

SECTION 303-03: Engine Cooling
DESCRIPTION AND OPERATION

2014 F-150 Workshop Manual
Procedure revision date: 10/25/2013

Engine Cooling

NOTICE: Vehicle cooling systems are filled with Motorcraft® Orange Antifreeze/Coolant. Always fill the cooling system with the manufacturer's specified coolant. Chemically flush the cooling system if a non-specified coolant has been used. Refer to [Cooling System Flushing](#) in this section. Failure to follow these instructions may damage the engine or cooling system.

NOTE: During normal vehicle operation, Motorcraft® Orange Antifreeze/Coolant may change color from orange to pink or light red. As long as the engine coolant is clear and uncontaminated, this color change does not indicate the engine coolant has degraded nor does it require the engine coolant to be drained, the system to be flushed, or the engine coolant to be replaced.

The cooling system consists of the following components:

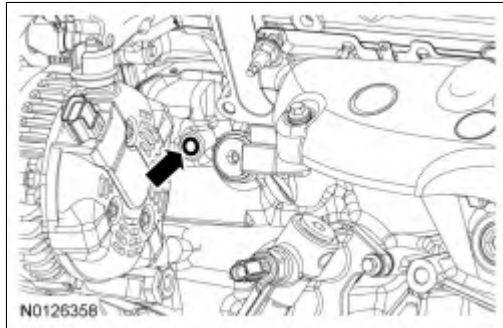
- Block heater (located in the thermostat housing for 3.5L Gasoline Turbocharged Direct Injection (GTDI) and 3.7L engines, the LH front of the 5.0L engine cylinder block and the LH rear of the 6.2L engine cylinder block.)
- Coolant expansion tank (6.2L engine)
- Degas bottle (3.5L GTDI, 3.7L and 5.0L engines)
- Electric cooling fan and shroud assembly
- Radiator
- Pressure relief cap (located on the radiator for the 6.2L engine and on the degas bottle for the 3.5L GTDI, 3.7L and 5.0L engines)
- Radiator draincock (located in the RH corner of the radiator)
- Upper and lower radiator hoses
- Coolant pump
- Coolant thermostat

Engine coolant provides freeze protection, boil protection, cooling efficiency and corrosion protection to the engine and cooling components. In order to obtain these protections, the engine coolant must be maintained at the correct concentration and fluid level in the degas bottle or coolant expansion tank.

When adding engine coolant, use a 48/52 to 50/50 mixture of engine coolant and distilled water, which equates to a freeze point between -31°C (-30°F) and -37°C (-34°F).

To maintain the integrity of the coolant and the cooling system:

- Add Motorcraft® Orange Antifreeze/Coolant or equivalent.
- Do not add/mix any other engine coolant. Mixing coolants may degrade the coolant's corrosion protection.
- Do not add alcohol, methanol, brine or any engine coolants mixed with alcohol or methanol antifreeze. These can cause engine damage from overheating or freezing.
- Do not mix with recycled coolant. Use of such coolants may harm the engine and cooling system components. Do not mix coolant types.



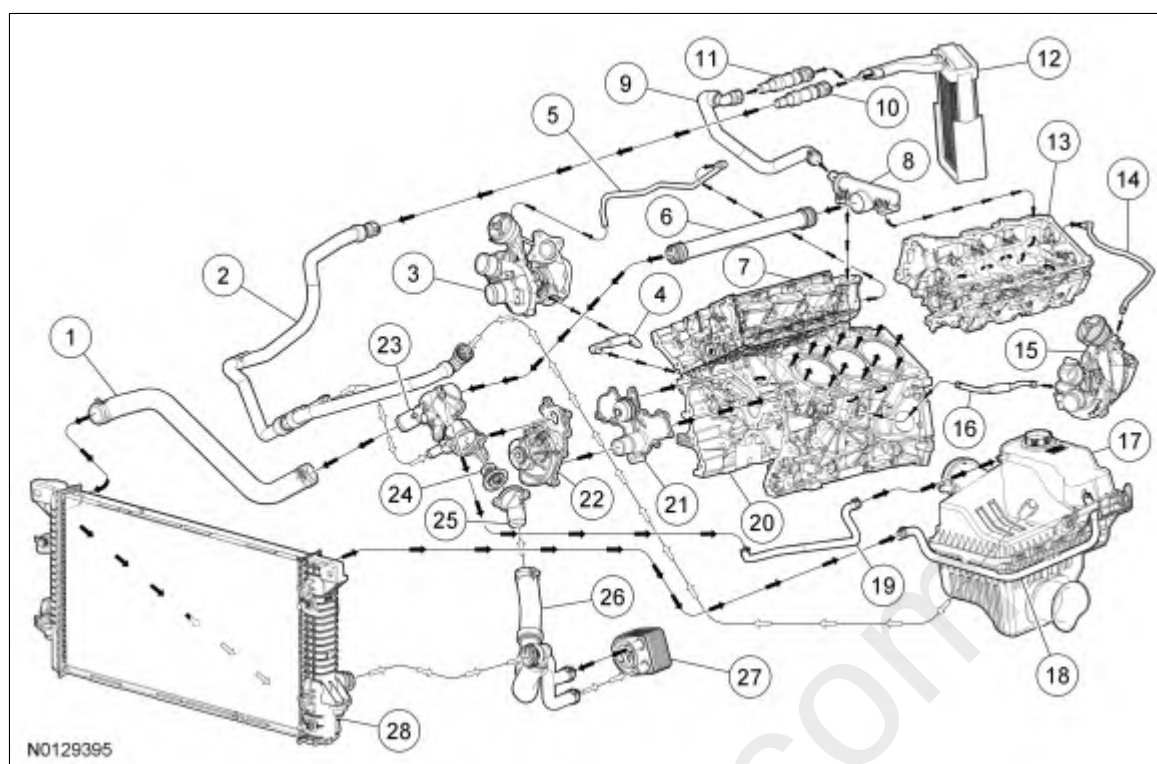
On 3.5L GTDI and 3.7L engines, a channel cover plate is located behind the front cover. It contains a timing chain idler and press in place gaskets separating engine coolant and engine oil. A weep hole is provided on the front left side of the engine behind the generator. If oil or coolant is leaking from the weep hole, then a gasket has failed and must be replaced. Refer to [Section 303-01A](#) for 3.5L GTDI engines or [Section 303-01B](#) for 3.7L engines.

The 3.5L GTDI, 3.7L and 5.0L engines use a cold side thermostat. This means the thermostat controls the flow of cooled radiator coolant into the warmer engine cooling circuit. The thermostat is located at the lower radiator hose connection to the engine. During initial warm-up, the engine coolant increases in temperature, causing the thermostat to open. The cooler coolant from the radiator mixes with the warm engine coolant, causing the thermostat to close. The thermostat opens and closes several times before the engine coolant is warm enough to allow the thermostat to remain open. The engine must run much longer than a vehicle with a hot side thermostat before the thermostat remains fully opened.

The 6.2L engine uses a typical hot side thermostat.

Coolant Flow Diagram, 3.5L Gasoline Turbocharged Direct Injection (GTDI)

NOTE: Black arrows indicate hot, white arrows indicate cold.

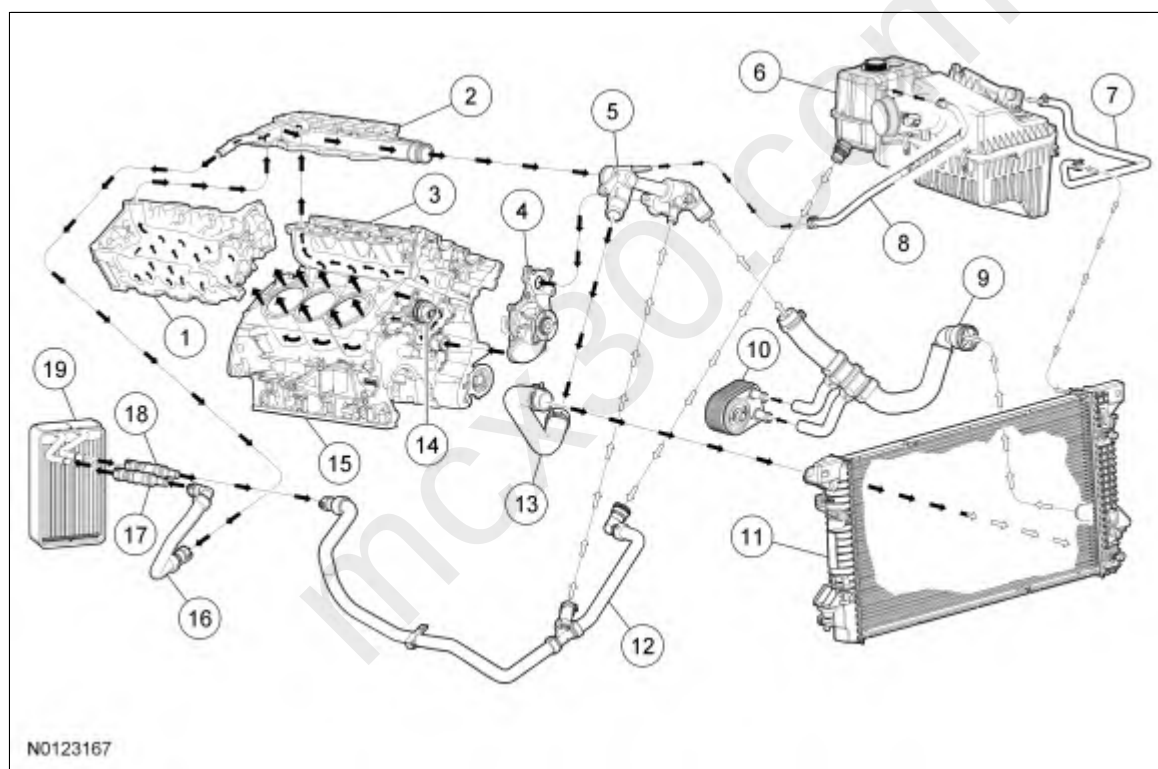


Item	Part Number	Description
1	8260	Upper radiator hose and clamp assembly
2	18472	Heater outlet hose
3	63K682	RH turbocharger
4	8K153	RH engine-to-turbocharger hose
5	8A520	RH turbocharger-to-engine hose
6	8A505	Coolant inlet pipe
7	6049	RH cylinder head
8	8C368	Coolant crossover manifold assembly
9	18472	Heater inlet hose
10	18472	Heater inlet restrictor
11	18472	Heater outlet restrictor
12	18476	Heater core
13	6049	LH cylinder head
14	8A520	LH turbocharger-to-engine hose
15	6K682	LH turbocharger
16	8K153	LH engine-to-turbocharger hose
17	8A080	Degas bottle
18	8075	Radiator-to-degas bottle hose
19	8276	Thermostat housing-to-degas bottle hose
20	6010	Cylinder block
21	8501	Cylinder block coolant pump hole cover

22	8501	Coolant pump
23	—	Thermostat housing (part of 8592)
24	8575	Thermostat (part of 8592)
25	—	Coolant inlet connection (part of 8592)
26	8286	Lower radiator hose and clamp assembly
27	6A642	Oil cooler
28	8005	Radiator

Coolant Flow Diagram, 3.7L

NOTE: Black arrows indicate hot, white arrows indicate cold.

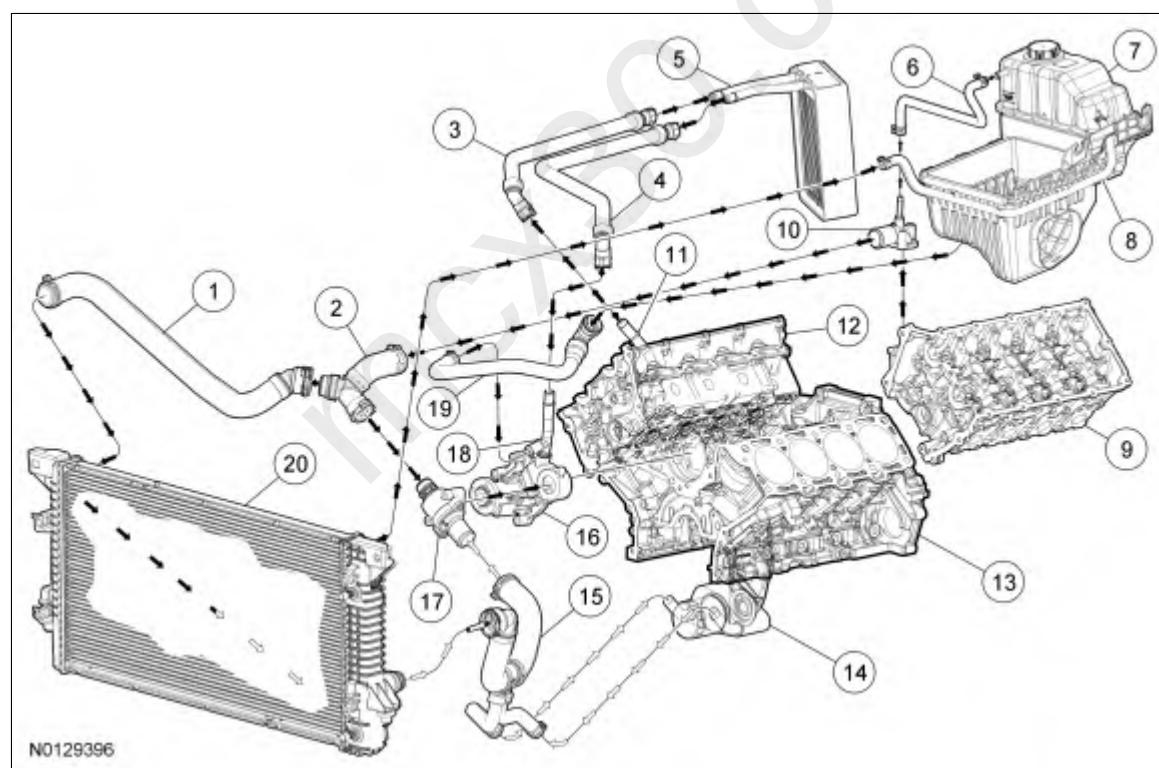


Item	Part Number	Description
1	6049	RH cylinder head
2	9424	Lower intake manifold
3	6049	LH cylinder head
4	8501	Coolant pump
5	8592	Thermostat housing
6	8A080	Degas bottle
7	8075	Radiator-to-degas bottle hose
8	8276	Thermostat housing-to-degas bottle hose

9	8286	Lower radiator hose and clamp assembly
10	6A642	Engine oil cooler (if equipped)
11	8005	Radiator
12	18472	Heater outlet hose
13	8260	Upper radiator hose and clamp assembly
14	8501	Cylinder block coolant pump hole cover
15	6010	Cylinder block
16	18472	Heater inlet hose
17	18472	Heater outlet jumper
18	18472	Heater inlet jumper
19	18476	Heater core

Coolant Flow Diagram, 5.0L

NOTE: Black arrows indicate hot, white arrows indicate cold.

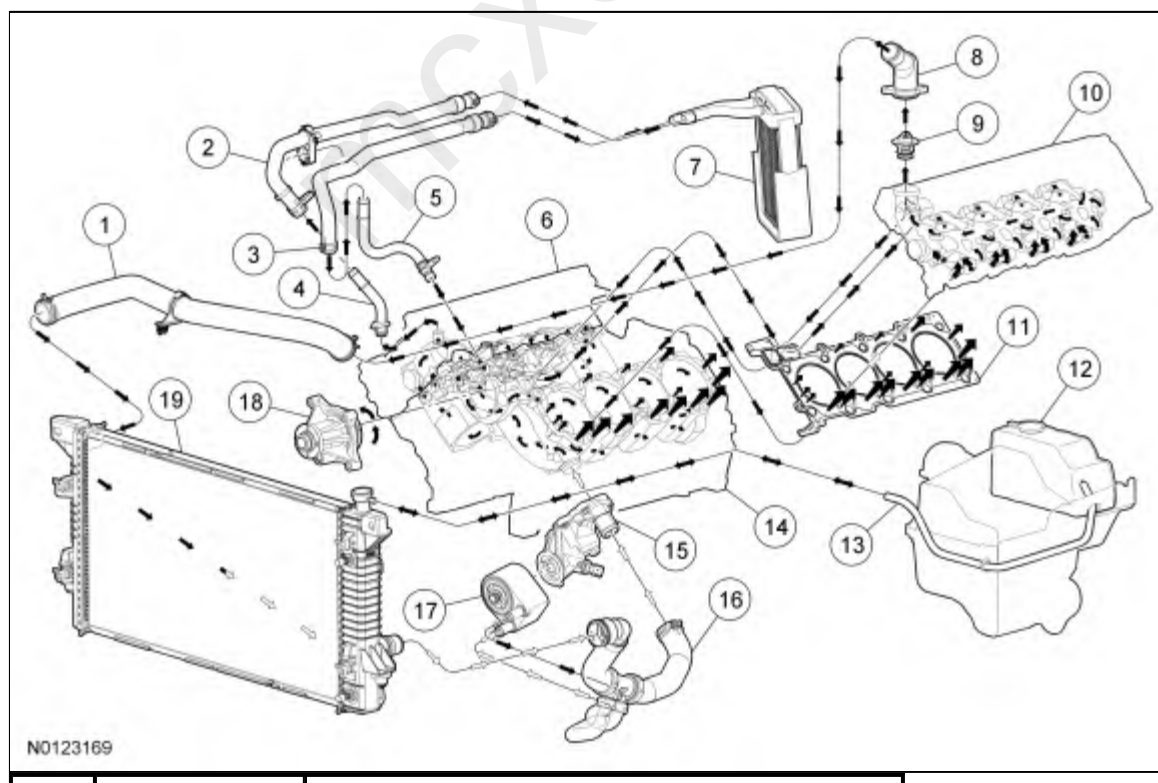


Item	Part Number	Description
1	8260	Upper radiator hose and clamp assembly
2	8566	Coolant bypass T-connector
3	18472	Heater inlet hose
4	18472	Heater outlet hose

5	18476	Heater core
6	8276	Coolant outlet connection-to-degas bottle hose
7	8A080	Degas bottle
8	8075	Radiator-to-degas bottle hose
9	6048	LH cylinder head
10	8592	Coolant outlet connection
11	18696	Heater inlet tube
12	6049	RH cylinder head
13	6010	Cylinder block
14	6A642	Engine oil cooler
15	8286	Lower radiator hose and clamp assembly
16	8501	Coolant pump
17	8592	Thermostat housing
18	18663	Heater outlet tube
19	8C350	Degas bottle-to-heater outlet tube hose
20	8005	Radiator

Coolant Flow Diagram, 6.2L

NOTE: Black arrows indicate hot, white arrows indicate cold.



Item	Part Number	Description
1	8260	Upper radiator hose
2	18472	Heater inlet hose
3	18472	Heater outlet hose
4	18696	Heater inlet tube
5	18663	Heater outlet tube
6	6049	RH cylinder head
7	18476	Heater core
8	8592	Coolant outlet connection
9	8575	Thermostat
10	6049	LH cylinder head
11	6051	LH cylinder head gasket
11	6051	RH cylinder head gasket
12	8A080	Coolant expansion tank
13	8N029	Radiator overflow hose
14	6010	Cylinder block
15	6881	Oil filter adapter
16	8286	Lower radiator hose and clamp assembly
17	6A642	Engine oil cooler
18	8501	Coolant pump
19	8005	Radiator