

Yellow	High pressure oil flow
Blue	Oil return/low pressure oil flow

For more detailed information on oil flow diagram, [View](#)

Lubrication System

The engine lubrication system is of the force-feed type in which oil is supplied under full pressure to the crankshaft, connecting rod bearings, timing chain tensioners, camshaft bearing caps and VCT solenoids. The flow of oil to the valve tappets and valve train is controlled by a restricting orifice located in the cylinder head gasket.

The lubrication system is designed to provide optimum oil flow to critical components of the engine through its entire operating range.

The heart of the system is a continuously variable vane style oil pump, regulated with a pressure control solenoid valve.

Generically, this design operates as follows:

- Maximum oil pump displacement has been selected to provide adequate volume to insure required pressure at both hot idle and maximum speed.
- An internal relief valve protects the system from excessive pressure during high viscosity conditions. When activated, it vents bypassed oil back to the oil pan.
- In conditions other than hot idle and maximum speed, system flow and pressure are controlled with a solenoid valve, receiving commands from the powertrain control module (PCM), to deliver correct oil pressure for all operation conditions based on engine speed, load, and oil temperature.
- The solenoid valve regulates oil pump performance by controlling oil pressure in the internal control chamber of the oil pump.

Ti-VCT

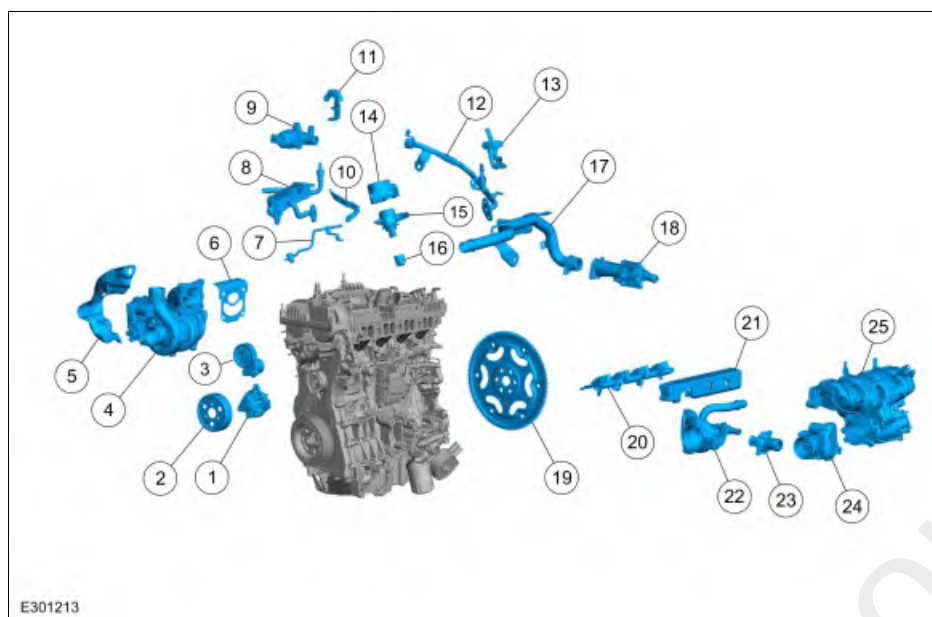
The Ti-VCT system allows variable control of the valves that optimizes combustion at full load providing improved power and low speed torque (broadening the torque curve) which enables variable valve overlap which provides better fuel economy and emissions and provides optimized cold start operation with improved exhaust emissions.

Valve Train

The valve train uses Direct Acting Mechanical Buckets (DAMB). The camshaft lobes are positioned directly above mechanical buckets which are positioned on top of the valves.

Engine Component View

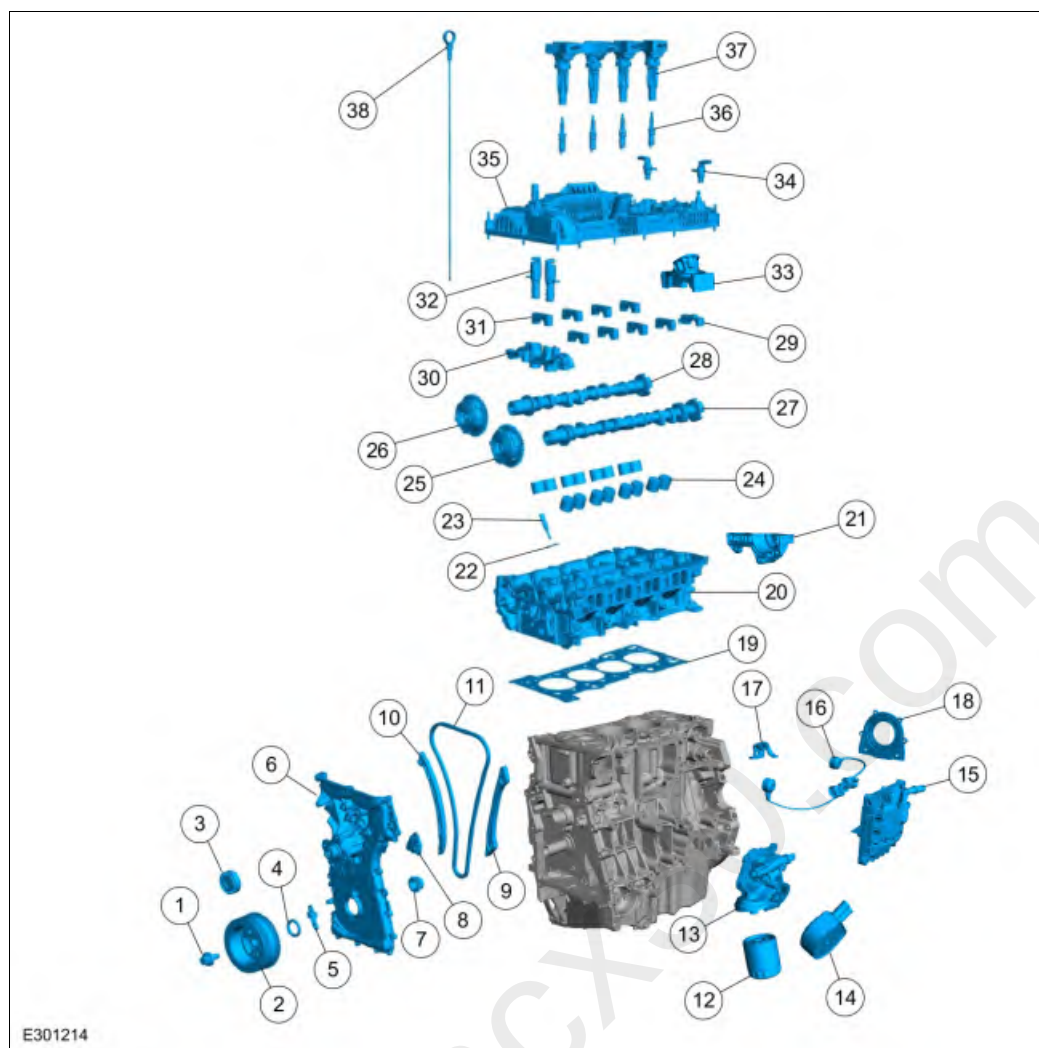
Engine – External Components



Item	Part Number	Description
1	8501	Coolant pump
2	8509	Coolant pump pulley
3	6A228	Accessory drive belt tensioner
4	9G438	Turbocharger
5	9G479	Turbocharger heat shield
6	9448	Turbocharger gasket
7	8B535	Coolant outlet tube
8	9F464	Exhaust gas recirculation (EGR) cooler
9	9D475	EGR valve
10	9F465	EGR cooler bracket
11	9D484	EGR valve bracket
12	9E469	EGR inlet tube
13	9J433	EGR transducer
14	9C374	High-pressure fuel pump cover
15	9D376	High-pressure fuel pump
16	9C587	High-pressure fuel pump tappet
17	8594	Coolant tube
18	8K556	Coolant outlet
19	6375	Flexplate
20	9F797	Fuel rail
21	9U550	Fuel rail shield
22	8C501	Coolant pump adapter
23	8575	Thermostat assembly
24	9E926	Throttle body
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25	9424	Intake manifold
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Engine â€” Front and Upper Components



Item	Part Number	Description
1	6K340	Crankshaft pulley bolt
2	6316	Crankshaft damper
3	19A216	Accessory drive belt idler pulley
4	6700	Crankshaft front seal
5	6C315	Crankshaft Position (CKP) sensor
6	6019	Engine front cover
7	6306	Crankshaft sprocket
8	6K254	Timing chain tensioner
9	6K297	Timing chain guide
10	6K255	Timing chain tensioner arm
11	6268	Timing chain
12	6714	Oil filter
13	6881	Oil filter adapter
14	6A642	Oil cooler
15	6A785	Crankcase vent oil separator
16	12A699	Knock sensor (KS) (2 required)