Bleeding the tank

The tank vent valve provides managed regeneration of carbon canister (AKF) using scavenging air. The scavenging air drawn through the carbon canister is enriched with hydrocarbons (HC) according to the level of charge of the activated carbon (HC) and then fed into the engine for combustion.

The development of hydrocarbons from the fuel tank is highly dependent on:

- the fuel and ambient temperatures
- air pressure
- the fuel level within the tank

The tank vent valve is closed when in a flow-free state. This prevents fuel vapours from the AKF reaching the intake manifold when the engine is not running.

On-board diagnosis II

Regardless of the pollutants created by the combustion within the engine, a vehicle will emit considerable amounts of unburned hydrocarbons. These hydrocarbon emissions can stem from leaks in the fuel system, but also from an insufficiently large fuel tank vent system (carbon canister becomes permeable).

For this reason, a further OBD II requirement concerns the fuel system and the fuel tank ventilation system. The maximum permissible level of escaping fuel fumes has been determined anew. Moreover, leaks larger than 1 mm in the fuel system must be recognized by the DME.

To this end, the following measures have been implemented in BMW vehicles:

- Fuel temperature reduction by fuel circuit with 3/2-way valve
- The carbon canister has been reshaped
- New activated carbons with improved absorption capability
- Inclusion of a fuel tank ventilation system diagnosis function in the engine control unit with the aid of a carbon canister shut-off valve and fuel tank pressure sensor

Fuel tank vent system diagnosis

Fuel tank vent system diagnosis is performed automatically in predefined cycles. It is only performed with the engine running. The entire system must be closed air-tight to allow detection of leaks in the fuel tank and fuel tank ventilation system. This is achieved by the shut-off valve (AAV) on the carbon canister (AKF).

Vacuum system:

The fuel tank vent valve (TEV) is opened. This remains open until a vacuum of 5-10 mbar in the entire system has been generated by the intake system. The vacuum in the fuel tank system is measured by the fuel tank pressure sensor.

The fuel tank vent valve is closed when the required vacuum is attained.

Now, the fuel tank vent valve and the carbon canister shut-off valve are both closed together. In this state, the DME control unit uses the fuel tank pressure sensor to monitor the previously generated vacuum in the fuel tank and fuel tank vent system. The engine control unit assumes that there is a leak if the vacuum is reduced by more than a defined threshold within a period of approx. 10 seconds.

Overpressure system:

The LDP (leak detection pump) is switched on and the fuel tank ventilation valve closed. The LDP remains on until a pressure of 5-10 mbar in the entire system has been generated. The pressure in the tank is measured by the reed switch in the LDP.

The LDP is switched off when the required pressure has been reached.

Now, the fuel tank vent valve and the carbon canister shut-off valve are closed together, the LDP is switched off. In this state, the DME control unit uses the fuel tank pressure sensor to monitor the previously generated overpressure in the fuel tank and fuel tank vent system. The engine control unit assumes that there is a leak if the overpressure is reduced by more than a defined threshold within a period of approx. 10 seconds.