possible the mobilization and demobilization of the diving system equipments. The maximum load to be lifted is 5 tons;
- e) The areas must be large enough to accommodate all diving equipment, in accordance with appendix 5.4, 5.5 and 5.7, and with minimum distance between parts of 600mm (For item **2.3 – FPSO AND FSO**, this areas should be projected with 12m x 6m, outside of the ship's deck). The total diving system weight is 30 tons. In locations where diving areas are provided, the handrail must be removable, because the system will extend through it.

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- f) Special attention must be taken to avoid gases discharge in the diving area;
- g) The sea chest, if existent, must have the grill with articulated joint at the bottom for opening without taking it off. Two (02) pad-eyes as described on item 2.3.3 must be made and positioned on the hull 1500mm above of each top corner.
- h) The utilities must be supplied as specified on item 3.

For each kind of off-shore unit, pay attention for respective specificity:

2.1 – FIXED PLATFORM (JACKET)

2.1.1- Moon-pool for launching the diving bell with minimum dimensions of 2.7 x 2.7 m. Provide removable handrail at its region.

2.1.2- Diving bell launching structure over the moon-pool with four (04) padeyes: one (01) for hanging and launching diving bell, two (02) for hanging ballast and respective gob-line and one (01) for emergency system. The padeyes dimensions shall be as described in appendix 5.6. It must foresee access for installation of cables and accessories (snatch block and clevis) to the pad-eyes;

2.1.3- Bases for launching diving bell winches, the ballast and emergency system, as showed in appendix 5.7;

2.1.4- Two (02) diving areas located at reverse sides of the platform with launching diving bell system (appendix 5.1, 5.2 e 5.3).

2.2 – SEMI-SUBMERSIBLE PLATFORM (SS)

The alternatives for diving areas location are the following:

2.2.1- ALTERNATIVE 1:

Diving areas located at platform port sideboard (PS), starboard (SB), prow and poop with diving bell launching system (appendix 5.1, 5.2 and 5.3);

Requirements that shall be cover for this alternative:

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2.2.1.1- Each diving area must have one fixed base for installation of the diving bell launching system. This base shall be compatible with diving bell launching system substructure, as showed in appendix 5.1;

2.2.1.2- The diving bell launching system must be located so that there is no interference on the diving bell descent projection until the deepest work location.

2.2.2- ALTERNATIVE 2:

Diving areas located in both sides of the platform with diving bell launching system in the middle of the platform.

Requirements that shall be cover for this alternative:

2.2.2.1- Moon-pool for launching the diving bell with minimum dimensions of 2.7 x 2.7 m. Provide removable handrail at this region;

2.2.2.2- Diving bell launching structure over the moon-pool with four (04) padeyes: one (01) for hanging and launching diving bell, two (02) for hanging ballast and respective gob-line and one (01) for emergency system. The padeyes dimensions shall be as described in appendix 5.6. It must foresee access for installation of cables and accessories (snatch block and clevis) to the pad-eyes;

2.2.2.3- Bases for launching diving bell winches, the ballast and emergency system, as showed in appendix 5.7;

2.2.2.4- Monorail, able to handle 7 tons, between the lay-down area and diving area, for mobilization and demobilization of diving bell system and respective winches.

2.2.3- ALTERNATIVE 3:

The diving area located in the middle of platform with diving bell launching system through the moon-pool.

The requirements that shall be cover for this alternative:

2.2.3.1- Moon-pool for launching the diving bell with minimum dimensions of 2.7 x 2.7 m. Provide removable handrail at this region;

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2.2.3.2- Diving bell launching structure over the moon-pool with four (04) pad-eyes: one (01) for hanging and launching diving bell, two (02) for hanging ballast and respective gob-line and one (01) for emergency system. The pad-eyes dimensions shall be as described in appendix 5.6. It must foresee access for installation of cables and accessories (snatch block and clevis) to the pad-eyes;

2.2.3.3- Bases for launching diving bell winches, the ballast and emergency system, as showed in appendix 5.7;

2.2.3.4- Support area to the diving operations, with base for diving bell, ballast and emergency winches installation. This area must have enough space for the divers get equipped and make possible and safe get in and out of the diving bell, as well as make easy the winches operation.

2.3 – FPSO, FSO

For this kind of platform, the diving areas shall follow these items:

2.3.1- Permanent areas in main deck in both sides, for positioning diving equipment;

2.3.2- The areas shall not cause any interference in the foreseen operations in FPSO or FSO (risers inspection, pull in and pull out, gob-line passage, hull inspection) with permanent process equipment (pipes, structures, valves, etc);

The CONTRACTOR also has to attend the following requirements to make the hull inspections possible:

2.3.3- Provide and install two rounded pad-eyes along the external hull surface at 1,0m above any submerged hull opening. The pad-eyes dimensions are the following: length = 12.5mm, passing hole internal diameter = 30mm;

2.3.4- Provide and install pad-eyes with the same dimensions described in the item 2.3.3, all around the submerged hull, at 2m from ship's bottom. The maximum distance between each pad-eye shall be 15m;

2.3.5- Provide and install rounded padeyes, with same dimensions indicated at item 2.3.3, on ship's bottom , between central and side tanks;

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2.3.6- Provide and install rounded padeyes, with same dimensions indicated at item 2.3.3, at both ship sides, 4m above the keel (base line of the ship), aligned with the watertight transverse bulkheads between tanks;

2.3.7- Design and provide watertight covers for all the hull openings and overboards situated below the maximum draft line. All covers shall be tested on board before leaving the yard;

2.3.8- The hull shall have handrails to make possible hull inspections.

3 – UTILITIES

The utilities for diving activities (independent for each diving area) are the following:

3.1- COMPRESSED AIR

3.1.1- Two (02) air outlets for diving bell and ballast winches:

- Required Pressure: 7 kg/cm²;
- Required Outflow: 20 Nm³/min (Approximately 2,85 m³/min, at constant pressure of 7 kgf/cm²), allowing ± 10% of tolerance.

3.2- ELECTRIC POWER

3.2.1- One (01) electrical outlet:

- 440 V / 60 Hz – carload = 100 A.

Obs.: The electric distribution to the diving system equipments is made through a distribution panel located in the workshop container. This panel has to be against explosion, with male plug provided.

3.3- POTABLE AND PROCESS WATER

3.3.1- One (01) potable water outlet to cleaning up equipment and diving clothes must be provided.

3.4- COMUNICATION

3.4.1- One (01) telephone connection for internal and external calls;

3.4.2- One (01) web connection access to Petrobras intranet and internet.

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4 – TECHNICAL DOCUMENTS

The CONTRACTOR has to make available the following documentation, at the end of the project:

- 4.1-** Technical specifications and installation drawings of all the cabling (hoses, electric cables and wire cables);
- 4.2-** Technical specifications and installation drawings of the handling devices (inside the turret, if existent);
- 4.3-** Technical specifications and installation drawings of pad-eyes, fixing devices and snatch blocks;
- 4.4-** Technical specification and installation drawings for the spot lights;
- 4.5-** Technical specification and installation drawings for the emergency ladder and its submerged lighting system;
- 4.6-** Drawings of every equipment skid;
- 4.7-** General and detailed arrangement plan of every permanent diving area;
- 4.8-** Technical specification for the handrail system at FPSO's, FSO's and FLNG's flat bottom and at the lower ring of the turret.

All technical specifications should include (where applicable) the scaled drawings with dimensions in mm. An original and two copies must be provided.

5 – APPENDIX

- 5.1-** Lay-out of the port sideboard diving area (SS): DE-3500.00-6500-941-PGT-009 – Rev. 2;
- 5.2-** Lay-out of the starboard diving area (SS): DE-3500.00-6500-941-PGT-010 – Rev. 2;
- 5.3-** Permanent diving areas in FPSO, FSO and FLNG with turret: DE-3000.00-1300-941-PEH-001 - Rev. 0;
- 5.4-** Permanent diving areas in FPSO, FSO and FLNG spread mooring: DE-3000.00-1300-941-PEH-002 – Rev. 0 ,DE-3000.00-1300-941-PEH-003 – Rev. 0 e DE-3000.00-1300-941-PEH-004 – Rev. 0;

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5.5- Padeyes location at the bottom of FPSO, FSO and FLNG: DE-3500.00-6500-941-PEP-002 – Rev. 1.

5.6- Pad-eyes for diving bell and gob-line: DE-3000.00-1300-941-PEH-005 – Rev. 0, DE-3000.00-1300-941-006 – Rev. 0, DE-3000.00-1300-941-PEH-007 – Rev. 0;

5.7- Standard base for diving bell, ballast and emergency winches: DE-3000.00-1300-941-PEH-008 – Rev. 0.