

# Compression Fit Lining – CFL

Ultra-Tight Fit Lining by  
Die-Reduction Technology

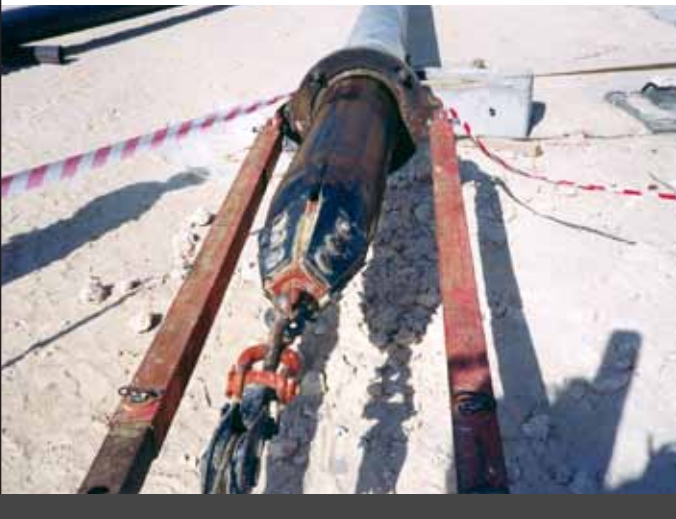


## Features:

- Ultimate Protection Against Internal Pipe Corrosion
- Can Be Pulled In Over Relatively Long Lengths
- Trenchless Technology-No Excavation
- Often Improving Hydraulic Capacity
- Proven Application for Over Three Decades

## Applications:

- Water Injection Pipelines
- Oil Flow Pipelines
- Effluent Water Disposal Pipelines
- Gas Distribution Pipelines
- Water Transmission Pipelines
- Water Distribution Pipelines
- Slurry Transport Pipelines
- Rising Mains
- Fire Water Mains



## Pipeline Rehabilitation

Within the APS, we are able to provide turnkey service to our customers in the utility, power, oil and gas industries. The choice of the most suitable pipeline rehabilitation system depends upon which performance parameters the pipe fails to meet and why the failures occur. Criteria like; condition of the existing pipeline, requirements for the desired performance, hydraulic capacity and structural design data, as well as financial considerations have to be taken into account. Since there is no single solution that covers each and every pipeline rehabilitation project, APS prides itself in providing a very broad range of pipeline rehabilitation methods from which we can offer a tailor-made solution fitting the specific circumstances of the project. Compression Fit Lining is one of these solutions.

APS CFL technology uses the molecular memory of plastic polymers to create an ultra-tight fitting liner inside of a host pipeline, in a way that is effective from the time the pipeline enters service or is rehabilitated throughout its entire service life. With many pipelines now designed to be operational for over 25 years, the lining system has to remain fully functional for that period. No annulus means maximum flow, no corrosion and no collapse risk.

With a track record substantiated by extensive condition assessment of recovered pipelines and very challenging pressure testing, APS demonstrates that its polymer lining hardware will keep very high (or low) pressure pipelines protected against internal corrosion for the duration by remaining corrosion and leak free.

## CFL Technology

CFL liners can be engineered in either an economical thin wall configuration aimed at re-establishing a pipeline's full operating capacity and pressure, where intermittent leakage or water quality is the primary concern, or in a thicker, fully structural form effectively providing a new "pipe within a pipe" solution for more seriously deteriorated pipelines.

The engineering and selection of the appropriate polyolefin material so as to provide the right technical and commercial solution for the job at hand is the single most important part of any compression fit lining project and this cannot be stressed too strongly.

Many plastics, including those within the polyolefin chain, such as polyethylene and polyamide have an inherent molecular memory. What that means is that when a force is applied to a section of those materials sufficient so as to cause deformation, when that force is subsequently removed, the material has a tendency to quickly revert to its original size and shape.

This translates into the ability to be able to start with a





plastic liner diameter that is greater than that of a host pipeline bore and by drawing it under tension through the CFL diameter reduction equipment, be able to reduce its diameter to an extent whereby it can be inserted inside the pipe bore where, after the release of the tension, its natural molecular memory causes it to revert toward its original diameter creating an ultra-tight “compression” fit within the host pipe.

The correct engineering of the liner diameter and CFL reduction gear ensures that the liner fit is always precise, so that the annular space between liner and pipe wall is less than one micron. This is especially important in high pressure and hydrocarbon related applications in terms of mitigating the potential effects of accumulated permeating gases between the pipe wall and liner.

## Installation Guidance CFL

CFL liners are fused into long, continuous leak free lengths prior to insertion through access pits, which can be up to one kilometre apart.

In situations where a pipeline has already been in service and CFL is being installed as a retrofit liner, it is particularly important that the host pipeline is internally cleaned to remove any fluid deposits and corrosion products. In all cases however it is necessary to ensure that there is no sharp, protruding internal weld spatter or other forms of

intrusion that may interfere with, or damage the liner during the insertion process. This is undertaken using a variety of abrasive pigs, scrapers and swabs before a final gauge plate and liner test piece is pulled through the entire length of the pipeline to be lined.

Once the pipeline cleanliness and surface preparation has been verified, the CFL liner diameter reduction equipment is installed at the liner entry point. A suitably rated towing cable is then spooled out from the towing winch and introduced through the length of the host pipeline to be lined and connected to a towing head which is positioned on the leading end of the liner section, which has been previously welded and tested, ready for installation by the CFL process.

The liner is then steadily and progressively towed into the host pipeline through the CFL installation equipment. Once started, the process of the liner installation is smooth and continuous at rates of up to ten meters a minute, until the liner is positioned throughout the entire length of the host pipe. The winch cable tension is then released so as to allow the liner to revert back toward its original diameter forming the ultimate Compression Fit within the bore of the steel pipeline.

Finally, the desired terminations are installed for reconnection to the neighbouring sections of similarly lined pipework before the final hydro-test and commissioning is completed ready for service.



APS introduced the Compression Fit Lining technology in the Middle East and has since build-up a very long track-record of successfully executing CFL projects in this region and beyond. Companies like Qatar Petroleum, Qatar Gas, Occidental Petroleum, PDO, KOC, ZADCO and many more top operating companies have become regular customers of our compression fit installation technology.

For a complete and detailed project reference list, please contact APS.

APS brings unrivalled levels of innovation, experience and expertise in corrosion engineering and contracting.

We have in-depth knowledge of the industry, our customers' day-to-day challenges and the environmental, health and safety standards in the marketplace. By working in close partnership with our customers, our company is able to provide timely, efficient, cost-effective and above all quality products and services.

APS is certified to and operates in compliance with ISO 9001:2008/BS EN, ISO 14001:2004 and OHSAS 18001:2007.

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