DETROIT DIESEL DD13 TURBO CHARGER AND WASTEGATE OPERATION
Description and Operation of the DD13 Turbocharger

Compression of air in the turbocharger causes an air mass to flow into the combustion chamber. The turbocharger consists of a turbine and compressor which are attached to a shaft. The exhaust gas flows to the turbine wheel and causes it to turn. This turning motion is transmitted to the shaft and the compressor impeller. The intake air from the air filter is compressed by the compressor impeller and flows over a charge air pipe to the charge air cooler. The compressed air is cooled in the charge air cooler, permitting a more dense charge of air to be delivered to the engine, and therefore, engine output is increased. The charge air then passes from the charge air cooler into the intake manifold. The turbocharger is mounted on the exhaust outlet flange of the engine exhaust manifold.

The advantages are as follows:

1) Increases the engine performance and torque.
2) Reduction of the fuel consumption compared to a similarly powered naturally aspirated engine.
3) Reduction of emissions.
1. Bolt
2. Washer
3. Turbocharger bracket
4. Bracket
5. Stud (qty6)
6. Bolt
7. Heat shield
8. Nut
9. Stud
10. Gasket

11. Turbocharger
12. Electronic proportioning valve
13. Turbocharger inlet pipe
14. Clamp
15. Turbo outlet elbow pipe
16. Heat shield
17. Air hose
Wastegate Operation

• A Wastegate is simply a turbine bypass valve. It works by diverting some portion of the exhaust gas around, instead of through, the turbine. This limits the amount of power that the turbine can deliver to the compressor, thereby limiting the turbo speed and boost level that the compressor provides.

• The actuator is calibrated (or set electronically with an electronic boost controller) by internal spring pressure to begin opening the Waste gate valve at a predetermined boost level. When this boost level is reached, the valve will open and begin to bypass exhaust gas, preventing boost from increasing.
Description and operation of the DD13 Wastegate solenoid

For EPA 10, DD13 uses a waste gate solenoid to control the turbocharger waste gate. The MCM uses a PWM signal to activate the waste gate solenoid to control the available air pressure to the waste gate on the turbocharger. There are many operating conditions that require use of the waste gate solenoid.
Removal of the DD13 Wastegate Solenoid

Remove as follows:

1. Disconnect the electrical harness connector (1) from the wastegate solenoid.

2. Remove the hose clamp (2) and remove the air line (1) from the wastegate solenoid.
Installation of the DD13 Wastegate Solenoid

Install as follows:

1. If removed, install the stud to the cylinder block boss. Torque the stud to 10 Nm (7.4 LB FT)

2. Install the wastegate solenoid on the cylinder block.

3. Install the bolt (3) and nut (2). Torque each to 30 Nm (22 LB FT).
4. Install the vehicle air supply (1) to the wastegate solenoid. Torque to 25 Nm (18 LB FT)
5. Install the air line to the wastegate solenoid and tighten hose clamp.

6. Connect the wastegate solenoid connector.
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