UPDATING ISO8217

Wanda Fabriek *of International Fuel Executive Intertek Testing Services (UK) Ltd, Caleb Brett Division, explains the latest changes to the international standard for marine fuel which will soon be published as the third edition of ISO8217.*

The third edition of ISO8217 will contain important changes aimed at reducing the problems and uncertainties observed with marine fuel quality. There are a lesser number of fuel grades, new parameters have been incorporated into the list of fuel properties and some of the limits are much stricter.

The Introduction to the third edition of ISO8217 explains the rational for the number of grades considered by the new specification. It says that:

"The specifications in this International Standard were prepared in co-operation with the marine and petroleum industries to meet the requirements for marine fuels supplied on a world-wide basis for consumption on board ships. Crude oil supplies, refining methods, ships' machinery and local conditions vary considerably. These factors have led historically to a large number of categories of residual fuels being available internationally, even though locally or nationally there may be relatively few categories. Several of the residual fuels are unique in origin to one country or area, but nevertheless are included in the specification because of their importance in the international marine fuel market."

There are no changes to the number of grades for the distillate fuel oils but the number of the residual fuel oil grades is reduced from 15 in the current ISO8217:1996 to 10 grades of residual fuel in the third edition.

The changes will be:

- Deletion of RMC 10 grade and re-naming of RMB 10 and RMC 10 to RMA 30 and RMB 30 respectively. Both grades will differ only by density and the pour point limits. All limits of other characteristics/parameters are identical;
- RMH45, RMK45 and RML45 will be removed from the specification on the basis that there was no difference, apart from the viscosity, between the specification parameters' limits for RM 45 grades and RM 55 grades;
- RML 55 will also be removed from the specification. The purpose of introducing it in the first edition of the standard was to provide what was believed to be a need for under boiler fuel in steamships. In the event it appears that no suppliers have ever made the grade available;
- RMH 55 and RMK 55 will be re-named RMH 700 and RMK 700 with a maximum viscosity of 700 cst at 50 oC. The decision to set the viscosity at 700 cst closely reflects manufacturing capabilities, as well as the highest viscosity that the current equipment can reasonably cope with.

The third edition is a large document and contains nine annexes, each explaining different fuel characteristics in greater detail. The fuel quality parameters, which are not included in the main table of the specification, like for example fuel acidity, are discussed in the annex to the main document. All annexes are informative, which means that they are not mandatory.

WANDA FABRIEK

Two tables will be included in the third edition, giving all the new characteristic limits.

This third edition of the standard reflects several important changes aimed at bridging the gap between the best available analytical methodology and the ever changing reality of the bunker market.

One of the most essential changes is to the viscosity classification of residual fuels, by changing the reference temperature from 100 °C to 50 °C. This change reflects the commercial market reality of purchasing bunkers on the basis of kinematic viscosity measured and expressed at 50 °C and not at 100 °C.

The third edition will align limits on sulphur to those currently being ratified by the International Maritime Organization.

The maximum ash content limit of residual fuels for the current RMH 35, RMK 35, RMH 55 and RMK 55 grades will be lowered from 0.20 % m/m to 0.15 % m/m limit. This is a very significant change, which further limits those extraneous elements resulting from the crude and refinery processing that contribute to engine wear and to fouling and corrosion in the engine and exhaust systems.

For distillate DMB grade of fuel oil, the sediment test by ISO3735 will be substituted by the Total Sediment Existent by ISO10307 Part 1, with the maximum limit of 0.10% (m/m).

The maximum water content limit of residual fuels will be

lowered from 0.8% (V/V) for the current RMD 15 grade and from 1.0% (V/V) to 0.5 % (V/V) for all other RM grades. This is a considerable improvement in the quality of the bunker fuel oil as delivered that addresses significantly the often expressed and understandable concern that the purchaser should not be required to pay for water.

The maximum density limits for the lower viscosity categories of residual fuels will also be lowered. For RMA 30 grade the density will be reduced from 975.0 to 960.0 kg/m3 maximum and, for RMB grade, from 981.0 to 975 kg/m3 maximum.

One form of contamination that has become more prevalent in recent years has been the use of waste or used automotive lubricating oils (ULO) as a blend component in marine bunkers.

The inclusion of used lubricating oil will be controlled in the third edition by limits on levels of zinc, phosphorous and calcium in all the residual fuel categories and in the DMC grade. The aim of this limit is that the fuel shall be free from ULO. The specification will declare that a fuel shall be considered to be free from ULO if one or more of the elements zinc, phosphorus and calcium are below or at the specified limits. All three elements shall exceed their limit before a fuel shall be deemed to contain ULO. The maximum limits are: zinc - 15 mg/kg, phosphorus - 15 mg/kg and calcium - 30 mg/kg.

In the recent past the bunker industry, and particularly end users, has expressed disappointment that the marine specification aim, to ensure a constant supply of problem free, good quality bunkers, seems to have failed.

The position of ISO8217 on control of various chemical contaminants is that it is not practicable to define every known or possibly anticipated offending property of residual fuel. The list would be almost infinite. The specification has to be compared to the hardware and the assurance of bunker quality must be looked at in its totality throughout the whole process of manufacture, storage and delivery. The ISO8217 specification is indeed only one part of the whole picture, which includes operators and distribution chain. The latter is the greatest variable in the process of maintenance and protection of bunker fuel oil quality from the manufacturing point down to the end user.

However, the protection required from the marine specification is already given by the first sentence in Sub Clause 4.1 of Clause 4, "General Requirements", of the current specification. This reads:

Table 1 — Requirements for marine distillate fuels

Characteristic	Unit	Limit	Category ISO-F-				Test method reference
			DMX	DMA	DMB	DMC	
Density at 15 °C	kg/m³	max.		890,0	900,0	920,0	ISO 3675 or ISO 12185
Viscosity at 40 °C	mm²/s	min. max.	1,40 5,50	1,50 6,00	— 11,0	— 14,0	ISO 3104 ISO 3104
Flash point	°C	min. min.	— 43	60 —	60 —	60 —	ISO 2719 ISO 2719
Pour point (upper) — winter quality — summer quality	°C	max. max.	— —	– 6 0	0 6	0 6	ISO 3016 ISO 3016
Cloud point	°C	max.	–16	—	—	—	ISO 3015
Sulphur	% (m/m)	max.	1,00	1,50	2,00	2,00	ISO 8754 or ISO 14596
Cetane index		min.	45	40	35	—	ISO 4264
Carbon residue on 10 %(V/V) distillation bottoms Carbon residue	% (m/m) % (m/m)	max. max.	0,30 —	0,30 —	— 0,30	— 2,50	ISO 10370 ISO 10370
Ash	% (m/m)	max.	0,01	0,01	0,01	0,03	ISO 6245
Appearance			Clear and bright		[5]	—	See 7.4 and 7.5
Total sediment, existent	% (m/m)	max.	—	—	0,10	0,10	ISO 10307-1
Water	% (V/V)	max.	—	—	0,3	0,3	ISO 3733
Vanadium	mg/kg	max.	—	—	—	100	ISO 14597 or IP 501 or IP470
Aluminium plus silicon	mg/kg	max.	—	—	—	25	ISO 10478 or IP 501 or IP 470
Used lubricating oil (ULO) Zinc Phosphorous Calcium	 mg/kg mg/kg mg/kg	 max. max. max.	The fuel shall be considered free of ULO if one or more of the elements Zn, P and Ca are below or at the specified limits. All three elements shall exceed the same limits before a fuel shall be deemed to contain ULO. 15 15 30				 IP 501 or IP 470 IP 501 or IP 500 IP 501 or IP 470

Table 2 — Requirements for marine residual fuels

Characteristic	Limit	Category ISO-F-									Test method reference
		RMA 30	RMB 30	RMD 80	RME 180	RMF 180	RMG 380	RMH 380	RMK 380	RMH 700	RMK 700	
Density at 15 °C, kg/m³	max.	960,0	975,0	980,0	991,0		991,0		1010,0	991,0	1010,0	ISO 3675 or ISO 12185
Kinematic viscosity at 50 °C,mm²/s	max.	30,0		80,0	180,0		380,0			700,0		ISO 3104
Flash point, °C	min.	60		60	60		60			60		ISO 2719
Pour point (upper), °C - winter quality - summer quality	max. max.	0 6	24 24	30 30	30 30		30 30			30 30		ISO 3016 ISO 3016
Carbon residue, % (m/m)	max.	10		14	15	20	18	22		22		ISO 10370
Ash, % (m/m)	max.	0,10		0,10	0,10	0,15	0,15			0,15		ISO 6245
Water, % (V/V)	max.	0,5		0,5	0,5		0,5			0,5		ISO 3733
Sulfur, % (m/m)	max.	3,50		4,00	4,50		4,50			4,50		ISO 14596 or ISO 8754
Vanadium, mg/kg	max.	150		350	200	500	300	600		600		ISO 14597 or IP 501
Total sediment potential, % (m/m)	max.	0,10		0,10	0,10		0,10			0,10		ISO 10307-2
Aluminium plus silicon, mg/kg	max.	80		80	80		80			80		ISO 10478
Used lubricating oil (ULO)		**The fuel shall be free of ULO. A fuel** shall be considered to be free of ULO if one or more of the elements Zinc, Phosphorus and Calcium are below or at the specified limits. All three elements must exceed the same limits before a fuel shall be deemed to contain ULO.										
Zinc, mg/kg Phosphorus, mg/kg Calcium, mg/kg	- - -	15 15 30										IP 501/IP470 IP 501/IP 470 IP 501/IP 470

"The fuels shall be homogeneous blends of hydrocarbons derived from petroleum refining".

The clause continues with: "This shall not preclude the incorporation of small amounts of additives intended to improve some aspects of performance."

These two sentences are intended to be unambiguous and to mean that that is all that can be incorporated in a fuel. Thus, in their own right, they effectively prohibit anything else.

As far as the choice of the characteristics of the fuel oil grades is concerned, the user's point of view is, on the whole, the same as that of the supplier, but the way of expressing it may not be the same. The user's requirements will always be that the bunker fuel should be:

- Safe to handle and easy to transfer;
- Stable at all stages of operation;
- Capable of being adequately cleaned of catalyst fines, dirt and water;
- Easy to ignite and combust;
- Non-corrosive.

ISO8217 standard does cover the points listed above and the perception that it inadequately protects the user is wrong. It has to be emphasised again that the whole marine industry is responsible for dealing with the bunker fuel quality problems and the international specification is only one of the tools used for this purpose. Of equal importance are the adequacy of the fuel handling and treatment systems, the design and maintenance of the engine and, very particularly, the competence and training of ships' engineers.

This article is based on a paper given at the13th SIBCON conference last year. In the next issue of *World Bunkering* Wanda will look at the development of marine fuel standards after the publication of the third edition of ISO8217.