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THE FINAL COUNTDOWN

WILL SHIPPING PLAY BY THE RULES?

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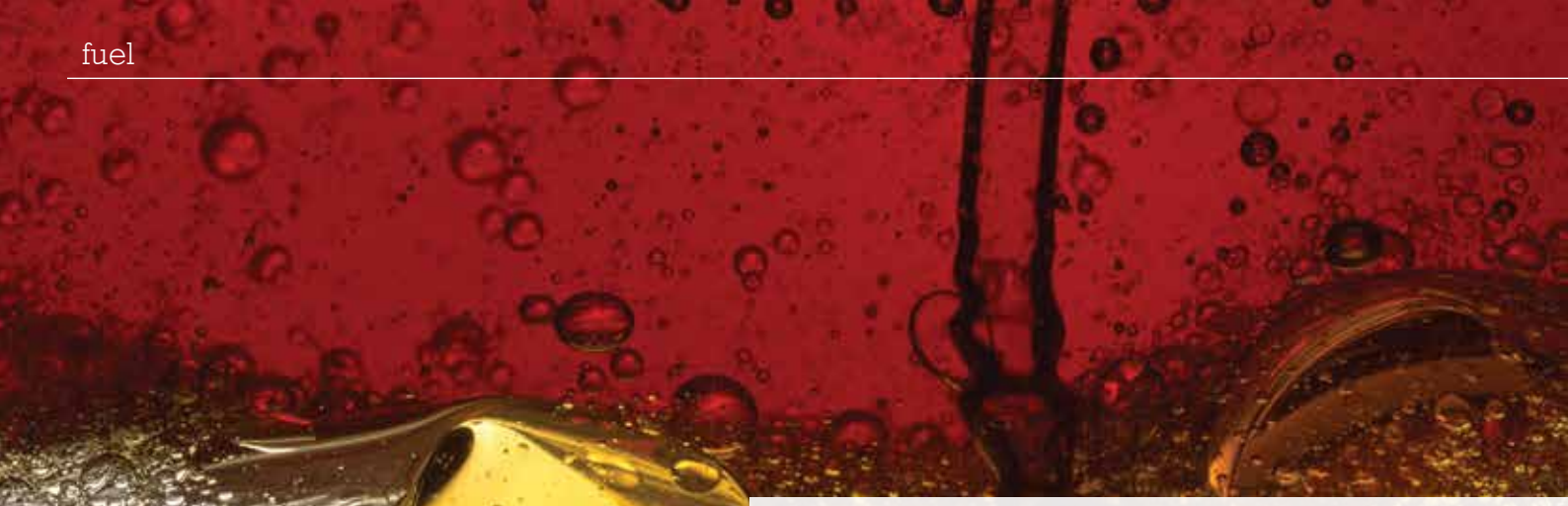

Put to the test

Wajdi Abdmessih of Seahawk Services takes a measured look at the new 0.10% sulphur fuels coming onto the market

The new 0.10% m/m sulphur limit within emission control areas (ECAs) comes into effect on 1 January 2015 and, as we all know, there is no residual fuel in existence which has a maximum sulphur content of 0.10% m/m. Many in the industry are therefore asking: 'What will be the 0.10% m/m sulphur fuel – the magic fuel that will replace the famous residual fuel oil?'

We should not worry – refineries have been anticipating this transition for years and are not going to let this golden opportunity pass. However, this 'new' product is definitely not residual fuel.

Companies such as ExxonMobil, CEPSA and Lukoil have already begun to offer a 0.10% mass sulphur fuel to the bunker market. Looking at the different refinery specifications and the results of our own laboratory analysis, this new ECA-friendly fuel is highly paraffinic and its characteristics are outlined in the table overleaf. However, the availability and pricing of these new fuels in comparison to marine gasoil (MGO) remain to be fully clarified.

One of the major quality problems associated with the new fuels is that of compatibility (spot test ASTM D4740). It is therefore advisable to avoid commingling this fuel with low sulphur residual fuel onboard a vessel.

Fuel analysis conducted in our laboratory on some of the new fuels (opaque) has revealed compatibility problems if mixed with residual fuel. To understand what could happen onboard the vessel when putting the new fuel in the same storage tanks that had previously been used for residual fuel oil, we have blended the new fuel with 1.00% of residual fuel, which represents the fuel remaining in the bottom of a vessel's storage tank, and tested the mix for compatibility. The result was a spot rating of 4 which means that the fuel is incompatible

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and causes a precipitation of asphaltenes.

Compatibility and sulphur tests should always be undertaken if you intend to add the fuel to the vessel tanks without cleaning them first; otherwise be sure to clean your residual fuel tank before taking this product.

Another issue that we found in some of the fuels is the high pour point (33°C). This will therefore require the fuel to be heated onboard the vessel and kept at a minimum of 5°C above the fuel pour point so as to avoid wax crystallisation. Unless this fuel has been treated in the refinery with pour point additive depressant, a vessel will encounter costs in maintaining it above the pour point all the time.

With highly paraffinic fuel, the Cold Filter Plugging Point (CFPP) test method ASTM D6371 should be used, particularly in the case of a vessel which operates in a cold temperature environment and which has been operating on low pour point fuel that does not require heating.

Even if the fuel oil meets the pour point specification, an unheated vessel filter can be easily clogged due to fuel wax crystallisation and this can lead to fuel starvation. While the CFPP is not required in the ISO 8217:2010 standard, it is recommended. Knowing the CFPP of the fuel will help to avoid this situation as the fuel can be treated in advance to eliminate operational problems.

Another phenomenon is wax drop out (WDO) which can occur on vessels using distillate fuel where wax suddenly drops out of the fuel and can cause major waxing in the tank and pipes.

It should also be noted that since the storage onboard a vessel is calculated based on mass, a metric ton (mt) of the low density fuel will occupy more space than a metric tonne of the high density fuel. Therefore, there will be a loss in storage capability of around 10% (depending on the density of the fuel).

If your maximum fuel storage is 1,000 mt based on fuel density of 991.0 kg/m^3, the same tank will be capable of holding a maximum capacity of 876 mt of fuel with a density of 868.0 kg/m^3.

Fuel density also impacts vessel energy costs. If we compare the energy obtained from two equal volume fuels – one with high density and the other with low density – we will find that the high density fuel produces more energy. As a result, an engine will require more fuel per volume of the low density fuel (5%-15%) to produce the same power as that achieved from a lower volume, high density fuel.

Our lab tests indicated that the new 0.10% sulphur fuels have good lubricity. However, there is still a high chance of a vessel receiving a fuel with poor lubricity as other fuels could be introduced into the supply chain. Using a fuel with low lubricity can potentially cause sticking and seizure of the fuel pump.

A low viscosity fuel could also lead to excessive wear in the fuel pump due to a reduction in the thickness of the lubricity film around the fuel pump plunger as well as fuel leakage around pump rotors, the pump barrel and plunger.

It is also useful to note the continuing problems over catfines (aluminium and silicon). Slurry oil has been used in residual fuel blending for many years. It does contain high levels of catfines, but it has low viscosity, low sulphur and a lower price in comparison to residual fuel oil and these factors make it a good blend stock.

Over the past few years, slurry oil has been used mainly to lower the sulphur level in residual fuel to meet the current 1.00% sulphur requirements within ECAs, and we have all seen an increase in the levels of catfines in 1.00% sulphur fuels.

However, since 1.00% sulphur fuels will no longer be needed, and will be replaced by 0.10% sulphur fuels from 1 January 2015, slurry oil will be used in blending high sulphur fuels. We can therefore expect to see an increase in the level of catfines in these fuels in the months to come.

Parameter	Typical new 0.10 % m/m Sulphur
Sulphur, % m/m	< 0.10
Appearance	Black - brown/green opaque
Density @ 15 °C kg/m^3	867.8 - 915.0
Viscosity @ 50 °C, mm^2/s	6.6 - 45
Ash, % m/m	< 0.01
Metals mg/kg	< 1
CCAI	< 810
Hydrogen Sulphide, mg/kg	< 1
Total Acid Number, mg KOH/g	< 1
Micro Carbon Residue, % m/m	< 0.30
Water, % v/v	< 0.10
Pour point, °C	-21 to 33
Flash point, °C	> 70

Seahawk Services is a fuel testing and inspection operation in West Deptford, New Jersey, United States. It has a fully-equipped testing lab capable of testing fuel samples to the full ISO 8217:2012 quality standard. It is also equipped with advance diagnostics instruments such as Fourier transform infrared spectroscopy (FTIR) and GC-MS (Gas Chromatography-Mass Spectrometry).

Wajdi Abdmessih was previously Vice President and Technical Director of New Jersey-based marine fuel testing and inspection service company. He has over 25 years of experience in marine fuel testing, developing internal testing methods and working with various organisations, providing data for sulphur monitoring worldwide. He has been involved in resolving complicated fuel problems and quality-related disputes, and has significant experience of helping owners and charterers deal with onboard problem fuel.

Wajdi Abdmessih
Seahawk Services
Tel: +1 856 845 4142
Mob: +1 732 407 2176
Email: Wajdi@SeahawkServices.com
Web: www.SeahawkServices.com