IASH 2007, the 10th International Conference on
Stability, Handling and Use of Liquid Fuels
Tucson, Arizona
October 5-11, 2007

A NEW REALISTIC LABORATORY SCALE FUEL OIL FILTRATION TEST

Wil J.M. Stassen, Koen Steernberg, Jacco D.M. Woldendorp, Arjen Nieuwhof and Frans G.A. van den Berg
Shell Global Solutions, Badhuisweg 3. NL 1031CM Amsterdam, The Netherlands

Klaus Schlame
Shell Global Solutions, Hohe-Schaar -Str. 36, D 21107 Hamburg, Germany

Heavy fuel oil may contain small amounts of sediments. These originate either from crude oil itself (silt and clay), from the refining process (e.g. catalyst fines) or are formed or picked up during transportation and storage (sludge, rust particles, other contaminants). Installations using heavy fuel oil are normally designed to deal with small amounts of such sediments. However, from time to time fuels appear in the market, which cause serious filtration problems, in extreme cases even causing failure of the equipment. In many cases these problem fuels met all the standard specifications for total sediments.

In order to evaluate various filtration problems in a performance related fashion, Shell Global Solutions has designed and built a novel filtration test rig, capable of simulating for the time the filtration process under application-oriented or field conditions of temperature, pressure and, most importantly, linear liquid velocity. The new unit consists of a heated storage vessel, a filter housing containing a 47 mm round piece of commercial filter material, an integrated electronically controlled flow meter + pump and a sensitive pressure difference indicator measuring the pressure drop over the filter as a function of time. The test rig can be used to simulate actual problem conditions, but in the course of this work we have also developed a standard test for comparing different fuels.

The standard test, which has been validated using a range of normal and problem fuels, uses a 10 micron stainless steel filter from Boll & Kirch. Fresh fuel is heated to obtain a viscosity of 35 cSt and pumped over the filter at a linear liquid velocity of 1 kg/cm2 filter surface area/hour for a period of four hours. The pressure drop over the filter is recorded as a function of time and converted into a Filterability Index (FI). After each test, the filter with adherent deposits can be easily removed for further investigations by independent analytical techniques such as elemental analysis, scanning electron microscopy (SEM), infrared (IR), etc.

During the presentation the use of the test rig will be explained and illustrated with several practical examples.