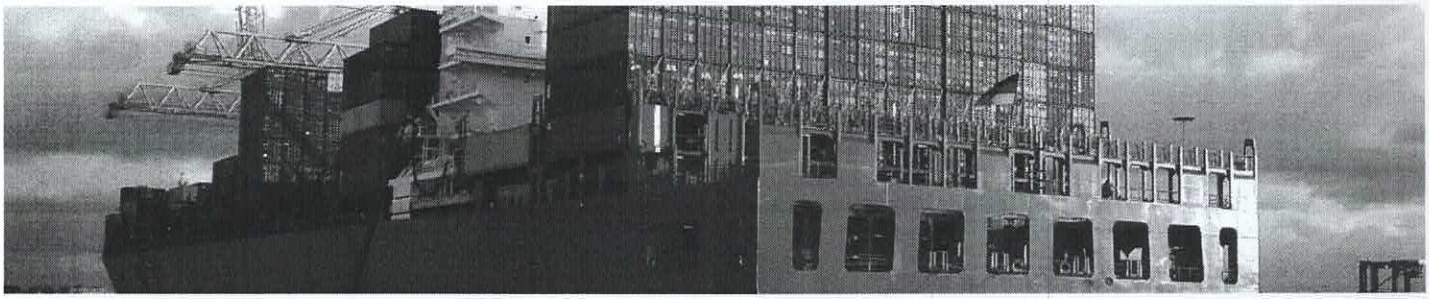

ISO 8217 2017 FUEL STANDARD

ISO 8217 2017 Fuel Standard for marine residual fuels

REQUIREMENTS FOR MARINE RESIDUAL FUELS

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	
Kinematic viscosity at 50 °C		mm²/s [a]	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/m³	Max	920,0	960,0	975,0	991,0	991,0				1010,0			ISO 3675 or ISO 12185; see 6.1
CCAI		–	Max	850	860	860	860	870				870			see 6.2
Sulfur [b]		mass %	Max	Statutory requirements											ISO 8754 or ISO 14596 or ASTM D4294; see 6.3
Flash point		°C	Min	60,0	60,0	60,0	60,0	60,0				60,0			ISO 2719; see 6.4
Hydrogen sulfide		mg/kg	Max	2,00	2,00	2,00	2,00	2,00				2,00			IP 570; see 6.5
Acid number [c]		mg KOH/g	Max	2,5	2,5	2,5	2,5	2,5				2,5			ASTM D664; see 6.6
Total sediment – Aged		mass %	Max	0,10	0,10	0,10	0,10	0,10				0,10			ISO 10307-2; see 6.9
Carbon residue – Micro method		mass %	Max	2,50	10,00	14,00	15,00	18,00				20,00			ISO 10370
Pour point (upper) [d]	winter	°C	Max	0	0	30	30	30				30			ISO 3016
	summer	°C	Max	6	6	30	30	30				30			
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			IP 501, IP 470 or ISO 14597; see 6.14
Sodium		mg/kg	Max	50	100	100	50	100				100			IP 501, IP 470; see 6.15
Aluminium plus silicon		mg/kg	Max	25	40	40	50	60				60			IP 501, IP 470 or ISO 10478; see 6.16
Used lubricating oil (ULO): – Calcium and zinc; or – Calcium and phosphorus		mg/kg	–	Calcium > 30 and zinc > 15 or Calcium > 30 and phosphorus > 15											IP 501 or IP 470, IP 500; see 6.17

a 1 mm²/s = 1 cSt.
b The purchaser shall define the maximum sulfur content in accordance with relevant statutory limitations. See Introduction.
c See Annex E.
d Purchasers should confirm that this pour point is suitable for the ship's intended area of operation.

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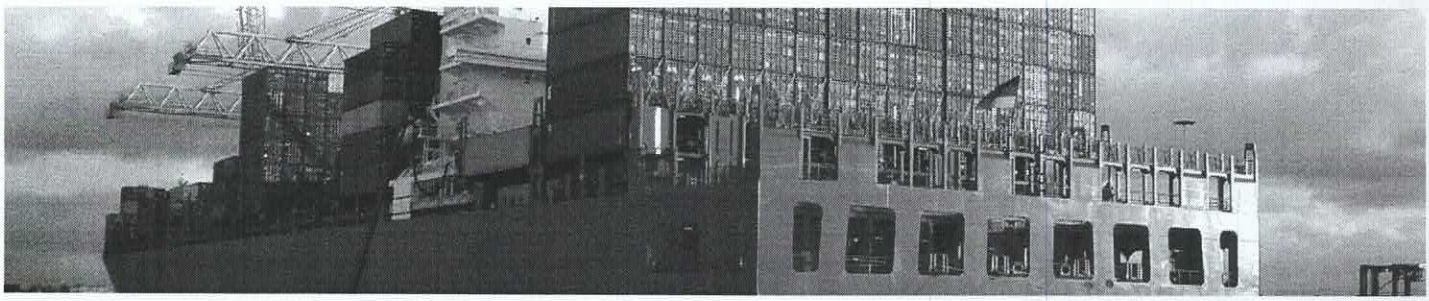

ISO 8217 2017 FUEL STANDARD

ISO 8217 2017 Fuel Standard for marine distillate fuels

REQUIREMENTS FOR MARINE DISTILLATE FUELS

Characteristic		Unit	Limit	Category ISO-F-							Test method(s) and references
				DMX	DMA	DFA	DMZ	DFZ	DMB	DFB	
Kinematic viscosity at 40 °C		mm^2/s [a]	Max	5,500	6,000		6,000		11,00		ISO 3104
			Min	1,400	2,000		3,000		2,000		
Density at 15 °C		kg/m^3	Max	–	890,0		890,0		900,0		ISO 3675 or ISO 12185; see 6.1
Cetane index		–	Min	45	40		40		35		ISO 4264
Sulfur [b]		mass %	Max	1,00	1,00		1,00		1,50		ISO 8754 or ISO 14596, ASTM D4294; see 6.3
Flash point		°C	Min	43,0	60,0		60,0		60,0		ISO 2719; see 6.4
Hydrogen sulfide		mg/kg	Max	2,00	2,00		2,00		2,00		IP 570; see 6.5
Acid number		mg KOH/g	Max	0,5	0,5		0,5		0,5		ASTM D664; see 6.6
Total sediment by hot filtration		mass %	Max	–	–		–		0,10 [c]		ISO 10307-1; see 6.8
Oxidation stability		g/m^3	Max	25	25		25		25 [d]		ISO 12205
Fatty acid methyl ester (FAME) [e]		volume %	Max	–	–	7,0	–	7,0	–	7,0	ASTM D7963 or IP 579; see 6.10
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 [f]	winter	°C	Max	–16	report		report		–		ISO 3015; see 6.11
	summer	°C	Max	–16	–		–		–		
Cold filter plugging point [f]	winter	°C	Max	–	report		report		–		IP 309 or IP 612; see 6.11
	summer	°C	Max	–	–		–		–		
Pour point (upper) [f]	winter	°C	Max	–	– 6		– 6		0		ISO 3016; see 6.11
	summer	°C	Max	–	0		0		6		
Appearance				Clear and Bright [g]					[c]		see 6.12
Water		volume %	Max	–	–		–		0,30 [c]		ISO 3733
Ash		mass %	Max	0,010	0,010		0,010		0,010		ISO 6245
Lubricity, corrected wear scar diameter (WSD) at 60 °C [h]		µm	Max	520	520		520		520 [d]		ISO 12156-1

a 1 mm^2/s = 1 cSt.
b Notwithstanding the limits given, the purchaser shall define the maximum sulfur content in accordance with relevant statutory limitations. See Introduction.
c If the sample is not clear and bright, the total sediment by hot filtration and water tests shall be required, see 6.8 and 6.12.
d If the sample is not clear and bright, the test cannot be undertaken and therefore, compliance with this limit cannot be shown.
e See 5.1 and Annex A.
f Pour point cannot guarantee operability for all ships in all climates. The purchaser should confirm that the cold flow characteristics (pour point, cloud point, cold filter, plugging point) are suitable for the ship's design and intended voyage. See 6.11.
g If the sample is dyed and not transparent, then the water limit and test method as given in 6.12 shall apply.
h This requirement is applicable to fuels with a sulfur content below 500 mg/kg (0,050 mass %).

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TABLE
The Characteristics and Requirements and Test Methods for Diesel Fuel (GAS OIL)

S. No.	Property	Units	Limits	Test Method
1.	Appearance	-	Clear	Visual
2.	Colour, ASTM	-	2.0 Max.	UAE.S GSO ISO 2049, ASTM D1500 ASTM D6045, IP196
3.	Ash	% (m/m)	0.010 Max.	UAE.S GSO 129, ASTM D482, ISO 624
4.	Gross Calorific Value	kcal/kg	Report	ASTM D4868
5.	Micro Method Carbon Residue, (on 10% Distillation Residue)	% (m/m)	0.20 Max.	UAE.S GSO ISO10370,UAE.S GSO ISO 1171, ASTM D4530
6.	Acid Number – Strong Acid Number -- Total	mg KOH/g	Nil Max. 0.10 Max.	UAE.S GSO 1075, ASTM D 974, ASTM D664
7.	Cetane Index, Calculated	-	50.0 Min.	UAE.S GSO ISO 4264/2008, ASTM D976, ASTM D4737
8.	Corrosion, Copper Strip (3h at100°C)	rating	1 Max.	UAE.S GSO ASTM D130, UAE.S GSO ISO 2160,
9.	Density at 15 °C	kg/l	0.8200 Min 0.8450 Max	UAE.S GSO ISO 3675, UAE.S GSO ISO 12185, ASTM D4052, ASTM D1298
10.	Sulphur, Total (ppm / mg/kg)		10.0 Max.	UAE.S GSO ISO 20884, UAE.S GSO ISO 20846, UAE.S GSO ISO 13032, ASTM D5453, ASTM D2622, ASTM D4294
11.	Distillation, 95 % (V/V) recovered at	°C	360 Max.	UAE.S GSO ISO 3405, ASTM D86, D7345, ASTM D7344 UAE.S GSO ISO 3924,
12.	Flash Point, PMCC	°C	65.0 Min.	UAE.S GSO ISO 2719, ASTM D93
13.	Pour Point	°C	Report	UAE.S GSO ISO 3016, ASTM D97, ASTM D5949, ASTM D5950, ASTM D5771
14.	Cloud Point	°C	Report	ASTM D2500, ASTM D5771, ASTM D5773
15.	CFPP	°C	Summer +12°C Max Winter +5°C Max	ASTMD 6371, IP 309
16.	Water and Sediment	% (V/V)	0.050 Max.	ASTM D2709
17.	Kinematic Viscosity at 40°C	mm^2/s	2.000 - 4.500	UAE.S GSO ISO 3104, ASTM D445, ASTM D7042
18.	Poly Aromatic Hydrocarbon (PAH)	% (m/m)	8.0 Max.	EN 12916, IP 391, ASTM D6591, ASTM D5186
19.	Lubricity, wear scar diameter (WSD) at 60°C	µm	460 Max.	UAE.S GSO ISO 12156-1 ASTM D6079, IP 450
20.	Oxidation Stability, total insoluble	g/m^3	25.0 Max.	ASTM D2274, UAE.S GSO ISO 12205
21.	Conductivity at 20°C	pS/m	50 Min	ASTM D2624

Note 1) No methylcyclopentadienyl manganese tricarbonyl (MMT) allowed to be add, (see also Clause 4). The MMT limited via a manganese content is 2.0 mg/kg Max.

Note 2) if biodiesel is adding to diesel fuel FAM content is 7 Max. % (V/V), Biodiesel B100 added shall meet the requirements of UAE Standard no. UAE.S 5023: 2018 + Amd 1: 2020

1.	Ester content	% mass	Report	EN 14103
2.	Density at 15 °C	kg/m^3	Report	UAE.S GSO ISO 3675 ASTM D4052
3.	Kinematic Viscosity[B] at 40°C	mm^2/s	1.9-6.0	UAE.S GSO ISO 3104, ASTM D445
4.	Flashpoint	°C	93 min.	UAE.S GSO ISO 3679, ASTM D93
5.	Sulfur content	% mass	0.0010 max.	ASTM D5453/D2622
6.	Distillation (AET) 90 % recovered	°C	360 max.	ASTM D1160
7.	Carbon residue[C] (100%) or Carbon residue (10%)	% mass	0.05 max. -	ASTM D4530
8.	Cetane number		47 min.	UAE.S GSO ISO 5165, ASTM D613
9.	Sulfated ash	% mass	0.02 max.	UAE.S GSO ISO 3987, ASTM D874
10.	Water and sediment	% volume	0.05 max.	UAE.S GSO ISO 12937, ASTM D2709
11.	Cloud point [D]	°C	Report	ASTM D2500
12.	Copper corrosion		No.3	UAE.S ASTM D130
13.	Acid number	mgKOH/g	0.50 max.	EN 4104, ASTM D664
14.	Oxidation stability	hrs.	3 min.	EN 14112 , EN 15751
15.	Methanol content	% mass	0.2 max.	EN 14110
16.	Monoglyceride content	% mass	0.40	ASTM D6584 EN 14105
17.	Free glycerol content	% mass	0.020 max.	ASTM D6584 EN 14105
18.	Total glycerol content	% mass	0.240 max.	ASTM D6584 EN 14105
19.	Na+K	mg/kg	5 max.	EN 14108 EN 14109, EN 14538
20.	Ca+Mg	mg/kg	5 max.	EN 14538
21.	Phosphorous content	mg/kg	10 max.	UAE.S ASTM D4951, ASTM D3231

A- The test methods indicated are the approved referee methods.
B - For some engines it may be advantageous to specify a minimum viscosity because of power loss due to injection pump and injector leakage. The 6.0 mm_2/s upper viscosity limit is higher than petroleum based diesel fuel and should be taken into consideration when blending.
C - Carbon residue shall be run on the 100 % sample. A 100% sample shall replace the 10 % residual, with percent residue in the original sample reported using the 10 % residual calculation.
D - The cloud point of biodiesel is generally higher than petroleum based diesel fuel and should be taken into consideration when blending.

Main References

EN 590-2013+A1-2017 Automotive fuels - Diesel - Requirements and test methods

ASTM D975 - 19 Standard Specification for Diesel Fuel