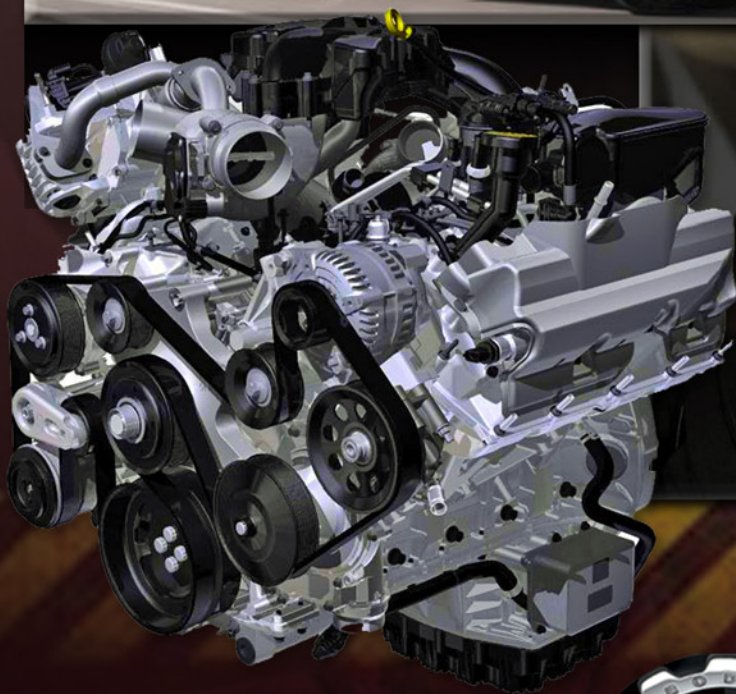


6.7L POWER STROKE® DIESEL



2015 "F" SERIES SUPER DUTY

◦ Engine Description ◦ Systems Overview ◦ Component Location ◦

REPAIR TECHNIQUES

Appropriate service methods and procedures are essential for the safe, reliable operation of all motor vehicles as well as the personal safety of the individual doing the work. This manual provides general directions for performing service with tested, effective techniques. Following them will help assure reliability.

There are numerous variations in procedure, techniques, tools and parts for servicing vehicles, as well as in the skill of the individual doing the work. This manual cannot possibly anticipate all such variations and provide advice or cautions as to each. Accordingly, anyone who departs from the instructions provided in this manual must first establish that they compromise neither their personal safety nor the vehicle integrity by their choice of methods, tools or parts.

NOTE, NOTICE, CAUTION AND WARNING

As you read through this manual, you may come across a **NOTE**, **NOTICE**, **CAUTION** or **WARNING**. Each one is there for a specific purpose. A **NOTE** calls attention to unique, additional or essential information related to the subject procedure. A **NOTICE** identifies a hazard that could damage the vehicle or property. A **CAUTION** identifies a hazard that could result in minor personal injury to yourself or others. A **WARNING** identifies a hazard that could result in severe personal injury or death to yourself or others. Some general **WARNINGS** that you should follow when you work on a vehicle are listed below.

- **ALWAYS WEAR SAFETY GLASSES FOR EYE PROTECTION.**
- **KEEP SOLVENTS AWAY FROM IGNITION SOURCES. SOLVENTS MAY BE FLAMMABLE AND COULD IGNITE OR EXPLODE IF NOT HANDLED CORRECTLY.**
- **USE SAFETY STANDS WHENEVER A PROCEDURE REQUIRES YOU TO BE UNDER THE VEHICLE.**
- **MAKE SURE THAT THE IGNITION SWITCH IS ALWAYS IN THE OFF POSITION, UNLESS OTHERWISE REQUIRED BY THE PROCEDURE.**
- **SET THE PARKING BRAKE WHEN WORKING ON THE VEHICLE. IF YOU HAVE AN AUTOMATIC TRANSMISSION, SET IN PARK UNLESS INSTRUCTED OTHERWISE FOR A SPECIFIC OPERATION. IF YOU HAVE A MANUAL TRANSMISSION, IT SHOULD BE IN REVERSE (ENGINE OFF) OR NEUTRAL (ENGINE ON) UNLESS INSTRUCTED OTHERWISE FOR A SPECIFIC OPERATION. PLACE WOOD BLOCKS (4" X 4" OR LARGER) OR WHEEL CHOCKS AGAINST THE FRONT AND REAR SURFACES OF THE TIRES TO HELP PREVENT THE VEHICLE FROM MOVING.**
- **OPERATE THE ENGINE ONLY IN A WELL-VENTILATED AREA TO AVOID THE DANGER OF CARBON MONOXIDE POISONING.**
- **KEEP YOURSELF AND YOUR CLOTHING AWAY FROM MOVING PARTS WHEN THE ENGINE IS RUNNING, ESPECIALLY THE DRIVE BELTS.**
- **TO PREVENT SERIOUS BURNS, AVOID CONTACT WITH HOT METAL PARTS SUCH AS THE RADIATOR, EXHAUST MANIFOLD, TAIL PIPE, THREE-WAY CATALYTIC CONVERTER AND MUFFLER.**
- **DO NOT SMOKE WHILE WORKING ON A VEHICLE.**
- **TO AVOID INJURY, ALWAYS REMOVE RINGS, WATCHES, LOOSE HANGING JEWELRY AND LOOSE CLOTHING BEFORE BEGINNING TO WORK ON A VEHICLE.**
- **WHEN IT IS NECESSARY TO WORK UNDER THE HOOD, KEEP HANDS AND OTHER OBJECTS CLEAR OF THE COOLING FAN BLADES!**

TOOLS

Commercially available hand tools and equipment are used along with Essential Special Service Tools (ESST) and Rotunda equipment. Power tools have become the acceptable industry standard and are used for disassembly only where applicable, unless specified otherwise in the Workshop Manual. The only exception to this policy is installing wheels in conjunction with the use of torque sticks, when possible.

NOTE: The descriptions and specifications contained in this manual were in effect at the time this manual was approved for printing. Ford Motor Company reserves the right to discontinue models at any time, or change specifications or design without notice and without incurring any obligation.

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6.7L Power Stroke® Diesel Updates

The 6.7L Power Stroke® Diesel was released in 2010 for the 2011 model year (MY) Super Duty. Since its release, there have been minor updates to the engine. More significant updates are scheduled for the 2015 model year engine. The following are changes that have been implemented between the initial release and the 2014 MY.

- Increased torque and power numbers (released shortly after initial 6.7L release)
- Stamped steel lower oil pan with a conventional drain plug.
- The stud was removed on the oil cooler for easier servicing of the oil cooler.
- Crankcase ventilation sensor was introduced 2013 model year.
- Modifications to the Diesel Particulate Filter (DPF) and diesel particulate filter pressure sensor.
 - DPF delta pressure sensor was incorporated in 2013 MY.
- Two NO_x sensors and modules.
 - The second NO_x sensor and module was added for the 2013 MY.
- Oil and coolant feed lines to the turbocharger have been updated.

2015 MY updates (These changes are mostly for the pickup, although some were applied to the chassis cab)

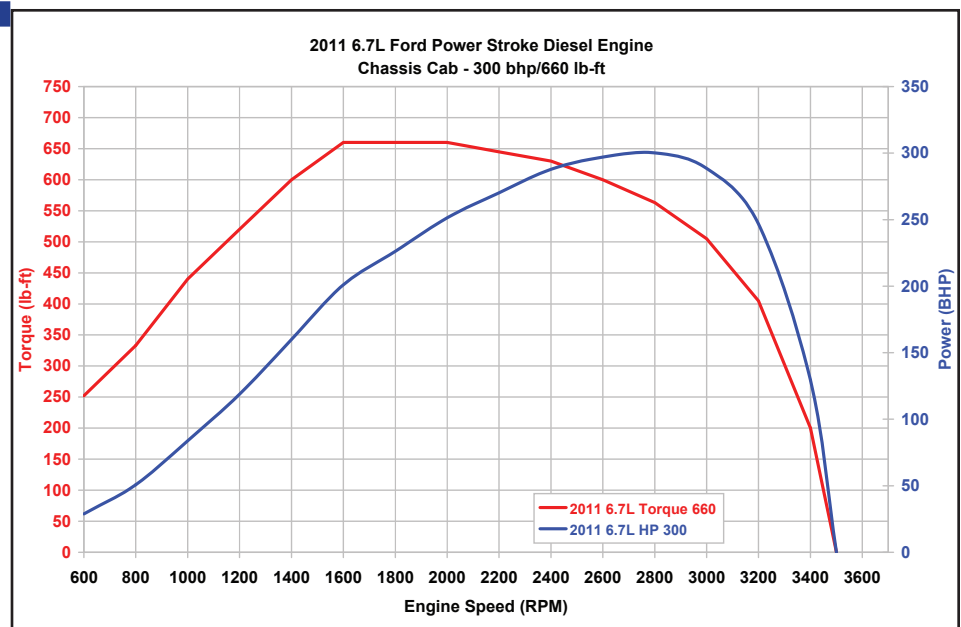
- IROX® coating used on the lower main bearing. (Update for pickup and chassis cab)
- Heavier crankshaft damper. (Update for pickup and chassis cab)
- Updated fan clutch.
- Exhaust Gas Recirculation (EGR) inlet temperature sensor. (Update for pickup only)
- Turbocharger with the following updates: (Update for pickup only)
 - Lower intake to accommodate the new turbocharger.
 - The electronic vacuum regulator valve and actuator was deleted.
 - Wastegate was deleted.
- Change to the coolant flow through the EGR cooler. (Update for pickup and chassis cab)
- Fuel pressure and temperature sensor in the low pressure fuel system were combined into one sensor.
- New high pressure fuel pump and injectors: (Update for pickup only)
 - The components physically look the same.
 - Longer stroke in the fuel pump.
 - All new injector tip.
- New up-pipes and downpipe including a new downpipe bracket. (Update for pickup only)
- Particulate matter sensor and module was added after the DPF.

2011 Torque and Horsepower for Chassis Cab

Peak torque: 650 lb-ft

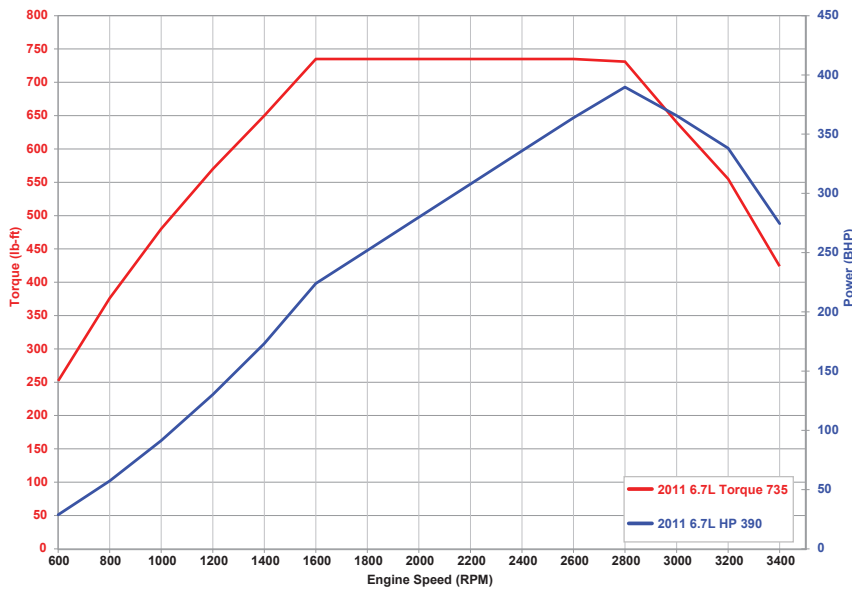
Peak horsepower: 300 hp

The torque and horsepower numbers for the chassis cab have not changed since the launch in 2010.



6.7L Power Stroke® Diesel Updates

2011 6.7L Power Stroke® Diesel Engine

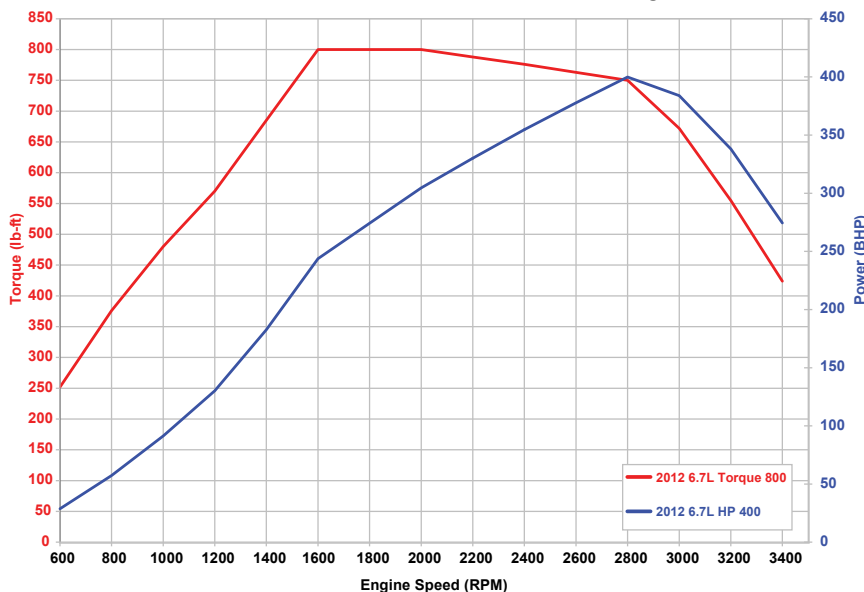


2011 Launch Torque and Horsepower

Peak torque: 735 lb-ft

Peak horsepower: 390 hp

2011 Post-Launch 6.7L Power Stroke® Diesel Engine



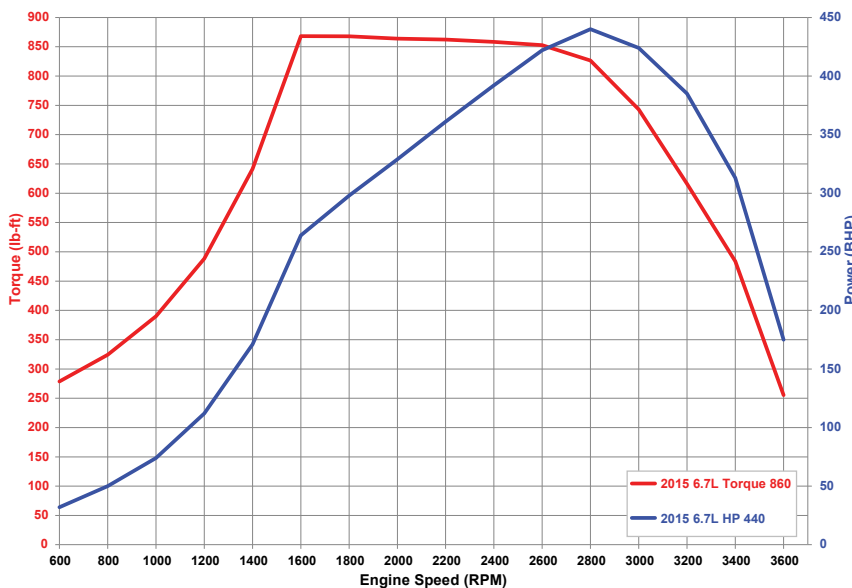
2011 Post Launch Torque and Horsepower Upgrade

Peak torque: 800 lb-ft

Peak horsepower: 400 hp

Available for the 2011 6.7L through a PCM update.

2015 6.7L Power Stroke® Diesel Engine



2015 Torque and Horsepower

Peak torque: 860 lb-ft

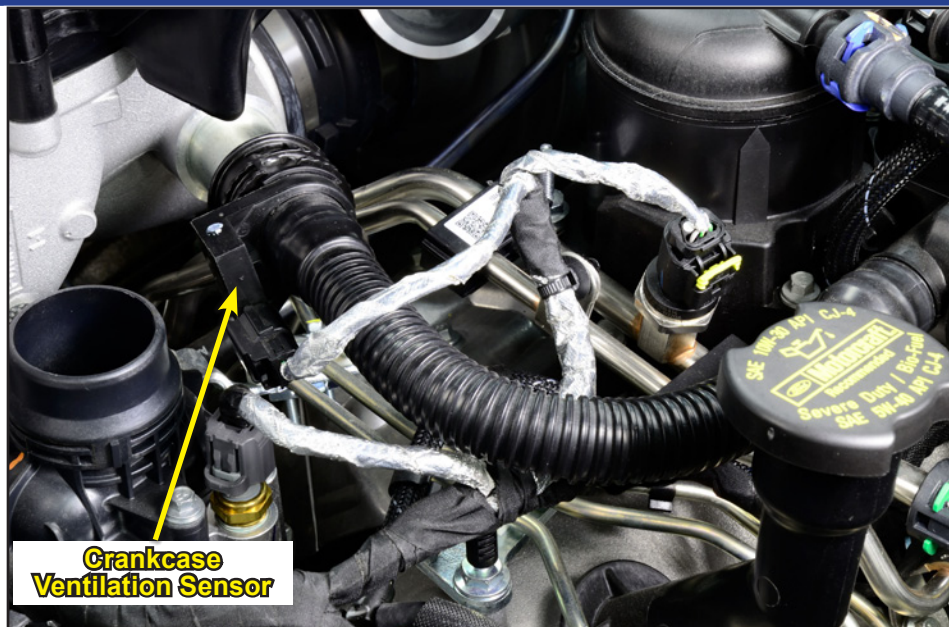
Peak horsepower: 440 hp

6.7L Power Stroke® Diesel 2012-2014 Updates

Crankcase Ventilation Sensor

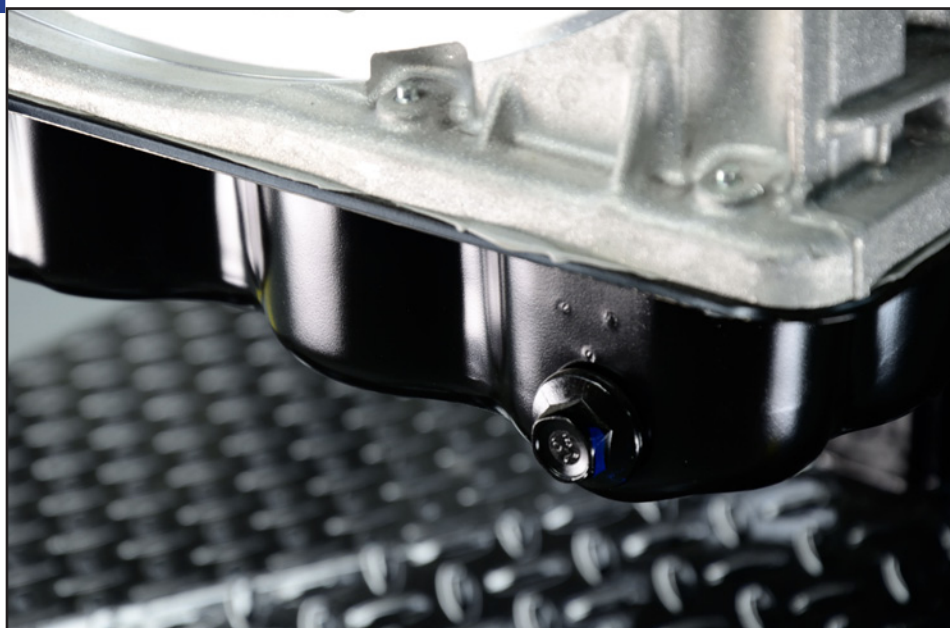
The crankcase ventilation sensor is a Hall-effect sensor mounted on the crankcase ventilation hose at the air inlet connection. The crankcase ventilation hose on the air inlet side has a tamper-proof connector. The crankcase ventilation sensor monitors the crankcase ventilation hose connection at the fresh air inlet. The crankcase ventilation sensor signal to the PCM indicates if the crankcase ventilation hose is connected or disconnected.

Introduced in the 2013 MY Super Duty.



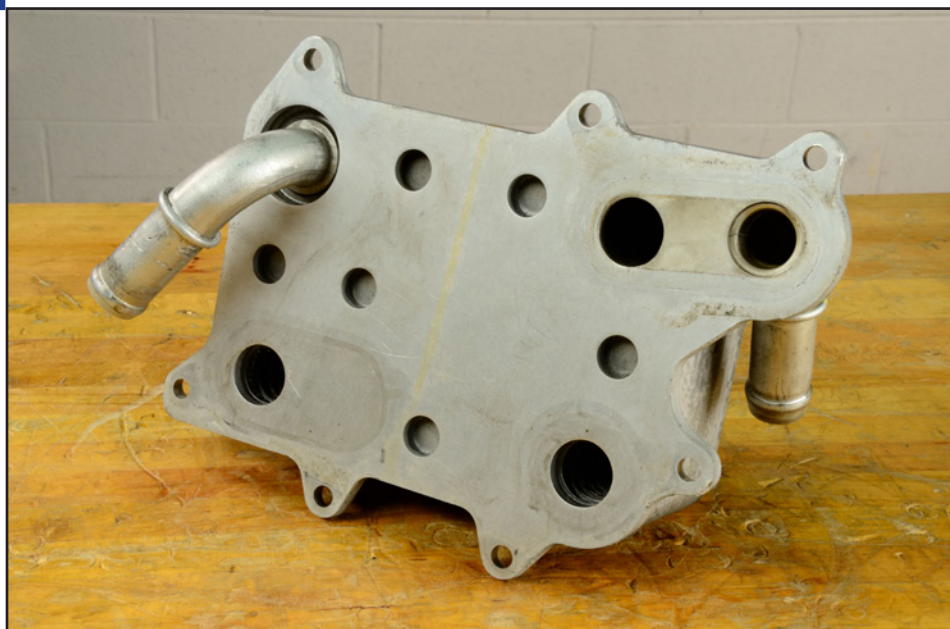
Oil Pan and Drain Plug

The oil pan was updated for the 2012 model year with a stamped steel lower oil pan. The quarter turn drain plug was replaced by a conventional drain plug at the same time.

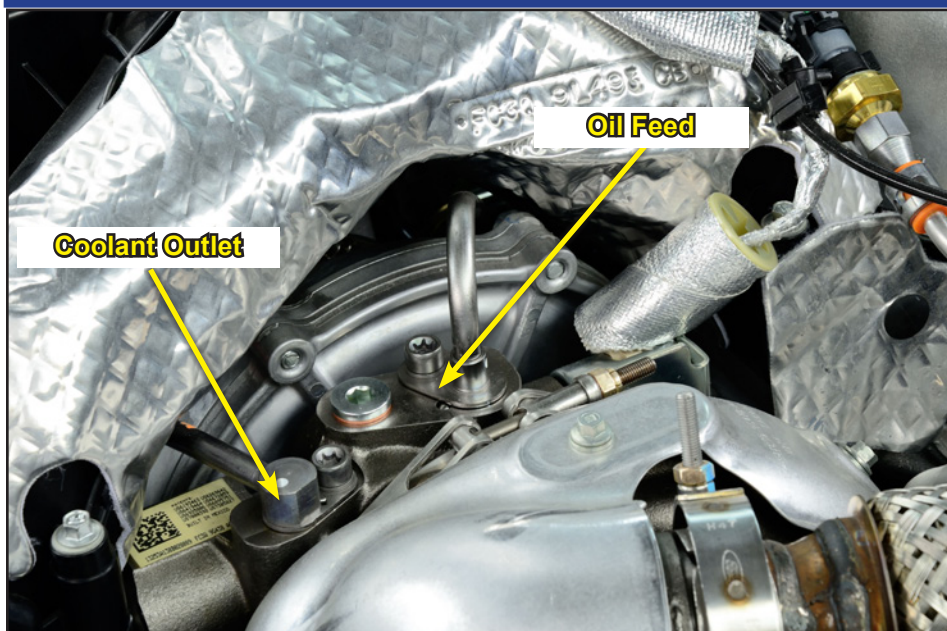


Oil Cooler

The oil cooler was updated to remove the hidden mounting point for the 2012 model year 6.7L. When servicing the oil cooler, the lower oil pan no longer needs to be removed.

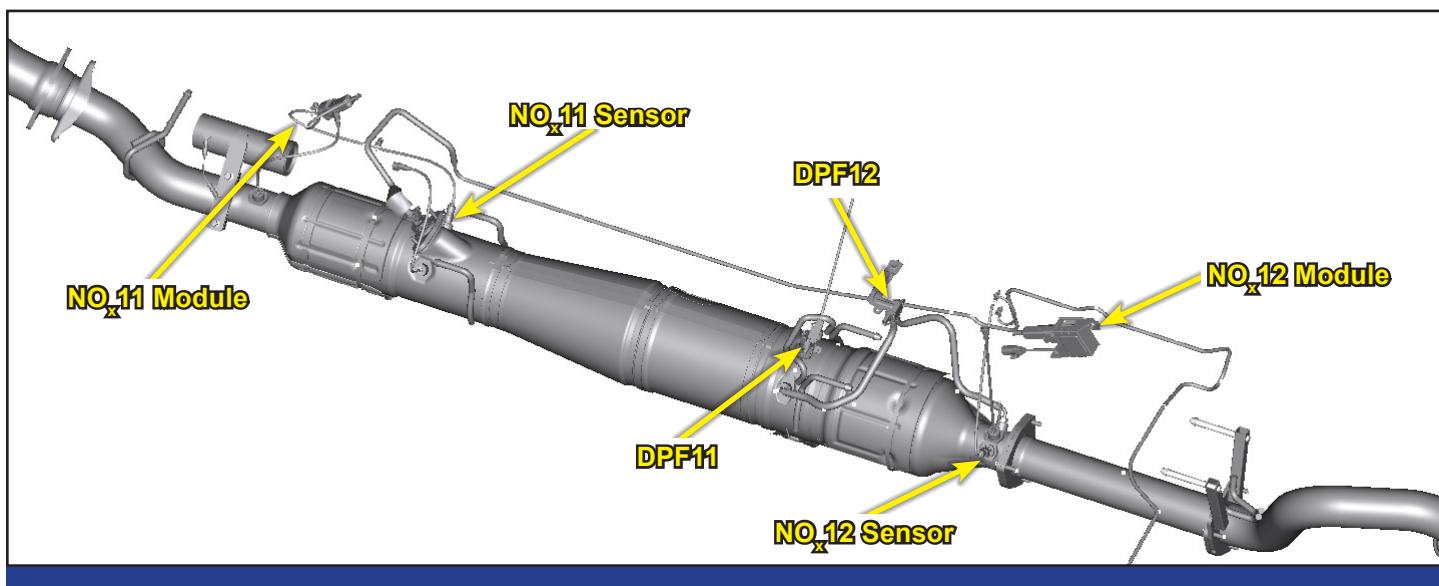


6.7L Power Stroke® Diesel 2012-2014 Updates



Turbocharger Cooling and Lubrication Lines

The cooling and lubrication lines going into the turbocharger have been changed from quick connections to bolt fasteners. This improves both sealing and durability.



NO_x Sensors and Modules

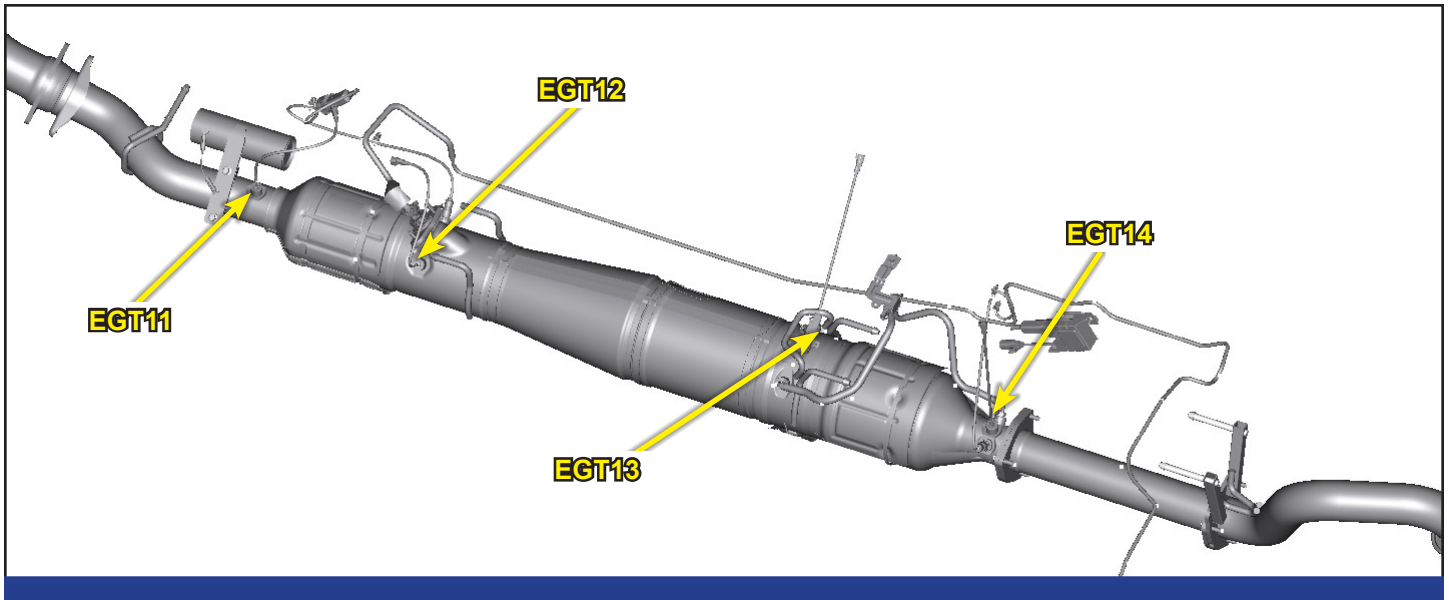
For the 2012 model year, a second NO_x sensor and module were added to the aftertreatment system. Nitrogen oxides bank 1, sensor 1 (NO_x 11) sensor and NO_x 11 module are mounted in the exhaust before the Selective Catalyst Reduction (SCR) so the PCM can monitor the effectiveness of the system.

Diesel Particulate Filter Pressure Bank 1 Sensor 2

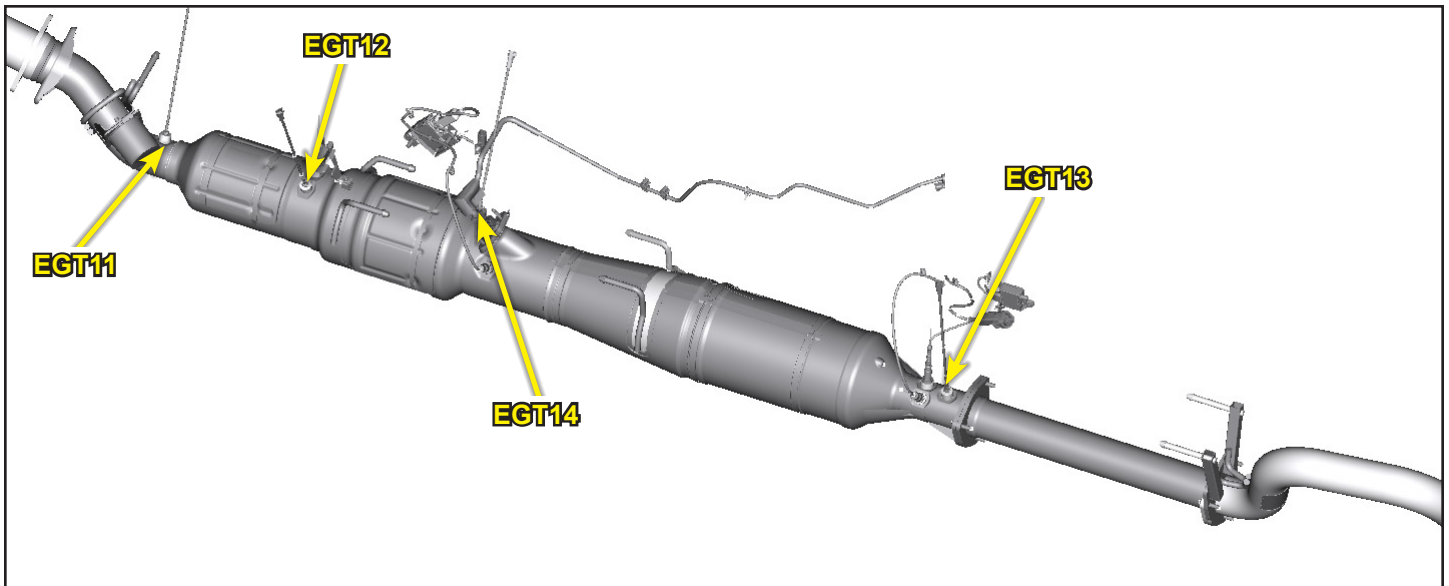
For the 2013 model year, a delta pressure DPF sensor (DPF12) was added to the aftertreatment system. This diesel particulate filter pressure sensor measures the pressure across the DPF. The sensor has two ports, one port senses the pressure in front of the DPF and the other senses the pressure after the DPF. The sensor is used to determine DPF integrity.

6.7L Power Stroke® Diesel 2012-2014 Updates

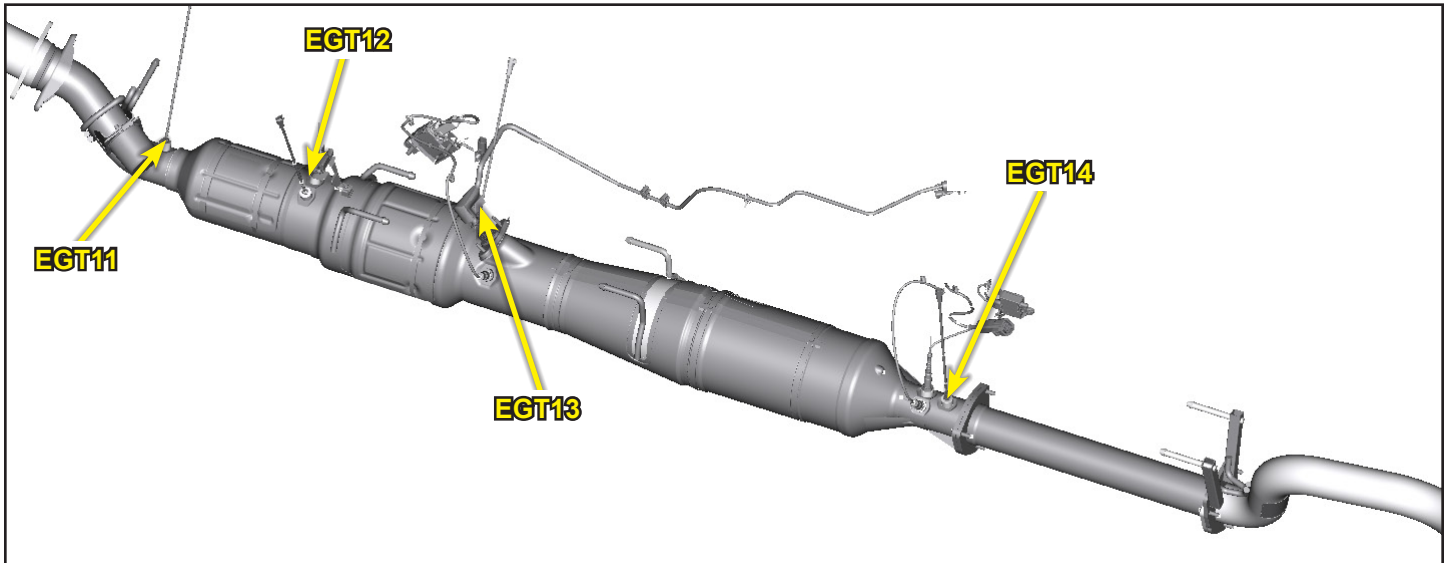
Exhaust Gas Temperature Sensor Location (Pickup 2011-2014 MY)



Exhaust Gas Temperature Sensor Location (Chassis Cab 2011-2012 MY)



Exhaust Gas Temperature Sensor Location (Chassis Cab 2013-2014 MY)



6.7L Power Stroke® Diesel 2015 MY Updates



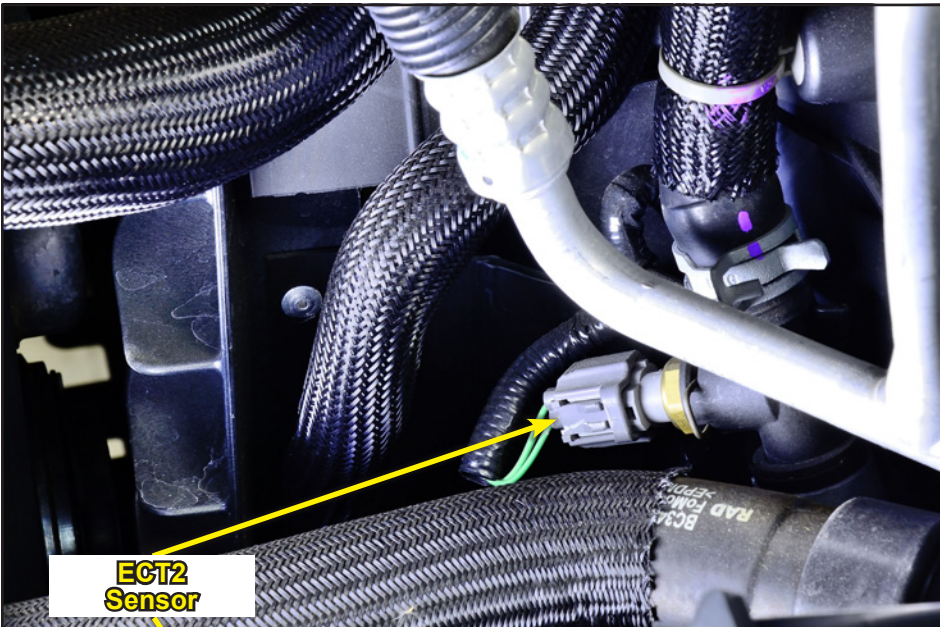
EGR Cooler

The coolant flow through the EGR cooler has been changed. The EGR cooler is carryover from the previous model year engine, but the secondary cooling system no longer cools the EGR gases.

Both cooling elements in the EGR cooler are now cooled by the high temperature cooling system.

The ECT2 sensor has been removed from the EGR cooler and the hole plugged.

On later 2015 models the EGR cooler is modified and the plug is deleted.



Cooling System Temperature 2 (ECT2)

Due to a change in the EGR cooler coolant flow, the ECT2 sensor has been removed from the EGR cooler. The sensor is now mounted in a "T" fitting in a coolant line located in the right front engine compartment. Removal of the air filter box provides access to the sensor.

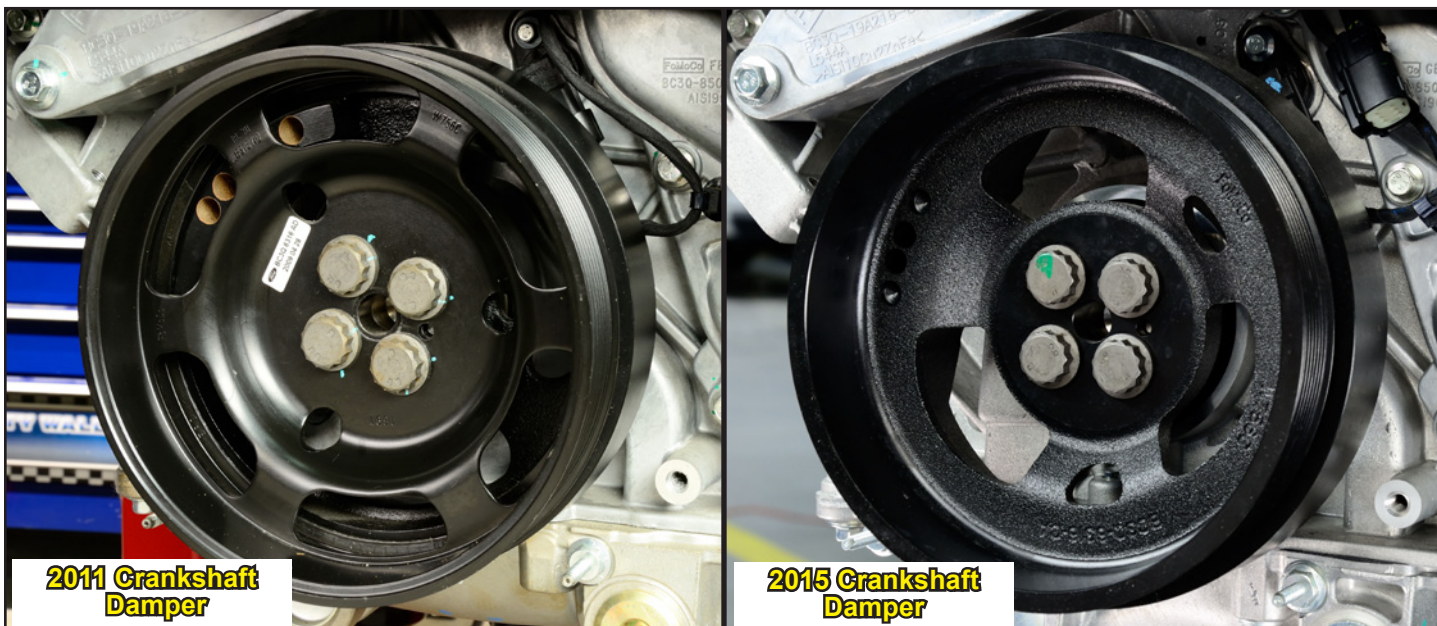


6.7L Power Stroke® Diesel 2015 MY Updates



Cooling Fan Clutch

The increased engine output creates more heat, so it was necessary to improve the durability of the fan clutch. Additional heat sinks have been added to the fan clutch to dissipate the heat generated by engine operation.

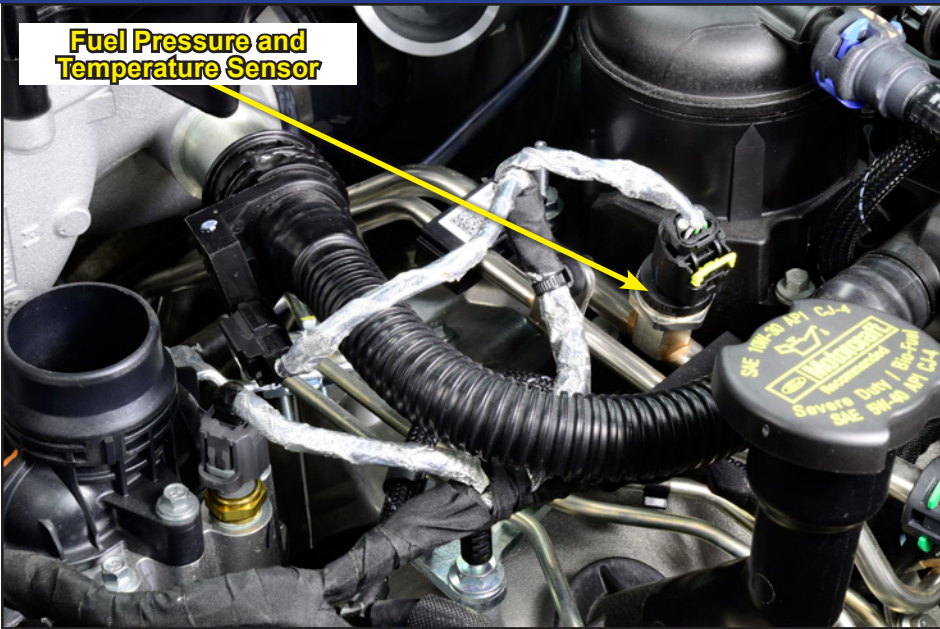


Crankshaft Damper

The crankshaft damper has been updated because of the increased power levels of the 2015 engine. More mass has been added and has been retuned to reduce torsional levels at the increased power levels. (Update for pickup and chassis cab)

6.7L Power Stroke® Diesel 2015 MY Updates

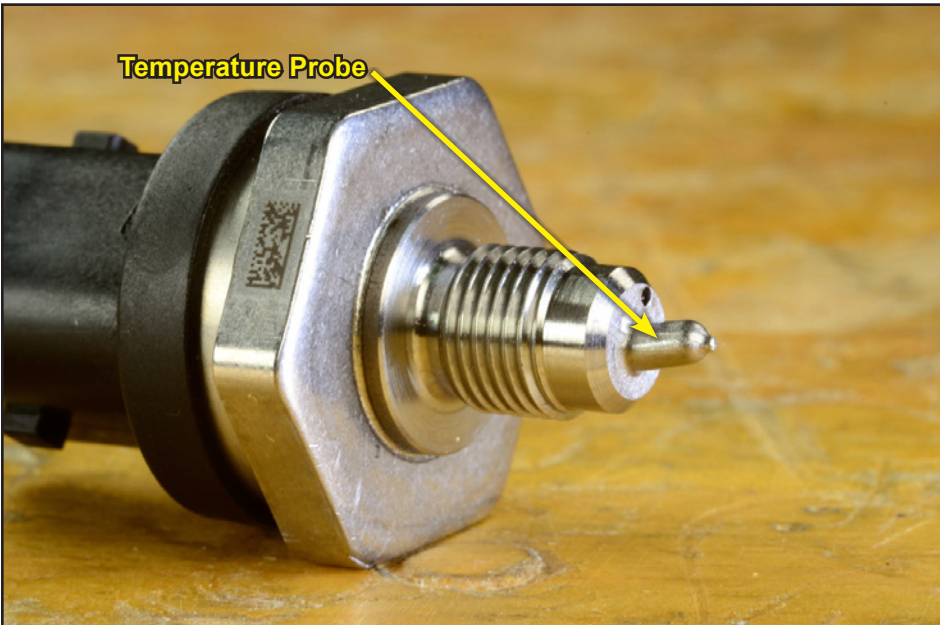
Fuel Pressure and Temperature Sensor



Fuel Pressure and Temperature Sensor

The fuel pressure and temperature sensor is a combined sensor that monitors both pressure and temperature of the low pressure fuel system.

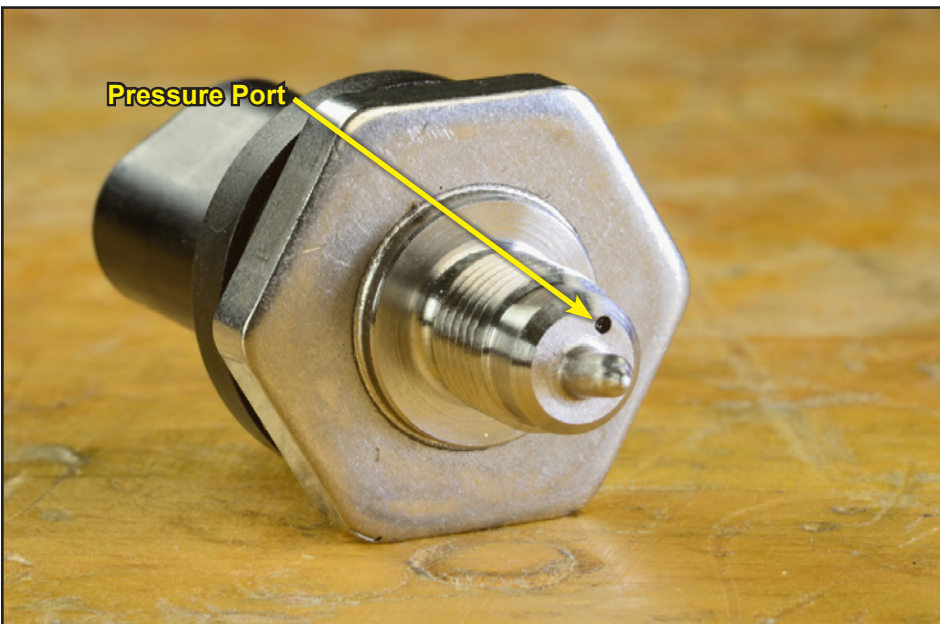
Temperature Probe



Temperature Sensor Half

The temperature component of the sensor is a thermistor device in which resistance changes with temperature. The electrical resistance of a thermistor decreases as the temperature increases, and resistance increases as the temperature decreases. The varying resistance affects the voltage drop across the sensor terminals and provides an electrical voltage signal to the PCM corresponding to temperature.

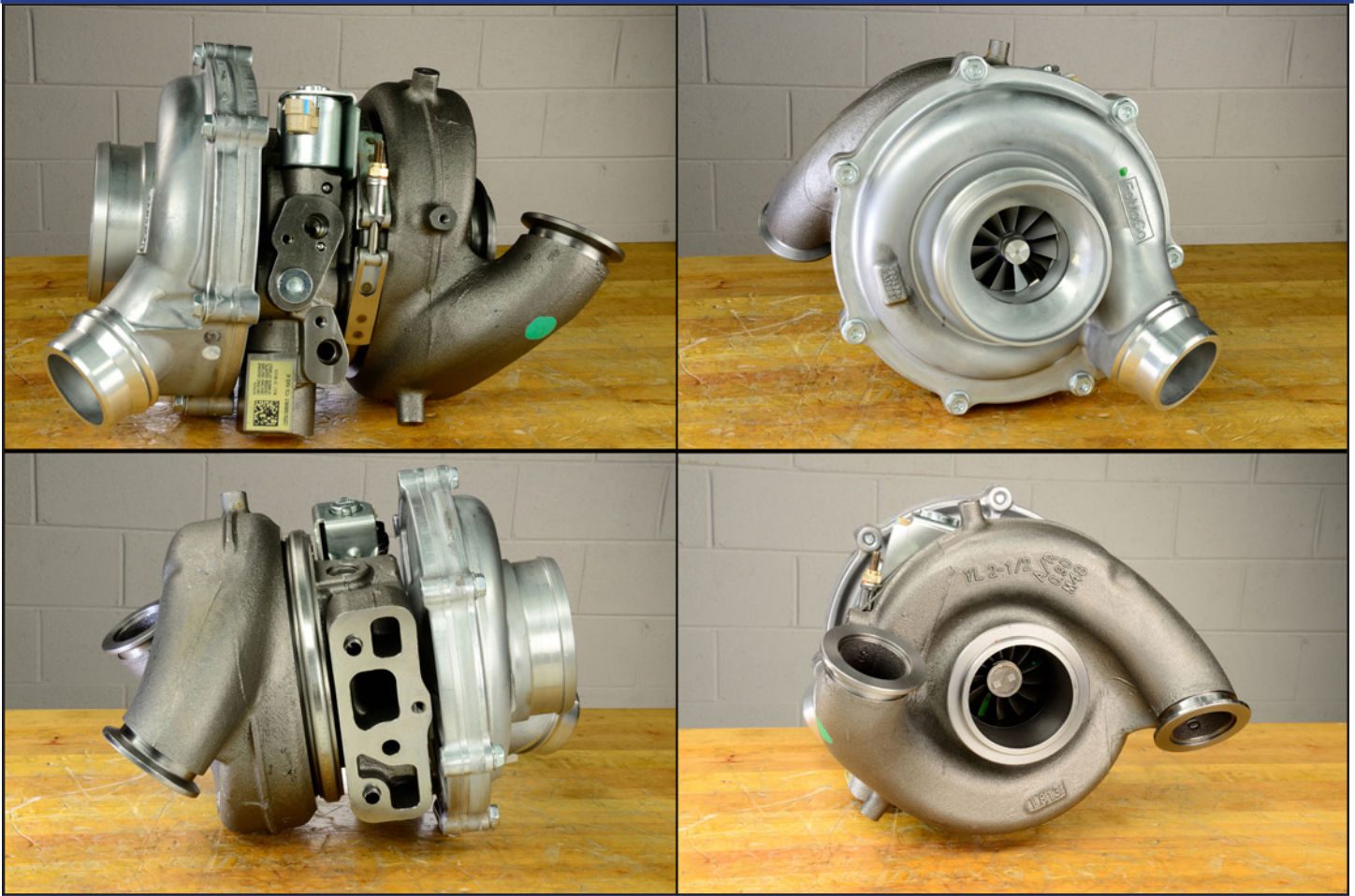
Pressure Port



Fuel Pressure Sensor Half

The fuel pressure component of the sensor provides a signal to the PCM indicating low fuel system pressure. The PCM supplies a 5-volt reference (VREF) signal, as well as supplying 5 volts on the FLP circuit. As pressure increases, the sensor signal voltage decreases. The new fuel pressure sensor is able to read the actual fuel pressure. The previous sensor was a switch that changed states when the minimum fuel pressure was reached.

6.7L Power Stroke® Diesel 2015 MY Updates



Turbocharger

The turbocharger uses variable vanes that surround the turbine wheel to dynamically adjust turbocharger speed using exhaust gases. During engine operation at low speeds and load, the vanes are closed to accelerate exhaust gases across the turbine wheel to help quickly increase turbocharger wheel speed. At high speeds the vanes open to prevent turbocharger overspeed conditions.

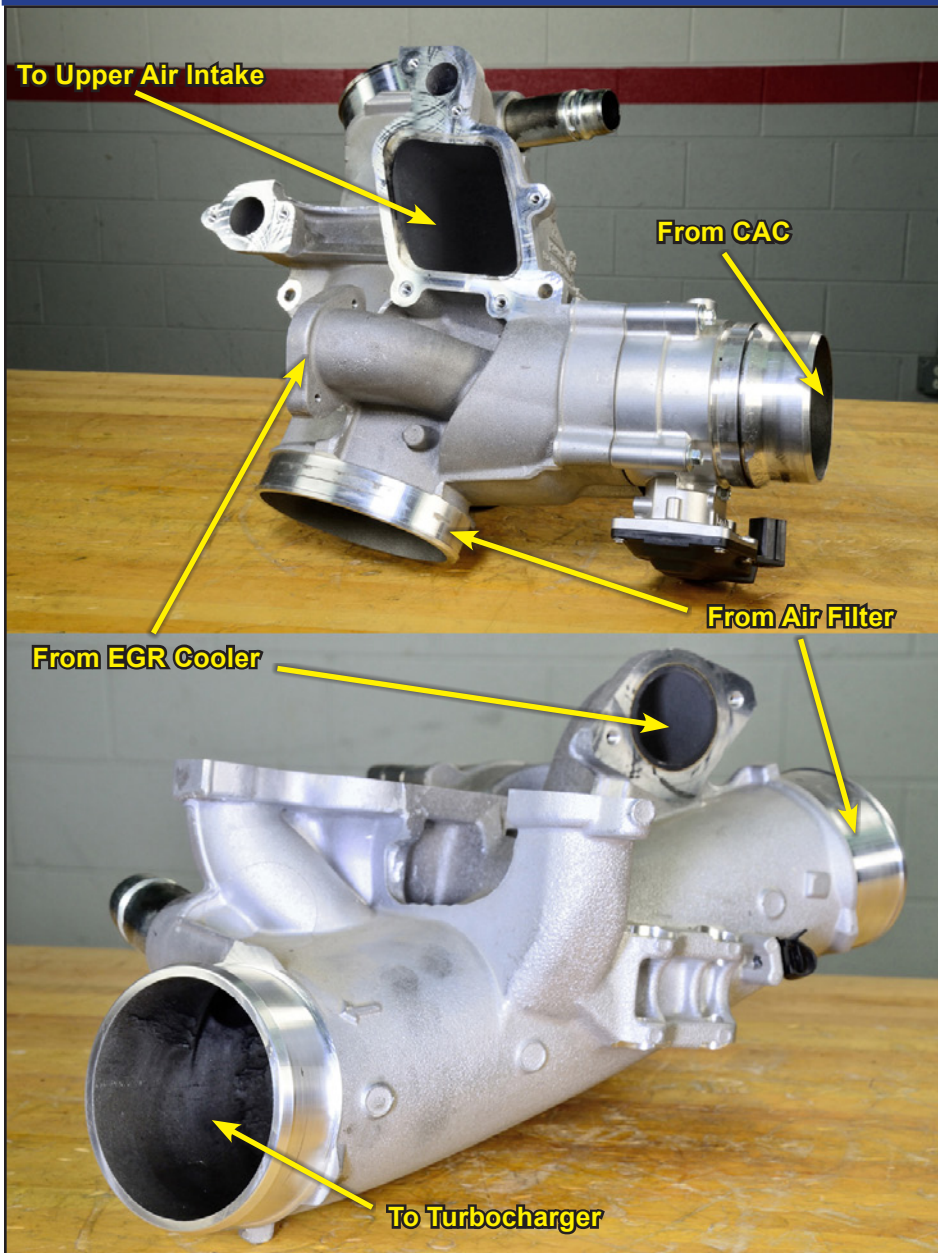
The turbocharger provides up to approximately 206.84 kPa (30 psi) boost at up to 130,000 RPM.

Separate oil and water feeds flow through the turbocharger mounting pedestal to lubricate and cool the turbocharger and eliminate as many external connections as possible.

Turbocharger Updates

- The DualBoost turbocharger has been replaced with a single boost turbocharger similar to the one found on the chassis cab vehicle.
- The wastegate has been removed from the turbocharger.
- The turbocharger is larger.

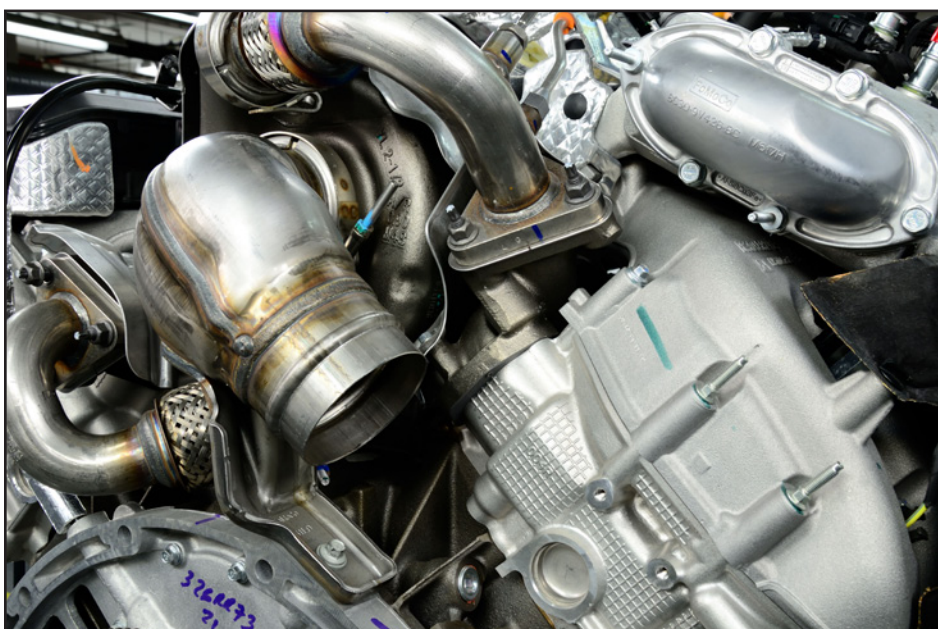
6.7L Power Stroke® Diesel 2015 MY Updates



Lower Air Intake

The lower air intake has been updated to accommodate the new turbocharger.

There is only a single air inlet feeding the turbocharger.



Exhaust Down Tube Off the Turbocharger

The cobra head has been shortened and redesigned to fit with the new larger turbocharger. The turbocharger outlet diameter increased along with the v-band clamp.

(pickup only)

6.7L Power Stroke® Diesel 2015 MY Updates



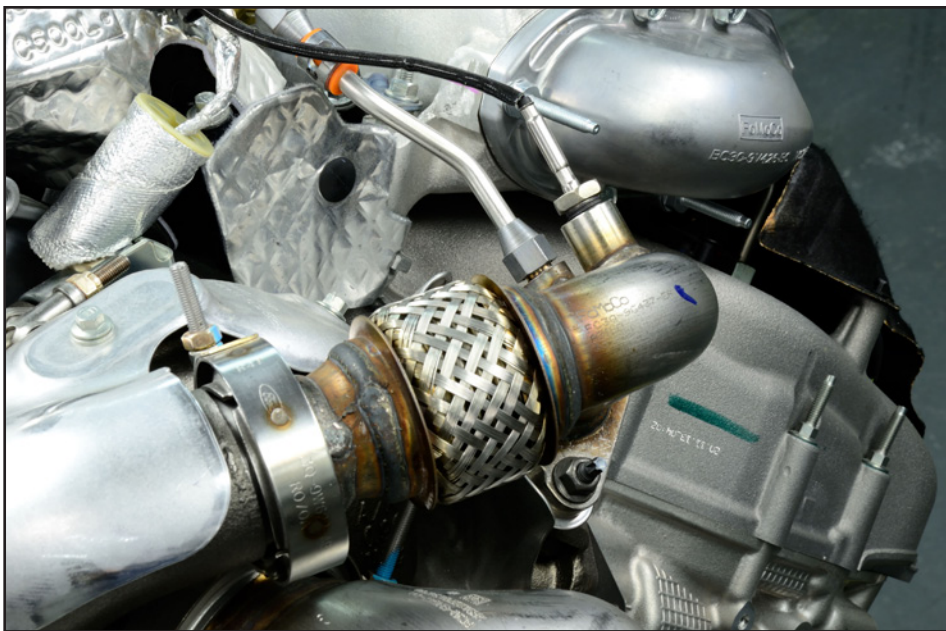
Particulate Matter Bank 1, Sensor 1 (PM11) Module

The PM11 module monitors the PM11 sensor and controls the PM11 sensor heater element. The PM11 module communicates with the PCM through the Controller Area Network (CAN) to report the presence of particulates in the exhaust gas, indicating a concern with the Diesel Particulate Filter (DPF).

Particulate Matter Bank 1, Sensor 1 (PM11)

The PM11 sensor detects the presence of particulates in the filtered exhaust gas. The sensor element consists of comb electrodes of infinite resistance through which exhaust gases pass. Diesel particulates (soot) are primarily carbon and are good conductors of electricity. When the particulates pass through the electrodes, they allow voltage to pass from one electrode to another, completing a circuit. This change in resistance is detected by the PM11 module and interpreted as soot leakage.

The PM11 sensor also contains a heater element to regenerate the sensor electrodes. The PM11 module activates the sensor's heater element, which heats the sensor to greater than 600°C (1112°F) to burn off soot deposits.



EGR Inlet Temperature Sensor (EGRT11)

The EGRT11 sensor monitors the exhaust temperature leaving the exhaust manifold prior to entering the turbocharger turbine housing and EGR cooler. It allows for improved driveability in loaded conditions and provides engine hardware protection.

(pickup only)

6.7L Power Stroke® Diesel 2015 MY Updates



Lower Main Bearing

The increase in engine power output puts more strain on the lower main bearings. To increase the durability of the lower main bearing they are coated with an IROX® polymer coating.

(Update for pickup and chassis cab)

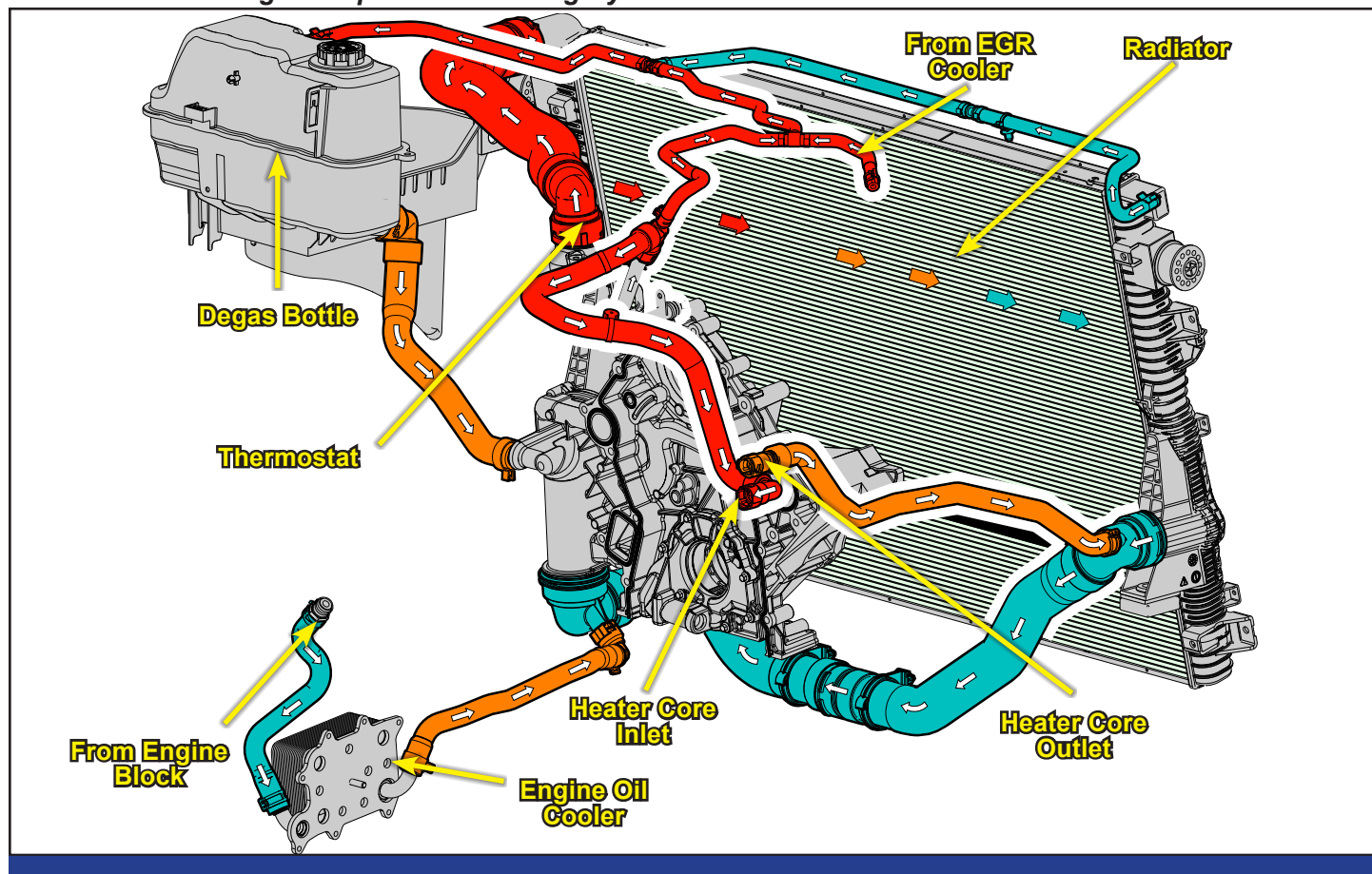
Exhaust Sensors

This chart lists different exhaust sensors that have been used in the aftertreatment system and which model year they were used.

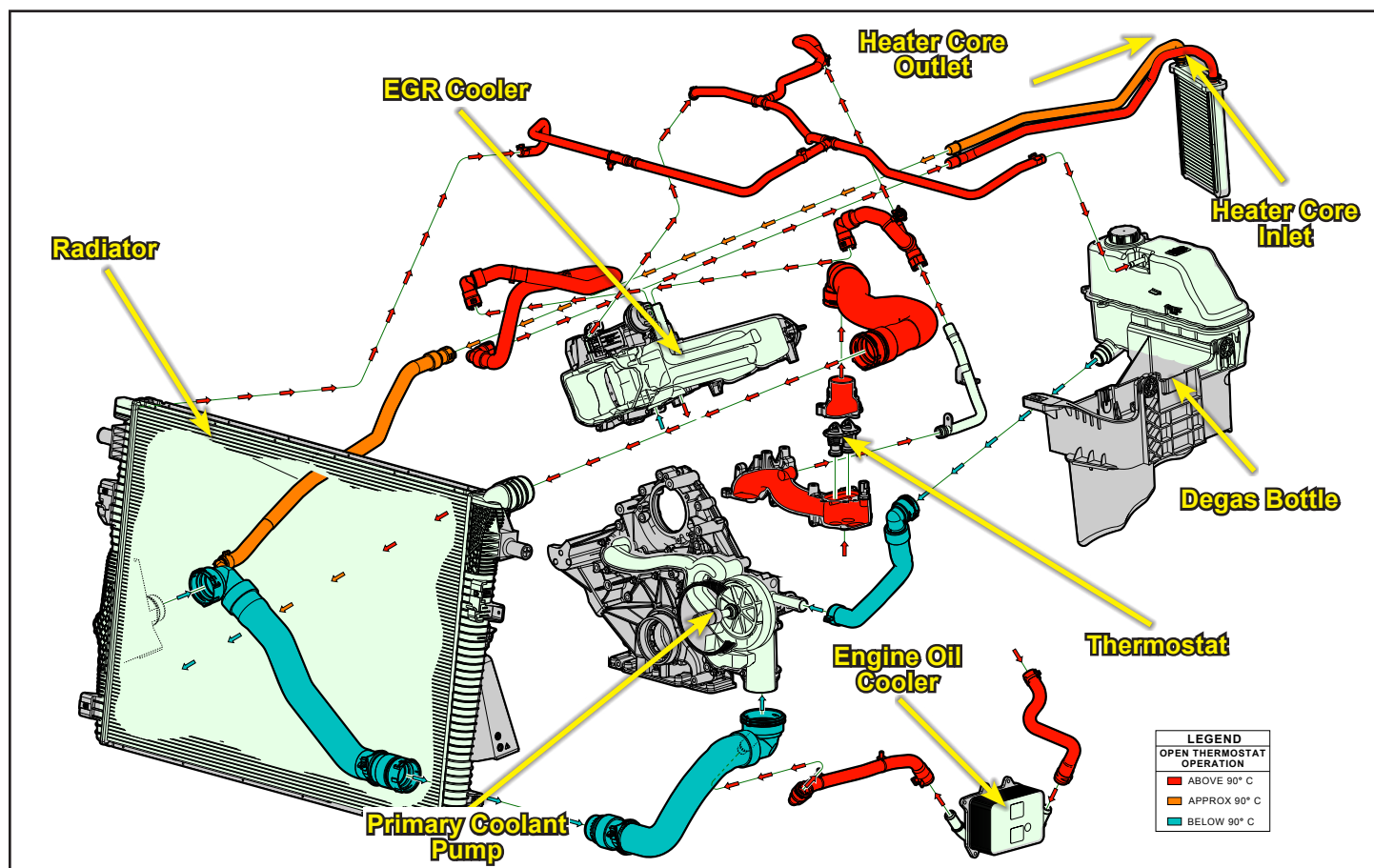
Exhaust Sensor	2011	2012	2013	2014	2015
DPF Pressure Sensor (upstream of DPF)	X	X	X	X	X
Delta Pressure DPF Sensor (pressure across DPF)		X	X	X	
NOx Sensor & Module (after DPF on pickups, after SRC on chassis cabs)	X	X	X	X	X
NOx Sensor & Module (feed gas, prior to Reductant Injector)			X	X	X
Particulate Matter (PM) Sensor & Module					X

6.7L Power Stroke® Diesel 2015 MY Updates

2011 Model Year High Temperature Cooling System

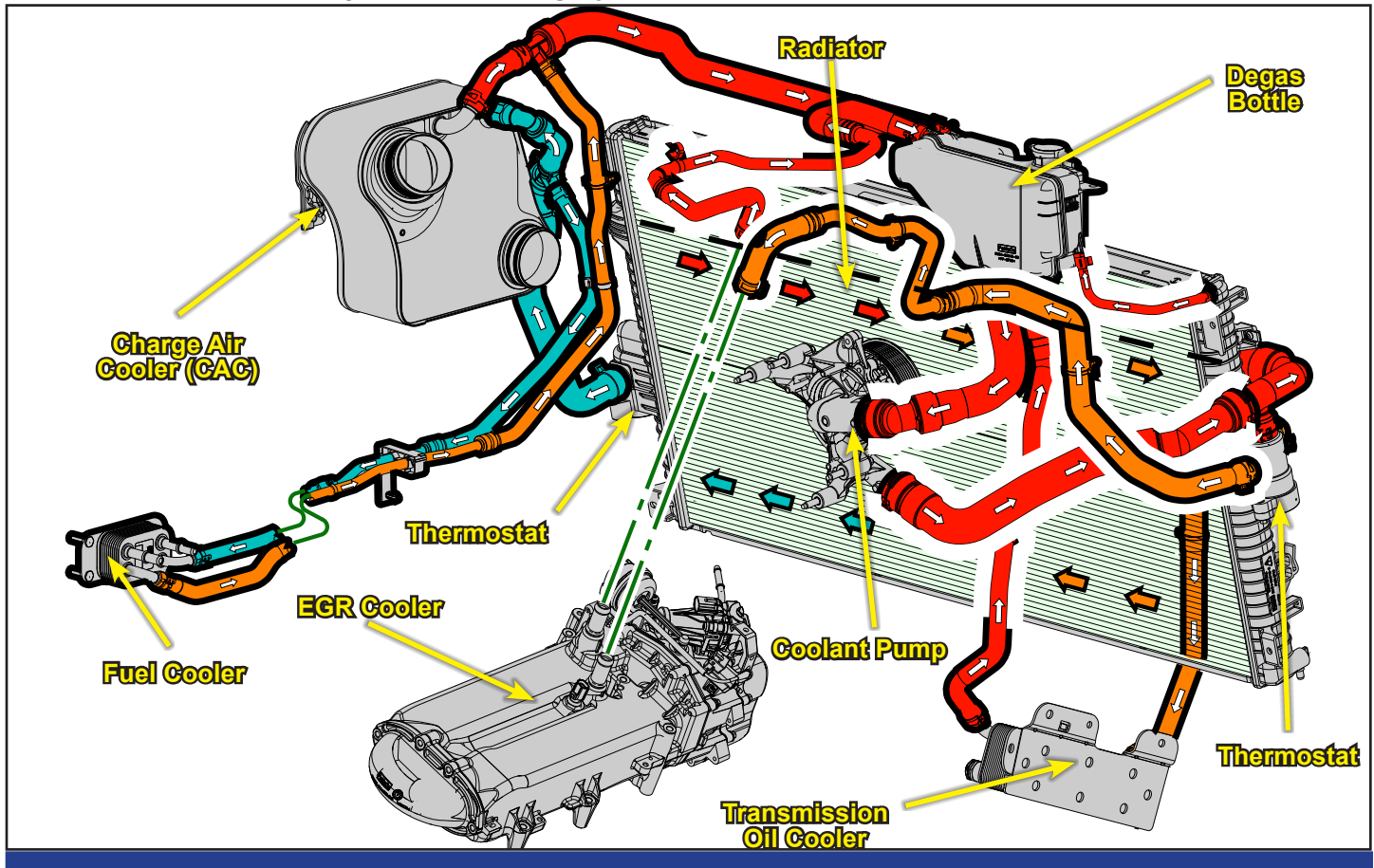


2015 Model Year High Temperature Cooling System (Updated for pickup and chassis cab)



6.7L Power Stroke® Diesel 2015 MY Updates

2011 Model Year Low Temperature Cooling System



2015 Model Year Low Temperature Cooling System (Updated for pickup and chassis cab)

