

# Soot index in marine engine oils

## Summary Information

- Correlates well with ASTM D5967
- Detection range of 0–20% soot
- Portable and battery operated
- Mid-Infrared Spectroscopy

## Product Description

The IR Sphinx spectrometer measure the mid-infrared spectrum of a sample and extract relevant parameters. The spectrometers do not contain any moving parts but use a solid state dispersion element in combination with black body infrared emitters to measure the infrared spectrum of a sample. This results in a unique product which is robust, battery operated and weighs less than 0.5 kg. The spectrometer can be configured to measure from 2.5  $\mu\text{m}$ -5.0  $\mu\text{m}$  or from 5.5  $\mu\text{m}$ -11.0  $\mu\text{m}$ . The IR Sphinx spectrometer come with a sophisticated but user friendly software called Sphinx Suite. The software is modular and the user can choose from a number of different software modules. The software is compatible with many common operating systems.

## Application

The soot index is a parameter that describes the extent to which the oil has become contaminated by fuel soot, an unwanted by-product of the combustion process. While the presence of soot is normal and expected for a given number of miles or hours of service on an engine oil, the concentration and state of soot may be abnormal, indicating a potential problem with the engine and/or a need for an oil change. In diesel engines, excessive amounts of soot can be generated by overfueling (air to fuel ratios), incorrect combustion temperatures, low operating revolutions, restricted intake and exhaust systems, or faulty turbochargers. Monitoring the soot levels is therefore an important part of the oil conditioning monitoring activities for marine engines. The IR Sphinx spectrometers extract the soot concentration from the mid-infrared absorption spectra of an oil sample without the need for any other consumables to carry out the measurement. The soot level can be detected either qualitatively or quantitatively using an appropriate calibration process.

## How to use

The IR Sphinx spectrometer enable the user to quickly measure the soot index of an oil sample. Depending on the product range the measurement is carried out in a slightly different way. For the IR Sphinx ATR products the oil sample placed on top of the ATR crystal making sure that the entire crystal is covered by the oil.

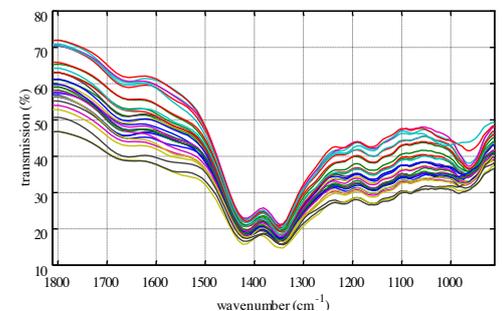
For the IR Sphinx transmission products the oil sample has to be present in the sample chamber. The transmission systems are best suited for inline measurement where the oil sample is delivered to the sample holder via a pumping system. Alternatively a syringe can be used to deliver the sample to the sample holder.

Once the sample is in place the measurement is started from the software. After about 30s the analysis of the sample is available.

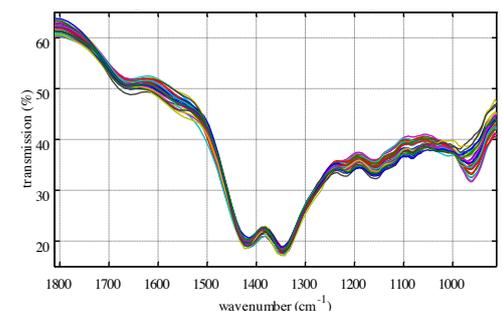
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## Results & Performance



Infrared absorption spectrum of marine engine oils with different levels of soot contamination. The increased soot contamination is reflected as a baseline shift in the mid-infrared absorption spectra of the samples.



The results shown in the figure above are the baseline corrected mid-infrared absorption spectra of the marine engine oils. The baseline correction has been carried out using the SphinxSuite software module. Using the baseline correction the soot level contamination of an oil sample can be quantified.

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