

# MAHLE

*Industrial Filtration*

## A CLEAN COMBINATION FINEST FILTRATION AND WATER SEPARATION

FUEL AND OIL TREATMENT SYSTEMS



**NFV**



**“Diesel Oil Pest” – a serious problem**

Diesel fuel or lubrication oil tanks can become contaminated with microorganisms (bacteria, yeasts, fungi and algae) every time the tank is filled or ventilated or if the contents are contaminated by pollutants. Microorganisms can only survive, grow and multiply in the water phase of any medium. Water phases develop during storage and transport, particularly when damp air inside the tank condenses.

Microbiological contamination can have very serious consequences, resulting in a loss of diesel and lubricant oil quality. The by-products of microorganic metabolism block filter elements, diesel and oil pipes, water separators and injection pumps. The material of the tank walls and pipes can also be severely damaged. Corrosion is further accelerated by water-soluble salts and hydrogen sulphide, a by-product of metabolism.

Microorganisms can survive and multiply in water concentrations higher than 60 ppm. The higher the water content in the medium, the more likely it is to become “infected”, resulting

in a greater threat to the functionality and material of the affected tanks, pipes and drive units.

**To prevent diesel oil pest: fuel treatment**

Water concentration is the crucial factor for microorganism growth and the diesel oil pest problem can only be addressed by reducing the amount of water in the fuel. This can be achieved by implementing continuous fuel and oil treatment to prevent the water content from rising above 60 ppm.

Mechanical separators which use centrifugal separation cannot provide the necessary level of dewatering. None of the systems which comply with the applicable DIN standards or the delivery standards of the mineral oil industry and NATO offer complete security, as they allow a water content of 500 ppm and 100 ppm respectively.

A truly effective and lasting method of protecting fuel and lubricants against increasing water concentrations, and thus against contamination by microorganisms, is to employ NFV fuel and oil treatment systems.

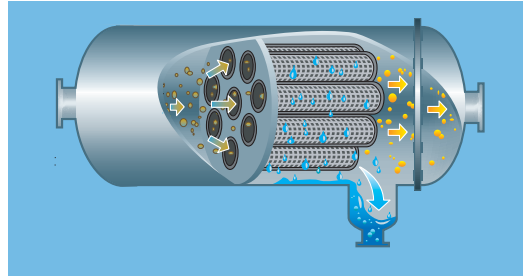


*Microbiological swabs of insufficiently dewatered diesel samples*

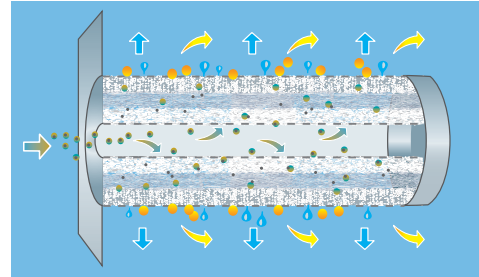


*Surface damage inside a ship's diesel oil tank*

## How NFV fuel and oil treatment systems work



1. The tanks contain one or multiple filter coalescer elements, depending on the flow capacity. The separated water is heavier than the medium being pumped through and it collects in a water container at the bottom of the tank.



2. Water droplets collect in the variably structured fibre bed layers. The size of the droplets increases in the flow direction; these droplets flow together to form a coherent water phase, which is removed. All solids are held back.

# EFFICIENT AND COST-EFFECTIVE FOR FUEL AND OIL TREATMENT SYSTEMS



KFWA/OFWA

### Single and multiple-stage fuel and oil treatment systems for all needs

NFV fuel and oil treatment systems can be used for all types of middle distillates, e.g. diesel fuel, light fuel oil, marine diesel oil MDO and lubricating oil. For all the most common contaminations in these media, including solid and suspended particles, such as dust, sediments, rust, and water, our systems represent the most efficient and cost-effective solution.



PTS

To treat the first phase, we offer a number of combined filter coalescers with varying degrees of fineness; these systems can be optimally adapted to meet specific requirements and technical configurations. An optional downstream separator membrane can be used to reduce the water content to 20 ppm unbound water in order to prevent contamination with microorganisms, which begins at 60 ppm. To treat heavy contamination with solids we recommend using a dual-phase version of the filter coalescer; this version has an upstream filter that can be exchanged independently.



FTS/OTS

### Configuration and design

MAHLE Industrie filtration supplies fuel and oil treatment systems with a wide range of flow capacities. The systems consist of a pump with a downstream depth filter or filter coalescer and an optional permanent separator, as well as a central control box, full differential pressure monitoring system, ventilators and an automatic water outlet system.

The systems can be supplied in vertical or horizontal configurations. They can be installed on the storage tank to continuously treat the medium or used to clean the medium prior to using, i.e. before it is pumped into the day tank or the engine.



### The advantages in overview:

- Finest filtration and water separation in one system
- High flow capacities in a compact design
- Separation efficiency is below 20 ppm unbound water which is far more effective than conventional treatment systems
- Highest efficiency combined with long uptimes for the filter coalescer elements
- Robust and extremely maintenance-friendly

# MIDDLE DISTILLATES

### NFV fuel and oil treatment systems in overview

Type	Flow rate (ca.)	Type	Flow rate (ca.)	Size (in mm)		
				Height	Width	Depth
KFWA 1 by	700 l/h	OFWA 1	5 l/min.	980	880	420
KFWA 1 main		-	-	1000	1100	420
KFWA 2 by	2000 l/h	OFWA 2	8 l/min.	1280	910	470
KFWA 2 main		-	-	1280	1140	470
KFWA 3 by	4000 l/h	OFWA 3	16 l/min.	1570	910	570
KFWA 3 main		-	-	1580	1210	570
KFWA 4 by	8000 l/h	-	-	1830	1370	690
PTS				on request		
FTS 600*	600 l/h	OTS 5	5 l/min.	1145	1000	590
FTS 1800*	1800 l/h	OTS 8	8 l/min.	1210	945	770
FTS 2400**	2400 l/h	OTS 16	16 l/min.	1530	730	700

\* free-standing in frame

\*\* Customized dimensions possible



### MAHLE Industriefiltration

develops and builds advanced filtration and separation technology for use in a wide range of industrial applications and in power plants, civil and military ship-building.

The company is part of the MAHLE Group, one of the top 30 automotive suppliers globally and the world market leader for combustion engine components, systems and peripherals.

NFV and AKO products are used in the following applications:

- Bilge water deoiling
- Ballast water treatment
- Cooling lubricant and detergent processing
- Industrial waste water cleaning
- Separation systems (petrochem. industry)
- Oil and fuel treatment for engines, turbines and gears; heavy oil filtration
- Protection of hydraulic units, pipe lines, transfer and circulation systems

## CAREFUL FUEL AND OIL TREATMENT PROTECTS ENGINES, TURBINES AND GEARS

MAHLE Industriefiltration supports their customers with fuel and oil treatment systems that benefit from our more than 40 years of experience. At the same time, we aim to lower costs while improving performance. The outstanding reliability of our filter coalescer separation technology is an invaluable asset in tough day-to-day production.

### Engines

Piston engines are the drive assemblies of choice for engine units that are in permanent operation, e.g. ships engines and engines in combined heat and power plants. The fuel used requires careful treatment to ensure that these engines, and particularly the injection systems, can run continuously for long periods of time.

### Turbines

All over the world, gas and steam turbine power plants that are fired with natural gas are increasingly being used as an alternative to coal and nuclear power. The state-of-the-art, high-efficiency turbine technology at the heart of these plants requires specially treated lubricants and control oils to function optimally.

### Gears

Increasing fuel prices are forcing manufacturers to design lighter systems using new materials. The construction of modern transmission systems is far more complex than a few years ago, and these systems require specially treated lubricants with precisely defined properties.



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