

# Onshore composite pipe

By Baker Hughes



# Baker Hughes is taking the energy industry forward.

Our role is to help our energy and industrial customers meet the challenges of an evolving market and remain relevant in a low-carbon future. We are committed to helping our customers innovate and find new ways of tackling current and future challenges.

That commitment is enabled by our ability to invest in new technology solutions, rigorously test them, and prove their effectiveness.

With more than 100 years of technology development and an extensive patent and knowledge portfolio, Baker Hughes continues to be a trusted partner to operators worldwide.

## Leveraging subsea expertise to drive onshore technology innovation

In-depth knowledge across the full subsurface and upstream/downstream technology spectrum gives us a powerful platform to look to the future and ensure our customers are ready to face the next decades with confidence.

Spoolable pipeline products were originally introduced in order to develop hydrocarbon reservoirs in the ocean connecting floating production storage and offloading units.

With more than 25 years of experience designing, manufacturing, and delivering flexible pipelines for some of the world's harshest subsea environments; our designing solutions for high pressure, high temperature, and extreme corrosion help us drive progress onshore.

## **Higher flows. Faster installation. Lower total cost of ownership.**

Composite pipes offer a profit-positive alternative. Modern materials have been developed after years of learning from the failures of the standard solutions.

Steel pipelines will slowly siphon away your margins from the moment you order the materials. Build-up on your pipe walls reduces your output and productivity. And the build-up of higher OPEX and ongoing maintenance costs drains more from your budgets.

Composite Pipes by Baker Hughes are designed to serve applications in high pressure, high temperature, and corrosive environments at a lower cost of ownership thanks to savings on installation and lower lifecycle costs.



# Composite pipe vs. steel

## Lower transportation costs

The spoolable, lightweight design of composite pipe allows for fewer trucks to transport materials to the installation site. One truck can transport 3.5km of composite pipe compared with only 1.5km of traditional steel pipe.

## Fewer equipment rentals

The lightweight pipe can be deployed with a backhoe, A-frame, spools, and a coupling machine. Connections do not require welding which also eliminates the need for x-rays. In the case of pull-through rehabilitation, no trenching equipment is needed.

## Less space needed for easements or rights of way

Less equipment, fewer workers, and minimal trenching requirements due to the simple installation process all allow for efficient use of space.

## Faster installation with lower risk

Long lengths of pipe on reels can be unspooled in less time than it takes to lower small segments of stick pipe into place. Fewer safety risks are posed due to lightweight material. And less equipment is needed, minimizing risk posed by equipment failure.

## Construction crews

Typically, a team of two to three people can manage the installation of a line. The pipe itself can be unspooled from an A frame and laid in longer continuous lengths than stick pipe.

**\$5B\***

spent annually on corrosion-related issues in U.S. alone

**60%**

approximate improvements in well installation time

**20%**

average saving on pipeline installation costs

# Comparing requirements for construction of 5,900ft of flowlines

## 4" Composite flowline

## 4" Steel flowline

### Mobilization



1 track hoe



3 pipe reels



1 warehouse



2 track hoes



95 joints

### Equipment



1 track hoe



2 track hoes

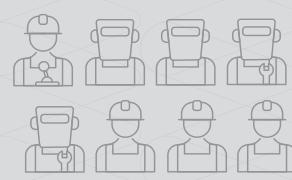
### Man power



1 supervisor  
1 equipment operator  
2 laborers



1 supervisor  
2 equipment operators  
2 welders (bead & hot pass/cap)  
2 welders helpers  
3 laborers



### X-ray

## Not needed

## Required

### Demobilization



1 track hoe



3 pipe reels

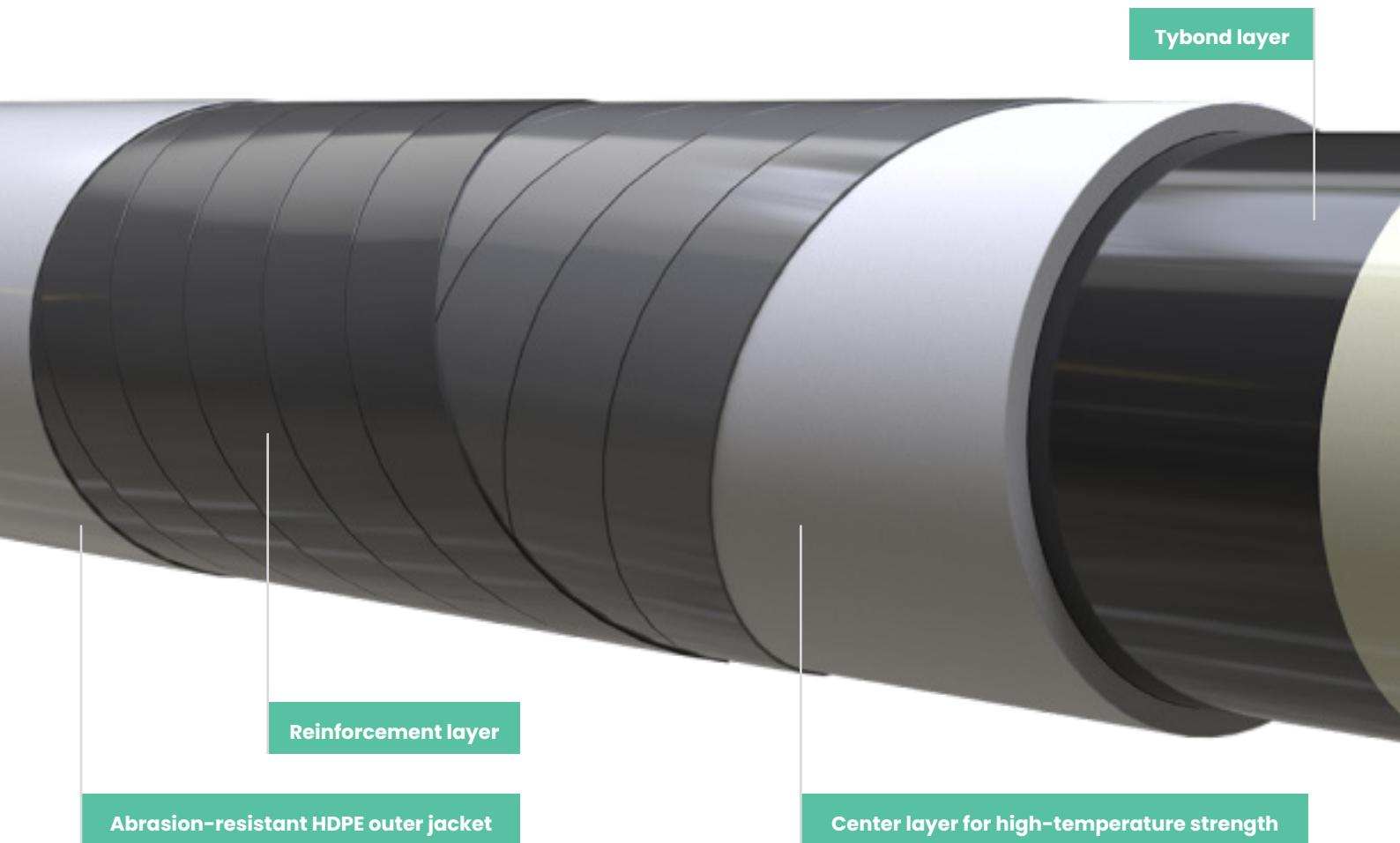


2 track hoes



1 misc. equipment and materials

# Composite pipe by Baker Hughes



## High pressure. Spoolable. Corrosion resistant.

Our in-house engineering & field-service team provides engineering support and recommendations to your design teams and field crews.

This typically includes line modeling, flow assurance and pressure curve analysis to ensure proper sizing, application and installation. Our modeling process presents various options and can help you decide which option to choose to best fit your project requirements.

Baker Hughes also provides peace of mind during installation with experienced field service technicians

that will ensure your project to run smooth and hassle-free, either through executing the job, supervising your crew or training your preferred contractor. Whatever suits your need best.

Whether through burial, surface, plowed, or otherwise – we accommodate multiple methods for deployment depending on the unique needs of the project.

## Couplings & Fittings

No welding required or makeup needed for flanges or thread joints

- Coupling options include NPT or BSPT threads, weld end, and API 6A/ASME B16.5 flange—all can mate with standard or custom pipe sizes
- Termination fittings connect to common oilfield infrastructure
- Available in carbon steel, 316 stainless steel, 2205 duplex stainless steel, or polyphenylene sulfide (PPS) coated

up to  
**2,250** PSI  
fluid pressure

up to  
**180°F**  
operating temperature

up to  
**8"Ø**  
diameter

Base Liner

**Whether you are installing a new line or rehabilitating an old one, Baker Hughes offers you three high-performance solutions:**

#### Nylon-lined

Recommended for high pressures & temperatures, permeation & paraffin buildup

#### PPS-lined

Recommended for extremely corrosive environments with high H<sub>2</sub>S, CO<sub>2</sub> or bacteria

#### HDPE-lined

Recommended for transport or disposal of fresh or produced water

**Suitable for highly corrosive applications and environments with high levels of CO<sub>2</sub> & H<sub>2</sub>S**

## Service capabilities

### Cut & deliver to length

We will manufacture exact lengths required for your specific project in order to maximize your flexibility in design. This is one way to design in cost savings to your project.

### Pipe transport & logistics

Our field-service team can deliver pipe on reels to your location from the manufacturing facility. Because we also manufacture the pipe, we can handle all the hassles of logistics – you just focus on the project.

### Staging & unspooling

In addition to logistical support, our experienced field-service technicians will be by your side to assist in staging the installation equipment and unspooling the pipe from reels.

### Installation & connection

To ensure the best possible outcome, we can certify each and every installation – including any necessary connections. This includes training for your staff onsite.

### Hydrostatic testing

Setting up and performing a hydrostatic test correctly is crucial to properly deploying spoolable pipelines. Our field-service team will be available to aid in hydrostatic testing once the line has been laid.

# A comprehensive product portfolio to meet the most challenging needs of the harshest sectors.

## Oil & Gas

Corrosive environments and hydrocarbons will always go hand in hand. As strong as steel, but with greater durability – nylon or PPS-lined Composite Pipes by Baker Hughes outlast and outperform conventional pipelines.

## Water Transport

Produced or fresh water transport or disposal present erosion and corrosion issues that steel pipes cannot address without extensive maintenance and treatment. HDPE-lined Composite Pipes by Baker Hughes offer a cost-competitive alternative.

## Mining

Slurries transported in mining often face the same challenges presented by the high pressures, temperatures, and corrosion/erosion of hydrocarbon transport. The low abrasion and no pressure derating of the pipe allows for a high flow at optimal diameters.





# Health, Safety & Environment Impact

## Non-metallics

Composite pipes utilize fully non-metallic, low-carbon material. This lowers demand from suppliers for metallic raw materials that carry a significant environmental cost to extract, refine, and transport. The low-corrosion design means less carbon waste pollutes the surrounding environment of aging steel infrastructure as composites are phased into use worldwide.

## Durability

Greater durability than steel allows for more sustainable, longer lasting infrastructure. Steel corrodes over a significantly shorter period of time versus composites, that is corrosion resistant. The need to condemn, repair/reline, or install new steel infrastructure brings additional environmental and economic costs.

## Corrosion resistant

Ultra-low permeation and corrosion resistance ultimately lowers fugitive emissions. This decreases potentially risky exposure for front line workers and the overall emission of greenhouse gasses like CO<sub>2</sub>.



Oil & Gas



Water



Industrial Applications



Corrosive Environments



Rehabilitation

## Oil & gas applications

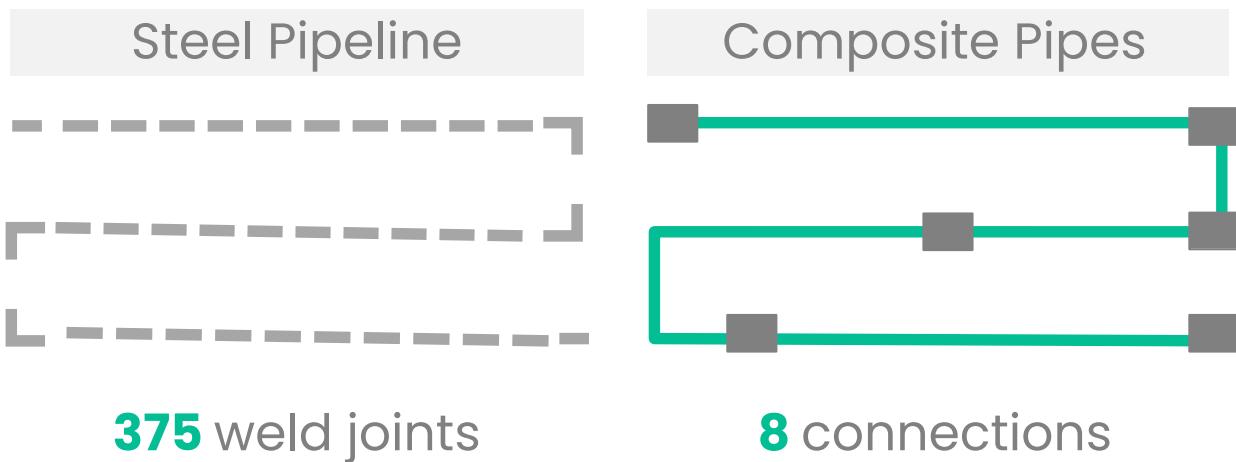
- Gathering lines
- Flowlines
- Salt-water disposal lines
- Gas-lift lines
- Water/CO<sub>2</sub> floods
- Water transport
- Velocity string
- Enhanced oil recovery
- High H<sub>2</sub>S & extreme corrosive environments

## Industrial Applications

- Mining/slurry
- Landfill
- Sewer systems
- Power generation
- Water wells
- Water transport

## Pipeline Rehabilitation

Comparison: 2.8 miles of 4" pipe



With decades-old steel pipeline still operating around the world, we are at risk of suffering from a failure that will impact our environment, our property and our health. According to a 2015 report by the Department of Energy, replacing all of the nation's oldest and most vulnerable pipelines would cost \$270 billion.\*

A far more cost-effective solution is pipeline rehabilitation, also commonly referred to as remediation or reline. Developed by Baker Hughes, this technology allows a flexible, thermoplastic pipe to be pulled through existing pipeline infrastructure, dramatically reducing the material and labor costs.

### Up to 50% cost savings vs. steel replacement

- No need to relicense Right of Way
- Minimal disturbance to landowners
- Initial infrastructure as secondary containment

Pigging, chemical treatments, and inspections can add \$232,500 per year to your operating expenses for just one mile of 6" steel pipe.

**With our pull-through rehab process, take care of your operational problems now and for the future.**

Discover how modern composite pipes can reduce your capital and operations expenditures, reduce production downtime, and improve your profits for the entire life cycle of the installation.

And learn what to look for to determine which composite pipe is right for your application.

Request more information or connect with a Baker Hughes representative at:

**[bakerhughescompositepipe.com](http://bakerhughescompositepipe.com)**

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