

## Additional Engine Specifications

Valve guide bore diameter 7.015-7.044 mm (0.2762-0.2773 in)  
Valve stem diameter—intake 6.975-6.995 mm (0.2754-0.2746 inch)  
Valve stem diameter—exhaust 6.949-6.970 mm (0.2744-0.2736 inch)  
Valve stem-to-guide clearance—intake 0.020-0.069 mm (0.00078-0.00272 inch)  
Valve stem-to-guide clearance—exhaust 0.046-0.094 mm (0.0018-0.0037 in)  
Valve head diameter—intake 37 mm (1.46 inch)  
Valve head diameter—exhaust 30 mm (1.18 inch)  
Valve face runout 0.05 mm (0.002 in)  
Valve face angle 45.5 degrees  
Valve seat width—intake 1.8-2.2 mm (0.071-0.086 inch)  
Valve seat width—exhaust 1.8-2.2 mm (0.071-0.086 inch)  
Valve seat runout 0.05 mm (0.002 inch)  
Valve seat angle 45 degrees  
Valve spring free length—intake 42.16 mm (1.6598 inch)  
Valve spring free length—exhaust 42.16 mm (1.6598 inch)  
Valve spring squareness 2 degrees  
Valve spring compression pressure—intake 711.47 N @ 26.19 mm (159.9 lb-ft @ 1.031 inch)  
Valve spring compression pressure—exhaust 711.47 N @ 26.19 mm (159.9 lb-ft @ 1.031 inch)  
Valve spring installed height 36.14 mm (1.4228 in)  
Valve spring installed pressure—intake 289.1 N @ 36.14 mm (64.99 lb-ft @ 1.4228 inch)  
Valve spring installed pressure—exhaust 289.1 N @ 36.14 mm (64.99 lb-ft @ 1.4228 inch)  
Roller follower ratio 1.8:1  
Hydraulic Lash Adjuster  
Diameter 16.000-15.988 mm (0.6299-0.6294 inch)  
Clearance-to-bore 0.018-0.069 mm (0.000709-0.002717 inch)  
Service limit 0.016 mm (1.0006299 inch)  
Hydraulic leakdown rate (a) 5-25 seconds  
Collapsed lash adjuster gap 0.80-1.20 mm (0.0315-0.0472 inch)  
**Camshaft**  
Theoretical valve lift @ 0 lash—intake (primary and secondary) 10.0 mm (0.3937 inch)  
Theoretical valve lift @ 0 lash—exhaust 10.0 mm (0.3937 inch)  
Lobe lift 5.54 mm (0.218 in)  
Allowable lobe lift loss 0.130 mm (0.0051 in)  
Journal diameter 26.962-26.936 mm (1.0615-1.0605 inch)  
Camshaft journal bore inside diameter 27.012-26.987 mm (1.0635-1.0625 in)  
Camshaft journal-to bearing clearance 0.025-0.076 mm (0.00098-0.002992 inch)  
Runout 0.025 mm (0.0010 in)  
End play 0.025-0.165 mm (0.00098-0.00649 inch)  
**Cylinder Block**  
Cylinder bore diameter 90.2-90.239 mm  
Cylinder bore maximum taper 0.016 mm  
Cylinder bore maximum out-of-round 0.016 mm  
Main bearing bore diameter 72.402-72.422 mm  
Head gasket surface flatness 0.15 mm (0.006 in) max. overall  
**Crankshaft**  
Main bearing journal diameter 67.493 mm  
Main bearing journal maximum taper 0.05 mm  
Main bearing journal maximum out-of round 0.05 mm  
Main bearing journal-to-cylinder block clearance 0.023-0.055 mm  
Connecting rod journal diameter 52.983-53.003 mm  
Connecting rod journal maximum taper 0.004 mm (0.0002 in)

Connecting rod journal maximum out-of-round 0.004 mm (0.0002 in)  
Crankshaft maximum end play 0.130-0.301 mm  
Thrust bearing journal diameter 67.493 mm  
Thrust bearing journal maximum out-of round 0.05 mm  
Thrust bearing journal maximum taper 0.05 mm  
Thrust bearing journal length 17.725-17.775 mm

#### **Piston and Connecting Rod**

Piston diameter 90.180-90.191 mm  
Piston-to-cylinder bore clearance -0.010/+0.026 mm  
Piston ring end gap – compression (top) 0.30 mm  
Piston ring end gap – compression (bottom) 0.50 mm  
Piston ring end gap – compression (oil ring) 0.65 mm  
Piston ring groove width – compression (top) 1.53-1.549 mm  
Piston ring groove width – compression (bottom) 1.519-1.539 mm  
Piston ring groove width – oil ring 3.031-3.055 mm  
Piston ring width – compression (top) 1.47-1.49 mm  
Piston ring width – compression (bottom) 1.47-1.49 mm  
Piston ring width – oil ring 2.854-2.984 mm  
Piston ring-to-groove clearance – compression (top) 0.04-0.079 mm  
Piston ring-to-groove clearance – compression (bottom) 0.029-0.069 mm  
Piston ring-to-groove clearance – oil ring 0.047-0.201 mm  
Piston pin bore diameter 22.0042-21.998 mm  
Piston pin diameter 21.991-29.994 mm  
Piston pin length 61.60-62.03 mm  
Piston pin-to-piston fit 0.0058-0.0132 mm  
Connecting rod-to-pin clearance 0.018-0.033 mm  
Connecting rod pin bore diameter 22.012-22.024 mm  
Connecting rod length 150.7 mm  
Connecting rod maximum allowed bend 0.038 mm per 25 mm  
Connecting rod maximum allowed twist 0.050 mm per 25 mm  
Connecting rod bearing bore diameter 56.866-56.886 mm  
Connecting rod bearing-to-crankshaft clearance 0.027-0.069 mm  
Connecting rod side clearance 0.15-0.45 mm

(a) Time necessary for plunger to leak down 1.6 mm of travel with 222 N force and leak down fluid in tappet.

#### **Miscellaneous Specs**

Inner serpentine belt - 6 rib. 96".

Supercharger belt - Stock belt is 75.1". Gates stock number is K080751. Gatorback stock number is 4080750.

## **Torque Specifications**

Torque Specifications Nm lb-ft lb-in (note that a dash means that particular spec isn't used)

**Special Note! Torque to yield bolts are NOT reuseable. Attempting to reuse a torque to yield bolt could result in it breaking.**

A/C compressor bolts 25 18 –

A/C peanut fittings 8 – 71

A/C muffler nut 25 18 –

Accelerator bracket bolts 10 – 89

Battery tray bolts 11 8 –

Belt idler support bracket assembly fasteners 25 18 –

Camshaft sprocket bolt 115 85 –

Coolant bypass tube studs 25 18 –  
Coolant bypass tube bolts 25 18 –  
Coolant hose and tube assembly bolt 25 18 –  
Cooling fan motor and shroud bolts 10 – 89

Connecting rod bolt Stage 1: Tighten to 25 Nm (18 lb-ft).  
Stage 2: Tighten to 80 Nm (59 lb-ft).

Engine front cover 25 Nm (18 lb-ft).  
Drive belt tensioner bolts 25 18 –

Cylinder head bolt Tighten the bolts in six stages, in the sequence shown.  
Stage 1: Tighten to 40 Nm (30 lb-ft).  
Stage 2: Tighten an additional 90 degrees.  
Stage 3: Loosen the bolts a minimum of one full turn.  
Stage 4: Tighten to 40 Nm (30 lb-ft).  
Stage 5: Tighten an additional 90 degrees.  
Stage 6: Tighten an additional 90 degrees.

Idler pulley bracket 25 18 –  
Power steering pump bolts 25 18 –  
Power steering hose fitting 65 48 –  
Power steering hose bracket bolt 10 – 89

Pulley to crankshaft bolt tighten the bolt in four stages.  
Stage 1: Tighten to 90 Nm (66 lb-ft).  
Stage 2: Loosen the bolt one full turn.  
Stage 3: Tighten to 50 Nm (37 lb-ft).  
Stage 4: Tighten an additional 90 degrees.

EGR valve to intake manifold 10Nm(89inlbs)  
Engine coolant degas bottle bolts 10 – 89  
Exhaust manifold studs 25 18 –  
Generator bolts 25 18 –  
Generator support bracket bolts 25 18 –  
Hood prop bolt 10 – 89  
Hood mounting nuts 12 9 –  
Heater water inlet tube 10 – 89  
Heater water outlet tube 24 18 –  
Lower intake manifold-to-cylinder head bolt 10 Nm (89 lb-in)

Main bearing cap bolt-vertical main bearing cap fasteners Stage 1: Tighten to 40 Nm (30 lb-ft).  
Stage 2: Tighten an additional 90 degrees  
jack screws against the cylinder block Stage 1: Tighten to 5 Nm (44 lb-in).  
Stage 2: Tighten to 10 Nm (89 lb-in).  
side bolts: 21Nm(15 ftlbs)

Oil filter adapter bolt 25 18 –  
Oil bypass filter to adapter 50 37 –  
Oil pump screen cover and tube-to-oil pump bolt 10 – 89

Oil pan-to-cylinder block bolt Stage 1: Tighten to 20 Nm (15 lb-ft).  
Stage 2: Rotate an additional 60 degrees

Oil pump-to-cylinder block bolt 10 – 89  
Radio ignition interference capacitor bolts 25 18 –  
Oil pump screen and pickup tube-to-main bearing cap stud spacer bolt 25 18 –  
Water pump pulley bolts 25 18 –  
Throttle body spacer nuts 25 18 –  
Vacuum accessory bracket fasteners 10 – 89  
Valve cover bolt 10 – 89  
Wiring harness support bracket 25 18 –  
Water pump-to-cylinder block bolt 25 18 –  
EGR valve to exhaust manifold tube nuts 40 30 –  
Power steering pump to engine 25 18 –  
Power steering hose bracket nut 25 18 –  
Power steering reservoir bracket fasteners 10 – 89  
Supercharger degas bottle bolts 10 – 89  
Camshaft cap cluster to cylinder head 10 – 89  
Timing chain tensioner bolts—primary 25 18 –  
Timing chain tensioner bolts—secondary 10 – 89  
Ignition coil cover bolts 10 – 89  
Generator mounting bracket retainers 10 – 89  
Oil level indicator tube retainer 10 – 89  
Primary timing chain guide-to-engine bolts 10 – 89  
Oil pump screen and pickup tube spacer to main bearing stud 25 18 –  
Belt idler pulley bolt 25 18 –  
Subframe brace nuts 41 30 –  
Flywheel 85Nm(63ftlbs.)

Pressure plate Stage 1: Tighten the bolts to 45 Nm (33 lb-ft).  
Stage 2: Tighten the bolts an additional 60 degrees.

Spark plugs 15 11 –

*Note: For the torque specs, some numbers are noted to be in newton meters (nm), ft. lbs. or in. lbs. Bare numbers are noted as foot lbs, then inch lbs. A dash in place of any of the three means that particular torque spec isn't used.*