



BP advancing the energy transition: MARPOL 2020

Technical Guide for 0.50% Sulphur Marine Fuel

The MARPOL legislative changes being introduced on 1 January 2020 mean that ships operating outside Emission Control Areas (ECAs) will have three options to achieve compliance, either by the use of exhaust gas abatement technology ('scrubbers') or by burning a fuel with maximum sulphur content of 0.50% mass or by burning LNG. To meet continuing legislation inside ECAs, ships will either have to use scrubbers or burn fuel with maximum sulphur content of 0.10% mass or use LNG.

Types of Fuel

From 1 January 2020, BP will have a range of products available to meet ships' fuel requirements:

- High Sulphur Fuel Oil - HSFO, for use on ships fitted with scrubbers
- Very Low Sulphur Fuel Oil - VLSFO, max sulphur content 0.50% mass
- Marine Gas Oil - MGO, max sulphur content 0.10% mass and 0.50% mass

BP has quality assurances in place to make sure that its products meet the requirements of ISO 8217 and are aligned with the standard grade names. VLSFO will become available to the market during 2019 so that ships can be compliant from 1 January 2020.

Operational Considerations for Handling VLSFO

As most VLSFO available will be blended from residual and distillate components, stability and compatibility will be key considerations. Depending on the manufacturing route and blending component availability, fuels may be predominantly aromatic or paraffinic in nature, and hence may be incompatible if mixed on board ship. BP will continue to supply stable fuels and is actively supporting current initiatives within ISO and CIMAC to evaluate stability and compatibility test methods for better control.

Ships should continue to segregate bunker stems on board and minimise their mixing throughout the fuel system in line with standard operating procedures. In addition to potential incompatibility between residual fuels, there is also a risk when mixing distillate and residual fuels as these too may be incompatible.

Due to changes in the way fuels will be manufactured, ships may see wider variation in the density and viscosity of the fuels supplied in different port locations. BP will always provide relevant fuel quality data to the ship's representative prior to the delivery.

Ship Tank Configurations

Segregated fuel system

To minimise the risk of incompatibility, the optimum solution is to completely segregate the storage and handling of the fuels on-board the ship, with separate bunker lines, separate storage, settling and service tanks. Even with the optimum tank configuration, the transition from one batch/grade of fuel to another still requires that prior to the engine, the two fuels from different tanks will be mixed.

Two settling tanks into one daily service tank

Where the ship has two settling tanks (enabling segregation of different batches/grades of fuels) feeding one daily service tank, then, prior to changeover, the contents of the daily service tank should be minimised before completely refilling the daily service tank with the next fuel.

One settling tank into one daily service tank

Where the ship has only one settling tank feeding one daily service tank, then, prior to changeover from one batch/grade to another, the contents of the settling tank should be minimised prior to completely refilling the settling tank with the next fuel. Then the contents of the daily service tank should be minimised prior to completely refilling the daily service tank with the fuel from the settling tank.

In all circumstances, during fuel grade transitions, it is recommended that the operation of the centrifuges and back flush filters are closely monitored to highlight any fuel incompatibility issues.



Ship Fuel Handling

Handling temperatures*

	Storage Tank	Settling Tank	Ideal Centrifuge Inlet
Distillate Fuel	10°C above pour point	10°C above pour point	10°C above pour point
Residual Fuel	10°C above pour point	65°C	98°C

*As for all marine fuels used on ships, storage temperatures should be in compliance with IMO MSC Circular 1321, Guidelines for measures to prevent fires in engine rooms and cargo pump rooms.

Viscosity

During the transition from a high viscosity residual fuel to a low viscosity fuel and vice versa, to reduce the risk of the fuel pumps scuffing, care needs to be taken to ensure that the rate of temperature change in the fuel pumps is not greater than the maximum recommended by the engine manufacturer, typically 2°C per minute. Operation on a fuel with low viscosity may lead to the possibility of significant fuel leakage from the fuel injection pumps and it may be difficult to start an engine on low viscosity fuel, if the fuel pumps have not been maintained within the engine manufacturer's recommendations.

Density

Ship owners should ensure that the on board centrifugal purification systems can successfully handle the density of the fuels supplied. These systems may require adjustment when switching fuel grades.

Ignition quality

Fuels supplied by BP will meet the requirements of ISO 8217. Thus no operational issues are anticipated burning fuels supplied by BP.

Ship operations

In advance of 1 January 2020, ship operators will need to develop implementation plans for individual ships to ensure tank capacities and handling capabilities meet requirements. For ships not fitted with scrubbers and intending to burn VLSFO, it will be necessary to clean ships' fuel oil tanks and service systems prior to 2020, as loading compliant fuel into empty fuel tanks that have previously carried HSFO and not been cleaned will potentially cause both operational issues and risk of non-compliance with the 0.50% sulphur limit.

After VLSFO has been loaded to the cleaned tank(s) and following sufficient running time on that fuel, it is recommended that fuel samples are taken just prior to the engine and tested for

sulphur content to ensure compliance. Such testing should be done well before 1 January 2020 to allow time for any remedial action which may be required.

In accordance with the MARPOL legislation, the primary responsibility for sulphur compliance lies with the ship owners. For ships using separate fuels to comply with the legislation when entering or leaving an ECA, it is a requirement that detailed written changeover procedures are on board. The ship has to record the volume of low sulphur fuel oil in each tank, the date, time and position of the ship when any fuel changeover operation is completed, prior to entry into an ECA or commenced after exit from an ECA.

Engine manuals should be consulted for guidance on the specific engine restrictions at the time of fuel grade changeover, but, typically, changeover should take place under part-load engine operation. The ship should carry out the transition taking into account all relevant safety considerations, including operating location.

Lubricants

Vessel operators will need to use the correct grade of lubricating oil suitable for low sulphur fuels in order to ensure the correct level of protection is provided. Guidance should be sought from the vessel's lubricant supplier.

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