Tech Tip

EMISSION CONTROL 122

CRANKCASE VENTILATION

Yesterday's Technology Poses Some New Challenges

The positive crankcase ventilation system (PCV) is yesterday's technology with a new set of challenges. While most consider the PCV system a simple and uneventful part of the emission control system, it can have a detrimental effect on the overall engine performance. A component failure can result in an array of problems including rough idle, surging, stalling, a sticking throttle plate, or excessive oil consumption.

The PCV system provides a calibrated vacuum purge of the crankcase, which prevents hydrocarbons from escaping and contaminating the atmosphere. Further, it reduces the formation of condensation, which can dilute the crankcase lubricant, resulting in major engine damage.

With the engine running, fresh air is drawn into the crankcase via a fresh air tube or breather element. The fresh air mixes with the blow-by gases and unburned fuel vapors and is purged into the intake manifold, via the PCV valve, where it is consumed in the combustion process. The PCV valve is influenced by manifold vacuum, and its flow rate is commensurate with engine RPM and manifold vacuum. The volume that a PCV valve can flow is controlled by a metered orifice, plunger and spring tension.

The PCV valve should be serviced or replaced in accordance with the vehicle manufacturer's service recommendations. Due to the stringent federal mandates concerning the warranty period of the emission control systems, most vehicle manufacturers no longer reflect mileage replacement intervals for the valve. Instead, they use selective wording such as "Part of emission control service" when referencing the valve at a given service interval.

Neglecting to service the system can result in costly engine damage, including blown seals, excessive oil consumption and damage to components such as oxygen sensors and catalytic converters. And when you make the replacement, make certain you install the correct valve for the application. Updates and modifications are being made by the vehicle manufacturers to circumvent certain performance conditions. Installing the original equipment type valve may reintroduce a problem into the vehicle.

EXCESSIVE OIL CONSUMPTION

GM offers a modified PCV valve to address customer complaints of excessive oil consumption on the following applications equipped with 4.8L, 5.3L or 6.0L engines:

1999–2002 Chevy Silverado, Suburban and Tahoe, 1999–2002 GMC Denali, Sierra, Suburban and Yukon, 2002 Chevy Avalanche, and 2002 Cadillac Escalade and Escalade EXT.

Excessive consumption would involve a vehicle that consumes one quart of oil per 2,000 miles. This is assuming the vehicle is a personal use, non-commercial type vehicle driven under normal conditions. Obviously, vehicles that are used in extreme service, such as heavily loaded trucks, or vehicles driven at high rates of speed would not be included, as their oil consumption rates may vary. Important: A minimum of a 4K mile engine break-in period should be performed, prior to condemning an engine for excessive oil consumption.

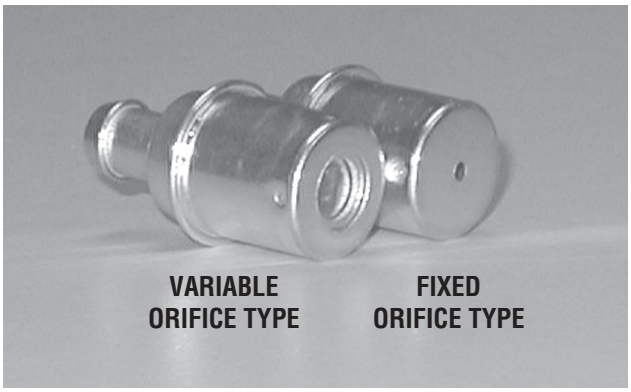
Some basic checks that should be performed first include:

1) Inspect the top and lower engine components and covers for evidence of leakage.
2) Verify the proper dipstick is being used and that the tube is secured in the engine.
3) After engine shut-down, allow five minutes for oil drain-back, prior to checking the oil level.
4) Make certain the vehicle is sitting in a level

position when checking the oil level.

5) Has the vehicle been driven at excessive speeds?
6) Has the vehicle been heavily loaded or pulling a loaded trailer or camper?
7) Is there evidence of engine overheating?

Assuming that the basic checks and considerations have been satisfied, GM recommends installing a revised PCV valve. It has been determined that under certain operating conditions, the original equipment variable type PCV valve flow rate may promote excessive oil consumption. The original equipment valve may promote a siphoning of the oil back into the intake manifold where it would be consumed through the combustion process. Examine the hose that attaches the PCV valve to the intake manifold for evidence of an excessive amount of oil. If excessive oil is present, GM recommends installing a revised PCV valve. The new style valve (GM #12572717, Mighty #3-932) is a fixed orifice valve with no moving parts (see illustration). The valve will not rattle when shaken. It is basically a shell of the OE style valve with an approximate .100



inch hole drilled in the bottom of the valve, providing a fixed flow rate. When servicing, technicians must be aware of the factory modification and be certain not to install the same type variable orifice valve that originally came on the vehicle. Doing so would reintroduce the performance condition that was corrected with the fixed orifice design.

The use of the fixed orifice PCV valve was also recommended by GM, for conditions involving a sticking throttle plate sensation on the 1999–2002 Chevy Silverado and GMC Sierra, 2000–2002 Suburban, Tahoe, GMC Yukon, Yukon XL and 2002 Avalanche equipped with 4.8L, 5.3L and 6.0L engines, and equipped with a mechanical throttle linkage. Other modifications in the campaign included a throttle bore and throttle plate cleanup, a rubber plug to seal the throttle plate hole, and a revised TPS adjustment, via the minimum air rate screw. For a complete description and procedure, ask your Mighty Rep or visit our website for a copy of Tech Tip #118 "Sticking Throttle Valve: Eliminating a Hard Accelerator Pedal Effort on GM Trucks."

FORD'S STICKING THROTTLE PLATE AND HIGH IDLE SPEED

Ford acknowledges that the following vehicles: 1997–98 Expedition, F150, F250 LD, 2000–2002 Expedition, F150 and the 1998 Lincoln Navigator equipped with a 5.4L engine may exhibit a sticking throttle sensation and high idle speeds when driven in cold ambient temperatures at a steady speed or during an extended idle. The performance condition is due to an ice build-up on the throttle plate, due to excessive moisture from the PCV system.

The first step in the diagnostic process involves verifying that the sticking throttle plate condition is not due to the common throttle bore and throttle plate contamination from combustion and EGR gases. When those conditions are ruled out, examine the fresh air hose of the PCV system for evidence of back-flow. This would be indicated by the presence of an oily residue and stains in the hose. If these conditions are present, Ford recommends installing a PCV service kit (YL3Z-6A603-AA). For 2000–2002 applications, a separate vacuum harness (XL3Z-9E498-MA) must accompany the service kit. Ford reflects 2.0 labor hours for the estimated time required to make the conversion.

While the PCV system may be deemed a relatively simple system, it is posing a new set of challenges, some of which may require major modifications to get the proper flow rate. When servicing the system, follow the application guide. However, be aware that when the valve called for differs from the component presently installed, there may be a good reason for it.

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