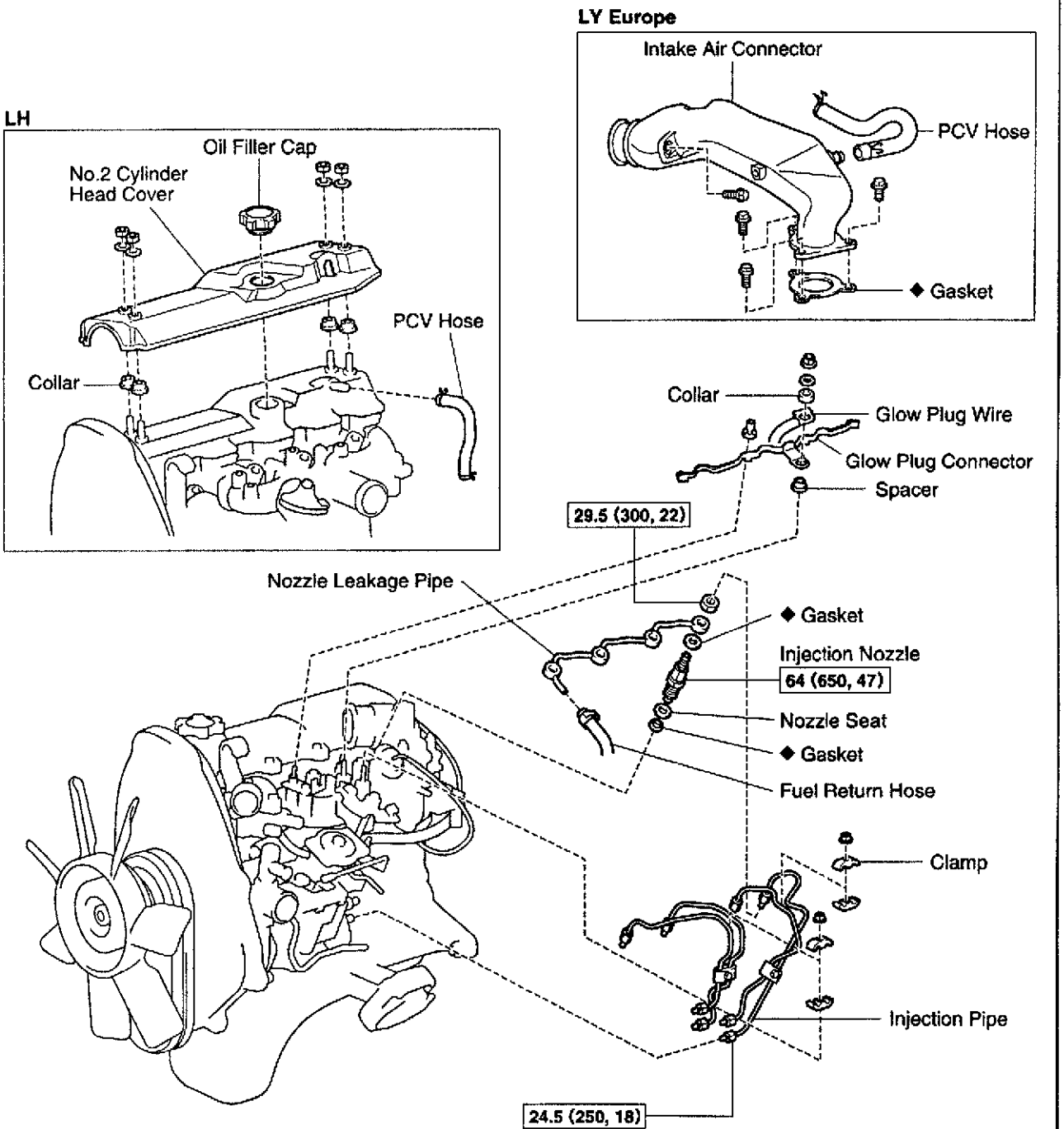
INJECTION NOZZLE

COMPONENTS FOR REMOVAL AND INSTALLATION

EG533W-09

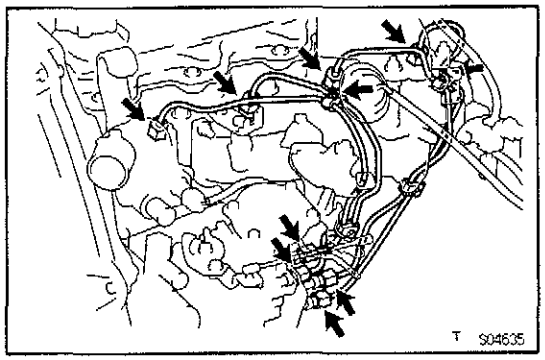
EG



N·m (kgf·cm, ft·lbf): Specified torque
◆ Non-reusable part

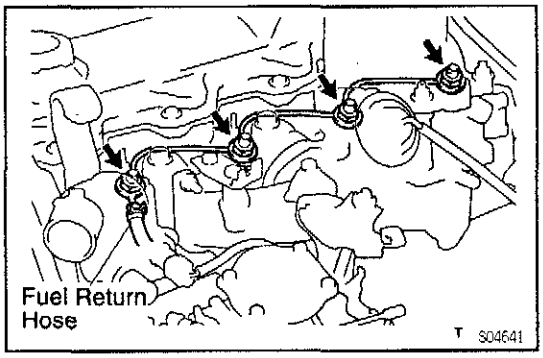
T

S04656

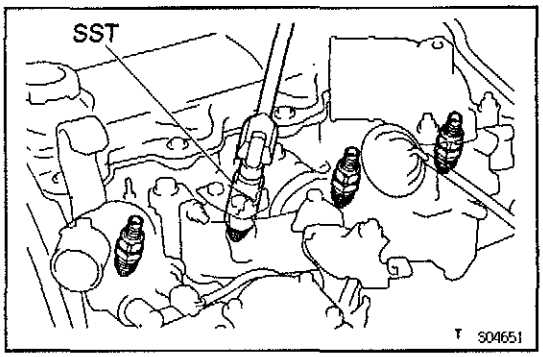


INJECTION NOZZLES REMOVAL

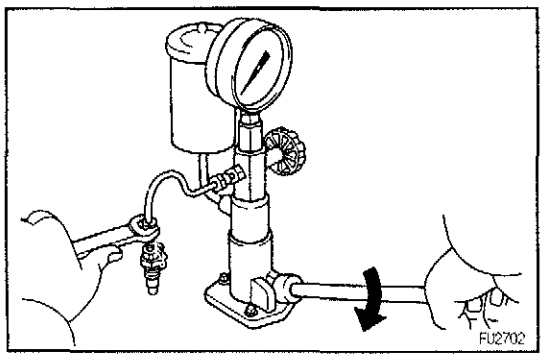
1. **REMOVE GLOW PLUG CONNECTOR**
   (See steps 2 to 5 in cylinder head removal in Engine Mechanical)
2. **REMOVE INJECTION PIPES**
(a) Loosen the 8 union nuts of the 4 injection pipes.
(b) Remove the 2 nuts, 2 upper pipe clamps, 4 injection pipes and lower pipe clamps.



3. **REMOVE NOZZLE LEAKAGE PIPE**
(a) Disconnect the fuel return hose from the leakage pipe.
(b) Remove the 4 nuts, leakage pipe and 4 gaskets.

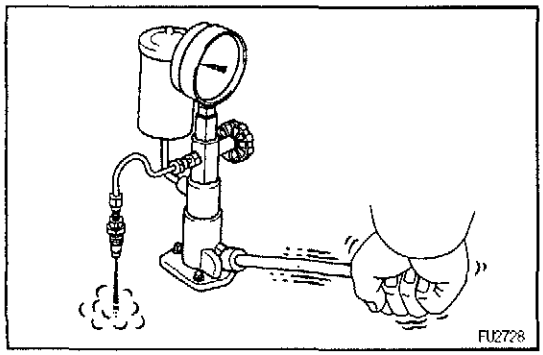


4. **REMOVE INJECTION NOZZLES**
Using SST, remove the 4 injection nozzles, 4 seats and 4 gaskets.
SST 09268–64010 (09268–64020)
HINT: Arrange the injection nozzles in correct order.



INJECTION NOZZLES TEST

1. **INJECTION PRESSURE TEST**
(a) Install the injection nozzle to the injection nozzle hand tester and bleed air from the union nut.
CAUTION: Do not place your finger over the nozzle injection hole.
(b) Pump the tester handle a few times as fast as possible to discharge the carbon from the injection hole.
(c) Pump the tester handle slowly and observe the pressure gauge.
(d) Read the pressure gauge just as the injection pressure begins to drop.



EG

Opening pressure:

New nozzle

14,810 — 15,590 kPa

(151 — 159 kgf/cm², 2,148 — 2,262 psi)

Reused nozzle

13,729 — 15,690 kPa

(140 — 160 kgf/cm², 1,991 — 2,276 psi)

HINT: Proper nozzle operation can be determined by a swishing sound.

If the opening pressure is not as specified, disassemble the nozzle holder and change the adjusting shim on the top of the pressure spring.

Adjusted opening pressure:

13,729 — 15,690 kPa

(140 — 160 kgf/cm², 1,991 — 2,276 psi)

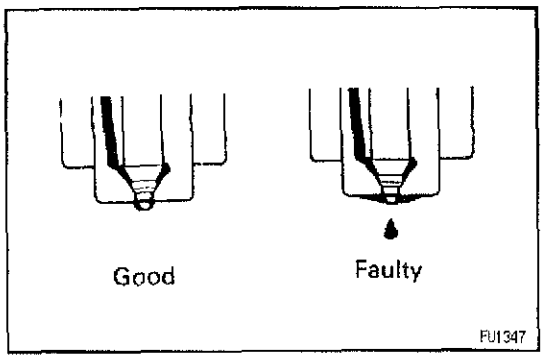
Adjusting shim thickness: **mm (in.)**

0.900 (0.0354)	1.300 (0.0512)	1.700 (0.0669)
0.950 (0.0374)	1.350 (0.0531)	1.750 (0.0689)
1.000 (0.0394)	1.400 (0.0551)	1.800 (0.0709)
1.050 (0.0413)	1.450 (0.0571)	1.850 (0.0728)
1.100 (0.0433)	1.500 (0.0591)	1.900 (0.0748)
1.150 (0.0453)	1.550 (0.0610)	1.950 (0.0768)
1.200 (0.0472)	1.600 (0.0630)	—
1.250 (0.0492)	1.650 (0.0650)	—

HINT:

- Varying the adjusting shim thickness by 0.05 mm (0.0020 in.) changes the injection pressure by about 628 kPa (6.4 kgf/cm², 91 psi) .
- Only one adjusting shim should be used.

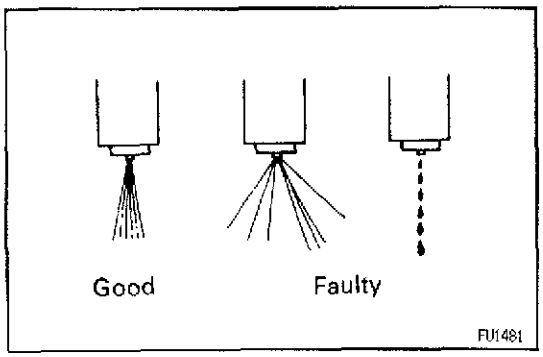
(e) There should be no dripping after injection.



2. LEAKAGE TEST

While maintaining pressure at about 981 — 1,961 kPa (10 — 20 kgf/cm², 142 — 284 psi) below opening pressure (adjust by tester handle), check that there is no dripping for 10 seconds from the injection hole or around the retaining nut.

If the nozzle drips within 10 seconds, replace or clean and overhaul the nozzle assembly.



3. SPRAY PATTERN TEST

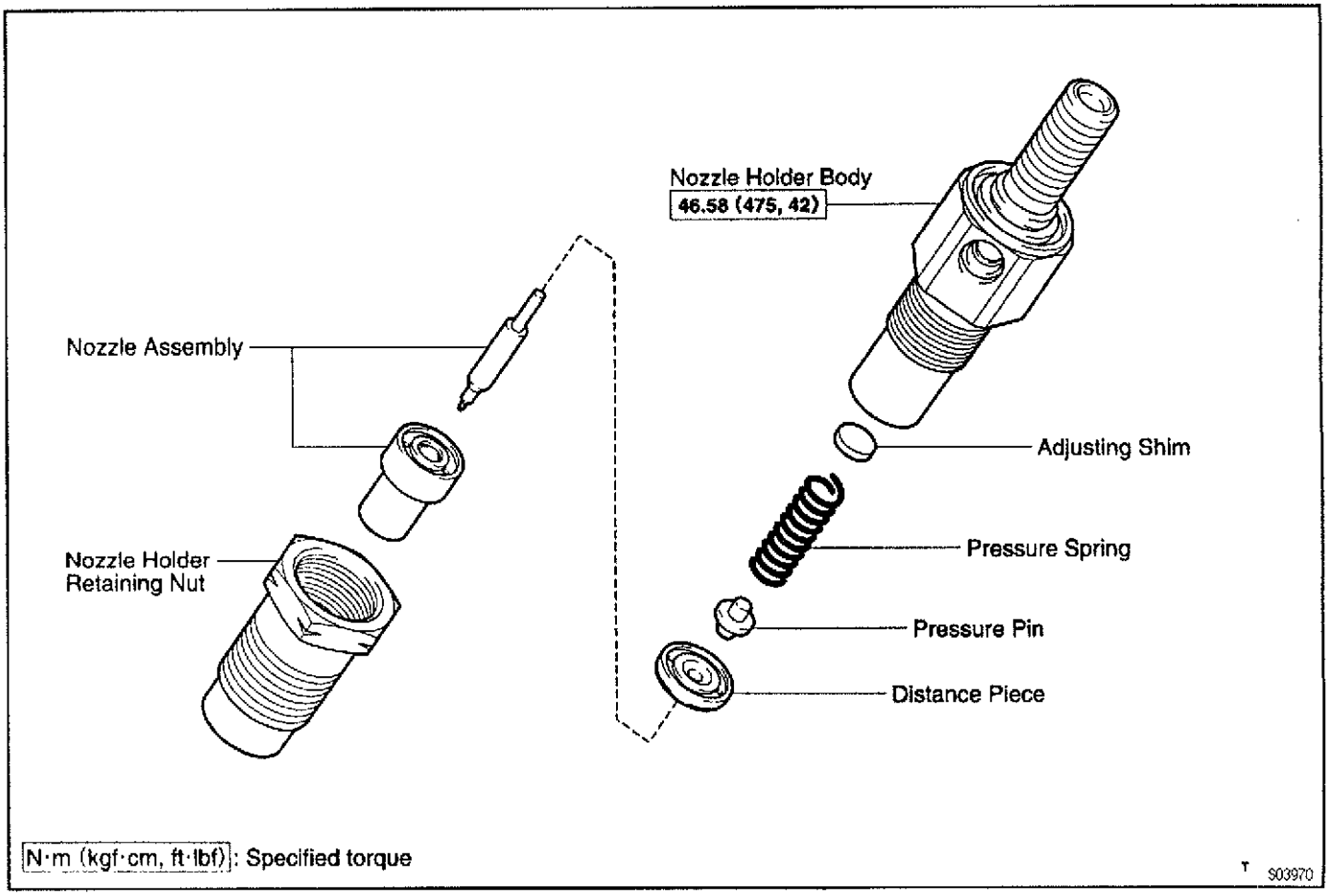
(a) The injection nozzle should shudder at a certain pumping speed between 15 — 60 times (old nozzle) or 30 — 60 times (new nozzle) per minute.

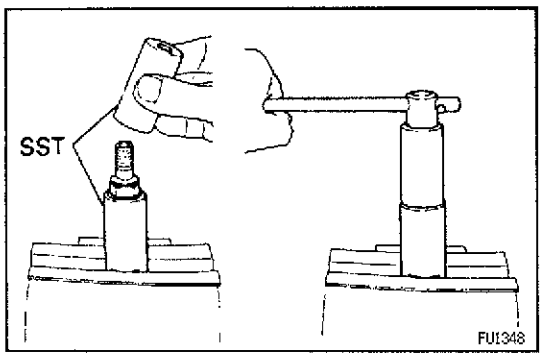
(b) Check the spray pattern during shuddering.

If the spray pattern is not correct during shuddering, the nozzle must be replaced or cleaned.

COMPONENTS FOR DISASSEMBLY AND ASSEMBLY

EG382-08





INJECTION NOZZLE DISASSEMBLY

EG340-06

DISASSEMBLE INJECTION NOZZLES

(a) Using SST, remove the nozzle holder body.
SST 09268–64010 (09268–64020, 09268–64030)
NOTICE: When disassembling the nozzle, be careful not to drop the inner parts.

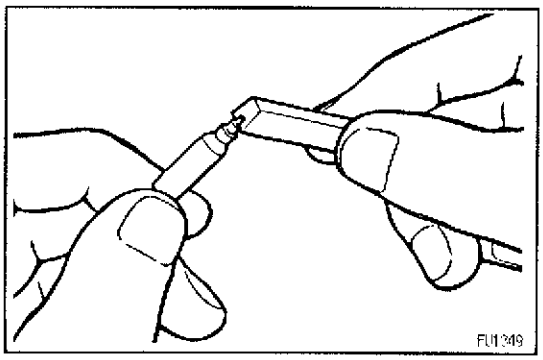
(b) Remove the pressure spring, shim, pressure pin, distance piece and the nozzle assembly.

INJECTION NOZZLES CLEANING AND INSPECTION

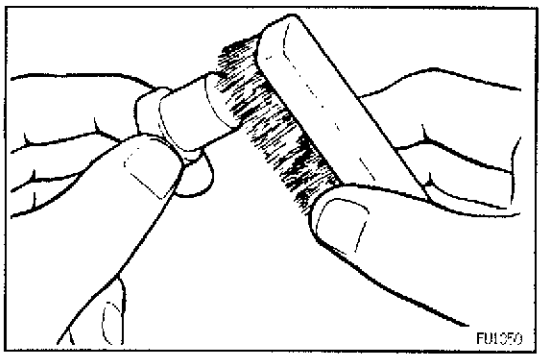
EG60M-02

1. NOZZLE CLEANING

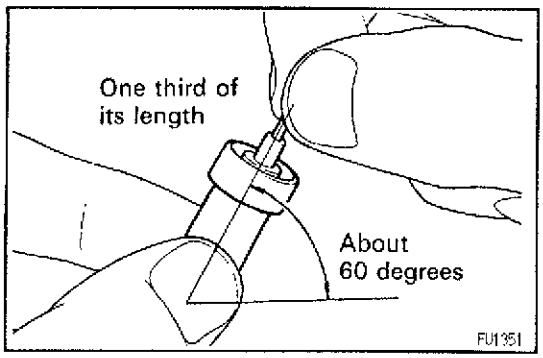
(a) To wash the nozzles, use a wooden stick and brass brush. Wash them in clean diesel fuel.
HINT: Do not touch the nozzle mating surfaces with your fingers.



(b) Using a wooden stick, remove the carbon adhering to the nozzle needle tip.

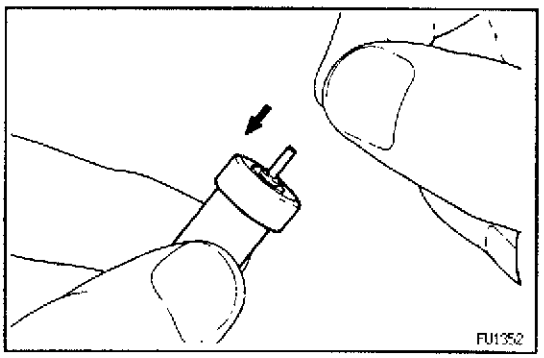


(c) Using a brass brush, remove the carbon from the exterior of the nozzle body (except lapped surface).
(d) Check the seat of the nozzle body for burns or corrosion.
(e) Check the nozzle needle tip for damage or corrosion.
If any of these conditions are present, replace the nozzle assembly.

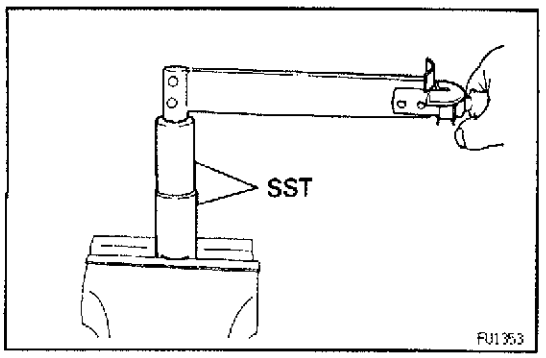


2. INSPECT NOZZLE ASSEMBLY

(a) Wash the nozzle in clean diesel fuel.
HINT: Do not touch the nozzle mating surfaces with your fingers.
(b) Tilt the nozzle body about 60 degrees and pull the needle out about one third of its length.



(c) When released, the needle should sink down into the body vent smoothly by its own weight.
(d) Repeat this test, rotating the needle slightly each time.
If the needle does not sink freely, replace the nozzle assembly.



INJECTION NOZZLES ASSEMBLY

1. ASSEMBLE INJECTION NOZZLE HOLDERS

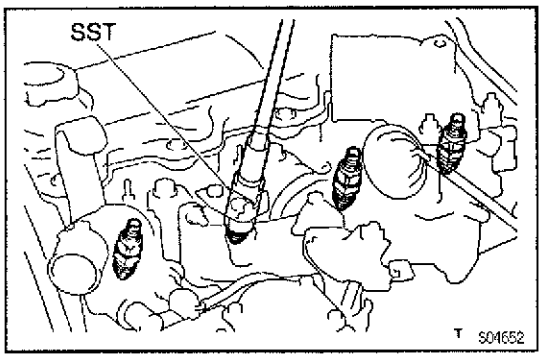
(a) Assemble the nozzle holder retaining nut, the nozzle assembly, distance piece, pressure pin, pressure spring, adjusting shim and nozzle holder body, and finger tighten the retaining nut.
(b) Using SST, tighten the nozzle holder body.
SST 09268–64010 (09268–64020, 09268–64030)

Torque: 46.58 N·m (475 kgf·cm, 42 ft·lbf)

NOTICE: Over torquing could cause nozzle deformation and needle adhesion or other defects.

2. **PERFORM PRESSURE AND SPRAY PATTERN TEST**
(See injection nozzles test)

EG



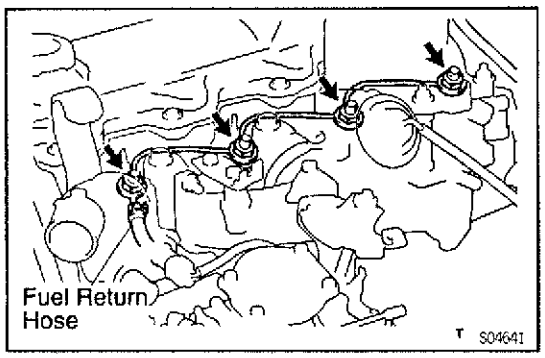
INJECTION NOZZLES INSTALLATION

EG7DC-01

1. **INSTALL INJECTION NOZZLES**

(a) Place 4 new gaskets and the 4 nozzle seats into the injection nozzle holes of the cylinder head.

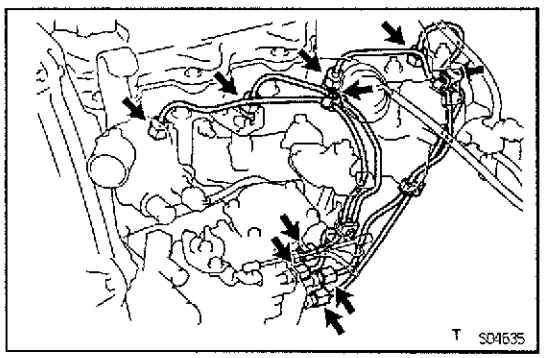
(b) Using SST, install the 4 injection nozzles.
SST 09268–64010 (09268–64020)
Torque: 64 N·m (650 kgf·cm, 47 ft·lbf)
NOTICE: Over torquing could cause nozzle deformation and needle adhesion or other defects.



2. **INSTALL NOZZLE LEAKAGE PIPE**

(a) Install 4 new gaskets and the leakage pipe with the 4 nuts.
Torque: 29.5 N·m (300 kgf·cm, 22 ft·lbf)

(b) Connect the fuel hose to the leakage pipe.



3. **INSTALL INJECTION PIPES**

(a) Place the 2 lower clamps on the intake manifold.

(b) Install the 4 injection pipes.
Torque: 24.5 N·m (250 kgf·cm, 18 ft·lbf)

(c) Secure the injection pipes with the 2 upper pipe clamps and 2 bolts.

4. **INSTALL GLOW PLUG CONNECTOR**
(See steps 14 to 17 in cylinder head installation in Engine Mechanical)

5. **START ENGINE AND CHECK FOR LEAKS**