

**MS MORGAN[®]
SCHAFFER**

Transformers - The Inside View



LAB SERVICES



ISO/IEC
17025:2005



LAB SERVICES

Lab Services

- MORGAN SCHAFFER, located in Montreal, Canada pioneered Dissolved Gas Analysis (DGA) in America.
- Almost 50 years of experience in transformer oil analysis providing precise and accurate analytical results to our clients.
- Accredited ISO/IEC 17025:2005, state-of-the-art laboratory, with an annual capability for processing thousands of samples.
- We currently serve more than 200 utility clients in over 65 countries.
- The scope of our accreditation covers all electrical, physical and chemical transformer oil tests performed in the lab.
- Morgan Schaffer's unique Low-level DGA analysis, with the lowest detection level (0.1 ppm for hydrocarbon gases), meets all transformer manufacturer's requirements.

Benefits

- Worldwide coverage, Morgan Schaffer can process samples from the four corners of the world through the use of **MS Oil LIMS**, which is the web-based collaboration tool we use with our extensive customer base. On-line analytical results available in real time. The client is informed via e-mail every time a result is available for reading, printing or retrieval.
- QA/QC procedures allow for complete traceability from the time a sample is created using our on-line **MS Oil LIMS** software until we produce your final test report.
- USA receiving/shipping center to facilitate the transit of oil samples within the United States.
- Clients can create sample analysis requests on-line and print sample tags with all the information as per the equipment and the test required.
- Tested and approved oil sample containers, syringes and jars are provided to our clients to ensure the quality of the samples, from the moment they are retrieved until they arrive in our laboratory.

Precision

Accuracy

Reliability

Innovation

TRANSFORMER SIGNATURE

When a new transformer is in service, establishing the Time Zero conditions is central to start building the transformers analysis history. This package includes the key tests to run every time a new unit is put in place.

The recommended tests in this package include:

■ Dissolved Gas Analysis

Key gases detected: H₂ (Hydrogen), O₂ (Oxygen), N₂ (Nitrogen), CH₄ (Methane), CO (Carbon Monoxide), CO₂ (Carbon Dioxide), C₂H₄ (Ethylene), C₂H₆ (Ethane), C₂H₂ (Acetylene).

DGA as per ASTM D3612-A.

■ Water Content

Water reduces the insulation capacity of the oil, excessive moisture accelerates the decomposition of the paper insulation.

Moisture in Oil content test as per ASTM D1533.

■ Furan Content

Furanic compounds are produced as the paper insulation deteriorates; measuring the concentration of those compounds gives an indication on the condition of the paper insulation.

Furan content as per ASTM D5837.

■ ASTM Package

Physical, Electrical and Chemical tests including: visual examination, dielectric breakdown, acidity, interfacial tension, density and color.

All as per their specific ASTM test methods.

■ Oxidation Inhibitor

Oxidation occurs and inhibitor is consumed, controlling the inhibitor content extends the life of the oil by preventing sludge formation.

Oxidation Inhibitor test as per ASTM D4768.

■ Power Factor 25°C and 100°C

Dissipation Factor is key for determining the presence of contaminants that cause power losses in the oil.

Power Factor at 25°C and 100°C as per ASTM D923.

■ PCB Analysis

Polychlorinated Biphenyl content, Morgan Schaffer performs this analysis under accreditation by the CSC. Results are recognized worldwide as being equivalent to any accredited laboratory that is signatory to ILAC.

PCB analysis as per ASTM D4059.

FAULT DETERMINATION

This basic package, is the first step when trying to locate and identify a specific transformer problem. The results from these tests will allow you to determine what other tests are required to be performed in order to have a clear understanding of your transformer's actual condition.

The recommended tests in this package include:

- **Dissolved Gas Analysis**

Key gases detected: H₂ (Hydrogen), O₂ (Oxygen), N₂ (Nitrogen), CH₄ (Methane), CO (Carbon Monoxide), CO₂ (Carbon Dioxide), C₂H₄ (Ethylene), C₂H₆ (Ethane), C₂H₂ (Acetylene).
DGA as per ASTM D3612-A.

- **Water Content**

Water reduces the insulation capacity of the oil, excessive moisture accelerates the decomposition of the paper insulation.

Moisture in Oil content test as per ASTM D1533.

- **Furan Content**

Furanic compounds are produced as the paper insulation deteriorates; measuring the concentration of those compounds gives an indication on the condition of the paper insulation.

Furan content as per ASTM D5837.

- **Metals in Oil**

High energy faults can generate metal particles of various kinds and establishing the concentration of these metal particles will help to narrow down the list of components involved in the fault.

ROUTINE TEST

It is recommended to perform routine tests at least once a year in order to monitor the health of your transformers. Faults can occur at any stage of your transformer's life and evolve rapidly. Testing your transformers on a regular basis will allow you to detect any unforeseen change in the condition of your transformers.

The recommended tests in this package include:

- **Dissolved Gas Analysis**

Key gases detected: H₂ (Hydrogen), O₂ (Oxygen), N₂ (Nitrogen), CH₄ (Methane), CO (Carbon Monoxide), CO₂ (Carbon Dioxide), C₂H₄ (Ethylene), C₂H₆ (Ethane), C₂H₂ (Acetylene).
DGA as per ASTM D3612-A.

- **Water Content**

Water reduces the insulation capacity of the oil, excessive moisture accelerates the decomposition of the paper insulation.
Moisture in Oil content test as per ASTM D1533.

- **Furan Content**

Furanic compounds are produced as the paper insulation deteriorates; measuring the concentration of those compounds gives an indication on the condition of the paper insulation.
Furan content as per ASTM D5837.

- **ASTM Package**

Physical, Electrical and Chemical tests including: visual examination, dielectric breakdown, acidity, interfacial tension, density and color.
All as per their specific ASTM test methods.

SPECIAL TESTS

Morgan Schaffer offers special transformer oil tests that allow you to have a more comprehensive view of your transformer oil condition. These tests can be run annually, bi-annually, or depending on the parameters evolution, a shorter sampling frequency may be required.

- **Corrosive Sulfur**

Corrosive Sulfur can lead to catastrophic failure of transformers by corroding copper on other metals; this test shows if the oil is corrosive or non-corrosive.

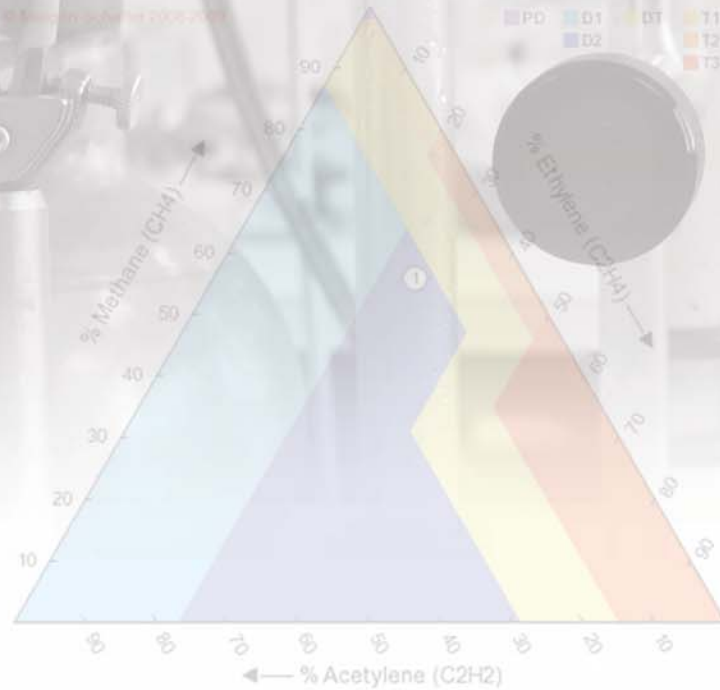
Corrosive Sulfur Test as per ASTM D1275-B.

- **DBDS Content**

Recent studies have identified dibenzyl disulfide (DBDS) as a corrosive sulfur compound. Presence of DBDS is a complementary key analysis to ASTM D-1275-B.

- **Passivator Content**

Adding passivators to the oil is a mitigation technique to prevent corrosive sulfur effects. As passivator is also consumed with time, its concentration in ppm should be monitored from time to time.



Sample ID	CH4 (ppm)	C2H4 (ppm)	C2H2 (ppm)	Diagnostic
1. M005754 - ASTM-PTP DGA0902	152	77	43	D2 - High energy electrical discharges

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Morgan Schaffer is ISO/IEC 17025:2005 accredited by the Canadian Standards Council for all its oil testing activities.
 Morgan Schaffer is compliant to ISO 9001:2008



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