

**APPENDIX A
FUEL SPECIFICATIONS**

Table A.1: ISO 8217 for Marine Distillate Fuels (1996)

Characteristic	Units	Limits	DMX	DMA	DMB	DMC
Density @ 15°C	kg/m	Max	--	890.0	900.0	920.0
Viscosity @ 40°C	mm ² /s	Min	1.40	1.50	--	--
	mm ² /s	Max	5.50	6.00	11.0	14.0
Flash Point	°C	Min	43	60	60	60
Pour Point, Winter	°C	Max	--	-6	0	0
Pour Point, Summer	°C	Max	--	0	6	6
Cloud Point	°C	Max	-16	--	--	--
Micro Carbon Residue on 10% Distillate Bottoms	%m/m	Max	0.30	0.30	--	--
Micro Carbon Residue	%m/m	Max	--	--	0.30	2.50
Ash	%m/m	Max	0.01	0.01	0.01	0.05
Sediment By Extraction	%m/m	Max	--	--	0.07	--
Total Sediment Existent	%m/m	Max	--	--	--	0.10
Water	% V/V	Max	--	--	0.3	0.3
Cetane Number	--	Min	45	40	35	--
Visual Inspection	--	--	Clear	Clear	--	--
Sulfur	%m/m	Max	1.0	1.5	2.0	2.0
Vanadium	mg/kg	Max	--	--	--	100
Aluminium & Silicon	mg/kg	Max	--	--	--	25

= No Specified Limit

Grade Description (As defined in ISO 8216, 1986): DMB: Distillate, General Purpose, may contain a trace of residuum. (Marine Diesel Oil)

Source: DNV, <http://www.dnv.com/maritime/fueltesting/fuelqualitytesting/ISO8217.asp>.

Table A.2: ISO 8217 for Marine Residual Fuels (1996)

Characteristic	Units	Limit	RMA 10	RMB 10	RMC 10	RMD 15	RME 25	RMF 25	RMG 35	RMH 35	RMK 35	RMH 45	RMK 45	RML 45	RMH 55	RMK 55	RML 55
Density @ 15°C	kg/m	Max	975	981	981	985	991	991	991	991	1010	991	1010	-	991	1010	-
Viscosity @ 100°C	mm ² /S	Max	10	10	10	15	25	25	35	35	35	45	45	45	55	55	55
Approx Viscosity @ 50°C *	mm ² /s		50	50	50	100	225	225	390	390	390	585	585	585	810	810	810
Flash Point	°C	Min	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
Pour Point, Winter	°C	MAX	0	24	24	30	30	30	30	30	30	30	30	30	30	30	30
Pour Point, Summer	°C	Max	6	24	24	30	30	30	30	30	30	30	30	30	30	30	30
Micro Carbon Residue	%m/m	Max	10	10	14	14	15	20	18	22	22	22	22	--	22	22	--
Ash	%m/m	Max	0.10	0.10	0.10	0.10	0.10	0.15	0.15	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Water	% V/V	Max	0.5	0.5	0.5	0.8	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sulfur	%m/m	Max	3.5	3.5	3.5	4.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Vanadium	mg/kg	Max	150	150	300	350	200	500	300	600	600	600	600	600	600	600	600
Aluminium & Silicon	mg/kg	Max	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Total Sediment Pot	%m/m	Max	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10

*Approximate Viscosity @ 50°C as indicated in ISO 82171996, Annex C.

-- = No Specified Limit

Source: DNV, <http://www.dnv.com/maritime/fueltesting/fuelqualitytesting/ISO8217.asp>.

Typical Fuel Specifications – Vancouver, Canada

Typical Product Specification

MDO Vancouver, B.C.

Density	0.875
Viscosity	3.4
Water	0.05%
Sulphur	0.4%
Ash	0.01
Pour Point	-8
Flash Point	68+

Conforms to ISO8217 DMB

Typical Product Specification

IF-180 Vancouver, B.C.

Density	0.9697
Viscosity	163
Water	0.10%
MCR	13.9
Sulphur	1.35%
Ash	0.06
Pour Point	LT -3
Flash Point	GT 70
Silicon	36
Aluminum	26
Sodium	25
Vanadium	44

We guarantee ISO8217 RME25 with max Vanadium 150 ppm and max Sodium 50 ppm.

Typical Product Specification

IF-380(RMG35) Vancouver, B.C.

Density	0.970
Viscosity	346
Water	LT 0.1%
MCR	13.5
Sulphur	1.25 %
Ash	0.03
Pour Point	-5c
Flash Point	83
Silicon	10
Aluminum	5
Sodium	13
Vanadium	53
TSP	LT 0.01

Source: ICS, March 2005



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PEMEX IF-180/DIESEL SPECIFICATION SHEET

The Intermediate fuel sold in Mexico is straight run product and should not contain many of the abrasive materials found in other fuels around the world where secondary processing is used. Mexican marine fuel products are derived from three domestic crude sources, namely: ISTMO, OLMECA and MAYA, and thus, as with many surrounding countries, (eg. Venezuela), the IF-180 has relatively high levels of Vanadium.

TYPICAL VALUES: PEMEX IF-180

Density @ 15°C	0.971
API Gravity @ 60°F	13.6
Kinematic Viscosity	174 cSt
Flash	85°C
Cloud	-10°C
CCR	13.91
Water & Sediment	0.10% vol
Sulphur	2.99% vol
Ash	0.06% vol
Sodium	2.89 ppm
Aluminum	0.88 ppm
Vanadium	270 ppm

TYPICAL VALUES: PEMEX DIESEL MARINO ESPECIAL

Density @ 15°C	0.829
API Gravity @ 60°F	38.4
Kinematic Viscosity	2.9 cSt
Flash	75°C
Cloud	-4°C
CCR	0.12
Water & Sediment	trace
Sulphur	0.44% vol

The values as stated above can be considered as applicable to all Mexican supply points on both Pacific and Gulf Coasts. Heavier or lighter grades may be blended upon request.

For further information, and/or most recent test results, contact ICS Petroleum Ltd. via the above listed numbers, or visit our web site at: www.icspet.com