
Evaporative Emission (EVAP) Systems

Overview

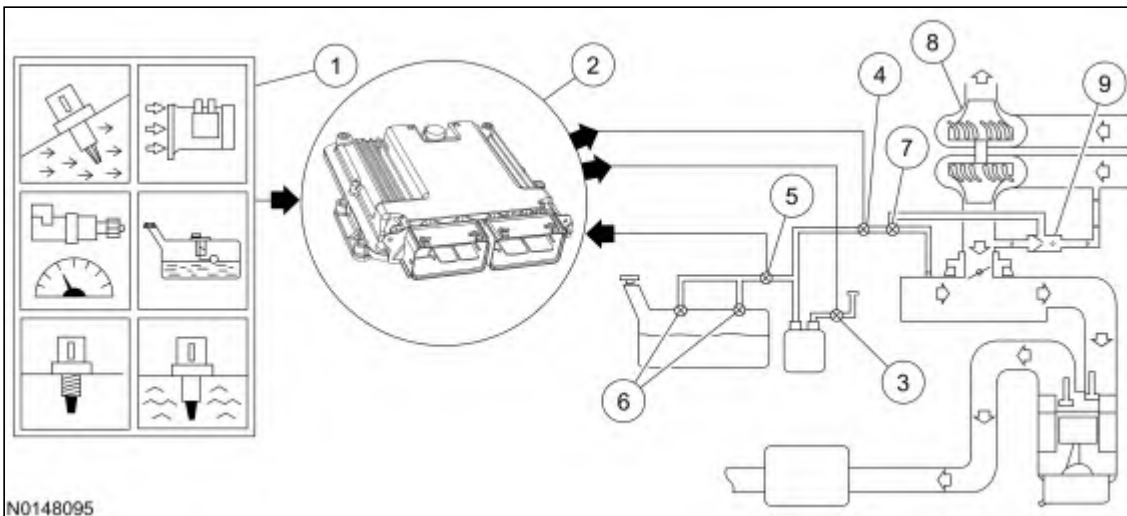
The EVAP system prevents fuel vapor build up in the sealed fuel tank. Fuel vapors trapped in the sealed tank are vented through the vapor valve assembly on top of the tank. The vapors leave the valve assembly through a single vapor line and continue to the EVAP canister for storage until the vapors are purged to the engine for burning.

All applications required to meet on board diagnostics (OBD) regulations use the enhanced EVAP system. Some applications also incorporate an on board refueling vapor recovery (ORVR) system. Refer to the Workshop Manual Section 303-13, Evaporative Emissions for vehicle specific information on the description and operation of the evaporative emission system.

Enhanced Evaporative Emission (EVAP) System

The enhanced EVAP system consists of a fuel tank, fuel filler cap or capless fuel tank filler pipe, fuel tank mounted or inline fuel vapor control valve, fuel vapor vent valve, EVAP canister, fuel tank mounted or fuel pump mounted or inline fuel tank pressure (FTP) sensor, EVAP purge valve, EVAP check valve (if equipped), intake manifold hose assembly, EVAP canister vent valve, PCM and connecting wires, and fuel vapor hoses. The enhanced EVAP system, including all the fuel vapor hoses, can be checked when a leak is detected by the PCM. For additional information on the EVAP system components, refer to [Engine Control Components](#) in this section.

1. The enhanced EVAP system uses inputs from the engine coolant temperature (ECT) sensor or cylinder head temperature (CHT) sensor, the intake air temperature (IAT) sensor, the mass airflow (MAF) sensor (if equipped), the FTP sensor and vehicle speed to provide information about engine operating conditions to the PCM. The PCM uses the fuel level input (FLI) and FTP sensor signals to determine activation of the EVAP leak check monitor based on the presence of vapor generation or fuel sloshing.
2. The PCM determines the desired amount of purge vapor flow to the intake manifold for a given engine condition. The PCM then outputs the required signal to the EVAP purge valve. The PCM uses the enhanced EVAP system inputs to evacuate the system using the EVAP purge valve, seal the enhanced EVAP system from the atmosphere using the EVAP canister vent valve, and uses the FTP sensor to observe total vacuum lost for a period of time.
3. The EVAP canister vent valve seals the enhanced EVAP system to atmosphere during the EVAP leak check monitor.
4. The PCM outputs a duty cycle between 0% and 100% to control the EVAP purge valve.
5. The FTP sensor monitors the fuel tank pressure during engine operation and continuously transmits an input signal to the PCM. During the EVAP monitor testing, the FTP sensor monitors the fuel tank pressure or vacuum bleed up. On some vehicles, a vapor blocking valve is used to isolate the fuel tank from the rest of the EVAP system for more efficient canister purging.
6. A valve inside the fuel tank mounted fuel vapor tube assembly prevents liquid fuel from entering the EVAP canister and the EVAP purge valve under any vehicle altitude, handling, or rollover condition.
7. On turbocharged engines, the EVAP check valve prevents boost pressure from entering the EVAP system.
8. On turbocharged engines, the turbocharger creates boost pressure in the intake manifold.
9. On turbocharged engines, an EVAP ejector is used to create a vacuum in the purge line during boost conditions. When in boost conditions a percentage of the boost pressure is applied to the EVAP ejector to create a vacuum. This vacuum draws purge vapors through the EVAP ejector into the intake air system upstream of the turbocharger.



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Enhanced Evaporative Emission System

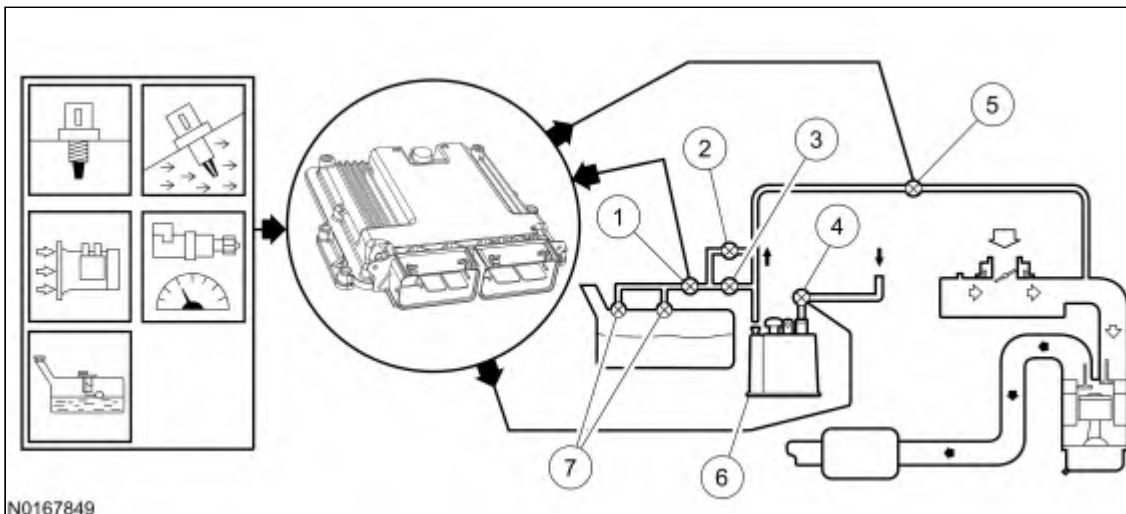
Evaporative Emission (EVAP) System

The EVAP system consists of an EVAP leak detection control module, EVAP canister, EVAP purge valve, fuel tank, capless fuel tank filler pipe, fuel vapor vent valve (FVVV), fuel tank isolation valve (FTIV), fuel tank pressure (FTP) sensor, fuel vapor hoses, intake manifold hose assembly, and the PCM.

The fuel tank side is normally sealed by the closed FTIV and the FVVV which block the flow of vapors from the fuel tank to the EVAP canister. This system only allows fuel vapors into the EVAP canister during refueling or an excessive fuel tank pressure condition.

During the EVAP leak check monitor, the PCM controls the EVAP leak detection control module to seal the EVAP canister from the atmospheric pressure by closing the switching valve and applying the target vacuum in the EVAP system by turning ON the vacuum pump. Operation of the system is as follows:

1. The FTP sensor monitors the fuel tank pressure and continuously transmits an input signal to the PCM.
2. The normally closed FVVV is a PCM controlled valve that blocks the flow of vapors from the fuel tank to the EVAP canister. The PCM opens the FVVV to allow fuel vapors to the EVAP canister during refueling.
3. The normally closed FTIV is a PCM controlled valve that blocks the flow of vapors from the fuel tank to the EVAP canister. The FTIV will automatically open to relieve excess pressure or vacuum if the fuel tank pressure or vacuum reaches a maximum calibrated value.
4. The EVAP leak detection control module is used to seal the EVAP system from the atmosphere and apply a vacuum on the EVAP system for EVAP leak check monitoring. A vacuum pump inside the EVAP leak detection control module applies a vacuum on EVAP system as needed during the EVAP leak check monitor. The pressure sensor internal to the EVAP leak detection control module monitors the system during the EVAP leak check monitor.
5. The EVAP purge valve is used to control the purge flow from the EVAP canister during engine running conditions.
6. The EVAP canister is used on the sealed EVAP system to collect fuel vapors during refueling only.
7. A valve inside the fuel tank mounted fuel vapor tube assembly prevents liquid fuel from entering the EVAP canister and the EVAP purge valve under any vehicle altitude, handling, or rollover condition.



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Typical EVAP System

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