Oxidation Stability Tests - market guide

- Fuels
- Lubricants and hydraulic oils
- Transformer and insulating oils
- Grease

Various processes may occur during the long-term storage or use of these products, these include oxidation, condensation and evaporation. The rate of these processes depends largely on storage and/or operating conditions. Various laboratory tests are made to determine the stability characteristics of these products.

Modern Biodiesel is more susceptible to degradation during storage than petrodiesel as unsaturated FAME components significantly decrease the oxidative stability of the fuel. The blending of biodiesel into petrodiesel and the complexity of modern sophisticated fuel injection systems (e.g., pump-jet, common rail) means that oxidation stability has become a very important quality parameter for the strategic storage of large quantities of fuel.

Oxidation stability covers two important physical characteristics:

Storage Stability - effects of humidity, sunlight, microorganisms, temperature, oxygen in the air, etc.

Thermal Stability - tendency to generate gum and solid deposits at elevated temperatures.

Some primary Oxidation test methods:

Test Methods ASTM D943; ASTM D2274/ISO 12205

Commonly referred to as the TOST test (Turbine Oxidation Stability Test) and widely used in the lubricants industry to evaluate the oxidation stability of various lubricant in the presence of water. It is also adopted for steam turbine and other circulating oils.

The expected life of a diesel fuel is indicated by the oxidation stability test ASTM D2274. The test measures how much gum and sediment will be deposited after keeping the fuel at 95°C in the presence of oxygen for 16 hours. It roughly corresponds to one year storage at 25°C. A test result of less than 20mg/L of sediment and gum is considered acceptable for normal diesel.

Test Method ASTM D525, D873, ISO 7536 and related specifications

Provides an indication of the tendency of gasoline and aviation fuels to form gum in storage. The sample is oxidized inside a stainless steel pressure vessel initially charged with oxygen at 100psi (689kPa) and heated in a bath. The amount of time required for a specified drop in pressure (gasoline) or the amount of gum and precipitate formed after a specific ageing period (aviation fuels) is determined.

EN 61125 A, B and C

Thermal – Oxidation Stability of Insulating Fluids

All methods use an elevated temperature with gas constantly bubbling through the oil and a copper catalyst. Method A uses oxygen as the gas, with a temperature of 100°C, method B uses oxygen at 120°C and method C uses air at 120°C. The results are reported in terms of total acid content of the fluid and total sludge content as a percentage of the weight of the fluid formed during the oxidation process.

Further information about Oxidation Baths can be found at:

www.stanhope-seta.co.uk/oxidation.asp

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