AMP TRANSFORMERS
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TRANSFORMER OIL SAMPLES

- Oil Samples to be taken of all transformers and analysed by SABS approved lab for the following:

1. **Dielectric strength**
   Dielectric strength is the voltage at which breakdown of the oil occurs. Insulating power decreases as the amount of contaminants in the transformer oil increases so the quality of the oil can be predicted.

2. **Total acid number (TAN)**
   TAN is the quantity of base (mg of KOH) that is required to neutralise acid constituents in 1g of sample. An increase in acid indicates that sludge formation is beginning to occur or is occurring.

3. **Moisture analysis**

Why is important to determine the moisture content in transformer oil?

- To determine if there are any leaks in the transformer
- Increase in moisture indicates insulating paper degradation
- Determine if decrease in insulating strength is due to high water content in the transformer oil.

4. **Polychlorinated biphenyl (PCB) analysis**

PCB's were released in the 1970's during the oil crises to bulk up the transformer oils. Due to the high toxicity of PCB's it is now legislation to know the PCB content of your transformer oil.

Oil Limits (Oil Cooling / Insulating properties)

Test	Limit	Unit of measure
Moisture	15 ppm. (Max)	ppm
Acidity	0.15 (Max)	Mg KOH/g Oil
Dielectric	50 KV (Min)	KV
PCB	50 ppm (Max)	ppm

5. Dissolved gas analysis (DGA)

Dissolved gases in transformer oils are inherent gases and gases that form due to the breakdown of the paper or oil under stress or degradation.
With regular DGA testing the following problems can be detected months in advance

- Overheating
- Loose connections
- Break in cellulose
- Arcing
- Partial discharge
- Corona

6. Furanic testing

Furanics are degradation products of the insulation paper found in transformers.
Analysing furanics is important in predicting the degradation of the insulating paper.

Note 1	<200		Test indicates extensive paper degradation has taken place, and has exceeded the critical point. The transformer is now a serious risk of failure.
Note 2	200-250		The paper is near or at the critical condition. Recommend that the transformer be taken out of service as soon as possible and thoroughly inspected.
Note 3	260-350		The paper is approaching the critical condition. Suggest inspection be scheduled and/or re-sample within 3/6/12 months to reassess condition. Paper samples can be taken for direct DP testing.
Note 4	360-450		The paper is starting to approach the critical condition. Suggest a re-sample in 6-12 months time.
Note 5	460-600		Significant paper deterioration but still well away from the critical level
Note 6	610-910		Mild to minimal paper aging