

## Residual Marine Fuels & Distillate Marine Fuels - ISO 8217: 2005(E)

PARAMETER	UNIT	LIMIT	MF 380CST			MF 180CST		MDO		MGO	
			RMG380	RMH380	RMK380	RME180	RMF180	DMB	DMC	DMX	DMA
Density at 15 °C	kg/m <sup>3</sup>	max	991.0		1010.0	991.0		900.0	920.0	-	890.0
Viscosity at 40 °C	mm <sup>2</sup> /s <sup>a</sup>	max						11.0	14.0	5.5	6.0
		min						-	-	1.4	1.5
Viscosity at 50 °C	mm <sup>2</sup> /s	max	380.0			180.0					
Water	% v/v	max	0.5			0.5		0.3	0.3	-	-
Micro Carbon Residue at 10% residue	% m/m	max						-	-	0.3	0.3
Micro Carbon Residue	% m/m	max	18	22		15	20	0.3	2.5	-	
Sulfur <sup>c</sup>	% m/m	max	4.5			4.5		2.0	2.0	1.0	1.5
Ash	% m/m	max	0.15			0.1	0.15	0.01	0.15	0.01	0.01
Vanadium	mg/kg	max	300	600		200	500	-		-	-
Flash point	°C	min	60			60		60	60	43	60
Pour point <sup>b</sup>	summer	°C	30			30		6	6	-	0
	winter	°C	30			30		0	0	-	-6
Aluminium + silicon	mg/kg	max	80			80		-	25	-	-
Total sediment (Existent)	% m/m	max						0.1		-	-
Total sediment (Potential)	% m/m	max	0.1			0.1					
Cloud point	°C	max						-	-	-16	-
Calculated Centane Index		min						35	-	45	40
Appearance								-	-	Clear & Bright	
Zinc <sup>d</sup>	mg/kg	max	15					-	15	-	
Phosphorus <sup>d</sup>	mg/kg	max	15					-	15	-	
Calcium <sup>d</sup>	mg/kg	max	30					-	30	-	

a. Annex C gives a brief viscosity/temperature table, for information purposes only. 1mm<sup>2</sup>/sa = 1cSt

b. Purchasers should ensure that this pour point is suitable for the equipment on board, especially if the vessel operates in both the northern and southern hemispheres.

c. A sulfur limit of 1.5% (m/m) will apply in Sox emission control areas designated by the international Maritime Organization, when its relevant protocol comes into force. There may be local variations.

d. A fuel shall be considered to be free from ULO if one of more of the elements zinc, phosphorus and calcium are below or at the specified limits. All three elements shall exceed the same limits before a fuel shall be deemed to contain ULO.

# Residual Marine Fuels - ISO 8217: 2010(E)

Characteristic	Unit	Limit	Category ISO-F-											Test method reference	
			RMA	RMB	RMD	RME	RMG				RMK				
			10 <sup>a</sup>	30	80	180	180	380	500	700	380	500	700		
Kinematic viscosity at 50 °C <sup>b</sup>	mm <sup>2</sup> /s	max	10,00	30,00	80,00	180,0	180,0	380,0	500,0	700,0	380,0	500,0	700,0	ISO 3104	
Density at 15°C	kg/m <sup>3</sup>	max	920,0	960,0	975,0	991,0	991,0				1010,0			see 7.1 ISO 3675 or ISO 12185	
CCAI	-	max	850	860	860	860	870				870			see 6.3 a)	
Sulfur <sup>c</sup>	mass%	max	Statutory requirements											see 7.2 ISO 8754 ISO 14596	
Flash point	°C	min	60,0	60,0	60,0	60,0	60,0				60,0			see 7.3 ISO 2719	
Hydrogen sulfide <sup>d</sup>	mg/kg	max	2,00	2,00	2,00	2,00	2,00				2,00			IP 570	
Acid number <sup>e</sup>	mg KOH/g	max	2,5	2,5	2,5	2,5	2,5				2,5			ASTM D664	
Total sediment aged	mass%	max	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	18,00				20,00			ISO 10370	
Pour point (upper) <sup>f</sup>	winter quality	°C	max	0	0	30	30	30				30			ISO 3016
	summer quality	°C	max	6	6	30	30	30				30			ISO 3016
Water	volume %	max	0,30	0,50	0,50	0,50	0,50				0,50			ISO 3733	
Ash	mass%	max	0,040	0,070	0,070	0,070	0,100				0,150			ISO 6245	
Vanadium	mg/kg	max	50	150	150	150	350				450			see 7.7 IP 501, IP 470 or ISO 14597	
Sodium	mg/kg	max	50	100	100	50	100				100			see 7.8 IP 501 IP 470	
Aluminium plus silicon	mg/kg	max	25	40	40	50	60				60			see 7.8 IP 501 IP 470	

a. 1mm<sup>2</sup>/s=1cSt

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

c. Due to reasons stated in Annex D, the implementation date for compliance with the limit shall be 1 July 2012.

Until such time, the specified value is given for guidance. For distillate fuels the precision data are currently being developed.

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

e. 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

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

## Distillate Marine Fuels - ISO 8217: 2010(E)

Characteristics	Unit	Limit	Category ISO-F-				Test method reference	
			DMX	DMA	DMZ	DMB		
Kinematic viscosity at 40 °C <sup>a</sup>	mm <sup>2</sup> /s	max	5,550	6,000	6,000	11,00	ISO 3104	
		min	1,400	2,000	3,000	2,000		
Density at 15 °C	kg/m <sup>3</sup>	max	-	890,0	890,0	900,0	see 7.1 ISO 3675 or ISO 12185	
Centane index	-	min	45	40	40	35	ISO 4264	
Sulfur <sup>b</sup>	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 <sup>c</sup>	mg/kg	max	2,00	2,00	2,00	2,00	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 <sup>e</sup>	see 7.4 ISO 10307-1	
Oxidation stability	g/m <sup>3</sup>	max	25	25	25	25 <sup>f</sup>	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	
Pour point (upper) <sup>d</sup>	winter quality	°C	max	-6	-6	-6	0	ISO 3016
	summer quality	°C	max	0	0	0	6	ISO 3016
Appearance	-	-	Clear and bright <sup>j</sup>			e, f, g	see 7.6	
Water	volume %	max	-	-	-	0,30 <sup>e</sup>	ISO 3733	
Ash	mass%	max	0,010	0,010	0,010	0,010	ISO 6245	
Lubricity, corrected wear scar diameter	µm	max	520	520	520	520 <sup>g</sup>	ISO 12156-1	

a. 1mm<sup>2</sup>/s=1cSt

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

c. Due to reasons stated in Annex D, the implementation date for compliance with the limit shall be 1 July 2012. Until such time, the specified value is given for guidance. For distillate fuels the precision data are currently being developed.

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

e. 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

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

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

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

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

## Residual & Distillate Marine Fuels - ISO Fuel Standard 8217:2017 (E)

Parameter	Unit	Limit	IF500		IF380		IF180		MGO		
			RMG500	RMK500	RMG380	RMK380	RME180	RMG180	DMA/DFA*	DMX	
Density - at 15°C	kg/m <sup>3</sup>	max	991	1010	991	1010	991		890	-	
Viscosity - at 50°C - at 40°C	mm <sup>2</sup> /s	max	500		380		180		-	-	
		min/max	-		-		-	-	2.0/6.0	1.4/5.5	
CCAI	-	max	870		870		860	870	-	-	
Flash Point	°C	min	60		60		60		60	43	
Pour Point - Winter - Summer	°C	max	30		30		30		-6	-	
			30		30		30		0	-	
Carbon Residue - Micro Method - Micro Method	mass%	max	18	20	18	20	15	18	-	-	
			-	-	-	-	-	-	-	-	
Carbon Residue - Micro Method on 10%	mass%	max	-	-	-	-	-	-	0.3		
Ash	mass%	max	0.1	0.15	0.1	0.15	0.07	0.1	0.01		
Water	volume %	max	0.5		0.5		0.5		-	-	
Sulfur	mass%	max								1.0 *	1.0
Vanadium	mg/kg	max	350	450	350	450	150	350	-	-	
Sodium	mg/kg	max	100		100		50	100	-	-	
Sediment - Total Sediment Aged - Total Sediment by Hot Filtration	mass%	max	0.1		0.1		0.1		-	-	
			-	-	-	-	-	-	-	-	
Aluminium plus Silicon	mg/kg	max	60		60		50	60	-	-	
Hydrogen Sulfide	mg/kg	max	2.0		2.0		2.0		2.0		
Acid Number	mg KOH/g	max	2.5		2.5		2.5		0.5		
Oxidation Stability	g/m <sup>3</sup>	max	-	-	-	-	-	-	25		
Fatty Acid Methyl Ester (FAME)*	volume %	max	-	-	-	-	-	-	- / 7.0 *	-*	
Lubricity	µm	max	-	-	-	-	-	-	520		
Cetane Index	-	min	-	-	-	-	-	-	40	45	
Cloud Point* - Winter* - Summer*	°C	max	-		-		-		report *	-16 *	
			-		-		-		-*	-16 *	
Cold Filter Plugging Point* - Winter* - Summer*	°C	max	-		-		-		report *	-*	
			-		-		-		-*	-*	
Appearance	-	-	-	-	-	-	-	-	Clear and Bright		
Used Lubricating Oil (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								

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\* Denotes changes to the last edition

