

FIELD TRIAL OF VACUUM DRY-OUT UNIT

Transformer: ACEC 24/30 MVA, 132/11 kV, 1986, Serial No. 54TF/TG 11772
Oil Volume: 17,560 litres Weight of Core and Coils: 31,000 kg

HISTORY

This transformer has a history of high moisture, low dielectric strength in the oil with DGA indicating Corona and Overheated Cellulose. The Corona may be partly due to moisture in the Oil and Cellulose.

An on-line dry-out trial was proposed for this unit. On-line dry-out units are designed to circulate and maintain the oil in a dry state. As the moisture seeks equilibrium between cellulose and oil, it will slowly migrate into the oil and be removed in the Dry-out units.

DRY-OUT TRIAL

An ESI Vacuum Dry-out/Degasser unit was installed on this transformer on 29/6/05. ESI Dry-out units have a number of safety devices allowing un-manned operation on energised equipment.

Oil was drawn into the Filter machine from the Main tank drain valve located approximately 75mm above the tank floor, quite a common position but not ideal as oil below the valve is 'dead' and can retain high levels of moisture. The oil is returned to the transformer through the Conservator drain valve. All transformer protection is left in-service as the Dry-out unit will not affect any of these devices.

OIL SAMPLING/TESTING

Moisture recorded by Vaisala in-line Moisture Meter

Date	Oil Temp	Filter Inlet ppm	Filter Outlet ppm
29/6/05 Start trial	36.6	18	3
19/7/05 Mid trial	43.3	8	2
21/8/05 End trial	41.9	6	2

Note: Vaisala meters are calibrated for new oil; 0.16 acidity oil has a saturation point 2 x new oil, therefore the on-line readings should be multiplied by 2 to match Karl Fisher results.



Oil samples were also taken from a sample valve located near the main tank drain valve and sent to TNB Research Laboratory for analysis.

TNB TEST RESULTS – TRANSFORMER MAIN TANK

Sample Date	Oil Temp	Moisture ppm K Fisher	IFT	Power Factor	Acidity mgKOH /gm	Dielectric kV
23/8/04	41.9	45			0.16	22
ESI Filter installed	36.6	31	21	0.062	0.14	19
29/6/05						
19/7/05	43.3	16	19	0.0473	0.08	85
21/8/05	41.9	13	19	0.0484	0.09	98

RESULT SUMMARY

The dry-out units are designed to remove moisture from the oil and windings affecting moisture (ppm) and Dielectric Strength (kV). As expected, only minor changes occurred in the other parameters. Using the S D Myers core moisture method as a guide, cellulose moisture decreased from 2.11% to 0.618%.



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