Service Letter

SL2025-771/KLH

Two-stroke

Copenhagen, August 2025

Action code: AT FIRST OPPORTUNITY

Test of pilot injection valve (PIV) using the on-board test rig

Concerns

Owners and operators of Everllence B&W two-stroke marine diesel engines.
Type: ME-GI engines with PIV.

Summary

Test of PIV using the on-board test rig.

Contact details

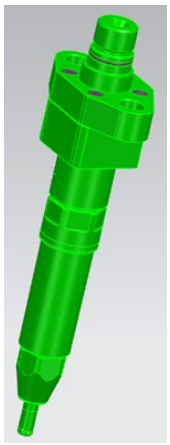
ApplicationDesign2s@everllence.com

References

Relevant instructions:
4265-0201-0033
4265-0201-0036
4265-0201-0040

Attachment

Updated Work Card; checking section



Pilot injection valve

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Change in oil viscosity

The reliable operation of your two-stroke engine depends on correct operation and maintenance. With this in mind, we would like to emphasise the importance of correctly testing pilot injection valves (PIV) using the on-board test rig, as highlighted in this Service Letter.

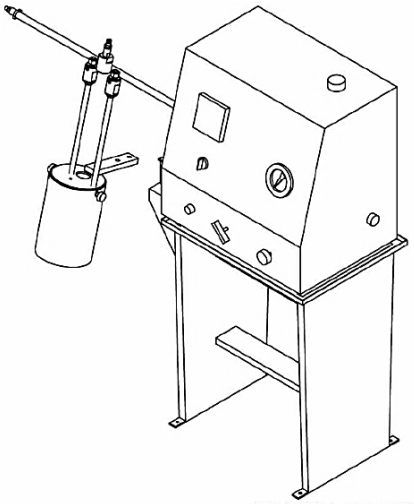
In the PIV design, additional clearance is applied compared to the fuel injection valve (FIV) design. Leakage through this clearance will disturb the function of the test tool and sometimes result in incorrect values for the opening pressure. And occasionally, it may even be impossible to conduct an opening pressure test.

Using hydraulic oil of 32 cSt in the test rig will reduce the leakage through the gaps during valve testing. Reference is made to the information stated in the latest PIV overhaul procedure:

2. Pressure testing pump

Use only hydraulic oil (rust-preventing) for testing, the viscosity of the oil depends on the design of the valve being tested:
Fuel Injection Valve (FIV): 7-10 cSt at 50°C
Pilot Injection Valve (PIV): 32 cSt at 40°C

NOTICE The high-pressure pump should be periodically checked in accordance with the supplier's instructions.



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Regarding hydraulic output, the test rig has far less capacity than the installation on an actual engine. Therefore, the internal leakage will not affect the performance or function of the valve when installed in the engine.

There is no need to re-test already overhauled and tested PIV injectors after changing to 32 cSt oil in the test rig. If an injector has a low opening pressure when testing with 32 cSt oil, carry out the overhaul according to the normal overhaul procedure.

Other injector types should still be tested using 7-10 cSt oil.

Please find the updated Work Card; checking section, attached.

Yours sincerely,

Susanne Kindt
Senior Vice President,
Engineering

Kim Blichfeldt Kirkeby
Senior Manager,
Engine Support

Checking

Warnings and key information

⚠ WARNING

Risk of hydraulic oil spray

Risk of damage to eyes or injection of hydraulic oil into the skin

- Protect yourself from potential spray.
  - ⇨ Use eye protection and gloves when operating the pressure testing device to protect from spray.
  - ⇨ Use mask when operating the pressure testing device to protect from oil mist.

Different pilot injection valve designs

Two general designs for Pilot Injection Valve (PIV) exists, depending on the bore size of the engine design.

The following checking includes both designs which have been clearly marked, when updating your checking procedures, ensure reference to correct versions.

1. Fuel oil injection valve

The injection valves must be given the utmost attention and care, as the greater part of irregularities that may occur during the running of the engine can be attributed to defects in these valves.

If the engine gives normal performance in accordance with diagrams and exhaust temperatures, it is only necessary to inspect the injection valves after the service period stated in the Checking and Maintenance Programme.
See maintenance schedule [0760-0301].

To obtain reliable results during testing of the injection valves, all injection valves that are dismantled from the engine must be disassembled, cleaned, inspected, and re-assembled before testing.
See "Overhaul," work card [4265-0301] and [4265-0401].

All injection valves must be function-tested before being mounted in the cylinder cover.

NOTICE **In case the slide-type injection valve is pressure tested without being cleaned between the fuel nozzle and the cut-off slide, the opening pressure value measured might be considerably lower than specified.**

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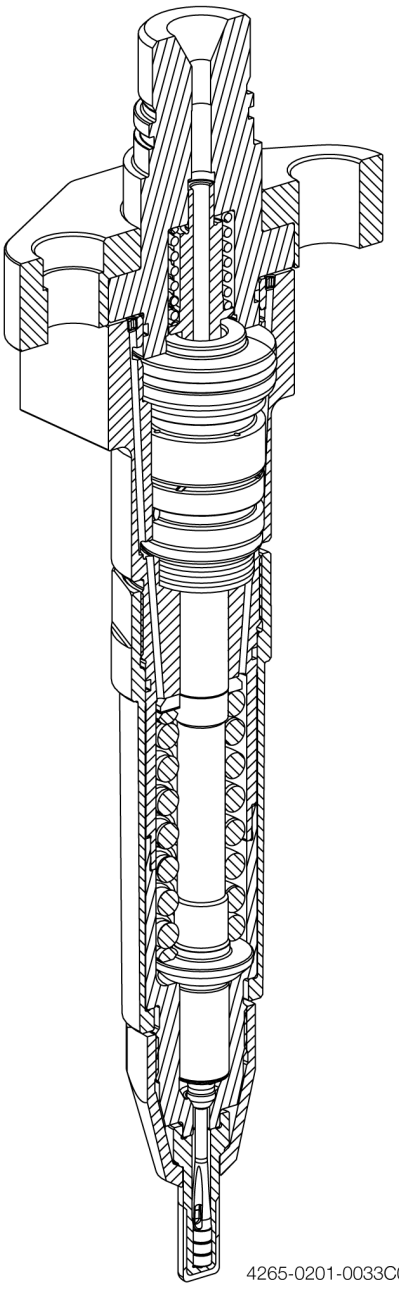
50-70 bore



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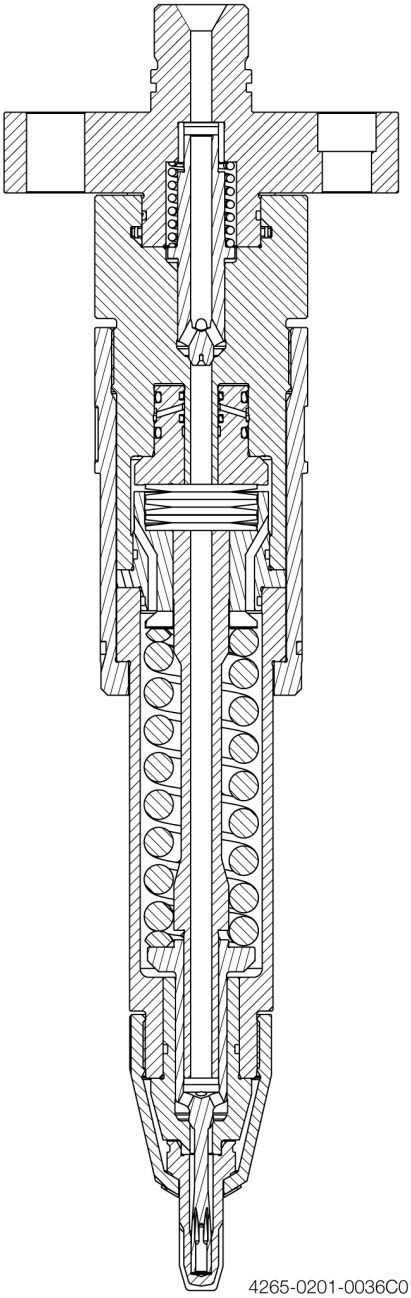
80-95 bore



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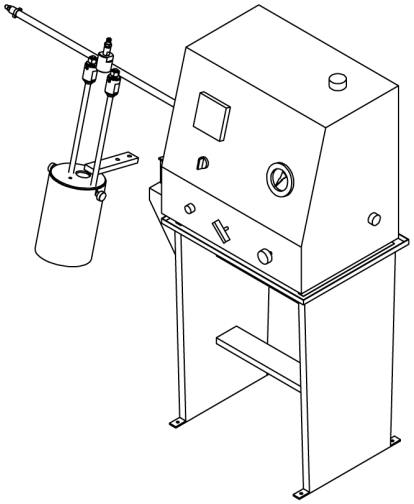
2. Pressure testing pump

Use only hydraulic oil (rust-preventing) for testing, the viscosity of the oil depends on the design of the valve being tested:
Fuel Injection Valve (FIV): 7-10 cSt at 50°C
Pilot Injection Valve (PIV): 32 cSt at 40°C

NOTICE **The high-pressure pump should be periodically checked in accordance with the supplier's instructions.**



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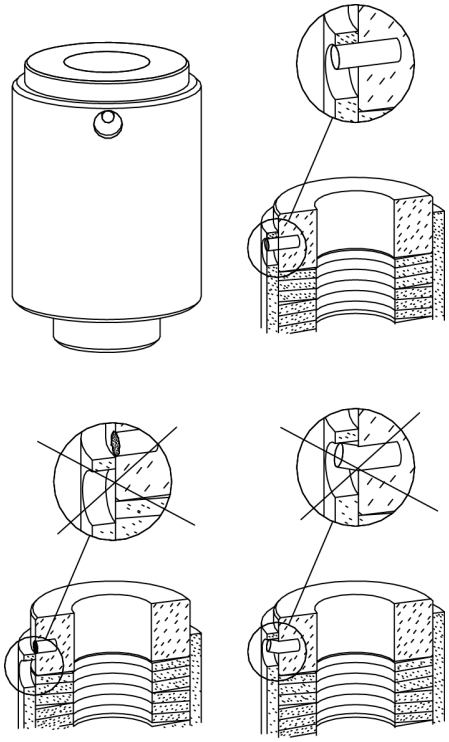
3. Spring pack

To ensure that over tightening has not taken place, check that the locking/indicating pin has not been bent or broken off.

In the event of over tightening, replace the spring pack by a new one.



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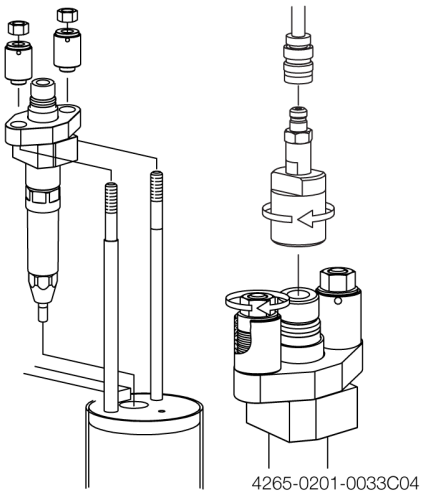
4. Setting-up the injection valve

Place the injection valve in the test rig and secure it with the spring packs and nuts.

Tighten the nuts until the top face of the pressure disc is flush with the top face of the spring housings.

Mount the oil pipe between the pressure testing pump and the injection valve.

Mount the drain pipe.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5. Pressure testing procedure

The following functions of the injection valve must be checked:

- Flushing and jet control
- Opening pressure
- Sealing test and sliding function
- Pressure test, O-ring sealing

NOTICE **All tests must be carried out as described in the instructions issued by the pressure testing pump manufacturer.**

6. Flushing and jet control

Remove air in the system and check the fuel jet in the following way.

Slowly increase the oil pressure until straight jets of oil are ejected from the nozzle holes (no atomisation).

Acceptance criteria:
There is to be a continuous jet of oil through at least one of the nozzle holes.

Owing to the geometry of the internal part of the nozzle - and because of the height to which the spindle is lifted during pressure testing is lower than the height it is lifted during normal engine operation - the fuel oil will not necessarily flow from all of the nozzle holes.

Cause of fault:
If the jets do not fulfil the above point, the cause may be:

- Dirt in the nozzle holes
- The nozzle is not mounted correctly.

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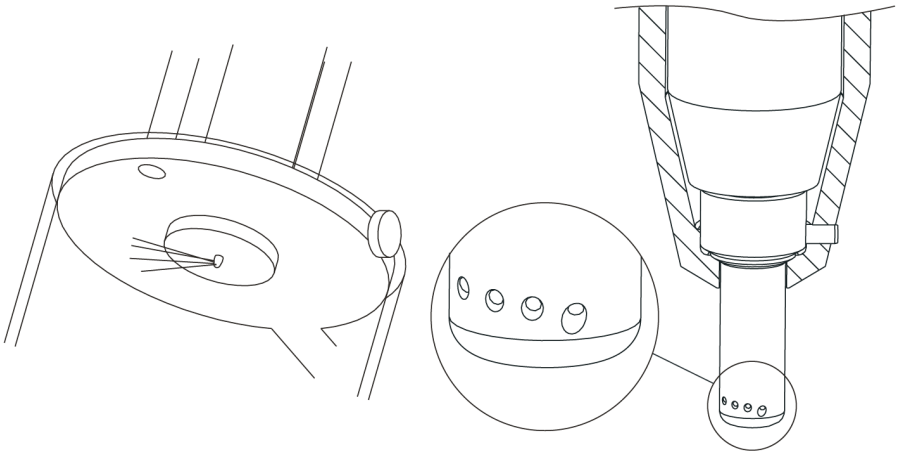

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7. Opening pressure

To check the opening pressure, increase the oil pressure until oil is admitted through the nozzle holes.

Acceptance criteria:
Check the opening pressure on the pressure gauge and compare with *data T42-009*.

Cause of fault:
If the opening pressure is higher than specified in *T42-009*, the cause may be that a wrong type of spring is used - replace the spring.

Alternatively, the cause may be friction between the cut-off shaft and the spindle guide housing. Clean the cut-off shaft and the spindle guide housing and check that the cut-off shaft can move freely inside the spindle guide housing. Alternatively, mount a new spindle guide complete.

If the opening pressure is lower than specified in *T42-009*, the cause is most likely that the spring has sagged. However wear on other internal fuel valve components contributing to establish the opening pressure may also be possible. Add shims to the fuel valve until opening pressure is within range. The shims are available as spares.

NOTICE **The highest number of shims to be added is maximum five. If more than five shims are needed, it will indicate that some parts of the valve must be replaced.**

If the opening pressure is still low after adding five shims, this will presumably indicate that a spring has lost tension. If the pressure is still low after exchanging the spring and adding shims, the sealing surface of the following parts should be inspected for wear and damage:

- Non-return valve.
- Spindle guide.
- Thrust Foot.

If minor wear or damage is found on the sealing surfaces, this can be corrected by lapping the affected parts, otherwise replace damaged and worn out parts.

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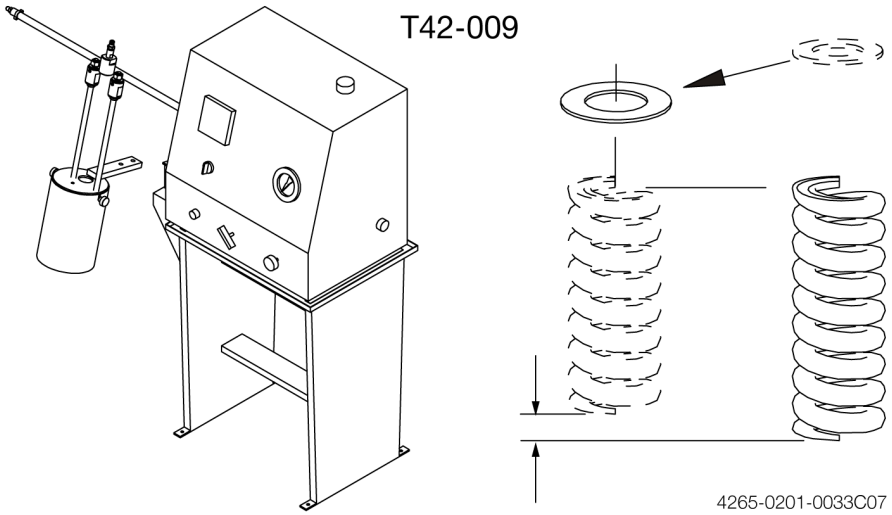
NOTICE Take care not to exceed operational dimensions during lapping, if dimensions are exceeded the parts must be replaced.

If parts of the valve have been replaced or the number of shims has been changed, the pressure testing procedure of the injection valve must be repeated.



8. Sealing test and sliding function

It is necessary to check the needle valve seat for tightness and the slide for correct closing.

Slowly increase the oil pressure to about 50 bar below the opening pressure. Maintain the built-up pressure by closing for the oil supply.

Acceptance criteria:
Oil must not flow from the nozzle holes.
The pressure drops relatively slowly to about 15 bar, after which it drops quickly to 0 (the slide is pressed against the conical seat and opens for circulation oil).

NOTICE Oil flows out of the leak oil outlet when the injection valve is full of oil.

Cause of fault:
If oil flows out of the nozzle holes, the cause is either:

• Defective spindle guide at needle seat, or a sticking spindle. Examine and/or replace the spindle guide.
See work card [4265-0301].

• Too quick pressure drop:
The clearances of the movable parts, both of the spindle guide and of the non-return valve, are too large, or the seats between the thrust piece/spindle in the spindle guide or thrust piece/valve slide in the non-return valve are damaged.

Examine and/or replace both the spindle guide and non-return valve.
See work card [4265-0301] and [4265-0401].

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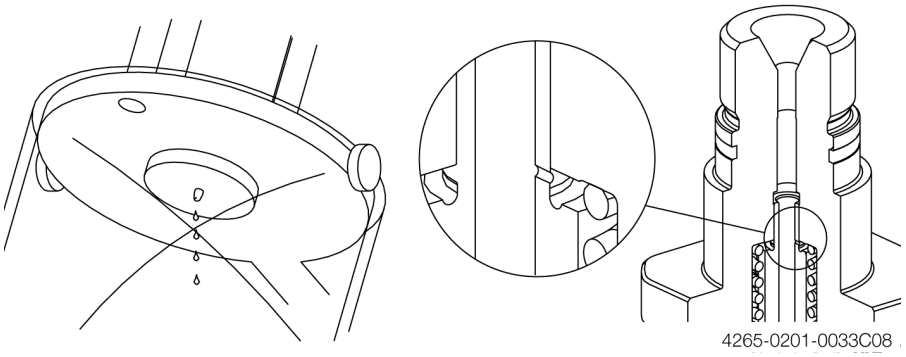
If a quick pressure drop from 15 to 0 bar cannot be registered:

- The valve slide is sticking; or
- The vent hole in the thrust piece is blocked.

If so, disassemble and examine the spindle guide, replace if necessary.
See work card [4265-0301].



9. Pressure test, O-ring sealing

To ensure that the leak oil (circulation oil) remains in the closed system, build up a working pressure of about max. 10 bar until oil flows out of the leak oil outlet.

Close the leak oil outlet with a gasket and plug screw.

INFO **Some valve designs are supplied with a flange for this purpose.**

Increase the working pressure to about 100 bar.

Acceptance criteria:
The built-up pressure of about 100 bar should be maintained.

Cause of fault:
If oil leaks out between the openings between sleeves and other components, the O-ring(s) inside the injection valve is defective, and must be replaced.

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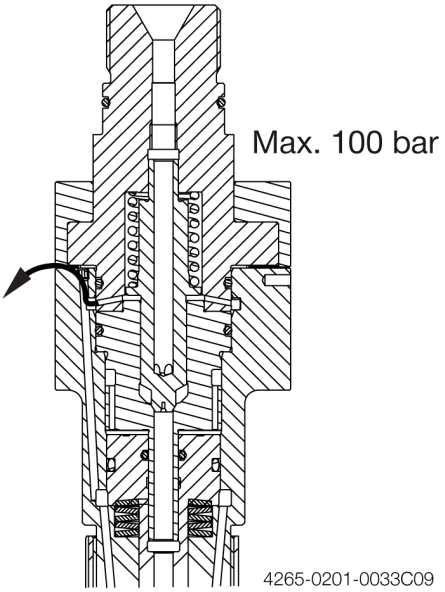
50-70 bore



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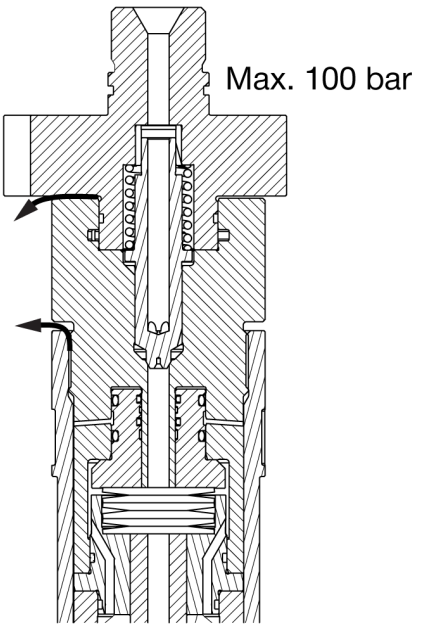
80-95 bore



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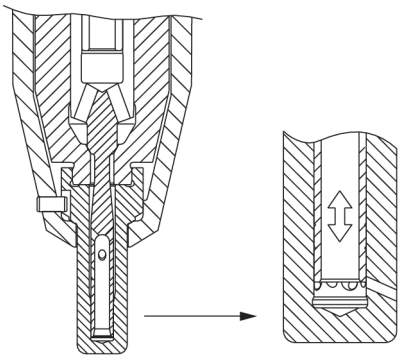
10. Atomisation test

The atomisation test may damage the valve, and may not be attempted, because it makes the needle oscillate, with a small lift at a very high frequency. The high pressure drop across the cut-off edge and the high contact pressure between slide and fuel nozzle, in combination with the poor lubricity of the test oil, increase the risk of seizures between cut-off slide and nozzle.

All of these conditions involve the risk of seizure between the cut-off slide and the nozzle.



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