

92/3
All types

Maintenance of the lub. oil protective strainer

On all MaK engines **directly before inlet** of the lubricating oil into the engine a protective strainer is fitted. Its main purpose is to keep dirt particles from the engine-which may be in the pipe system behind the filter circuit as a consequence of shipyard works or repairs. This protective strainer has a 200 µm filter gauze insert and must be checked resp. cleaned, therefore, at certain intervals.

In the Operating and Maintenance Instructions the maintenance of this protective strainer is described in

Job Card

08.04.03

On the occasion of visits of MaK personnel on board it was noticed that checking of this protective strainer is frequently neglected, possibly due to ignorance. Considerable consequential damages caused by defective or dirty filter inserts may result.

Therefore, we wish to draw your attention once more to the importance of observing the maintenance recommendation acc. to the Operating and Maintenance Instructions of the engine.

92/4
All types

Chroming of Crankshaft Pins and Journals

In connection with repairs in the field of crankshafts and their bearing surfaces; we receive increasingly the question as to whether lightly damaged crankshaft pins and journals can be salvaged by the process of hard-chroming the surface to obtain the original dimensions once more.

However the opinion of the Classification Societies in this respect is that the restoration of the crankshaft pins and journals by a process of hard-chroming to the original dimensions does not produce the same quality of finish. According to their knowledge today there have been repeated damages throughout the world-wide fleet where hard chrome treated pins and journals have developed flaws, resulting in consequential damages in many cases, of serious nature.

We as Krupp MaK the engine manufacturer, must emphasise to our customers, not ultimately because of the high costs of such damages, that such a repair procedure **cannot be recommended**.

Because of the associated risks for the ship's safety have yet to be assessed up to now, **the Classification Societies** have decided that the repair procedure on crankshaft pins and journals by hard chroming **is not authorized**.

93/1
all Type

Vibration dampers, for all engine types

Most of the MaK engines are equipped with a vibration damper which protects the crankshaft against dangerous torsional vibrations. Torsional vibrations are influenced by the operating principle of the combustion engine, by the firing sequence, and last but not least by the degree of mass balancing. In many cases they are inevitable. The vibration damper has the effect that resonant torsional vibrations will not develop in critical speeds. Consequently it is a vital component for the Diesel engine.

A good vibration damper works without being noticed and completely without problems for a rather long period. The scope of maintenance work required is comparatively small, and the maintenance intervals are long.

For the above reasons it is quite possible that a vibration damper is not noticed before its function is reduced. Of course, this involves considerable risks for the crankshaft. Therefore, we wish to draw your attention once more to the absolute necessity of observing the scheduled maintenance intervals stated in the operating manual of the engine.

As sometimes thorough maintenance works are not possible on board, Krupp MaK has organized an overhaul and exchange service for all standard vibration damper types some time ago.

93/5
All types

Check of injection nozzles

The fuel consumption of a diesel engine depends more or less on an exact atomization of the injected fuel. The nozzle elements being used nowadays, have been especially improved for the short injection times at high injection pressures.

Unfortunately this dynamic process cannot be realized any more during an inspection of the nozzles. That is to say, an inspection proving the perfect nozzle condition by means of usual testers is only possible to a certain degree. The normally existing nozzle testers can, therefore, only be used for adjustment of the opening pressure, for checking of the nozzle bores i.e. their non-plugged condition and, to a certain extent, for leakage tests of the nozzle needles.

For a secure judgment of the nozzle condition only the behaviour of the exhaust gas temperature is decisive.

Nozzle inspections should, therefore, only be effected if the exhaust gas temperature obviously deviates from the mean value of all cylinders in the specific load range. Inspections by pressure-testing, dependent on time intervals, will not bring about any essential knowledge because also the distinctive nozzle buzzing of earlier times is no longer existing.

Due to the long-term wear it is, however, recommendable to exchange the nozzle elements after 6000 running hours at the latest.

Up-dated job cards of the Operating and Maintenance Instructions can be obtained by request from your local MaK Service Station.

93/6
All types

Check of the fuel rack zero-position on stop

We learned by experience that for adjustment of engine operating values after overhauls of injection pumps or for correction of exhaust gas temperatures, the injection pump fuel rack is changed frequently. This measure is only admissible in exceptional situations and then only within a limit of ± 1 .

After each overhaul as well as at regular intervals the fuel rack zero-position on stop of all injection pumps is to be checked by all means. In any case it must be ensured that the injection pump stop position coincides with the zero discharge. In this connection attention must be paid to the fact that not always the zero fuel rack position is identical with the zero discharge. Please draw the exact data from the acceptance brake certificate (test bed certificate) where you will find a description under "position of the fuel rack when the control lever is in stop position".

In case of nonobservance it might happen that the unloaded engine runs in overspeed in spite of the stop position of the pumps. For the same reason attention must be paid that the fuel racks of all injection pumps are easily moving and the overspeed protection is o.k.

Do not close the stop valve for the starting air during operation .

The air system of the engine does not only supply the starting system but also the emergency stop system of the engine and, if existing, the oil mist detector.

From time to time we have observed that after the engine starting process the stop valve for the starting air was closed.

If the stop valve is closed not only the starting air but also the air supply to the emergency stop cylinders at the injection pumps and to the oil mist detector is shut off.

That means the function of two essential safety systems is not given.

The operational reliability of the engine, however, imperatively requires that the starting air supply is always opened during operation.

In no case the stop valve for the starting air must be closed during operation.

For any additional information please contact the MaK After-Sales Service.

98/3**All Enginelines as far as concerned****Oil Mist Detector (Visatron 115/87)**

Within the scope of our product follow-up we do not only judge the operating behaviour of the various engine lines in general, but also the behaviour of single components.

The oil mist detector of the company Schaller, type Visatron VN 115/87, used by us exclusively in recent years, has reached a very high level of reliability. There are practically no false alarms anymore if maintenance is carried out properly. For this reason, it must be implied that in case of an alarm, there is really an engine failure and it is absolutely necessary to ascertain the reason of this trouble before the engine is started again.

In case of an alarm most of the classification societies only demand a reduction of engine output. Occasionally the crew waited too long before the engine was stopped to investigate the reason for the alarm. The result was, in some cases, severe damage that could have been avoided.

Therefore MaK urgently recommends to all customers to connect the oil mist alarm of the oil mist detector in the safety system to the automatic engine stop. A binding stipulation of the classification societies that the alarm must be connected to automatic engine reduction does not exist. The engine manufacturer may give another recommendation.

This work can be carried out by the crew without problems. The relevant terminals can be found in the circuit diagram supplied with the engine. Should there be problems, the service organisation of MaK will be able to assist.

We consider it recommendable to upgrade older devices, which are possibly susceptible to failures, to the present series, as far as it is technically possible. The technical possibilities in every particular case would have to be checked. MaK would be pleased to assist and submit an offer if you are interested.

Oil Mist Detector**Modification of the Alarm Setting****„Ship's Name“****Engine Type****Engine No.**

1. ☐ **Yes, we did change the alarm to engine stop.**
2. ☐ **Yes, we want to modify the alarm setting, but we need some further information from MaK.**
3. ☐ **Yes, we intend to have the alarm setting modified by a MaK technician and will place an order with MaK.**
4. ☐ **Yes, we want to get the oil mist detector replaced by the new type if possible. Please let us have a respective quotation.**
-

5. ☐ **No, we do not want to modify the alarm settings.**

Reason (s):

Running appearance valve cams and rollers

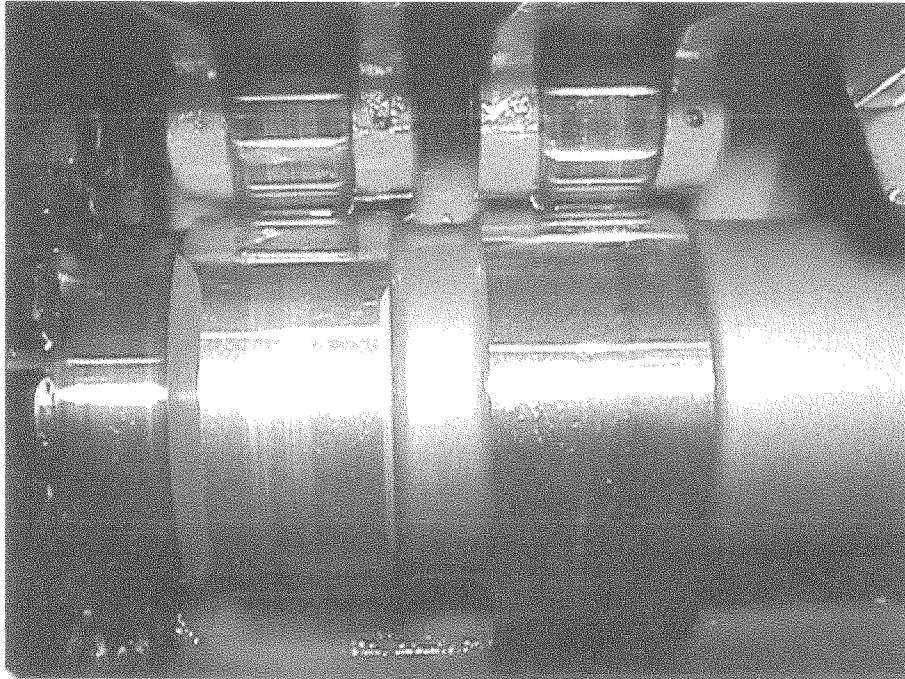
Due to on going questions regarding the early hour appearance of valve cams and rollers we offer the following position:

After a very short running period, such as after the test bed run or during commissioning, a clear running appearance is visible on the cams and rollers of the inlet and exhaust valves. This may grow more distinct during the first 1000 operating hours. During further operation this process comes to a standstill and the running appearance changes only insignificantly. Normally the running appearance can hardly be sensed by hand or touch and does not affect the operating reliability. Our vast field experience has confirmed this.

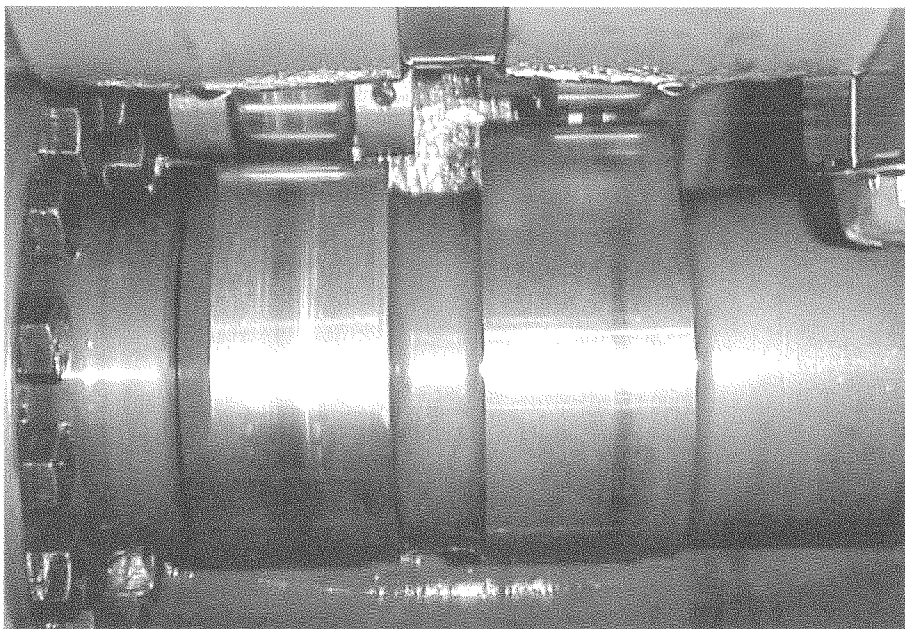
The fuel cams do not normally display this appearance. Under normal operating conditions only slight running traces are visible in the area of the fuel cam roller lifting surface.

To illustrate this, pictures with the typical running appearance are attached to this service information.

Laufbilder Ventilnocken und Rollen - running appearance valve cams and rollers



Laufbild nach 20 Bh - running appearance after 20 operating hours



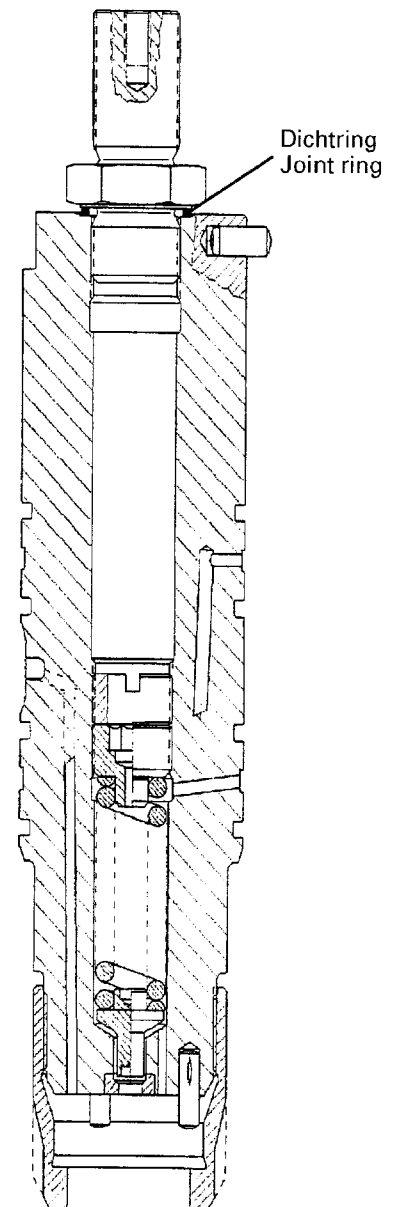
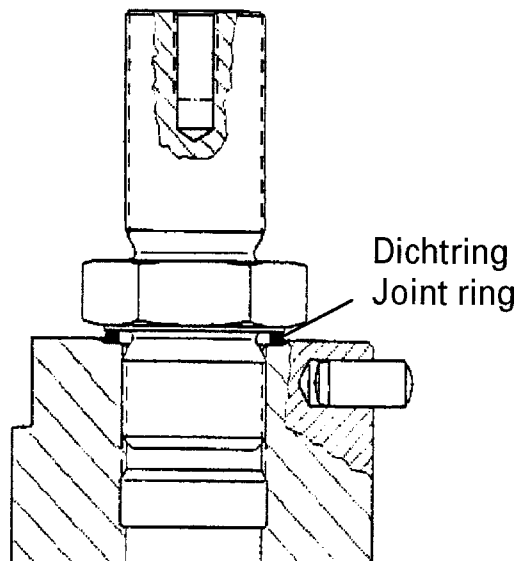
Laufbild nach 5 400 Bh - running appearance after 5 400 operating hours

Joint ring at injection valve

The injection valve on the M 25 engine has proven optimum reliability in both operation modes, MDO and HFO. This injection valve, however, must be carefully completed. During assembly of the upper locking screw deformations to the joint ring might occur. This could lead to leak fuel with following contamination of the lubricating oil.

When completing an M 25 injection valve, attention must be paid to the following:

- The joint ring must be centered.
- The locking screw is to be tightened with a torque of $M = 90 - 120 \text{ Nm}$.
- The joint ring must be checked visually once more for correct fitting. Otherwise, the before-mentioned procedure is to be repeated with a new joint ring.



Differential pressure indicators duplex fuel filters

**99/13
M32/M25**

In the scope of the permanent product control of our engines unfortunately we had to notice that in the recent past there were isolated cases of leakages on differential pressure indicators of the duplex fuel filters mounted on the engine.

In the reported cases cracks developed in the housing of the differential pressure indicator and leakages of fuel resulted. This problem arose on heavy fuel and MDO engines.

In a joint action together with the supplier of the differential pressure indicators we are working on a solution of the problem, giving this matter topmost priority.

In order to exclude any risk for the operating staff and the engines, as an emergency measure on the engines concerned the stop cocks on the dirty oil and clean oil sides of the differential pressure indicators must be closed until further notice.

As these filters as indicator filters with 34 µm are connected behind a 10 µm automatic filter, this preliminary measure does not affect the operating safety of the engine. The electric supervision of the automatic filter guarantees the watch-free operation.

In this connection we recommend to observe the cleaning intervals of 600 operating hours stated in the maintenance schedule for the duplex fuel filters in any case.

As soon as our examinations are terminated, we will contact you immediately via our local agencies and realize all measures which guarantee a safe, trouble-free operation.

Ball Valves on Boll & Kirch Fuel Duplex Filters

**00/06
All Types**

We have received reports that leakages have occurred to the ball valves of the fuel duplex filters. The reported cases show the following characteristics of damage:

- a) Leakage at the O-ring of the ball valve stuffing box.
- b) Moving of the ball valve shaft by its own with the consequence of fuel leakage.

Our filter supplier has informed us that neither the straight-way nor the angle type ball valves, fitted at the fuel and lub. oil duplex filters, may be repaired in the event of leakage. Repairs at the ball valve stuffing box would destroy the adhesive locking of the stuffing box nut. This might lead to loosening of the stuffing box nut and to moving of the ball valve shaft.

The ball valve assembly must be replaced in the event of a leak.



BOLL & KIRCH Filterbau GmbH

Boll & Kirch Office North

Ahrensburg 02nd May .2000

Service Letter

Globe valves fitted to Boll & Kirch Duplex Filters

On the occasion of a recent incident we would like to point out that globe valves which are fitted to Boll & Kirch lube oil and fuel oil duplex filters – in angle or in straight design – cannot be repaired in case of a leakage.

Efforts to repair the stuffing box or to replace the seal ring cause the destruction of the adhesive safety locking. This may result in an uncontrollable loosening of the stuffing box nut.

! In case of a leakage these ball valves have to be changed completely !

N.Weichhold

Boll & Kirch Office Nord

Differential Pressure Indicators Fuel Duplex Filters

**00/07
M25/M32**

As you have already been informed by our Customer Service Information No. 99/13, leaks have occurred at the pipework and the differential pressure indicators on the engine mounted fuel duplex filters.

In this context we asked you to close the stopcocks on both the waste and the clean oil side on all installations concerned as a precautionary action until further notice in order to exclude any danger to the operating personnel and the installation.

We have now developed a solution to the problem in co-operation with our filter supplier.

This solution requires design modifications of the pipework and the differential pressure indicators for the fuel duplex filters. In detail these are:

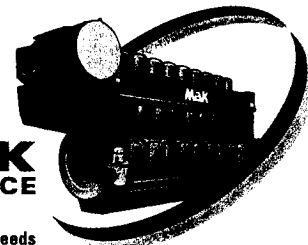
- Pipework increased to 8 x 1.5 mm steel tube
- Weld nipple joints
- Screw-in pieces on the clean and waste oil side of the filter with 1 mm throttle
- Differential pressure indicators with screw-in pieces out of steel
- Stopcocks as straight-way type 1/4"

Intense investigations of the problem clearly revealed that only M32 engines with 480 kW/cyl., the M32 IMO engines with 440 kW/cyl. and a few M25 engines are affected.

New conversion kits of the improved version are available.

Our local agencies will shortly contact the operators of the installations affected.

Should your engines not be concerned, you may reopen the stopcocks on the clean and waste oil side of the differential pressure indicator.



Check of injection nozzles

All types

The fuel consumption of a diesel engine depends more or less on an exact atomization of the injected fuel. The nozzle elements being used nowadays, have been especially improved for short injection times at high injection pressures.

Unfortunately this dynamic process cannot be realized any more during an inspection of the nozzles. That is to say, an inspection proving the perfect nozzle condition by means of usual testers is only possible to a certain degree. The normally existing pressure testers can, therefore, only be used for adjustment of the opening pressure, for checking of the nozzle bores, i.e. their non-clogged condition and, to a certain extent, for leakage tests of the needles.

For a secure judgment of the nozzle condition only the behaviour of the exhaust gas temperature of each cylinder is decisive.

Nozzle inspections should, therefore, only be effected if the exhaust gas temperature obviously deviates from the mean value of all cylinders in the specific load range. Inspections by pressure-testing, dependent on time intervals, will not provide any valid insights knowledge because also the distinctive nozzle buzzing of earlier times is no longer existing.

Due to the long-term wear it is, however, recommendable to exchange the nozzle elements after 6000 running hours (old C-Engines, M 332 to 601) and 8000 running hours (new engine generation, M 20 to M 43) respectively at latest.

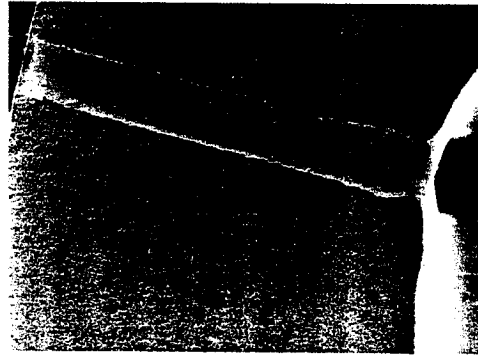
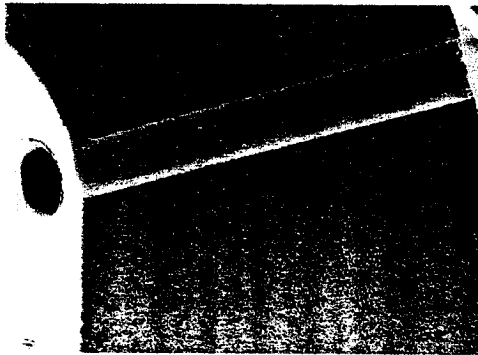
Corresponding job cards of the Operating and Maintenance Instructions can be obtained by request from your local Service Station.

Original MaK Injector Nozzle Elements

**Optimised Lifetime
Excellent Quality
Excellent Reliability
Short Delivery Time
Low Total Cost**

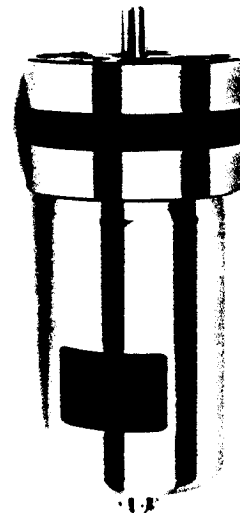
M 332 C
M 35
M 453 C
M 552 C
M 601 C
M 20
M 25
M 32 / M 32 C
M 43

- **Optimised Lifetime:** MaK Premium Injector Nozzle Elements are designed and manufactured for a lifetime of 8,000h (6,000h for M 332 C, M 35, M 453 C, M 552 C, M 601 C), if MaK's Instructions for Heavy Fuel Operation are followed. Only the best materials and processes are used to provide long component lifetime.



Injection nozzle holes before and after treatment, scale 25:1

- **Excellent Quality:** A special aftertreatment to the injection holes developed by MaK engineers enables the Nozzle Element to provide an optimised spray pattern over the entire lifetime. The Nozzle Element is designed to work precisely with all other parts of the combustion chamber. The optimised spray pattern is a major contribution to an optimised burning process in the combustion chamber. A perfect spray pattern protects the liner from carbon deposits and makes a contribution to achieve low fuel consumption. The optimised burning process provides longer life for valves as well as liners, piston rings and piston crowns. This is best possible with Original MaK Injector Nozzle Elements which are optimised for use in our engines.
- **Excellent Reliability:** Every Original MaK Injector Nozzle Element is tested with a process specially designed by MaK engineers. All measurements are recorded to ensure our quality is constantly maintained. Additionally, we use field information for continuous improvement.
- **Short Delivery Time:** Original MaK Injector Nozzle Elements are usually shipped within 24h after the order has been placed, as are most MaK Original Spare Parts, to best serve our customers.
- **Low Total Cost:** Original MaK Injector Nozzle Elements provide extra value for the price the customer pays. The operation costs for the engine is reduced.
- **For quotations or orders please contact your local MaK Service Organization.**



Original MaK Injector Nozzle Elements are World-Class High-Tech Products

Service Information No. 03/02

28.06.02

R 5-3 Exchange of Turbine Bearing

M25

Based on operating experience from overhauls and sporadic damages, the turbocharger type R 5-3 was redesigned to improve the operating reliability for the operator. In this connection also the turbine bearing was reconstructed.

Since in the past there had unfortunately been in a few cases problems in the area of the turbine bearing, we decided to implement this improvement also on the R 5-3 turbochargers, that have already been delivered. For this purpose we agreed together with the turbocharger maker on a conversion of all turbochargers concerned (up to register No. #106).

Please contact your regional Caterpillar/MaK agency to fix a suitable date for realization of the necessary work. Preferably, the place for the turbocharger modification should be a European port. Priority shall have engines with a running time between 6,000 and 12,000 hours. The work on the turbocharger will take approximately 12 hours. Should there be a favourable opportunity, such as shipyard time, long staytime in port, lay-up time or routine overhaul, please consider this for your time scheduling and inform the appropriate Service Organization accordingly.

Regarding the commercial aspect we want to suggest the following procedure:

In case of a running time below 20,000 hours the exchange of the turbine bearing is on principle at no cost for the customer.

Should it turn out during this retrofitting action, that turbocharger components, which are in no direct connection with the modification, ought to be exchanged, this will be done against invoice. This applies for instance to compressor-end bearings and nozzle rings in **heavy fuel operation**, when a running time of > 12,000 hours was attained.

Should an exchange of nozzle rings become necessary at less than 12,000 running hours, payment is subject to a pro-rata arrangement (12,000 running hours 100% cost nozzle rings; 6,000 running hours 50% cost nozzle rings).

In cases, where the time limit for a bearing exchange (20,000 running hours) has almost or already been attained and a bearing exchange is approaching anyway, the costs for all spare parts required, except for the new turbine-end bearing, as well as the traveling costs of the engineer are to be borne by the customer. In connection with the modification offered by us, we will bear proportionate wage costs for maintenance of the turbocharger, and will not charge them according to the actual man hours, but in a lump sum of 1,000 Euro (possibly arising surcharges for Sunday and holiday work / night hours or overtime will also be to the debit of the customer).

This Service Information and the offers contained therein are valid without obligation and exclusively for the case described above.

Service Information No. 06 / 02

June 2002

Relief Valve Maintenance

All Engine Types

The operating instructions do not include any maintenance rules for the relief valve. Adjustment and testing only take place once in the factory before test bed run.

As due to its design the setting pressure cannot be adjusted subsequently, no test/overhaul of the relief valve will be specified in future.

Experience from the field also shows that after overhauls or tests of relief valves their tightness is not ensured any more!

Relief valves must always be changed after 30 000 operating hours.

Relief valves must also be changed after opening because of excessive cylinder pressure!

The MaK Operating Instructions of the Relief Valve have been changed accordingly in chapter "Maintenance and Replace" (A5.05. 01.06.70.00).

The revised sheets can be obtained for the respective engine type from all field organizations.

Service Information No. 02 / 03

May 2003

Questionnaire Engine Condition in Respect to SOLAS Chapter II-2

All Engines

Please fill in this form completely. Only then we are in a position to offer you extensive and detailed advice.						
Date	Engine-No.	Engine type	"Ships name"	Company		
SOLAS II-2 Part A Chapter 15.2.9			High pressure pipes with inflammable liquids > 20bar			
<i>Interpretation: This regulation requires all external high pressure fuel delivery lines between the high pressure fuel pumps and fuel injectors to be protected with a jacketed piping system capable of containing fuel from a high pressure line failure. A jacketed pipe incorporates an outer pipe into which the high pressure fuel pipe is placed forming a permanent assembly. The jacketed piping systems to include a means for collection of leakages and arrangements are to be provided for an alarm to be given on a fuel line failure.</i> <i>The System sold by Caterpillar Motoren complies with the SOLAS regulations in all aspects.</i>						
				yes	no	
Double wall pipes existing?						
Do the double wall have connections for leak oil?						
Condition of the pipes. Action necessary?						
Is the injection pump space shielded?						
Is the Cover of the injection pump space in a sufficient condition?						
Offer requested?						
Is a leak oil line existing?						
Is the condition of the leak oil line in order, action necessary?						
Offer requested?						
Is a leak oil monitoring existing?						
Is the condition of the leak oil monitoring in order, action necessary?						
Offer requested?						
Is a leak oil alarm existing?						
Is the condition of the leak oil alarm in a workable condition?						
(Cables, connection to the alarm plant)?						
Offer requested?						
Is a survey by a CAT technician requested?						

Service Information No. 02 / 03

May 2003

Questionnaire Engine Condition in Respect to SOLAS Chapter II-2

All Engines

SOLAS II-2 Part A Chapter 15.2.11		Low pressure pipes with inflammable liquids 2,5 - 20 bar	
Interpretation: This regulation requires oil fuel, lubricating oil and other flammable oil piping to be screened or otherwise suitably protected to avoid as far as practicable oil spray. Spray shields are intended for use around flanged joints, flanged bonnets and any other flanged connections in oil pressure systems which are located above the floor plates and which have no insulation in way of the joints. The purpose of spray shields is to prevent the impingement of leaked or sprayed flammable liquid onto a hot surface or other source of ignition.			
The flange protections supplied by Caterpillar Motoren meet the SOLAS requirements			
	yes	no	
Is the low pressure pipe still in the original state?			
Is the condition of the low pressure system in order?			
Is an offer for screening of the pipe connections requested?			
Is a survey by a CAT technician requested?			
SOLAS II-2 Part A Chapter 15.2.11		Hot surfaces	
Interpretation: This regulation requires that all surfaces with temperatures above 220 Celsius (430 °F), which may be impinged as a result of a fuel oil, lubricating oil and other flammable oil system failure be properly insulated. Insulation of hot surfaces is preliminary to reduce the risk of fire by reduce the temperatures of surfaces below the auto-ignition temperature of fuel oil or other flammable oils. Manufacture's instructions should be followed if available. Permanent insulation should be used to the greatest extent possible. Insulation should be provided with readily removable sections to allow access for normal maintenance. Where the insulation used is oil absorbent or may permit the penetration of oil, the insulation should be encased in steel sheathing or equivalent material. This applies not only to the exhaust piping, but also to other heat surfaces like those of the safety/indicator cocks or pre-heaters with temperatures above the permissible limit.			
The exhaust cladding supplied by Caterpillar Motoren is classified by 4 classification societies if mounted by our personnel. The shield of the safety and indicator valves complies also with the SOLAS regulations.			
	yes	no	
Are the exhaust pipes / exhaust cladding still in the original state?			
Are the safety- / indicator valves insulated?			
Is the condition of the exhaust cladding in good order ?			
Is the visit of a technician to determine necessary actions requested?			

Service Information No. 02 / 03
May 2003

Questionnaire
Engine Condition in Respect to SOLAS Chapter II-2

All Engines

Service Information Nr. 05 / 03

Date: June 27, 2003



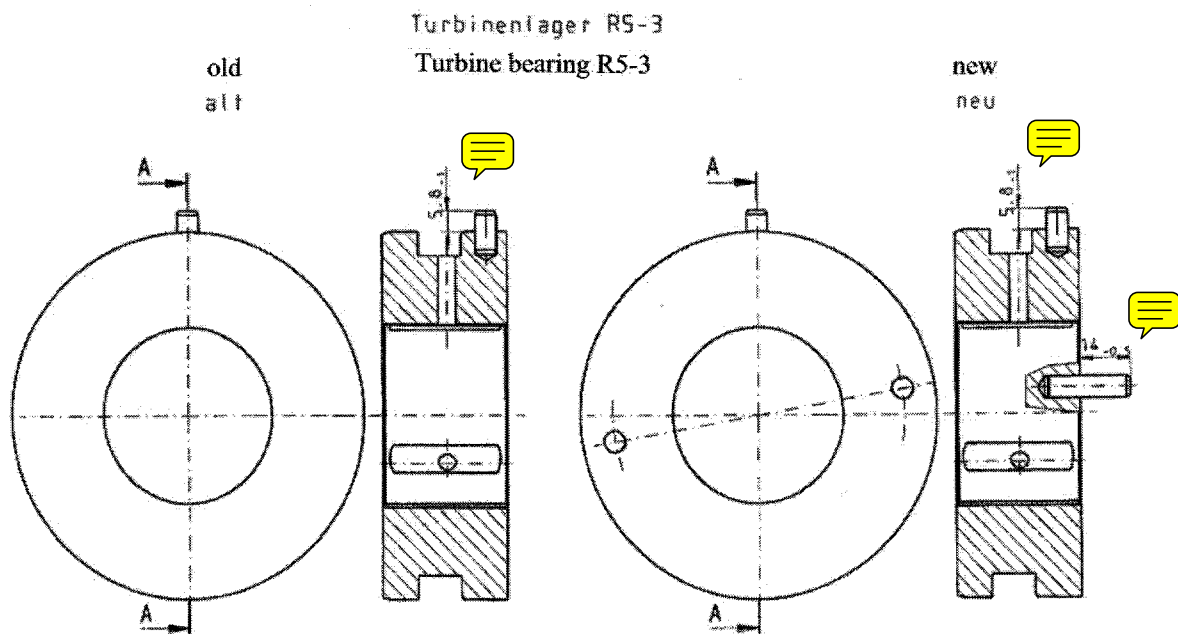
Replacement of R 5-3 Turbine Bearings in the Spare Parts Kit M25

In Service Information 03/02 dated June 26, 2002 we announced that a new turbine bearing would be introduced for the R 5-3 turbocharger.

We recommend not using the old bearing type any more.

The new version can be identified by the 3 retention pins (1x radial and 2x axial). These pins have a diameter of 6 mm.

Please check all spare parts kits you may have on board or in your warehouse. If you should find any new, unused turbine bearings of the old type, we are offering you to exchange these at no cost to you (the old bearing is to be sent back to us). Please contact your Caterpillar (MaK) Service Station referring to this Service Information .



Service Information No. 07 / 03

Date 23.07.2003

Handling of SOLAS Activities

Non Current Engines

On July 01, 2003, the 1994 Amendments to SOLAS II-2 came into force and are now mandatory for older ships as well as new ships.

In the second quarter of 2003, Caterpillar Motoren, our Dealers, and our Service Stations have seen a growing number of inquiries from our customers.

Handling and resolving of these inquiries has shown us that much communication is necessary to find a solution that fits the engine and meets the required standard.

It is difficult to have a standard solution for all engines, or even for one series of engine, regardless of their age, original design status or current condition. We are also mindful that the costs related to the necessary modifications must be acceptable to our customers.

With these goals as our target, we have created parts kits that are flexible enough to meet the requirements of every engine.

If the components of these kits are mounted by authorized service personnel you can be sure that the respective SOLAS requirements are covered.

To avoid serious problems, like vessel detention, Caterpillar Motoren recommends that owners with engines that are not complying with the SOLAS regulations should upgrade them to full compliance.

Your dealer / agent is your primary contact to discuss this issue in detail.

For more information please see the attached Parts News.

Ship / Station: Ship.comp. / Customer: Engine-No.: Enginetype: Output: Speed:	Main Engine: Aggregate: Put into operation: Last overhaul: Running hours:	Brand of fuel: Brand of oil: Date: Name: Function:
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Testing for leaks	o.k.	n.o.k.	Imp.		o.k.	n.o.k.	Imp.		o.k.	n.o.k.	Imp.
Crankcase doors				- Controlshaft Inject.pp.				Exhaustgaspipe			
Camshaft doors				Fuel-filter				- Connection cyl.heads			
Door at gear-housing				- Change over cock				- Connection turbo			
- on camshaftside				- Diff.press. indicator				- Connect. compensator			
- on exhaustgasside				HT-Coolingwaterpumps				Charge-air cooler			
Crankshaftsealing				- Drivelflange				- Sealing waterside			
- Couplingside				- Flangeconnections				- Sealing flangeconnection			
- opposite couplingside				LT-Coolingwaterpumps				Turbocharger			
Cylinderhead covers				- Drivelflange				- Cool.waterpipe for turbo			
CW- distrib.hous. / crankcase housing				- Flangeconnections				- Oilpipe for turbo			
- Pushrod-guidance				Oilpump				- Turbocharger oiltight			
- Air-passage				- Drivelflange				- Turbocharger gastight			
Media guiding system				- Pipeconnections				Airpassage housing			
- Cool.water collecting pipe				Oilpan				- to compensator			
- Cool.water distribution pipe				- Flangerail				- to cooler housing			
- Waterpass.distrib.hous/Cyl.head				- Flangeconnection				Starting-air system			
- Fuel distribution pipe				Oilfilter				- Distributionpipe			
- Fuel return pipe				- Change over cock							
- Fuel pressure pipe				- Diff.press. indicator							

Functional test	o.k.	n.o.k.	Imp.		o.k.	n.o.k.	Imp.		o.k.	n.o.k.	Imp.
Emergency stop-system				Turning device				Oil mist detector			
- Pneumatic-cylinder				- Shift arrangement				Alarm-system			
- Pipes				- Finalswitch/Start.interl.				Safety-system			
- Stop-handle				Indicator valves				- Overspeedsignal			
Mobility				Main starting valve				- Stopsignals			
- Regulating shafts / Inject.pumps				Air starter				- Startlocking			
- Regulating shaft				Speedcontrol				Lokal engine operation			
- Control-handle				- Stopmagnet							
				- Speedregulation							

General visual check	o.k.	n.o.k.	Imp.		o.k.	n.o.k.	Imp.		o.k.	n.o.k.	Imp.
Exhaust manifold cover				Indicators				Camshaft / Rollers			
- Front wall plate				- press. indicator panel				- Running surface inlet			
- Back wall plate				- Exhaustgasthermo.				- Running surface outlet			
- Holder / Consoles				- other thermometers				- Running surface fuel			
- Screws				- Press.switch/Transmit.				- Running surface rollers			
				- Sensors / Cables							
Turbocharger				Turning device				Generator / Shaftgenerator			
- Fixings / Consoles				- E-Motor				Oillevel			
Pumproom cover				- Consoles				Airfilter			
Linkage governor/regulating shaft				Flexible coupling				Lifting screws secured			
				- Rubber elements				Shift lock device space/clear.			

Miscellaneous	o.k.	n.o.k.	Imp.	Operationdatas	o.k.	n.o.k.	Imp.		o.k.	n.o.k.	Imp.		
DICARE				Fuel rack position				Fuel temperature					
- online				Exh.gastemp. aft cyl.				Viscosity					
- offline				Exh.gastemp. aft turb.				Fuel pressure					
DIMOS				Turbochargerspeed				Oil-pressure					
Treatment coolingwater				Chargeair pressure				Oil inlet temperature					
Treatment oil				Ch.air temp. bef. cooler				Oil consumption					
				Ch.air temp.aft.cooler				Combustion pressure					
				Coolingwat.temp.aft.eng.				Luboil autom.-filter					
				Coolingwater pressure				Fuel autom.-filter					

General condition		1 - 10	Wishes of the operators for improvement:
- of the engine			
- of the system			
Satisfaction of the operator		1 - 10	
- with the engine			
- with the service			
No. of unplanned enginestops / Year			
No. of unplanned repairs / Year			
Notes: With the result "n.o.k." the kind of fault has to be documented acc. to the key of faults, see below. In the column "Imp." documentate the impact level acc. to the key, see below. (like example below)			All fat and italic written checks are important and have to be documentate immediately. All normal written checks are less important and can be checked later.
Remarks to the column "n.o.k." and improvement recommendation:			
			Signature: _____ Place / Date _____

Kind of fault:

Shortcode:

2 broken
 3 inserted
 4 jammed
 5 locked
 6 cracked
 7 blown through
 8 weared
 9 leaking
 10 deformed

Designation:

Shortcode:

11 detached
 12 electrical defect
 13 volume to small
 14 distored
 15 seized
 16 damaged
 17 temperature differences
 18 out of order
 19 not existent

Designation:

Impact level:

1. repair immed., because of eng. damage
 2. repair as soon as possible
 3. repair during next overhaul

Example:

Testing for leaks	o.k.	n.o.k.	Imp.
Crankcasedoors	x		
Camshaftdoors		9	2

o.k. = okay
 n.o.k. = not okay
 Impactlevel

Verkleidung Pumpenraum
Pump space cladding

Kraftstoffdruckrohre (doppelwandig)
Fuel pressure pipes (double wall)

Abdeckung für Indikatoren/Sicherheitsventil
Screening for Indicators/Safety Valve

Leckoffleitung
Leakoff Line

Kraftstoffdruckrohre (doppelwandig)
Fuel pressure pipes (double wall)

Abdeckung Öffnungen
Screening Oil Pipes

Abdeckung Öffnungen
Screening Oil Pipes

Abgasverkleidung
Exhaust Gas Cladding

Leckoff Überwachung
Leakoff Monitoring

Schmieröl-Pumpe
beim 8 und 9 Zyl.
Lub oil pump
at 8 and 9 Cyl.

Schmieröl-Pumpe
beim 6 Zyl.
Lub oil pump
at 6 Cyl.

Kit A: Kraftstoffdruckrohre / Fuel pressure pipes
Kit B:

Kit C: Kraftstoff-Leckage / Leaktail Line
Kit D: Kraftstoff-Leckage / Screening Oil Pipes
Kit E: Abdeckung für Indikatoren/Sicherheitsventil / Screening for Indicators/Safety Valve
Kit F: Abgasverkleidung / Exhaust Gas Cladding
Kit G: Verkleidung Pumpenraum / Pump space cladding

SOLAS - Nachrüstungen Modifications



Caterpillar Marine Division

Service Organisation for
MaK Marine Engines

Technical Product Support

Falckensteiner Str. 2, 24159 Kiel
P. O. Box, 24157 Kiel

Verteiler:

Your Reference

Our Reference
VT 6
Papendieck

Phone 24157 Kiel
Direct dialling 15.08.2003
+49 (0) 431 3995-2825
Fax 3995-4825 or 3995-
E-mail papendieck_karl_h@CAT.com

SOLAS Requirements on Fire Protection Third Information

Gentlemen,

This is the third letter on the SOLAS subject. With this letter we would like to inform you about the further proceeding. Basis are our activities since our last information.

We think that this is a chance of additional parts and service sales for us and also for you, our dealers / agents. We, therefore, want to make an active use of this opportunity via the following communications and actions:

1. Availability of Part Kits

As already mentioned we will start this action with the in-line engines of the series M453.

- The part kits "A" and "B" is expected to be available in week 36.
- The exhaust claddings (part kit "C").
 - Has to be ordered specifically to engine.
 - Delivery time will be 4 weeks.
 - The modification of the cladding can be done only during stay in a dockyard.
 - The dockyard dates have to be verified by the dealers
- The pump room cladding (part kit "D") is expected to be available in week 36. Compared with the previous design this cladding will be an improved version with handy sections.

Caterpillar Marine Division
A Division of
Caterpillar Motoren GmbH & Co. KG
Neumühlen 9, 22763 Hamburg
Phone: +49 (0) 40 2380-3000
Telefax: +49 (0) 40 2380-3535
Register of Companies:
Local Court of Hamburg HRA 98522
Managing Director: Roberto Dionisio

Caterpillar Motoren GmbH & Co. KG
Falckensteiner Straße 2, 24159 Kiel
P. O. Box, 24157 Kiel
Registered Seat: Kiel
Register of Companies:
Local Court of Kiel HRA 3735

General Partner:
Caterpillar Motoren Verwaltungs-GmbH
Registered Seat: Kiel
Register of Companies: Local Court of Kiel HRB 4621
Management Board: Jan E. Grundtman, Chairman
Oswald Schöffel, Paul Wroblewski

The part kits for the other old engine series will be available as follows:

M451 / M452 / M551 / M552 / M 282 / M 323 / M 601 / M 35

Part kits „A“ available ex shelf

Part kits „B“ , „C“ , „D“ availability will be announced within short.

For our new engine series from the **M20 up to the M43** we will give you separate communications.

2. Customer Information

Caterpillar intends to inform the shipping companies owning M453 engines directly by means of a letter about SOLAS in week 34. This letter will indicate that the dealer or agent responsible for their area will contact them. Please send us, preferably the e-mail addresses of the contact persons in the shipping companies.

3. Customer Calls

After having all information at hand, please immediately contact the superintendents of the shipping companies located in your area of responsibility, beginning with the M453 operators. This personal contact is an indispensable prerequisite to attaining the objectives expected from this action. In the attached communications please find the following information:

- Line of reasoning (Service information + Overview of SOLAS Parts) for your talks with the customers. **(paper copies by mail)**
- List containing the M453 engines in your contract area. **(by fax in case only Internet address is available to us)**
- Bulletin with the most important information on SOLAS. **(paper copies by mail)**
- Price list for the M453 part kits. **(by fax in case only Internet address is available to us)**
- Questionnaire to ascertain the current SOLAS equipment of the engines.
- Check list to ascertain the current condition of the engines.

4. Pricing

From the price list you will see that the operators will be given discounts and the dealers given bonuses by CAT for the part kits. Likewise a discount of 10 % of the labor costs is expected from our dealers / agents vis-à-vis the operators. This discount will not be refunded by CAT. From our point of view sharing can reasonably be expected from you, since this action will lead to additional sales and further service orders.

5. Questionnaire

Please review the questionnaire with your customer. It will help to ascertain the current equipment on the engines. For this purpose please offer the shipping agents visits on board by your skilled service personnel. If this visit results in an order for a CAT parts kit these visits on board should be at no cost to the shipping companies and will be refunded by CAT with € 500 max. for one visit if the necessary parts volume will be ordered with you.

6. Check List

Please review the check list with your customer. It shall serve as documentation of the current condition of the engines to enable the creation of additional offers for parts deliveries or service activities.

7. Contact Person in your Organization

In case of further inquiries please let us have the name of the SOLAS contact person in **your** organization.

8. Contact Person in Kiel

Your contact persons in Kiel are:

Marketing: Bodo Albrecht
Tel: +49 (0)40 2380 3103 E-Mail: albrecht_bodo@CAT.com

Engineering & Regulations: Karl-Heinz Papendieck
Tel: +49 (0)40 3995 2825 E-Mail: papendieck_karl_h@CAT.com

Part kits: Klaus Humboldt
Tel: +49 (0)40 3995 2822 E-Mail: Humboldt_klaus@CAT.com

9. Assembly

Authorized service personnel of the CAT service organization shall exclusively carry out the assembly.

The time required for a 6 cylinder M 453 engine is as follows:

Part kit „A“:	3 hours (2 persons)
Part kit „B“:	4 - 8 hours (2 persons) without pump cladding
Part kit „C“:	20 hours (2 persons) during shipyard period
Part kit „D“:	3 - 6 hours (2 persons) eventually during shipyard period

These hours may vary due to local conditions.

10. Assembly Drawings

For assembly of the part kits you will receive assembly drawings. Please ensure that unauthorized persons do not copy these drawings.

11. Certificate

CAT will issue a copy of a type approval certificate by the responsible classification society which confirms that the required parts kit mounted by our Service Organization meets the necessary SOLAS requirements.

12. Warranty

After mounting the part kits by authorized service personnel Caterpillar grants a warranty of 12 months, max. 15 month after delivery, on these parts provided again that the part kits were completely mounted.

Let us jointly utilize this possibility to intensify our business relations with our customers and increase our sales.

Should you have any further questions please contact one of the persons mentioned before.

With best regards

Caterpillar Motoren GmbH & Co. KG

i. V. Heinsohn

i.V. Papendieck

Service Information No. 08 / 04

Date: 27-AUG-2004

KBB Turbocharger KBB Service Information S44 and S45

M20 / M25

1. KBB Service Information S44

Subject: Maintenance interval for MDO / HFO
Valid for TC type: R2-2 to R4-2, R4-3, R5-3

2. KBB Service Information S45

Subject: Turbine cleaning
Valid for TC type: R3-2, R4-2, R4-3 and R5-3

Subject: Maintenance interval for MDO/ HFO

Valid for TC type: R2-2 to R4-2, R4-3, R5-3

Valid for engines: All

1.1 Maintenance interval

1.1.1 Maintenance for Marine Diesel Oil (MDO) application



The operating hours given in the table below are guidelines which can be reduced for adjustment to the maintenance intervals of the engine.

Item	Maintenance work	Maintenance interval (operating hours)
1.	Check for abnormal noise	24
2.	Compressor washing during operation, actuate compressor washing system	24 - 48
3.	Clean air filter at silencer	approx. 250 or on demand
4.	Check fastening bolts at the feet, tighten all housing bolts and piping joints	once after commissioning, then every 1,000 hours
5.	Inspection I • disassembly • cleaning • checking of rotor and bearings • checking of housings • assembly	max. 10,000
6.	Inspection II • like inspection I • replacement of the bearings	max. 20,000
7.	Inspection III • like inspection II • replacement of the rotor	max. 40,000

1.1.2 Maintenance for Heavy Fuel Oil (HFO) application

The operating hours given in the table below are guidelines which can be reduced for adjustment to the maintenance intervals of the engine.

Item	Maintenance work	Maintenance interval (operating hours)
1.	Check for abnormal noise	24
2.	Compressor washing during operation, actuate compressor washing system	24 - 48
3.	Turbine washing during operation, actuate turbine washing system Cleaning with water	approx. 300 depending on HFO quality
4.	Clean air filter at silencer	approx. 250 or on demand
5.	Check fastening bolts at the feet, tighten all housing bolts and piping joints	once after commissioning, then every 1,000 hours
6.	Inspection I • disassembly • cleaning • checking rotor and bearings • checking housings • assembly	max. 10,000
7.	Inspection II • as inspection I • replacement of bearings	max. 20,000
8.	Inspection III • as inspection II • replacement of rotor	max. 40,000



The nozzle ring is subject to an increased wear for heavy fuel oil operation. Therefore it is a wear part.

The lifetime of the nozzle ring is approximately 12,000 hours, but it depends on HFO quality and operating conditions.

After exceeding the lifetime the nozzle ring should be replaced in case of fundamental change of performance data as charge air pressure and exhaust temperature.

Subject: Turbine cleaning

Valid for TC type: R3-2, R4-2, R4-3 and R5-3

Valid for engines: M20 and M25 from CAT / MaK

Cleaning of turbine

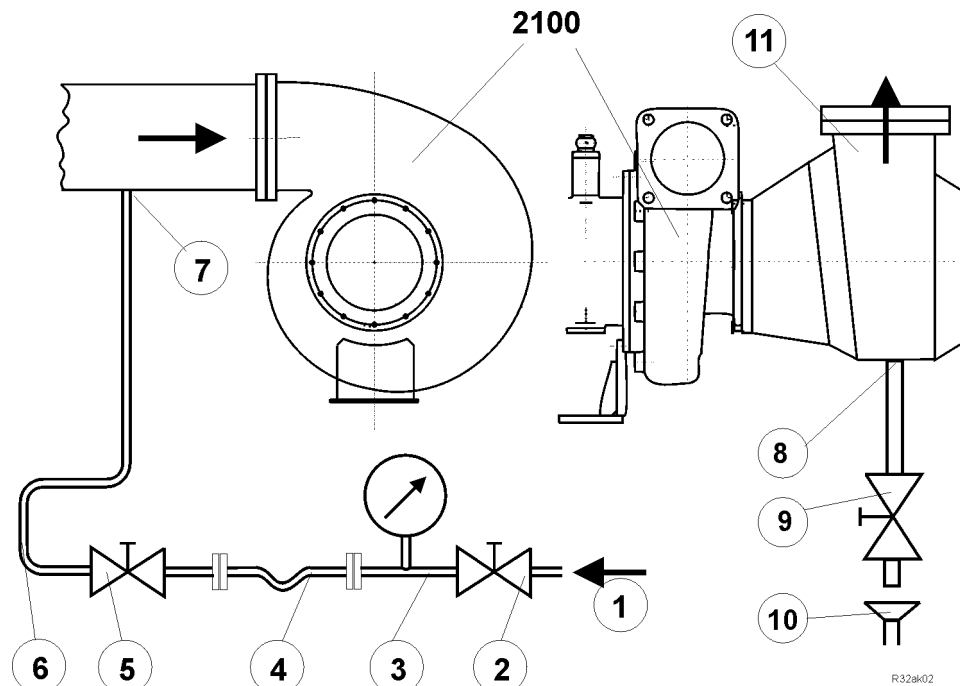


Heavy fuel oil operation results in contamination and deposits on nozzle ring and turbine wheel reducing the efficiency. Due to these deposits the charge air pressure will be increased.

The washing intervals depend on the fuel quality and operating conditions. That's why they must be adjusted based on the experience gained during engine operation if necessary later on. The washing interval could be adjusted from 50 to 600 hours.

The increase of charge air pressure could be used for adjusting the washing interval, which could adjusted within 50 to 600 hours.

Read and take down the charge air pressure and exhaust gas temperatures at a reference point (at 75 % or 100 % of the output) before and after washing to check the washing effect.



Legend (Example, could vary depending on engine installation)

- | | | |
|---------------------------|------------------------|---------------------------------|
| 1 Sanitary fresh water | 6 Wash-water piping | 10 Escape funnel or sight glass |
| 2 Regulating valve | 7 Injector | |
| 3 Fresh-water piping | 8 Connection for drain | 2100 Turbine inlet housing |
| 4 Removable flexible tube | 9 Valve | 11 Turbine outlet housing |
| 5 Stop valve | | |

Work sequence:

1. Connect the flexible tube (4) to fresh-water piping (3).
2. Reduce the engine output to approx. 15 % of its rating until the temperature after cylinder has come down to its specified value. (see table)
3. Wait for approx. 10 minutes!
4. Open the valve (9) of the drain (8) (if present).
5. Open valve (2) and adjust the water pressure (see table).
6. Open stop valve (5) for approx. 30 seconds and close again.
7. Wait for approx. 3 minutes so that the injected water can evaporate.
8. Repeat steps 6. and 7. twice or three times.
9. Close the stop valve (5), valve (2) and the valve (9) of the drain.
10. Run dry the exhaust gas turbocharger at constant load for approx. 30 minutes, increase engine load slowly!
11. Repeat the washing process if the exhaust gas turbocharger is affected by vibrations which did not occur before.
12. Remove the flexible tube (4).

Operating values for turbine washing

Engine output	Exhaust gas temperature after cylinder	Exhaust gas temperature before / after the turbine	Water pressure (gauge)	Total washing period
max. 15%	300 – 330 °C	400 – 420 / <330 °C	1.5 – 2 bar	3-4x 30 sec



- **Hot exhaust gas can escape from the drain - Risk of burning!**
- **Continue to operate the engine for at least 30 minutes after cleaning.**
- **Do not wash before a stop of operation. Corrosion risk!**
- **Washing is ineffective in case of hardened deposits, thus perform washing at regular intervals.**
- **Pay attention also to instruction of the engine's operating manual!**