

PFT Solutions

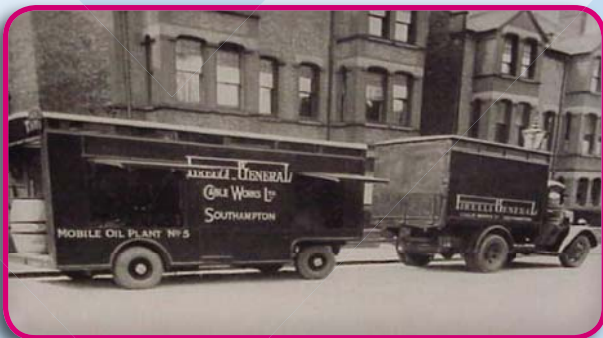
Introduction

Within the UK and around the world the backbone of underground electricity transmission has been borne by fluid filled cables generally operating between 33kV and 400kV, some of which are still in service from the 1930's. Fluid filled technology has largely been superseded by the advent of XLPe type cables which are now being installed for new schemes.

Most utilities and transmission operators have significant quantities of fluid filled systems within their networks and will continue to do so for many years. Fluid filled cables have proven to be reliable work horses provided the fluid pressure is maintained via the integrity of the metallic sheath and associated accessories.

Leaks can occur on fluid filled cables for a number of reasons but typically through metal fatigue, external corrosion or third party damage. Once a leak occurs it is generally identified by the cable operator through the activation of low pressure alarms and to ensure that the cable remains operational new cable fluid is pumped into the system pressure tanks to keep pace with the leak volume.

Traditionally the main method for locating cable fluid leaks has involved de-energising the cable circuit, excavation to gain access and then applying a liquid nitrogen freeze. Fluid pressures are monitored which then indicate which side of the freeze the leak is occurring. This process is then repeated at different locations until such time that the leak is found. It is not uncommon for this process to take between 3 & 7 attempts before the leak is identified. Many old lead sheath cables have porosity and the cable leaks when high loadings are applied. When the circuit is de-energised and the temperature reduces the leaks often close up making them difficult to find. Throughout the year, in the UK alone many thousands of litres of cable fluid escape into the environment.

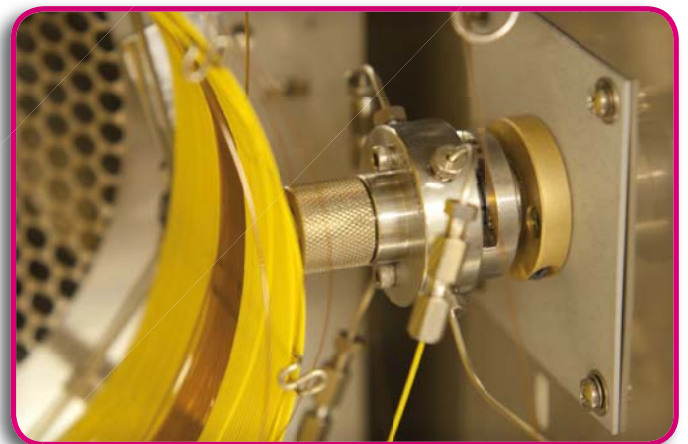


What is PFT?

PFT stands for Perfluorocarbon Tracers. These highly volatile compounds, with excellent electrical insulation properties are added to the cable fluid in minute quantities. Where the cable system is damaged, the fluid with the PFT tracer leaks into the environment and the volatile PFT compounds permeate through the ground and can be picked up using highly sophisticated detection equipment.

Innovation from the world's leading cable brand

PFT Solutions is a new business developed by Prysmian enabling fluid filled cable operators to benefit from this new advanced technology, thereby having the opportunity to reduce their environmental impact from cable fluid leaking and extending the usable life of fluid filled cable systems, ultimately making them better environmental neighbours. **Within the UK market Prysmian are the only domestic provider of this complete service.**



PFT Solutions

Prysmian's PFT Solutions business offers the following three essential services required for modern fluid filled cable maintenance, these consist of pumping new cable fluid and **injection** of PFT Tracers, **detection** of PFT Tracers from the leak and having tools, equipment and know how to **repair** the leak, including specialist civil works.



Injection of PRYSMATAG

Injection



Within the UK Prysmian operate the largest independent and most modern fleet of mobile oil plants. Throughout the world many fluid filled cable operators rely on Prysmian equipment for the maintenance of their circuits.

In order to cater for this new technology Prysmian have developed the 'Prysmatag' method of injecting PFT's into cable fluid and then into the cable system. Through our unique position in continuing to manufacture accessories for fluid filled cable systems we have been able to draw upon our experience to manufacture bespoke tagging equipment which is modular and easily deployable to site.

Two types of injection are available for customers and these are as follows:



> Tag a cable circuit with PFT cable fluid during an outage.

This method has the following advantages:

- > Vulnerable cable systems that have high environmental impacts if they leak can be pre-tagged so that should a leak occur it can be located and repaired within days rather than months.
- > Cable systems that have on-going small leaks can be de-energised, tagged, located and repaired within a couple of weeks.
- > Many fluid filled cables have poor quality cable fluid within them which consist of a mixture of old mineral oil types. Replacing the loose oil with modern alkylbenzine oils offers greater bio-degradability should these fluids leak into the environment and the knowledge that the new fluid within the cable has superior electrical qualities and greatly improved gas absorption properties which over time will prove beneficial to the cable system.



> During routine cable pumps which are conducted by Prysmian on behalf of many cable operators often maintaining the status quo between fluid lost and fluid replaced, Prysmian are able to offer 'Prysmatag Live'.

This method has the following advantages:

- > The cable system does not have to be de-energised.
- > The Prysmatag Live system targets all cable leaks by virtue of the fact that fluid is being pumped into systems that already have leaks.
- > Prysmatag Live can take a number of routine pumps before the PFT Tracers reach the cable leak dependant on the location of the leak in relation to the distance from the pumping valve and the leak rate.



An additional benefit of the PFT Solutions technology is the location of leaks in nitrogen gas compression cables, both internal and external types. Due to the hazardous nature of SF6 gases an alternative has been required and this need is now met by PFT Solutions.



Detection of PFT

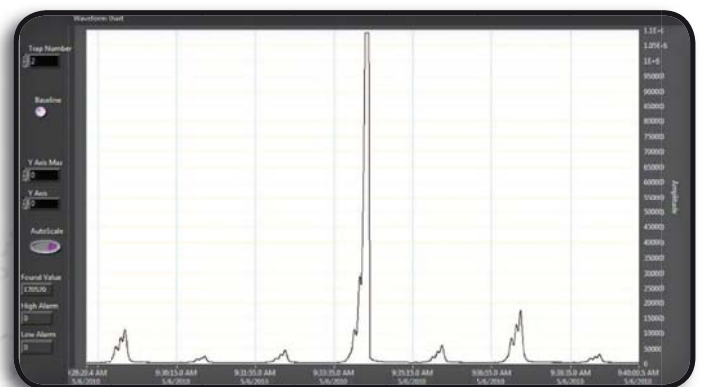


Perfluorocarbons are a man-made substance which are present in the atmosphere at very low background levels, typically 2-3 parts per quadrillion (ppq). To put this into context there are about 1 quadrillion human hairs in existence across the globe so we would be looking to detect, for example, around 2-3 strands of hair across the heads of the entire world's population.

Prysmian have developed an advanced mobile laboratory which can detect the background levels of perfluorocarbon in the atmosphere. Our laboratory and skilled engineers are available for rapid deployment at the request of our customers. Upon our arrival at site we will sample the air over the cable route and detect any PFT which has permeated through the subsoil from the leaking cable fluid. The level of PFT above a cable leak is incredibly small, typically 40-100 ppq, however using our specialist equipment is readily detectable above the background levels of perfluorocarbon.

Upon identifying a high level of PFT the challenge for our engineers is to give an accurate location to within one/two metres of the cable leak. We achieve this by undertaking a number of shallow barholes in the ground surface and then analysing the air from within those holes.

Within the UK our engineers take responsibility for undertaking the barholing on behalf of our clients and within our detailed report provide the exact location of all barholes such that they can be reported to the local highways department.



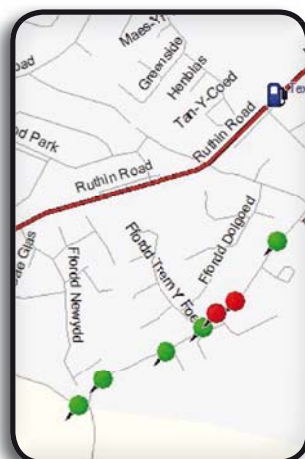
The main advantage of Prysmian's PFT Solutions mobile laboratory is that the analysis time between taking the air sample and gaining the result is 90 seconds, this means that detection results are achieved in real time. This compares very favourably with some other technologies which require traps to be set, samples to be sent by courier to laboratories and then results received one/two weeks later.

The PFT Solutions detection process is carried out with the cable circuit energised, this avoids the problems associated with porous lead sheath cables where the leak rate often reduces following cable de-energisation and cooling.

We are also able to carry out immediate on site quantitative analysis of cable fluid to determine the type and concentration of PFT present in a circuit.



Our mobile laboratory is synchronised with a GPS system which indicates way points on an electronic map to signify high levels of PFT. Clearly not all cable routes travel along areas accessible to vehicles and cable routes often pass through fields, parkland and footpaths. To cater for these locations Prysmian have portable air sampling equipment carried onboard the mobile laboratory.



Repair of cable fluid leaks

Repair



Prysmian have many decades of experience in the installation, maintenance and repair of fluid filled cables. Specialists from the Prysman Group are available throughout the world. Within the UK Prysman have fluid filled cable maintenance engineers, high voltage jointers and oil mechanics supported by teams of skilled civil workers operating from 6 locations. By combining these skills with our headquarters resource which consist of cable accessories manufacture, high voltage test facilities, cable jointing engineers, system/installation design engineers and the large portfolio of specialist tooling held within our logistics department, Prysman is unrivalled in its ability to provide the complete service.

Throughout the UK Prysman offer a 24 hour call-out service and can be contacted on the following number: **0845 400-2-132**



Summary of essential services:

- > All aspects of fluid-filled cable repair undertaken
- > Supply of fluid-filled accessories
- > Civil works undertaken by Prysman direct labour
- > Electrical testing and fault finding capability
- > Site staff fully trained and hold a minimum of BESC



Equipment

At Prysman we recognise above all the environmental benefits of this technology and as such are prepared to sell under a licence agreement the equipment required for this service into international markets.

Prysmian will support new purchasers of this equipment with full technical training in the UK and at customers premises with the aim of building an international PFT Solutions community to share the benefits of this cutting edge technology.



Commercial

Although the technology of injection and detection is complex you will find the Prysman Terms and Conditions for this service simple and easy to understand. For further information on our rates please contact us.



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