

FIGURE 28-1 Most catalytic converters are located as close to the exhaust manifold as possible, as seen in this display of a Chevrolet Corvette.

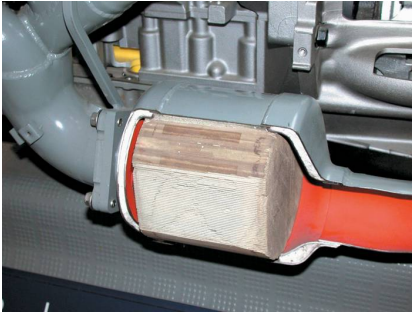


FIGURE 28-2 A typical catalytic converter with a monolithic substrate.

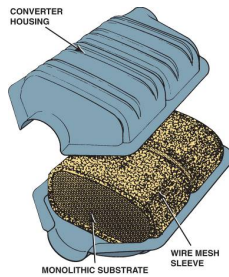


FIGURE 28-3 The three-way catalytic converter first separates the NO_x into nitrogen and oxygen and then converts the HC and CO into harmless water (H_2O) and carbon dioxide (CO_2). The nitrogen (N) passes through the converter and exits the tailpipe and enters the atmosphere which is about 78% nitrogen.

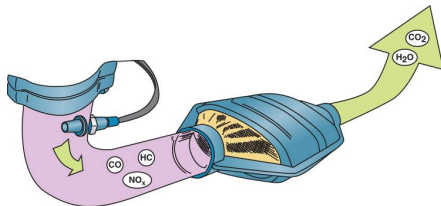


FIGURE 28-4 The small oxidation section of the converter helps build heat for the reduction section to reduce NO_x emissions in the rear brick on most newer vehicles.

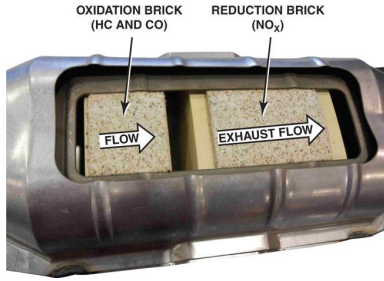


FIGURE 28-5 The OBD-II catalytic converter monitor compares the signals of upstream and downstream oxygen sensors to determine converter efficiency.

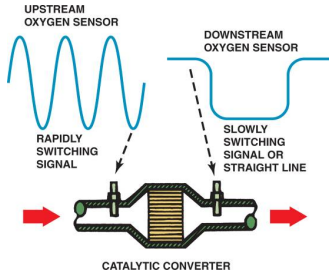


FIGURE 28-6 The waveform of a downstream O₂S sensor from a properly functioning converter shows little, if any, activity.

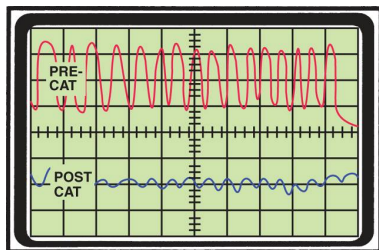
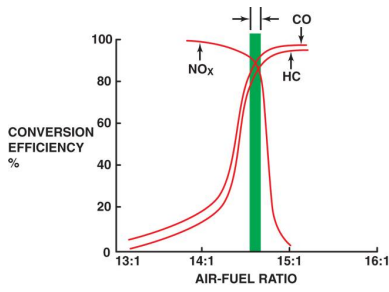


FIGURE 28-7 The highest catalytic converter efficiency occurs when the air-fuel mixture is about 14.7:1.



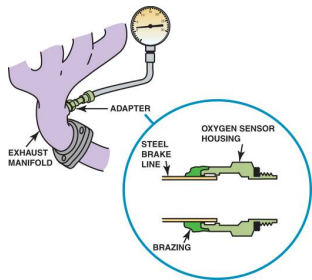
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FIGURE 28-8 A catalytic converter that rattles when lapped was removed, and the substrate, or what was left of it, fell out. This converter has to be replaced and the root cause of why it failed found and corrected.



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FIGURE 28-9 A back pressure tool can be made by using an oxygen sensor housing and epoxy or braze to hold the tube to the housing.



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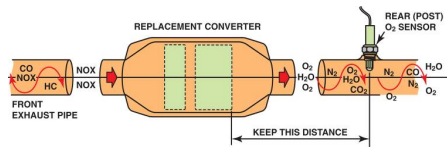
FIGURE 28-10 This partially melted catalytic converter tested okay at idle but had excessive back pressure at idle speeds.



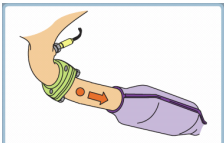
FIGURE 28-11 The temperature of the outlet should be at least 10% hotter than the temperature of the inlet. If a converter is not working, the inlet temperature will be hotter than the outlet temperature.



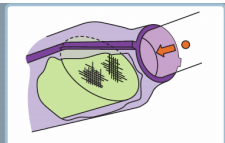
FIGURE 28-12 Whenever replacing a catalytic converter with a universal unit, first measure the distance between the rear brick and the center of the rear oxygen sensor. Be sure that the replacement unit is installed to the same dimension.



CATALYTIC CONVERTER OPERATION



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

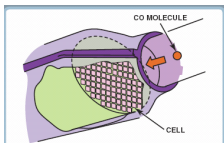


2 The CO molecule is starting to enter the converter.

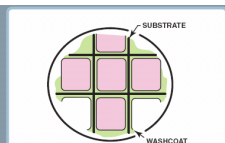
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CATALYTIC CONVERTER OPERATION



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.

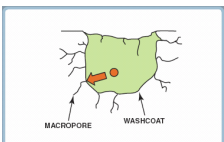


4 The CO molecule enters a cell. The substrate is coated with porous aluminum (Al_2O_3) called the washcoat. The catalytic material is sprayed onto the washcoat.

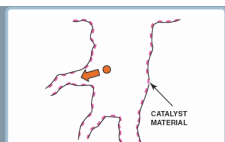
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CATALYTIC CONVERTER OPERATION



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



6 The CO molecule enters a smaller micropore.

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CATALYTIC CONVERTER OPERATION

7 The CO molecule is absorbed onto a catalyst site. Only a few grams of catalyst material are applied to the wafercoat.

8 The CO molecule is converted to a CO₂ molecule.

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CATALYTIC CONVERTER OPERATION

9 The CO₂ molecule is exiting the small micropore.

10 The CO₂ molecule is exiting the larger macropore.

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CATALYTIC CONVERTER OPERATION

11 The CO₂ molecule is exiting the converter.

12 A poisoned converter.

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