

Action code: **WHEN CONVENIENT**

Fuel Injection Valve Condition

SL2016-628/KEL
October 2016

Concerns

Owners and operators of
MAN four-stroke diesel engines.
Type: L16/24, L23/30H, L21/31, L27/38,
L28/32H, V28/32S

Summary

Accelerated wear/damage to nozzle tips are in most cases caused by poor fuel oil quality i.e. fuel contamination and this will cause poor combustion which in turn will result in poor engine performance and eventually may result in major damage to the engine.

Reference is made to:

Planned Maintenance Programme

Attachment:

A Quick Guide for inspection of the fuel injection valve condition

Dear Sirs

Based on experience from visits and supervision onboard seagoing vessels, MAN Diesel & Turbo has observed the following issues regarding fuel injection valves:

- Premature inspection of fuel valves i.e. before scheduled inspection according to the Planned Maintenance Programme causing maintenance induced failures and extra cost.
- Short lifetime of fuel nozzles (expected lifetime 8000 hours according to instruction manual).
- Broken fuel nozzle springs as a result of excessive pretensioning by repeatedly readjusting the opening pressure to new value causing dynamic overloading of the spring.
- Repair/Re-condition of fuel injection valves (not recommended by MAN Diesel & Turbo).
- Incorrect cleaning of nozzle tips causing damage to the injection nozzle.

This Service Letter describes the criteria for removing the fuel injection valves, replacement of nozzles before expected lifetime & cleaning of the fuel nozzle element.

Yours faithfully


Mikael C. Jensen
 Vice President
 Engineering


Jan Johansson
 Superintendent Engineer
 Operation



MAN Diesel & Turbo

H. Christoffersensvej 6
4960 Holeby
Denmark
Phone: +45 54 69 31 00
Fax: +45 54 69 30 30
mandieselturbo-hol@mandieselturbo.com

www.mandieselturbo.com

MAN Diesel & Turbo

Niels Juels Vej 15
9900 Frederikshavn
Denmark
Phone: +45 96 20 41 00
Fax: +45 96 20 40 30
mandieselturbo-frh@mandieselturbo.com

MAN Diesel & Turbo

Branch of MAN Diesel & Turbo SE,
Germany
CVR No.: 31611792
Head office: Teglhølmegade 41
2450 Copenhagen SV, Denmark
German Reg.No.: HRB 22056
Amtsgericht Augsburg

Recommendation:

The fuel injection valve should be operated for 8000 hrs without removal, unless a specific reason dictates so. To ensure safe operation, MAN Diesel & Turbo’s heavy fuel oil operating instructions and treatment of fuel oil must be strictly observed including correct filtration.

Opening pressure must be adjusted according to latest guide lines, in order to prevent breakage of the spring.

New: With the engine equipped with the latest requirement of filters, i.e. common **10µm abs.** automatic back flush filter for the auxilliary engines and a **25µm abs.** fuel safety filter fitted to each GenSet, a maintenance interval of at least **8000** hours for fuel valves can be expected.

However, at the below stated indications, inspection of the fuel valves are mandatory.

- Deviation of more than 40°C of exhaust gas outlet temperature measured at cylinder head among cylinders.
- Exhaust gas temperature inlet turbocharger has increased to 10°C below alarm limit.
- Black smoke is observed during normal static load.

Therefore performance check is strongly recommended at least once a week.

NOTICE

Do not remove one or more of the fuel injection valves from the engine for checking the function and performance without a specific reason

Any question regarding this Service Letter can be forwarded to leo7-hol@mandieselturbo.com



Not a criterion for remove any fuel injection valves for pressure testing, adjustments or overhaul.
Fuel valves should remain in engine unless other indications dictate so.



Low exhaust gas temperature at cyl. no. 4.
 If the temperature decrease is related to the fuel injection valve the cause is most likely sticking needle in fuel nozzle.
Fuel injection valve should be removed for checking.



High exhaust gas temperature at cyl. no. 4.
 If the temperature increase is related to the fuel injection valve the cause is most likely leaking or worn fuel nozzle.
Fuel injection valve should be removed for checking.

NOTICE

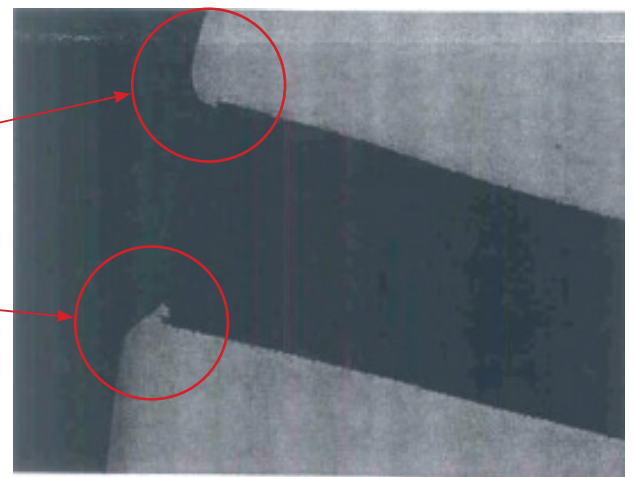
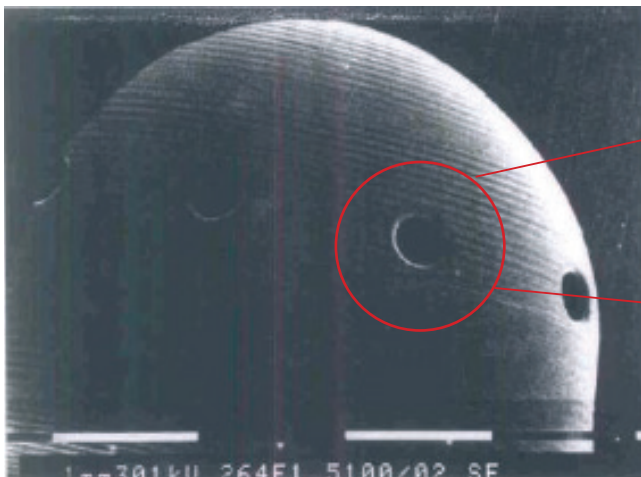
Correct cleaning procedure of the nozzle is necessary to ensure proper atomisation of the fuel in the combustion chamber



Steel brush including rotating steel brush will destroy the nozzle spray holes and a new nozzle element is required.

NOTICE

Consequence by using rotating steel brushes:



Example of a nozzle tip cleaned by a rotating steel brush causing edges in the nozzle bores which destroy the atomisation. Complete and clean combustion is a function of fuel atomisation.

NOTICE

Carbon deposit accumulation around the fuel injection nozzle can be cleaned with a nylon sponge and diesel oil as this will not harm the nozzle holes

The fuel injection valve should be cleaned from the outside i.e. without dismantling the fuel valve, check should be done in fully assembled condition.

For judgment of the fuel nozzle condition, only opening pressure and leakage should be used as criteria for acceptance or rejection.

Spray pattern test should not be used as a criterion, as the test bench injection capacity is too small to produce the same condition as exists in the engine.

Drop in opening pressure is typically caused by wear in the needle seat in the fuel injection valve or setting of the spring. Setting of the spring cannot be avoided, however wear in the seat area is the result of wear from abrasive particles and can be reduced by proper treatment of the fuel.

In case of leakage or low opening pressure, the valve should be opened for internal check of parts.

If leakage is the reason for opening the fuel valve, typically the nozzle will have to be replaced as a minimum, while a low opening pressure normally dictates a replacement of the spring. In both situations replacement of other parts may be required based on condition.



Nozzle condition before cleaning & after cleaning with a nylon sponge.