

Strohm 

Thermoplastic Composite Pipe

# TCP Flowline

No corrosion, lower cost and less CO<sub>2</sub>



“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.”



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.

## Excel in simplicity

The Thermoplastic Composite Pipe (TCP) developed by Strohm excels in its 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<sub>2</sub>

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.

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

# The TCP Flowline offers the following advantages

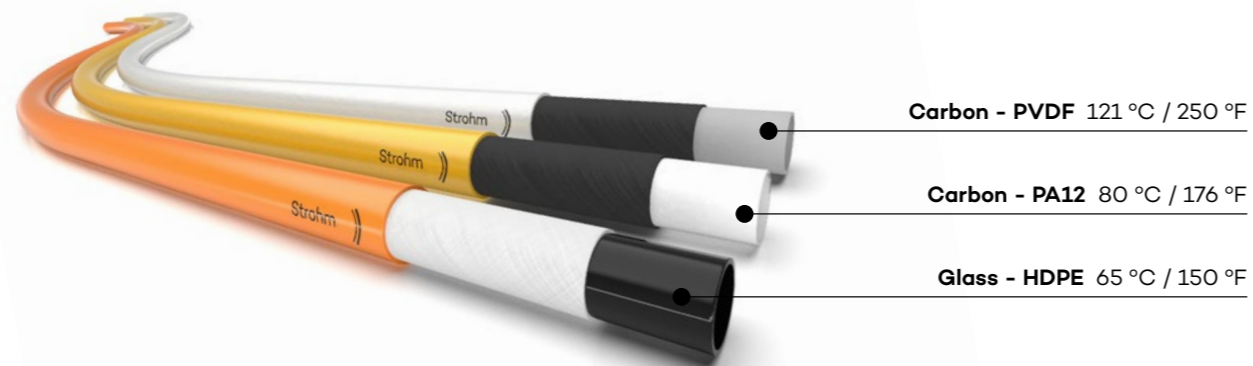


- No corrosion
- Flexible and spoolable
- High internal and external pressure ratings
- Smooth bore - fully piggable
- Simple, reliable and field-mountable end fittings
- Low U-value compared to steel pipe
- Continuous lengths of 3,000 to 6,000 metres depending on diameter and pressure rating
- Quick installation by reel lay
- Lowest total installed cost and total cost of ownership
- Reduced CO<sub>2</sub> 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.

# TCP Flowline specifications

- Inner diameters ranging from 2, up to 7.5 inch (8 inch NPS)
- Internal pressures up to 690 bar (10,000 psi)
- Water depths in excess of 2,500 metres
- 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



# TCP Flowline: End Fittings & Installation

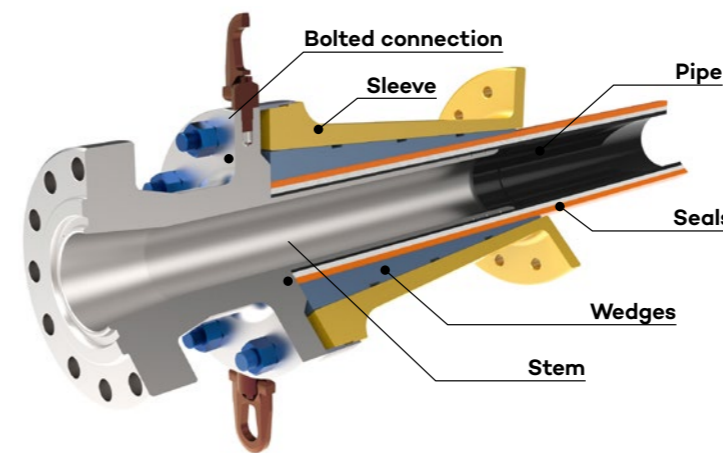
The solid pipe wall enables the use of simple end terminations that can be made up within hours at any location in the world.

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

The end fitting consists of a metal composite interface and a client-specified flange.



Flange systems available today include API, ANSI and compact flange / hub connectors.

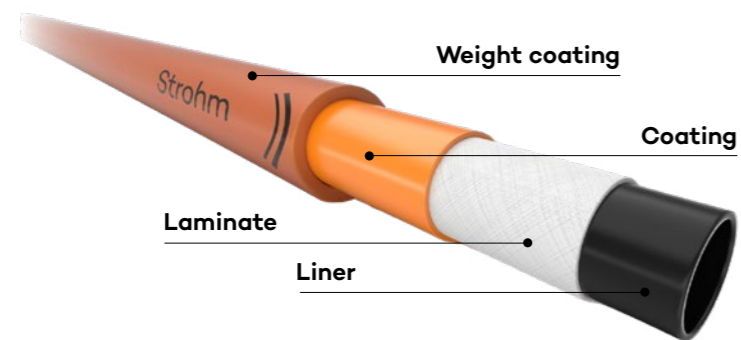
We supply in a variety of materials including carbon steel, 316 stainless steel, super duplex and Inconel. All our end fittings can be equipped with ancillaries, such as bend restrictors or bend stiffeners.

# 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.



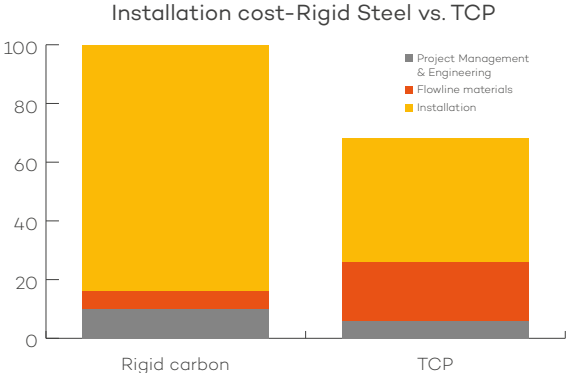
# Cost Reduction, Qualification & Manufacturing

Actual cost reduction achieved with TCP Flowlines differ from project to project. For a typical in-field flowline, the cost distribution between materials, installation and general project cost (including PME) are compared below for a 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.

### 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.



### Qualification

Today, Strohm is the first company to have certified and qualified the design methods and production processes, in accordance with DNVGL-ST-F119, the new DNV standard for TCP. Furthermore, the TCP Flowline is qualified under API RP 15S and also been the subject of numerous informal qualification programmes by a number of operators.



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