

Fastener Specifications

Single Use Threaded Fastener/Component Tightening Specifications

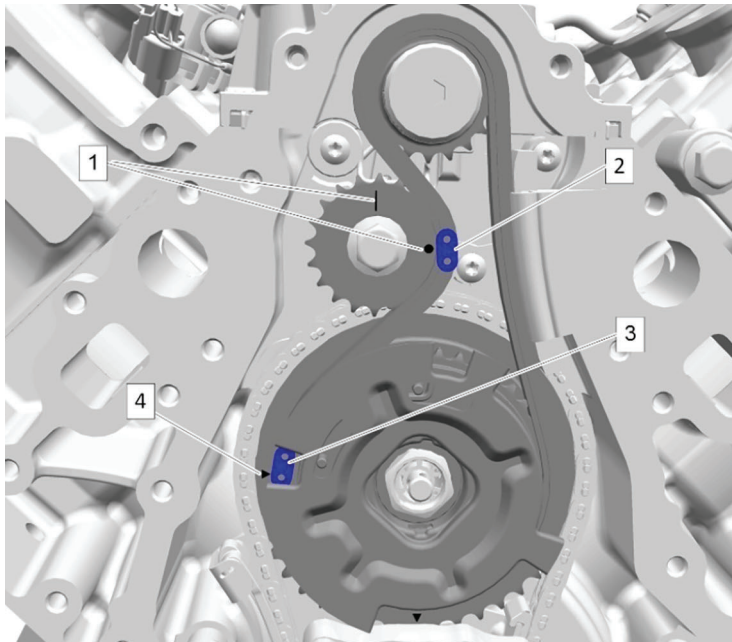
Application	Specification
	Metric (English)
<i>Note: All fasteners/components listed in this table MUST BE DISCARDED and replaced with NEW after removal.</i>	
Camshaft Position Actuator Magnet Bolt	10 N•m (89 lb in)
Camshaft Position Actuator Solenoid Valve	
• First Pass:	65 N•m (48 lb ft)
• Final Pass:	90 degrees
Crankshaft Balancer Bolt – New Bolt with Flanged Head	
• First Pass:	150 N•m (111 lb ft)
• Second Pass:	Loosen 360 degrees
• Third Pass:	80 N•m (59 lb ft)
• Final Pass:	125 degrees
Crankshaft Balancer Bolt – New Bolt with Retained Rotating Washer	
• First Pass:	150 N•m (111 lb ft)
• Second Pass:	Loosen 360 degrees
• Third Pass:	80 N•m (59 lb ft)
• Final Pass:	200 degrees
Cylinder Head Bolt Refer to procedure for tightening sequence and torque values.	Refer to image for tightening sequence and torque values
Exhaust Manifold Bolt	25 N•m (18 lb ft)
Fuel Feed Intermediate Pipe Fitting	30 N•m (22 lb ft)

Reusable Threaded Fastener Tightening Specifications

Application	Specification
	Metric (English)
<i>Note: All fasteners listed in this table can be reused after removal.</i>	
Accessory Drive Belt Idler Pulley Bolt	20 N•m (15 lb ft)
Accessory Drive Belt Tensioner Bolt	58 N•m (43 lb ft)
Balance Shaft Chain Guide Bolt	10 N•m (89 lb in)
Balance Shaft Driven Sprocket Bolt	58 N•m (43 lb ft)
Balance Shaft Idler Sprocket Bolt	58 N•m (43 lb ft)
Balance Shaft Retainer Bolt	10 N•m (89 lb in)
Camshaft Position Sensor Bolt	25 N•m (18 lb ft)
Camshaft Position (CMP) Sensor Wire Harness Bolt	10 N•m (89 lb in)
Camshaft Retainer Bolt – TORX Head Bolt Refer to procedure for tightening sequence and torque values.	
Connecting Rod Bolt	
• First Pass:	20 N•m (15 lb ft)
• Final Pass:	85 degrees
Coolant Temperature Sensor	20 N•m (15 lb ft)
Crankshaft Balancer Bolt – Ensure the Balancer is Completely Installed	330 N•m (244 lb ft)
Crankshaft Oil Deflector Bolt	10 N•m (89 lb in)
Crankshaft Position Sensor Bolt	25 N•m (18 lb ft)
Crankshaft Rear Oil Seal Housing Bolt	25 N•m (18 lb ft)
Engine Block Coolant Drain Hole Plug	60 N•m (44 lb ft)
Engine Block Coolant Heater	50 N•m (37 lb ft)
Engine Block Oil Gallery Plug	30 N•m (22 lb ft)

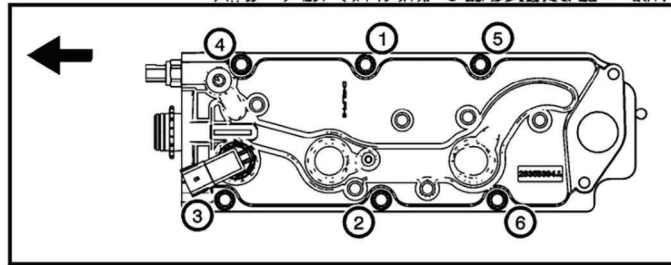
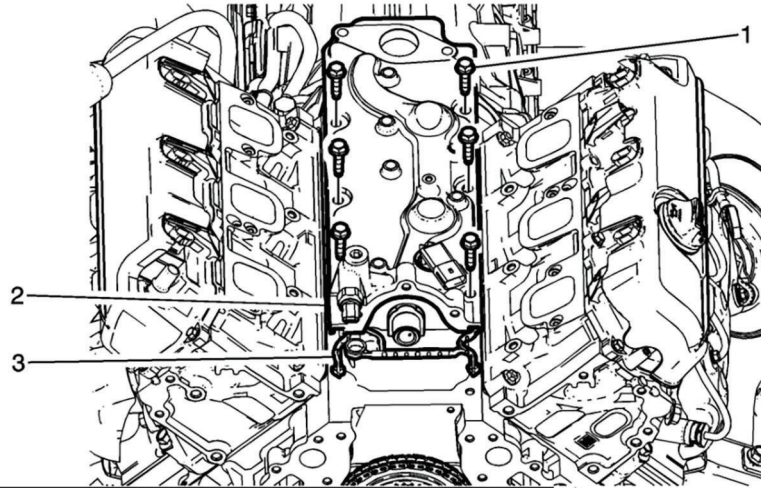
Reusable Threaded Fastener Tightening Specifications

Application	Specification
	Metric (English)
<i>Note: All fasteners listed in this table can be reused after removal.</i>	
Engine Coolant Manifold Bolt	25 N•m (18 lb ft)
Engine Oil Cooler Adapter	12 N•m (9 lb ft)
Engine Mount Engine Side Bolt	50 N•m (37 lb ft)
Evap Purge Valve Bolt	4.5 N•m (40 lb in)
Exhaust Manifold Heat Shield Bolt	10 N•m (89 lb in)
Front Cover Bolt	25 N•m (18 lb ft)
Fuel Feed Pipe Bolt	10 N•m (89 lb in)
Fuel Injection Fuel Rail Bolt	25 N•m (18 lb ft)
Fuel Injection Fuel Rail Crossover Pipe Bolt	10 N•m (89 lb in)
Fuel Pump Bolt	25 N•m (18 lb ft)
Fuel Pump Lifter Follower Guide Bolt	25 N•m (18 lb ft)
Fuel Rail Fuel Pressure Sensor	33 N•m (24 lb ft)
Generator Bracket Bolt	50 N•m (37 lb ft)
Ignition Coil Bracket-to-Valve Rocker Arm Cover Bolt	10 N•m (89 lb in)
Intake Manifold Bolt	Refer to image for tightening sequence and torque values
Intake Manifold Cover Bolt	4.5 N•m (40 lb in)
Intake Manifold Cover Stud	4.5 N•m (40 lb in)
Knock Sensor Bolt	25 N•m (18 lb ft)
Knock Sensor Heat Shield Bolt	25 N•m (18 lb ft)
Manifold Absolute Pressure Sensor Bolt	4.5 N•m (40 lb in)
Oil Filter	3/4 to 1 full turn after gasket makes contact with the sealing surface on the filter mounting flange
Oil Filter Center Tube Bolt - Outside Oil Pan	10 N•m (89 lb in)
Oil Filter Center Tube Bolt - Inside Oil Pan	10 N•m (89 lb in)
Oil Filter Fitting	55 N•m (41 lb ft)
Oil Level Indicator Tube Bolt	10 N•m (89 lb in)
Oil Pan Bolt	Refer to image for tightening sequence and torque values
Oil Pan Bolt - Lower Oil Pan to Upper Oil Pan	10 N•m (89 lb in)
Oil Pan Cover Bolt	10 N•m (89 lb in)
Oil Pan Drain Plug	25 N•m (18 lb ft)
Oil Level Sensor Bolt	10 N•m (89 lb in)
Oil Pressure Sensor	35 N•m (26 lb ft)
Oil Pump Screen Bolt	10 N•m (89 lb in)
Oil Pump Bolt	25 N•m (18 lb ft)
PCV Valve	6 N•m (53 lb in)
Spark Plug	20 N•m (15 lb ft)
Starter Heat Shield Bolt - Side	10 N•m (89 lb in)
Starter Heat Shield Bolt - Rear	25 N•m (18 lb ft)
Throttle Body Bolt	10 N•m (89 lb in)
Timing Chain Tensioner Bolt	25 N•m (18 lb ft)
Valve Lifter Guide Bolt	12 N•m (9 lb ft)
Valve Lifter Oil Manifold Bolt	1. First pass in sequence 15 N•m (11 lb ft) 2. Final pass in sequence 30 N•m (22 lb ft)
Valve Lifter Oil Manifold Filter Plug	30 N•m (22 lb ft)
Valve Rocker Arm Bolt	30 N•m (22 lb ft)
Valve Rocker Arm Cover Bolt	10 N•m (89 lb in)
Water Inlet Housing Bolt	10 N•m (89 lb in)
Water Pump Impeller Bolt	10 N•m (89 lb in)



With the timing marks on the crank and cam aligned, the dark colored balance shaft chain link (3) will align with the other timing mark on the cam sprocket (4). Also, the other dark colored balance shaft chain link (2) will align with the dot on the balance shaft sprocket (1).

Balance Shaft Idler Sprocket Bolt	58 N·m (43 lb ft)
Balance Shaft Driven Sprocket Bolt	58 N·m (43 lb ft)
Camshaft Position Actuator Solenoid Valve	
• First Pass:	65 N·m (48 lb ft)
• Final Pass:	90 degrees

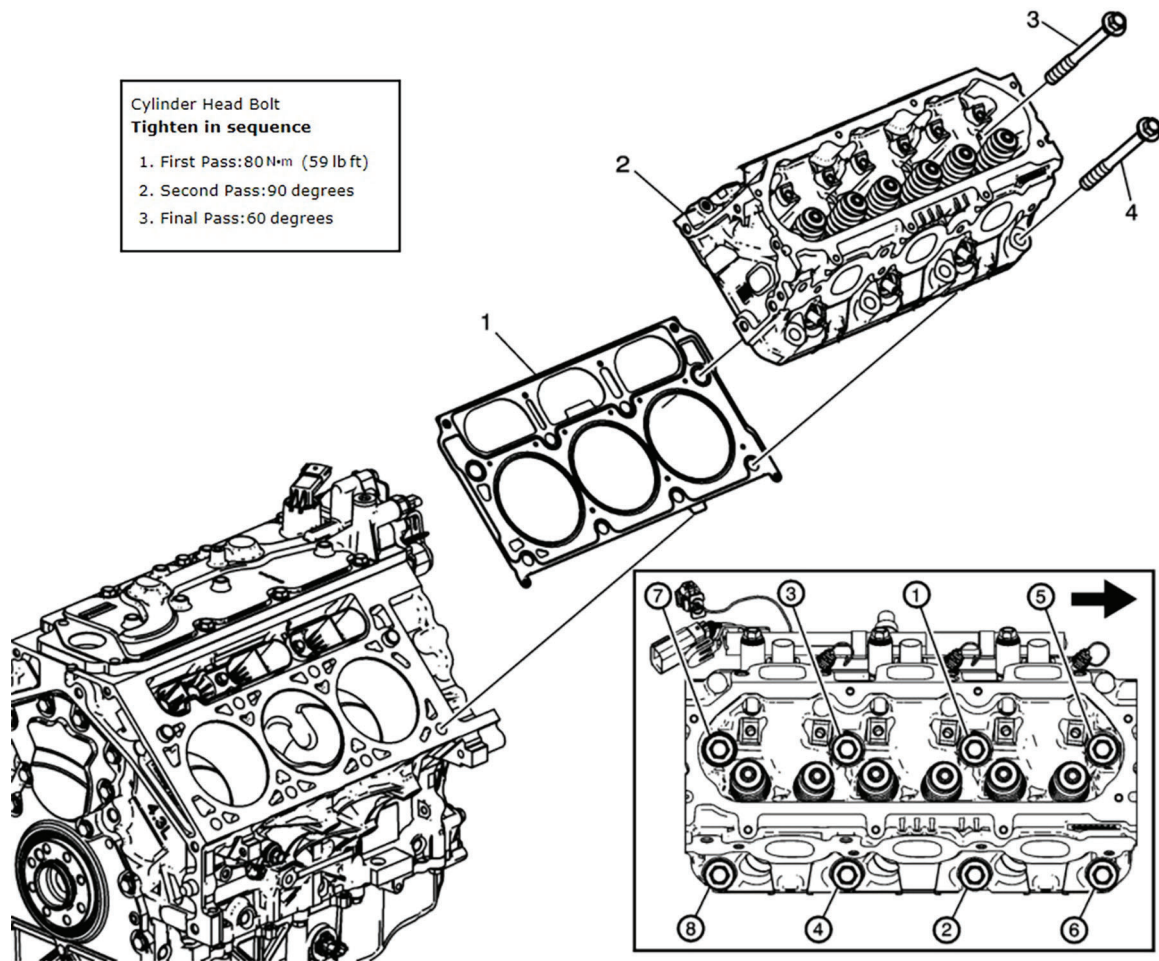


Valve Lifter Oil Manifold Bolt

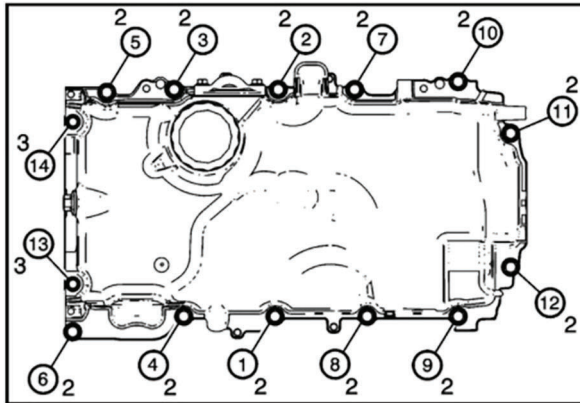
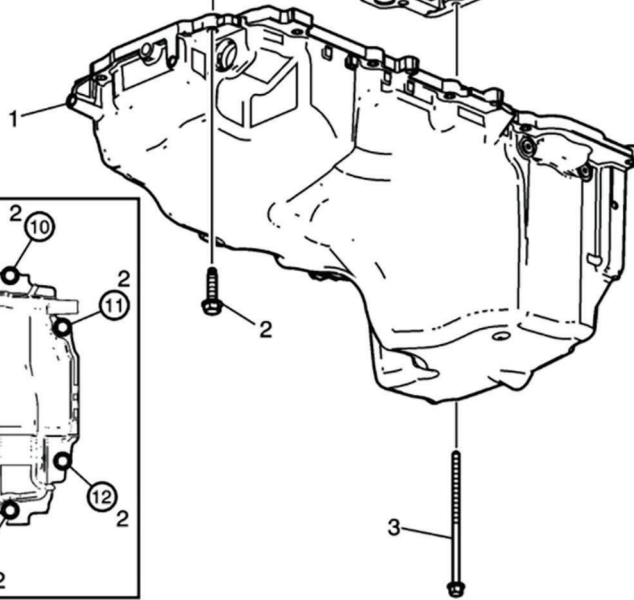
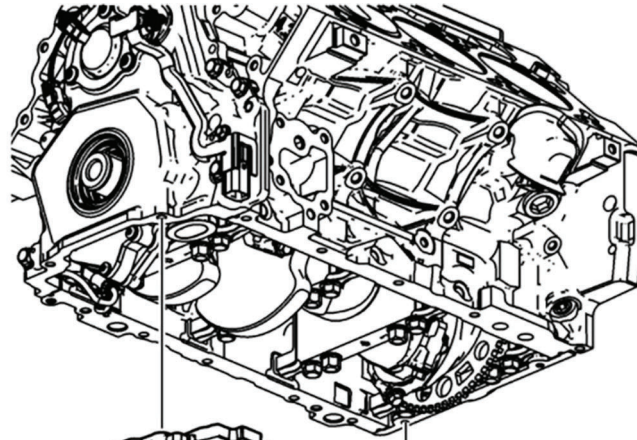
1. First pass in sequence **15N·m (11 lb ft)**
2. Final pass in sequence **30N·m (22 lb ft)**

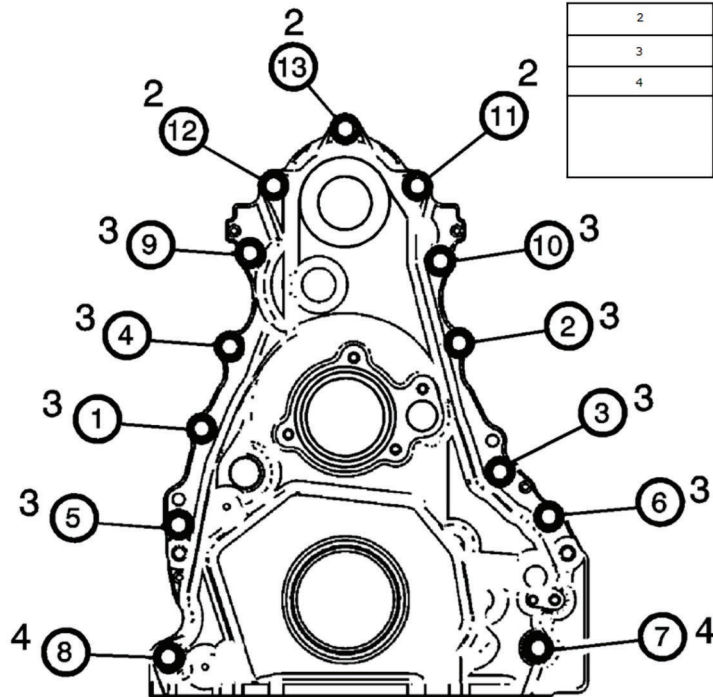
Cylinder Head Bolt
Tighten in sequence

1. First Pass: 80 N·m (59 lb ft)
2. Second Pass: 90 degrees
3. Final Pass: 60 degrees

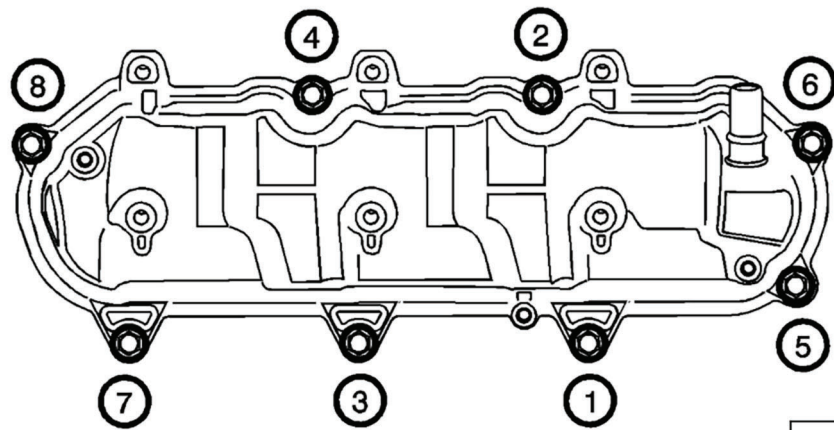


2	Oil Pan Bolt Tighten in sequence 25 N·m (18 lb ft)
3	Oil Pan Bolt Tighten in sequence 12 N·m (106 lb in)

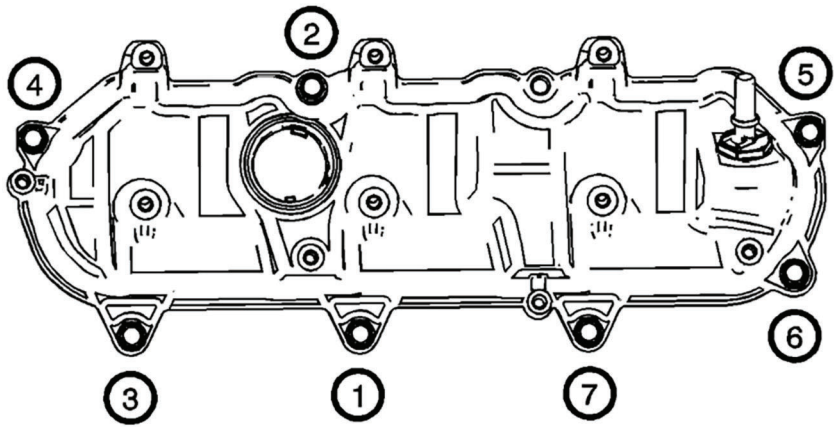


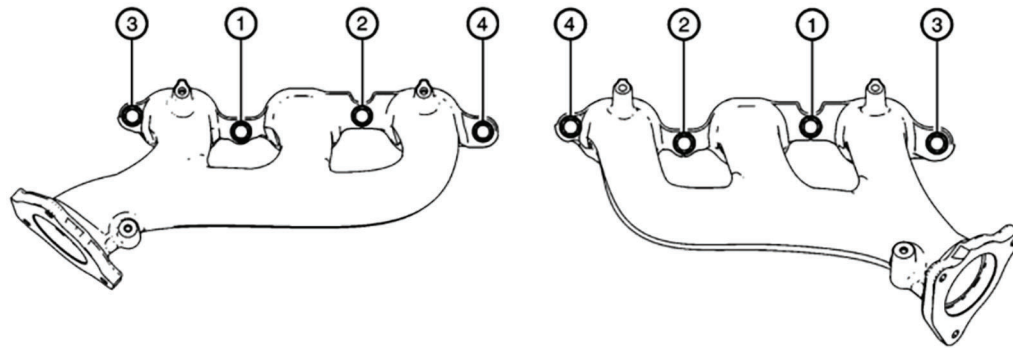


2	Engine Front Cover Bolt—M8 x 1.25 x 40.7
3	Engine Front Cover Bolt—M8 x 1.25 x 30.7
4	Engine Front Cover Bolt—M8 x 1.25 x 50.7
	Procedure Tighten the front cover bolts in the sequence shown. Tighten 25Nm (18 lb ft)



Valve Rocker Arm Cover Bolt
10 N·m (89 lb in)





Exhaust Manifold Bolt

Procedure

Note: The cylinder head exhaust manifold bolt hole threads must be clean and free of debris or threadlocking material.

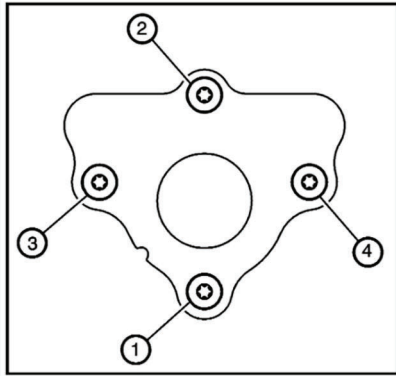
1. Install New Bolts
2. Tighten the exhaust manifold bolts in the sequence shown.

Tighten in sequence — New Cylinder Head

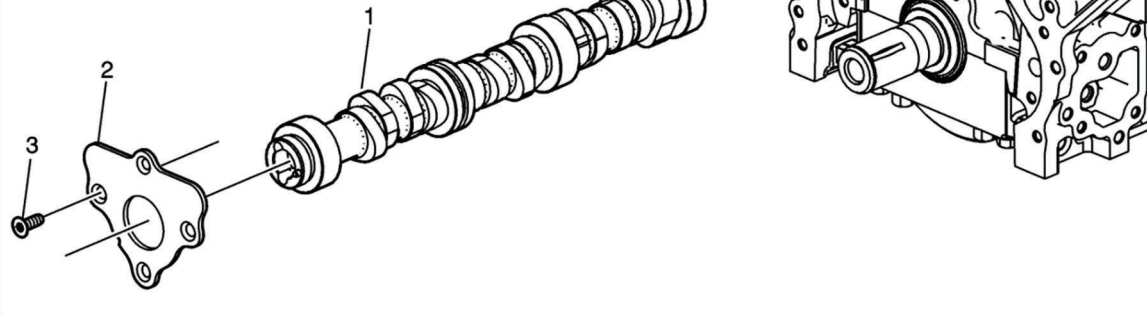
1. First Pass: **27 N•m (20 lb ft)**.
2. Second Pass: Loosen 180 degrees .
3. Final Pass: **23 N•m (17 lb ft)**

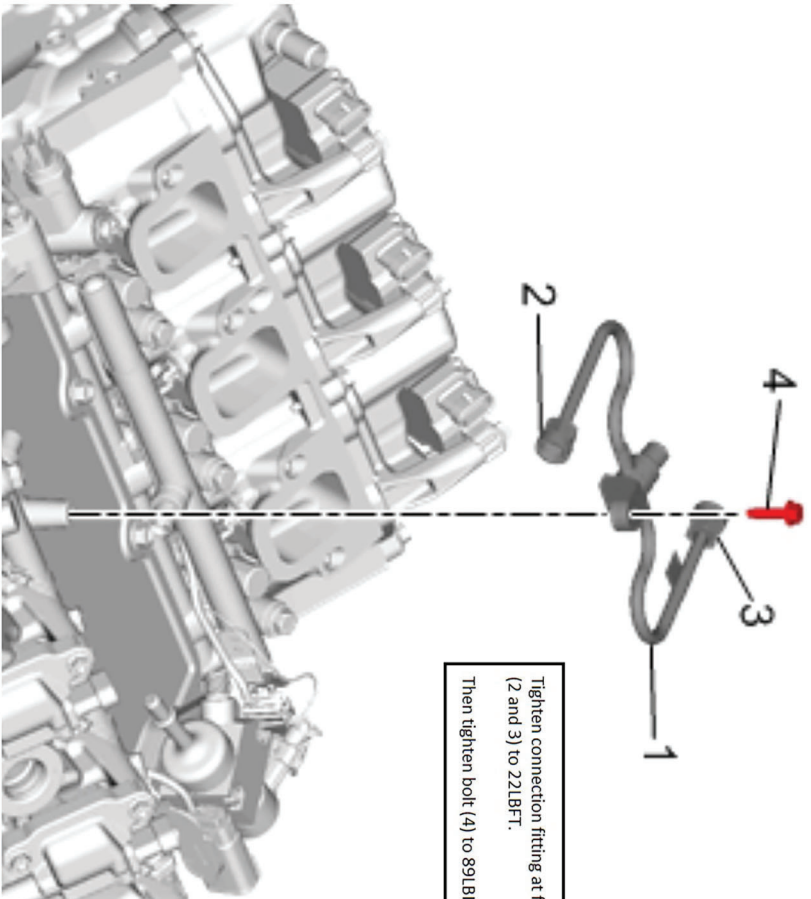
Tighten in sequence — Existing Cylinder Head

23 N•m (17 lb ft)

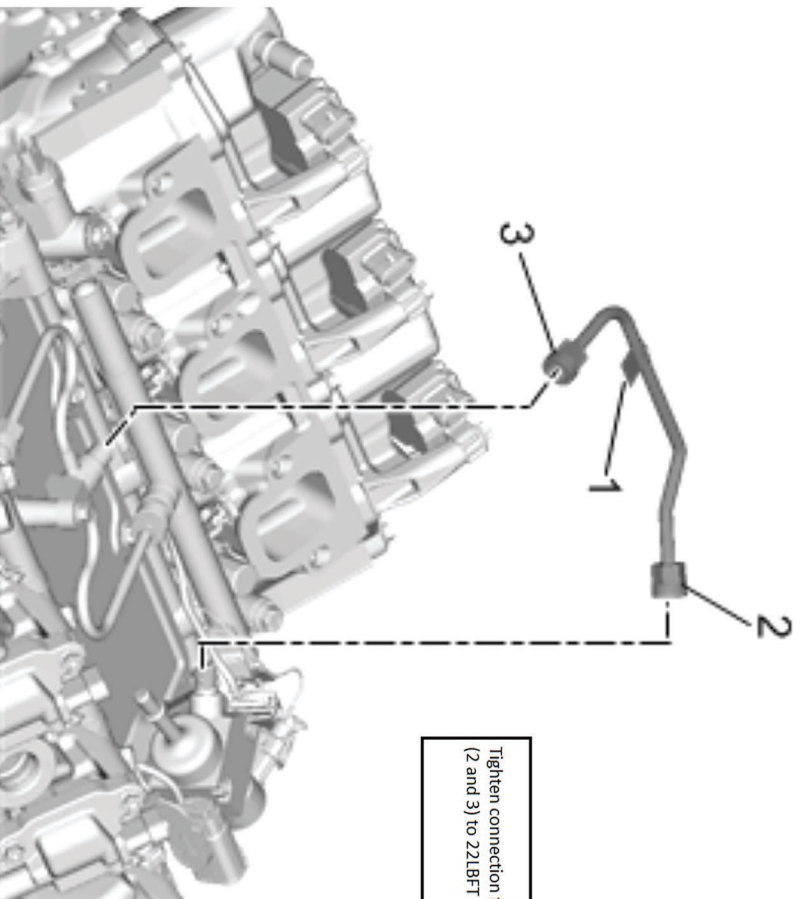


Camshaft Retainer Bolt
Procedure
Tighten the retainer bolts in the sequence shown.
Tighten
15N·m (11 lb ft)





Tighten connection fitting at fuel rail
(2 and 3) to 22LBFT.
Then tighten bolt (4) to 89LBIN



Tighten connection fittings
(2 and 3) to 22LBFT



