

Bolt Torque Table										
Steel Grade	SAE 5		Socket Head Cap Screws		Button Head Cap Screws		Flat Head Cap Screws		Low Head Cap Screws	
Nominal Dia. And Thread Pitch	Bolt Torque Specs in Foot Pounds or (Inch Pounds)									
	Dry	Lubed	Dry	Lubed	Dry	Lubed	Dry	Lubed	Dry	Lubed
1/4-20	(101)	(76)	(168)	(120)	(100)	(75)	(100)	(75)	(78)	(59)
5/16-18	(209)	(157)	(348)	(264)	(210)	(157)	(210)	(157)	(156)	(117)
5/16-24	(231)	(174)	(384)	(288)						
3/8-16	31	23	51	38	32	24	32	24	23	17
3/8-24	35	26	58	43						
7/16-14	49	37	81	61	50	38	50	38		

Metric Bolt Torque Table										
Property Class	Hex Head 8.8		Socket Head Cap Screw		Button Head Cap Screw		Flat Head Cap Screws		Low Head Cap Screws	
Nominal Size and Thread Pitch	Bolt Torque Specs in Foot Pounds or (Inch Pounds)									
	Dry	Lubed	Dry	Lubed	Dry	Lubed	Dry	Lubed	Dry	Lubed
M6 x 1.00	(92)	(69)	(156)	(116)						
M8 x 1.25	19	14	32	24			21	16		
M10 x 1.50	37	28	62	47			41	31		

BOLT TORQUE FACTORS	
LUBRICANT OR PLATING	TORQUE CHANGES
Oil	Reduce torque 15% to 25%
Dry Film (Teflon or moly based)	Reduce torque 50%
Dry Wax (Cetyl alcohol)	Reduce torque 50%
Chrome plating	No change
Cadmium plating	Reduce torque 25%
Zinc plating	Reduce torque 15%

Baseline torque is calculated for a non-lubricated, un-plated bolt

## LS TORQUE VALUES

### Main Cap Bolt Torque Values

Inner main cap bolts:	15 ft-lb (1st pass), 80 deg (final)
Outer main cap stud nuts:	15 ft-lb (1st pass), 53 deg (final)
Main cap side bolts:	18 ft-lb

### If using aftermarket main cap studs:

ARP inboard primary main cap nuts:	50 ft-lb
ARP outboard primary main cap nuts:	60 ft-lb
ARP 8mm main cap side bolts:	20 ft-lb

**Note:** When using aftermarket main studs, always follow the stud maker's tightening specifications for their studs and nuts.

### Cylinder Head Bolt Tightening

11mm x 20.0 x 155.5mm bolts:	22 ft-lb, plus 76 deg
11mm x 20.0 x 101.0 mm bolts:	22 ft-lb, plus 76 deg, plus 34 deg
8mm x 1.25 x 46mm bolts:	22 ft-lb

**Note:** Original equipment cylinder head bolts are torque-to-yield-type and should not be reused. If planning to use OE cylinder head bolts during a build, always use new bolts.

### ARP Cylinder Head Studs

ARP cylinder head stud 7/16" nuts:	80 ft-lb w/ARP moly (in 3 steps)
ARP 8mm upper studs:	22 ft-lb w/ARP moly

### Connecting Rod Bolts

OE rod bolts (First Design):	15 ft-lb (1st pass), plus 65 deg (2nd pass)
OE rod bolts (Second Design):	15 ft-lb (1st pass), plus 75 deg (2nd pass)

**Note:** When using aftermarket rod bolts, follow the bolt manufacturer's tightening specifications, which might include torque, torque-plus-angle, or bolt stretch specs.

### Intake Manifold

OE Plastic Injection Manifold:	44 in-lb (1st pass), 89 in-lb (2nd pass)
Aftermarket aluminum four-barrel carb intake manifold:	44 in-lb

### Exhaust Manifold/Header to Heads

Exhaust manifold bolts first pass:	11 ft-lb
Exhaust manifold bolts final pass:	18 ft-lb
Exhaust manifold heat shield bolts:	80 in-lb

### Miscellaneous OE Torque Specs

Camshaft retainer plate bolts:	18 ft-lb
Camshaft gear bolts:	26 ft-lb
OE timing chain damper bolts:	18 ft-lb
Oil pump mounting bolts:	18 ft-lb
Oil pump cover bolts:	106 in-lb
Oil pump relief valve plug:	106 in-lb
Oil pump screen nuts:	18 ft-lb
Oil pump to screen bolt:	106 in-lb
Oil pan bolts 8mm (pan to block and pan to front cover):	18 ft-lb
Oil pan bolts 6mm (pan to rear cover):	106 in-lb
Oil filter fitting:	40 ft-lb
Oil level indicator tube bolt:	18 ft-lb
Oil level sensor:	115 in-lb
Oil pan baffle bolts:	106 in-lb
Oil pan closeout cover bolts:	106 in-lb
Oil pan cover bolts:	106 in-lb
Oil pan drain plug:	18 ft-lb
Oil pressure sensor:	15 ft-lb
Oil filter:	22 ft-lb
Knock sensors:	15 ft-lb
Front cover bolts:	18 ft-lb
Rear cover bolts:	18 ft-lb
Block valley cover bolts:	18 ft-lb
Water pump bolt:	11 ft-lb (1st pass), 22 ft-lb (2nd pass)
Water pump cover bolts:	11 ft-lb
Lifter bucket 6mm bolts:	125 in-lb
Flywheel bolts:	15 ft-lb (1st pass), 37 ft-lb (2nd pass), 74 ft-lb (final)
Spark plugs:	15 ft-lb (new), 11 ft-lb (used)
Throttle body bolts:	106 in-lb
Transmission housing (bellhousing) bolts:	37 ft-lb
Valve lifter guide tray bolts:	106 in-lb
Rocker arm bolts:	22 ft-lb
Rocker arm cover bolts:	106 in-lb
Water inlet housing bolts:	11 ft-lb
Crankshaft balancer bolt initial seating:	24 ft-lb
Crankshaft balancer bolt (using new bolt):	37 ft-lb plus 140 deg
Crankshaft oil deflector nuts:	18 ft-lb
Crankshaft position sensor bolt:	18 ft-lb
Coolant temperature sensor:	15 ft-lb

## LS TORQUE VALUES

Cylinder head coolant plug:	15 ft-lb	Alternator rear bracket to block bolt:	18 ft-lb
Cylinder head core hole plug:	15 ft-lb	Alternator rear bracket to alternator bolt:	18 ft-lb
Block coolant drain plugs:	44 ft-lb	Ground strap bolt at rear of cylinder head:	37 ft-lb
Coolant air bleed pipe bolts:	106 in-lb	Ignition coil to bracket bolts:	106 in-lb
Engine mount heat shield nuts:	89 in-lb	Ignition coil bracket to valve cover bolts:	106 in-lb
Engine mount through bolts:	70 ft-lb	Drive belt idler pulley bolt:	37 ft-lb
Engine mount through bolt nuts:	59 ft-lb	Drive belt tensioner bolts:	37 ft-lb
Engine mount to engine block bolts:	37 ft-lb	Air injection reaction pipe to exhaust manifold bolts:	15 ft-lb
Engine service lift bracket 10mm bolts:	37 ft-lb	A/C compressor bolts:	37 ft-lb
Engine service lift bracket 8mm bolt:	18 ft-lb	A/C compressor bracket bolts:	37 ft-lb
EGR valve bolts first pass:	89 in-lb	A/C idler pulley bolt:	37 ft-lb
EGR valve bolts final pass:	22 ft-lb	A/C tensioner bolt:	18 ft-lb
EGR valve pipe to cylinder head bolts:	37 ft-lb	Accelerator control cable bracket bolts:	89 in-lb
EGR valve pipe to exhaust manifold bolts:	22 ft-lb		
EGR valve pipe to intake manifold bolts:	89 in-lb		
Fuel injection rail bolts:	89 in-lb		
Alternator bracket bolts:	37 ft-lb		

### OE BLOCK FASTENER SIZES

**Note:** OE LS engine fasteners are metric

Cylinder head bolts (OE):	11mm x 1.5 x 100mm
Cylinder head pinch bolts:	8mm x 1.25 x 45mm
Main cap primary bolts (inner):	10mm x 2.0 x 100mm
Main cap bolts with stud tips (outer):	10mm x 2.0 x 85mm
Main cap side bolts:	8mm x 1.25 x 25mm
Timing cover bolts:	8mm 1.25 x 30mm
Rear cover bolts:	8mm x 1.25 x 25mm
Lifter tray retaining bolts:	6mm x 1.0 x 20mm (shouldered)
Camshaft plate screws:	8mm x 1.25 x 25-30mm
Valley cover plate bolts:	8mm x 1.25 x 30mm
Timing chain dampener bolts:	8mm x 1.25 x 35mm
#12561663 straight-thread block L-side water plug:	30mm x 1.25 x 10mm
#11588949 straight-thread plugs:	16mm x 1.5 x 10mm
#9427693 front oil expansion plug:	16mm dia.
Connecting rod bolts:	9mm x 1.0 x 43mm
Crankshaft snout damper bolt:	16mm x 2.0 x 105mm