Shell Australia
Product Supply Specifications

Fuels: **Fuel Oils** **Confidential**

Product Codes:

SIPM :	----	SAP :	200004060
IRIS :	**MFOFJ**	PINS :	15274001

Product/Brand Name:

Marine Fuel Oil 180 Fiji

Specifications: ISO 8217 Class RME 180
MARPOL Annex VI

Origin: **All Sources**
Destination: **Marine Bunkers: Fiji**

Marine Fuel Oil 180 Fiji (SMFO E180) is designed to comply with the specifications listed above.

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PROPERTY	UNITS		PSS LIMITS	TEST METHODS ASTM/ OTHER	NOTES
Composition				ISO 8217	Note : 1
Density @ 15°C	kg/m³	max.	**900.0 - 991.0**	D1298/IP385	Note: 2 & 3
Viscosity @ 50°C	mm²/s	max.	**180**	D445	Note : 2
Flash Point	°C	min.	**65**	D93	
Pour Point	°C	max.	10	D97	
Calculated Carbon Aromaticity Index (CCAI)			**Report**	ISO 8217	Note : 4 & 5
Sulphur	% mass	max.	**4.0**	D2622/D4294/IP336	
Water	% vol	max.	**0.5**	D95	
Ash	% mass	max.	**0.10**	D482	
Conradson Carbon Residue	% mass	max.	**15.0**	D189/ D4530	
Strong Acid Number	mg KOH/g	max.	**Nil**	D974	
Total Acid Number	mg KOH/g	max.	**3.0**	D664	
Aluminium & Silicon	mg/kg	max.	**70**	D5184	
Lead	mg/kg		**Report**	D5185	
Vanadium	mg/kg	max.	**200**	D5863/IP288/GR354	
Sodium	mg/kg		**Report**	D5863/IP288	
Existent HFT	% mass	max.	**0.10**	D4870/IP375	
Accelerated HFT	% mass	max.	**0.10**	D4870/IP390	
Differential, Total Sediment (Potential minus Existent)	% mass	max.	0.05	Calculation	
Zinc	mg/kg	max.	15	IP501	Note: 6
and Phosphorus	mg/kg	max.	15	IP501	
and Calcium	mg/kg	max .	30	IP501	

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NOTES

1. The composition of the fuel shall be homogenous blends of hydrocarbons derived from petroleum refining. This shall not preclude the incorporation of small amounts of additives intended to improve some aspects of performance. The fuel shall be free of inorganic acids and used lubricating oils.
   The fuel should not include any added substance or chemical waste which;
   - Jeopardises the safety of ships or adversely affects the performance of the machinery; or
   - Is harmful to personnel; or
   - Contributes overall to additional air pollution.

   Only components listed in the SMP Fuel Oil Quality Assurance System may be used.

2. To reduce the risk of supplying fuels with unacceptable ignition qualities, the following additional controls apply to fuels in this table:

Where the measured Viscosity of the Blend (mm2/s @ 50C) is in the range:	The Density (kg/m³) must not exceed:
180-170	991
<170-140	988
<140-120	985
<60-30	975

3. Density test method as detailed in ISO8217 lists ISO12185 (densitometer) and ISO3675 (hydrometer) as approved methods.

4. Ignition performance requirements of residual fuels in marine diesel engines are primarily determined by engine type and, more significantly engine operating conditions. Fuel factors influence ignition characteristics to a much lesser extent. Guidance on acceptable ignition quality values should be obtained from the engine manufacturer.

5. A Nomogram exists (ISO 8217:2005(E)) for determining CCAI by the extension of a straight line connecting the viscosity and the density of a fuel.

   However the value can be calculated using the following formula:

   CCAI = D-81-141 Log_{10} {Log_{10}(Vk+0.85)}-483 Log_{10}(T+273)/323)
   where Vk = Kinematic Viscosity (mm^2/s) at temperature T°C
   D = Density (kg/m^3) at 15°C

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NOTES CONTINUED

6. This test is required to confirm that no Used Lubricating Oil has been added. The specification limits the combined presence of zinc, phosphorus and calcium to 15, 15 and 30 mg/kg respectively. This implies that a fuel is deemed to contain ULO if all three limits are exceeded simultaneously. The referee test method to determine these elements is IP 501 "Determination of aluminium, silicon, vanadium, nickel, iron, calcium, zinc and phorphorus in residual fuel oil by ashing, fusion and inductively coupled plasma emission spectrometry", or IP 470 "Determination of aluminium, silicon, vanadium, nickel, iron, calcium, zinc and sodium in residual fuel oil by ashing, fusion and atomic absorption spectrometry" for zinc and calcium, and IP 500 "Determination of the phosphorus content of residual fuels by ultra-violet spectrometry" for phosphorus. If ULO is KNOWN not to be added to the Fuel Oil then these metals can be determined on a frequency basis – this refers to supply ex a Shell Group refinery only. Under all other circumastances then these elements must be tested and the result meet specified limits.
The same conditions apply for blending component in that if the FOBC is sourced from Shell Group Refinery then a frequency test can be used, however in all other situations the ULO metals must be measured.

Shell Eastern Petroleum (Pte) Limited

Pulau Bukom P.O. Box 1908 Singapore 903808 Company Reg No. 196000089G

Certificate of Quality

Product : FOTA2
Product Code : 5568FJ
Vessel : NIZON
Certificate No : 2006/000933

Sample No : 060009220
Destination : ONE OR MORE SAFE PORT(S) FIJI
Date : 19/03/2006

Properties	Unit	Sample Source / Batch Number / Method	Tank 113	
Density at 15 degree C	kg/L	ASTM D4052	0.9858	✓
Viscosity at 50 degree C	cSt	ASTM D445	169.4	✓
Sulphur content	%m	IP 336	3.53	✓
Pour point	deg C	ASTM D97	-9	✓
Ash content	%m	ASTM D482	0.019	✓
Flash point	deg C	ASTM D93B	75.0	✓
Water Content	%vol	ASTM D95	0.70	✗
Sediment content	%m	ASTM D473	0.01	✓
Neutralisation value: Strong acid number	mgKOH/g	ASTM D974	Nil	✓
Neutralisation value Total acid number	mgKOH/g	ASTM D664	0.12	✓
Vanadium	mg/kg	ASTM D5708B	70.8	✓
Lead content	mg/kg	PBM 138T	<1	✓
Calcium content	mg/kg	IP 501-CA	4	✓
Zinc content	mg/kg	IP 501-ZN	3	✓
Phosphorus content	mg/kg	IP 501-P	2	✓
Aluminium and Silicon	mg/kg	IP 377	34	✓
Conradson carbon residue	%m	ASTM D189	13.20	✓
Total sediment by hot filtration	%m	IP 375	0.03	✓
Accelerated Total Sediment	%m/m	IP 390-B	0.05	✓
HFTA & HFTE difference	%m/m	IP 390 / 375	0.02	✓
Calculated Carbon Aromaticity Index		CALCULATED	856	✓

CERTIFIED ORIGINAL

SECTION LEADER

Date: 19/3/06

Shell Eastern Petroleum (Pte) Ltd

PULAU BUKOM LABORATORY

ORIGINAL SIGNED
TAN BOON HIAN

Independent Petroleum Laboratory Limited

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LABORATORY TEST REPORT

Customer:	Shell Fiji Limited	Copy to:	Dave Jacobson Eroni Verevukivuki
Location:	Walu Bay	Reference:	-
Product:	Marine Fuel Oil	Lab Sequence Numbers:	211078
Source:	Tank 1	Report Reference:	RFLA 211078

The usual testing was carried out on a sample of Marine Fuel Oil (FO180) as detailed below:

		Sample Description:	**Tank #1**
		Date Drawn:	**6/04/06**
		IPL Sequence Number:	**211078**
TEST METHOD	**TEST**	**UNITS**	
ASTM D 4052	Density at 15°C	kg/L	0.9826
ASTM D 93A	Flash Point - P.M.C.C.	° C	68.5
ASTM D 445	Kinematic Viscosity @ 50°C	cSt	164.3
ASTM D 97	Pour Point	° C	-3
ASTM D 95	Water by Dean & Stark	% volume	<0.05
IP 375	Total Sediment Existent	% mass	<0.01
IP 375 & IP 390	Total Sediment Potential (Procedure A)	% mass	0.02

Report compiled by: _____ (Graham Bradbury) Dated : 13 April 2006

Report checked by: _____ (MaryAnne Tuhiwai) Dated : 13 April 2006

Notes:
This report relates specifically to the samples as received.
The latest issue of the relevant test methods was used unless otherwise stated.