The Lebanese Republic
Ministry of Energy and Water
Directorate General of Oil
The General Director

LEBANESE REPUBLIC
MINISTRY OF ENERGY AND WATER

No: 40/T
Beirut: 29/6/2022

To Whom It May Concerns

Knowing that the estimated yearly quantities of fossil fuels needed for Electricite Du Liban (EDL) simulations for (8-10) hours of electricity supply to the local consumers are as follows:

Petroleum Product	Yearly Quantity (Metric Tons)
Gas Oil	1,250,000.00
HFO Quality Grade (B)	400,000.00
HFO Quality Grade (A)	180,000.00
TOTAL :	1,840,000.00

- And in order to assess the feasibility of the opportunity for the international petroleum companies and Institutions to supply the Ministry of Energy and Water with the above mentioned petroleum products of the enclosed specifications for EDL needs, we ask any interested party to provide us with the following informations:
  - The pricing terms such as the name of the Platts quotation, period for pricing (number of Platts quotations around Bill of Lading date), discount on the Platts, premium discount,...
  - The terms of payment such as deferred payment at a certain number of days from bill of lading date,...
  - The quickest period to send us your reply about the delivery of the mentioned petroleum products.
  - Any other needed information.

- And given the critical situation of the electricity sector in Lebanon, we ask the interested party to acknowledge receipt and send us a quick response in this regard.

Director General of Oil

Engineer Aurore Feghaly

Enclosure: - Specifications of Gas Oil
- Specifications of HFO Quality Grade (B)
- Specifications of HFO Quality Grade (A)

هام وعاجل جداً

كهرباء لبنان

"مؤسسة عامة"

ELECTRICITE DU LIBAN

"Etablissement Public"

شارع النهر - بيروت - تلفون : ٢٩- ٤٤٢٧٢٠-١-٩٦١+
فاكس : ٥٨٣٠٨٤-١-٩٦١+
ص.ب. ١٣١

رقم المحفوظات:
رقم الصادر: ٢١٠٤
بيروت في ١٨/٠٥/٢٠٢١

جانب المديرية العامة للنفط
فاكس : ٠١/٢٨٠٧٠١

الموضوع : ملاحظات حول المواصفات الفنية لمادة الغاز أويل موضوع استدراج العروض الفوري رقم T/ ١١١ تاريخ ٢٠٢١/٠٤/٢٩.

المراجع : - كتاب المديرية العامة للنفط الى مؤسسة كهرباء لبنان تاريخ ٢٠٢١/٠٥/١١ .

بالإشارة الى الموضوع والمرجع أعلاه،

وعطفاً على كتاب المديرية العامة لإدارة المناقصات رقم ١٠/٤٢ تاريخ ٢٠٢١/٠٥/٠٦ (مستند رقم ١)، بأن الخبير الأوروبي يوصي من حيث المبدأ بأخذ رأي الشركة الصانعة في طريقة الاختبار ASTMD381، وأن هذا الأمر يقرر بالنهاية بالاتفاق ما بين مؤسسة كهرباء لبنان والشركة الصانعة، وهو خارج عن اختصاص إدارة المناقصات،

وعطفاً على كتابكم تاريخ ٢٠٢١/٠٥/١١ (مستند رقم ٢)، وبعد الاطلاع على كتب الشركات المرفقة بكتابكم ودرس الملاحظات، نفيدكم بالتالي:

أولاً: بالنسبة لملاحظات شركة "ZR Energy DMCC" وفق كتابها رقم T0408-42-MEW-PT0802 تاريخ ٢٠٢١/٠٥/٠٤ (مستند رقم ٣):

- **Gum Content:** Can you please clarify if what is meant is "washed gums" or "unwashed gums"? Please confirm the correct testing method that is applicable for gasoil not jet fuel. The notes also mention "washed and unwashed" – does this actually mean "washed or unwashed"?

  Answer: The value 7mg/100 mL is for both washed and unwashed Gum content. We confirm that the applicable test method is ASTM D381 as per Siemens request. As for the notes, it is "washed and unwashed".

- **Heat of Combustion:** This test method (ASTM D4809) is not industry standard. We suggest using ASTM D4868 which is industry standard.

Answer: This is the applicable test method (ASTM D4809) as per the manufacturer Company Siemens' Manual. Knowing that, this method was applied for testing the "LHV" of Gas oil sample from the last two cargos by the certified laboratory Bureau Veritas – Dubai contracted by the General Directorate of Oil.

- **Sediment particulates:** We would like to point out that the test methods applicable are not suitable. The standard test method relevant for gasoil is ASTM D6217 or IP415.Testing method of DIN 51419 is obsolete and was cancelled in 1983. We suggest you remove all test methods that are not ASTM 6217 + IP415.

Answer: All these test methods are according to Siemens Manual, which are applied by the certified laboratory Bureau Veritas – Dubai, contracted by the General Directorate of Oil, for testing the Sediment particulates in the Gas oil sample from the last two cargos.

- **Sediment particulates:** The particulates size specified is "d<10µm , 10≤d≤25 µm , d>25 µm" which are unknown parameters and seem to look for the sizes of particles, rather than overall quantity. These methods are designed for determination of total quantity of contamination particles and do not imply to calculate their quantity depending on size of each particle as is requested in the spec. If it is necessary to count the particles according to their diameters, then the suggested method is ASTM D7619.

Answer: This test method is according to Siemens Manual, which is applied by the certified laboratory Bureau Veritas – Dubai, contracted by the General Directorate of Oil, for testing the Sediment particulates in the Gas oil sample from the last two cargos.

- **Acid number:** The Unit need to be corrected – mg KOH/g instead of mg /g KOH.

Answer: The correct unit for acid number is mg/g KOH as per Siemens Manual.

- **Chlorine:** The test method requested is not suitable. The methods to be used are IP510 or UOP779.

Answer: The method D4929 / ISO15597 for testing "Cl" is requested by the manufacturer Company Siemens.

- **Notes for evaluation:** This section is extremely unclear. We request further clarifications on this section.

Answer: Kindly specify the exact points that are not clear in the evaluation.

ثانياً: بالنسبة لملاحظة شركة "Independent Petroleum Group Limited" وفق كتابها تاريخ ٢٠٢١/٠٥/٠٤ (مستند رقم ٤):

- Requesting a waiver in the Gum which will make us in a better position to participate in your tender for subject requirement.

Answer: The Gum Content is requested by the Manufacturer company Siemens. knowing that the additional set of parameters marked as "Ranges as per Siemens Experience" will be evaluated if the Gum Content (washed and/or unwashed) are outside the specified range 7mg/100mL, where two Gas oil cargos were evaluated and approved according to these additional parameters.

ثالثاً: بالنسبة لملاحظات شركة "ELINOIL Hellenic Petroleum Company" وفق كتابها تاريخ ٢٠٢١/٠٥/٠٥ (مستند رقم ٥):

- Given that Gasoil should be tested for Gums under ASTM381 if unwashed and , if anyway if it is tested, the method cannot produce a result of less than 7mg/100mL (unwashed), we presume that the second set of parameters marked as "Ranges as per Siemens Experience", will always be applicable.

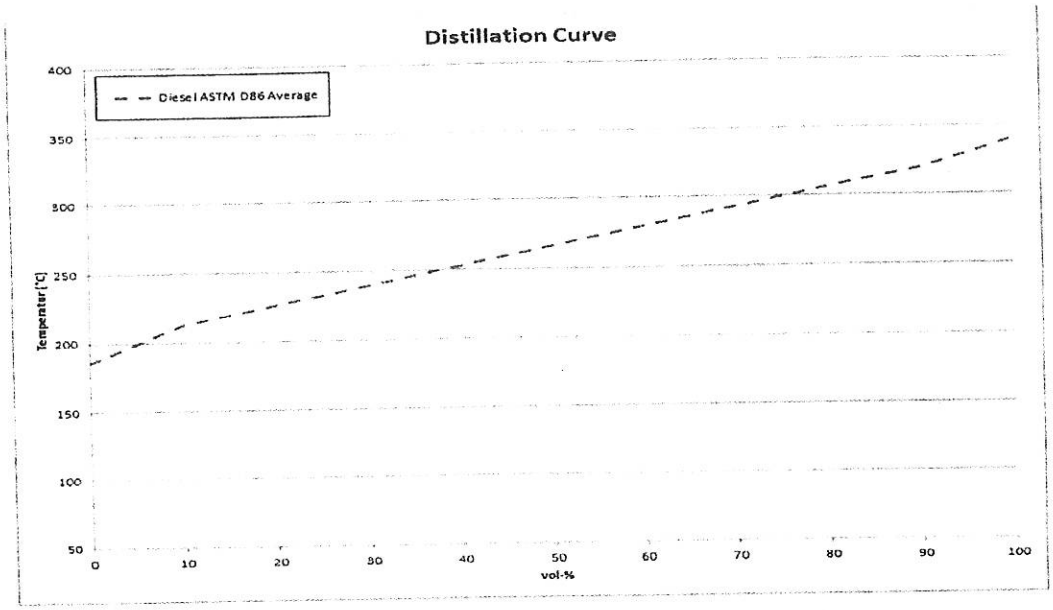
Answer: Correct, if the unwashed Gum Content exceeds 7mg/100mL.

- We are still reviewing the relative values for C, H, and O.

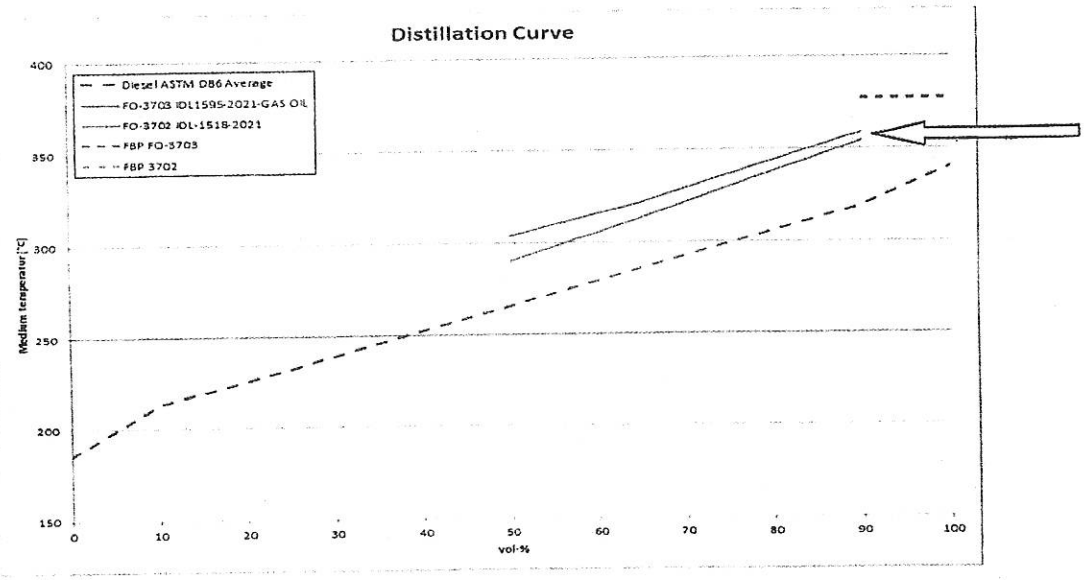
Answer: Noted.

- Regarding distillation, we have noticed that the rejection criteria are totally vague. In ASTMD86, there is no reference boiling curve. Therefore, we don't understand where the requested specification refers to. Furthermore, the notion of a "strong deviation" is totally subjective and open to wide interpretation. Could you please specify what stands for strong deviation? We would strongly recommend that you revise the specification to indicate min/max values for the distillation, as per the diesel specification for example.

Answer: Kindly find below the reference boiling curve according to ASTM D86, where the requested curve shall be parallel to this reference curve, taking into consideration that there is already a max limit for the 90 % volume of Distillation which is set to 365 ^{0}C.

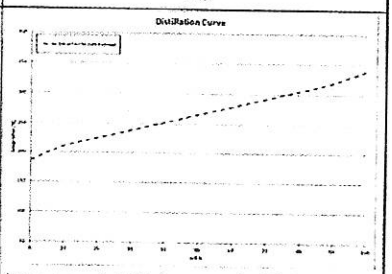


As an example, kindly find below the distillation curves for two Gas oil Cargos that were evaluated accordingly and accepted in the last couple of months.



رابعاً: بالنسبة لملاحظات مختبر "Bureau Veritas" – دبي وفق البريد الالكتروني تاريخ ٢٠٢١/٠٥/٠٩ (مستند رقم ٦):

- Recommends splitting the Gum content test into two lines, for the unwashed and washed, while stating the conditions at which the test was performed at, such as temperature and time.

All parameters must be filled by the Gas oil supplier					
Parameters	Test Method	Unit	Limits as per Siemens Manual		For Evaluation
			Min	Max	
Total Sulfur (S)	ASTM D3246/D5453/ ISO6326	Mass %		0.2	These parameters shall be evaluated in all conditions
Fuel Bound Nitrogen (FBN)	ASTM D4629	Mass %		0.015	
Lower Heating Value (LHV)	ASTM D4809/DIN51900	MJ/kg	42		
Density (at 15°C)	ASTM D1298/DIN51757	kg/m3	820	870	
Kinematic Viscosity (at 40°C)	ASTM D445/ISO-3104/DIN51562-1	mm2/s(cSt)	1.3	5.5	
Distillation, 90 % volume recovered @ °C max	ASTM D86/ISO3405	°C		365	
Carbon Residue	ASTM D4530/ISO10370/DIN51551	Mass %		0.15	
Oxidation Stability	ASTM D2274/IP365/95	mg/100ml		2.5	
Sediment & Water	ASTM D2709	Vol %		0.1	
sediment Particulates d<10µm 10≤d≤25µm d≥25µm	ASTM D6217/IP415/DIN51419/DIN EN 12662	mg/kg		20 18 2 0	
Water	ASTM D95	Vol %		0.05	
Sediment	ASTM D473/ISO3737/DIN51789//DIN EN 12662	Mass %		0.01	
Gum Content (Unwashed)	ASTM D381	mg/100ml		7	
Pour Point (ϑPP)	ASTM D97/ISO3016	°C		0	
Flashpoint (ϑFP)	ASTM D93/D56/ISO2719	°C	60		
Acid Number	ASTM D664	mg/g KOH		0.1	
Ash content	ASTM D482/ISO6245/DIN51575/DIN EN 2645	Mass %		0.01	
Na + K	ASTM D3605 / DIN 51790	mg/kg		0.5	
V	ASTM D3605 / DIN 51790	mg/kg		0.5	
Pb	ASTM D3605 / DIN 51790	mg/kg		1	
Ca	ASTM D3605 / DIN 51790	mg/kg		1	
Cl	ASTM D4929/ISO15597	mg/kg		6	
Parameters	**Test Method**	**Unit**	**Ranges as per Siemens Experience**		
Carbon (C)	D5291 / DIN 51721	% Mass	85 - 87.5		These parameters shall be evaluated if Gum content value (washed and/or unwashed > 7mg/100mL)
Hydrogen (H)	D5291 / DIN 51721	% Mass	11 - 14.5		
Oxygen (O)	D5291 / DIN 51721	% Mass	<0.2		
Distillation range 50 % evaporated 65 % evaporated 90 % evaporated (Defined above) End point	D86 / ISO 3405	°C	 * the measured distillation curve should show a slope and shape parallel to the above reference boiling curve (according to ASTM D86).		
Cold filter Plugging point (CFPP)	D637/EN116	°C	Fuel temperature > 10 °C + CFPP		

Note for Evaluation:

* If Gum content (washed and un-washed) ≤ 7mg/100mL and all the parameters (with limits as per Siemens manual) comply with the above mentioned limits, then the gas oil sample complies with the required specifications.

* If Gum content (washed and/or un-washed) > 7mg/100mL, and all the parameters (with limits as per siemens manual) and all the remaining parameters (with ranges as per Siemens Experience) comply with the above mentioned limits and ranges, then the gas oil sample complies with the required specifications.

Answer: Siemens has already clarified to Bureau Veritas during the online meeting held on 29/03/2021 that the performed modifications to ASTM D381 by BV are plausible and this depends on the core know how of the laboratory itself, and this was mentioned in Siemens letter dated 02/04/2021 as follows:

*" As stated in the meeting from 29th of March 2021 and the customer letter (dated 30.3.2021) the performed modifications are plausible. Necessary modifications to **ASTM D381** depending on fuel quality and sample are core know how of the individual laboratories."*

كما نفيدكم بأننا سنقوم بمراسلة مختبر Bureau Veritas – دبي والشركة الصانعة Siemens لمراجعة ملاحظات شركة ZR Energy، علماً أنه تم تطبيق طرق الفحص المذكورة من شركة ZR Energy من قبل مختبر Bureau Veritas- دبي دون تدوين أي اعتراض،

استناداً الى ما ورد أعلاه، تجدون ربطاً جدول المواصفات المطلوبة للغاز أويل حيث تم توضيح طريقة تقييم الـ Distillation range، مع وضع رسم بياني كمرجع لاعتماده لدى تقييم نتيجة فحص هذا المكون.

كما تجدر الإشارة الى أن مختبر Bureau Veritas - دبي قد أجرى جميع الفحوصات الأساسية والإضافية المذكورة في الجدول المرفق على عينتي الغاز أويل المأخوذتين من الباخرتين Histira Perla و Antares خلال الشهرين الماضيين حيث تم قبول تفريغ الباخرتين على أساسها،

وبالتالي، نتمنى عليكم إطلاق مناقصة تأمين شحنة الغاز أويل فوراً وبالسرعة القصوى وفق ما ورد أعلاه واستناداً الى جدول المواصفات الموضّح المرفق، وعطفاً على كتاب مؤسسة كهرباء لبنان رقم ٢٠١٦ تاريخ ٢٠٢١/٠٥/١١.

وتفضلوا بقبول فائق الاحترام.

ب.ع. – ر.ع.
أ.ع.- ط.ي.- ب.س.
ف.ح.- خ.ح.

رئيس مجلس الإدارة
المديـر العـام

كمـال الحايـك

نسخة إلى: - معالي وزير الطاقة والمياه

All parameters must be filled by the Gas oil supplier

Parameters	Test Method	Unit	Limits as per Siemens Manual		For Evaluation
			Min	Max	
Total Sulfur (S)	ASTM D3246/D5453/ ISO6326	Mass %		0.2	These parameters shall be evaluated in all conditions
Fuel Bound Nitrogen (FBN)	ASTM D4629	Mass %		0.015	
Lower Heating Value (LHV)	ASTM D4809/DIN51900	MJ/kg	42		
Density (at 15°C)	ASTM D1298/DIN51757	kg/m3	820	870	
Kinematic Viscosity (at 40°C)	ASTM D445/ISO-3104/DIN51562-1	mm2/s(cSt)	1.3	5.5	
Distillation, 90 % volume recovered @ °C max	ASTM D86/ISO3405	°C		365	
Carbon Residue	ASTM D4530/ISO10370/DIN51551	Mass %		0.15	
Oxidation Stability	ASTM D2274/IP365/95	mg/100ml		2.5	
Sediment & Water	ASTM D2709	Vol %		0.1	
sediment Particulates d<10µm 10≤d≤25µm d≥25µm	ASTM D6217/IP415/DIN51419/DIN EN 12662	mg/kg		20 18 2 0	
Water	ASTM D95	Vol %		0.05	
Sediment	ASTM D473/ISO3737/DIN51789//DIN EN 12662	Mass %		0.01	
Gum Content	ASTM D381	mg/100ml		7	
Pour Point (9PP)	ASTM D97/ISO3016	°C		0	
Flashpoint (9FP)	ASTM D93/D56/ISO2719	°C	60		
Acid Number	ASTM D664	mg/g KOH		0.1	
Ash content	ASTM D482/ISO6245/DIN51575/DIN EN 2645	Mass %		0.01	
Na + K	ASTM D3605 / DIN 51790	mg/kg		0.5	
V	ASTM D3605 / DIN 51790	mg/kg		0.5	
Pb	ASTM D3605 / DIN 51790	mg/kg		1	
Ca	ASTM D3605 / DIN 51790	mg/kg		1	
Cl	ASTM D4929/ISO15597	mg/kg		6	

Parameters	Test Method	Unit	Ranges as per Siemens Experience	These parameters shall be evaluated if Gum content value (washed and/or unwashed > 7mg/100mL)
Carbon (C)	D5291 / DIN 51721	% Mass	85 - 87.5	
Hydrogen (H)	D5291 / DIN 51721	% Mass	11 - 14.5	
Oxygen (O)	D5291 / DIN 51721	% Mass	<0.2	
Distillation range 50 % evaporated 65 % evaporated 90 % evaporated End point	D86 / ISO 3405	°C	The reference is the boiling curve in ASTM D86, where the evaluated curve should show a slope and shape parallel to this reference, i.e.: - strong deviations to higher temperature indicate an increased potential for forming soot during combustion, which is not acceptable. - strong deviations to lower temperature with initial boiling points << 100°C indicate volatile fuel fractions, which is not acceptable.	
Cold filter Plugging point (CFPP)	D637/EN116	°C	Fuel temperature > 10 °C + CFPP	

Note for Evaluation:

* If Gum content (washed and un-washed) ≤ 7mg/100mL and all the parameters (with limits as per Siemens manual) comply with the above mentioned limits, then the gas oil sample complies with the required specifications.

* If Gum content (washed and/or un-washed) > 7mg/100mL, and all the parameters (with limits as per siemens manual) and all the remaining parameters (with ranges as per Siemens Experience) comply with the above mentioned limits and ranges, then the gas oil sample complies with the required specifications.

ADDITIONAL SPECIFICATIONS FOR HFO PARAMETERS FOR GRADE B

S.N°	Parameters	Units	Specifications	Test Methods
19	Bromine Number	g Br/100g	< 12	ASTM D 1159
20	Ratio of Asphaltene content / Conradson Carbon Residue		<0.66	ASTM D 189 (OR ASTM D4530)/IP 143
21	P-Value		> 1.5	ASTM D7112 / SMS1600
22	Heptane Insoluble	(mass/mass)%	min: 0.5 and max: 30	ASTM D6560
23	Cleanliness rating	-	< 3	ASTM D4740
24	Paraffin Wax content	(mass/mass)%	< 5	UOP 46

Notes

1. Limit to two different HFO sources as maximum for ship loading.
2. HFO should be supplied according to ISO 8217 – 2017.
3. a: For Vanadium / Sodium Ratio, if Vanadium Va > 100 mg/kg, sodium Na < 1/3 of Vanadium.
4. b: The total sediment content should include the following tests: TSE, TSP and TSA.

HEAVY FUEL OIL PARAMETERS FOR GRADE B HFO

S.N°	Parameters	Units	Specifications	Equivalent Test Methods	ISO 8217-2017
1	Total Sediment Content [b]	(mass/mass)%	< 0.1%	IP 390	ISO 10307-2
2	Viscosity at 50°C	mm^2/s	< 380	ASTM D445	ISO 3104
3	density at 15°C	kg/m^3	< 991	ASTM D4052	ISO 3675 or ISO 12185
4	Micro carbon residue	% m/m	< 18	ASTM D524 or ASTM D4530	ISO 10370
5	aluminum + silicon	mg/kg	< 60	IP501	IP 501, IP 470 or ISO 10478
6	Sodium [a]	mg/kg	< 100	IP501	IP 501, IP 470
7	Ash	% m/m	< 0.1	ASTM D482	ISO 6245
8	Vanadium [a]	mg/kg	< 350	IP501	IP 501, IP 470 or ISO 14597
9	CCAI		< 870	ISO 8217	see 6.3 a)
10	Water	%V/V	< 0.5	ASTM D95	ISO 3733
11	pour point	°C	< 30	ASTM D97	ISO 3016
12	flash point	°C	> 60	ASTM D93	ISO 2719
13	sulfur	% m/m	< 1	ASTM D4294	ISO 8754, ISO 14596
14	acid number	mgKOH/g	< 2.5	ASTM D664	
15	used lubricating oils (ULO): Calcium and zinc, or calcium and phosphorus	mg/kg	the fuel should be free from ULO, and shall be considered to cointain ULO, when either of the following conditions is met: * calcium > 30 and zinc > 15 or * calcium > 30 and phosphorus > 15	IP501	IP 501 or IP 470 , IP 500
16	hydrogen sulfide	mg/kg	<2	IP 570	IP 570
17	Heat of Combustion	MJ/kg Gross	> 41	ASTM D 4868:2000	
18	Sediments and Water	% VOL	< 1	ASTM D 1796:1997	

EDL-CS

0003

HEAVY FUEL OIL PARAMETERS FOR GRADE A HFO

	Parameters	Specified	Rejected	Test Method
1	Density Kg/L at 15 ^{0}C		> 0.991	ASTM D 1298:1999 OR ASTM D 4052:1996
2	KINEMATIC VISCOSITY AT 50 DEG C (MM2/S)	165	>240 <92	ASTM D 445:1997
3	FLASH POINT pensky martins closed cup ^{0}C		<66	ASTM D 93:2002
4	SULFUR CONTENT % MASS		>1	ASTM D 129:2000 OR ASTM D 4294:2002
5	SEDIMENT PCT MASS		>0.2	ASTM D 473:2002
6	WATER & SEDIMENTS PCT VOL	1	>1.5	ASTM D 1796:1997
7	ASH CONTENT PCT MASS	0.12	>0.15	ASTM D 482:2000
8	SODIUM CONTENT PPM	40	>45	ASTM D 5863:2000
9	VANDIUM CONTENT PPM	110	>135	ASTM D 5863:2000
10	POUR POINT ^{0}C		>30	ASTM D 97:1996
11	ASPHALTENES PCT MASS	3	>5	IP 143
12	HEAT OF COMBUSTION MJ/kg Gross		<41	ASTM D 4868:2000
13	CARBON RESIDUE PCT WT		>18	ASTM D 524:2000