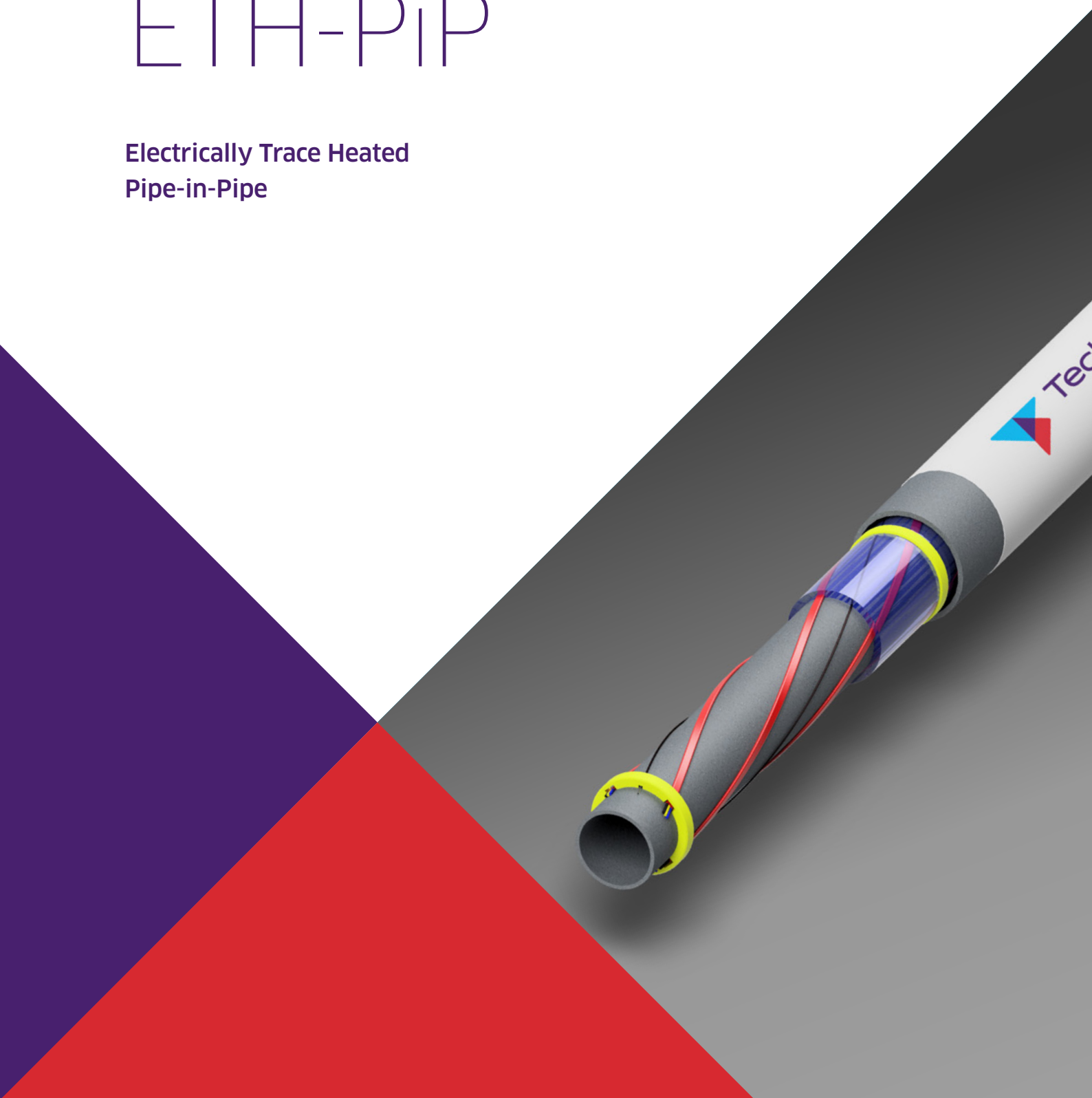
TechnipFMC

ETH-PiP

Electrically Trace Heated Pipe-in-Pipe



Spoolbase fabrication of ETH-PiP

Electrical trace heating

TechnipFMC's electrical tracing technology allows operators to optimize production and reduce risks of subsea flowline blockage

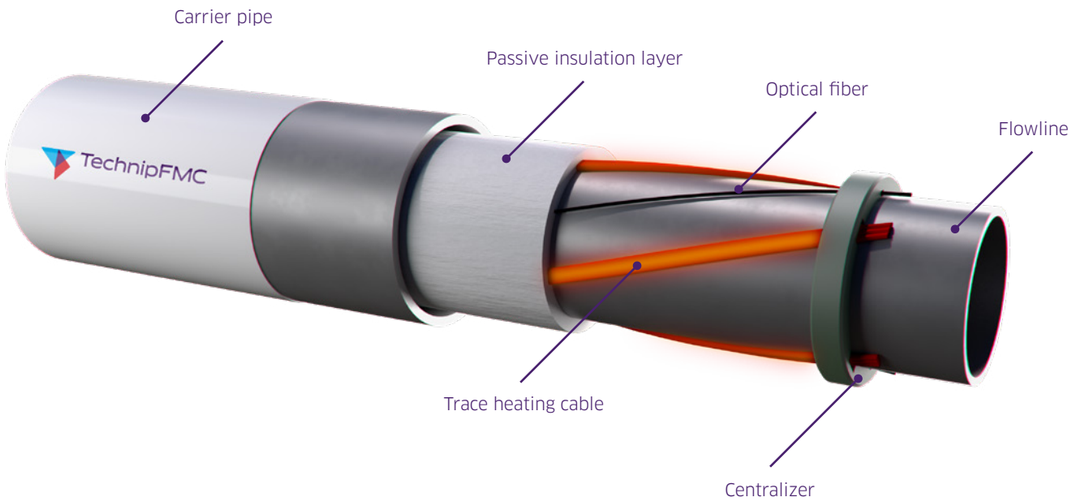
Blockage of subsea production flowlines carrying wellhead fluids is a recognized industry problem. TechnipFMC's Electrically Trace Heated Pipe-in-Pipe solves the problem through a combination of advanced passive insulation, controllable and high-performance active heating, and fiber optic measurement technology.

The ETH-PiP system can control fluid temperature and avoid hydrate or wax formation for long and challenging tie-backs. Even if hydrates or waxes form, they can be monitored and safely removed.

ETH-PiP can enable field developments through:

- Excellent passive flow assurance under normal flow
- Real-time monitoring and control of produced fluids
- Simplified field architecture; no need for flow loops
- Low power demand and minimal impact on host facilities
- Capabilities for heavy oil applications and long tie-backs

Key features



TechnipFMC ETH-PiP technology offers:

- Highly efficient electric trace heating
- State of the art pipe-in-pipe thermal insulation
- Fiber optic temperature monitoring
- High integrity and built-in redundancy

The ETH-PiP consists of a highly insulated pipe-in-pipe with additional electrical trace heating and fiber optic temperature monitoring cables. The cables are located in the annulus of the pipe-in-pipe and helically wound around the inner pipe under the insulation material. The trace heating cables are wired in a three-phase configuration. Centralizers are installed in the annulus to protect the insulation and cables.

The ETH-PiP is fabricated at an onshore spoolbase and installed by reel-lay vessel. Electrical and fiber optic connections are made by wet-mate connectors at a single location.

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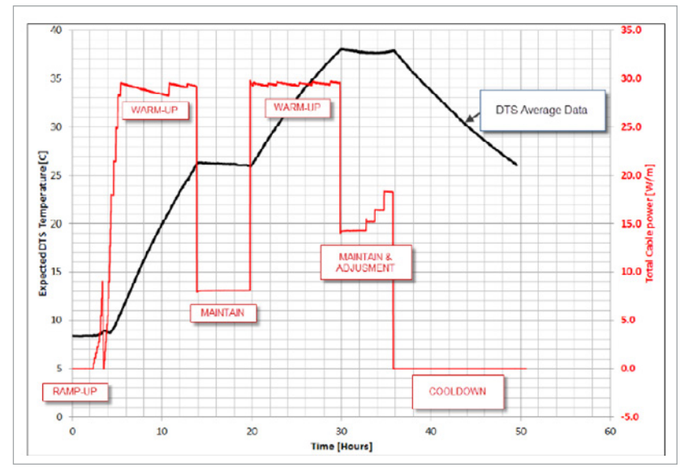
Track record

The ETH-PiP technology was first deployed by TechnipFMC on the Total Islay field in the North Sea in 2011. This marked the first deployment of a subsea electrical trace heated pipeline. TechnipFMC has since been awarded the world's second subsea ETH-PiP contract in the Norwegian sector of the North Sea.

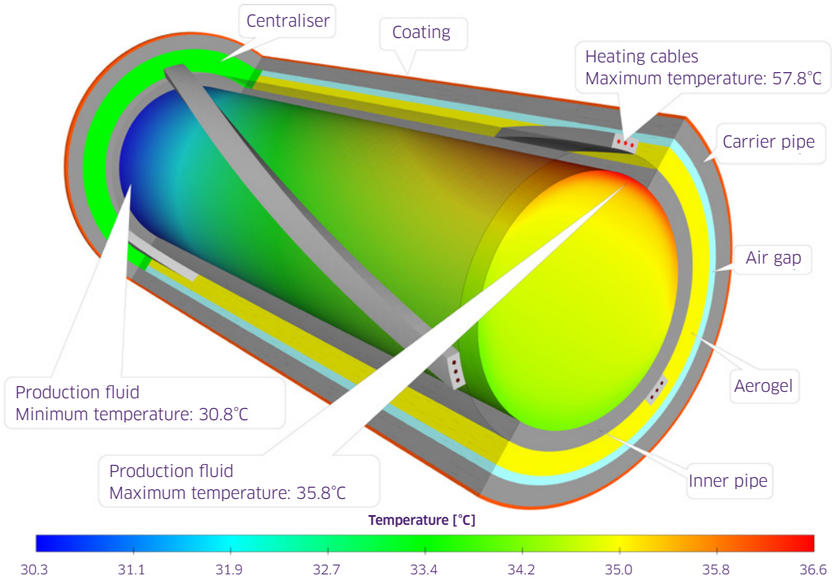
This first-generation system has been tested regularly and successfully. The results have been published in several technical papers. Significant development work has taken place since 2011 to extend the power rating, length capability and reliability of the system.



Testing of the Islay ETH-PiP

Operational temperature monitoring

Qualification



Project example
CFD analysis

ETH-PiP characteristics include:

- Pipe-in-pipe dimensions from 6”/10” up to 12”/18”
- OHTC performance down to 0.5 W/m²K
- Cable phase/line voltage up to 3.8 kV/6.6 kV
- Representative heating power up to 55 W/m on one cable
- Maximum length 50 km at full-power rating or greater with reduced power rating or step-out supply

The ETH-PiP has undergone extensive development, qualification and testing. This includes; engineering and flow assurance studies, qualification testing at small-scale and full-scale, deployment, and testing in the field.

The system and component testing and qualification have been validated and endorsed by independent operators.

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TechnipFMC
Evanton spoolbase

Key benefits

The ETH-PiP system shows exceptional passive insulation and active heating capabilities. Benefits include:

- Proven technology with subsea track record and extensive onshore experience
- Onshore fabrication tested and verified before installation
- Live temperature monitoring in both passive (unheated) and active operations
- Enhanced operational flexibility, allowing operators to minimize shutdowns and maximize production
- Temperature monitoring and active heating enabling less conservative flow assurance design and reducing CAPEX
- Low power consumption and power supply requirements, reducing OPEX and CAPEX

Rigid Pipeline and Installation Technologies

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