Fuel Analysis Report
DEMO CUSTOMER

Report date
23-Nov-2016

DEMO VESSEL (1234567)
Ghent, 18-Nov-2016

Specification
Based on this sample results are outside specification limits

Operational
Based on this sample, operational difficulties may be experienced. Please refer to the comments on Al+Si

Sample Number	ROT1612345
Bunker Date	18-Nov-2016
Supplier	DEMO SUPPLIER
Loaded From	DEMO BUNKER TANKER
Quantity per C.Eng.	1600 MT

Product Type	(HFO)
Fuel Usage	Main Engine
Sampling Point	Ship Manifold
Sampling Date	19-Nov-2016
Sampling Method	Continuous Drip
Seal Data	1234567 (VPS, Intact)
Related Seals	2345678, 3456789
Marpol Seal	A4567890

Source Of Data	B.D.N.
Density @ 15°C	990.7 kg/m³
Viscosity @ 50°C	371.1 mm²/s
Sulfur	2.10 % m/m
Volume @ 15°C	2605.886 m³
Quantity	2581.651 MT

Sent From	Ghent
Date Sent	19-Nov-2016
Arrived at Lab	20-Nov-2016

83%
fuel treatment efficiency

98 °C
separation temperature

2580.869 MT
calculated quantity

Indicates that results are outside specification limits and that comments are given

Test Results

	Unit	Test Results	RMG380	Test Method
Density @ 15°C	kg/m³	**991.5**	991.0	ISO 12185
Viscosity @ 50°C	mm²/s	372.2	380.0	ISO 3104
Water	% V/V	0.12	0.50	ASTM D6304-C
Micro Carbon Residue	% m/m	16.71	18.00	ISO 10370
Total Sediment Potential	% m/m	0.02	0.10	ISO 10307-2
Ash	% m/m	0.06	0.10	LP 1001
Vanadium	mg/kg	123	350	IP 501
Sodium	mg/kg	21	100	IP 501
Pour Point	°C	< 24	30	LP 1304
Flash Point	°C	> 70.0	60.0	ISO 2719-B
CCAI (Ignition Quality)[1]	-	853	870	ISO 8217
Aluminium + Silicon	mg/kg	**84**	60	
Acid Number	mg KOH/g	< 0.1	2.5	ASTM D664
Sulfur	% m/m	2.73		ISO 8754
Aluminium	mg/kg	47		IP 501
Silicon	mg/kg	37		IP 501
Iron	mg/kg	25		IP 501
Nickel	mg/kg	38		IP 501
Calcium	mg/kg	4		IP 501
Magnesium	mg/kg	1		LP 1101
Zinc	mg/kg	1		IP 501
Phosphorus	mg/kg	< 1		IP 501
Potassium	mg/kg	< 1		LP 1101
Net Specific Energy[1]	MJ/kg	40.25		ISO 8217

[1] Calculated value

Specification Comparison

Results compared with ISO 8217:2010 specification RMG380, table 2. Based on this sample please note the following:

Outside specification limit: Density @ 15°C, Aluminium + Silicon

Operational Advice

Al+Si	Fuel contains catalytic fines as indicated by aluminium + silicon. Increased wear of liners, piston rings, injectors and fuel pumps is likely when these highly abrasive particles are not reduced by at least 83%.
Separators	Fuel temperature at separator inlet should be maintained at a constant temperature of 98 °C. Ensure a constant flow rate through the separator at a reduced rate. Consider to operate separators in parallel. Cleaning the disc stack of the separators in use will further improve the efficiency.
Fuel System Check	Based on the high concentration of impurities, we recommend to send a set of FSC samples to assess the efficiency and confirm optimum operation of the fuel treatment plant. As a minimum, representative samples taken before and after the separators are required for this assessment. Please refer to the Instruction Manual included in the sample kits for more detailed information.

83%
fuel treatment efficiency

98 °C
separation temperature

Quantity

Calculated Quantity	2580.869 MT. Quantity (Weight) is based on BDN Volume, tested density and a weight factor of 1.1 kg/m³ (ASTM D1250-80 Table 56)..

2580.869 MT
calculated quantity

Temperature

Injection	145 °C for 10 mm²/s, 125 °C for 15 mm²/s, 115 °C for 20 mm²/s, 110 °C for 25 mm²/s
Transfer	45 °C

Previous Test Results

	Unit	GHENT **09-Oct-2016** ROT1623456	GHENT **05-Sep-2016** ROT1634567	SETUBAL **07-Aug-2016** ROT1645678	GHENT **11-Jun-2016** ROT1656789
Density @ 15°C	kg/m³	991.2	991.0	989.4	995.0
Viscosity @ 50°C	mm²/s	377.6	386.3	352.9	367.6
Water	% V/V	0.30	0.13	0.07	0.13
Micro Carbon Residue	% m/m	14.55	16.75	14.93	13.42
Sulfur	% m/m	2.58	2.65	3.02	2.22
Total Sediment Potential	% m/m	< 0.01	0.03	0.01	0.03
Ash	% m/m	0.06	0.07	0.04	0.05
Vanadium	mg/kg	156	189	132	125
Sodium	mg/kg	21	24	16	19
Iron	mg/kg	47	64	18	35
Nickel	mg/kg	51	50	43	37
Calcium	mg/kg	8	5	5	4
Magnesium	mg/kg	1	< 1	< 1	3
Zinc	mg/kg	1	2	< 1	1
Phosphorus	mg/kg	< 1	< 1	< 1	< 1
Potassium	mg/kg	2	< 1	< 1	< 1
Pour Point	°C	< 24	< 24	< 24	< 24
Flash Point	°C	> 70.0	> 70.0	69.0	> 70.0
Net Specific Energy[1]	MJ/kg	40.22	40.27	40.21	40.36
CCAI (Ignition Quality)[1]	-	852	852	851	856
Aluminium + Silicon	mg/kg	22	30	28	59

[1] Calculated value

Best Regards,
On behalf of Veritas Petroleum Services BV
E. Hoogendoorn
Technical Adviser

For assistance or further information on this report please contact your nearest VPS office or contact us directly at
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