

2022 CHEVROLET CORVETTE SERVICE MANUAL

- SEARCH

1. Engine/Propulsion
2. Exhaust
3. Description and Operation
- 4.

Exhaust Tail Pipe Flow Control System Description and Operation

Engine Exhaust Flow Valve System

The engine exhaust flow control valve system has two subsystems:

1. The exhaust tail pipe flow control valve system. Also known as the exhaust sound quality valve control system.
2. The cylinder deactivation exhaust flow control valve system. Also known as the active fuel management (AFM) exhaust flow valve control system.

Exhaust Tailpipe Flow Control Valve System

The exhaust tailpipe flow control system is used to tune the exhaust note for high performance vehicles. The vehicle is equipped with two tailpipe exhaust valves. One in the left tailpipe and one in the right tailpipe. Each exhaust tailpipe valve is installed in the low restriction exhaust path of a dual outlet muffler, near the exhaust tip.

When a tailpipe exhaust valve is open, the low restriction exhaust path is opened to the atmosphere, and the exhaust note becomes more aggressive.

An output circuit from the fuel pump control module is used to control the actuator that opens the left and right exhaust tailpipe valves. The exhaust flow control valve opens and closes when the fuel pump control module commands the actuator by pulse width modulation of the control signal.

To provide a more aggressive exhaust note when the vehicle is started, the exhaust tailpipe valves are opened during an engine crank event during specific modes of operation if that option is available. Once the engine is running, accelerator pedal position, transmission gear and engine speed are used to determine the commanded state (open or closed) of the exhaust tailpipe valves.

There are four specific exhaust performance modes that result in different behavior of the exhaust tailpipe valves. These modes are:

Note:

You may notice an exhaust tone change due to the AFM system activation, or during certain driving conditions to meet Federal noise pass-by regulations. Review the cylinder deactivation exhaust flow control system operational modes listed below for additional details.

1. Winter/Eco Mode: Exhaust tailpipe valves will be closed at all times when the engine is running.
2. Tour Mode: Exhaust tailpipe valves are closed when the engine is idling and during normal/non-aggressive driving. Valves open during aggressive driving.
3. Sport Mode: Exhaust tailpipe valves are open when the engine is idling and during most driving scenarios. See note above.
4. Track Mode: Exhaust tailpipe valves are open at all times. See note above.

It is possible to personalize the exhaust sound. When engine sound enhancement is turned off via the personalization menu, the exhaust tailpipe valves will be put into track mode no matter which vehicle mode (Winter/Eco, Tour, Sport, or Track) is displayed on the drivers instrument panel.

Cylinder Deactivation Exhaust Flow Control Valve System

As a means to improve fuel economy, the engine management systems in some vehicle applications include provisions to deactivate half of the engine cylinders under certain operating conditions. For example, under a light load. The cylinder deactivation exhaust flow control valve subsystem is used to mitigate the impact that powertrain engine cylinder deactivation (active fuel management) has on the quality of the exhaust sound. When the active fuel management system is in operation, the cylinder deactivation exhaust flow control valve subsystem takes over control of the exhaust tailpipe flow control system. When active fuel management is operating, the exhaust tailpipe flow control valves are commanded shut resulting in a quieter exhaust note until the active fuel management system deactivates with increased throttle demand at which time the exhaust tailpipe flow control returns to the operational status determined by the vehicle specific mode that is being used.

The cylinder deactivation exhaust flow control system controls the undesirable exhaust noise generated during the cylinder deactivation process. This is achieved through the use of up to two electronically actuated cylinder deactivation exhaust flow control valves in the vehicle exhaust system.

The cylinder deactivation exhaust flow control valves are commanded to the closed position by a pulse width modulated signal from the fuel pump control module in response to active or pending engine cylinder deactivation. When the cylinder deactivation exhaust flow control valves are in the closed position, the engine exhaust flows through a hole machined in the plates integral to the valves. When the engine is operating on all cylinders, the cylinder deactivation exhaust flow control valves are commanded to the open position in order to minimize exhaust restriction. To provide some control hysteresis, once the cylinder deactivation exhaust flow control valves have been commanded to the closed position, they are not reopened until the engine torque reaches a calibrated minimum value that is determined as a function of the driver selectable performance mode.

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