

Service Information


Caterpillar Motoren GmbH & Co. KG product support information for medium-speed engines

Engine platform: All	Engine type: MDO / HFO	No. 0030com - Issue 1; Mar. 28, 2024
Engine section: Fuel System	Validity: February 2025	

Action: For your information

Biofuels

In this "Service Information", we would like to inform you that we have updated the chapter „Ignition Oil“ and added the chapter "Biofuels" to our **Operating Media** Manual (*Chapter 4*). The information in this Service Information corresponds to the status on the date of publication and has been incorporated into the current **Operating Media** Manual. Minor updates are not communicated separately. We therefore recommend to always use the latest documents. The latest manuals can be requested from your authorized **Caterpillar** dealer.



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VD8836

Inert gas specification for DF engines

Gas temperature upstream of engine in-	°C	0 - 60
Minimum inert gas pressure	bar(g)	8
Maximum inert gas pressure	bar(g)	10
Allowed gases	-	Nitrogen >= 95 %
	-	Carbon dioxide 2.5
Maximum sulphur content as H ₂ S	%	0.05 (= 770 mg/mn ³)
Maximum ammonia content	mg/m ³	25
Maximum fluorine content	mg/m ³	Σ=50
Maximum chloride content	mg/m ³	
Maximum oil content	mg/m ³	50
Maximum particle content	mg/m ³	50
Maximum particle size	µm	5
Maximum dew point	°C	-20



3.16 Ignition Oil

Property	ISO test category	Test
Fuel type	DMA/DFA & DMZ/DFZ	ISO 8217:2017*
Max. particle contamination	25/20/20**	ISO 4406

* The use of other fuels requires the prior agreement of Caterpillar.

** If the indicated limit value is exceeded, a significant reduction in service life of the components in the ignition oil system has to be expected.



ATTENTION

Biofuels have no approval to be used as ignition oil.

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3.17 Biofuels

3.17.1 Introduction

In the light of the industry's decarbonization targets, the demand for alternative fuels is also increasing in the marine sector in order to meet legal requirements. Biofuels alone will not suffice to meet the required targets, but they can make a contribution.

This document outlines key considerations for the use of biofuels.

3.17.2 Type of Biofuels

FAME

The biofuel, or biodiesel, FAME (fatty acid methyl ester) known from the automotive industry is specified in EN 14214. A diverse range of renewable raw materials, including vegetable oil, used cooking oil and animal fat, can be utilized for the production of FAME.

A biofuel made from 100 % FAME is also known as B100. FAME can be mixed with conventional diesel fuel and is frequently blended with ISO 8217-compliant fossil diesel fuel in the marine sector. The mixing ratio determines the designation; for instance, B20 denotes a blend with 20 % FAME, while B30 indicates a blend with 30 % FAME.

Caterpillar's medium-speed diesel engines are compatible with B100 or any mixing ratio, provided that the mixing component adheres to standard ISO 8217.

HVO

HVO (hydrotreated vegetable oil) is a renewable diesel standardized under EN 15940, which is primarily derived from biological residues and waste materials through synthesis or hydrotreatment processes. The production process generates paraffinic hydrocarbons closely resembling those present in fossil diesel.

HVO can be used as a fuel in Caterpillar medium-speed diesel engines.

Other Biofuels with Minimum Requirement According to VD8712

Due to the large number of different raw materials and processes that can be used to produce biofuels, Caterpillar Motoren GmbH & Co. KG has developed an internal standard, VD8712, to accommodate biofuels not covered by the previously mentioned categories. VD8712 outlines the minimum requirements for fuels suitable for use in medium-speed diesel engines from Caterpillar Motoren GmbH & Co. KG. Please contact your Caterpillar dealer before using fuels of this type.

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3.17.3 Fuel Properties

Density and calorific value

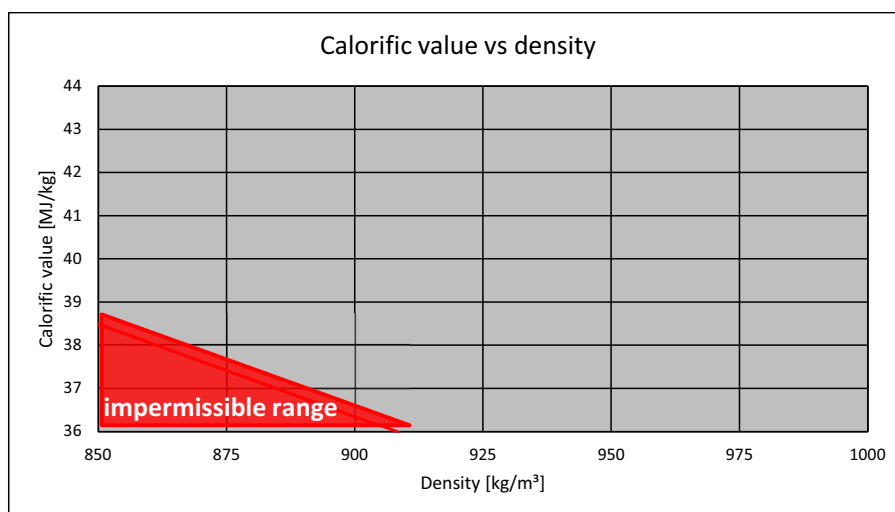
The maximum power output of the engine and the volumetric fuel consumption are significantly influenced by the fuel density and the calorific value. The following table lists typical values for diesel fuel (DMA), FAME and HVO.

Property	Unit	DMA (ISO 8217)	FAME (EN 14214)	HVO (EN 15940)
Density	kg/m ³	... 890	860 ... 900	765 ... 810
Calorific value	MJ/kg	42	36	44

FAME has a calorific value that is up to 15 % lower than DMA, leading to increased fuel consumption. More fuel is required for the same amount of energy. Typically, the engines provide ample control reserve to continue utilising the engine's full power.

HVO generally has a slightly higher calorific value than diesel fuel, but its density is slightly lower, resulting in a volumetric calorific value that hardly differs.

The product of calorific value (MJ/kg) and density (kg/m³) must be at least 32,700 MJ/m³. If the value is lower, the power output of the engine may be reduced.



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Cold properties

The cold properties of FAME can vary significantly, influenced by both the raw material and the production process. Depending on the fuel quality, fuel preheating may be necessary. Cloud point and CFPP are crucial for evaluating the cold properties.

The cloud point is the temperature at which the fuel begins to cloud due to the formation of crystals.

The CFPP (cold filter plugging point) describes the temperature at which the filter becomes clogged due to precipitation.

As HVO has similar cold properties to DMA, it does not require any special handling.

Property	Unit	DMA (ISO 8217)	FAME (EN 14214)	HVO (EN 15940)
Cloud point	°C		-3 ... +16	-34 ... -10
CFPP	°C		-10 ... +13	-44 ... +5

Flash point

Property	Unit	DMA (ISO 8217)	FAME (EN 14214)	HVO (EN 15940)
Flash point	°C	> 60	> 101	> 55

According to SOLAR regulations, a minimum flash point of 60 °C is required for marine fuels. As EN 15940 permits a minimum flash point of 55 °C, the flash point should be specified during procurement.

Storage

Due to the similarity of HVO and fossil diesel fuel, no special precautions are required when using HVO.

Before filling FAME for the first time, both the storage tank and the day tank should be cleaned to minimise possible deposits. Due to its cleaning effect, FAME tends to dissolve deposits and dirt, which then enter the fuel system, potentially causing clogged filters or damage to the fuel system.

It is important to ensure that free water in the tank is drained regularly. The presence of water in FAME can lead to microbial growth and acid formation, which can have a negative impact on the service life of the injection components.

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The thermal and oxidation stability of FAME must be taken into account. In addition to increasing acidity, deposits can also form, leading to clogged filters. Fuels that contain FAME should therefore not be stored for longer than six months and should be used up quickly. Excessive heating of the biofuel must be avoided.

Use at the engine

When using biofuels, engine lubricating oils that are approved for use with distillate fuels must be used. A base number of 30 has proven to be positive.

When using FAME, employing a separator is advisable to eliminate any slurry, impurities or degradation products from the fuel. Depending on the fuel quality, fuel preheating may be necessary to prevent wax formation and maintain the required viscosities.

Emission regulations

Fuels used in marine diesel engines must comply with the requirements of "MARPOL Annex VI, Regulation 18 Fuel Oil Quality".

According to the regulations, fuel mixtures with up to 30 % biofuel content are approved for use. In accordance with the IMO's "MEPC.1/Circ.795/Rev.8" letter, it is generally assumed that marine diesel engines certified in accordance with MARPOL Annex VI Regulation 13 may use fuels without requiring onboard emissions testing if the biofuel content exceeds 30 %.

There is no need to apply an exemption under Regulation 3 of MARPOL Annex VI to consider the use of biofuels and there is no need to follow the equivalence procedure under Regulation 4 of MARPOL Annex VI.

To prove that biofuels do not cause an engine to exceed the applicable NOx emission limit, a self-test according to the onboard verification procedure (to be found in the engine-specific technical file) is sufficient.