

Service Information

Caterpillar Motoren GmbH & Co. KG product support information for medium-speed engines

Engine platform: M32
Engine section: Turbocharger

Engine type: 6M32
Validity: until further notice

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Information for all recipients of Service Information

Action: for your information



Cleaning of ABB turbochargers TPS61-F / A145-M for 6M32 engines

Regular cleaning of the exhaust turbine is essential to ensure optimum engine operation using HFO as fuel. Depending on the quality of the fuel used, particularly hard deposits can be formed on the nozzle ring in conjunction with high exhaust gas temperatures. Heavily contaminated turbine components, in particular a contaminated nozzle ring, lead to deterioration in turbine efficiency and increases in exhaust gas temperature, turbocharger speed, charge air pressure and ignition pressures. Reduced engine power and poorer efficiency are the result. Under certain circumstances, even the omission of only one turbine washing cycle can lead to a build-up of carbon residues that can no longer be removed with the next regular cleaning process. The resulting need for an early turbocharger service increases the operating costs of the engine plant.

Turbine cleaning

Generally, there are two different washing processes for cleaning the turbine: short-term and long-term washing. Which washing process to use depends on the turbocharger type (see Table 1).

In **short-term washing**, water is introduced into the turbine several times for a short time. This leads to temperature shocks which cause the dirt to flake off.

The cleaning effect of **long-term washing** is based on dissolving the dirt with water. Thus, the 10-minute cleaning time should ensure that all dirty surfaces are wetted with water and that dirt is dissolved.

Turbocharger Type	Washing process	Duration	Water quantity	Cleaning intervals
ABB TPS61-F	short-term washing	3x 30s	5 - 12 l / washing	150 – 200 h
ABB A145-M	long-term washing	10 min	12 l / min	50 – 200 h

Table 1

Operating experience has shown that in some cases ABB TPS61-F as well as ABB A145-M turbochargers mounted on 6M32C engines, despite regular turbine washing in compliance with the washing parameters, were found with turbines and nozzle rings so dirty that manual cleaning of the components was necessary. ABB TPS61-F turbines, which are cleaned by means of short-term washing, were especially affected.

If your M32 engines experience problems cleaning the above turbocharger types, we recommend the following first steps:



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Corner valve

The corner valve is a needle valve that ensures the intended flow only when fully open. It is therefore important to open the valve as far as possible. If the corner valve is damaged or malfunctions, we recommend converting the washing system to a variant with ball valve.

Washing interval

Chemical analyses show that usually deposits on turbines and nozzle rings are mainly oxidic vanadium compounds. If fuels with a high vanadium content are used, we recommend shortening the washing intervals.

Washing parameters

In order to ensure the greatest possible success in turbine cleaning, it is necessary to adhere to the cleaning parameters as precisely as possible. In case of doubt or contradicting information, the parameters specified in the turbocharger manufacturer's documentation are to be followed.

Water leaks

Water leaks in the pipes of the turbine washing device and the turbine housing during the washing process are difficult to avoid completely. If, however, there are large water leaks, in which the turbine casing is heavily wetted on the outside, the very high thermal loads that occur can lead to cracks in the casing.

Leaks in the inlet pipes reduce the amount of washing water supplied, which reduces the cleaning effect of the washing process.

If noticed, any type of leakage should be repaired as soon as possible.

If problems with contaminated turbines persist, the following technical options are available:

1. Modification of the washing device

A new washing device with an orifice and a ball valve as operating element is available for 6M32C engines with ABB TPS61-F and ABB A145-M turbochargers. The advantages of this device are the more easily recognisable position (fully open / closed), easier handling and greater resistance to corrosion / vibration.

2. Long-term washing with ABB TPS61-F

Field experience and tests have shown improved cleaning results with the long-term washing procedure, therefore in case operators experience insufficient cleaning results with the short-term water injection, ABB recommends changing to long-term washing (refer to ABB turbocharger operation manual for more details on the cleaning procedure).

For TPS-F turbochargers with single exhaust gas inlet, long-term water injection may lead to minor water leakage between the bearing casing and the turbine casing. In order to improve

the system tightness side against possible exhaust gas or water leakages (e.g. during turbine cleaning), ABB has introduced a special design which results in a modified turbine side. This modification is offered by ABB Turbo Systems and can only be carried out by an authorized ABB service station.

3. Conversion to an axial turbocharger

Due to its design, an axial turbocharger can be cleaned more easily than a radial turbocharger. Such turbochargers have several wash nozzles distributed symmetrically around the circumference and installed directly in front of the nozzle ring. In addition, these turbocharger types have a drain in the turbine housing to discharge the wash water. As a general rule, the maintenance costs of the turbocharger types to be considered for a conversion are lower than for the radial turbochargers originally mounted to the engines.

If you are interested in any of the proposed solutions or have any questions, please contact the CAT / MaK service company of your choice.