

PEL

Transformers - The Inside View



LAB SERVICES



ISO/IEC
17025:2005



Lab Services

PEL can help you read the pulse of your transformers with our Transformer Oil Assessment Package

Are your transformers in trouble? Their distress signals can only be decoded by testing the transformer oil, the heart of the Electrical Transformer Power design. When working properly and within specifications, transformer oil:

- increases transformer efficiency and useful lifetime
- serves as a dielectric fluid and heat transfer medium
- saves on replacement costs, cuts downtime, and improves customer service

PEL can help you read the pulse of your transformers with our Transformer Assessment Package. It will tell you if your transformer oil is within specifications and diagnose internal faults inside the paper, windings, and core. The package consists of:

- a set of six fluid quality tests
- dissolved gas content of the oil

PEL offers a full service
Transformer Oil Testing Laboratory in
Lahore Pakistan

Precision

Accuracy

Reliability

Innovation

Routine Oil Tests

The international electrotechnical commission (IEC) is the standard reference body used by most utilities in the world. IEC 60296 and 60422 cover all the specifications for new as well as used oil. A routine transformer check-up requires only six of these tests to tell the quality of the oil. The tests recommended are the following:

- **Dielectric Strength (Breakdown Voltage):**

Breakdown voltage of transformer oil indicates its ability to resist electrical stress. An oil sample is placed between two electrodes with a 2.5mm gap. A constant increasing voltage is applied until the oil discharges at a certain kV. New oil is, on average between 35 kV and 45 kV.



- **Neutralization (Acid Number):**

This test measures the neutralization number. When oil oxidizes in a transformer, acid and sludge are produced as well as water. A severe increase in neutralization number can be detrimental to the insulation system. New oil specification is 0.01 or less.



- **Interfacial Tension (IFT):**

It is the measurement of molecular attractive force between their unlike molecules at the interface of oil and water. The more contaminants in the oil, the lower the interfacial tension. New oil specification is 40 dyne/cm minimum.



- **Moisture Content:**

A low water content in mineral insulating oil is necessary to achieve adequate electrical strength and low dissipation losses. New oil specification is less than 30 ppm.



- **Dielectric Dissipation Factor:**

This test is a measure for dielectric losses caused by the oil. Increased DDF can indicate contamination of the oil by moisture particles or soluble polar contaminants or poor refining quality. DDF shall be measured at 90°C.



- **Colour & Visual:**

This test checks turbidity, cloudiness, suspended particles and colour. New oil has a colour rating of 0.5 and is bright and clear.



Fault Determination

Dissolved Gas Analysis

Large utilities worldwide recognize Dissolved Gas Analysis (DGA) as a proven, effective diagnostic method when used in a routine yearly check-up.

A gas sample is extracted from the oil and nine key gas components namely: Hydrogen, Oxygen, Nitrogen, Methane, Carbon Monoxide, Carbon Dioxide, Ethane, Ethylene and Acetylene are analyzed.

When a transformer is failing, the chemical compounds in the oil break down to give off these gases. Elevated concentrations can signal corona discharge, overheating, arcing, or cellulose insulation paralysis.

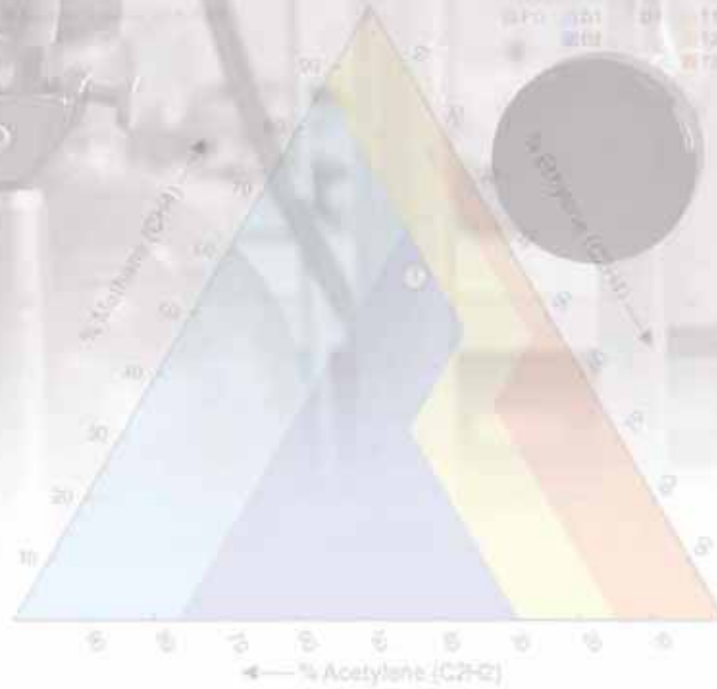


Other Tests

Other Transformer Oil Tests offered by PEL

- Pour Point D-97
- Flash Point D-92
- Kinematic Viscosity at 40°C & -20°C D-88
- Furan Analysis
- Degree of Polymerization
- Corrosive Sulphur
- PCA & PCB Contents
- Oxidation Stability
- Specific Resistance





W: Sample ID C₂H₂ (ppm) C₂H₄ (ppm) C₂H₂ + C₂H₄ (ppm) Diagnostic
 1: 1000724 - 10714270 0810902 182 24 42 C2 - High energy - electrical discharge

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