



Products
services
portfolio

Retrofit & upgrade

MAN PrimeServ

2-stroke engine
solutions



Optimized equipment

Your partners for retrofit solutions

Reliability, greater efficiency and compliance with new environmental legislation are just some of the benefits our advanced retrofit solutions provide.

Keeping your equipment consistently up to date

Your existing engines, machinery, auxiliary systems, instrumentation and control systems might be aging, but that does not mean they cannot keep delivering value. Our comprehensive, tailored retrofit solutions can bring your assets up to date and keep them there, through continuous development and modernization.

Available for a wide range of engines, propulsion systems and turbochargers, our retrofits and upgrades will help you improve efficiency, boost performance, save on fuel and lube oil, while lowering maintenance costs and enabling more flexible operation.

MAN PrimeServ retrofits will also help you comply with increasingly stringent environmental regulations and put your operations on the road to energy transition and decarbonization. And they will benefit your employees by improving crew safety, making equipment easier to operate and lowering emissions onboard.

For reducing emissions from diesel engines, consider our dual fuel retrofit solutions. In addition to improving your environmental performance, these retrofits can help you save fuel and reduce operating costs.





Fuel oil saving	06-13
MAN EcoCam	06
MAN EcoNozzle	07
Flexible TCCO	08
Engine specific study	09
PMI VIT	10
MAN EcoTorque	11
PMI Autotuning	12
PMI ACCo	13
Lube oil optimization	14-16
Alpha lubricator	14
Alpha lubricator MC upgrade	15
Alpha lubricator ME upgrade	16
Safety & reliability	17-21
Safety screen filter	17
Dynamic limiter function	18
MAN load optimizer	19
ECS EasyDetect	20
MAN EngineVault	21
Emission management	22-27
EEXI OPL MC	22
EEXI OPL ME	23
MAN PPL MC	24
MAN PPL ME	25
Slide fuel valve	26
SOx scrubber engineering services	27
Operational improvement	28-30
MAN FIVA	28
Cat fines filter	29
Super fine filter	30
Product overview	32-35
Service with passion	36-37
Worldwide service	38-39

MAN EcoCam

Outstanding fuel savings with flexible exhaust valve timing.

Description

The MAN EcoCam is a low-cost, simple fuel saving product. This low-load optimized virtual cam gives you lower emissions and instant fuel savings between 10% and 60% load. The MAN EcoCam enables efficient slow steaming with operational flexibility for mechanical engines and is available for engines with a wide exhaust camshaft.

Principle

The MAN EcoCam enables a variable cam profile without any mechanical modification of the camshaft itself. It is based on flexible exhaust valve timing that enables adjustment of the closing time of the exhaust valves according to engine load. The MAN EcoCam solution includes an amendment to the existing technical file.

Depending on an engine's load profile, the MAN EcoCam typically generates savings in the range of 2 to 6 g/kWh.

Key benefits

- Fuel savings between 2 and 6 g/kWh
- Slow steaming with operational flexibility
- Easy installation
- High return on investment
- Easy to operate (automatic)
- Effective between 10% and 60% load
- No exchange of exhaust cam required

Applicability

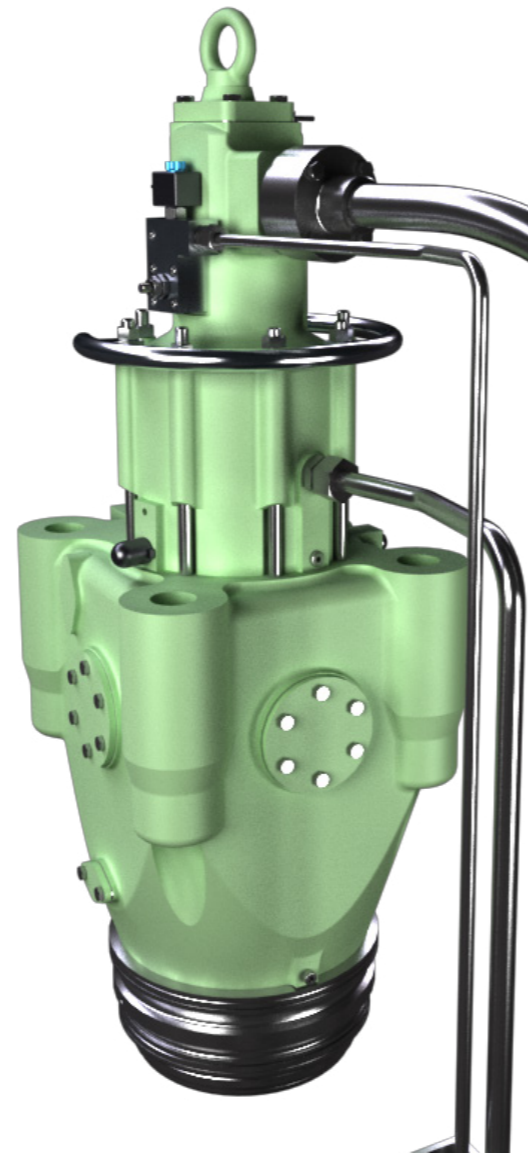
- S50/60 MC-C engines with a special cam profile

Scope of supply

- Newly designed MAN EcoCam actuator housing for exhaust valves
- Control system including automatic engage and disengage functionality
- Operating panel in the engine control room
- Torsional vibration check

Reference List

- Sold to more than 50 vessels.



MAN EcoNozzle

Fuel savings with the MAN EcoNozzle, the latest addition to the new MAN Eco-family designed to provide fuel savings in the entire load range. With this new concept fitted, your engine will have state-of-the-art combustion control.

Description

The MAN EcoNozzle fits the existing slide fuel valve and replacements can be done during a regular overhaul. The MAN EcoNozzle is a wear part with the same TBO as the original fuel nozzle. It can easily be fitted right away, or when the old fuel nozzle must be changed anyway.

Applicability

- S50MC-C Mark 7/8

Principle

The fuel spray pattern has been redesigned to achieve an optimised flame formation and fuel propagation. Furthermore, the combustion control has been redesigned. This means that it is possible to optimise the SFOC, and thereby reduce CO₂ emissions, without increasing NO_x emissions beyond the NO_x regulations.

Scope of supply

- Complete new spindle guide including MAN EcoNozzle
- A new set of cleaning tools for the MAN EcoNozzle
- An amendment to the Technical File

Potential savings

Fuel savings in the area of 2-7 g/kWh depending on the engine load, which gives a payback time down to 3-5 months.

Key benefits

- Instant fuel savings in the entire load range - up to 7g/kWh from day one
- Easy installation - no engine modification required
- High return on investment
- Full operational flexibility
- Lower CO₂ emissions - NO_x within regulations
- Easy retrofit of the original wear part
- Significant fuel savings without compromising the emission regulations
- Can be fitted by the crew during normal overhaul
- It is a wear part that must be changed anyway

Reference List

- Sold so far to approximately 40 engines



Flexible TCCO

Slow steaming & SFOC reduction

Description

By installing a turbocharger cut-out system, the operator has the option of disabling one or more of the turbochargers for low-load operation. This improves the performance of the remaining turbochargers, and reduces SFOC.

Principle

Out of the total operational costs of a ship, fuel costs account for by far the highest proportion. Low-load operation, also well known as “slow steaming”, represents a highly effective and popular measure to cut fuel costs and, thereby, the total operational costs. With more than 500 systems in operation worldwide, the shipping world has given the turbocharger cut-out system a warm welcome.

Key benefits

- Improved performance of remaining turbochargers
- Improved combustion and cleaner engine
- Fuel savings up to 6g/kWh
- Short payback time
- High flexibility

Scope of supply

- Set of gate valves
- Insulation
- Pipes and fittings
- Control system
- Cables
- Installation “(optional)”
- Commissioning
- Amendment to Technical File
- Engineering package
- Torsional vibration evaluation

Applicability

- 50-98 MC/MC-C engines
- 50-98 ME/ME-C engines
- 50-60 ME-B engines
- Installation of the turbocharger cut-out requires minimum two turbochargers

Reference List

- Sold to more than 500 vessels



Engine specific study

Fuel savings and emission reduction through tailor made retrofit solutions

Description

An engine specific study presents customized engine optimization concepts. Typical optimization objectives are the reduction of fuel oil consumption and/or emission reductions (e.g. Tier-level upgrade, sulphur content max. 0.5%). We investigate various engineered (off-standard) retrofit solutions based

on several combined and harmonized new components to determine which option best meets your needs. Exhaust gas bypass (EGB) retrofit, derating, uprating and engine tuning are examples of such retrofit solutions.

Principle

The engine specific study proposes one or more investigated retrofit solutions. The description for each solution comprises the benefits (savings/reductions), scope of supply, price, payback time and the evaluation of torsional vibrations.



Key benefits

- Overview of relevant retrofit solutions
- Description of each solution
- Provides relevant data for the customer's internal business case evaluation

Applicability

- All MC/MC-C engines
- All ME/ME-C engines
- All ME-B engines

PMI VIT

Optimal tuning for MC engines

Description

The PMI for Variable Injection Timing (VIT) is an engine measurement and tuning product for mechanical MC and MC-C engines based on PMI Auto-tuning for ME engines. The PMI VIT system automates the engine measurement and tuning process, providing fuel saving and ensuring optimal engine performance at all times.

Key benefits

- Fuel savings
- Improved running performance and engine efficiency
- Lower engine maintenance costs and increases reliability
- Eased work load on the crew
- Automatic adjustment due to ambient conditions or fuel properties

Scope of supply

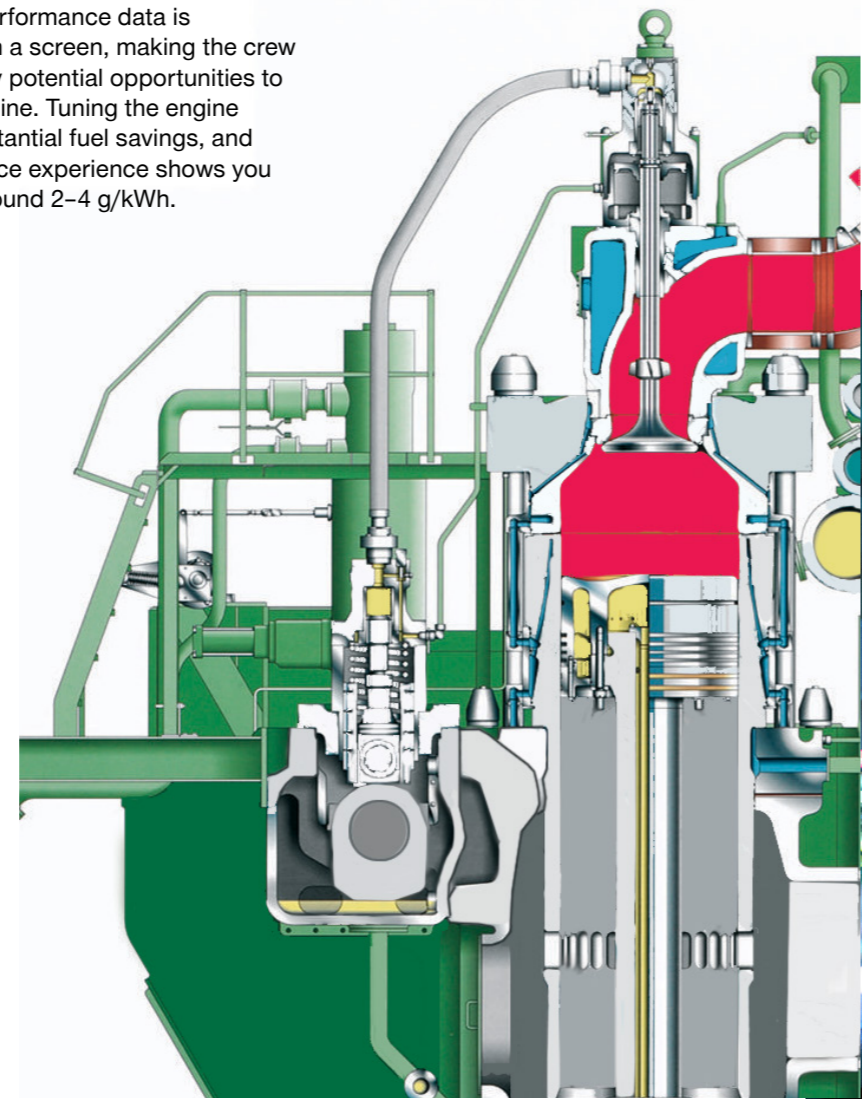
- PMI sensor Kit (Kistler) or PMI sensor Kit (ABB)
- PMI offline kit
- Electronic VIT system package
- Mechanical VIT system package
- Encoder
- VIT renovation kit

Applicability

- 50-98 MC/MC-C engines
- Installation of PMI VIT requires installed VIT fuel pumps
- All ME-B engines

Principle

The PMI VIT system is used for mechanically controlled MAN B&W two-stroke engines and ensures the optimal cylinder pressure by controlling fuel-injection timing via an electronic actuator on the VIT rack. The PMI VIT system makes it easy to monitor and troubleshoot the combustion process. Constant performance data is displayed on a screen, making the crew aware of any potential opportunities to tune the engine. Tuning the engine means substantial fuel savings, and typical service experience shows you can save around 2-4 g/kWh.



MAN EcoTorque

It is no longer necessary to maintain a steady engine speed and waste fuel. The MAN EcoTorque energy system reduces fuel consumption to its maximum potential. Maintenance and repair costs is minimized while ensuring a productive and trouble-free operation. Invest in EcoTorque today and enjoy the highest level of fuel efficiency and engine performance available. This solution is economically beneficial – and your engine will thank you.

Description

MAN EcoTorque is the new default governor setting that actively controls the engine to keep the fuel index steady, thereby stabilizing the torque by letting the engine's speed float within a specified range.

Principle

The stabilized fuel index result in lower fuel consumption. Compared to operating the engine in "RPM mode", experience shows that "Torque mode" saves an approx. 1 g/kWh on the specific fuel oil consumption, while maintaining the same vessel speed.

The MAN EcoTorque functionality is installed on the main operating panel as "Torque mode". It is automatically activated when operating maneuver FULL and above.

Key benefits

- Improved cylinder liner condition
- Smoother engine operation
- The effect of external conditions on engine operation is minimized
- Prolongs the time between overhauls for cylinder liners and piston rings
- Approx. 1 g/kWh fuel saving
- Great return on investment

Scope of supply

- MAN EcoTorque software

Applicability

- All ME engines



PMI Autotuning

PMI Auto-tuning is MAN Energy Solutions automated performance optimization system. Automatic engine monitoring and tuning of Pmax. The system will automatically adjust the individual cylinder's Pmax according to live-measurements from sensors on each cylinder.

Description

PMI Auto-tuning is used for electronically controlled MAN B&W two-stroke engines. This PMI system configuration ensures the optimal cylinder pressure by adjusting the fuel-injection timing and the opening of the exhaust valve.

Key benefits

- Substantial fuel savings
- Improved running performance and engine efficiency
- Reduced engine maintenance costs and increased reliability
- Automatic engine adjustment in response to ambient conditions
- Reduced CO₂ and particulate emissions
- Installation can be carried out during normal service

Scope of supply

- PMI sensor Kit (Kistler) or PMI sensor Kit (ABB)
- PMI installation kit
- DAU 12 upgrade kit
- PMI offline kit

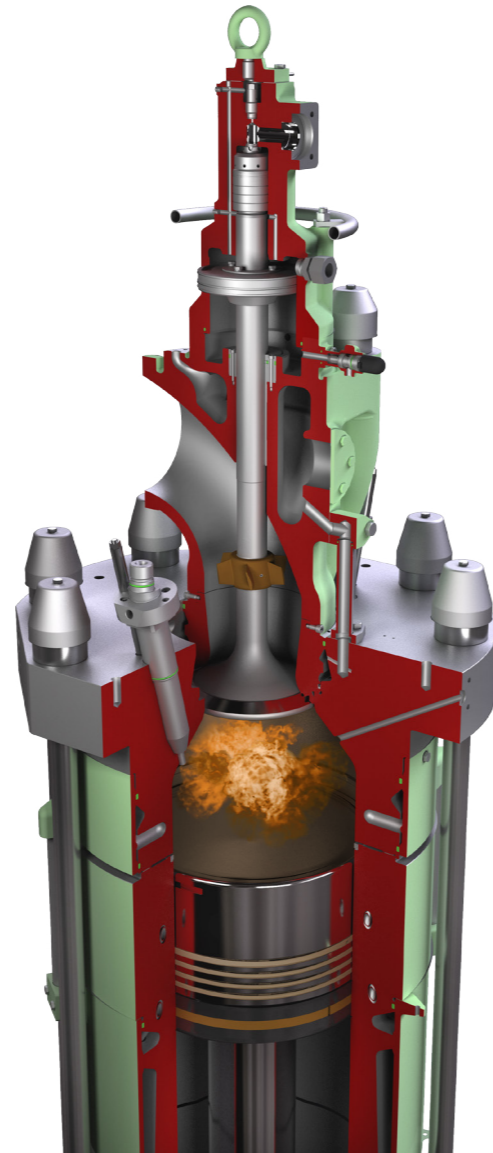
Principle

The PMI system makes it easy to monitor and troubleshoot the combustion process. Constant performance data are displayed on a screen, making the crew aware of any potential opportunities to tune the engine. Tuning the engine means substantial fuel savings where typical service experience shows you can save around 2–4 g/kWh.

The reduction in SFOC enables a CO₂ reduction. PMI Auto-tuning enable the vessel to automatically regulate combustion pressure. The result is an optimal combustion process that reduces fuel oil consumption by improving the performance of the engine.

Applicability

- All ME/ME-C engines
- All ME-B engines



PMI ACCo

With PMI Adaptive Cylinder Control, MAN Energy Solutions takes engine tuning to the next level. Using a new, patented algorithm, closed loop control ensures that each individual cylinder always operates at its optimal cylinder pressure. This gives you the best engine performance and lowest possible fuel consumption at all times.

Description

A successor to PMI Auto-tuning, PMI Adaptive Cylinder Control is a fully automatic system that will constantly help you secure optimal engine tuning regardless of engine load, load range, load changes, and varying fuel calorific values.

The core of the system is the patented closed loop control algorithm, which monitors and controls the pressure rise, compression pressure and the mean indicated pressure for each cylinder. Using values from the engine's performance trial as reference, the algorithm adjusts the fuel index and exhaust valve operation of each cylinder for optimal performance.

Principle

With PMI Adaptive Cylinder Control, it is no longer necessary to enter the fuel's calorific value. The system controls the individual cylinder's pressure and automatically adjusts for any fluctuations or changes to the fuel. Depending on your load profile, fuel savings will be 1 to 3.5 g/kWh compared to operation with PMI Auto-tuning.

The reliability of the system has also improved: In the event that an individual PMI sensor should fail, the control for that specific cylinder will switch to manual mode, while the remaining cylinders continue automatic operation unaffected.

Key benefits

- Fully automatic system
- Lowest possible fuel consumption at all times
- Improved engine tuning
- Slow steaming support
- Automatic adjustment for fuel variations
- Increased reliability
- Great return on investment

Scope of supply

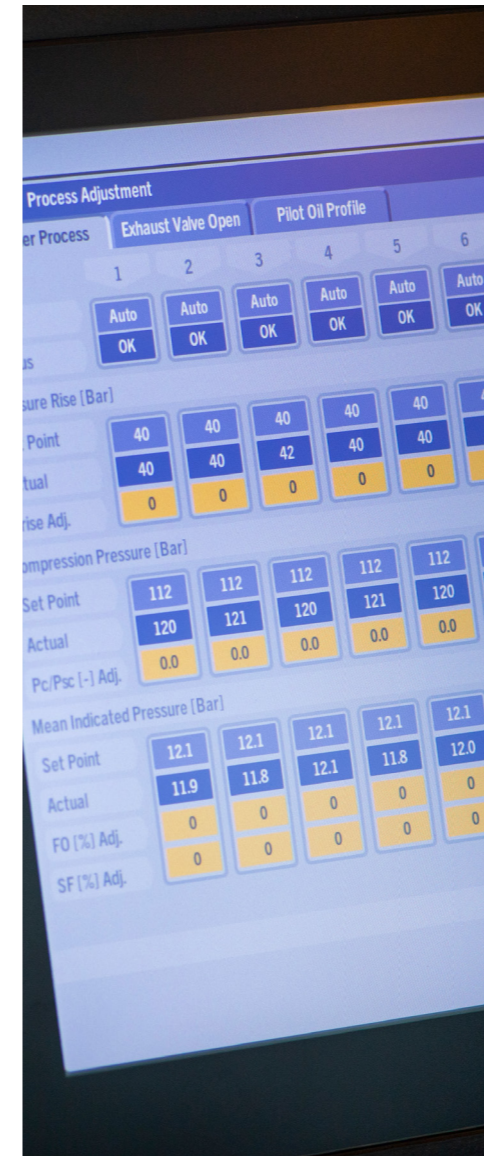
- PMI Adaptive Cylinder Control software

Applicability

- All ME-C engines with a Power Map

Reference List

- Standard configuration on engines since March 2020



Alpha lubricator

Alpha adaptive cylinder oil control (Alpha ACC): The Alpha ACC is based on an algorithm controlling the cylinder oil dosage proportionally to the sulphur content in the fuel.

Description

To explore the potential savings with the Alpha ACC, a large-scale testing programme was initiated on MAN B&W two-stroke MC and MC-C engines in service for a number of owners.

Results were positive, especially with respect to:

- Cylinder oil consumption
- Particle emissions
- Combustion chamber wear.

Scope of supply

Alpha Lubricator System retrofit for ships in service

Operating at sea:

- Mounting of Alpha Lubricators
- Installation of pump station
- Piping between Alpha Lubricators and pump station
- Cabling between Alpha Lubricators and Alpha Lubricator control unit
- Piping from Alpha Lubricator up to T-piece (but not final connection to T-piece)

Principle

The cylinder oil amount is controlled by the Alpha Lubricator control unit.

Two criteria determine the control:

- The cylinder oil dosage must be proportional to the sulphur content in the fuel
- The cylinder oil dosage must be proportional to the engine load, i.e. the amount of fuel entering the cylinders.

Implementation of the above two criteria leads to an optimal cylinder oil dosage.

Key benefits

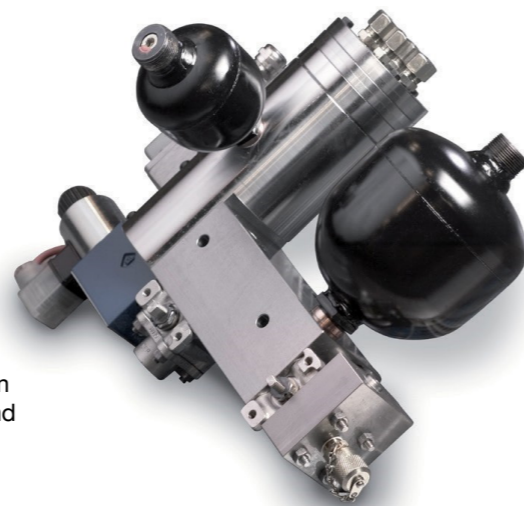
- Significant savings on cylinder oil
- Lower particle emission levels
- Reduced combustion chamber wear.

Applicability

Alpha Lubricator retrofit installations are carried out according to the owner's choice.

- Provision of parts
- Provision of parts and supervision
- Provision of parts, supervision and installation teams
- Turnkey projects.

As the main element of cylinder liner wear is of a corrosive nature, the amount of neutralising alkaline components needed in the cylinder will therefore be proportional to the amount of sulphur which generates sulphurous acids entering the cylinders. A minimum cylinder oil dosage is also set in order to satisfy the other requirements of a lubricant, such as providing an adequate oil film and detergency properties.



Alpha lub MC upgrade

The Alpha Lubricator upgrade is a major improvement of the system. By adopting the new lubricator layout, complete lubrication optimisation at all engine loads is now possible.

Description

In early 2012, a new layout of the Alpha Lubricator on new MC engines was introduced. Along with a number of design improvements, the injection volume and frequency have been changed in order to optimise the cylinder oil consumption at low loads.

The Alpha Lubricator upgrade has been introduced as a retrofit solution, to optimise the cylinder oil consumption on existing engines.

Substantial over-lubrication at low load generates deposits on the piston crown and rings, increasing the risk of cylinder liner damage.

In addition, over-lubrication generates excess costs for unnecessary lubricating oil.

Scope of Content

The Alpha Lubricator upgrade, slow steaming kit, comprises a new MCU, including the latest software, and the improved lubricator layout:

MCU Mk 2: New hardware version, plug- and-play in existing ALCU. New software with upgraded algorithm and system interface

Key benefits

- Cylinder lubrication oil savings of 20-50% at low load
- More accurate feed rate control at all engine loads
- Minimising over-lubrication at low load, reducing deposits, hence improving the cylinder condition
- Implementation of design features
- Upgraded interface to the latest software version

Lubricators: Complete lubricators with all new design features (recommended at the standard 5-year lubricator overhaul)

or:

Lubricator kits: Parts to modify the lubricators for optimised slow steaming operation (solenoid valves, accumulators, etc. must be in good working condition).

Scope of supply

Each set of Alpha Lubricator Upgrade consists of:

- 1 pc. MCU MK 2.5
- Complete pcs. of lubricator upgrade kits

Applicability

- Installation of MCU
- Modification of existing Alpha Lubricators



Alpha lub ME upgrade

The Alpha Lubricator ME upgrade is an improvement to the existing Alpha Lubricators for ME engines. The upgrade involves the software and hardware of existing ME Alpha Lubricator and changes the lubrication pattern of ME engines.

Description

The upgrade increases the frequency of cylinder lubrication across all engine loads and, at the same time, reduces the amount of cylinder oil injected during each stroke, thereby effectively reducing the daily consumption of cylinder lube oil.

Most engines in service are designed with a long lubricator stroke length and a large diameter of the lubricator plungers. This leads to higher cylinder lube oil volumes being injected at each stroke. As a result, the frequency of injection is kept at a minimum level to prevent over-lubrication.

Key benefits

- Reduction in liner wear rate of up to 55%
- Savings in cylinder lube oil consumption of up to 30%
- Accurate feed rate control at all engine loads
- No attendance cost if ECS version is already installed on the vessel

Applicability

- ME engine

Principle

The new software intelligently increases the frequency of cylinder lube oil injections based on engine load. The frequent injections ensure that the cylinder liner is always covered with sufficient lube oil and has sufficient load carrying capacity to reduce the abrasion between cylinder liner and piston rings.

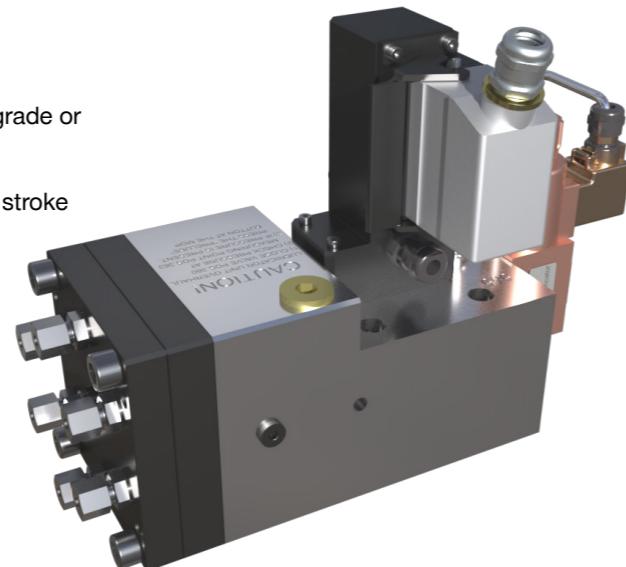
Test results have shown a reduction in iron content in the scrape down analysis by up to 40%.

Scope of supply

- ECS software version upgrade or parameter update
- Small diameter plungers
- Spacers for adjusting the stroke length
- 5 bar non-return valves
- Other upgrade items depending on the engine configuration

The reduction in plunger diameter ensures injection of the smallest volume of cylinder lube oil throughout the loads of engine. Second, the stroke length of the lubricators is reduced. The reduction in stroke length also contributes to reducing the cylinder oil volume injected across the loads of the engine.

The software and hardware changes have been developed for each engine type to ensure that the total cylinder lube oil consumption is reduced while providing a frequent lubrication for the engine.



Safety screen filter

Protection of Proportional Valve

Description

The Safety Screen Filter is a 100 micron filter developed for ME/ME-C and ME-B engines. The Safety Screen Filter ensures continuous operation of the multi-way valves by protecting the proportional valve from contaminants in the hydraulic oil.

Proper functionality of the proportional valve relies on clean hydraulic oil. This should be ensured by a 6 micron automatic back-flushing filter. However, if unsuspected large particles have entered the hydraulic system, e.g. from a maintenance job, these particles can cause the proportional valve to malfunction.

Principle

The Safety Screen Filter protects the proportional valve against the large particles and, thereby, potentially prevents an unexpected cover lift.

Particles might interfere the functionality of the proportional valve. This could lead to engine stoppage and dismantling of the proportional valve. A Safety Screen Filter can prevent this situation from occurring.

Key benefits

- Protect proportional valve against malfunction
- Reduce risk of cover lift
- Improve reliability
- Safety for crew
- Easy installation done by crew

Scope of supply

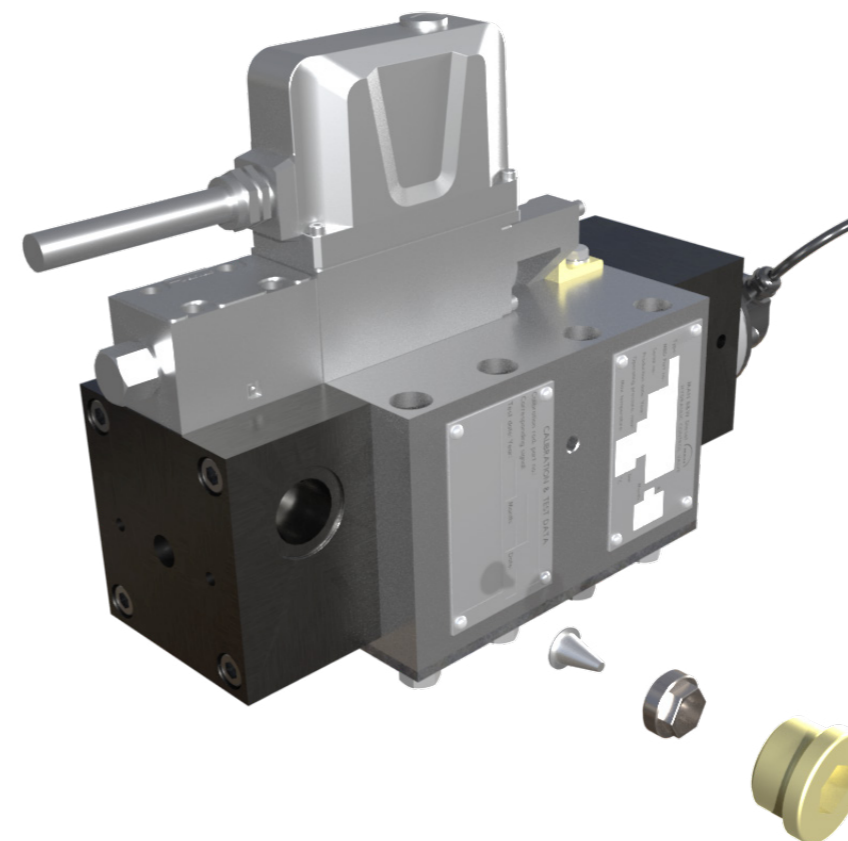
- New bottom piece with filter
- Nut, plug and packing set

Applicability

- All ME, ME-B & ME-C engines.

Reference List

- The Safety Screen Filter is a solution for new ME/ME-C and ME-B engines and is installed on approximately 700 engines.



Dynamic limiter function

The dynamic limiter function (DLF) is a new engine control system functionality that has been developed to improve engine and ship acceleration, maneuverability and crash-stop.

Description

The dynamic limiter function system adjusts the engine operating parameters for maximum torque when required and for maximum 30 minutes. When the DLF has been active for 30 minutes it will gradually roll back to the normal fuel index limiters.

Key benefits

- Improved maneuverability
- Improved engine and ship acceleration
- Quick passage of barred speed range
- Improved crash-stop performance
- Fully automatic

Scope of supply

Dynamic limiter function software that can be retrofitted without renewing torsional vibration measurements.

Applicability

- All ME-C engines
- All ME-B engines

Principle

A sufficient propeller light running margin is still needed to achieve sufficient engine power and vessel speed in long lasting heavy conditions

The idea behind DLF is that accelerations are short events that occur at below maximum power and engine speed. In such situations, it is possible to generate higher torque, and thereby power, without jeopardizing engine reliability.

Quick passage of barred speed range
Due to excessive torsional vibrations at the main critical resonance, many shaft lines have a barred speed range (BSR). In order not to damage the shaft line, it must be possible to pass the barred speed range quickly in all relevant conditions.



MAN load optimizer

MAN Load Optimizer is an engine control system update developed to improve cylinder liner condition and reduce excessive wear.

Description

MAN Load Optimizer is an engine control system update that has been developed to improve cylinder liner condition and reduce the risk of excessive wear.

Using a new set of features and functionalities, it protects the engine during load-up and load changes.

Principle

A new set of features protects your engine from sudden rapid power increases in the full load range. Such sudden power increases can occur if the external conditions for the vessel changes, and will cause the fuel index to rapidly increase, which can affect the cylinder condition adversely.

Your engine is further protected as MAN Load Optimizer continuously quantify the actual engine load according to the nominal propeller curve and adjusts if the engine is running heavy. This limits the permissible pressure rise in the cylinder and reduces the surface contact pressure from the piston rings on the cylinder liner, which protects both cylinder liner and piston rings.

Key benefits

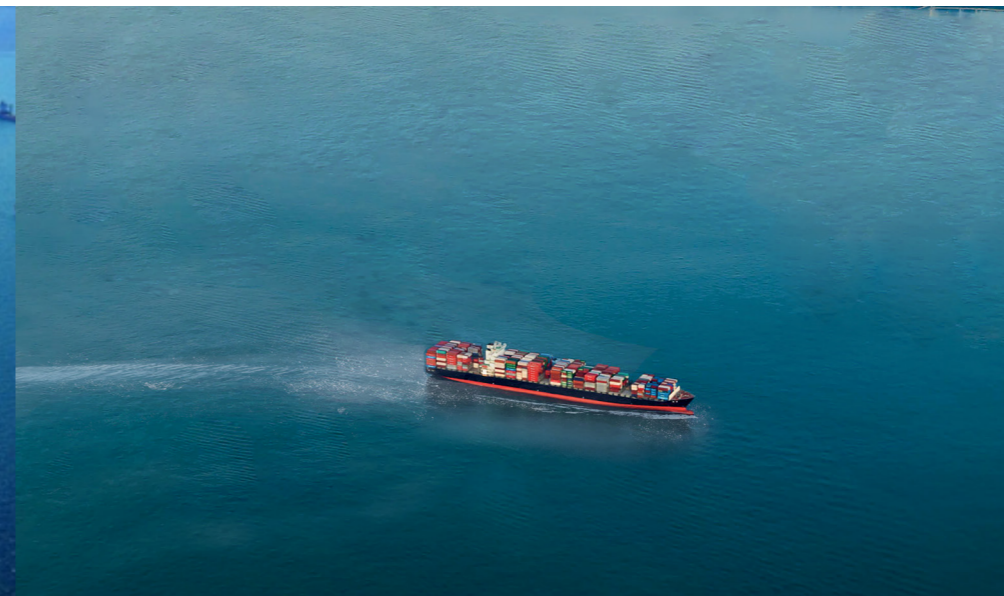
- Improved cylinder liner condition and protection of piston rings
- Minimized unplanned maintenance
- Fully automatic system

Scope of supply

MAN Load Optimizer software

Applicability

- All ME-C engines 80 bore and larger
- mark 9 and newer.



ECS EasyDetect

An upgrade of the engine control system power supply enables easy troubleshooting and improved reliability

Description

On older ME-C and ME-B engines, the engine control system (ECS) controllers and the multi-purpose controllers (MPCs) have a common power supply. This means that the isolation resistance from the ECS power circuit to ground for all controllers and all components connected to the ECS can only be monitored in one place.

Key benefits

- Swift identification of cable failures or loose connections
- Quick identification of defective components, i.e. sensors, cables, or controllers
- Less downtime
- Peace of mind for the crew who has the best trouble-shooting tool available
- Online monitoring of the isolation level as well as noise pulse counts

Scope of supply

- Insulation detection modules
- Power supply units with galvanic separation
- Upgrade of the engine control system, if necessary

Principle

The upgrade separates the power supply for all MPCs in the ECS (Fig.1), equips all controllers with isolation resistance monitoring (IRM) modules (Fig. 2) and updates the ECS-software.

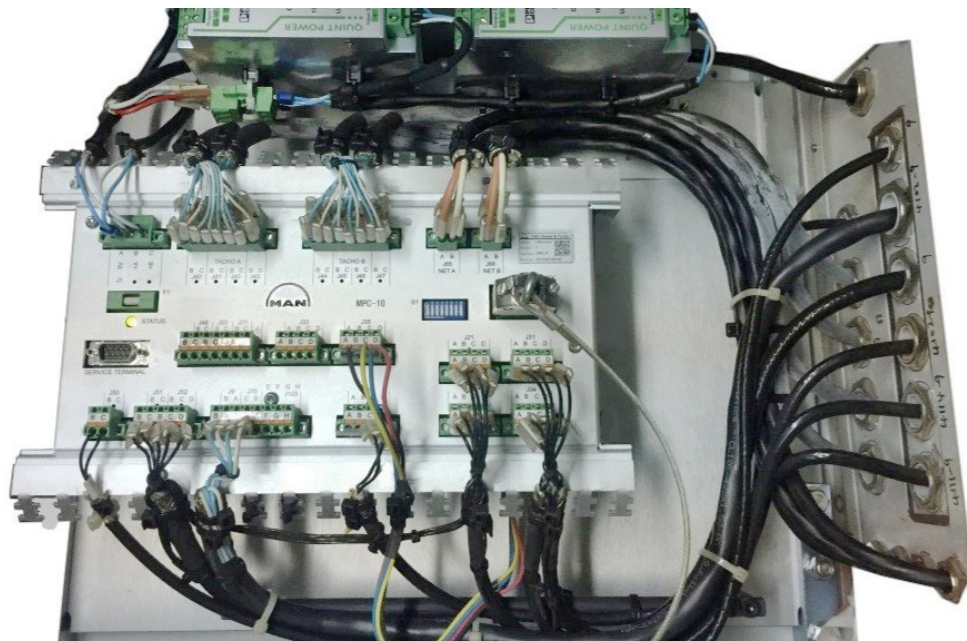
This upgrade enables easy monitoring of the isolation resistance on each individual controller of the ECS, which is displayed on the MOP (Fig. 3) and logged in the CoCoS engine diagnostics system.

Applicability

All ME-C and ME-B engines

This upgrade enables easy monitoring of the isolation resistance on each individual controller of the ECS, which is displayed on the MOP (Fig. 3) and logged in the CoCoS engine diagnostics system.

With these new tools at hand, the troubleshooting efforts can be focused on the correct part of the system, and the data logs allows for any correlation with other events to be tracked, making troubleshooting faster and easier.



MAN EngineVault

Cybercrime is a fast-growing threat in many industries. Studies predicted that the total cost of cybercrime exceeded USD 6 trillion in 2021. And ransomware attacks – not uncommon in shipping – were increasing by 350% a year. These attacks can be perpetrated through online hacking, or carried out onboard via simple physical means, such as USB flash drives.

Description

Cybersecurity in our industry is not as tightly regulated as in aviation, for example – although this has changed on January 1, 2021, when the IMO, SIRE and SOLAS start requiring operators to address the issue. Insuring against cyberattacks is not standard practice either, and insurance policies do not normally cover acts of war, terrorism or employee malice – which very well could be the source of a cyberattack.

Principle

MAN EngineVault gives you the best possible protection of your main engine network from online and physical cyberattacks. Unique in the industry, it combines state-of-the-art software and hardware to provide firewall protection, comprehensive whitelisting and application-layer protection that seals off your engine network from virtually any threat – including on-board attacks via compromised USB flash drives and other physical media.

Key benefits

- Uniquely effective protection against cybercrimes
- Lower risk of service disruptions and off-hire periods
- Greater safety for crews, and protection of physical assets
- Compliance with regulations and IMO requirements
- Ensure business continuity and protect your reputation
- Enabled for the coming remote MAN Security Update Service
- Enables you for other current and future retrofit products

Scope of supply

- 1x Managed Switch
- 1x mGuard
- 1x EMS-MOP
- 2x EC-MOP IV

Applicability

- One day of service attendance by Superintendent
- Attendance can be performed in port, at anchorage or during dockings
- Vessel will be immobilized for up to 5 hrs.
- Vessel specific hardware will be pre-configured before shipment



MAN OPL MC

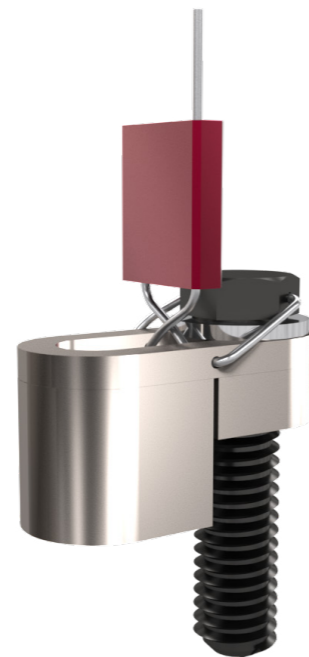
MAN Overridable Power Limitation MC

Description

MAN Overridable Power Limitation (OPL) is a retrofit solution designed to lower the energy efficiency index for existing ships (EEXI) by limiting the engine power of the existing fleet to comply with the IMO resolution MEPC 335 (76) adopted on 17 June 2021.

Principle

MAN OPL is a measure to limit the main engine's maximum continuous rating (MCR), with the possibility to be overridden if the safety of the vessel is compromised. The MAN OPL is a mechanical stopper device for limiting the fuel index. The solution is tamper proof, which includes that the MAN OPL solution cannot be overridden via local control.



Key benefits

- Simple solution, fast and easy way to limit the power output of engines or un-limit the engine if additional power is needed and allowed
- No additional systems required
- Easy installation, can be done by service engineer during normal port stay
- OPL system can be activated on the first survey day in 2023

Applicability

- All two stroke MC engines

MAN OPL ME

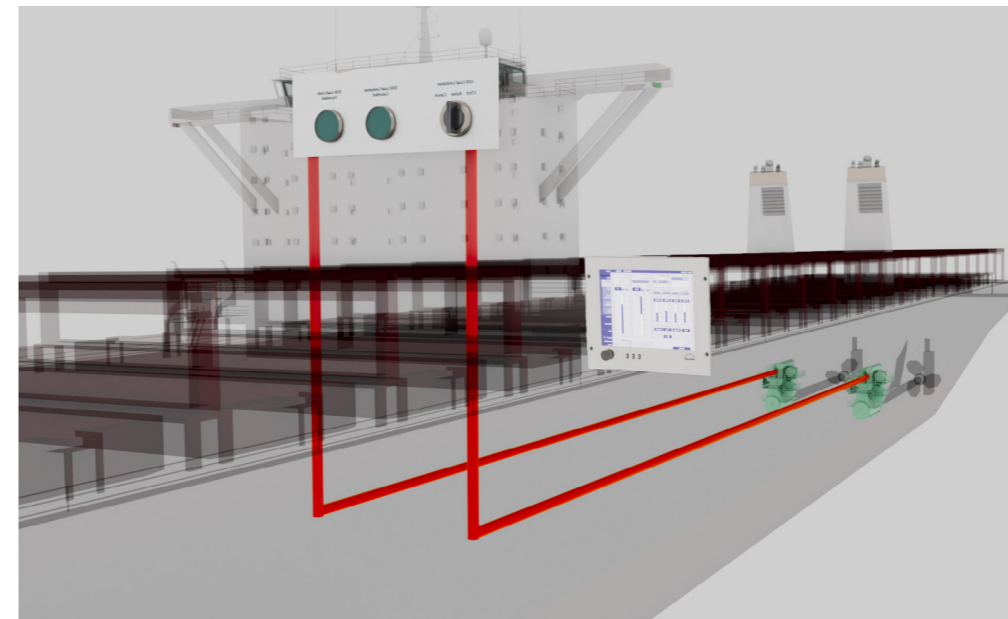
MAN Overridable Power Limitation ME

Description

MAN Overridable Power Limitation (OPL) is a retrofit solution designed to lower the energy efficiency index for existing ships (EEXI) by limiting the engine power to comply with the IMO resolution MEPC 335(76) adopted on 17 of June 2021.

Principle

MAN OPL for electronically controlled ME type engines is a solution that consists of software and hardware. The engine power is limited electronically by installing a new software and parameter file in the engine control system (ECS). The MAN OPL is controlled via a remote operating panel consisting of a switch and control lamps installed either on the Bridge or in the engine control room.



Key benefits

- Simple solution, fast and easy way to limit the power output of engines or un-limit the engine if additional power is needed and allowed
- No additional equipment needed
- Easy installation, can be done by service engineer during normal port stay
- OPL system can be activated on the first survey day in 2023

Applicability

- All two stroke ME engines (ME-C and ME-B)

MAN PPL MC

MAN Permanent Power Limitation (PPL) is a retrofit solution designed to lower the energy efficiency index for existing ships (EEXI) by limiting the engine power to comply with the IMO resolution MEPC 335(76) adopted on 17 June 2021.

Description

MAN PPL is a wire seal that limits the engine power by restricting the fuel index to a pre-calculated set value.

Implementing the EEXI PPL solution allows the vessel to use the 75% PME rule given in the EEXI regulations MEPC.333(76) 2.2.1. Please consult with your classification society in order to verify that a permanent power limitation can be used for the specific vessel.

Principle

When installing the wire seal, adaptation of the stop screw on board the vessel is necessary to match the limited fuel index from EPL report. Holes are drilled through stop crew, counter-nut and bracket where the seal is to be mounted. The wire seal is marked with a unique serial number and an MAN Energy Solutions TRUST marking for easy identification and verification.

A surveyor can verify the PPL installation by the following means

- Check serial number on seal against ship's log
- Check actual limited index against calculated limited index in the EPL report

Key benefits

- Simple solution – fast and easy way to limit the power output of MC engines
- No additional systems necessary, such as remote controls and logging devices

Scope of supply

- 1 TRUST-marked wire seal
- Drill
- EPL report

Applicability

Applicable for two-stroke MC, MC-C engines



MAN PPL ME

MAN Permanent Power Limitation (PPL) is a retrofit solution designed to lower the energy efficiency index for existing ships (EEXI) by limiting the engine power to comply with the IMO resolution MEPC 335(76) adopted on 17 June 2021.

Description

MAN PPL for electronically controlled ME type engines is a solution consisting of software. The engine power is limited electronically by installing a new software and parameter file in the engine control system (ECS).

MAN PPL is a measure to limit the main engine's maximum continuous rating (MCR).

Principle

The ECS calculates the engine load continuously. The calculation is based on engine speed, fuel index, and cylinder pressure. The fuel index will remain unlimited until the power limit is reached.

Implementing the EEXI PPL solution allows the vessel to use the 75% PME rule given in the EEXI regulations MEPC.333(76) 2.2.1. Please consult with your classification society in order to verify that a permanent power limitation can be used for the specific vessel.

Key benefits

- Simple solution – fast and easy way to limit the engine power output
- No additional systems are necessary, such as remote controls and logging devices
- Easy installation – depending on the current ECS software version, as the installation can be done remotely or by an MAN service engineer during a port stay

Scope of supply

- Software update (if necessary)
- EPL Report

Applicability

Applicable for two-stroke ME-C engines

Slide fuel valve

This type of valve reduces the amount of waste products, gives better combustion properties and is a must-have for slow-steaming operation.

Description

The spray pattern of the fuel is further optimised leading to an improved and more complete combustion process. This results in less deposits throughout the gas ways and a reduction in overall emissions, such as HC, and particulate matter. The visible smoke level is also greatly reduced as a result of the improved combustion.

The need for maintenance is reduced with the cleaner gas ways, and testing procedures are simpler thanks to the improved design.

Scope of supply

Each set of the Slide Fuel Valve system consists of:

- Complete set of Slide Fuel Valves
- Complete set of spare Slide Fuel Valves
- Complete set of spare Slide Fuel Valves for spare cylinder covers
- Complete set of maintenance tools, including:
 - Cleaning tool for fuel valve
 - Cleaning tool for fuel nozzle
 - Grind mandrel-valve head
 - Grind mandrel f. thrust spindle
 - Grind mandrel holder outside
 - Grind mandrel holder inside
 - Adapter unit type PPMI 1000
 - Milling and grinding tools, if necessary

Cleaner Exhaust Gas Ways

The following photograph illustrates key benefits of retrofitting a slide fuel valve. The left side of the photo shows an exhaust valve bottom piece with substantial deposits caused by an incomplete combustion process.

The right side of the photo shows the same valve seat after installation of a slide fuel valve. The photo was taken after 890 running hours with the new slide fuel valve. No additional cleaning or scraping was done when retrofitting the new type of fuel valve.

Key benefits

- Improved low load performance
- Cleaner combustion chamber
- Cleaner exhaust gas pathways
- Less visible smoke formation
- Lower HC, and particulate emission
- Improved cylinder condition.



What is an Approved Method (AM) for MAN B&W Engines

As slide fuel valves often reduce NOX emissions, they are also used in the development of AMs. An AM is a method to document that it will bring an engine in compliance with the present Tier I NOX limits.

An AM developed by MAN Energy Solutions comprises a slide fuel valve upgrade and documentation. An AM File (AMF) will be issued. The AMF is similar to a NOX Technological File issued for engines built after 2000, but in a reduced format.

Applicability

- Installation of Slide Fuel Valves
- Adjustments of the fuel pump index and Pmax.
- If necessary: dismantling and modification of cylinder covers.

SO_x scrubber engineering services

Starting in January 2020, the global sulphur cap on marine fuels will be reduced from 3.50% to 0.50% sulphur.

Description

Continued use of high-sulphur HFO will be allowed if an exhaust gas cleaning (EGC) device is installed and certified, to comply with the new sulphur regulations. This device could be a SOx scrubber.

Principle

Retrofitting a SOx scrubber may require engine modifications and a technical file amendment to ensure continued compliance with IMO's NOx Technical Code 2008.

MAN PrimeServ offers a SOx scrubber engineering service package with recommendations on the turbocharger rematching parts and approval by relevant classification societies if needed.

The turbocharger rematching will ensure that the fuel oil consumption will remain as optimal as before installation of a SOx scrubber, that NOx emission level will remain unchanged, and that the engine heat load will stay within the expected range.

More information can be found in our service letter: SL2018-665

Key benefits

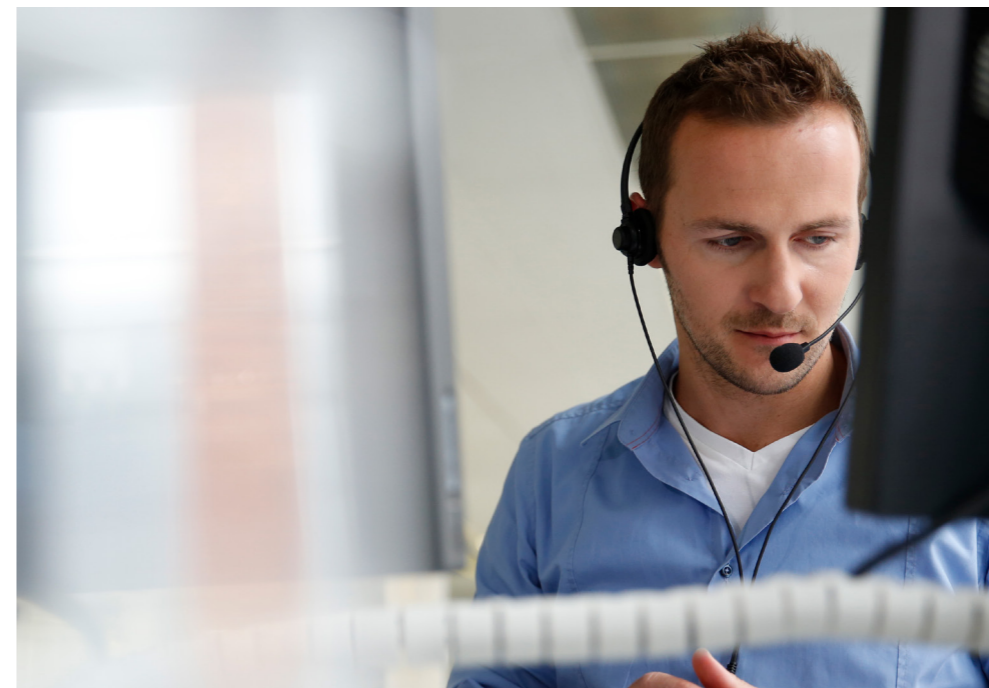
- Ensure optimal engine performance
- Avoid heat load issues on exhaust valve piston, cover, fuel nozzle, etc.
- Comply with the provisions of NOx Technical Code 2008

Scope of supply

- Report with exhaust gas data
- Report with recommendation of turbocharger re-matching
- Turbocharger re-matching parts

Applicability

- All engines



MAN FIVA/ELFI ELVA

Retrofit from Curtiss-Wright FIVA to MAN FIVA

Description

MAN FIVA, ELFI and ELVA The FIVA (fuel injection valve actuation), ELFI (electronic fuel injection) and ELVA (electronic valve actuation) valves are an essential part of the ME engine to ensure optimal running performance. The electronic valves are high-precision units which controls either the fuel injection, the exhaust valve actuation or both.

Key benefits

- Up-to-date technology and design
- Increased lifetime
- Factory overhaul
- MAN FIVA spares guaranteed
- Worldwide service of MAN FIVA valves
- Reduced maintenance costs

Scope of supply

- Complete MAN FIVA valves including proportional valves and inductive sensor
- New cables to CCU including junction box between CCU and MAN FIVA valve

Applicability

- All ME-C engines
- All ME-B engines

Principle

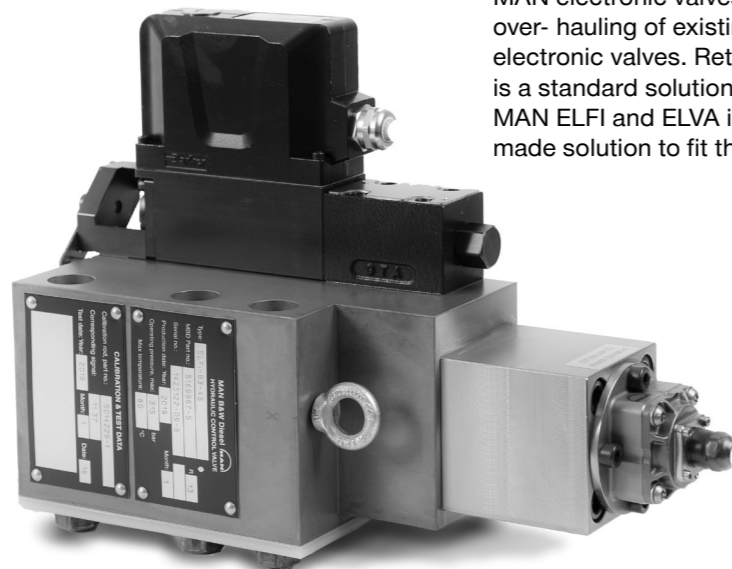
In this way, the electronic valves serve the same function on an electronically controlled ME engine as the camshaft on a mechanically controlled MC engine.

Curtiss-Wright electronic valves

Curtiss-Wright (CWAT) has ceased their production of electronic valves, so it is no longer possible to purchase new CWAT electronic valves.

Reference List

- Sold to approx. 40 engines



MAN PrimeServ has stopped the overhauling support of CWAT electronic valves. Therefore, MAN PrimeServ recommends a retrofit solution where we convert existing CWAT electronic valves to MAN electronic valves.

Retrofit to MAN electronic valves

MAN PrimeServ offers and recommends a retrofit solution to MAN electronic valves. This is a long-term solution that includes the latest technology and ensures safety for the future as MAN offers brand new MAN electronic valves as well as overhauling of existing MAN electronic valves. Retrofit to MAN FIVA is a standard solution while retrofit to MAN ELFI and ELVA is a custom made solution to fit the HCU-block.

Cat fines filter

Catalytic particle fuel oil filter. Catalytic (cat) fines are small, very hard particles from the refining process. They are used as a catalyst and occur in a higher level in low-sulphur fuel. As they wear the engine fast, it is highly recommended to use a filter to clean the fuel and remove the cat fines.

Description

Catalytic (cat) fines are small, very hard particles from the refining process. They are used as a catalyst and occur in higher concentration in low-sulphur fuel. As they wear the engine quickly, we strongly recommend using a filter to clean the fuel and remove the cat fines. The Cat Fines Filter (CFF) operates in the fuel cleaning system. It reduces the cat fines level in the fuel, thus reducing the wear and damage that the cat fines would otherwise inflict on the engine cylinders and fuel equipment.

Principle

The cat fines filter has a 10 micron auto-filter with backflushing capability. This means that the system filters the oil continuously on all filter candles except one, which is in cleaning/standby mode. If the pressure gets too high, an automatic warning is released to the control box. If the content of cat fines in the fuel increases, the period between backflushings will be shorter.

Therefore, this is not only a filter, but also a very good indicator of bad fuel quality. With the introduction of the 0.50% sulphur cap from 2020, an increase in the level of cat fines in fuel is expected. The cat fines filter is therefore a good preventive solution that will benefit the engine.

Key benefits

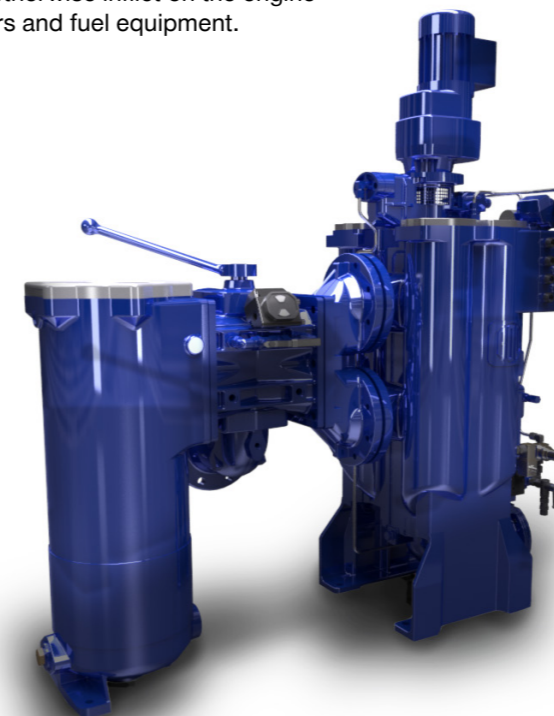
- Improved fuel oil cleanliness
- Solution is recommended for all new buildings (see SL 2017-638 DOJA)
- Preventive solution
- IMO 2020 ready
- Significantly lower risk of damage

Scope of supply

- Cat fines filter unit with bypass filter
- Control box
- Spare filter candles optional

Applicability

- Available for all two-stroke and four-stroke engines.
- Installation point for optimal effect is in the fuel circulation line.
- Installation can be carried out either during docking or during port stay



Super fine filter

Improved cleanliness of hydraulic oil. The Super Fine Filter (SFF) is a filter element developed for electronically controlled ME/ME-C and ME-B engines. The Super Fine Filter improves the cleanliness of the hydraulic system oil, and is now standard on new ME engines.

Description

The lubricating and cooling oil system on an engine lubricates the main bearings, thrust bearing, axial vibration damper, piston cooling, crosshead bearings and crankpin bearings. It also supplies oil to the complete hydraulic system on the ME engine and to the moment compensator and torsional vibration damper, unless the engine has a separate system for hydraulic control oil.

Principle

The ME engine consists of many expensive and fine-tolerance components, like the hydraulic power supply, FIVA/ ELFI valve, fuel booster, exhaust actuator, etc. The Super Fine Filter (see fig. 1) has been developed to improve the cleanliness of the hydraulic oil going to the ME engine, in order to keep it within the ME engine system cleanliness level. The SFF is fitted in the redundancy filter compartment.

Reference

- The Super Fine Filter is a proven solution on ME/ME-C and ME-B engines delivered since the beginning of 2015
- More than 400 SFF retrofitted

The Super Fine Filter should be used once every month. We also recommend to use it after topping-up the hydraulic oil main tank. This will improve the cleanliness of the hydraulic oil going to the lubrication parts and the ME engine. Moreover, early replacement of ME engine components can be avoided.

Key benefits

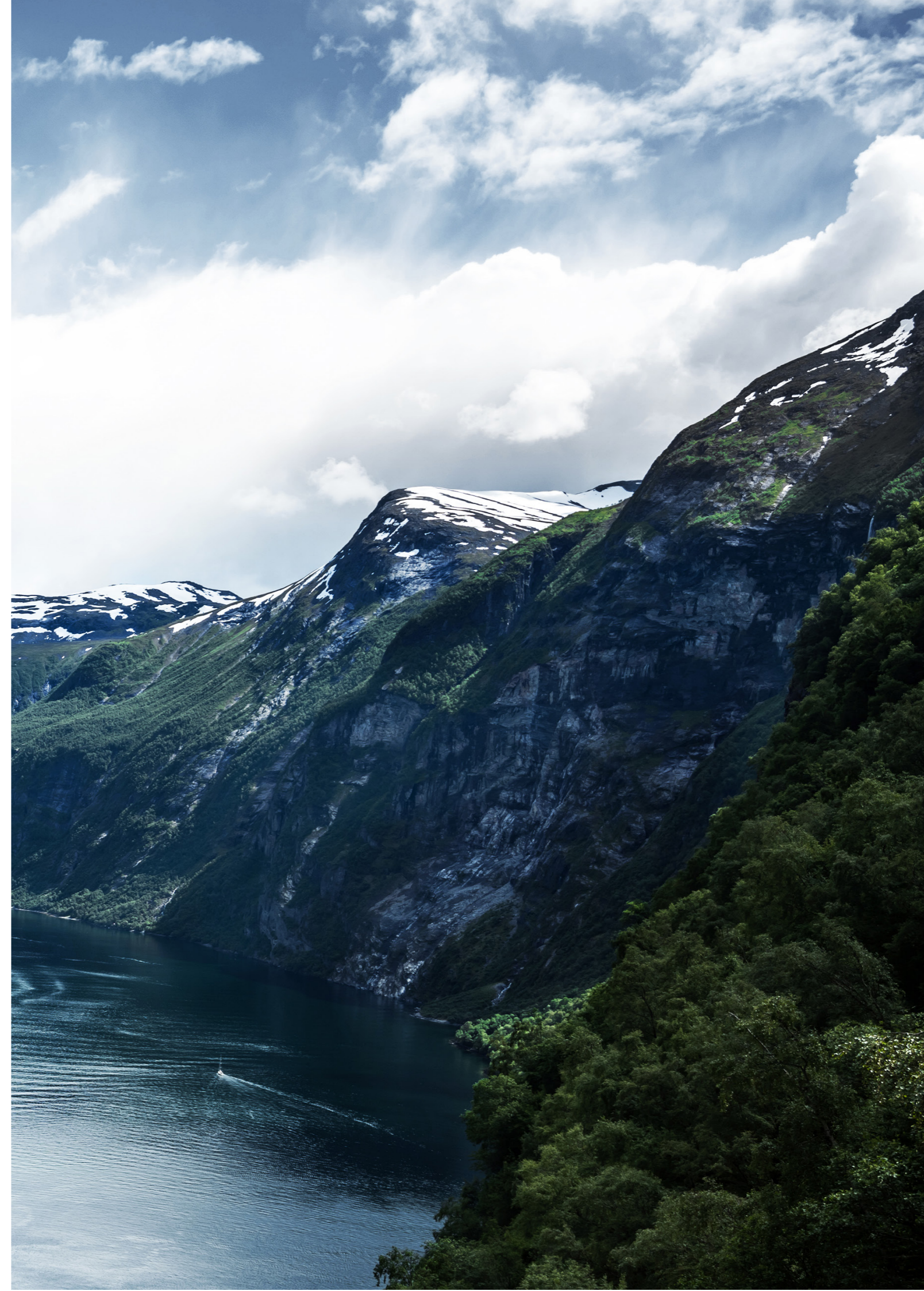
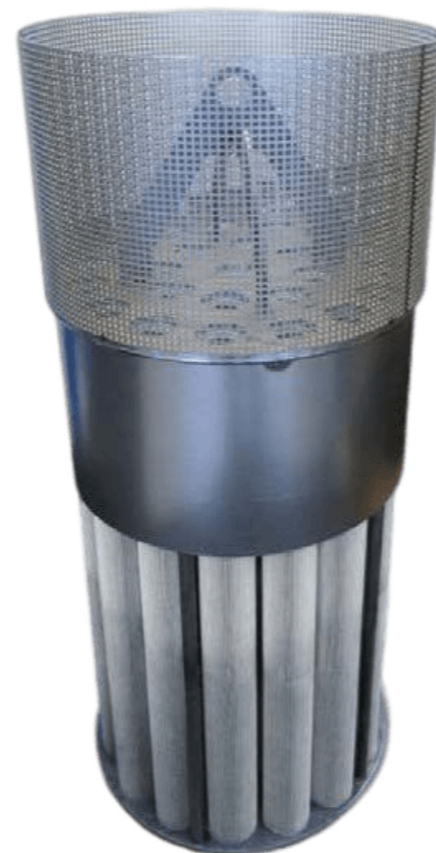
- Significantly reduced risk of damage to expensive ME engine components and internal lubrication parts
- Improved cleanliness of hydraulic oil
- No need to install separate system for hydraulic control oil
- Low-cost solution
- Plug & play – easy installation

Scope of supply

- Super Fine Filter with cartridges mounted on a cartridge holder. Plug & play for easy installation by the ship crew.

Applicability

- ME/ME-C with specific filter type
- ME-B with specific filter type



Product overview

Retrofit & upgrade

Safety & reliability
Safeguards your engine, equipment and personnel, while improving the overall reliability of your engine equipment

Emission management
Ensure your engine is up to date with the emissions standards and your emissions ratings are favorable.

Operational improvement
Prolong your time between overhaul, reduce your operational costs and extend the lifetime of your engine equipment

	Safety Screen Filter	Dynamic Limiter Function	MAN Load Optimizer	ECS Easy-Detect	MAN Engine-Vault	MAN OPL MC	MAN OPL ME	MAN PPL MC	MAN PPL ME	Slide Fuel Valve	Sox Scrubber Engineering Service	MAN FIVA	Cat Fines Filter	Super Fine Filter
Benefits														
Save fuel oil						✓	✓	✓	✓	✓	✓			
Slow steaming										✓				
Save lubricating oil										✓				
Flexible operation		✓	✓							✓		✓		
Reduce emissions	✓			✓		✓	✓	✓	✓	✓	✓		✓	✓
Reduce maintenance			✓							✓	✓	✓	✓	✓
Increase TBO	✓		✓							✓	✓		✓	
Improve performance	✓	✓	✓							✓				
Improve safety		✓	✓		✓					✓				
Applicable for														
MC/MC-C										✓			✓	
ME/ME-C	✓	✓	✓	✓	✓					✓	✓	✓	✓	✓
ME-B	✓									✓				

MAN PrimeServ

Service with passion

MAN PrimeServ is the dedicated MAN Energy Solutions service brand. Via a network of over 100 service centers worldwide, MAN PrimeServ provides 24/7 service across the globe. Our range of services includes technical support, consulting and OEM spares, as well as maintenance, repair and comprehensive individualized service plans.



365

days a year

24

hours a day

MAN PrimeServ's aim is to provide

- Prompt delivery of high-demand OEM spare parts within 24 hours
- Fast, reliable and competent customer support
- Individually tailored O&M contracts
- Ongoing training and qualification of operators and maintenance staff
- Global service, 24 hours a day, 365 days a year
- Diagnosis and troubleshooting with our high-performance Online Service



MAN Energy Solutions and legacy brands

MAN PrimeServ is our brand name for high-quality aftersales support for the entire MAN Energy Solutions product portfolio. Through refinements to our products and repair techniques, we ensure and enhance our technological leadership and technical expertise as an original equipment manufacturer (OEM) for the brands united under MAN Energy Solutions.

Worldwide service

We offer retrofitting and upgrade services to bring engines and turbochargers already in service up to the very latest standards of performance and efficiency.

Represented in all key markets and major ports, with a network of more than 100 service centers, and with skilled field service managers at the ready to provide first-class technical support, MAN PrimeServ is fully primed to provide 24/7 service, wherever you are. In power plants, marine engines & systems and turbomachinery, offering reliable technical support when you need it most, our service solutions include OEM spare parts, engine and machinery maintenance and repairs, customized service agreements, and individual consulting.

For existing equipment, our holistic retrofit and modernization solutions keep your engines or turbochargers up-to-date and at optimal levels of reliability, availability, and economic

efficiency. Through cutting-edge digital technology we are able to hike performance and minimize downtimes, while our remote connections enable live data analysis, ensuring quick, and effective solutions. MAN PrimeServ Academies provide expert training courses around the world, developing the operational and maintenance skills required.

For more information please visit
www.man-es.com/services

100

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