

DTC	P0442	EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (SMALL LEAK)
------------	--------------	---

DTC	P0455	EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (GROSS LEAK)
------------	--------------	---

DTC	P0456	EVAPORATIVE EMISSION CONTROL SYSTEM LEAK DETECTED (VERY SMALL LEAK)
------------	--------------	--

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP INSPECTION PROCEDURE (see page [05-313](#)).

INSPECTION PROCEDURE

Refer to the EVAP INSPECTION PROCEDURE (see page [05-313](#)).

MONITOR DESCRIPTION

The ECM tests the Evaporative Emissions (EVAP) system using the fuel tank pressure sensor, Canister Close Valve (CCV), and EVAP VSV. The ECM closes the EVAP system and creates negative pressure (vacuum) into it. The ECM then monitors the internal pressure using the fuel tank pressure sensor (refer to the leak Check graphic).

P0442, P0455 and P0456

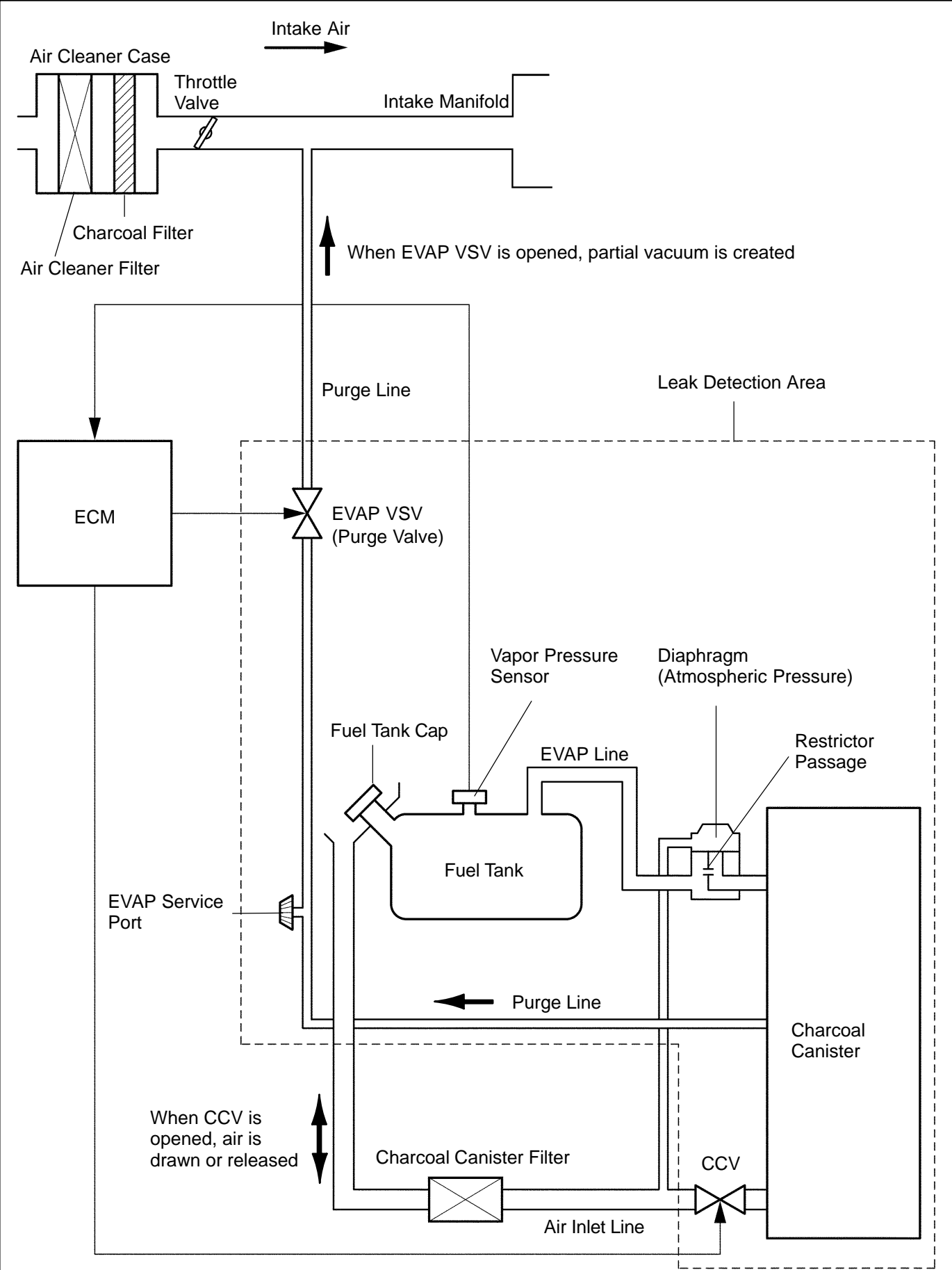
A leak in the evaporative emission system prompts the ECM to set DTC P0442, P0455 or P0456.

The ECM checks if the EVAP has leaks. First, the ECM opens the EVAP VSV while the CCV is closed. After a sufficient amount of time has passed, a high negative pressure (vacuum) will develop in the fuel tank as air is drawn into the intake manifold. The EVAP VSV is then closed. The ECM then monitors the pressure increase (loss of vacuum) in the fuel tank. If the pressure rises beyond a specified amount, the ECM determines that the system has a leak, turns on the MIL and outputs a DTC.

The ECM has separate DTCs for small and large leaks:

- (1) DTC P0442 is set when the internal fuel tank pressure has a large increase and the EVAP system has a small leak.
- (2) DTC P0455 is set when the EVAP system has a very large leak. The ECM tries to create negative pressure (vacuum) in the fuel tank by opening the EVAP VSV while the CCV is closed. However, the fuel tank pressure does not decrease beyond a specified threshold.
- (3) DTC P0456 is set when the internal fuel tank pressure increases slightly and the EVAP system has a very small leak.

DTC No.	DTC Detection Condition	Trouble Area
P0442 P0455 P0456	<ul style="list-style-type: none"> • Cold engine start. • EVAP VSV has been operated and turned OFF, sealing negative pressure (vacuum) in system. • ECM begins to monitor fuel tank pressure increase and one of the following occurs (2 trip detection logic): <ul style="list-style-type: none"> (a) Rapid, sharp increase in pressure occurs, indicating small leak in EVAP system. DTC P0442 is set. (b) Negative pressure (vacuum) is not strong enough, indicating large hole in EVAP system. DTC P0455 is set. (c) Increase in pressure above expected amount occurs, indicating small leak in EVAP system. DTC P0456 is set. 	<ul style="list-style-type: none"> • Vacuum hose has cracks, holes, or is blocked, damaged or disconnected • Fuel tank cap incorrectly installed • Fuel tank cap has cracks or is damaged • Open or short in vapor pressure sensor circuit • Vapor pressure sensor • Open or short in EVAP VSV circuit • EVAP VSV • Open or short in CCV circuit • CCV • Fuel tank has cracks, holes, or is damaged • Charcoal canister has cracks, holes, or is damaged • Fuel tank over fill check valve cracks, or is damaged • ECM

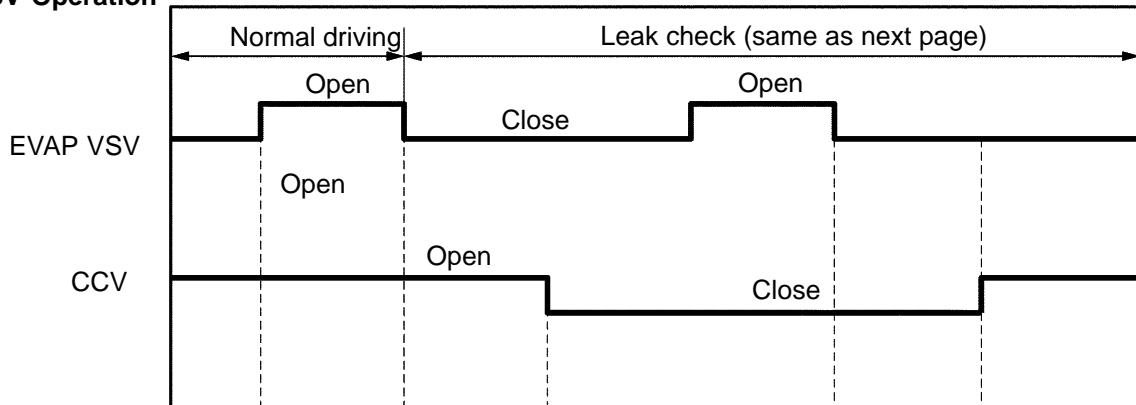


VSV Malfunction Condition and Leak Check

EVAP VSV is Open: ON

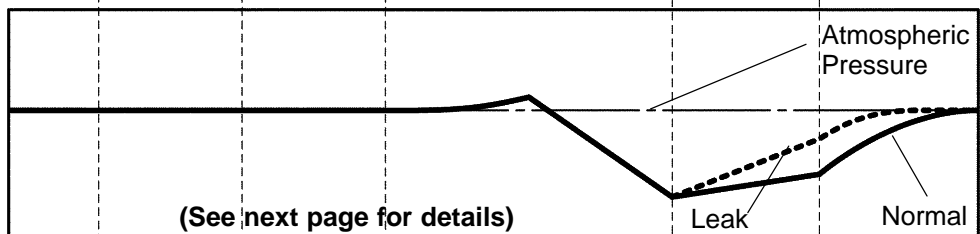
CCV is Open: OFF

VSV Operation

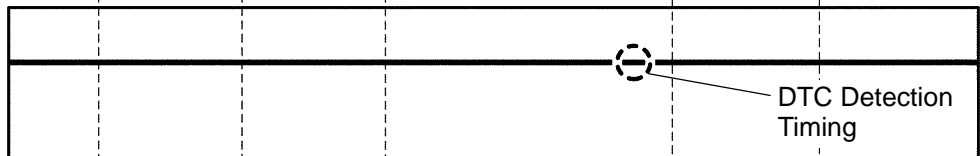


Pressure in Fuel Tank

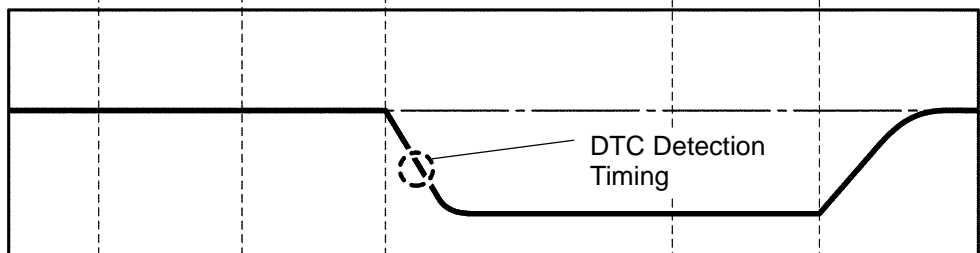
Normal Condition or
EVAP System Leak
(Normal Pressure Line)



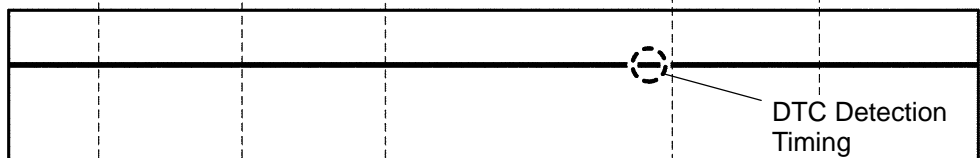
EVAP VSV
Close Malfunction
(P0441)



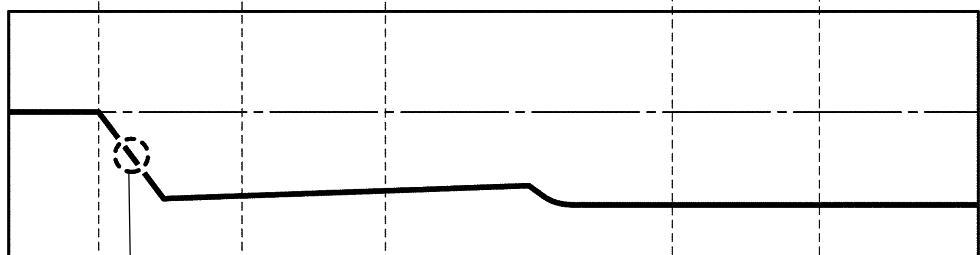
EVAP VSV
Open Malfunction
(P0441)



CCV Open
Malfunction
(P0446)



CCV Close
Malfunction
(P0446)

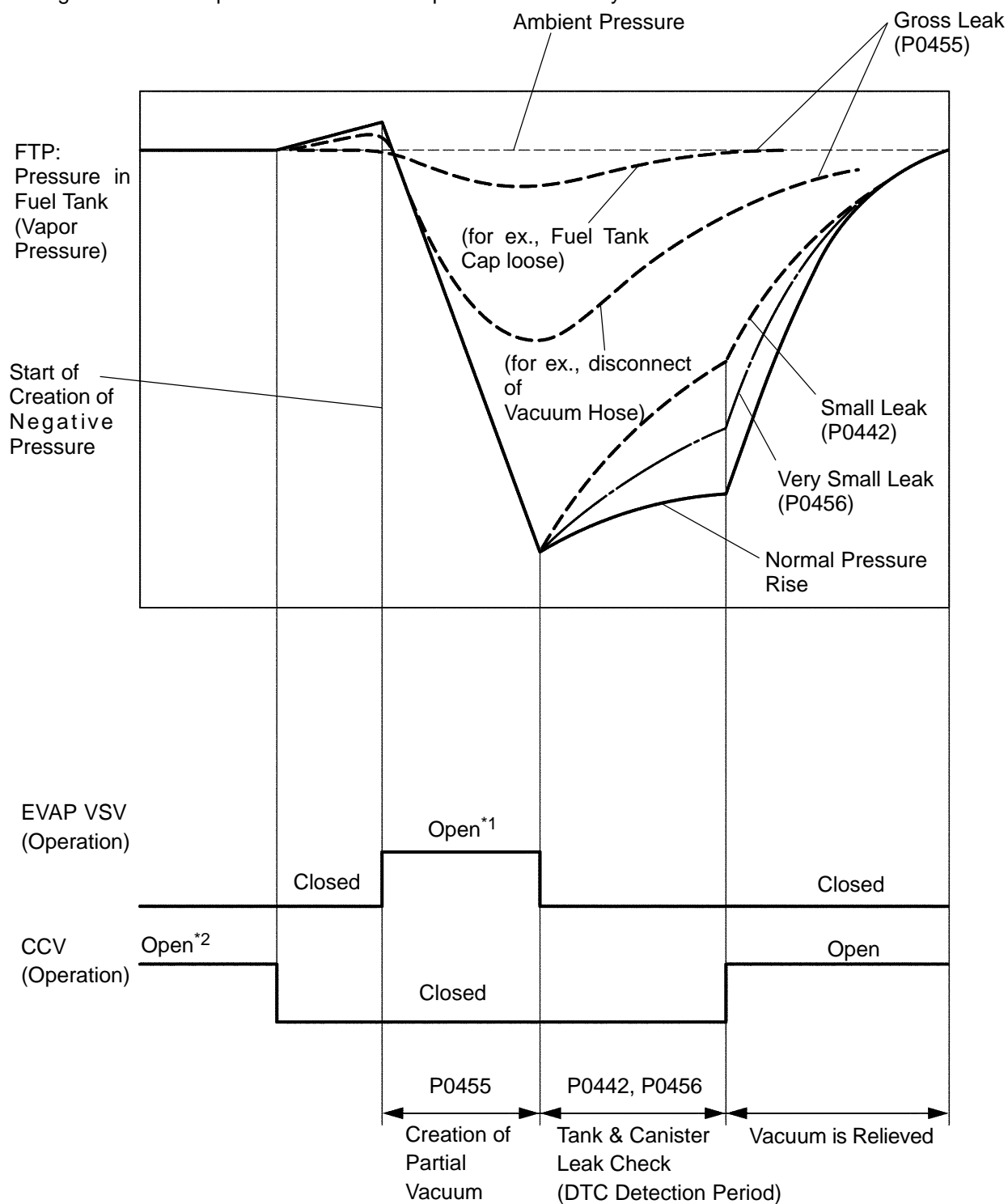


DTC Detection Timing

Leak Check

Initial Condition:

- Cold start
- Engine coolant temperature/intake air temperature. are nearly same



*1: EVAP VSV is Open: ON

*2: CCV is Open: OFF

MONITOR STRATEGY

Related DTCs	P0442: EVAP 0.04 inch leak P0455: EVAP gross leak P0456: EVAP 0.02 inch leak
Required sensors/ components (Main)	CCV, EVAP canister, EVAP hose, Fuel cap, Fuel tank and Purge VSV
Required sensors / components (Related)	ECT, FTP, IAT, MAF and VSS (Vehicle Speed Sensor)
Frequency of operation	Once per driving cycle
Duration	Within 90 seconds
MIL operation	2 driving cycles
Sequence operation	None

TYPICAL ENABLING CONDITIONS

P0442, P0455, P0456

The monitor will run whenever the following DTCs are not present	See page 05–16
Battery voltage	11 V or more
Altitude	Less than 7,874 ft. (2,400 m)
Throttle position learning	Completed
FTP sensor malfunction	Not detected
IAT at engine start – ECT at engine start	–7 to 11.1°C (–12.6 to 20°F)
EVAP VSV and CCV	Not operated by scan tool
Either of the following conditions 1 or 2 is met:	–
1. Purge duty cycle	10 % or more when intake air amount is 12 g/sec. or more
2. Purge concentration for 30 seconds	–5 % or more when vehicle speed is less than 6.25 mph (10 km/h)
Refuel	Not refueled with engine running
FTP	–1.7 kPa (–12.75 mmHg) or more

P0456 (EVAP 0.02 inch leak):

ECT at engine start	4.4 to 32°C (39.9 to 89.6°F)
IAT at engine start	4.4 to 32°C (39.9 to 89.6°F)
IAT	4.4°C (39.9°F) or more
Vehicle speed change	Vehicle is driven by steady speed
Fuel slosh	No sloshing (i.e. fairly smooth road)
Time after engine start	Within 50 minutes
FTP change before vacuum introduction	Minimum change
Fuel level	Less than 90 %
0.04 inch leak	Not detected
CCV malfunction	Not detected
Vehicle speed	Less than 81.25 mph (130 km/h)
Purge VSV malfunction	Not detected

P0455, P0442 (EVAP gross leak, EVAP 0.04 inch leak)

ECT at engine start	4.4 to 35°C (39.9 to 95°F)
IAT at engine start	4.4 to 35°C (39.9 to 95°F)
IAT	4.4°C (39.9°F) or more
Vehicle speed change	Vehicle is driven by steady speed
Fuel slosh	No sloshing (i.e. fairly smooth road)
Time after engine start	Within 50 minutes
FTP change before vacuum introduction	Minimum change
Fuel level	Less than 90 %

TYPICAL MALFUNCTION THRESHOLDS

P0456 (EVAP 0.02 inch leak):

Both of following condition A and B are met	–
A. FTP changes for 5 seconds when FTP is –2.27 kPa (–17 mmHg)	0.08 kPa (0.6 mmHg) or more
B. FTP changes for 5 seconds when FTP is –2.67 kPa (–20 mmHg)	0.08 kPa (0.6 mmHg) or more

P0442 (EVAP 0.04 inch leak):

Both of following Condition A and B are met	–
A. FTP changes for 5 seconds when FTP is –2.67 kPa (–20 mmHg)	0.19 kPa (1.4 mmHg) or more
B. FTP changes for 5 seconds when FTP is –2.27 kPa (–17 mmHg)	0.19 kPa (1.4 mmHg) or more

P0455 (EVAP gross leak):

FTP when vacuum introduction completed	–0.933 kPa (–7 mmHg) or more
--	------------------------------

MONITOR RESULT

Refer to page [05-25](#) for detailed information.

The test value and test limit information are described as shown in the following table. Check the monitor result and test values after performing the monitor drive pattern (see page [05-27](#)).

- TID (Test Identification Data) is assigned to each emissions-related component.
- TLT (Test Limit Type):
If TLT is 0, the component is malfunctioning when the test value is higher than the test limit.
If TLT is 1, the component is malfunctioning when the test value is lower than the test limit.
- CID (Component Identification Data) is assigned to each test value.
- Unit Conversion is used to calculate the test value indicated on generic OBD II scan tools.

TID \$02: EVAP system – LEV II Vacuum monitor

TLT	CID	Unit Conversion	Description of Test Data	Description of Test Limit
1	\$01	Multiply by 0.183 (mmHg)	Test value of EVAP VSV stuck close: Determined by fuel tank pressure change during vacuum introduction	Malfunction criteria for EVAP VSV stuck closed
0	\$02	Multiply by 0.0655 (seconds)	Test value of EVAP VSV stuck open: Determined by duration that fuel tank pressure is higher than criteria	Malfunction criteria for EVAP VSV stuck open
0	\$03	Multiply by 0.0655 (seconds)	Test value of canister closed valve (CCV): Determined by duration that fuel tank pressure is lower than criteria	Malfunction criteria for Canister Closed Valve (CCV)
0	\$04	Multiply by 0.0458 (mmHg)	Test value 0.04 inch leak: Determined by fuel tank pressure change	Malfunction criteria for 0.04 inch leak
0	\$05	Multiply by 0.0458 (mmHg)	Test value 0.02 inch leak: Determined by fuel tank pressure change	Malfunction criteria for 0.02 inch leak