

Service Information No. 01 / 02

Date: 03.01.2002



Turbine End Washing of the Turbocharger at Zero Load

M43

On modern four-stroke engines the state of the turbocharger plays a decisive role for long-term warranty of the full engine output and reliability under all operating conditions. The hard combustion residues developing on the nozzle ring and the blading of the turbine in heavy fuel operation are influencing the turbocharger efficiency to a large extent and, consequently, also the thermal engine load.

This phenomenon is unavoidable and has been taken into account when developing and dimensioning the components for our engines being unrestrictedly suitable for heavy fuel operation. To avoid an inadmissible increase of the thermal load, regular washing of the turbocharger at compressor and turbine end, according to the washing instructions, is an essential part of engine operation.

Some of the M 43 engines with longer operating periods showed risen exhaust gas temperatures at the cylinders and the turbine which might lead to increased thermal load. Joint investigations with the turbocharger makers revealed that in case of certain fuel qualities and operating conditions the washing routine, applied so far, does not lead to the desired success so that, on the long run, the turbine efficiency is noticeably influenced.

To optimize the washing success an altered washing procedure has been developed and tested in several field trials. After obtaining positive results, the new washing procedure shall be applied on all M 43 engines now.

1. Washing at compressor end will be carried out unchanged at full load with the same parameters.
2. Cleaning at turbine end will be differentiated in future between
 - a) generator mode and
 - b) propeller drive.

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- a) Engine as generator drive
Turbine washing shall be carried out at zero load with generator switch opened.
If possible, the cleaning process shall proceed before connecting the engine to the grid. To avoid corrosion, it must absolutely be ensured that after washing, the engine still continues running for approximately 10 minutes without or at low load to dry the turbine.

- b) Engine as propeller drive
Washing is carried out within a load range from 0-20% at rated speed. For this purpose the pitch propeller plant must be changed to constant speed operation!

The water quantities and injection periods required for an effective cleaning are being ensured by the washing control of the turbocharger maker. The new washing procedure can only be applied after modifying the washing control by the ABB Service!

Attached please find a new description of the turbocharger cleaning process for updating the maintenance instructions.

The appropriate CAT Service Organization will contact you soon to fix a date for modifying the washing control.

M43

24, 150

See also: C5.05.06.10.20.nn, C5.05.06.10.30.nn

Spare parts list: B1.05.06.43725n

Time requirement: 0 Pers./ 0,00 h

Personnel qualification: skilled engine hand

Operating medium: Heavy fuel

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ABB Turbocharger Cleaning - TPL Production Series Running on Heavy Fuel

General:

The washing process for turbine and compressor is controlled by the ABB washing control system. The program control ensures optimum washing sequences.

A detailed description of the washing control system is provided in the ABB documentation (see book C).

Note:

The washing intervals are depending on the fuel quality and the operating conditions. They can only be definitely fixed on the basis of experience gained in operation. If the operating conditions require it, the following washing intervals must be adapted accordingly.

1. Compressor cleaning at **90 - 100 %** output every **24 hrs**.
2. Turbine cleaning every **150 hrs**.

a) Propeller drive:

Propeller drive, non-engageable
<ul style="list-style-type: none"> - Preferably 10 min. after engine start Engine control stand selector switch to "local" Engine speed at speed knob to 400 rpm at zero pitch
<ul style="list-style-type: none"> - Load reduction in offshore operation on the combinator curve to a value of 0.7 - 0.75 x of the rated speed

Propeller drive, engageable
<ul style="list-style-type: none"> - Preferably 10 min. after engine start Engine disengaged Engine control stand selector switch to "local" Adjust engine speed at speed knob to rated speed
<ul style="list-style-type: none"> - In offshore operation disengage one engine at a time Adjust engine speed at speed knob to rated speed

b) Generator operation

Generator engine (ship) / take generator from the grid
Open generator switch
Engine control stand selector switch to "local" / leave speed at rated speed

Generator engine (EPG) / take generator from the grid
Open generator switch
Engine control stand selector switch to "local" / leave speed at rated speed

Note:

Maximum exhaust gas temperature before turbocharger $t = 430^{\circ}\text{C}$

Attention:

Do not apply thermal shock cleaning any longer for cleaning the turbine!

3. After finishing turbine cleaning the following applies:

- 3.1 Continue running the engine until a stationary state of all operating values is attained (**approx. 10 min.**).
- 3.2 Start wet cleaning of the turbine according to the directives in the ABB documentation (**see book C**).

Attention:

In case of the automatic ABB washing control do not use the program "Thermal Shock Cleaning" any more!