

Cable Leak Location in Oil Filled Cables *THE EASY WAY*



Test Van and Tagging Unit

Traditionally leak location in **Oil Filled Cables** has been a long, expensive, potentially damaging (to the cable) and environmentally unfriendly process.

H.V. Test (Pty) Ltd have pioneered an **innovative** method of locating the position of leaks in oil-filled cables that addresses the problems associated with the traditional method of exposing and freezing portions of the cable until the leak is isolated.

The project was completed in December 2009 and since then until April 2017 a total of 320 leaks were located. This on a cable network that first needed to be tagged before leak location could take place.

Our process is a three-step process:

1. Tagging

All oil-filled cables in your system must first be tagged with our **special chemical tracer PFT**. The tracer elements are introduced into the oil using our proprietary systems which carefully control the dosing concentrations to minimum levels. At these levels it has been shown that there is no impact on the dielectric properties of the oil yet the concentration of the tracer chemicals are sufficient to be detected by our super-sensitive detection system, even in difficult terrain of soil or tar and concrete pavings.

There is little economic sense in not tagging all the cables in a system in advance.

The tracer can be introduced with the cable offline or online. Our preferred method is to introduce the tracer elements **online** whilst the oil is being treated or introduced.

The **speed** of the tagging process depends on the speed at which the tagged oil can be introduced into the cable. The order of these delays is typically days per cable and it is therefore important that all cables in a system are pre-tagged rather than waiting until a cable is leaking before tagging.

The tracer chemicals are non-naturally occurring and are used in such small quantities (inert) that they do not impact on the **environment**.



Test Van Layout

2. Leak Location

Finally the leak is located with our advanced tracer detection systems. A **vehicle** is fitted out with sampling, concentrating and analysis tools that will automatically sample the atmosphere as the cable route is traversed. The position of the samples is recorded using a GPS receiver and the sample analysed to detect the presence of the PFT tracer elements.

The concentration of the tracer elements is compared to **baseline readings** taken before the start of the leak location process and alarms are raised when the tracer components are detected at the required concentrations.

Our systems are capable of detecting 10 parts per quadrillion (10^{15}) of the tracer elements. This **extreme sensitivity** means that most leaks can be detected by slowly driving the cable route and sampling.

Extreme environmental, routing and other conditions may mean that samples may need to be collected from **bar-holes** drilled into the tar/concrete and these samples manually presented to the vehicle for analysis.

3. Leak Detection

As with all oil-filled cable systems the presence of a leak is detected by dropping pressures or oil levels in the oil storage vessels. H.V. Test (Pty) Ltd can assist with **online systems** to detect level or pressure changes and report these changes to a centrally located control or service centre.

Case Studies

We have a number of case studies from our experiences within **Eskom** in **South Africa** where this system has been operational since early 2009. Ask us for copies of these case studies.

Demonstration

We invite interested parties to visit our facilities where we can demonstrate the efficacy of our systems and, if available, arrange interviews with Eskom where you can experience and discuss the **benefits** with users of the system.

Environmental Impact

The system has a massive impact in **reducing** the amount of oil that has leaked into the ground because of the ability to locate leaks so much faster than by way of the freezing method.

Costs

Costs will vary depending on the solution chosen but typically there are **no direct costs** involved per fault. The system will pay for itself in leak location savings (excluding clean-up savings and outage costs, fines etc.) after typically 10-15 leaks have been located.

Time savings

Typically our experience has been that cable leaks are accurately located within **3-4 hours** of the arrival at a fully tagged cable. Obviously the time taken depends on the actual leak location, the accurate cable route being known, reasonable environmental conditions being present and depends upon the cable installation specifics.

Cable damage

Cable damage caused by the excavation and freezing processes is **entirely eliminated**.

Our System

At HV Test (Pty) Ltd we offer a **tagging solution** to initially tag all the cables in your system. The cost of this will depend upon the location, length and the type of cables installed. Our team will initially travel to your locations and tag and

document the cable installations for use in future leak location activities.

During the tagging process we will begin the customisation of the **detection vehicle** for your application. The lead time on this process is typically 6-12 months depending on the level of customisation and the availability of resources.

The detection vehicle is **sold** to the utility and includes the training, scheduled vehicle and assistance with leak location.

Your operators will be **trained** on the use of the system which they will operate to do the actual leak location.

New cables can be tagged at any stage in the future and pre-tagged cables can be "**topped up**" as required by our operators. The costs will depend upon the location and tagging requirements.

For more information please contact us on +27 11 782 1010 or +27 82 824 0112 (Michael) or on email at kallie@hvtest.co.za.