



InField Liner

Technology in Line

Flexible Kevlar Reinforced PVDF Liner – Revolutionary Subsea Pipeline Rehabilitation System

Features:

- Significantly extends lifetime of existing pipelines
- Economical solution compared to new lay carbon steel pipelines
- Saves time in design, planning and installation compared to new lay
- Protection of environment due to dual containment
- Multiple IFL systems already installed within the PETRONAS pipeline network

Applications:

- Existing Hydrocarbon Subsea Pipelines
- De-Commissioned Hydrocarbon Subsea Pipelines
- New Hydrocarbon Subsea Pipelines Exposed to Highly Corrosive Environments
- Existing Hydrocarbon Onshore Pipelines Difficult to Access for Rehabilitation



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. InField Liner – IFL - is one of these solutions.

Internal corrosion may cause a pipeline to prematurely reach the end of its useful service life before its intended design life, which then necessitates pipeline replacement. Historically, there has been no viable method for installing an internal structural corrosion barrier to existing hydrocarbon subsea pipelines. Offshore pipeline operators around the globe have therefore been faced with the extremely high costs of mobilizing large pipe lay spreads for the replacement of offshore pipelines.

In 2013 PETRONAS & APS concluded a three year multi-million dollar research & development project to develop the materials and means and mechanisms for the in-situ placement of a full-bore internal pipeline composite rehabilitation corrosion barrier which has subsequently been successfully deployed for the rehabilitation of multiple existing high pressure oil and gas subsea pipelines.

IFL Technology

The IFL liner comprises of a Solvay Speciality Polymer PVDF inner liner, a tightly woven Aramid core, using Dupont Kevlar fabric, with an outer layer of Thermoplastic Polyurethane from BASF.

The inner PVDF provides resistance to the most aggressive hydrocarbon exposure conditions, with hot sour crude oil up to 110 °C. The Kevlar core provides the liner with a remarkably high tensile strength, enabling the insertion of very long lengths of liner, accommodating multiple 90 degrees bends exceptional host pipe matching pressure retaining capability within its tight fit operating criteria. The outer TPU provides maximum abrasion resistance, required during the installation of IFL.

IFL is ideal for rehabilitating infield pipelines running from platform-to-platform or from platform to shore. IFL is also used as a corrosion barrier for new pipelines, exposed to extreme corrosive environments, caused by substances like Sulphate Reducing Bacteria (SRB) in combination with high water cuts, whereby the predicted lifetime of pipeline



without an effective corrosion barrier would be relatively short.

IFL is originally developed as a viable and cost-effective method for subsea pipeline rehabilitation system. However IFL also has specific applications in the onshore hydrocarbon pipeline industry, whereby the pipeline is required to be rehabilitated over long lengths, due to the inability to gain access to the pipeline at shorter length intervals.

Installation Guidance IFL

A thorough inspection of the existing subsea pipeline prior to the detailed planning of any IFL Liner rehabilitation project is a mandatory pre-requisite, as is the collation of all data relative to the prevailing operating parameters and conditions.

This data is used to assess the general condition and remaining wall thickness of the existing pipeline and to verify the IFL Liner size requirements in the event that an enhanced tight-fit high pressure liner is required. Prior to the offshore deployment of the IFL™ installation marine spread, the host pipeline will have been decommissioned, cleaned and finally gauged ready for the liner insertion.

The IFL material, although manufactured in a circular profile, is able to be temporarily flattened for transportation and reeled onto a transportation drum that can be sized so as to fit into conventional shipping containers. Each drum can be loaded with up to 5 kilometres of IFL liner, dependent upon the liner diameter.

These drums are then shipped to an onshore location within the destination country, usually a

marine supply base, where they are further processed into a folded liner format prior to finally being sent offshore to the platform location for installation.

The actual IFL Liner installation process is extremely fast, being operated at speeds of approximately 10 meters per minute. The IFL Liner drum is, wherever practical positioned on the offshore platform structure, or when necessary, on the deck of a work boat from where the liner can be unspooled.

A feeder cable will have been fired through the pipeline during the final cleaning and gauging procedure and this is used to pull back through the liner installation winch cable for connection to a towing head which is located on the leading end of the liner.

Once the IFL Liner has been drawn through the entire pipeline length, it is then re-rounded by filling with pressurized air. The liner, which is manufactured to the same diameter as that of the host pipeline bore, then expands to form an intimate fit with the inner wall of the host pipe.

With the liner then fully re-rounded against the wall of the host pipeline, the last task is the installation of the end termination inserts which ensure reliable compression seals and restraint at the liner ends. The re-lined pipeline can then be hydro-tested in the conventional manner and the top-side pipe work reconnected, following which the pipeline is then ready for re-commissioning and for its new, extended life of operation.



APS has already successfully installed multiple InField Liners for the PETRONAS subsea pipeline network in Malaysia whereby the re-commissioning of previously shut down pipelines has been enabled. APS has the exclusive license to distribute and install the IFL technology globally. APS is either directly involved as an installer, or uses licensed franchise organizations. If you are interested in becoming a licensed franchise organization, or generally would like more information on the IFL technology, please contact our APS Headquarters in Dubai.

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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