

Action code: WHEN CONVENIENT

Fuel tank cleaning

Supplement to SL2019-670

SL2019-674/JAP

July 2019

Concerns

Owners and operators of MAN B&W two-stroke marine diesel engines.

Type: All MAN B&W engines.

Summary

Cleaning of fuel tanks by using cleaning agents to dissolve sediments may increase the cat fines content of the fuel oil supplied to the engine. The cat fines content must be lowered to the guiding values (SL2017-638/DOJA) to ensure safe operation of the engine.

Other relevant Service Letters:

SL2019-670/DOJA

SL2017-638/DOJA

SL2019-671/JAP

Dear Sir or Madam

The forthcoming switch to 0.50% S very-low-sulphur fuel oil (VLSFO) will be a challenging task for owners and operators securing that the fuel bunker tanks are sufficiently cleaned before filling in 0.50% S VLSFO.

It has come to our attention that vendors are promoting the use of cleaning agents, that when mixed into the fuel tanks dissolve the sediment in the bottom of the tanks. It makes it possible to clean the tanks in service and remove the tank sediment with the fuel system separators.

It is of the utmost importance to secure that the sediment containing large amounts of settled catalytic fines (cat fines) from previously bunkered fuel is sufficiently removed from the fuel before it enters the main engine.

The current maximum allowed content of cat fines (Al+Si) in the fuel before the engine is 15 mg/kg for short periods.

For questions or inquiries regarding the content in this Service Letter, contact our Operation Department at: Operation2S@man-es.com

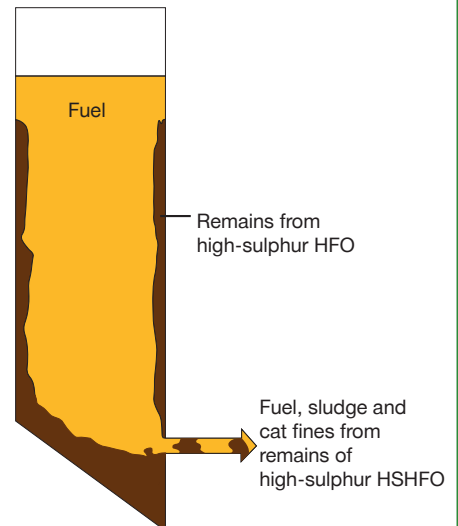
Yours faithfully



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Introduction

Future limitations lower the limit of the fuel oil sulphur content to 0.50% sulphur, and it is expected that this results in the need for cleaning existing bunker tanks to remove the sediment containing sulphur and settled cat fines from the bottom of the tanks.

If operators choose to dissolve the sediment and dilute it with the bunkered fuel (see Figure 1), great care should be taken to secure that cat fines or other particles from the sediment are not supplied to the engine, which will cause heavy wear and potentially liner scuffing.

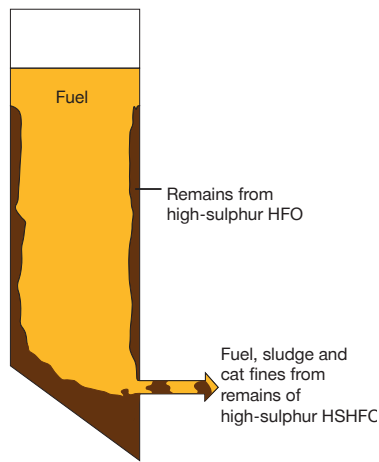


Figure 1: Dissolved sediment from HSFO may contain a large amount of cat fines.

Fuel tank cleaning

Cleaning the fuel tanks can be done by emptying the tanks (stripping) and manually cleaning the tanks to secure that the sediment is removed and thus not endangering the operation of the fuel consumers as well as the equipment in the fuel system, i.e. pump valves and separators.

However, choosing to dissolve the sediment and dilute it with fuel to be consumed can potentially increase the risk of supplying particles from the sediment (cat fines) to the engines. If the sediment is dissolved, we advise the operators to secure sufficient cleaning of the fuel to meet the guiding values put forward in SL2017-638/DOJA.

Fuel tank sediment

Investigation of sediment from tanks has shown that the content of cat fines may be as high as 19,000 mg/kg in adverse situations. Values in the range of 4,000 to 19,000 mg/kg can be expected. If the sediment is dissolved we recommend to take samples of the sediment before applying the dissolving agents.

The expected level of cat fines in the fuel tank, once the sediment is dissolved, should be calculated (Appendix A).

Proper action should be taken to secure sufficient cleaning to lower the cat fines content to meet the guiding values. Please note that the calculations cannot take into account that the dissolved sediments are mixed unhomogenously in the fuel tank. The sediment concentration most likely increases in the bottom of the tank (see Figure 2), which leads to a higher concentration of cat fines in the fuel pumped to the settling tank when using the fuel.

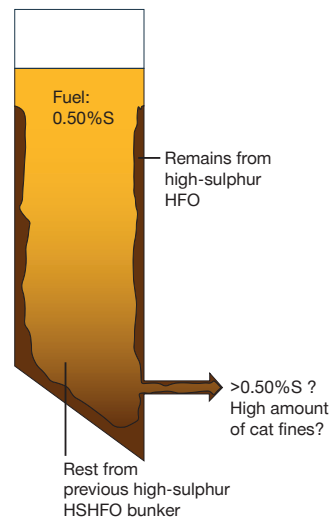


Figure 2: Once the sediment is dissolved the concentration in the tank may vary and cause an uneven flow of cat fines in the fuel.

The procedure for using fuel containing dissolved sediment

We recommend to take fuel samples frequently to be able to document that the fuel has been sufficiently cleaned. We also recommend to take fuel samples before the fuel separator, after the separator and at the main engine inlet.

Engine wear

If the cat fines content in the fuel is not lowered sufficiently, there is a risk that the engine will suffer from abrasive wear. This will typically show as piston ring wear, cylinder liner wear and piston crown ring groove wear and it can occur very quickly, and in some cases it may evolve to liner scuffing.

Keeping track of engine wear when using the fuel can be done by checking the iron (Fe) content of the drain oil. In this case, using an onboard test kit which measures the magnetic Fe content should be sufficient to monitor day-to-day variations in engine wear. It is recommended to keep such daily recordings when using the diluted or treated fuel (Appendix B).

Appendix A

Example of fuel cat fines concentration, if the fuel tank sediment with a high concentration of cat fines is dissolved in the fuel.

Table 1 shows the cat fines concentrations of the fuel, depending on the filling level of the fuel tank and the amount of dissolved sediment. If a fuel tank contains 20 mm of sediment with 19,000 mg/kg cat fines and this is completely dissolved in a full tank filled with a fuel containing 25 mg/kg cat fines at a tank height of 1.7 m, the fuel later pumped to the settling tank will contain 248 mg/kg of cat fines. This amount needs to be lowered to below 15 mg/kg before the engine inlet.

Tank height [m]		1.7	Sediment thickness [m]		0.02	Cat fines content in sediment [mg/kg]		19,000			
New fuel cat fines [mg/kg]		Tank filling level [%]									
25		10%	20%	30%	40%	50%	60%	70%	80%	90%	100%
Dissolved sediment [%]	10%	246	135	99	80	69	62	57	53	50	47
	20%	469	247	173	136	114	99	88	81	74	69
	30%	693	359	248	192	159	136	120	108	99	92
	40%	916	471	322	248	203	174	152	136	124	114
	50%	1,140	582	397	304	248	211	184	164	149	136
	60%	1,363	694	471	360	293	248	216	192	174	159
	70%	1,587	806	546	415	337	285	248	220	199	181
	80%	1,810	918	620	471	382	323	280	248	223	204
	90%	2,034	1,029	695	527	427	360	312	276	248	226
100%	2,257	1,141	769	583	471	397	344	304	273	248	

Table 1: Examples of cat fines concentrations in the final fuel, depending on how much new fuel is bunkered in the tank and how much sediment is dissolved in the final fuel.

Appendix B

The guiding levels for Fe content in the drain oil can be seen in Table 2. The stated numbers are the total Fe content, as described in SL2019-671. The limits can also be used as guidance for on-board testing of magnetic iron.

Guiding drain oil levels

Engine bore size	Max. Fe content (ppm)
26-50	100
60-70	150
80-98	200

Table 2: Guiding values for Fe content in the drain oil. Refer to SL2019-671.



F.O.T. NEW GENERATION™

DESCRIPTION

F.O.T. NEW GENERATION is a concentrated fuel oil additive specifically designed to facilitate the handling and burning of all types of heavy fuel as well as to disperse and dissolve sludge, suspending high fuel particles into solution. In this way, fuel blends gain a homogeneous nature while compatibility and stability problems are highly reduced.

F.O.T. NEW GENERATION is a very cost effective product due to the very low dosage needed, yielding from its concentrated nature.

ADVANTAGES AND CHARACTERISTICS

- Disperses and dissolves sludge based high fuel particles.
- Prevents sludge formation and carbonaceous deposits in tanks.
- Maintains homogeneity and stabilization of the fuel.
- Leads to improved combustion of the fuel oils.
- Absolutely soluble in the various types of heavy fuels.
- Reduces tank cleaning costs.
- Has anticorrosive properties and is highly stable.
- Cost effective due to the very low dosage needed, yielding from its concentrated nature.
- Easy to handle and use.

PHYSICAL PROPERTIES

F.O.T. NEW GENERATION is an organic-based fuel oil additive consisting of solvents, dispersants, polymers, corrosion inhibitors and surface-active agents that result in a maximum performance of the treated fuel oil.

Appearance / Color : Clear, yellow-orange liquid
Specific gravity : 0.86 -0.88 gr/cm³ at 25 °C
Flash Point : 70 °C
Odor : Aromatic Solvent Odor

PACKAGING

Order Number : 562511 (25 ltrs)
562111 (210 ltrs)
Container : Steel drum

APPLICATION AND USE

A. Dosing Procedure

The quantity suggested for fuel oil treatment is a proportion of 1 litre of F.O.T. NEW GENERATION for 16 - 20 cubic meters of fuel.

B. Feeding Procedure

After the quantity of F.O.T. NEW GENERATION has been determined, it must be added to the main storage tanks before fuel bunkering or to the deep tanks through the entire fuel system.

IMPORTANT INFORMATION

Atomization and F.O.T.

F.O.T. NEW GENERATION contains surface-active agents, which reduce the limit of surface tension between oil and air while they disperse the water residual and turn fuel into fine droplets within the burner. As a result, a greater distribution of fuel quantity throughout the burner is created, thus achieving a better fuel utilization, through complete combustion. Therefore, energy is preserved by the saving of fuel.



SAFETY AND HANDLING

HANDLING	Handle with care. Store in a dry, cool and well ventilated environment.
SAFETY	IMMEDIATE ACTIONS
Eye Contact	Avoid Eye contact. Otherwise, flush with plenty of water for a few minutes. Seek medical attention.
Skin Contact	Avoid Skin contact. Otherwise, wash contaminated area thoroughly with water. Seek medical attention.
Inhalation	Avoid inhalation of vapors. Otherwise, seek fresh air source at once. Seek medical attention.
If Swallowed	Avoid ingestion. Otherwise, consume a considerable quantity of water. Do not induce vomiting. Seek medical attention.
GENERAL INSTRUCTIONS	Avoid spillage, splashing and mishandling. Precautionary measures for body protection are strongly recommended before use.

Read the Material Safety Data Sheet before using this product.

For detailed information on safety and health, please refer to Material Safety Data Sheet and/or Product Label.

MARICHEM MARIGASES Worldwide Services or any subsidiary or associated companies warranties of merchantability and competence, if any, along with any expressed warranties concerning this merchandise, shall not be actionable or pertinent or effective if the good is used contrarily or differently to the directions herein and in no other way due to impending hazards from inappropriate use of the good explained herein. Merchandise might vary insubstantially depending on country of origin. The information provided concerning merchandise is exclusively presented to the customer.



FUEL POWER CONDITIONER 25 LTR

Product group: **650** Product number: **778785**

Unitor™ FuelPower™ Conditioner stabilizes and stops sludge formation in fuel tanks. Unitor™ FuelPower™ Conditioner also improves separation reducing the amount of sludge wasted.



Product information

Fuel stability and compatibility is an increasing problem with modern marine heavy fuels, especially with blending of low sulfur fuels.

The solution for handling these unstable and incompatible fuels is Unitor™ FuelPower™ Conditioner, it stabilizes and stops sludge formation in fuel tanks.

Unitor™ FuelPower™ Conditioner also improves separation reducing the amount of sludge wasted keeping the fuel homogeneous through the whole fuel system delivering a stable fuel ready for combustion.

Features

- Stabilizes fuel blends, reducing compatibility problems
- Disperses and prevents sludge formation
- Reduces the amount of sludge wasted in the centrifugal separator

Benefits

- The conditioning properties of Unitor™ FuelPower™ Conditioner ensures your fuel is stable and that a minimum of sludge is wasted in tanks and centrifugal separators
- With purifier working efficiently, filters clean and fuel system in good shape you can focus on the important things

Specification

General

Invent Hazard Material (IMO/EU) classification	C-6
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Physical properties

Appearance	Clear, light brown
Density [kg/dm³]	0,84
Flash Point [°C]	>61
Form	Liquid

Technical data

Not Compatible	May swell rubber and synthetic rubber
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Documents

[No Objection Letter Wartsila](#)

Directions for use

Dosage and control

Ideally, FuelPower Conditioner should be dosed directly into the bunker tank prior to bunkering. However, it can be introduced to the settling tank or during transfer from storage. Dosage rates are best determined from the results of fuel analysis, i.e. sediment content or compatibility test which is easily performed on board using the Compatibility Test Kit.

ASTM SPOT	1	2	3	4	5
SEDIMENT%	0.05 OR LESS	0.05	0.1	0.2*	0.5 OR OVER*
DOSE RATE	**1:20 000	1:10 000	1:5000	1:2500	1:1000

* Avoid using this fuel if possible.

** Fully compatible blends, with a sediment percentage of less than 0.05, should not require treatment for incompatibility. Marginal number 1 spots may cause sludging if the fuel is not handled carefully, so some treatment may be necessary, especially if other problems such as water content or corrosion are apparent.

If test results are not available, an initial dose of 1:15 000 is recommended, and adjustments made as necessary.

The average dosage for FuelPower Conditioner is 1:15 000 or 67 ppm. When starting a dosage into a fuel tank it is advisable to use a staged dosage to avoid high amounts of sludge from the fuel into purifiers and filters. This is especially important if the fuel tank has not been cleaned for an extended period of time. With a stage dosing smaller amounts of sludge will be picked up and over a longer period of time.

DOSING	DOSAGE LEVEL	COMMENT
1st Time	1:25 000	Initial dosage not to upset the tank
2nd Time	1:20 000	Second and third dosages can be done a bit higher as most of the easily available sludge will be gone
3rd time and forward	1:15 000	From the 3rd dosage and forward the recommended dosage of 1:15 000 can be used

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F.O.T. ULS™

DESCRIPTION

F.O.T. - ULS is a new generation fuel additive which improves the lubricity of all Ultra Low Sulphur Marine Fuel Oils. This combination of solvents, lubricity additives, and corrosion inhibitors, is the only solution for such type of fuels. F.O.T. - ULS is highly cost effective due to the very low dosage needed, yielding from its concentrated nature.

Emission concerns have led to the application of new regulations in Marine Fuels. From 1st January 2015, ships travelling within 200 nautical miles of shore in North America, the Baltic, North seas and through English channel must limit sulphur content into fuel oil to 0.1% (Ultra Low Sulphur Fuel Oil), down from 1%, according to International Maritime Organization rules - Annex VI of MARPOL - Sulphur limits, as adopted by IMO Marine Environment Protection Committee (MEPC) 58th Session in October 2008 - Revised MARPOL Annex VI - Resolution MEPC.176 (58).

Reducing the level of Sulphur compounds in the Marine Fuel Oil can reduce the ability of the oil to lubricate the injection system of the engine, causing the fuel injection pump to seize. Lower lubricity can significantly increase wear of fuel pumps, valves and injector nozzles over an extended period of use.

F.O.T. - ULS provides superior lubricity properties to the Ultra Low Sulphur Fuel Oils in order to avoid these eventualities. Furthermore, it prevents problems associated with the accumulations of injection deposits.

ADVANTAGES AND CHARACTERISTICS

- Provides superior lubricity properties to the Ultra Low Sulphur Fuel Oils.
- Also, suitable for normal low Sulphur Fuel Oils.
- Prevents wear on contacting metal surfaces and their seizure.
- Reduces significantly injector deposits.
- Protects fuels systems against corrosion.
- Will not separate in the fuel tank.
- It gives effective results well below standard EC limit of 460 µm, as proven by HFRR test performed according to ISO 12156-1 standard test method.

- Contains only harmless substances.
- Does not contain chlorinated solvents.
- Easily dispersed into the fuel.
- Cost effective due to the very low dosage needed, yielding from its concentrated nature.
- Easy to apply and use in the fuel oil with excellent results.

PHYSICAL PROPERTIES

Appearance	: Clear liquid.
Color	: Yellow.
Odor	: Characteristic (Slight).
Specific Gravity	: 0.87 - 0.90 gr/cm ³ at 20°C (ASTM D 1298)
Flash Point	: > 120°C

PACKAGING

Order Number	: 562508 (25 ltrs) 562108 (210 ltrs)
Container	: Steel drum

APPLICATION AND USE

A. Dosing Procedure

For Marine Gas Oils (MGO) and Marine Diesel Oils (MDO), the normal dosage of F.O.T. - ULS is 1lt per 25 cubic meters of fuel.

For Intermediate Fuel Oils (IFO) and Heavy Fuel Oils (HFO) the dosage is 1lt of F.O.T. - ULS per 20 cubic meters of Fuel Oil.

B. Feeding Procedure

F.O.T. - ULS should be dosed directly in the fuel storage tank, preferably prior to bunkering. This way the product is better mixed in the fuel.

It is suggested that, firstly dose the requested quantity of F.O.T. - ULS followed by the Ultra Low Sulphur Fuel Oil in the settling tank, in order to accomplish better homogenization.



SAFETY AND HANDLING

HANDLING	Handle with care. Store in a dry, cool and well ventilated environment.
SAFETY	IMMEDIATE ACTIONS
Eye Contact	Avoid Eye contact. Otherwise, flush with plenty of water for a few minutes. Seek medical attention.
Skin Contact	Avoid Skin contact. Otherwise, wash contaminated area thoroughly with water. Seek medical attention.
Inhalation	Avoid inhalation of vapors. Otherwise, seek fresh air source at once. Seek medical attention.
If Swallowed	Avoid ingestion. Otherwise, consume a considerable quantity of water. Do not induce vomiting. Seek medical attention.
GENERAL INSTRUCTIONS	Avoid spillage, splashing and mishandling. Precautionary measures for body protection are strongly recommended before use.

Read the Material Safety Data Sheet before using this product.

For detailed information on safety and health, please refer to Material Safety Data Sheet and/or Product Label.

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DIESELPower LUBRICITY 25 LTR

Product group: **650** Product number: **779094**

Unitor™ DieselPower™ Lubricity is formulated to enhance the lubricity of diesel fuels.

Product information

Unitor DieselPower Lubricity has been found to be particularly effective in ultra low sulphur diesel fuels and gas oils that are blended to meet governmental regulations on fuel sulphur content.

Unitor DieselPower Lubricity also provides excellent performance as a lubricity improver component in diesel detergent packages and does not affect the water emulsification tendency of a fuel as measured by ASTM D-1094.



Features

- Improves the lubricity of low sulphur diesel fuels
- Can be used as a stand-alone product or component in diesel packages
- Effective at 50-150 ppm range in meeting the HFRR requirement for lubricity specifications
- Does not interact with the fuel

Benefits

- Protects your engine from wear so you can avoid unscheduled and expensive maintenance
- Quality is ensured so you can rest easy with good engine protection
- You can safely use the product in all types of fuels

Specification

General

Invent Hazard Material (IMO/EU) classification	C-6
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Physical properties

Appearance	Yellow
Density [kg/dm³]	0,895
Flash Point [°C]	180
Form	Liquid
Materials compatibility	Teflon, Viton , Plasite 10-7122, Plasite 10-9500, Mild Steel, Mild Aluminium, Brass, 304 SS, 316 SS and copper
Pour Point [°C]	6
Solubility	Insoluble in water, soluble with most organic solvents

Technical data

Not Compatible	Natural Rubber, Vinyl, Polyethylene, Neoprene, PVC, Hypalon, Buna-N , Polypropylene, Plexiglas, Ethylene, Propylene Rubber and Polyurethane
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Documents

[WSS---DieselPower-Lubricity-PVS-Cert](#)

Directions for use

Dosing Method

Preferable application of DieselPower Lubricity is directly into the transfer pump suction to ensure proper mixing. Product may be added to storage or blending tanks with adequate mixing. Dosage of DieselPower Lubricity may vary depending on the fuel quality.

Best dosing and storage temperature : 20 °C (68 ° F) - 40 °C (104 °F)

Sampling and Testing

DieselPower Lubricity also provides excellent performance as a lubricity improver component in diesel detergent packages and does not affect the water emulsification tendency of a fuel as measured by ASTM-D1094.

Dosing and Control

The normal dosage of DieselPower Lubricity is between 100 and 200 ppm (100 to 200 mls per m³ fuel). Independent testing has shown that an application of around 125ppm can improve the HFRR wear scar performance of ULSD to below the specification level of 460um. DieselPower Lubricity may be blended with other components into diesel detergent packages for ultra low sulphur diesel fuel and has no known adverse interaction with common components such as detergents, pour point improvers, cetane improvers or antifoams.

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