

# MEASURING ANTIOXIDANT INHIBITOR IN TRANSFORMER OIL WITH THE INFRACAL FILTOMETER



## INTRODUCTION



Monitoring the degradation of the antioxidant in transformer insulating oil can result in substantial savings by extending the service life of the oil and by slowing down the transformer aging process. 2,6 ditertiary-butyl paracresol (DBPC) and 2,6-di-tert-Butyl Phenol (DBP) are common inhibitors that prevent oxidation of the electrical insulating oil in transformers. Periodic testing is typically not

done as often as it should because of the time and expense involved to transport samples to a laboratory. The InfraCal Filtometer is an inexpensive, easy-to-use field analyzer that would not only encourage more frequent testing but also allow tests to be made on-site with a substantial cost savings over laboratory analysis.

## PRINCIPLE OF OPERATION

The InfraCal Filtometer is a compact, fixed-filter mid-infrared analyzer with no moving parts and an insignificant optical air path. It weighs less than 5 pounds and can be operated from a battery pack or a cigarette lighter adapter cable. This makes it portable, sturdy and operable in a range of ambient conditions typically found in field environments. An internal calibration table and easy-to-use operator interface allows for analysis by non-technical personnel. DBPC and DBP have a characteristic infrared absorption band at  $2.7 \mu\text{m}$  ( $3650 \text{ cm}^{-1}$ ). As the inhibitor is depleted, the infrared absorbance decreases. The InfraCal Filtometer provides a direct readout in percent DBPC or DBP.

## ANALYSIS

The ASTM Method 2668 specifies measuring DBPC and DBP concentrations by infrared analysis. This is typically done using an FTIR spectrometer. However, due to its complexity, cost and environmental requirements, an FTIR spectrometer is usually impractical to move out of the laboratory into the field. The InfraCal Filtometer is preset with a  $2.7 \mu\text{m}$  filter specific to DBPC and DBP. A one millimeter flow-through cell allows for easy introduction of the sample and easy cleaning. The InfraCal Filtometer can accurately measure the inhibitor on site from 5% down to 0.02% in less than one minute.

## PRODUCT SPECIFICATIONS

**Dimensions:** 6.5 x 6.5 x 5" (165 x 165 x 127 mm)

**Weight:** 4.5 lbs. (2.0 kg)

**Display:** 4 digit, 7-segment red LED, 5/8 in. character height

**Power Requirements:**

Voltage – 12 V dc, +2% max.

Power – 7.5 watts max., 5 watts typical

Input – Switchcraft 760 plug or equivalent, center positive

**Suggested Power Sources:**

Wall supply; AC/DC converter type (supplied as standard)

12 volt auto battery adapter connector

Portable 12 volt battery pack

**Measurement Range:**

0.02 to 5%

**Operating Temperature Range:**

40°F (4°C) to 110°F (45°C)

**User Selected Calibration:**

Zero balance adjustment

Up to 20 point curve fitting calibration

**Communications Port:**

RS232 port, 9-pin D-Sub female, PC compatible, for upload to PC, datalogger or printer

**InfraCal Flow-Through Cell Analyzer, Model FCC**

Model Number: 405-2023

