

DTC	P0441	Evaporative Emission Control System Incorrect Purge Flow
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DTC SUMMARY

DTCs	Monitoring Items	Malfunction Detection Conditions	Trouble Areas	Detection Timings	Detection Logic
P0441	Purge VSV (Vacuum Switching Valve) stuck open	Vacuum pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure measured. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If stabilized pressure higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that purge VSV stuck open	<ul style="list-style-type: none"> • Purge VSV • Connector/wire harness (Purge VSV – ECM) • ECM • Pump module • Leakage from EVAP system 	While ignition Switch OFF	2 trip
P0441	Purge VSV stuck closed	After EVAP leak check performed, purge VSV turned ON (open), and atmospheric air introduced into EVAP system. 0.02 inch leak pressure standard is measured at the start and at the end of the leak check. If pressure does not return to near atmospheric pressure, ECM determines that purge valve stuck closed	<ul style="list-style-type: none"> • Purge VSV • Connector/wire harness (Purge VSV – ECM) • ECM • Pump module • Leakage from EVAP system 	While ignition Switch OFF	2 trip
P0441	Purge flow	While engine running, following conditions successively met: <ul style="list-style-type: none"> • Negative pressure not created in EVAP system when purge VSV turned ON (open) • EVAP system pressure change less than 0.5 kPa (3.75 mmHg) when vent valve turned ON (closed) • Atmospheric pressure change before and after purge flow monitor less than 0.1 kPa (0.75 mmHg) 	<ul style="list-style-type: none"> • Purge VSV • Connector/wire harness (Purge VSV – ECM) • Leakage from EVAP line (Purge VSV – Intake manifold) • ECM 	While engine running	2 trip

CIRCUIT DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) Inspection Procedure (see page [DI-368](#)).

MONITOR DESCRIPTION

The two monitors, Key-Off and Purge Flow, are used to detect malfunctions relating to DTC P0441. The Key-Off monitor is initiated by the ECM internal timer, known as the soak timer, 5 hours* after the ignition switch is turned to OFF. The purge flow monitor runs while the engine is running.

1. KEY-OFF MONITOR

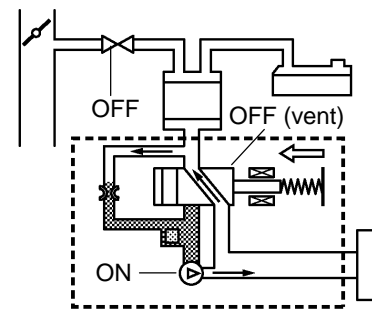
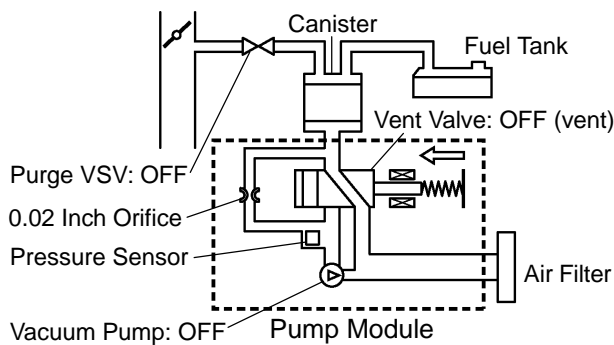
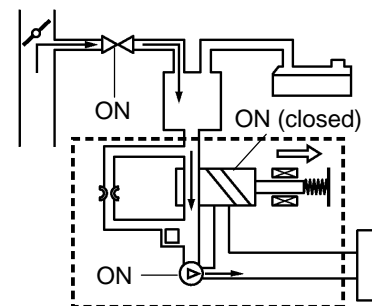
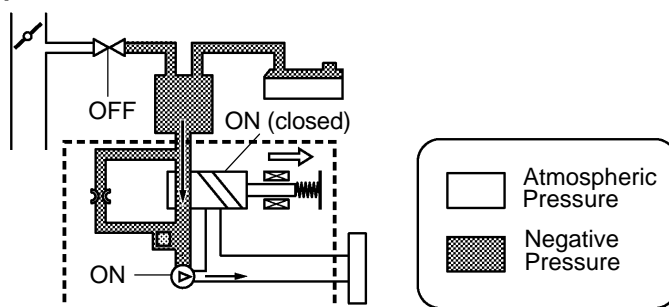
5 hours* after the ignition switch is turned OFF, the electric vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the ignition switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the ignition switch is turned off, the monitor check starts 2.5 hours later.

Sequence	Operations	Descriptions	Duration
–	ECM activation	Activated by soak timer, 5 hours (7 or 9.5 hours) after ignition switch turned to OFF.	–
A	Atmospheric pressure measurement	Vent valve turned OFF (vent) and EVAP system pressure measured by ECM in order to register atmospheric pressure. If EVAP pressure is not between 70 kPa and 110 kPa (525 mmHg and 825 mmHg), ECM cancels EVAP system monitor.	10 seconds
B	First 0.02 inch leak pressure measurement	In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally.	60 seconds
C	EVAP system pressure measurement	Vent valve turned ON (closed) to shut EVAP system. Negative pressure (vacuum) created in EVAP system, and EVAP system pressure then measured. Write down the measured value as it will be used in the leak check. If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor.	15 minutes*
D	Purge VSV monitor	Purge VSV opened and then EVAP system pressure measured by ECM. Large increase indicates normal.	10 seconds
E	Second 0.02 inch leak pressure measurement	Leak check is performed after second 0.02 inch leak pressure standard is measured. If stabilized system pressure higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking.	60 seconds
F	Final check	Atmospheric pressure measured and then monitoring result recorded by ECM.	–

* If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

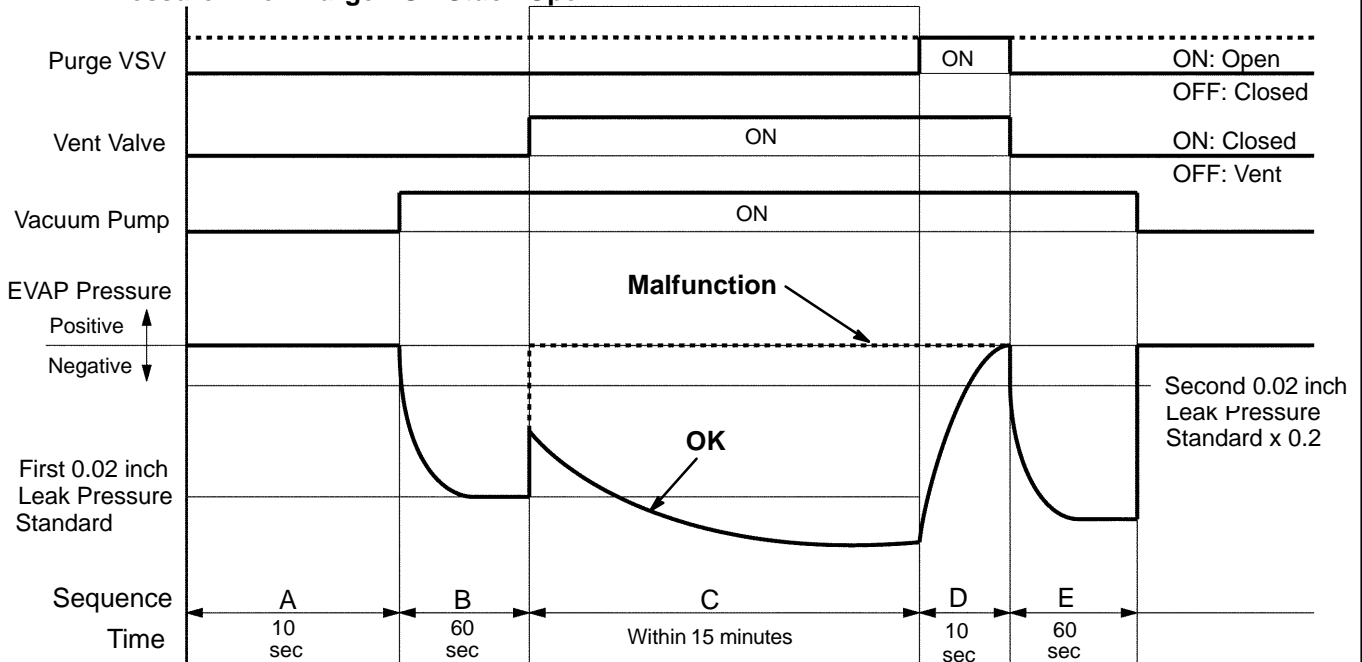
Operation A: Atmospheric Pressure Measurement**Operation B: 0.02 Inch Leak Pressure Measurement****Operation C: EVAP Leak Check****Operation D: Purge VSV monitor**

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(a) Purge VSV stuck open

In operation C, the vacuum pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The EVAP system pressure is then measured by the ECM using the pressure sensor. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2], the ECM interprets this as the purge VSV (Vacuum Switching Valve) being stuck open. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

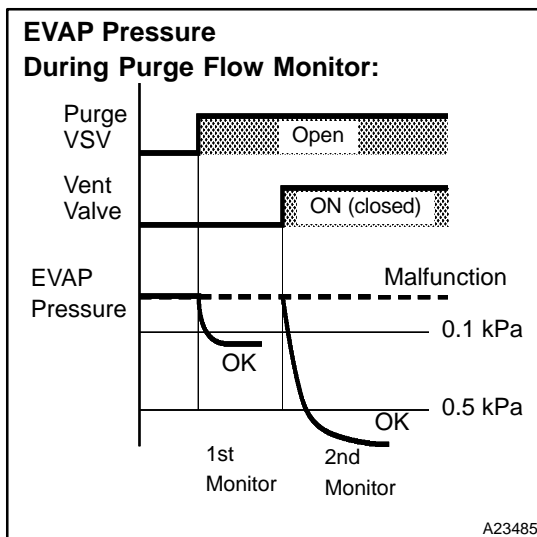
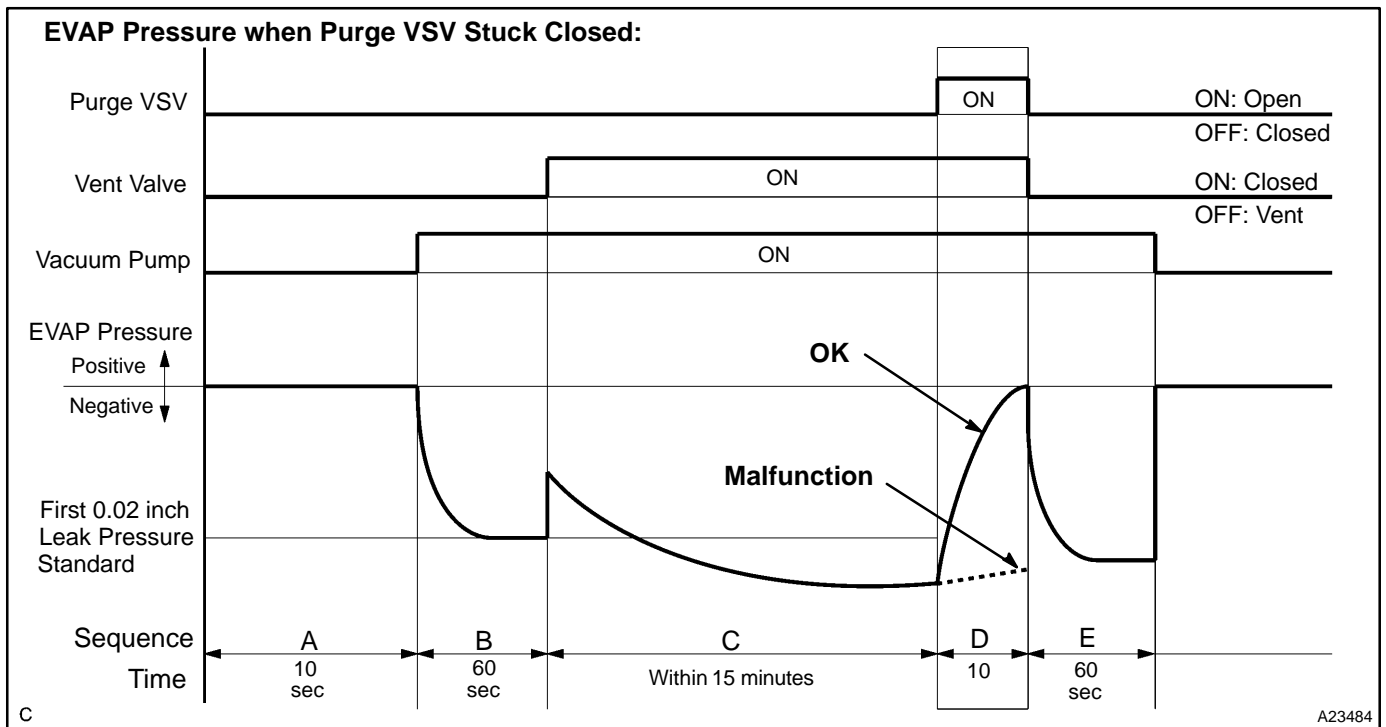
EVAP Pressure when Purge VSV Stuck Open:

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(b) Purge VSV stuck closed

In operation D, the pressure sensor measures the EVAP system pressure. The pressure measurement for purge VSV monitor is begun when the purge VSV is turned ON (open) after the EVAP leak check. When the measured pressure indicates an increase of 0.3 kPa (2.25 mmHg) or more, the purge VSV is functioning normally. If the pressure does not increase, the ECM interprets this as the purge VSV being stuck closed. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

**2. PURGE FLOW MONITOR**

The purge flow monitor consists of the two step monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

- The 1st monitor
While the engine is running and the purge VSV (Vacuum Switching Valve) is ON (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.
- The 2nd monitor
The vent valve is turned ON (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kPa (3.75 mmHg), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:

In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.

MONITOR STRATEGY

Related DTCs	P0441	Purge VSV stuck open
		Purge VSV stuck closed
		Purge flow
Required sensors/components	Purge VSV, Pump module	
Frequency of operation	Once per driving cycle	
Duration	Purge VSV stuck open and closed: Within 15 min. (varies with amount of fuel in tank) Purge flow: Within 10 min.	
MIL operation	2 driving cycle	
Sequence of operation	None	

TYPICAL ENABLING CONDITIONS

Item	Specification	
	Minimum	Maximum
The monitor will run whenever these DTCs are not present	See page DI-18	
Purge VSV stuck open and closed:		
Atmospheric pressure	70 to 110 kPa (525 to 825 mmHg)	
Battery voltage	10.5 V	–
Vehicle speed	–	2.5 mph (4 km/h)
Ignition switch	OFF	
EVAP pressure sensor malfunction (P0450, P0452, P0453)	Not detected	
EVAP canister purge valve	Not operated by scan tool	
EVAP canister vent valve	Not operated by scan tool	
EVAP leak detection pump	Not operated by scan tool	
Both of the following conditions are met before IG switch OFF	Condition 1 and 2	
1. Duration that vehicle is driven	5 min.	–
2. EVAP purge operation	Performed	
ECT	4.4 to 35°C (40 to 95°F)	
IAT	4.4 to 35°C (40 to 95°F)	
Time after key off	5 or 7 or 9.5 hours	
EVAP key-off monitor sequence	1 to 8	
1. Atmospheric pressure	–	
Next sequence is run if the following condition is set	–	
Atmospheric pressure change	–	0.3 kPa (2.25 mmHg) for 1 sec.
2. First reference pressure measurement	–	
Next sequence is run if all of the following conditions are set	Condition 1, 2 and 3	
1. EVAP pressure just after reference pressure measurement start	–	–1 kPa (–7.5 mmHg)
2. Reference pressure	–4.85 to –1.057 kPa (–36.38 to –7.93 mmHg)	
3. Reference pressure	Saturated	

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3. EVAP canister vent valve close stuck check	–	
Next sequence is run if the following condition is set	–	
EVAP pressure change after vent valve is ON	0.3 kPa (2.25 mmHg)	–
4. Vacuum introduction	–	
Next sequence is run if the following condition is set	Condition 1 and 2	
EVAP pressure	Saturated within 12 minutes	
5. EVAP canister purge valve close stuck check	–	
Next sequence is run if the following condition is set	–	
EVAP pressure change after purge valve is open	0.3 kPa (2.25 mmHg)	–
6. Second reference pressure measurement	–	
Next sequence is run if all of the following conditions are set	Condition 1, 2, 3 and 4	
1. EVAP pressure just after reference pressure measurement	–	–1 kPa (–7.5 mmHg)
2. Reference pressure	–4.85 to –1.057 kPa (–36.4 to –7.92 mmHg)	
3. Reference pressure	Saturated	
4. Difference between first reference pressure and second reference pressure	–	0.7 kPa (5.25 mmHg)
7. Leak check	–	
Next sequence is run if the following condition is set	–	
EVAP pressure when vacuum introduction is complete	–	Less than second reference pressure
8. Atmospheric pressure measurement	–	
EVAP monitor is complete if the following condition is set	–	
Atmospheric pressure difference between sequence 1 and 8	–	0.3 kPa (2.25 mmHg)
Purge flow:		
Engine condition	Running	
ECT	4.4°C (40°F)	–
IAT	4.4°C (40°F)	–
EVAP pressure sensor	Not detected	
EVAP canister purge valve	Not operated by scan tool	
EVAP system check	Not operated by scan tool	
Battery voltage	10 V	–
Purge duty cycle	8 %	–

TYPICAL MALFUNCTION THRESHOLDS

Detection Criteria	Threshold
Purge VSV stuck open:	
EVAP pressure when vacuum introduction is complete	Higher than reference pressure x 0.2
Purge VSV stuck closed:	
EVAP pressure change after EVAP canister purge valve is open	Less than 0.3 kPa (2.25 mmHg)
Purge flow:	
Both of the following conditions are met	Condition 1 or 2
1. EVAP pressure change when purge flow is started	Less than 0.1 kPa (0.75 mmHg)
2. FTP change during purge operation when vent valve is closed	Less than 0.5 kPa (3.75 mmHg)

MONITOR RESULT (MODE 06 DATA)

Refer to page [DI-26](#) for detailed information on Monitor Result.

INSPECTION PROCEDURE

Refer to the EVAP Inspection Procedure (see page [DI-368](#)).