

86 CATALYTIC CONVERTERS

? FREQUENTLY ASKED QUESTION

Can a Catalytic Converter Be Defective without Being Clogged?

Yes. Catalytic converters can fail by being chemically damaged or poisoned without being mechanically clogged. Therefore, the catalytic converter should be tested not only for physical damage (clogging) by performing a back pressure or vacuum test and a rattle test but also for temperature rise, usually with a pyrometer or propane test, to check the efficiency of the converter.

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Figure 86-9 A back pressure tool can be made by using an oxygen sensor housing and epoxy or braze to hold the tube to the housing.

Labels in diagram: EXHAUST MANIFOLD, ADAPTER, OXYGEN SENSOR HOUSING, STEEL BRAKE LINE, BRAZING.

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Figure 86-10 This partially melted catalytic converter tested okay at idle but had excessive back pressure at higher engine speeds.

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Figure 86-11 The temperature of the outlet should be at least 10% hotter than the temperature of the inlet. If a converter is not working, the inlet temperature will be hotter than the outlet temperature.



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TECH TIP

Aftermarket Catalytic Converters

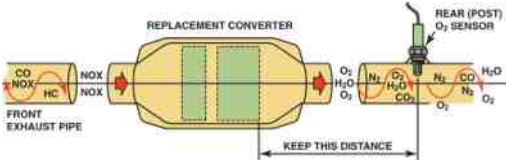
Some replacement aftermarket (nonfactory) catalytic converters do not contain the same amount of cerium as the original part. Cerium is the element that is used in catalytic converters to store oxygen. As a result of the lack of cerium, the correlation between the oxygen storage and the conversion efficiency may be affected enough to set a false diagnostic trouble code (P0422).

NOTE: If an aftermarket converter is being installed, be sure that the distance between the rear of the catalyst block is the same distance from the rear oxygen sensor as the factory converter to be ensured of proper operation. Always follow the instructions that come with the replacement converter. SEE FIGURE 86-12.

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Figure 86-12 Whenever replacing a catalytic converter with a universal unit, first measure the distance between the rear brick and the center of the rear oxygen sensor. Be sure that the replacement unit is installed to the same dimension.



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TECH TIP

Catalytic Converters Are Murdered

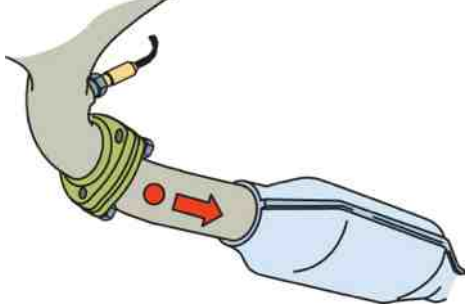
Catalytic converters start a chemical reaction but do not enter into the chemical reaction. Therefore, catalytic converters neither wear out nor die of old age. If a catalytic converter is found to be defective (nonfunctioning or clogged), look for the root cause. Remember this: "Catalytic converters do not commit suicide—they're murdered."

Items that should be checked when a defective catalytic converter is discovered include all components of the ignition and fuel systems. Excessive unburned fuel can cause the catalytic converter to overheat and fail. The oxygen sensor must be working and fluctuating from 0.5 to 5 Hz (times per second) to provide the necessary air-fuel mixture variations for maximum catalytic converter efficiency.

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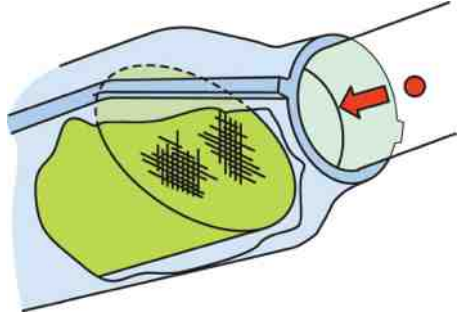
CATALYTIC CONVERTER OPERATION 1 Carbon monoxide leaves the engine through the exhaust valve on the exhaust stroke.



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CATALYTIC CONVERTER OPERATION 2 The CO molecule is starting to enter the converter.



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CATALYTIC CONVERTER OPERATION 3 A CO molecule is ready to enter a cell. The number of cells ranges from 300 to 900 per sq. in. The substrate is cordierite (Mg, Al, Si) or foil-backed metal with a 0.002- to 0.006-inch (0.05- to 0.15-mm)-thick wall.

The diagram shows a cross-section of a catalytic converter housing. Inside, there is a grid of square cells. A red dot representing a CO molecule is shown entering one of the cells from the right, with a red arrow pointing left towards the cell. Labels include 'CO MOLECULE' with an arrow pointing to the red dot, and 'CELL' with an arrow pointing to one of the grid cells.

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CATALYTIC CONVERTER OPERATION 4 The CO molecule enters a cell. The substrate is coated with porous aluminum (Al_2O_3) called the washcoat. The catalytic material is sprayed onto the washcoat.

The diagram shows a circular cross-section of a cell. The interior is divided into a grid of six rectangular channels. The walls of these channels are coated with a porous material. Labels include 'SUBSTRATE' with an arrow pointing to the grid structure, and 'WASHCOAT' with an arrow pointing to the porous coating on the channel walls.

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CATALYTIC CONVERTER OPERATION 5 The CO molecule enters a micropore, which has been created in the porous washcoat.

The diagram shows a close-up of a porous washcoat structure. It consists of a central green rectangular block with many small, irregular pores extending from its surface. A red dot representing a CO molecule is shown entering one of these pores from the left, with a red arrow pointing right into the pore. Labels include 'MACROPORE' with an arrow pointing to the main green block, and 'WASHCOAT' with an arrow pointing to the porous structure.

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