

FIRST SCHEDULE

[Regulation 7]

FIRST SCHEDULE

[Regulations 2 and 8(3)(b)]

BUNKER FUELS**PART I**

High speed diesel (GAS OIL) 0.25% sulphur

Fuel oil HSFO 180 CST catalytic cracked product

Fuel oil HSFO 380 CST

Distillate Marine Fuels

Residual Marine Fuels

PART II – HIGH SPEED DIESEL (GAS OIL) 0.25% SULPHUR

Characteristics	Units	Limits	Test Methods
Visual appearance **	mg KOH/g	Clear + bright	
CETANE NUMBER		Min. 49	ASTM D 613-08
Acid number, strong	mg KOH/g	Max. NIL	ASTM D 974-08
Acid number, total	mg KOH/g	Max. 0.25	ASTM D 974-08
Ash	%W	Max. 0.01	ASTM D 482-07
Carbon residue, ramsbottom on 10% residue	%W	Max. 0.20	ASTM D 524-04
Cloud point	°C	Max. 15.5	ASTM D 2500-05 / D5771-05
Colour, ASTM		Max. 2.50	ASTM D 1500-07 / ASTM D 6045-04
Corrosion, copper strip 3h at 100°C		Max. No. 1	ASTM D 130-04
Distillation 50% recovered at	°C	To report	ASTM D 86-07b

Characteristics	Units	Limits	Test Methods
Distillation 90% recovered at	°C	Max. 366	
Distillation 95% recovered at	°C	Max. 385	
Flash point, PMC**	°C	Min. 66	ASTM D 93-08
Pour point	°C	Max. 6	ASTM D 97-08/D 5949-01
Density at 15°C**	Kg/L	Min. 0.82 Max. 0.860	ASTM D 1298-99 (2005) / D4052-96 (2002)
Sediment**	%W	Max. 0.01	ASTM D 473-07
Sulphur	%W	Max. 0.25	ASTM D - 4294-03
Viscosity, kinematic at 40°C	CST	Min. 2 Max. 4.5	ASTM D 445-06
Water	%V	Max. 0.05	ASTM D 4377-00(11)
Conductivity at 20°	Ps/m	Min. 75 Max. 350	D2624-07a
CFPP**	°C	Max. 0°C	IP309-99

**PART III – FUEL OIL HSFO 180 CST CATALYTIC
CRACKED PRODUCT**

Characteristics	Units	ISO/IP Methods	Min	Max
Density at 15°C**	Kg/L	IP 160-99		0.990
Kinematic viscosity at 50°C	CST	ISO 3104-1994		172.1
Sulphur content**	% (m /m)	ISO 8754-2003E		3.5
Pour point	°C	ISO 3016-1994E		15
Flash point (PMCC)**	°C	ISO 2719-2002E	64	
Water	% (v/v)	ISO 3733-1999		0.38

Characteristics	Units	ISO/IP Methods	Min	Max
Carbon residue	% (m/m)	ISO 10370-1993E		14.1
Ash	% (m/m)	ISO 6245-200IE		0.08
Vanadium	mg/kg	XTD ISO 10478-1994		194
Aluminium plus silicon	mg/kg	ISO 10478-1994		56
Total sediment, potential	% (m/m)	ISO 10307-2-1993E Procedure B		0.08
Total sediment, existent	% (m/m)	ISO 10307-1-1993		0.08
Total sediment, differential	% (m/m)	Calculations		0.05
Strong acid number	mg/KOH/g	ISO 6618-1997/IP139-98(2004)		NIL
Total acid number	mg/KOH/g	ISO 6619-1988/IP177-96(2004)		2.7
Zinc	mg/kg	IP 501-05 / ICP-MS		12
Phosphorous	mg/kg	IP 501-05 / ICP-MS		12
Calcium	mg/kg	IP 501-05 / ICP-MS		26
CCAI		Calculations		859
H2S (liquid phase)	PPM	ASTM D 7621-2010 or IP 570-2011		2

PART IV – FUEL OIL HSFO 380 CST

Characteristics	Units/ASTM test method	Typical values	Maximum values
Kinematic viscosity	mm ² /s at 50°C - D 445-06	225 to 380	380
Density**	Kg/L at 15°C - D 1298-99(2005) / D 4052-96 (2002)	0.98	0.99
Ash	% mass - D 482-07	0.05	0.1
Micro carbon residue	% mass - D 4530-07	16	19
Total sediment potential (TSP)	% mass - IP390-94 (2004) (Procedure B)	100	200
Vanadium	mg/kg (PPM) - AAS GF / IP 433-2000 (2010)	50	100
Sodium	mg/kg (PPM) ASTM D 1318-00 (2011)	3%	4%
Sulphur**	% mass - D 4294-03	3%	4%
Water content	% Volume - D 95-05	0.5	1
Flash point**	°C - D 93-08	66 (Min.)	-
Pour point*	°C-ASTM-D 5950-02 (2007)	9	21
Asphaltenes	% mass - IP 143- 04	-	14
Gross calorific value	KJ/kg - ASTM 4868-00 (2005)	42 000	-
CCAI		830	850
Al + Si	mg/kg - AAS GF	<10	30

* Pour point value preferably in multiples of 3

PART V – DISTILLATE MARINE FUELS

Characteristic	Unit	Limit	Category ISO-F-				Test method reference
			DMX	DMA	DMZ	DMB	
Kinematic viscosity at 40°C ^a	mm ² /s	max.	5,500	6,000	6,000	11,00	ISO 3104
		min.	1,400	2,000	3,000	2,000	
Density at 15C ^{0**}	kg/m ³	max.	-	890,0	890,0	900,0	see 7.1 ISO 3675 or ISO 12185
Cetane index	-	min.	45	40	40	35	ISO 4264
Sulphur ^{b**}	mass %	max.	1,00	1,50	1,50	2,00	see 7.2 ISO 8754 ISO 14596
Flash point ^{**}	°C	min.	43,0	60,0	60,0	60,0	see 7.3 ISO 2719
Hydrogen Sulfide	mg/kg	max.	2,00	2,00	2,00	2,00	see 7.11 IP 570
Acid number	mg KOH/g	max.	0,5	0,5	0,5	0,5	ASTM D664
Total sediment by hot filtration	mass %	max.	-	-	-	0,10 ^d	see 7.4 ISO 10307-1
Oxidation stability	g/m ³	max.	25	25	25	25 ^e	ISO 12205
Carbon residue: micro method on the 10% volume distillation residue	mass %	max.	0,30	0,30	0,30	-	ISO 10370
Carbon residue: micro method	mass %	max.	-	-	-	0,30	ISO 10370
Cloud point	°C	max.	-16	-	-	-	ISO 3015

Characteristic		Unit	Limit	Category ISO-F-				Test method reference
				DMX	DMA	DMZ	DMB	
Pour point (upper) ^c	winter quality	°C	max.	-	-6	-6	0	ISO 3016
	summer quality	°C	max.	-	0	0	6	ISO 3016
Appearance		-	-	Clear and bright ^h			d, e, f	see 7.6
Water		volume %	max.	-	-	-	0,30 ^d	ISO 3733
Ash		mass %	max.	0,010	0,010	0,010	0,010	ISO 6245
Lubricity, corrected wear scar diameter (wsd 1,4) at 60°C ^h		µm	max.	520	520	520	520 ^g	ISO 12156-1

a 1 mm²/s = 1 cSt.

b Notwithstanding the limits given, the purchaser shall define the maximum sulphur content in accordance with relevant statutory limitations. See Annex C.

c Purchasers should ensure that this pour point is suitable for the equipment on board, especially if the ship operates in cold climates.

d If the sample is not clear and bright, the total sediment by hot filtration and water tests shall be required, see 7.4 and 7.6.

e If the sample is not clear and bright, the test cannot be undertaken and hence the oxidation stability limit shall not apply.

f If the sample is not clear and bright, the test cannot be undertaken and hence the lubricity limit shall not apply.

g This requirement is applicable to fuels with a sulphur content below 500 mg/kg (0,050 mass %).

h If the sample is dyed and not transparent, then the water limit and test method as given in 7.6 shall apply.

Characteristic	Unit	Limit	Category ISO-F-												Test method reference		
			RMA		RMB		RMD		RME		RMG					RMK	
			10 ^a	30	80	180	380	500	700	180	380	500	700	380		500	700
Total sediment aged	mass %	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	see 7.5 ISO 10307-2
Carbon residue: micro method	mass %	max.	2,50	10,00	14,00	15,00	15,00	15,00	15,00	18,00	18,00	18,00	18,00	20,00	20,00	20,00	ISO 10370
Pour point (upper) ^e	winter quality	max.	0	0	30	30	30	30	30	30	30	30	30	30	30	30	ISO 3016
	summer quality	max.	6	6	30	30	30	30	30	30	30	30	30	30	30	30	ISO 3016
Water	volume %	max.	0,30	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	ISO 3733
Ash	mass %	max.	0,040	0,070	0,070	0,070	0,070	0,070	0,070	0,100	0,100	0,100	0,100	0,150	0,150	0,150	ISO 6245
Vanadium	mg/kg	max.	50	150	150	150	150	150	150	350	350	350	350	450	450	450	see 7.7 IP 501, IP 470 or ISO 14597
Sodium	mg/kg	max.	50	100	100	100	100	100	100	100	100	100	100	100	100	100	see 7.8 IP 501 IP 470

Characteristic	Unit	Limit	Category ISO-F-								Test method reference			
			RMA	RMB	RMD	RME	RMG			RMK				
			10*	30	80	180	180	380	500	700		380	500	700
Aluminium plus silicon	mg/kg	max.	25	40	40	50		60						see 7.9 IP 501, IP 470 or ISO 10478
Used lubricating oils (ULO): -calcium and zinc; or -calcium and phosphorus	mg/kg	-	The fuel shall be free from ULO. A fuel shall be considered to contain ULO when either one of the following conditions is met: - calcium>30 and zinc>15; or - calcium>30 and phosphorus>15								see 7.10 IP 501 or IP 470 IP 500			

a This category is based on a previously defined distillate DMC category that was described in ISO 8217:2005, Table 1. ISO 8217:2005 has been withdrawn.

b 1 mm²/s = 1cSt.

c The purchaser shall define the maximum sulphur content in accordance with relevant statutory limitations. See 0.3 and Annex C.

d See Annex H

e Purchasers shall ensure that this pour point is suitable for the equipment on board, especially if the ship operates in cold climates.

** The results of tests for these characteristics should be submitted to the Director General before clearance is granted.