



Weatherford®

Composite Sleeve Repair

Making in-service repairs
without welding



Delivering integrity under pressure.

Pipeline & Specialty Services

Precommissioning | Commissioning | **Maintenance** | Shutdowns | Decommissioning

Keep revenue flowing and reduce overall repair costs.

Performing regular pipeline inspections to detect anomalies early and selectively remediating those anomalies using composite sleeve repair (CSR) technology is essential in maintaining an uninterrupted flow of oil and gas to clients and avoiding expensive overhauls and shutdowns.

Permanent repairs of nonleaking anomalies.

CSR systems address both axial and circumferential anomalies including cracks, girth welds, seam welds, dents, gouges, galling, lamination and corrosion. All of these anomalies are detectable in their early stages by Weatherford's caliper, ultrasonic, magnetic flux leakage and transverse field inspection tools in sizes ranging from 6 to 56 in. Strength calculations identify anomalies that jeopardize pipeline integrity and require repair.

Sleeves can be installed on pipeline with diameters ranging from 8 to 56 in. The two steel sleeve halves are bolted together around the pipe and the stiff composite material is injected into the annular area without shutting down the pipeline—even in hot oil applications. All pipeline repairs conform to the regulations and requirements for environmental safety. Completed repairs are actually stronger than the pipe itself.

Repairing major damage.

CSR technology can repair damage as deep as 80 percent of pipe wall thickness and as extensive as 60 percent of pipe circumference. The bond between the sleeve and epoxy blocks the migration of oil and gas when corrosion or other anomalies ultimately perforate the pipe wall.



Grit blasting of metal half sleeves



Quality control of sleeve welds



Adjustment of annulus gap from 0.2 to 1.6 in. (5 to 40 mm)



Preparation of epoxy



Sealing of pipe ends with fast curing agent



Sleeve prepared for filling with epoxy



Monitoring of sleeve filling with epoxy

Proven effective in major pipeline networks.

The CSR technique has been used for nearly two decades. Additionally, CSR technology has been technically validated by numerous tests simulating entire pipeline-life scenarios in terms of internal pressure-loading and fatigue cycles. CSR systems use only the highest quality materials to ensure pipeline repair integrity.

With a scheduled program of in-line inspection services and selective composite-sleeve repairs, operators can realize many advantages:

- Save on overall repair costs by eliminating pipeline overhauls
- Avoid costly pipeline shutdowns while making repairs
- Make repairs without hazardous welding activities
- Ensure pipeline integrity for greater personnel and environmental safety

Pipeline integrity—knowing that all is well.

The industry's goal is to maintain and prolong the life cycle of any asset. Weatherford has developed key inspection, cleaning, isolation, drying and testing services to ensure minimum disruption to production while ensuring that the integrity of an asset is retained.

For example, when performing in-line inspection using multiple technologies such as caliper, MFL and ultrasonic,

our engineers use a single database to store the collected data. This database allows a single analyst to compare features between the technologies, providing greater clarity on anomalies. Ultimately, use of the database results in faster decision making for corrective action.



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Weatherford provides a range of services used throughout the life cycle of pipeline and process facilities, onshore and offshore. Our global network of locations puts highly trained and experienced people, equipped with the latest technology, right at your doorstep. Pipeline & Specialty Services: **Delivering Quality Under PressureSM**.

Go with solidly established pipeline expertise and technology.
Visit weatherford.com/pss, or e-mail pss@weatherford.com.



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