

# 4CP Pipes

Circumferentially Compressed Composite Concrete Pipes

## The **LATEST INNOVATION** in Drainage, Sewer, and Drinking Water Pipes

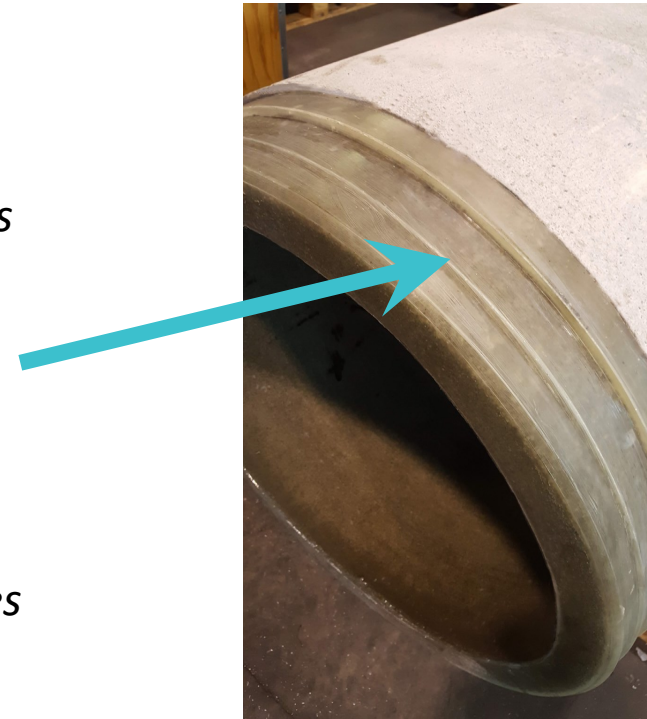


*A new Corrosion Free Concrete Pipe option that can weight significantly less than conventional Reinforced Concrete Pipe (RCP), is stronger and more tolerant of soil settlement, and has improved sealing at the pipe joints.*

*Consistent with the US 2045 Transportation Plan.*

*4CP can be supplied with a Polymer Liner achieving the same chemical resistance as a GRP pipe.*

*These are all very desirable features that could benefit Agencies responsible for Stormwater, Sewer, and Drinking Water Management Systems.*



**To understand the innovation, we need to make a brief history**

# Pipes History

Pipe Type		Strength	Weakness
UNREINFORCED CONCRETE PIPES	They were the first kind of Concrete Pipes produced. Most of the 100+ year old pipes in service, are unreinforced.	Long life is mostly coming from the fact that there is no steel reinforcement that can corrode.	Once the maximum crushing load is reached pipes collapse catastrophically.
REINFORCED CONCRETE PIPES (RCP)	Starting in the 1930's Unreinforced Concrete Pipes started to be replaced by steel reinforced concrete pipes (RCP)	The RCP Pipes do not collapse catastrophically.	The steel reinforcement is subject to corrosion.
FLEXIBLE PIPES	The RCP Pipe Market has been eroded by flexible pipes, even if more expensive. They were thought to be better than RCP pipes, but over time their weakness emerged.		They do not last over time: the main problems are Delamination of GRP Pipes, Bouyancy, and Buckling.
4CP PIPES: THE RETURN OF CONCRETE	4CP Pipes overcome the limitations of RCP, Plastic, and GRP, providing concrete the opportunity to recapture market shares lost to alternative materials.		

# 4CP - The Core of this Innovation

- They are **Concrete Pipes WITHOUT STEEL REINFORCEMENT**
- They are **WRAPPED IN "TENSION" WITH FIBER**
- This provides **FLEXURAL STRENGTH**, and forms a **PROTECTIVE CASING THAT PREVENTS LEAKS**





# 4CP - Benefits

- Long-lasting Corrosion Free Pipes
- Absence of leaks
- Reduced Cost
- Drastic reduction of CO2 Footprint

*Also, the Ultra-Thin Concrete Pipes makes possible to regain the market for Small Diameter Pipes, that are currently made of Plastic / GRP*



**NEW** Ultra-Thin Concrete Pipes  
with Thickness from 1/20 ID



**INNOVATION FOR**  
Current Concrete Pipes  
/ Jacking Pipes



**INNOVATION FOR**  
AWWA C301 Pressure  
Pipes

# NEW Ultra-Thin Concrete Pipes (UTCP)

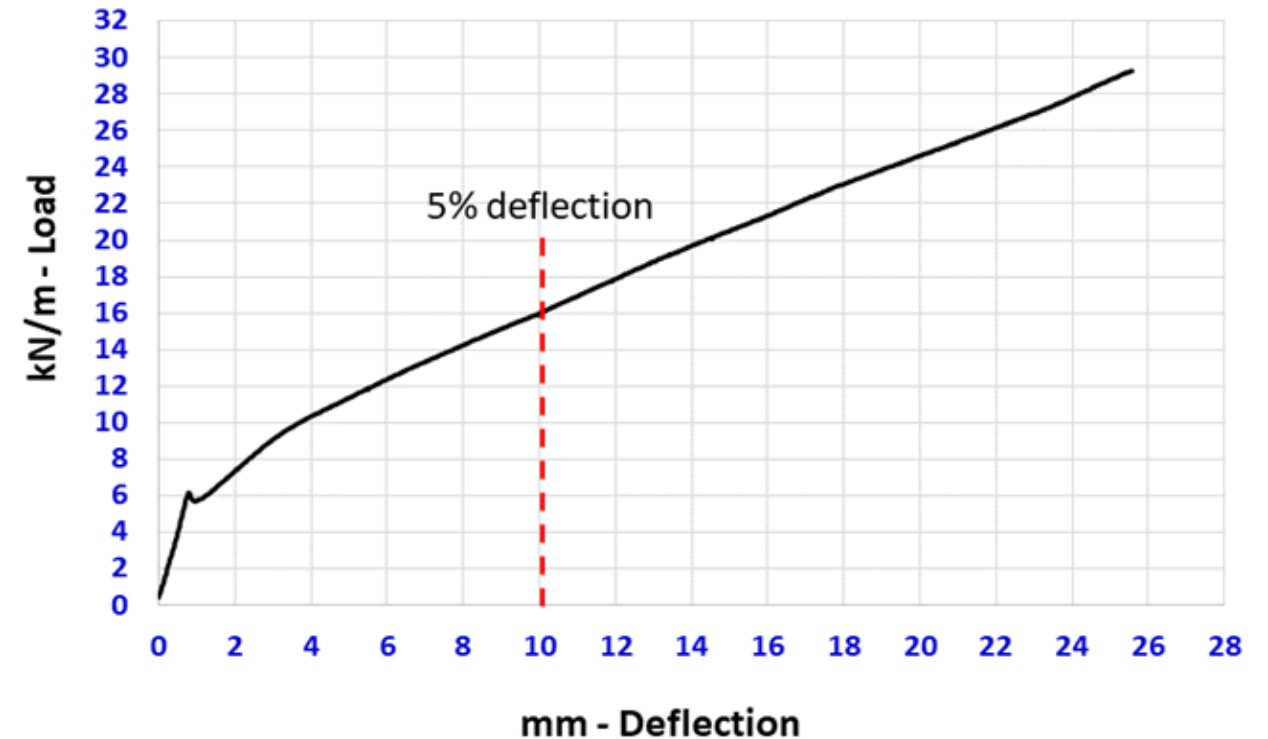
- Thickness from 1/20<sup>th</sup> ID
- Flexural Behaviour & Robustness
- ID from 150 mm



UTCP Flexural Behavior. Thanks to the “Wrap in Tension”

Concrete shows a behavior that is very similar to steel

**D Load Test - DN200 8mm Thickness**



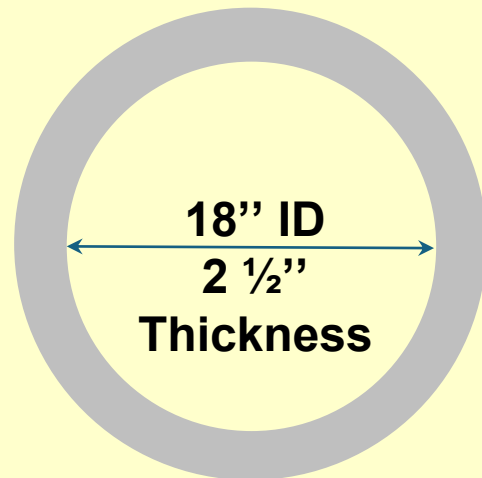


# RCP / UTCP Pipe Cost Comparison

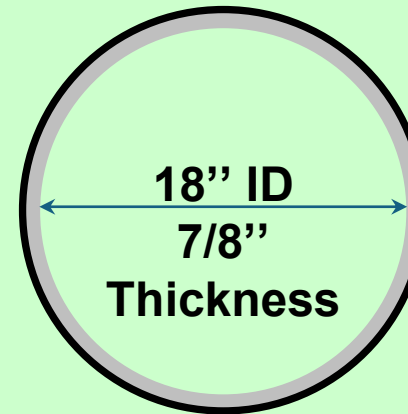
Current C76 Reinforced  
Concrete Pipe  
18" ID (450 mm) – 2 ½" (63 mm)  
Thickness  
Class III – Wall B



UTCP Pipe  
(no steel reinforcing)  
18" ID – 7/8" (22 mm)  
Thickness

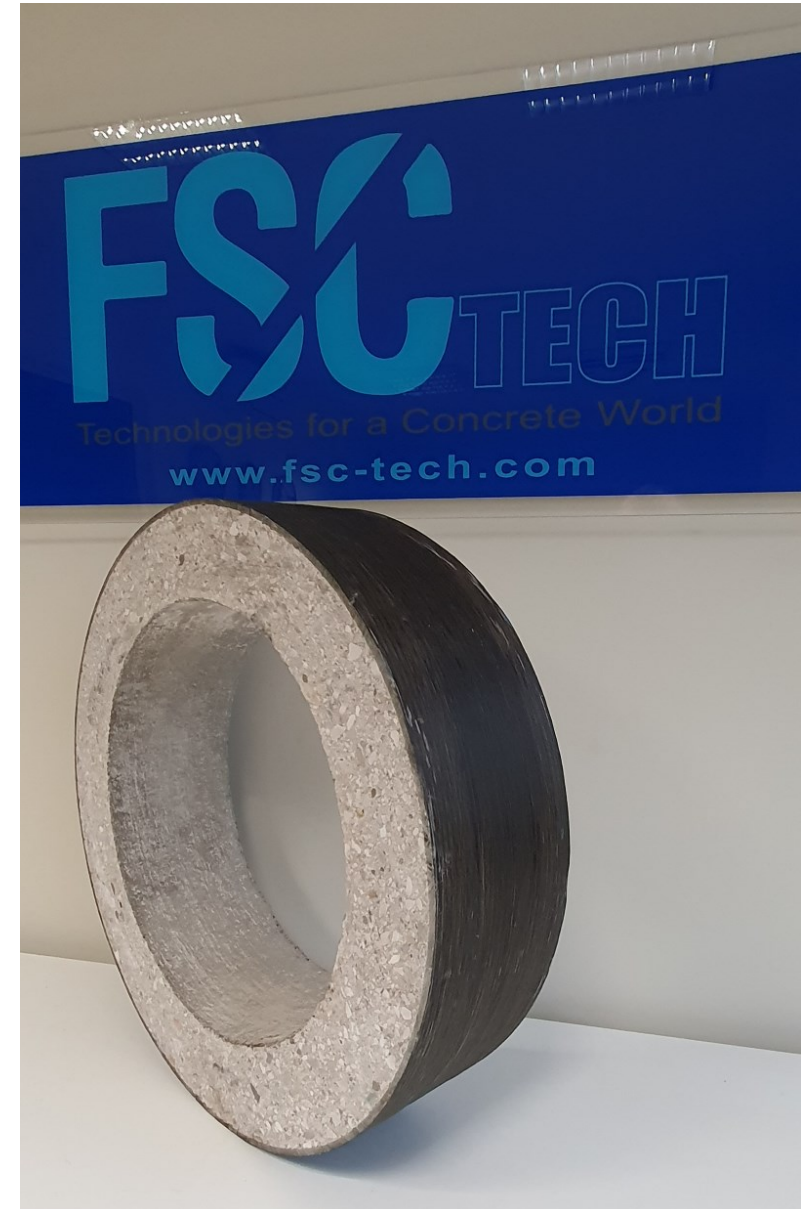


**Raw Material Cost Saving 66%**  
**Weight Savings 67%**  
**Raw Material CO2 Footprint Saving 70%**



The **STEEL REINFORCING IS REPLACED** with **FIBER WRAPPED IN TENSION**

- Long-lasting Corrosion Free Pipes
- Absence of leaks
- Reduced Cost
- Drastic reduction of CO2 Footprint



## The “Wrap in Tension” provides unmatched Flexural Strength and Resilience





The **STEEL REINFORCING IS REPLACED** with **FIBER WRAPPED IN TENSION**

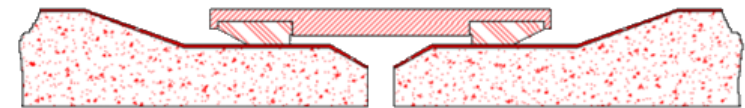
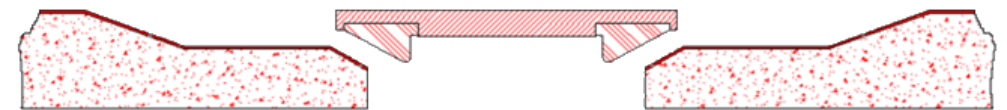
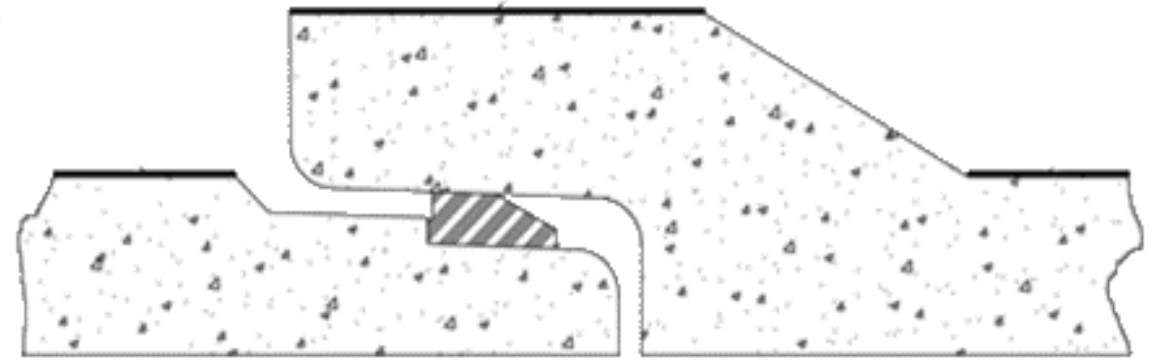
- Increased Axial Capacity
- Reduced Friction coefficient



# 4CP Joints

By placing **THE SEALING SURFACE ON THE 4CP WRAPPING**, there are several advantages:

- **CONTINUITY OF THE IMPERVIOUS SURFACE**, even if the concrete cracks or is porous
- In **PRESSURE APPLICATIONS**, every portion of the concrete core has post compression
- By placing the gasket on the collar, it has the advantage to be **COMPRESSED ALSO FROM THE INTERNAL PRESSURE**





**PRESTRESSING WIRE and MORTAR COATING**  
are replaced by **FIBER WRAPPED IN TENSION**



**ROBUSTNESS AND DURABILITY**

**REDUCED COST**

**REDUCED WEIGHT**

**FASTER AND SIMPLIFIED PRODUCTION  
PROCESS**

# SPUN LINER Technology

Enabling Concrete Pipes the same level of chemical resistance as an Organic Polymeric Tube

- An **INTERNAL LAYER** of **POLYMER CONCRETE** is projected to the inner side of the pipe **INCLUDING JOINTS**
- **NO EXTRA WORK AT THE INSTALLATION SIDE**





# THANK YOU

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