E

MARINE ENVIRONMENT PROTECTION COMMITTEE
76th session
Agenda item 5

MEPC 76/5
29 January 2021
Original: ENGLISH
Pre-session public release: ☒

AIR POLLUTION PREVENTION

Review of 2020 marine fuels quality

Submitted by ISO

SUMMARY

Executive summary:	This document provides information on the distribution of RM and DM fuels with a focus on the main characteristics of VLSFO bunkers as supplied during the period January to June 2020 and in comparison to 2018 HSFO. Data has been gathered from most of the major global testing agencies including those contributing to the IMO sulphur monitoring programme.
Strategic direction, if applicable:	1
Output:	1.18
Action to be taken:	Paragraph 16
Related documents:	PPR 7/22/Add.1, annex 22, item 8 and PPR 8/5/1

Introduction

1 In the lead up to the implementation of regulation 14.1.3 of MARPOL Annex VI on 1 January 2020, the shipping industry raised concerns over the uncertainty and potential diversity of the VLSFO characteristics. In response to this, the ISO committee in charge of ISO 8217 (ISO/TC28/SC4 and its WG6) presents in this document a global overview of the key VLSFO fuel characteristics in use during the period January to June 2020.

2 The ISO/TC28/SC4/WG6 reviewed the characteristics and reported performance of VLSFOs supplied to ships in the period January to June 2020 based on test data, from more than 100,000 bunkers as loaded, collected from a number of major global testing agencies and made comparisons with the quality of HSFO supplied in the period January to June 2018.

Marine fuel quality review, January – June 2020

3 DM[1] and RM[2] Distribution: Groups of fuel oils considered are defined as follows:

DM: fuels of viscosity ≤ 11 cSt at 40°C + RM fuels of viscosity < 8.3 cSt at 50°C
RM: fuels of viscosity ≥ 8.3 cSt at 50°C
RM VLSFO: RM fuels with S content 0.11 < S≤ 0.53 mass%
RM HSFO: RM fuels with S content > 0.53 mass%

4 Data shows an increase in the percentage of DM samples from 28% in 2018 to 37% in 2020 and a decrease in the percentage of RM samples from 72% in 2018 to 63% in 2020.[3]

5 Flash Point: In both 2018 and 2020 more than 99% of DM fuels had a flash point (FP) ≥ 60°C. A small increase of 2020 DM samples (but still below 1% of all samples) with a flash point of between 55°C ≤ FP < 60°C was recorded compared to the 2018 DM samples. In 2020, 99.9% of RM VLSFO samples had a flash point ≥ 60°C and 0.08% had a flash point between 55°C ≤ FP < 60°C. In both 2018 and 2020, more than 99.5% of HSFO samples had a flash point ≥ 60°C.

6 Table 1 compares the approximate average value of certain ISO 8217 characteristics of 2020 RM VLSFO samples with 2018 RM HSFO samples.

Table 1: average of RM fuel oil characteristics, 2020 vs 2018

	2020 RM VLSFO	2018 RM HSFO
Viscosity at 50°C, cSt	105	355
Density, kg/m3	936	988
MCR, mass%	5.4	13.9
Net Spec Energy, MJ/kg	41.7	40.3
CCAI	813	848
Al+Si, mg/kg	18.2	22.3
Sulphur, mass%	0.45	2.61

7 The above data shows that VLSFOs have a lower average viscosity, density, micro carbon residue (MCR), Calculated Carbon Aromaticity Index (CCAI) and higher net specific energy than 2018 HSFO. This points to VLSFOs being more paraffinic in nature than HSFO resulting in improved combustion characteristics.

8 Pour point is another characteristic indicative of the nature of the fuel oil. Higher pour point temperatures indicate a more paraffinic composition. The data shows that 19% of the 2020 RM VLSFO samples tested had a pour point above 21°C whereas it was only 2% of 2018 RM HSFO samples that had a pour point above 21°C.

1 DM: Distillate Marine

2 RM: Residual Marine

3 Percentage figures of the samples quoted in this document are referring to the percentages of the total number of bunkers loaded and are not based on the mass of the fuel.

PP > 21°C	2020 RM VLSFO	2018 RM HSFO
% of samples	19	2

9 Viscosity: The most notable change, as illustrated below, is the broader spread of viscosity of VLSFOs to that of HSFO requiring increased attention to fuel management practices. 44% of 2020 RM VLSFO samples have a viscosity at 50°C in the range 20-80 cSt and 36% have a viscosity at 50°C in the range 80-180 cSt. For 2018 RM HSFO, it is 0.6% and 4.8% respectively. 95% of 2018 RM HSFO samples and 13-14% of 2020 RM VLSFO samples had a viscosity at 50°C > 180 cSt.

Viscosity, V 50°C, cSt	**2020 RM VLSFO**					
	V ≤ 10	10 < V ≤ 20	20 < V ≤ 80	80 < V ≤ 180	180 < V ≤ 380	V > 380
% of samples	1.6	4.9	44	36	13	< 0,5

Viscosity, V 50°C, cSt	**2018 RM HSFO**					
	V ≤ 10	10 < V ≤ 20	20 < V ≤ 80	80 < V ≤ 180	180 < V ≤ 380	V > 380
% of samples	< 0.1	< 0.1	0.6	4.8	73	22

10 Sulphur: 94% of combined 2020 DM and RM fuels have a S content ≤ 0.50%, 1% in the range 0.50 < S ≤ 0.53% and 5% have a S content > 0.53%. In 2018, 69% of DM and RM samples had a S content > 0.53%.

S, mass%	**2020 DM and RM**		
	S ≤ 0.50	0.50 < S ≤ 0.53	S > 0.53
% of samples	94	1	5

S, mass%	**2018 DM and RM**		
	S ≤ 0.50	0.50 < S ≤ 0.53	S > 0.53
% of samples	29	2	69

11 Al+Si: 99.8% of 2020 RM VLSFO samples had a Al+Si (catalytic fines) content ≤ 60 mg/kg and 0.2% of samples had a Al+Si content > 60 ppm. In 2018, 98.5% of RM HSFO samples had a Al+Si ≤ 60 mg/kg and 2.5% of samples had a Al+Si content > 60 ppm.

Al+Si, mg/kg	**2020 RM VLSFO**		**2018 RM HSFO**	
	≤ 60	> 60	≤ 60	> 60
% of samples	99.8	0.2	98.5	1.5

12 Total Sediment: 5% of 2020 RM VLSFO samples had a total sediment accelerated (TSA) in the range 0.05 ≤ TSA ≤ 0.10 mass% compared to 5.8% of 2018 RM HSFO samples. 0.7% of 2020 RM VLSFO samples have TSA in the range 0.10 < TSA ≤ 0.15 mass% and 0.8% have TSA > 0.15% in comparison to 0.09% and 0.14%, respectively, for the RM 2018 HSFO samples.

TSA, mass%		**2020 RM VLSFO**		
	TSA < 0,05	0.05 ≤ TSA ≤ 0.10	0.10 < TSA ≤ 0.15	TSA > 0.15
% of samples	93.5	5.0	0.7	0.8

TSA, mass%		**2018 RM HSFO**		
	TSA < 0,05	0.05 ≤ TSA ≤ 0.10	0.10 < TSA ≤ 0.15	TSA > 0.15
% of samples	94.0	5.8	0.09	0.14

13 Fuel stability data, expressed through Total Sediment (TSA) in the above, show a noticeable increase in the percentage of samples exceeding the specification limit of max. 0.10 mass%. Field problems have been reported not only for VLSFO exceeding the TSA/TSP specification limit but also for VLSFO having TSA/TSP well below the max. specification limit. Further investigation is therefore already ongoing to better understand the sediment formation tendency of these VLSFOs, the testing of same and other factors potentially influencing the sediment formation tendency.

Conclusion

14 The data shows that 2020 RM VLSFOs in comparison with 2018 HSFOs generally have lower viscosity, lower density, lower MCR and lower CCAI, higher net specific energy and a higher pour point, all of which, as anticipated before, point to VLSFOs in general tending towards being paraffinic in nature and having better ignition and combustion properties in comparison with HSFOs. Compared to HSFOs, VLSFO characteristics show a wider viscosity distribution and generally lower viscosity and density. Combined with the possibility of a higher pour point, a greater awareness of the fuel properties as loaded, with regard to managing storage, treatment and onboard fuel handling temperatures is required.

15 The ISO/TC28/SC4/WG6 is in the process of reviewing ISO 8217:2017 taking into consideration the outcome of this fuel quality review and taking note of continuing trends and feedback from the industry. It is considering including an informative indicator to evaluate whether a fuel tends to have a paraffinic or aromatic character. Such an indicator could be part of the next ISO 8217 standard, which is expected to be published in 2023.

Action requested of the Committee

16 The Committee is invited to review the information in this document and to take action, as appropriate.

____