

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 Oxidation Catalyst Converter (OC) • Damaged DPF • Loose or damaged sensors or sensor mountings • Damaged tail pipe • Clogged passages in tail pipe • Broken or damaged exhaust hanger brackets • Loose or damaged heat shields • Modified or removed components

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
Loss of power “vehicle performance complaint	• Exhaust pipe pinched or crushed • Damaged oxidation OC • Full/loaded DPF • Clogged catalyst or DPF • Loose obstruction in exhaust • Restricted exhaust (possible frozen condensate in selective catalyst reduction SCR)	INSPECT the exhaust system. REPAIR or INSTALL new components as necessary. If the concern is still present, REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.
	Restricted exhaust (possible frozen condensate in SCR)	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 Powertrain Control/Emissions Diagnosis (PC/ED) manual.

Condition	Possible Sources	Actions
Burning smell “ usually occurs at idle, with possible traces of smoke	- Foreign material caught in exhaust system - Missing heat shields - Fluid leak on exhaust - Foreign materials or surrounding components contacting the exhaust system	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	OC	At times, a slight sulfur smell is normal for the OC. The cause is the sulfur content in the diesel fuel being used. ADVISE the customer no repair is required.
	- Rich fuel conditions - Misfire conditions - Excessive sulfur content in fuel	REFER to the Powertrain Control/Emissions Diagnosis (PC/ED) manual.
Visible rust on surface of exhaust pipes	OC/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 (62 lb-in). 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 OC, DPF or SCR	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 SCR, DPF and the OC. A boroscope can also be used to inspect the OC, DPF and SCR for loose or broken elements. DETERMINE if there are loose or broken elements in the catalytic converters. 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.

Condition	Possible Sources	Actions
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.
	OC, DPF, SCR	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 SCR, DPF and the OC. DETERMINE if there are loose or broken elements in the catalytic converters. REPAIR or INSTALL new components as necessary.
	Exhaust 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 or leaks	CHECK the exhaust system for leaks. Using a rubber mallet, TAP on the exhaust components to duplicate the noise concern. Lightly TAP on the SCR, DPF and the OC. DETERMINE if there are loose or broken elements in the OC, DPF and SCR. REPAIR or INSTALL new components as necessary.
Pinging noise – occurs when exhaust system is hot, engine turned off	OC, DPF and SCR	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.
Engine vibration – is felt with increases and decreases in engine rpm	Strain on exhaust system isolators	REPAIR or INSTALL new components as necessary.

Condition	Possible Sources	Actions
Drumming noise “ occurs inside the vehicle during idle or high idle, hot or cold. Very low-frequency drumming is very rpm dependent	Exhaust system vibration excites the body resonances inducing interior noise	REPAIR or INSTALL new components as necessary.

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