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2017 Ford Fusion Service and Repair Manual

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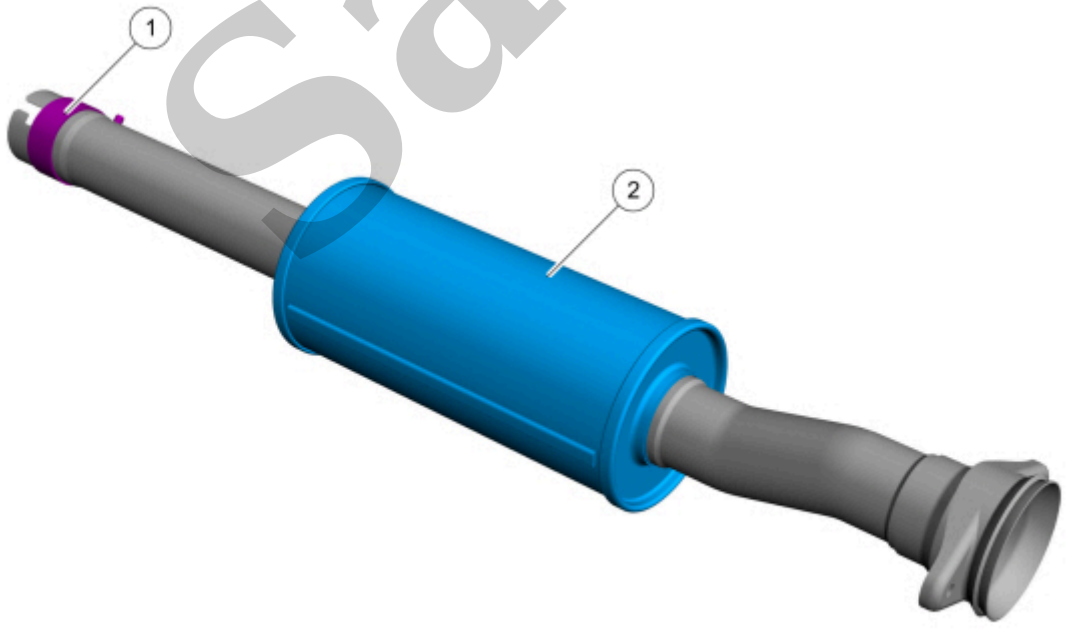
For additional information, refer to: Spark Plugs(303-07C Engine Ignition - 3.5L EcoBoost (BM), Removal and Installation).

For additional information, refer to: Spark Plugs(303-07D Engine Ignition - 3.5L V6 PowerBoost (CN), Removal and Installation).

For additional information, refer to: Spark Plugs(303-07E Engine Ignition - 5.0L 32V Ti-VCT, Removal and Installation).

3	RH (right-hand) exhaust gas oxygen sensor - upstream
4	Isolators
5	Exhaust clamp
6	LH (left-hand) exhaust gas oxygen sensor - downstream
7	LH (left-hand) exhaust gas oxygen sensor - upstream
8	Exhaust gasket
9	LH (left-hand) catalytic converter heat shield
10	LH (left-hand) catalytic converter
11	Exhaust Y-pipe heat shield
12	Exhaust gasket
13	RH (right-hand) catalytic converter heat shield
14	RH (right-hand) catalytic converter



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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.

harmless products. The catalyst initiates and speeds up heat producing chemical reactions of the exhaust gas components so they are used up as much as possible.

Light Off Catalyst

As the catalyst heats up, converter efficiency rises rapidly. The point at which conversion efficiency exceeds 50% is called catalyst light off. For most catalysts this point occurs between 246°C to 302°C (475°F to 575°F). A light off catalyst is a three way catalytic (TWC) converter that is located as close to the exhaust manifold as possible. Because the light off catalyst is located close to the exhaust manifold it achieves the required temperature faster and reduces emissions more quickly than the catalyst located under the body. Once the catalyst lights off, it quickly reaches the maximum conversion efficiency for that catalyst.

Three Way Catalytic (TWC) Converter Conversion Efficiency

A TWC convertor requires a stoichiometric air fuel ratio of 14.7 pounds of air to 1 pound of gasoline, or 14.7 to 1, for high conversion efficiency. To achieve these high efficiencies, the air to fuel ratio must be tightly controlled with a narrow window of stoichiometry. Deviations outside of this window greatly decrease the conversion efficiency. For example a rich mixture decreases the HC (hydrocarbon) and CO conversion efficiency while a lean mixture decreases the NO_x conversion efficiency.

For vehicles using E85 the required air to fuel ratio is 9.8 to 1. Other gasoline/ethanol mixtures require a variable air to fuel ratio between 14.7 to 1 to 9.8 to 1 dependent on the percentage of ethanol content.

Exhaust System

The exhaust system conveys engine emissions from the exhaust manifold to the atmosphere. Engine exhaust emissions are directed from the engine exhaust manifold to the catalytic converter through the front exhaust pipe. A universal HO2S (heated oxygen sensor) is mounted on the front exhaust pipe before the catalyst. The catalytic converter reduces the concentration of CO, unburned HCs, and NO_x in the exhaust emissions to an acceptable level. The reduced exhaust emissions are directed from the catalytic converter past another HO2S (heated oxygen sensor) mounted in the rear exhaust pipe and then on into the muffler. Finally, the exhaust emissions are directed to the atmosphere through an exhaust tailpipe.

Underbody Catalyst

The underbody catalyst is located after the light off catalyst.

Three Way Catalytic (TWC) Converter

The TWC converter contains either platinum (Pt) and rhodium (Rh) or palladium (Pd) and rhodium (Rh). The TWC converter catalyzes the oxidation reactions of unburned HCs and CO and the reduction reaction of NO_x. The 3 way conversion can be best accomplished by always operating the engine air fuel ratio at or close to stoichiometry.

Catalyst Efficiency Monitor

The catalyst efficiency monitor uses an oxygen sensor before and after the catalyst to infer the HC (hydrocarbon) efficiency based on the oxygen storage capacity of the catalyst. Under normal closed loop fuel

    - Engine RPM (revolutions per minute) 1,000 to 1,300 RPM (revolutions per minute)
    - Engine load 15 to 35%
    - Inferred catalyst temperature 454°C - 649°C (850°F - 1,200°F)
    - Number of universal HO2S (heated oxygen sensor) switches is 50
- Second Airflow Cell
    - Engine RPM (revolutions per minute) 1,200 to 1,500 RPM (revolutions per minute)
    - Engine load 20 to 35%
    - Inferred catalyst temperature 482°C - 677°C (900°F - 1,250°F)
    - Number of universal HO2S (heated oxygen sensor) switches is 70
- Third Airflow Cell
    - Engine RPM (revolutions per minute) 1,300 to 1,600 RPM (revolutions per minute)
    - Engine load 20 to 40%
    - Inferred catalyst temperature 510°C - 704°C (950°F - 1,300°F)
    - Number of universal HO2S (heated oxygen sensor) switches is 30

Six drive cycles may be required to illuminate the MIL (malfunction indicator lamp) during normal customer driving, because an exponentially weighted moving average algorithm is used to determine a concern. If the KAM (keep alive memory) is reset, a concern illuminates the MIL (malfunction indicator lamp) in 2 drive cycles.

General Catalyst Monitor Operation

The catalyst monitor duration is 12 to 30 seconds, once per drive cycle. If the catalyst monitor conditions are met, the catalyst monitor may run and complete after all of the upstream HO2S (heated oxygen sensor) functional tests are complete and the EVAP (evaporative emission) system is functional, with no stored DTCs; however, the catalyst monitor may run and complete before the downstream HO2S (heated oxygen sensor) deceleration fuel shut off (DFSO) test is complete. In this case, the catalyst monitor inspection maintenance (I/M) readiness flag may indicate complete before the O2S I/M readiness flag indicates complete. If the catalyst monitor does not complete during a particular driving cycle, the already accumulated switch/signal data is retained in the KAM (keep alive memory) and is used during the next driving cycle to allow the catalyst monitor a better opportunity to complete.

Index ratios for ethanol (flex fuel) vehicles vary based on the changing concentration of alcohol in the fuel. The threshold to determine a concern typically increases as the percent of alcohol increases. For example, a

Catalyst System

309-00A Exhaust System - 2.7L EcoBoost (238kW/324PS)	***2022 F-150***
Diagnosis and Testing	***Procedure revision date: 06/17/2022***

Catalyst System

Diagnostic Trouble Code (DTC) Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.

REFER to: Diagnostic Methods

(100-00 General Information, Description and Operation).

Diagnostic Trouble Code Chart

Module	DTC (diagnostic trouble code)	Description	Action
PCM (powertrain control module)	P0420:00	Catalyst System Efficiency Below Threshold (Bank 1): No Sub Type Information	GO to Pinpoint Test HF
PCM (powertrain control module)	P0430:00	Catalyst System Efficiency Below Threshold (Bank 2): No Sub Type Information	GO to Pinpoint Test HF

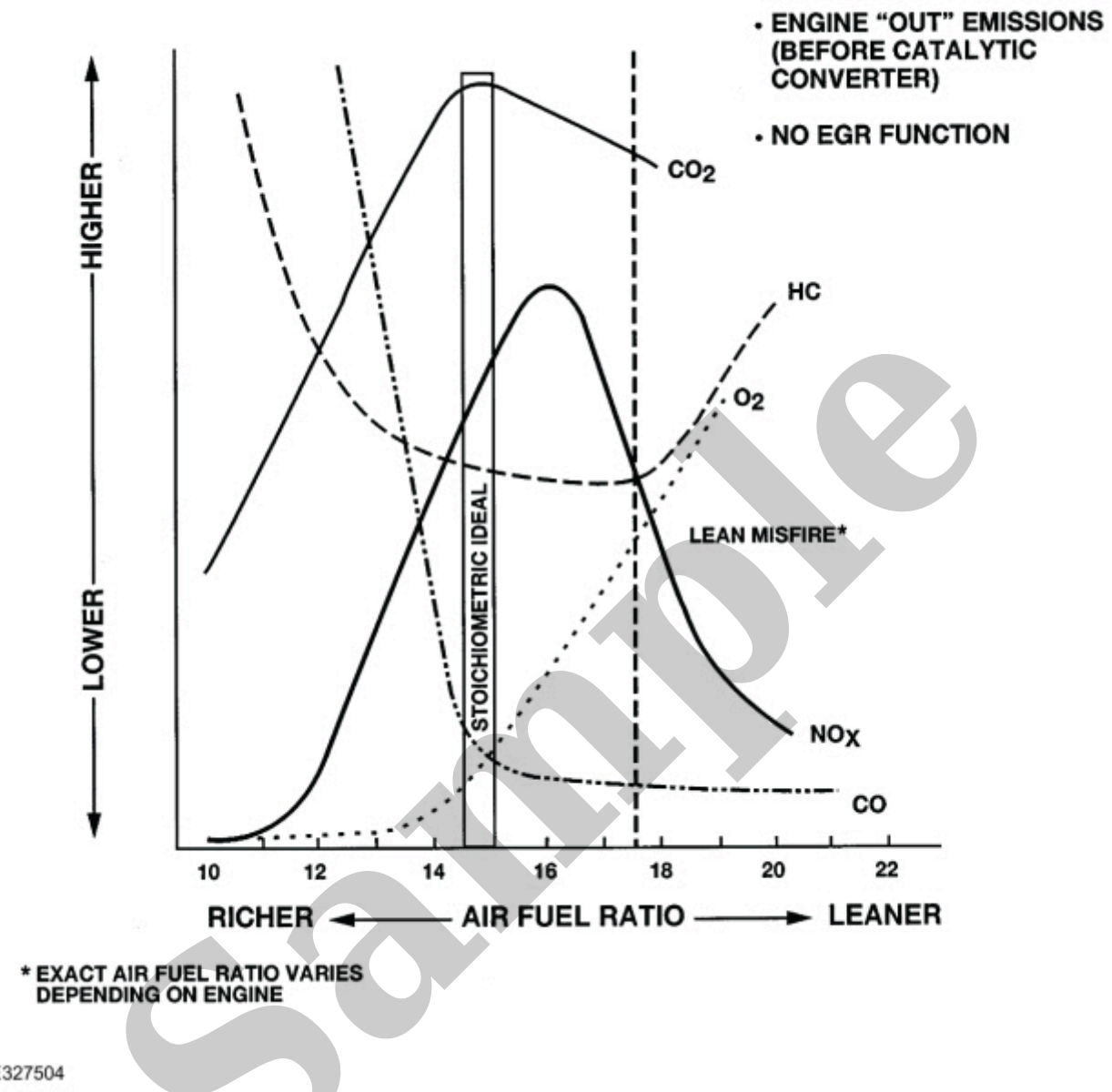
Global Customer Symptom Code (GCSC) Chart

Diagnostics in this manual assume a certain skill level and knowledge of Ford-specific diagnostic practices.

REFER to: Diagnostic Methods

(100-00 General Information, Description and Operation).

Global Customer Symptom Code Chart



Verifying an excessive grams per mile (gpm) indication using a parts per million (ppm) reading.

For excessive vehicle gas readings, compare the actual gpm reading to the gas cutpoint level needed to pass testing. This gives an indication of how much the ppm reading has to be reduced (if the actual reading is twice the cutpoint, the baseline reading has to be cut in half or more).

Example:

- The actual HC (hydrocarbon) produced by a vehicle is 1.6 gpm. The cutpoint for HC (hydrocarbon) in this example is 0.8 gpm. The actual reading is twice the cutpoint.
- The HC (hydrocarbon) reading obtained for the same vehicle during the baseline drive averages 440 ppm. In order for this vehicle to pass the inspection/maintenance test, the HC (hydrocarbon) reading

Possible Sources

- Exhaust system concerns
- Echaust leaks
- Engine oil contamination
- Engine oil contamination of the catalyst
- Base engine concerns
- Misfires
- Leaking fuel injector
- Damaged turbocharger
- Damaged HO2S (heated oxygen sensor)

Pinpoint Test Steps available in the on-line Workshop Manual.