Strohm

Thermoplastic **Composite Pipe**

TCP Flowline

No corrosion, lower cost and less CO_2

Strohm is the **world's leading manufacturer and the first** to have developed Thermoplastic Composite Pipe (TCP)

We develop TCP products for high end applications in the energy and renewable sectors. Our pipe products do not corrode, reduce total cost of ownership and have a minimal carbon footprint.

TCP excels in simplicity
The solid wall consists of an inner liner, thermoplastic composite reinforcement layers and an outer coating. All layers are melt-fused together, ensuring a bond between the layers that is as strong and durable as the base materials.

TCP Flowline: No corrosion, lower cost, less CO_2

The significant costs associated with corrosion mitigation or replacement of affected subsea flowlines poses a significant threat to ongoing operation of existing assets and the value proposition of new ones.

With the introduction of our TCP Flowline, corrosion is no longer a threat to the integrity of your subsea infrastructure and corrosion mitigation measures could be a thing of the past.

The TCP Flowline is delivered in long spoolable lengths on standard reels, enabling cost effective transport and allowing for vertical or horizontal installation methods using smaller vessels such as field support vessels.

"**TCP has a growing track record** in all applications and is quickly being accepted as **a credible alternative to steel** and flexible products in flowline and jumper applications."

Key benefits

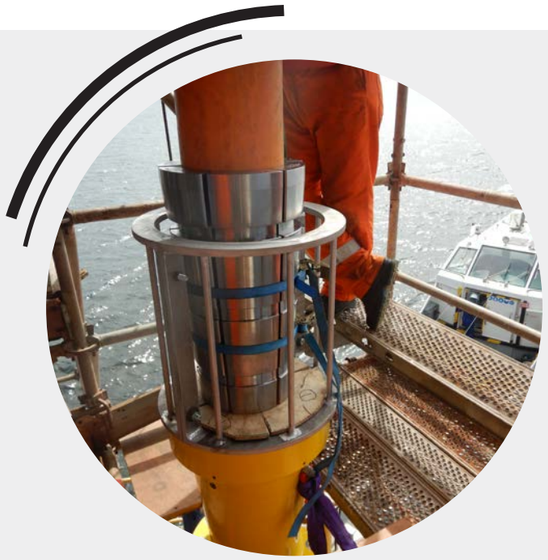
- No corrosion
- Flexible and spoolable
- High internal and external pressure ratings
- Smooth bore - fully piggable
- Simple, reliable and field-mountable end fittings
- Low U-value compared to steel pipe
- Continuous lengths of 3,000 to 6,000 metres depending on diameter and pressure rating
- Quick installation by reel lay
- Lowest total installed cost and total cost of ownership
- Reduced CO_2 footprint

Strohm's TCP Flowline is developed for offshore use in both shallow and deep waters and is designed for oil field conditions with exposure to seawater, sweet and sour hydrocarbon mixtures and oil field chemicals. To meet pressure and temperature requirements, the TCP Flowline is optimised by using the right materials for the job. This includes glass or carbon fibre reinforcements, and polymers including PE, PA12 and PVDF.

Carbon - PVDF 121 °C / 250 °F

Carbon - PA12 80 °C / 176 °F

Glass - HDPE 65 °C / 150 °F



Specifications

- Inner diameters ranging from **2**, up to **7.5 inch** (8 inch NPS)
- Internal pressures up to **690 bar** (10,000 psi)
- **3,000 m** water depth
- Temperatures from **-20 °C** up to **121 °C** (-4 °F up to 250 °F)
- Spoolable lengths up to **3,000 m** for 7.5 inch, smaller diameters at longer lengths

Installation methods

TCP can be installed using the vertical or horizontal lay installation methods.

TCP is engineered for maximum installation flexibility, allowing it to be deployed using both horizontal lay and vertical lay installation methods.

The TCP Flowline is supplied in long spoolable lengths, reducing installation costs by up to 30%. The pipe can be installed using small, multi-purpose vessels, further enhancing project agility by eliminating the need to wait for a suitable vessel. It can be pulled through the J-tube without end-fitting, reducing the size and weight of J-tubes by 50%.

The result is a versatile pipeline solution that enables operators to choose the most efficient vessel and installation strategy for each project.

End fittings

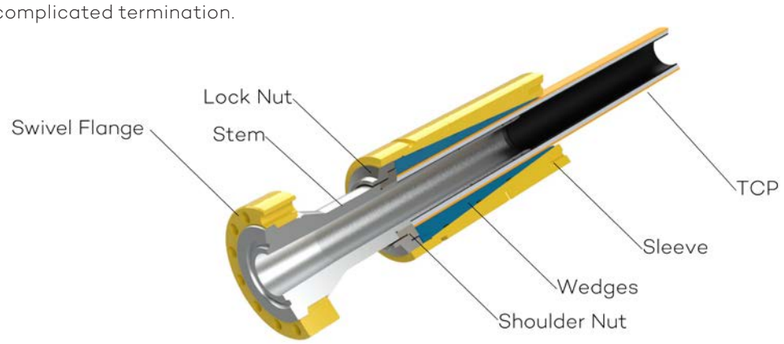
The solid pipe wall enables the use of simple end terminations that can be made up within hours at any location in the world.

The proven clamping method avoids having to terminate individual reinforcement layers and can be applied at any point on a pipe. The flowline can be terminated (essentially, cut to size) offshore, permitting small I-tube diameters and providing the ability to adapt the final length offshore.

Various flange & material options
Our end fitting design excels in simplicity. Due to the fully bonded construction of our TCP products there are no individual reinforcement layers that require complicated termination.

Instead, it relies on proven mechanical clamping and sealing methods, which allow termination at any length, both in the field and in our manufacturing facility.

In addition, we can supply all relevant ancillary items, such as bend restrictors, bend stiffeners, and buoyancy modules.

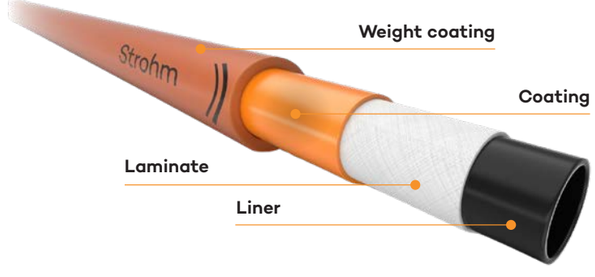


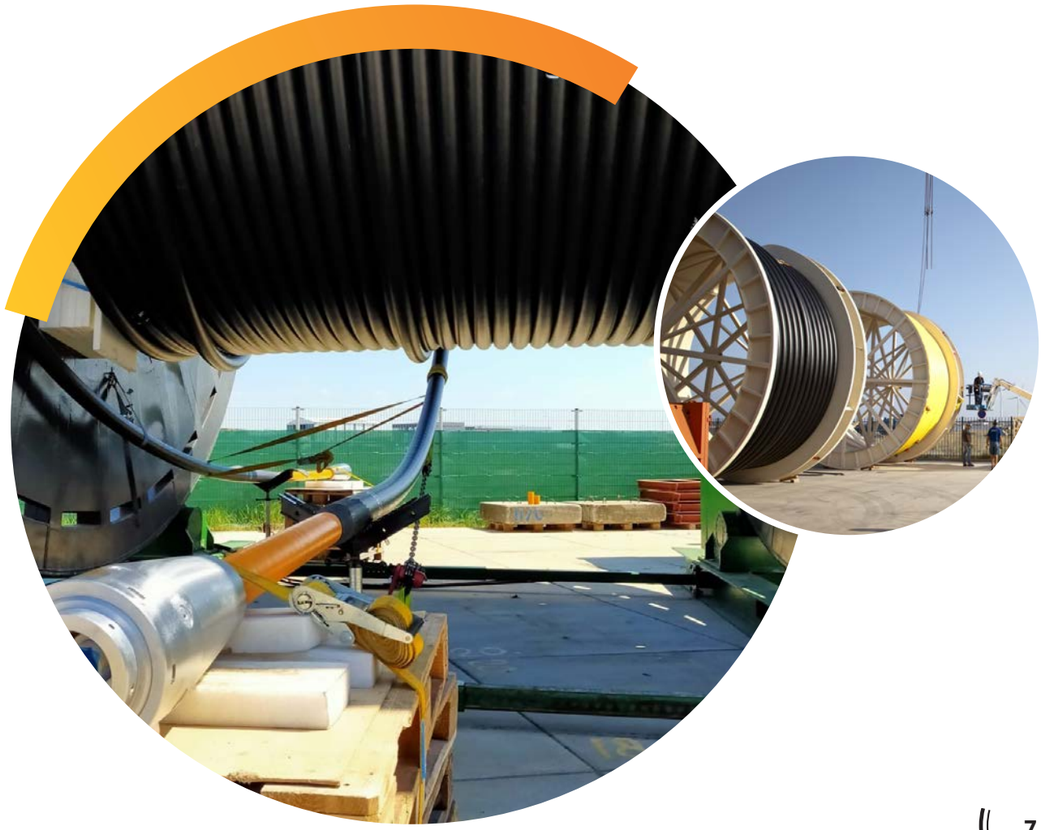
On-target weight

A weight coating can be applied to the pipe to offer a stable pipeline system subsea with the required on-target weight.

In addition to an external weight coating, there are numerous solutions for providing external weight for on-bottom stability including ballasting, trenching or rock dumping.

Strohm works with the installation contractors to develop the optimal solution for on-bottom stability.

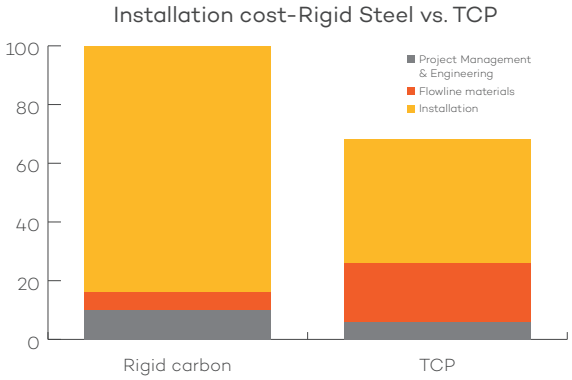




Cost reduction, qualification and manufacturing

The actual cost reduction achieved due to the TCP Flowline can differ from project to project. For a typical in field flowline, the cost distribution between materials, installation, and general project costs including project maintenance engineering are compared between carbon steel and TCP Flowline.

This example compares a 3 km tie-back, where a cost reduction of 30% is achieved with TCP Flowline versus carbon steel. Comparisons against more exotic metal grades such as a high grade corrosion resistant alloy (CRA) offer an increased saving.



Qualification

Today, Strohm is the first company to have certified and qualified the design methods and production processes, in accordance with DNVGL-ST-F119, DNV's TCP standard for TCP. Furthermore, the TCP Flowline has also been the subject of multiple informal qualification programmes developed with global operators.

Manufacturing

Strohm's manufacturing facility is based in IJmuiden (Port of Amsterdam), The Netherlands. The manufacturing facility has direct sea access and our TCP Flowline can be loaded directly onto our client's vessels. The quay is 330 m in length with a water depth of 9.5 m.

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