Saipem/Eni Offshore Pipeline Repair System (SiRCoS)

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ABSTRACT

SiRCoS is an Eni property pipeline repair system to fulfill a subsea pipeline repair intervention. It comes from the long lasting experience of Eni/Saipem in designing, laying and operating deep, long offshore gas pipeline. The basic functional requirements for the system are: diverless repair intervention and fully piggability after repair. The system guarantees an as low as possible mobilization/intervention time; furthermore the system is able to repair very deep (beyond 2000 m water depth), large diameter, high thick & concrete coated walled pipes.

KEY WORDS : Deep offshore pipeline, repair system, diverless, intervention sleeve, spool piece.

NOMENCLATURE
ALARP: As Low As Reasonable Possible,
CIE: Common Intervention Equipment,
MAOP: Maximum Allowable Operative Pressure,
MISP: Module Installation Spool Piece,
ROV: Remote Operated Vehicle,
RPC: Repair pipeline Components,
SiRCoS: Sistema Riparazione Condotte Sottomarine (i.e. Subsea Pipeline Repair System)
WPS: Welding Procedure Specification

INTRODUCTION

Natural gas will play a crucial role to satisfy the continuous growing energy demand in the coming years, large gas reservoirs need to be linked to final very far users market. This challenge has to be faced mainly by pipeline systems. Materials & construction improvements are mandatory to assure overall reliability and transport efficiency of such huge (high capacity) network systems over the whole operational lifetime span. Subsea crossing is a key factor transportation option, particularly for the gas supply to Europe. Thousand kilometres of marine pipelines have been laid since the 70’s starting in shallow water. The remarkable record of safety and reliability is the result of a continuous improving in design material, construction techniques, operation & maintenance. In the late nineties large offshore gas transportation trunk lines were built and operated in the depths and it is foreseen that new systems will be needed for an increasingly integrated network of international systems.

In this field, Eni and Saipem have been active over the last three decades on deep offshore laying in Mediterranean and Black Sea (Bianchi, 2001) developing competitive solutions for very deep, difficult environmental, installation and service conditions waters submarine pipelines. However during the fabrication and installation phase and later, in service condition the environment and functional & accidental loads should be considered as potential threat to the long term reliability. The Know How developed to improve construction, to minimize environmental and functional risks, has demonstrated the power to face any challenging situation; the key points are mainly the upgrade in pipe production quality control and the application of innovative laying solution. But to reduce in an “ALARP point of view” the detrimental effect of an unexpected failure event, it’s mandatory to develop technologies for inspection, maintenance and mainly repair pipeline even in severe environment or “directly man inaccessible”. This paper is to provide a description of the SiRCoS repair components for very deep scenarios.

Deep water long transmission pipeline overview.

To connect far gas fields to consumption countries long trunk new pipelines are planned to be installed in deeper waters where operation and maintenance present greater challenges. The costs of inspection,