Fuel Analysis Report
SIGMA TANKERS INC.

Report date
09-Aug-2017

DUBAI CHARM (9402495)
Brunsbuttel, 05-Aug-2017

Specification
Based on this sample the specification is met

Operational
Based on this sample, operational difficulties may be experienced. Please refer to the comments on Density and MCR

501.005 MT
calculated weight

Sample Number	ROT1729387
Bunker Port	Brunsbuttel
Bunker Date	05-Aug-2017
Supplier	AEGEAN
Loaded From	ANTONIE
Quantity per C.Eng.	501 MT

Product Type	HFO
Fuel Usage	UniFuel
Sampling Point	Ship Manifold
Sampling Date	05-Aug-2017
Sampling Method	Continuous Drip
Seal Data	0438211 (VPS, Intact)
Related Seals	0438212, 0438213, 0438214
Marpol Seal	3641331

Source Of Data	B.D.N.
Density @ 15°C	989.6 kg/m³
Viscosity @ 50°C	341.7 mm²/s
Sulfur	2.40 % m/m
Volume @ 15°C	506.885 m³
Quantity	501.056 MT

Sent From	Kiel
Date Sent	07-Aug-2017
Arrived at Lab	08-Aug-2017

Indicates that comments are given

ED_002238_00003828-00001

Test Results

	Unit	Test Results	RMG380	Test Method
Density @ 15°C	kg/m³	**989.5**	991.0	ISO 12185
Viscosity @ 50°C	mm²/s	362.1	380.0	ISO 3104
Water	% V/V	0.06	0.50	ASTM D6304-C
Micro Carbon Residue	% m/m	**17.26**	18.00	ISO 10370
Total Sediment Potential	% m/m	0.06	0.10	ISO 10307-2
Ash	% m/m	0.06	0.10	LP 1001
Vanadium	mg/kg	229	350	IP 501
Sodium	mg/kg	19	100	IP 501
Calcium	mg/kg	< 1	30	IP 501
Zinc	mg/kg	2	15	IP 501
Phosphorus	mg/kg	< 1	15	IP 501
Pour Point	°C	< 24	30	LP 1304
Flash Point	°C	> 70.0	60.0	ISO 2719-B
CCAI (Ignition Quality)[1]	-	851	870	ISO 8217
Aluminium + Silicon	mg/kg	4	60	
Sulfur	% m/m	2.50		ISO 8754
Aluminium	mg/kg	1		IP 501
Silicon	mg/kg	3		IP 501
Iron	mg/kg	60		IP 501
Nickel	mg/kg	51		IP 501
Magnesium	mg/kg	< 1		LP 1101
Potassium	mg/kg	< 1		LP 1101
Net Specific Energy[1]	MJ/kg	40.37		ISO 8217

[1] Calculated value

Specification Comparison	Results compared with ISO 8217:2010 specification RMG380, table 2. Based on this sample and the tested parameters the specification is met.

Operational Advice

Density	Separator operation may be difficult. Optimum adjustment of the separators is important for efficient fuel treatment.
MCR	Depending on engine type and engine load, increased carbonaceous deposits may occur in combustion spaces and turbochargers. Avoid low load operation and increase the scavenge air temperature. Verify correct settings for injection timing and injection viscosity.

Quantity

Calculated Weight	501.005 MT.
Calculated Mass	501.563 MT. The calculated quantities are based on BDN Volume and tested density. A weight factor of 1.1 kg/m³ (ASTM D1250-80 Table 56) has been applied to calculate the weight.

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	ALGECIRAS **06-Jun-2017** ROT1721518	HOUSTON **15-Apr-2017** HOU1711168	ROTTERDAM **25-Feb-2017** ROT1707734	LISBON **30-Dec-2016** ROT1700455
Density @ 15°C	kg/m³	985.0	990.4	991.2	989.1
Viscosity @ 50°C	mm²/s	313.2	362.2	383.3	365.1
Water	% V/V	0.07	0.28	0.11	0.08
Micro Carbon Residue	% m/m	14.88	13.46	16.00	16.69
Sulfur	% m/m	3.22	2.27	2.87	2.63
Total Sediment Potential	% m/m	0.01	0.05	0.02	0.05
Ash	% m/m	0.05	0.08	0.06	0.06
Vanadium	mg/kg	85	145	162	146
Sodium	mg/kg	26	30	20	22
Iron	mg/kg	22	58	37	31
Nickel	mg/kg	32	36	49	49
Calcium	mg/kg	6	17	4	6
Magnesium	mg/kg	< 1	3	2	1
Zinc	mg/kg	1	16	1	1
Phosphorus	mg/kg	1	8	1	1
Potassium	mg/kg	< 1	3	< 1	< 1
Pour Point	°C	< 24	< 24	< 24	< 24
Flash Point	°C	70.0	> 70.0	> 70.0	61.0
Net Specific Energy[1]	MJ/kg	40.21	40.33	40.21	40.33
CCAI (Ignition Quality)[1]	-	848	852	852	850
Aluminium + Silicon	mg/kg	32	57	48	40

[1] Calculated value

FSC Recommendation

System sample recommended	-	No	Yes	Yes	No
System sample received	-	No	**No**	**No**	No

Best Regards,
On behalf of Veritas Petroleum Services BV
B. van Ee
Senior 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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