

exhaust system heat and should be inspected at regular intervals to make sure they are not dented or out of position. If a sound insulator and shield is damaged or shows evidence of deterioration, install a new insulator and shield. The sound insulators and shields for the muffler, muffler pipe, resonator and catalytic converter pipe are installed separately.

Some exhaust fasteners must be discarded and new ones installed as indicated in the procedures. Discard any damaged or heavily corroded fasteners and install new ones as necessary. Some exhaust fasteners are of a prevailing torque design. Use only new fasteners with the same part number as the original. Tighten the fasteners to the specified torque during reassembly to make sure of correct retention of exhaust components.

DIAGNOSIS AND TESTING > EXHAUST SYSTEM > SYMPTOM CHART(S)

Symptom Chart: Symptom Chart - Exhaust System

Verify the customer concern. Inspect the components of the exhaust system for obvious signs of damage or other mechanical concerns using the following chart.

Visual Inspection Chart - Mechanical

Mechanical
Exhaust pipe pinched or crushed Damaged muffler and tailpipe Broken or damaged exhaust hanger brackets Damaged catalytic converters Loose or damaged heat shields

Verify the exhaust system is installed correctly, with clamps correctly located and tightened to specifications. If the fault is not visually evident, determine the symptom. GO to Symptom Chart below.

Symptom Chart

Condition	Possible Sources	Actions
Vehicle has low or no power - vehicle performance complaint	Exhaust pipe pinched or crushed Damaged catalytic converters Loose obstruction in exhaust	REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
	Restricted exhaust (possible frozen condensate in muffler)	CHECK drain holes for foreign material. PARK the vehicle inside to thaw. TEST the vehicle for normal operation. If the concern is still present, REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Burning smell - usually occurs at idle, with possible traces of smoke	Foreign material caught in exhaust system Missing heat shields	INSPECT the exhaust system for foreign material or missing heat shields. REPAIR or INSTALL new components as necessary.

Odor - described as a sulfur or rotten egg smell	Catalytic converters Excessive sulfur content in fuel	At times, a slight sulfur smell is normal for catalytic converters. The cause is the sulfur content in the gasoline being used. ADVISE the customer no repair is required.
	Rich fuel conditions Misfire conditions	REFER to the ENGINE CONTROLS - INTRODUCTION (EXCEPT DIESEL & HYBRID) .
Visible rust on surface of exhaust pipes	Catalytic converters/exhaust system	Surface rust is a characteristic of materials used on exhaust systems. Exposure to heat or road salt may result in surface rust. INSPECT for perforations. If there are no perforations, the condition is normal.

Symptom Chart: Symptom Chart - NVH

Symptom Chart

Condition	Possible Sources	Actions
Rattle, squeaks or buzz type noise - from the bottom of the vehicle	Loose or damaged heat shield	INSPECT the exhaust system for loose or missing heat shields or foreign material trapped between the heat shields and the exhaust system components. If any heat shields are loose, INSTALL worm gear clamp 7L5Z-5A231-AA and tighten to 7 Nm. If the heat shields are missing or a rattle, noise or buzz condition persists, INSTALL a new heat shield or component as necessary.
	Loose or damaged exhaust isolators	VERIFY the exhaust isolators are correctly installed. INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Damaged exhaust isolator hanger bracket	INSPECT the exhaust system components for damage or broken hangers. INSTALL new components as necessary. CHECK for loose or damaged exhaust hanger brackets or fasteners. TIGHTEN the bolts to specification or INSTALL new components as necessary.

	Loose or damaged catalytic converters or muffler	MOVE the exhaust system to simulate the bouncing action of the vehicle, checking for exhaust-to-body contact while moving the exhaust system. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler, then the catalytic converter. DETERMINE if there are loose or broken baffles in the muffler or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
	Exhaust grounded to chassis	INSPECT for signs of exhaust components-to-body contact. REPAIR or INSTALL new components as necessary.
Drone or clunk type noise - from the bottom of the vehicle	Loose or damaged exhaust isolators	INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Exhaust grounded to chassis	INSPECT for signs of exhaust components-to-body contact. REPAIR or INSTALL new components as necessary.
Whistles, boom, hum or ticking type noise - noise tends to change as the engine warms. The noises are often accompanied by exhaust fumes	Exhaust system leak	INSPECT the entire exhaust system for leaks. CHECK for punctures, loose or damaged clamps/fasteners, gaskets, sensors or broken welds. EXAMINE the chassis for grayish-white or black exhaust soot, which indicates exhaust leakage at that point. To magnify a small leak, have an assistant hold a shop towel over the tail pipe outlet while listening for a leak. REPAIR or INSTALL new components as necessary.
	Catalytic converters	MOVE the exhaust system to simulate the bouncing action of the vehicle, checking for exhaust-to-body contact while moving the exhaust system. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler and the catalytic

		converters. DETERMINE if there are loose or broken baffles in the muffler, or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
	Exhaust muffler/resonator drain hole enlarged due to corrosion	CONFIRM the drain holes are the noise source. INSTALL new components as necessary.
Hissing or rushing noise - high frequency sound and the vehicle performance is unaffected	Exhaust system Exhaust flow through pipes	CHECK the exhaust system for leaks. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the muffler and the catalytic converter. DETERMINE if there are loose or broken baffles in the muffler, or a loose or broken element in the catalytic converter. REPAIR or INSTALL new components as necessary.
Pinging noise - occurs when exhaust system is hot, engine turned off	Catalytic converters/exhaust system	Cool down pinging is a result of the exhaust system expanding and contracting during heating and cooling. This is a normal condition.
Vibration - occurs at idle and at low speeds. Also accompanied by a clunk or buzz type noise	Loose or damaged exhaust isolator	INSPECT the exhaust isolators for wear or damage. INSTALL new isolators as necessary.
	Loose or damaged exhaust isolator hanger brackets	INSPECT the exhaust isolator hanger brackets for wear or damage. INSTALL or REPAIR as necessary.
	Exhaust system grounded to chassis	REPAIR or INSTALL new components as necessary.
Engine drumming noise - normally accompanied by vibration	Damaged or misaligned exhaust system	INSPECT the exhaust system for loose or damaged fasteners or isolators. REPAIR or INSTALL new components as necessary.
Sputter type noise - noise worse when cold, lessens or disappears when the vehicle is at operating temperature	Damaged or worn exhaust system	INSPECT the exhaust system for leaks or damage. REPAIR as necessary.
Thumping noise - from the bottom of the vehicle, worse during acceleration	Misaligned exhaust system	CHECK the exhaust system to chassis clearance. CHECK the exhaust system isolators for damage. REPAIR as necessary.