Buyer's guide

Michael Green of Lintec Testing Services looks at the proposed revision of the ISO 8217 fuel quality standard from a fuel purchaser's perspective

As we move further into 2010, the implementation of the fully revised ISO 8217 standard becomes more of a reality. As the Final DIS (Draft International Standard) looks to become the finished standard, there are a great number of questions being raised by fuel purchasers about what the final standard will mean for them and the fuel they purchase.

Whenever new legislation or restrictions are implemented there is typically a degree of confusion and uncertainty, and the 2010 version of the *ISO 8217* standard is no different.

The aim of the standard is to improve the quality of fuel being sold, but in reality are the limits that the standard puts in place going to ensure a better quality fuel is supplied? Certain aspects of the new standard have placed doubts in the minds of fuel purchasers as new and unfamiliar test parameters are introduced.

As a leading fuel testing company, **Lintec Testing Services Ltd** has already had a great deal of feedback from our clients outlining their questions and concerns.

The most common concerns relate to lubricity, changes to Section 5 and the safety aspect of hydrogen sulphide (H_2S).

All these factors must be considered, and fuel buyers must be comfortable with the possible implications before they purchase fuel against the new spec.

Many of the changes that have been put forward in the draft will be extremely beneficial to fuel buyers as they should significantly improve the overall quality of bunker fuel, and have been well received.

For example, the proposed reduction of limits for both aluminium and silicon (Al + Si), also known as cat fines, and vanadium, and the amendment in the criteria for detection of waste lube oil, should all contribute to a reduction in long term wear damage to marine engines.

So too the inclusion of limits for acid content and sodium should have a positive effect on prolonging engine life.

In contrast, many new aspects of the standard, such as lubricity and the limit for H_2S, have prompted a more negative response.

This being the case, the obvious response is to ask why have these particular proposals been so poorly received?

Hydrogen sulphide

Although there are operational issues that can be experienced based on high concentrations of H_2S being present, safety of the vessel's crew is of paramount importance as far as H_2S is concerned and the overriding issue is one of health and safety.

'Is the hydrogen sulphide limit acceptable for a parameter that deals with a health and safety issue, rather than an operational issue?'

The current ISO 8217 standard (2005 version) does not set any requirements for testing of H_2S content and the new standard sets out to rectify this matter.

The DIS has proposed a maximum of 2 parts per million (ppm) of H_2S in the liquid phase as the limit for the new specification, with an implementation date of 2012.

However, the question that we would raise based on this recommendation would be – is this limit acceptable for a parameter that deals with a health and safety issue, rather than an operational issue?

If a fuel has an H_2S content of 2 ppm in the liquid phase this can equate to approximately 200 ppm in the vapour phase. At this sort of level, even limited exposure offers an immediate risk to human health.

The new standard does make positive progress by recognising the need to test for H_2S but, unfortunately, does not go far enough.

It is fair to surmise that future revisions of the *ISO 8217* standard will need to address this limit and look at ways that it can be reduced. For further development there is also scope to impose a stricter limit for levels in the vapour phase which would reflect the equivalent content in the liquid phase. This would simply allow an additional level of protection and hopefully ensure safer working conditions.

Lubricity

One of the most common topics for discussion is the aspect of lubricity of bunker fuels.

The draft standard states that all distillate fuels will now require the lubricity of a fuel to be tested if the sulphur content is less than 0.05% (500ppm).

The proposed lubricity test for the revised standard has been stated as the *ISO 12156-1* method. This method employs the high frequency reciprocating rig (HFRR) technique to gauge the natural lubricity of a fuel. The HFRR technique applies a

Michael Green is the Technical Manager of Lintec Testing Services Ltd.

Contact:
Michael Green
Lintec Testing Services Ltd
Tel: +44 1325 390 184
Fax: +44 1325 460 055
Email: mg@lintec-group/com

reciprocating 200 gramme (g) load weight to a ball bearing which is in direct contact with a polished metal surface. The wear scar observed after a set time frame relates to the overall natural lubricity of the fuel. The limit designated in the revised standard for size of wear scar is set at 520 microns (μ) for marine distillate fuels. Any fuels that show a wear scar in excess of 520μ will be deemed as being off specification.

The demand for low sulphur fuels has increased greatly in recent months due to the implementation of the European Union (EU) sulphur regulations governing limits for use in EU ports and in-land waterways.

Pressure on suppliers

The increase in demand has placed greater pressure on fuel suppliers to provide fuel that meets with the current EU limits and the consequence of this is an increase in the number of fuels undergoing additional treatment to reduce sulphur content.

It is this treatment process that raises the most questions and concerns amongst fuel purchasers.

The treatment process is conducted at the refinery stage and the main aim is to reduce elements within the fuel that will contribute to unwanted emissions when the fuel is burned.

In addition to reducing sulphur content it is also designed to remove nitrogen and aromatic hydrocarbons.

The process works by passing the fuel into a reaction vessel together with a feedstock containing high levels of hydrogen at extreme pressure.

The hydrogen reacts with sulphur to form H_2S, the nitrogen compounds are converted to ammonia and the aromatic compounds become saturated. The high pressure feedstock also contains an aqueous amine solution which absorbs the H_2S and allows it to be removed. The ammonia produced is dissolved in the process water which is removed as 'sour water'.

The key factor with regard to this process is the fact that it strips the fuel of its natural lubricating qualities.

A common misconception is that sulphur is a natural lubricant within fuel and the removal reduces lubricity.

This is partially correct in that the sulphur content within fuel is intrinsically linked to 'minor species' such as nitrogen, oxygen and polyaromatic species. These linked species are directly responsible for the overall natural lubricity of the fuel. Therefore, as the sulphur is removed these minor species are also removed, and so too is the natural lubricity.

In addition, the overall hydro-treatment process can have a significant effect on the viscosity of the fuel, which in turn leads to operational and combustion issues when burned.

'As fuel treatment becomes more commonplace and the use of blend/cutter stocks increases, greater numbers of marine fuels are found to contain unwanted contaminants'

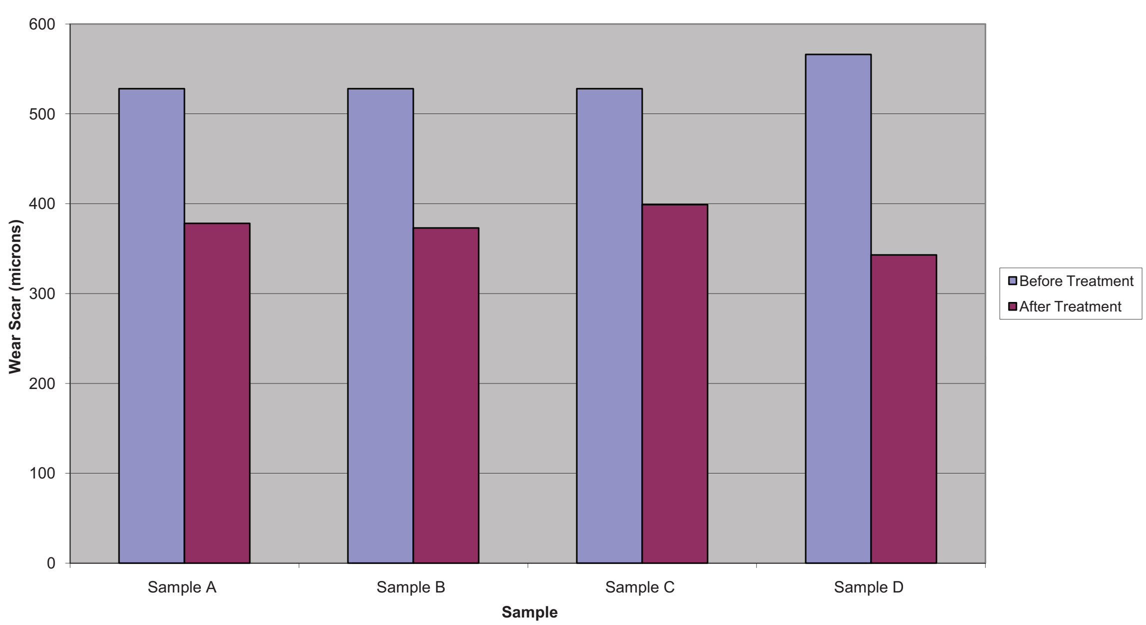

Figure 1: Lintec Additive Investigation

'The investigation has shown that all tested additives significantly improved the overall lubricity of the fuels treated. However, regular applications of additives to distillate fuels will result in significant additional costs that will need to be taken into account'

This being the case, we can clearly see that a process designed to remove components of fuel that contribute to unwanted emissions also has a significant effect on the overall quality of the fuel.

In many cases, the removal of sulphur has such an effect on the lubricity of the fuel that lubricant additives are required to ensure it is suitable for use.

As more questions have been raised regarding application of additives, and with the introduction of new additives to the market, Lintec felt obliged to investigate further so that it could provide its clients with as much information as possible.

Consequently, Lintec has conducted a series of tests designed to look at the overall effects of a selection of additives when applied to a wide variety of distillate fuels.

The fuels included in this investigation were taken from a range of ports worldwide and were of varying sulphur content. This allowed us to gain a clearer idea of the overall natural lubricity of each fuel and the effect of each additive.

The graph shown on page 45 gives a general overview of the results gained from the investigation.

The investigation has shown that all tested additives significantly improved the overall lubricity of the fuels treated. However, regular applications of additives to distillate fuels will result in significant additional costs that will need to be taken into account.

In addition, we would also seek to question as to whether this aspect of fuel treatment is the responsibility of the fuel purchaser, or whether it falls under the remit of the supplier.

Waste chemicals

Section 5 of ISO 8217:2005 deals with the 'general requirements' of marine fuel, and more specifically, aspects of chemical contamination.

As fuel treatment becomes more commonplace and the use of blend/cutter stocks increases, greater numbers of marine fuels are found to contain unwanted contaminants.

As a result, Section 5 of the ISO standard has become more relevant in relation to disputes between purchasers and suppliers.

However, as the 2005 standard does not highlight specific contaminants or acceptable concentrations, there are no definitive grounds on which a potential claim could be based.

The 2010 version of the standard sets out to provide a clearer indication of what is acceptable so that claims may be processed within specific boundaries.

This being the case, the question that must be asked is: 'Does the new standard go far enough?'

In the 2010 version of the ISO standard, Section 5 has been extended but still retains the overall feel of the original sentiment expressed in the 2005 standard.

For example, it still maintains that fuels should be a homogeneous blend of hydrocarbons which should be free from inorganic acids and used lubricating oils. It also maintains that fuel shall not contain any added substance or chemical waste but now with the inclusion of Annex B which offers further clarification as to the nature of these 'deleterious materials'.

It goes on to state that fuel should be free from any material that renders the fuel unsuitable for use in marine applications and that it should be free from bio-derived materials other than *de minimis* levels of FAME (Fatty Acid Methyl Esters).

In making this recommendation it cross references Annex A, which provides more specific details relating to Section 5.4.

When these additional annexes are examined, we find that although they do recommend that contaminants should not be present they stop short of advising which compounds are classed as contaminants and specifying acceptable limits for such contaminants.

Clouding the issue

The use of terms such as *de minimis* would also appear to cloud the issue further. In cases where contaminants are found what would be considered to be a *de minimis* quantity? Some suppliers may view 100 ppm of a particular contaminant to be *de minimis* whereas fuel buyers may consider 10 ppm *de minimis*.

The fact that there is a degree of interpretation required will always cast doubt on what is an appropriate level.

These are only a few of the main issues that have been raised based on the Final DIS and most centre around the tests and their implications.

However, one very significant point that remains open for debate is with regard to fuel suppliers themselves.

Questions must be asked, particularly with regard to their opinions of the proposals that have been made, about any additional costs that will be incurred and whether they will be passed on to the purchaser. Most importantly of all, whether they feel it will be feasible to provide fuel that meets with the 2010 standard.