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Installation of reeled rigid pipelines connected to large and heavy subsea structures in ultra deepwater

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ABSTRACT

The PDEG-B installation scope comprised 165km of X-65 pipelines in water depths up to 1400m with 15 end and in-line structures, some of which were the largest ever launched from the reeled pipelay vessel Skandi Navica.
The larger structures (Pipeline End Manifold Y pieces) weighing more than 40te had dimensions exceeding the limits of the lay ramp structure handling frame normally used for standard structure handling onboard the vessel. A special frame was designed and attached to the aft end of the pipelay vessel's ramp to secure the structure during pipelay initiation. This proved to be a suitable arrangement for the deployment of large and heavy pipeline end manifolds. Three large In-Line-Tees were also installed in water depths up to 1052m.
Specific facilities for installation of the mentioned sub sea structures were developed, e.g. inclined base to suit the seabed profile, articulated yokes to allow the deployment and landing, attachment of buoyancy elements to reduce the level of stress on the pipeline, development of a contingency procedure to guarantee the structures' upright stability etc.
Special attention was dedicated to the scenario of deepest section of the 12" pipelay (>1250m). The new Subsea7 Pipelay vessel, Seven Oceans, performed the deployment of 22km of pipeline that would exceed Skandi Navica capacities.
The purpose of this paper is to present all relevant aspects of the successful installation of the structures not only restricted to their design, but also focusing on the modifications to the pipelay Vessel and offshore operations during the PDEG-B project.

KEY WORDS: End and in-line subsea structures; rigid pipelay; deepwater.

INTRODUCTION

Oil and gas development in Brazil is characterized by fields located in deepwater. PDEG-B is an EPIC project, comprising the engineering, procurement, installation and commissioning of six pipelines in water depths varying from 100m up to 1400m, which connects FPSOs, Semi-Submersible Platforms and a fixed platform by means of 12,75" (323,85mm) and 10,75" (273,05mm) OD steel pipe.

The subsea field layout is composed of three oil and three gas pipelines, connecting subsea facilities from three different fields: Roncador, Marlim Leste and Marlim Sul, as per figure 1.
All pipelines were fabricated at Subsea 7's spool base located in UBU, Espírito Santo, Brazil, and 15 trips of the pipelay vessel were necessary to complete the scope of the project. The Pipelay Support Vessel (PLSV) Skandi Navica laying spread equipment were upgraded due to the high loads expected during the deployment of large and heavy structures and during pipelay over deep sections of the routes.
The pipelay over the deepest section of the 12,75", wall thickness of 25.4mm, which comprised 22km, was performed by PLSV Seven Oceans as the expected dynamic top tensions would exceed the capacityof the upgraded Skandi Navica laying equipment.

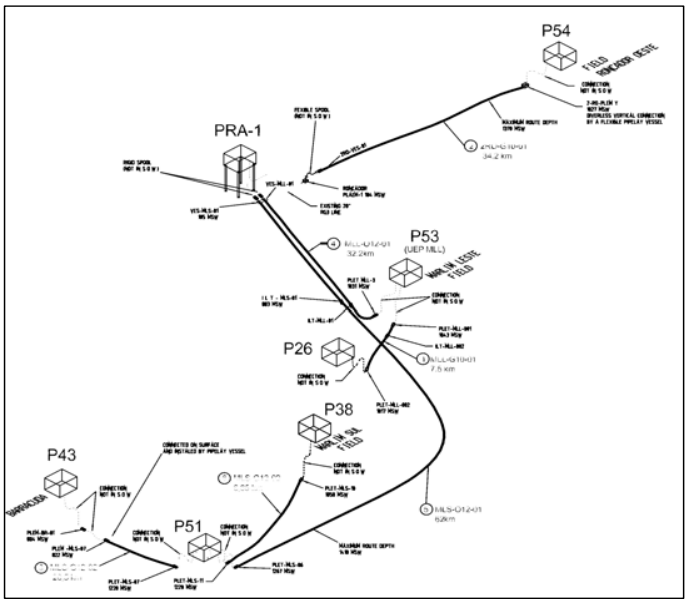

Figure 1 – Schematic drawing of the PDEG-B layout