

Heavy Fuel Oil

The engine together with proper external feed system can be operated on heavy fuel oil of viscosity up to 700 cSt at 50 °C, which corresponds to the grades of CIMAC H700 (CIMAC Recommendation No. 21, 2003). However, the fuel should be cleaned and preheated before entering the engine with following specifications at least.

Diesel Fuel Oil

The quality requirements for MDO shall be in accordance with CIMAC DA, DB, DC grade. If the engine is run on blended MDO(A-bunker diesel), i.e. CIMAC DC grade, a centrifugal treatment system should be prepared. For reference, specification for CIMAC DA, DB and DC is as follows:

Properties	Unit	Limit	HFO (CIMAC H700)	MGO (CIMAC DA)	MDO	
					(CIMAC DB)	(CIMAC DC)
Kinematic viscosity	mm ² /s(cSt)	max	700 at 50 °C 12.0 ~18.0 ^(B)	1.5 ~ 6.0 at 40 °C 2.0 ~ 14.0 ^(B)	2.5 ~ 11.0 at 40 °C 2.0 ~ 14.0 ^(B)	4.0 ~ 14.0 at 40 °C 2.0 ~ 14.0 ^(B)
Density at 15 °C	kg/m ³	max	991.0 1010.0 ^(A)	890.0	900.0	920.0
Flash point	°C	min	60	60	60	60
Pour point (Winter quality)	°C	max	30	-6	0	0
Carbon Residue	% mass	max	22 15 ^(B)	0.30 ^(C)	0.30	2.5
Asphaltenes	% mass	max	8	-	-	-
Ash	% mass	max	0.15 0.03 ^(B)	0.01 0.01 ^(B)	0.03 0.03 ^(B)	0.03 0.03 ^(B)
Total sediment, potential	% mass	max	0.10	-	-	-
Total sediment, existent	% mass	max	-	0.10	0.10	0.10
Water	% volume	max	0.5 0.2 ^(B)	-	0.3 0.2 ^(B)	0.3 0.2 ^(B)
Sulfur ^(D)	% mass	max	4.50 3.50 ^(B)	1.50	2.00	2.00
Cetane index	-	min	-	40	35	-
Vanadium	mg/kg	max	600 150 ^(B)	-	-	100
Sodium	mg/kg	max	100 30 ^(B)	-	-	50 30 ^(B)
Aluminum+Silicon	mg/kg	max	80 15 ^(B)	-	-	25 15 ^(B)
Solid Particles	mg/kg	max	20 ^(B)	20 ^(B)	20 ^(B)	20 ^(B)
	μm	max	5 ^(B)	5 ^(B)	5 ^(B)	5 ^(B)

(A) : Adequate purifying equipment for high density is required.

(B) : Limited value before engine inlet for operation.

(C) : 10% volume distillation bottoms

(D) : A sulfur limit of 1.5% m/m will apply in SO_x Emission Control Areas designated by the IMO, when its relevant Protocol comes into force. There may be local variations.

Note 1: The following kinds of fuel are not to be used:

- 1) Bunker fuel including cat-fines
- 2) Bunker fuel including land-used lubricating oil waste
- 3) Bunker fuel including alkylation bottom oil (total acid<3, strong acid=0)

Note 2: Additional properties are specified by the engine manufacturer, which are not included in the CIMAC fuel quality. (CIMAC Recommendation No. 21, 2003)