

STATS Pipe End Plugs facilitate Pipe Spooling for Aasta Hansteen Field

Subsea 7 contracted STATS Group to provide positive isolation of pressurised clad pipe to facilitate spool reeling onto the pipe lay vessel at their facility in Norway, prior to installation at the Aasta Hansteen gas field.

When the Aasta Hansteen gas field was discovered in the Norwegian Sea in 1997, its remote location and deep water were always going to make recovering resources challenging. Situated 300 kilometres from shore and at water depths of 1300 metres, its location is out with the current established infrastructure.

The planned field development including a SPAR platform will be the first such installation on the Norwegian continental shelf. The SPAR floating installation consisting of a vertical column moored to the seabed features conventional topsides and processing facilities. Once installed the risers transporting the gas from the seabed to the platform and further to the Polarled pipeline will be pure steel, another first for the Norwegian continental shelf.

Subsea 7 were contracted to perform the tow out and hook-up of the SPAR FPSO including Steel Catenary Riser (SCR) system and reeled installation of 12" BuBi® mechanically lined pipe. This involved the fabrication of flowlines and SCRs at Subsea 7's spool base facility at Vigra, Norway. In order to allow the 12" BuBi® pipe to be welded and reeled onto the

vessel, STATS Group provided positive isolation of the pressurised pipe during spool reeling operations.

STATS proposed the use of their Pipe End Plugs which feature locks and dual seals and are capable of conducting pressure tests up to 200 bar. Pipe End Plugs are typically used during the construction and fabrication of pipe spools and piping systems, these fail-safe tools cap open-ended pipe, facilitating hydrostatic leak and strength tests. Pipe End Plugs provide many benefits, hydraulically activated they are quick and easy to install providing a safe and cost effective solution. STATS range of Pipe End Plugs cover two separate products, the I-PEP™ which fits internally to the pipe and the E-PEP™ which grips the pipe externally.

Prior to the arrival of the pipe lay vessel the first pipe spool of 960 meters was positioned at the quayside and Hi-Diff Pigs were inserted into the vessel end of the spool, once installed a reel flooding head was welded to the pipe spool and a Pull-In Head was bolted to the spool flange. The second pipe spool of 1.5 kilometres was positioned and welded to the spool, with the arrival of the vessel the pipe spool was attached to the vessel using the Pull-In Head. A STATS E-PEP™ was then installed to the pipe spool and a small volume of water was injected through the E-PEP™ into the spool. This water would be used to act as a buffer for the



Spoolbase with welding station and pipe lay vessel in distance

Hi-Diff Pigs which will be pigged through the spool as the pipe is pressurised from the vessel. The pipe spool was then pressurised to 40 bar and the High-Diff Pigs were pigged towards the E-PEP™, once water began to flow through the open valve on the E-PEP™ the valve was then closed and the pressure held. The pressure acting on the E-PEP applies differential pressure across the tool which self-energises the locks and seal ensuring fail-safe operation. The pipe spool was then reeled onto the vessel until the end of the pipe spool was located in the welding station, this allowed the next 1.5 km pipe spool to be positioned and welded into place. The pipe spool was then depressurised and the valve on the E-PEP™ was opened allowing the water to drain from the spool and the E-PEP™ was hydraulically unset and removed from the end of the spool. The pipe spools were then welded together and non-destructive testing (NDT) was carried out to confirm the integrity of the new weld. The E-PEP™ was then positioned and installed at the end of the pipe spool and water was injected through the valve on the E-PEP™. The sequence was then repeated to pressurise the pipe spool, pigging the High-Diff pigs through the spool and allowing the mechanically clad spool to be reeled onto the vessel.



12" E-PEP installed to pipe spool

Prior to commencing the final stage of the spooling operation, STATS installed a 12" I-PEP™ into the pipe spool, the internally installed I-PEP™ features locks and seals which grip the inside of the pipe. Installing this tool ensured there was nothing on the outside of the pipe that could clash or restrict the pipe spool as it was reeled through the pipe rollers between the quay side and the vessel.

Campaigns took place in 2015 and 2016 which consisted of 6 km and 11 km of BuBi® mechanically clad flowlines being reeled onto the vessel and installed at the Aasta Hansteen gas field. STATS also

supplied a mechanical clamp and 1" hot tapping machine to facilitate the draining of the pressurised spooling fluid from the pipe once it was reeled onto the vessel. STATS provided specialist hot tapping cutters and a four stage process to allow the mechanically clad pipe to be hot tapped to eliminate contamination of the flowlines with drilling swarf.

This project was not the first time Subsea 7 and STATS have collaborated during pipe reeling and installation projects. This successful project follows a similar workscope completed in the ultradeep waters of Brazil at the Guara and Lula fields at water depths of 2100 meters. STATS I-PEPs™ and E-PEPs™ were used to facilitate the pressurised installation of 85 km of 8" BuBi® mechanically clad flowlines during a 15 month campaign.



12" I-PEP installed in end of spool to allow reeling onto vessel