
Exhaust Catalyst and Exhaust System

The exhaust catalyst and exhaust system consists of the following components. For additional component information, refer to [Engine Control Components](#) in this section.

- Four exhaust gas temperature (EGT) sensors that measure the exhaust gas temperature.
- An oxidation catalytic converter (OC) that reduces emissions and assists in diesel particulate filter regeneration.
- A selective catalytic reduction (SCR) catalyst that chemically reduces nitrogen oxides (NOx) to nitrogen (N₂) and water (H₂O).
- A reductant injector that sprays diesel exhaust fluid (DEF) into the exhaust system as a component of the NOx reduction reaction.
- A diesel particulate filter pressure sensor that measures the gauge pressure of the exhaust gas before the diesel particulate filter.
- A diesel particulate filter that traps soot and ash particulates.
- A NOx sensor that detects levels of NOx in the exhaust stream, to monitor SCR efficiency.

Overview

The purpose of the exhaust catalyst and exhaust system is to convey the exhaust gas from the engine to the atmosphere and reduce the tail pipe emissions of hydrocarbon (HC), carbon monoxide (CO), nitrogen oxides (NOx) and diesel particulates. The diesel particulates, soot and ash, are captured and periodically reduced by the diesel particulate filter regeneration cycle.

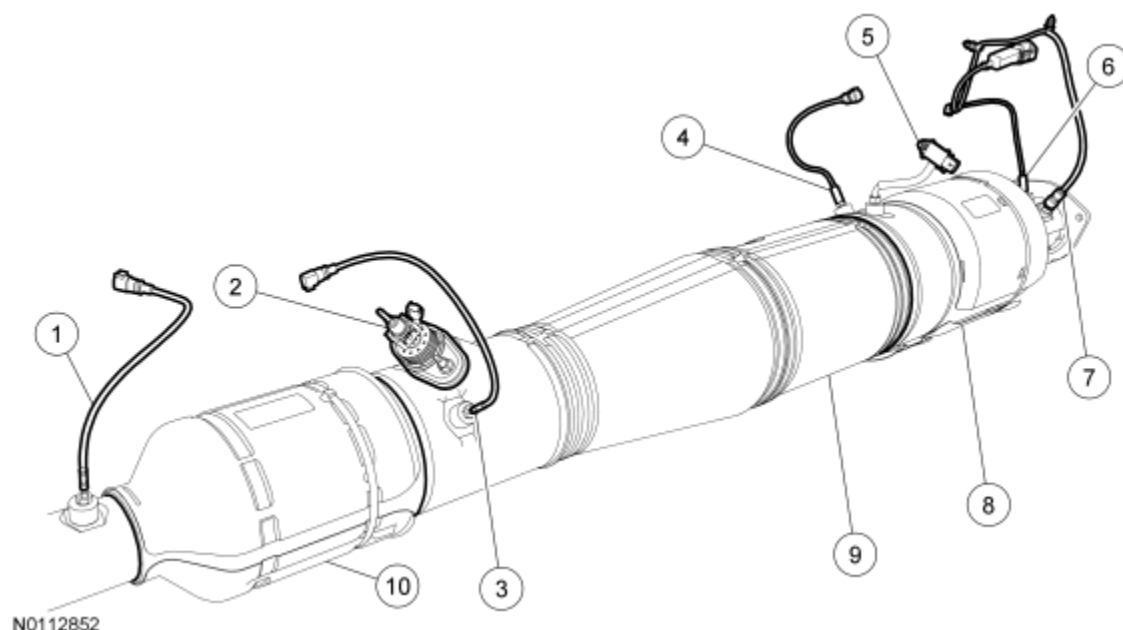
The exhaust gas and particulates are directed away from the engine through the exhaust manifold. The exhaust gas concentrations are then reduced to acceptable levels as the exhaust gas passes through the oxidation catalytic converter (OC). Since the particulates are components of the exhaust gas, some soot particulates may deposit on the OC. These particulates are removed during regeneration. The reduced emissions exhaust gas and particulates continue to the selective catalytic reduction (SCR) catalyst. As the exhaust gas enters the SCR catalyst, diesel exhaust fluid (DEF) is mixed into the stream and thermally decomposes to ammonia and carbon dioxide. The ammonia and NOx component of the exhaust gas are chemically reduced to nitrogen and water and the exhaust gas and particulates continue to the diesel particulate filter. In the diesel particulate filter, the exhaust gas and particulates flow through the channels of substrate filter. The channels of the substrate filter are alternately blocked, so the exhaust gas and particulates are forced to pass through the filter medium and into the adjoining channels to exit the filter. As the exhaust gas passes through the filter medium, any particulates larger than the pores of the filter are removed from the flow of exhaust gas and trapped for diesel particulate filter regeneration. The reduced emissions exhaust gas and any remaining particulates flow through the muffler and tail pipe into the atmosphere.

Diesel Particulate Filter Regeneration

The diesel particulate filter regeneration occurs during normal vehicle operation. The powertrain control module (PCM) may regenerate the diesel particulate filter at idle. During the diesel particulate filter regeneration, fuel is injected into the cylinder after the main combustion. The extra fuel increases the temperature of the exhaust gas and lights-off the OC. The temperature of the exhaust gas increases to greater than 550°C (1,022°F) at the OC and diesel particulate filter. At this temperature soot burns. Soot particulates that may have accumulated on the OC or in the diesel particulate filter are burned and the ash is trapped in the diesel particulate filter. The ash particulates that remain in the diesel particulate filter are mainly comprised of metallic compounds generated during combustion and from corrosion in the exhaust system.

Exhaust System (Wide Frame System)

Note: For narrow frame applications, the locations of the SCR catalyst and the diesel particulate filter are switched.

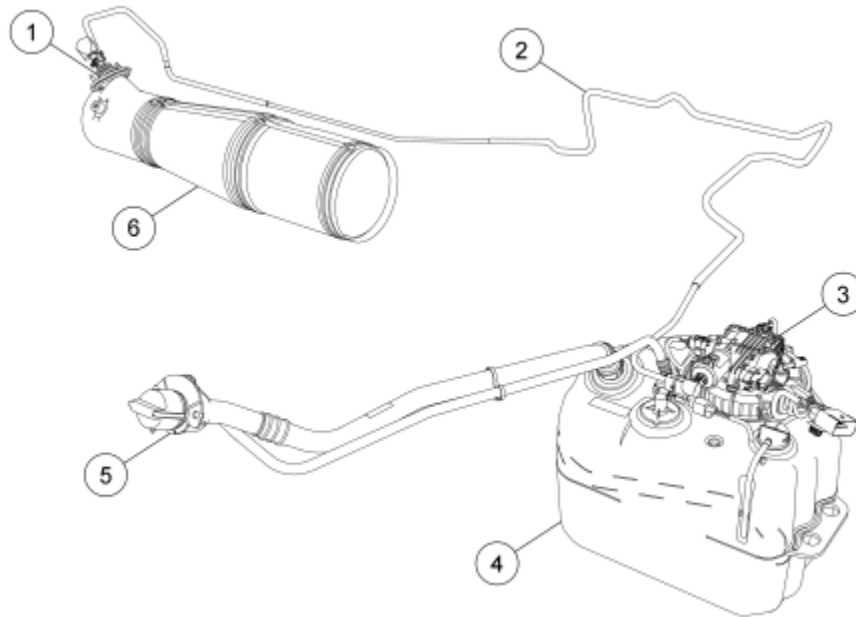


Item	Number	Description
1	—	Exhaust gas temperature bank 1, sensor 1 (EGT11)
2	—	Reductant injector
3	—	Exhaust gas temperature bank 1, sensor 2 (EGT12)
4	—	Exhaust gas temperature bank 1, sensor 3 (EGT13)
5	—	Diesel particulate filter pressure sensor
6	—	Exhaust gas temperature bank 1, sensor 4 (EGT14)
7	—	NOx sensor
8	—	Diesel particulate filter
9	—	Selective catalytic reduction (SCR) catalyst
10	—	Oxidation catalytic converter (OC)

Selective Catalytic Reduction (SCR) System

The SCR system reduces nitrogen oxides (NOx) in the exhaust stream by a chemical reduction process using the SCR catalyst and a reductant injection system that introduces diesel exhaust fluid (DEF) into the exhaust system upstream of the SCR catalyst. The reductant injection system is directly controlled and monitored by the PCM. For additional information on the SCR system components, refer to [Engine Control Components](#) in this section.

SCR System



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Item	Number	Description
1	—	Reductant injector
2	—	Reductant pressure line
3	—	Reductant pump assembly
4	—	Reductant tank
5	—	Reductant tank filler hose
6	—	SCR catalyst
