

Measuring Antioxidant Inhibitor in Transformer Oil



InfraCal Filtometer, Model CH

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 fixed filter infrared analyzer that, unlike an FTIR spectrometer, has no moving parts and an insignificant optical air path. This makes it portable, rugged and suitable for use in a field environment. 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 microns (3650cm^{-1}). As the inhibitor is depleted, the infrared absorbance decreases. An internal calibration table in the InfraCal Filtometer allows for a digital readout in % 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 its complexity, cost and environmental requirements, an FTIR spectrometer is usually impractical to move them out of the laboratory into the field. The InfraCal Filtometer, with a 2.7 micron filter specific for the OH absorbance band (common to DBPC and DBP) and a 0.2mm pathlength sealed cell can accurately measure the inhibitor on site from 5% down to 0.02% in less than one minute.

Specifications:

Dimensions	6.5 x 6.5 x 5 in. (165 x 165 x 225 mm)
Weight	4.5 lbs (2.0 kg)
Display	4 digit, 7 segment red LED, 5/8" character height
Power Requirements	12V DC, 7.5 watts max
Power Supply	Universal AC/DC converter type (supplied as standard), optional 12 volt battery
Operating Temperature Range	4°C - 45°C
Humidity	0 – 98% relative humidity (non-condensing)
Communications Port	RS 232, PC Compatible
Analytical Wavelength	2.7 μm (3650cm^{-1})
Sealed Cell	1.0 mm pathlength (provided by customer)

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