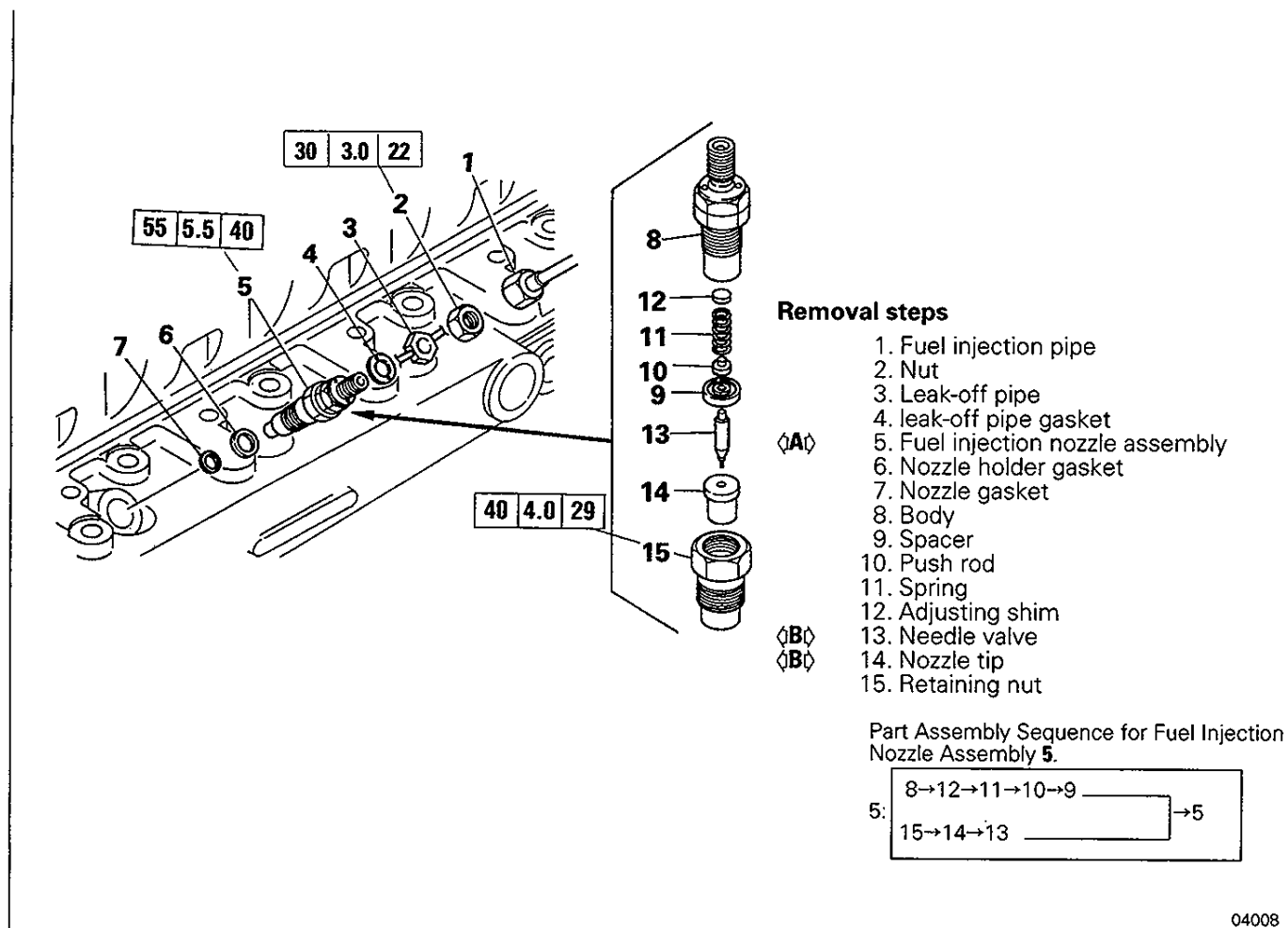


21. FUEL INJECTION NOZZLE

REMOVAL AND INSTALLATION



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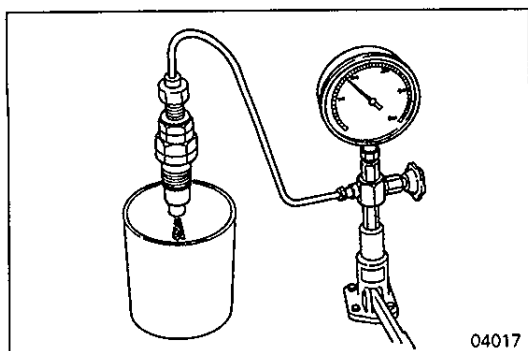
INSPECTION

FUEL INJECTION NOZZLE ASSEMBLY

- (1) Install the nozzle tester to the fuel injection nozzle assembly 5 and perform the following checks:

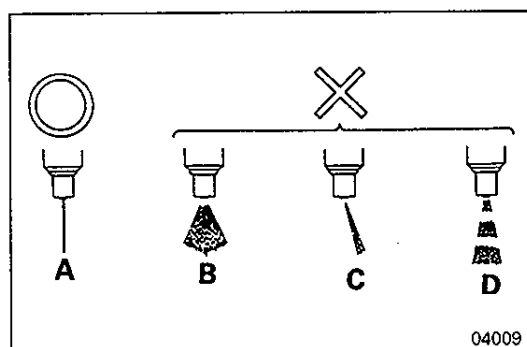
Caution

- Prior to proceeding with the checks, bleed air from the fuel injection nozzle by pumping the nozzle tester lever two or three times.



Valve Opening Pressure Check

- (1) Operate the nozzle tester lever at 1 to 2 seconds per stroke. Read the pressure when, after a gradual increase, the pointer deflects rapidly.
- (2) If the reading deviates from the specified standard value, disassemble the fuel injection nozzle, clean and reassemble. Then, make necessary pressure adjustment using adjusting shims **12**.
- (3) A shim thickness of 0.1 mm (0.04 in.) changes the valve opening pressure by 1,177 – 2,157 kPa (12 – 22 kg/cm², 171 – 313 psi). [The shim thickness necessary to change the pressure by 100 kPa (1 kg/cm², 142 psi) is between 0.0045 mm (0.00018 in.) and 0.0083 mm (0.00033 in.).]
- (4) If the reading still deviates after the adjustment, replace the fuel injection nozzle assembly **5**.

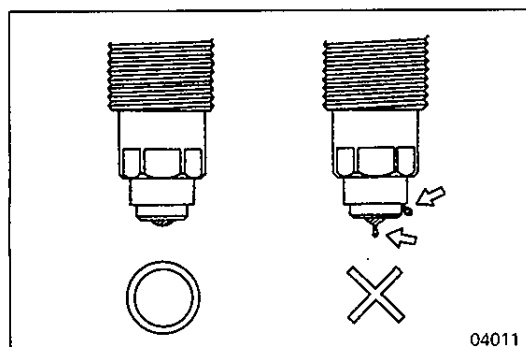


Check Spray Pattern

- (1) Inject fuel continuously by pumping the nozzle tester lever quickly (1 to 2 seconds per stroke).
 - A:** The spray is a straight and fine streak with a spray angle of approx. 0° <Non-turbo> or 10° <Turbo>. (Acceptable)
 - B:** The angle of spray is too wide. (Unacceptable)
 - C:** The spray is out of the axial line. (Unacceptable)
 - D:** The spray breaks. (Unacceptable)
- (2) Disassemble, clean and recheck the fuel injection nozzle assembly if necessary. If the problem still remains after another check, replace the fuel injection nozzle assembly.
- (3) Check that the fuel injection nozzle does not dribble after injection.

Caution

- Keep away from the fuel jet.



Oil Tightness Check

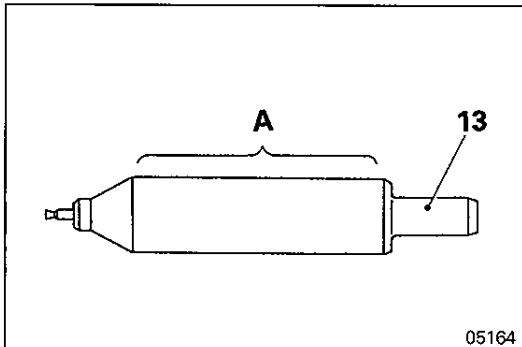
- (1) Slowly increase the nozzle internal pressure and maintain it at the specified test pressure of 12,749 – 13,729 kPa (130 – 140 kg/cm², 1,849 – 1,991 psi). In this condition, check that the fuel injection nozzle does not start dribbling within 10 seconds.
- (2) If the dribbling begins in less than 10 seconds, disassemble, clean and recheck the fuel injection nozzle assembly **5**. If the problem still remains after another check, replace the fuel injection nozzle assembly.

REMOVAL SERVICE POINTS

◇A◇ FUEL INJECTION NOZZLE ASSEMBLY REMOVAL

Caution

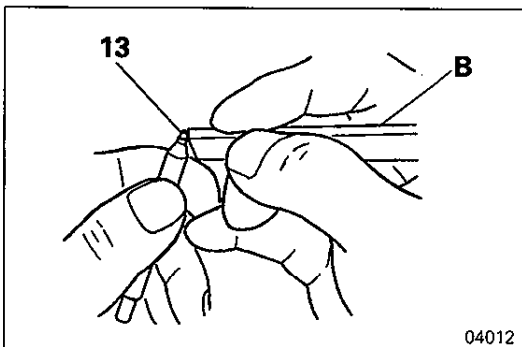
- Remove deposited carbon from the fuel injection nozzle assembly 5 before disassembling, reassembling and adjusting it. Prior to disassembly, check the fuel injection nozzle for abnormal injection pressure, abnormal spray and fuel leaks. If it is found in order, do not disassemble the fuel injection nozzle assembly.



◇B◇ NEEDLE VALVE / NOZZLE TIP REMOVAL

Caution

- Be sure not to touch the sliding contact surface A of the needle valve 13.
- Be sure not to change the original combination of the needle valve 13 and nozzle tip 14 removed.



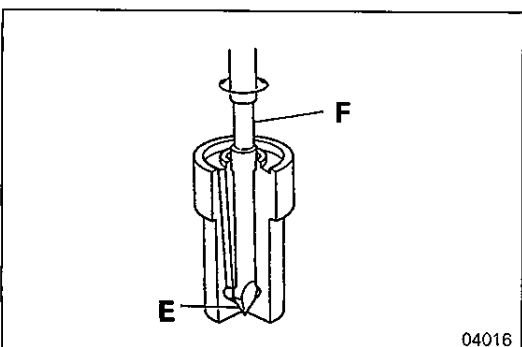
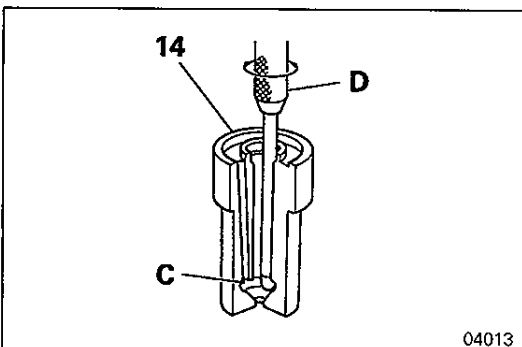
CLEANING

NEEDLE VALVE / NOZZLE TIP

- (1) Wash the needle valve 13 and nozzle tip 14 removed in clean kerosene (cleaning oil) and remove deposited carbon from them in the following manners using the specified special tools.
 - (a) Remove carbon deposited on the tip of the needle valve 13 using the special tool Cleaning Bar B.

Caution

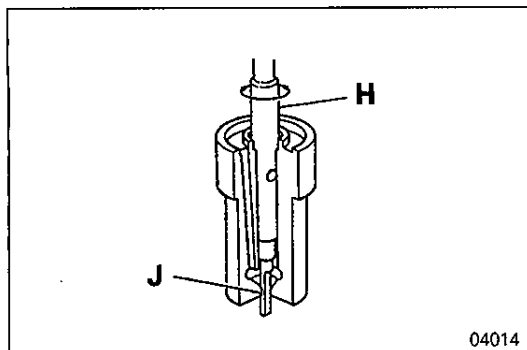
- For cleaning, never use a wire brush or any other hard metal tool.
- (b) Remove carbon accumulated in the oil pit C of the nozzle tip 14 using the Cleaning Scraper D.



- (c) Clean the seat E of the nozzle tip 14 using the special tool Cleaning Scraper F.

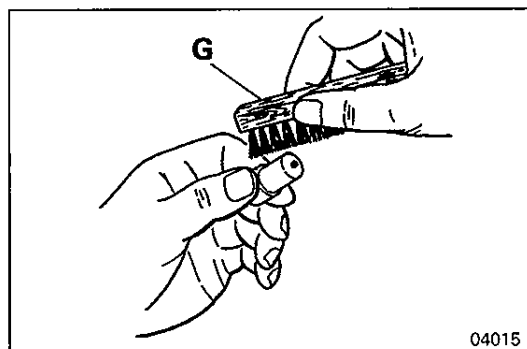
Caution

- Use sufficient care not to damage the seat surface.
- (d) To remove baked carbon, use the Fuso Carbon Remover.

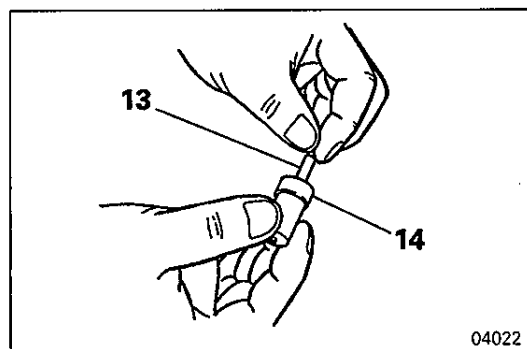


- (e) Remove carbon deposited in the nozzle hole area of the nozzle tip **14** by turning the special tool Needle Cleaner **H** that runs through the nozzle hole **J**.

Cleaning needle diameter: Less than 1.0 mm (0.04 in.)



- (f) Remove carbon deposited on the external surface of the nozzle tip **14** using the special tool Wire Brush **G**.



INSPECTION

NEEDLE VALVE / NOZZLE TIP

- (1) Wash the needle valve **13** and nozzle tip **14** clean in clean kerosene (cleaning oil) prior to reassembly.
- (2) Pull out the needle valve **13** to approximately one third of its length, let go of it and see if it slides down by gravity. (Repeat this procedure a few times after turning the needle valve each time.)
- (3) If the needle valve **13** fails to slide down by itself, wash it again and give it another check. Replace the needle valve **13** and nozzle tip **14** as a set.