

THE ON-LINE MOLECULAR SIEVE TO DRY OUT POWER TRANSFORMERS

TRANSEC



TRANSEC CL3 installed on 275/66KV transformer with On-line monitoring for moisture and temperature

Power and distribution transformers are some of the most important and expensive assets in a power network. Compared to other equipment, they are very reliable and require very little maintenance since they have no continuously moving parts. However, the insulating materials degrade with time in service, and ultimately determine the end of life of the transformer.

In a free breathing transformer water can not only enter the insulation material through the natural expansion and contraction of oil as the temperature cycles, but water is a by-product of the break down of the long chain hydrocarbon glucose molecule as a result of thermal and electrical stress, as the transformer ages. Excessive moisture will saturate the insulation and increase its conductivity. At higher temperatures vapour, or free moisture can develop increasing the risk of partial discharge .

TRANSEC is an on-line molecular sieve, developed and manufactured in the U.K., that will continuously remove water from the oil and from the paper insulation in a power transformer. This process not only reduces ageing, but will improve the dielectric strength of the insulation, and increase reliability.

Features:

- ❑ **Economic and Low maintenance system that is easily installed and commissioned to a live transformer.**
- ❑ **Uses oil as the transfer medium to extract water from the paper insulation, where 95% of water is retained.**
- ❑ **Weigh-in, weigh-out following regeneration ensures control of exact amount of water removed during absorption cycle.**
- ❑ **Integral in-line oil filter will trap particulate matter and improve the dielectric strength of the oil.**
- ❑ **Can incorporate on-line monitoring of temperature and moisture in oil.**
- ❑ **CL3 Model for oil volumes above 10,000 litres. CL1 Model for oil volumes below 10,000 litres. Midel 7131 can be accommodated although 3 phase pump is required.**

Benefits:

- ❑ **Reduces the effects of ageing on Transformers**
- ❑ **Increases reliability and service life of transformers by continuously removing moisture and fibres.**
- ❑ **Enables transformers to be run on higher load cycles with greatly reduced risk of failure.**
- ❑ **Increases plant utilisation and will allow capital expenditure to be deferred.**

TRANSEC SYSTEM

Moisture has a great influence on the life expectancy and the load carrying capacity of a transformer. Water is not only detrimental to the dielectric properties of the liquid and paper insulation system, it also decreases its resistance to ageing, and reduces the electrical and mechanical strength of the solid insulation. In general, the mechanical life of the insulation is halved for each doubling of the ppm water content ; the rate of thermal deterioration of the paper is directly proportional to its water content.

The TRANSEC system has the capacity to remove up to 10 litres of water from a transformer, before saturation, by using insulation oil as the carrier. Plumbed into the oil circuit at high and low level, the zeolite molecular sieve material will chemically bond water molecules as the oil is pumped through the molecular bed. A 10 micron particulate filter will at the same time remove extraneous matter, such as fibres, which can become ionised, from the oil, improving its dielectric strength.

TRANSEC will benefit transformers in different ways:

The New Transformer - A new transformer will leave the factory with a % moisture in paper figure of approximately 0.5%. If TRANSEC is installed from new, it will maintain the insulation at this level, removing only small quantities of water, but may more than double the design life of the asset, for a fraction of the cost of the new transformer.

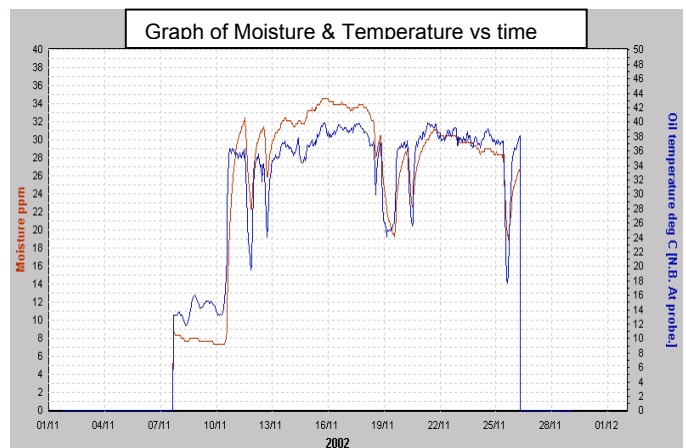
The Operational Transformer - Has been in service for a number of years, but analysis on an oil sample shows a water content of 20ppm at 50° C. Knowing the volume of oil, and the dry weight of solid insulation, the Piper graph will tell us that the % moisture in insulation has risen to 4%, a level at which threatens accelerated ageing, as well as a danger of partial discharge, or possibly free water in oil. TRANSEC should be used for a calculated drying programme to reduce this figure by 50%, but in any case not below 1.5%. In drying the transformer and maintaining it in this state, the life of the asset will have been extended by many years.

The Out of Service Transformer - Perhaps the most obvious target for TRANSEC is to keep an off-line transformer free from moisture, formed through condensation, during the natural ambient temperature cycle. When the transformer is called back into service, the oil must be dry and able to withstand the electrical stress when energised and put on load.

MONITORING MOISTURE AND TEMPERATURE

With TRANSEC, and a Vaisala HMP228 monitor, a trend of moisture and temperature can be established to maintain any transformer at a reduced optimum level of water content, giving the asset a longer life, and improving its ability to withstand incidents of high electrical stress.

When the input and output ppm levels at the TRANSEC unit converge, the molecular sieve material is saturated, and the cylinders need to be changed. TRANSEC (UK) Ltd offer a cylinder exchange service, as well as full installation, and commissioning. Each cylinder has a serial number, and the 'as supplied' weight recorded on our database. A direct comparison after saturation shows the quantity of water removed from that cylinder, and so the water removal process can be managed



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