Engine - 2.0L EcoBlue (77kW/105PS) (YL)/2.0L EcoBlue (96kW/130PS) (YM)/2.0L EcoBlue (125kW/170PS) (YN) - Engine

Print

Diagnosis and Testing

Special Tool(s) / General Equipment

 E50097	Compression Test Adapter 303-1651
Ford diagnostic equipment	
Compression tester	
Oil pressure gauge	
UV leak detection lamp	

Inspection and Verification

1. Verify the customer concern.
2. Visually inspect for obvious signs of mechanical or electrical damage.

VISUAL INSPECTION CHART

Mechanical	Electrical
• Coolant leaks • Oil leaks • Fuel system leaks • Visibly damaged or worn parts • Loose or missing nuts or bolts	• Fuse(s) • Loose or corroded connector(s) • Damaged or worn switch(es) • Powertrain control module (PCM)

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
4. If the cause is not visually evident, verify the symptom and refer to the Symptom Chart.

Symptom Chart

Symptom	Possible Sources	Action
Loss of oil	* Oil leaks from the engine or auxiliary components.	* CHECK for evidence of oil leaks on components. Use an ultraviolet (UV) leak tester if oil leak is not evident. INSTALL new gaskets or components as required.
	* Internal or external leak at the oil cooler.	* CHECK the coolant expansion tank for oil film on the coolant surface. INSTALL a new oil cooler or oil cooler gasket.
	* Leak at the crankshaft front or rear oil seal.	* INSTALL a new crankshaft oil seal. REFER to: (303-01B Engine) Crankshaft Front Seal (Removal and Installation), Crankshaft Rear Seal (Removal and Installation).
Oil consumption	* Use of the wrong type of engine oil.	* DETERMINE the last type of engine oil used (refer to the latest invoice or oil receipt) and compare with the specification.

		INSTALL a new engine oil filter and the correct engine oil. REFER to: Specifications (303-01A Engine, Specifications).
	* Faulty positive crankcase ventilation system. - Hoses or ventilation/breather valves are blocked. This causes excessive pressure in the crankcase which causes oil to enter the combustion chamber. - Crankcase ventilation oil separator is faulty and engine oil can enter the combustion chamber through the intake manifold.	* CHECK that the crankcase ventilation system is operating correctly and repair as necessary.
	* Turbocharger seals.	* INSTALL a new turbocharger. REFER to: Turbocharger (303-04C Fuel Charging and Controls - Turbocharger, Removal and Installation).
	* Damaged gaskets or mating surfaces. - Cylinder head gasket is damaged or mating faces are warped. - Valve stem seals are worn causing engine oil to enter the combustion chamber between the valve stem and the valve stem guide.	* CHECK the gaskets and mating surfaces for damage. - REMOVE the cylinder head. Check the mating faces, cylinder head gaskets and the flatness of the cylinder head and engine block mating faces. - INSTALL new valve stem seals. REFER to: Valve Stem Seals (303-01A Engine, Removal and Installation).
	* Piston ring or cylinder liner wear.	* INSTALL new components as necessary.
Coolant consumption	* Cooling system components.	* REFER to: Engine Cooling (303-03A Engine Cooling, Diagnosis and Testing).
	* Exhaust gas recirculation (EGR) cooler (if equipped).	* INSTALL a new EGR cooler. REFER to: Exhaust Gas Recirculation (EGR) Cooler (303-08A Engine Emission Control, Removal and Installation).
	* Oil cooler.	* INSTALL a new oil cooler.
	* Damaged gaskets or warped mating faces.	* REMOVE the cylinder head. REFER to: Cylinder Head - Vehicles Built From: 01-11-2016 (303-01A Engine, Removal and Installation). CHECK the cylinder head gasket for damage. CHECK the cylinder head and cylinder block for distortion.
	* Cracks or fractures in engine components surrounded by coolant, such as cylinder liners and cylinder head combustion chamber.	* DETERMINE the damaged engine component and INSTALL a new component.
Engine will not crank	* Battery or cables.	* CHECK the battery and cables. REFER to: Charging System (414-00 Charging System - General

		Information, Diagnosis and Testing).
	* Starter motor or cables.	* CHECK the starting system. REFER to: Starting System (303-06A Starting System, Diagnosis and Testing).
Engine cranks but will not start	* Fuel tank is empty.	* CHECK the fluid level.
	* Water in fuel.	* DRAIN the water from the fuel system. REFER to: Diesel Filter Water Drain-Off (310-00A Fuel System - General Information, General Procedures).
	* Fuel filter blocked.	* INSTALL a new fuel filter element. REFER to: Fuel Filter Element (310-01A Fuel Tank and Lines, Removal and Installation).
	* Air in fuel lines.	* BLEED the fuel system. Check the fuel system for leaks. REFER to: Fuel System Bleeding (310-00A Fuel System - General Information, General Procedures).
	* Engine intake air system.	* CHECK the intake air system. REFER to: Intake Air Distribution and Filtering (303-12A Intake Air Distribution and Filtering, Diagnosis and Testing).
	* Glow plug faulty.	* CHECK the glow plugs. REFER to: Glow Plug System (303-07A Glow Plug System, Diagnosis and Testing). INSTALL new glow plugs as necessary. REFER to: Glow Plugs (303-07A Glow Plug System, Removal and Installation).
	* Engine management system.	* CHECK the engine management system. REFER to: Electronic Engine Controls (303-14A Electronic Engine Controls, Diagnosis and Testing).
	* Fuel pump faulty.	* CHECK the fuel pump. REFER to: Fuel Charging and Controls (303-04A Fuel Charging and Controls, Diagnosis and Testing).
	* Incorrect valve timing.	* CHECK and adjust the valve timing.
	* Broken or damaged timing chain or sprocket.	* CHECK the timing chain and sprockets. INSTALL new components as necessary.
Very poor power output/fuel consumption too high/engine running rough	* Fuel system.	* CHECK the fuel system components.
	* Engine intake air system.	* CHECK the intake air system. REFER to: Intake Air Distribution and Filtering (303-12A Intake Air Distribution and Filtering, Diagnosis and Testing).
	* Exhaust system blocked.	* CHECK the exhaust system.
	* Engine management system.	*

		CHECK the engine management system. REFER to: Electronic Engine Controls (303-14A Electronic Engine Controls, Diagnosis and Testing).
	* Turbocharger.	* CHECK the turbocharger. REFER to: Turbocharger (303-04C Fuel Charging and Controls - Turbocharger, Diagnosis and Testing).
	* Fuel pump faulty.	* CHECK the fuel pump. REFER to: Fuel Charging and Controls (303-04A Fuel Charging and Controls, Diagnosis and Testing).
	* Incorrect valve timing, timing chain or timing sprocket damaged.	* CHECK and adjust the valve timing. INSTALL new components as necessary.
Noisy running	* Engine auxiliary components loose or damaged.	* CHECK engine auxiliary components for damage/looseness.
Noisy running, misfiring/backfiring	* Incorrect fuel	* DETERMINE which type of fuel was the last put in the tank (note the country specific fuel specifications).
	* Water in fuel or fuel contaminated.	* CHECK the fuel system for water or other contamination. REFER to: Diesel Filter Water Drain-Off (310-00A Fuel System - General Information, General Procedures).
	* Fuel pump faulty.	* CHECK the fuel pump. REFER to: Fuel Charging and Controls (303-04A Fuel Charging and Controls, Diagnosis and Testing).
	* Valve timing incorrect, timing chain or timing sprocket damaged.	* CHECK and adjust valve timing. INSTALL new components as necessary.
Noisy running/valve train noise	* Excessive valve clearance due to faulty hydraulic valve tappets.	* INSTALL new hydraulic valve tappets.
	* Timing chain damaged.	* INSTALL a new timing chain.
	* Timing chain incorrectly tensioned.	* CHECK the timing chain tension. INSTALL a new tensioner, as necessary.
	* Timing chain guides worn or damaged.	* CHECK the timing chain guides. INSTALL new guides as necessary.
Noisy running/engine block	* Engine components - Pistons - Piston rings - Connecting rod large end, main bearing or thrust bearing journals - Connecting rods bent or damaged.	* CHECK the engine components for wear or damage. Make sure all components are within specification. INSTALL new components as necessary.

Engine Oil Leaks

NOTE: Before installing new gaskets or oil seals, make sure that the fault is clearly established.
If the oil leak cannot be identified clearly by a visual inspection, carry out a UV test:

Ultraviolet (UV) Testing

1. Clean the engine and transmission with a suitable cleaning fluid such as brake cleaner.
2. Pour test fluid GV-2911-3090A in accordance with the quantity specified by the manufacturer through the oil filler neck into the engine and install the oil filler cap.

WARNING: On manual transmissions put the transmission into NEUTRAL. Failure to follow these instructions may result in personal injury.

3. Start the engine and let it run for about five minutes.
4. Switch off the engine.

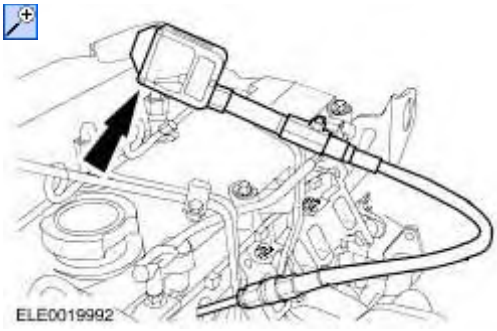
NOTE: If no leak can be found, road test the vehicle under various loads and again check the engine for leaks.

5. Check the engine for oil leaks using a UV leak detection lamp GV-2929 or UV leak detection lamp GV-2911 B11.
6. Rectify any leaks found and recheck the engine for oil leaks.

Measure the Compression Pressure

WARNING: Do not smoke or carry lighted tobacco or open flame of any type when working on or near any fuel related components. Highly flammable mixtures are always present and can ignite. Failure to follow these instructions may result in personal injury.
NOTE: The powertrain control module (PCM) receives an error message when the relay is removed or electrical components are disconnected. This error message must be deleted from the fault memory by connecting the Ford diagnostic equipment after completing the measurement.
NOTE: Valve clearance must be set correctly before performing a compression test. Make sure engine is at the normal operating temperature.
NOTE: The varying design of compression checking devices and fluctuating starter motor speeds normally only allows to check if the compression is even in all cylinders.
NOTE: The readings from the compression pressure check should be used as an indication of cylinder balance. If one or more of the readings is significantly lower than the others, investigate that particular cylinder for concerns.

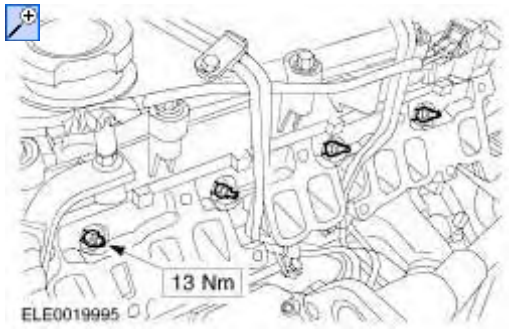
1. Remove the glow plugs.
   REFER to: Glow Plugs (303-07A Glow Plug System, Removal and Installation).



2. Install a suitable compression tester with Special Tool 303-1051 into the glow plug bore.

NOTE: Crank the engine with the starter motor until the reading on the compression tester stops rising.

3. Carry out the measurement on all cylinders, following the measuring equipment manufacturer's instructions and compare each cylinder compression reading.
4. Detach the compression tester and adapter.



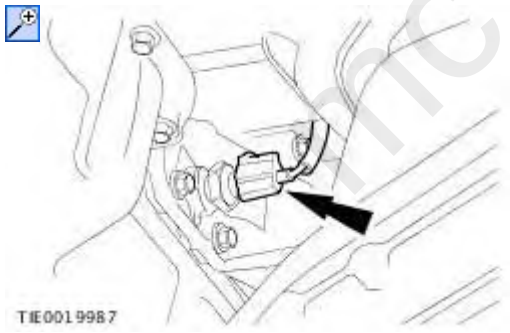
5. Install the glow plugs.
   REFER to: Glow Plugs (303-07A Glow Plug System, Removal and Installation).
6. Reset the PCM fault memory.

Measure the Oil Pressure

The oil pressure depends on various factors (engine speed, oil temperature, oil viscosity, amount of oil filter contamination etc.).

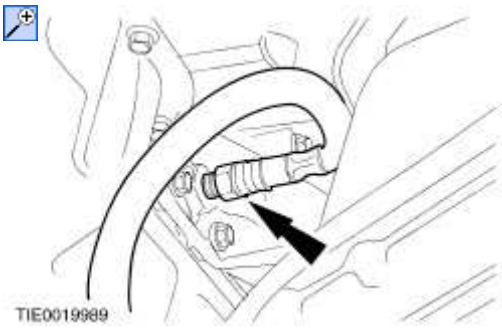
NOTE: Measure the oil pressure at the specified engine speed. Measure the oil pressure at an oil temperature of 80°C.
NOTE: The graphics used are for illustration purposes only.

1. Raise and support the vehicle.
   REFER to: Jacking and Lifting (100-02 Jacking and Lifting, Description and Operation).

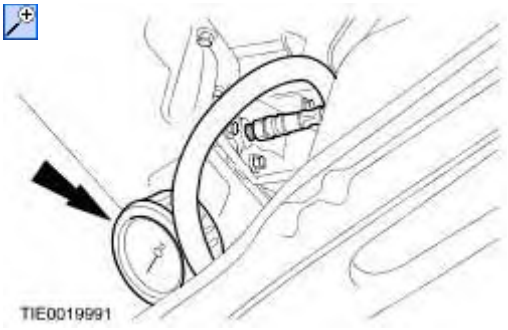


2. Disconnect the oil pressure switch electrical connector.

3. Remove the oil pressure switch.

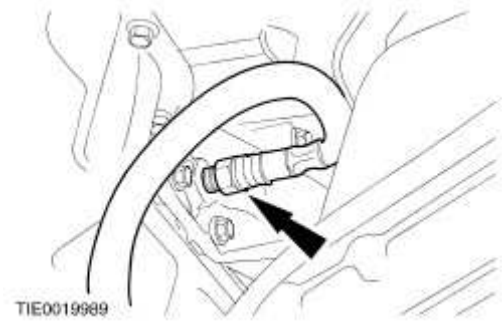


4. Attach the oil pressure gauge (GV 2134) with the oil pressure gauge connector.
5. Lower the vehicle.
6. Start the engine
7. Raise and support the vehicle.
   REFER to: Jacking and Lifting (100-02 Jacking and Lifting, Description and Operation).

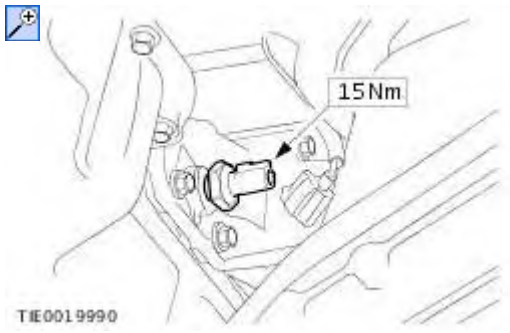


NOTE: Oil pressure at 2000 rpm must be between 2.0 bar minimum and 5.0 bar maximum.
NOTE: Oil pressure at idle must be 1.25 bar minimum.

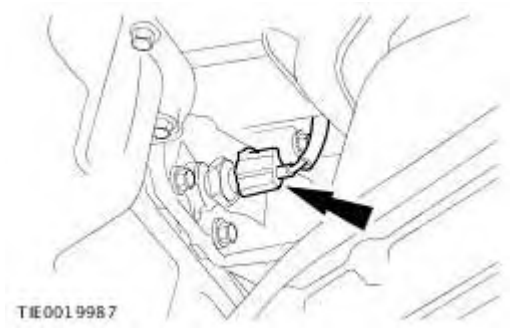
8. Measure the oil pressure.
9. Lower the vehicle.
10. Stop the engine.
11. Raise and support the vehicle.
    REFER to: Jacking and Lifting (100-02 Jacking and Lifting, Description and Operation).



12. Remove the oil pressure gauge and the oil pressure gauge connector.



13. Install the oil pressure switch.



14. Connect the oil pressure switch electrical connector.
15. Lower the vehicle.

Valve Train Analysis - Static (Engine Off)

1. Remove the valve cover.

Check all components of the valve train for damage and wear. Make sure that only original components are installed and that all nuts and bolts are tightened to the specified torque.