

BUNKERSPOT

INDEPENDENT INTELLIGENCE FOR THE GLOBAL BUNKER INDUSTRY

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**IN-LINE METERING:
Buffalo leads the charge**

Reserve stability

Lintec's Maurice O'Donoghue argues that the current ISO 8217 does not deal adequately with the issue of the reserve stability of marine fuel oils



In recent months, Lintec has not only been dealing with an increased number of incidents regarding the overall quality of fuel but has also seen a very significant increase in the number of problems regarding fuel stability in particular.

It is well known that all marine fuels have some kind of asphaltene content. Fuels which hold all asphaltenes uniformly dispersed throughout the fuel are termed 'stable' fuels.

Until relatively recently, the stability of a fuel oil was generally believed to be a function of the *quantity* of asphaltenes present in the fuel. However, it is the *type* of asphaltene present, rather than the quantity, that will have a significant bearing on the stability of the fuel.

It is widely believed that the traditional test method of hot filtration, currently included in the protocol for the **International Organization for Standardization's ISO 8217:2005** specification for bunker fuels, is sufficient to give a general indication of the stability of fuel.

In reality, this test method is indicative of the sediment content and asphaltene aggregates rather than an insight into the dispersion of the asphaltene molecules, and hence the stability reserve, of a fuel.

If the fuel oil is aromatic in character (i.e. asphaltene molecules in a general ring formation), then the asphaltenes present in the fuel will tend to be polar. In this case, they will naturally repel and remain suspended in solution.

However, if the oil medium is paraffinic in character (i.e. the asphaltene molecules are string-like, and held in a line), then the asphaltenes will have a tendency to flocculate, resulting in the formation of unwanted sludge.

The sludge materials can block filters, possibly leading to fuel starvation and further serious consequences. In addition, the cost, time taken and practicalities of dealing with and disposing of large quantities of sludge can be problematic.

Although stability is dependent upon the chemistry of the fuel, this can be influenced by external factors. For example, in order to reduce the sulphur content, or influence density or viscosity, fuels are often blended, which means that a cutter stock of some kind is introduced into the fuel.

As the requirement for ships to burn low

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sulphur fuel oil (LSFO) has increased, more fuels are being blended in order to keep up with the increased demand. The introduction of cutter stocks into fuel can have a negative effect on stability and result in problems onboard a vessel. Similarly, any blending onboard a vessel, perhaps when a new bunker stem is mixed with any fuel remaining on board, can potentially have very serious consequences and should be avoided.

Lintec is currently employing new techniques to accurately determine the Stability Reserve of marine fuel oils. These techniques provide an accurate indication of the overall reserve stability of a fuel and allow shipowners and charterers to have an indication, before the fuel is used, of the potential issues that the vessel might experience.

The stability of a fuel can be determined by conducting Reserve Stability Number (RSN) analysis using test method *ASTM D7061*. The fuel oil sample is diluted with toluene and heptane is added, forcing the asphaltenes in the fuel to settle out.

The rate at which the asphaltenes settle out is measured by scanning the sample using an infrared light source and measuring the change in transmittance over time. Fuel samples demonstrating a more rapid change in transmittance are considered to be more unstable. The analysis results are provided to the client in the form of number which relates to the reserve stability of the fuel.

A stability number between 0 and 5 would indicate that the fuel has a high reserve stability (i.e. the fuel can be considered to be a stable fuel). A stability number between 5 and 10 would indicate that the fuel has a medium

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reserve stability. A stability number greater than 10 would indicate that the fuel has a low reserve stability (i.e. the fuel can be considered to be potentially unstable).

Fuels of a low or medium RSN are generally accepted to be of reasonable quality and are unlikely to demonstrate stability issues. However, there is some potential for the fuel to exhibit tendencies that might provide stability related issues when utilised onboard a vessel. When this is the case, we recommend that care is taken when using the fuel and should any problems be encountered that we are informed accordingly.

The test method ASTM D7061 is not currently included in the ISO 8217:2005 specification. However, as stability issues in bunker fuels are occurring more frequently, there is an increased requirement for it to be included in the analysis scheme offered by the service provider.



AN INTRODUCTION TO FUEL ANALYSIS

Essential for everyone involved in marine fuels

'In *An Introduction to Fuel Analysis*, Nigel Draffin offers numerous detailed diagrams, tables, charts and photographs which will certainly help anyone who has any doubts about what can be found in marine fuels and, once found, what to do about it.'

Cockett Marine Oil Ltd

'In this book lies a wealth of information that will enable everyone from the newcomer to the 'old hand' to understand bunker fuels and what they contain, how to test each key parameter and what the test results actually mean, and what happens when problem results appear.'

'On the basis that prevention is always better than cure, everyone involved in the supply or purchasing of bunker fuels should be aware of the many parameters that are covered in marine fuel specifications and know what is reasonable to expect and possible to accept. Armed with this information, many routine problems can be avoided and costly mistakes can be averted.'



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