SPECIFICATIONS—3.9L ENGINE

ENGINE SPECIFICATIONS

Camshaft

Bearing Diameter	
No. 1	50.800-50.825 mm (2.000-2.001 in)
No. 2	50.394-50.419 mm (1.984-1.985 in)
No. 3	49.606-49.632 mm (1.953-1.954 in)
No. 4	39.688-39.713 mm (1.5625-1.5635 in)
Diametrical Clearance	0.0254-0.0762 mm (0.001-0.003 in)
Max. Allowable	0.127 mm (0.005 in)
End Play	0.051-0.254 mm (0.002-0.010 in)
Bearing Journal Diameter	
No. 1	50.749-50.775 mm (1.998-1.999 in)
No. 2	50.343-50.368 mm (1.982-1.983 in)
No. 3	49.555-49.581 mm (1.951-1.952 in)
No. 4	39.637-39.662 mm (1.5605-1.5615 in)

Connecting Rods

Bearing Clearance	0.0127-0.0559 mm (0.0005-0.0022 in)
Piston Pin Bore Diameter	24.940-24.978 mm (0.9819-0.9834 in)
Side Clearance (Two Rods)	0.152-0.356 mm (0.006-0.014 in)
Total Weight (Less Bearing)	726 grams (25.61 oz)

Crankshaft

Connect Rod Journal	
Diameter	53.950-53.975 mm (2.124-2.125 in)
Out-of-Round (Max.)	0.0254 mm (0.001 in)
Taper (Max.)	0.0254 mm (0.001 in)
Diametrical Clearance	
No. 1	0.0127-0.0381 mm (0.0005-0.0015 in)
Nos. 2, 3, and 4	0.0127-0.0508 mm (0.0005-0.0020 in)
Max. Allowable (Nos. 2, 3, & 4)	0.0635 mm (0.0025 in)
End Play	0.051-0.178 mm (0.002-0.007 in)
Max. Allowable	0.254 mm (0.010 in)
Main Bearing Journals	
Diameter	63.487-63.513 mm (2.4995-2.5005 in)
Out-of-Round (Max.)	0.0254 mm (0.001 in)
Taper (Max.)	0.0254 mm (0.001 in)

Cylinder Block

Cylinder Bore	
Diameter	99.314-99.365 mm (3.910-3.912 in)
Out-of-Round (Max.)	0.127 mm (0.005 in)
Taper (Max.)	0.254 mm (0.010 in)
Oversize (Max.)	1.016 mm (0.040 in)
Distributor Lower Drive Shaft	
Bushing (Press Fit in Block)	0.0127-0.3556 mm (0.0005-0.0140 in)
Shaft-to-Bushing Clearance	0.0178-0.0686 mm (0.0007-0.0027 in)
Tappet Bore Diameter	22.99-23.01 mm (0.9051-0.9059 in)

Cylinder Head

Compression Pressure	689 kPa (100 psi)
Gasket Thickness (Compressed)	1.2065 mm (0.0475 in)
Valve Seat	
Angle	44.25° - 44.75°
Runout (Max.)	0.0762 mm (0.003 in)
Width (Finish) – Intake	1.524-2.032 mm (0.060-0.080 in)
Width (Finish) – Exhaust	1.016-1.542mm (0.040-0.060 in)

Hydraulic Tappets

Body Diameter	22.949-22.962 mm (0.9035-0.9040 in)
Clearance in Block	0.0279-0.0610 mm (0.0011-0.0024 in)
Dry Lash	1.524-5.334 mm (0.060-0.210 in)
Push Rod Length	172.57-173.08 mm (6.794-6.814 in)

ENGINE SPECIFICATIONS (CONT.)

Oil Pump

Clearance Over Rotors (Max.)	0.1016 mm (0.004 in)
Cover Out-of-Flat (Max.)	0.0381 mm (0.0015 in)
Inner Rotor Thickness (Min.)	20.955 mm (0.825 in)
Outer Rotor	
Clearance (Max.)	0.3556 mm (0.014 in)
Diameter (Min.)	62.7126 mm (2.469 in)
Thickness (Min.)	20.955 mm (0.825 in)
Tip Clearance Between Rotors (Max)	0.2032 mm (0.008 in)

Oil Pressure

At Curb Idle Speed*	41.4 kPa (6 psi)
At 3000 rpm	207-552 kPa (30-80 psi)
Oil Pressure Switch	
Actuating Pressure (Min.)	34.5-48.3 kPa (5-7 psi)

*CAUTION: If pressure is ZERO at curb idle, DO NOT run engine at 3,000 rpm.

Oil Filter

Bypass Valve Setting	62-103 kPa (9-15 psi)

Pistons

Clearance at Top of Skirt	0.0127-0.0381 mm (0.0005-0.0015 in)
Land Clearance (Diametrical)	0.635-1.016 mm (0.025-0.040 in)
Piston Length	86.360 mm (3.40 in)
Piston Ring Groove Depth	
Nos. 1 and 2	4.572-4.826 mm (0.180-0.190 in)
No. 3	3.810-4.064 mm (0.150-0.160 in)
Weight	592.6-596.6 grams (20.90-21.04 oz)

Piston Pins

Clearance	
In Piston	0.00635-0.01905 mm (0.00025-0.00075 in)
In Rod (Interference)	0.0178-0.0356 mm (0.0007-0.0014 in)
Diameter	24.996-25.001 mm (0.9841-0.9843 in)
End Play	NONE
Length	75.946-76.454 mm (2.990-3.010 in)

Piston Rings

Ring Gap	
Compression Rings	0.254-0.508 mm (0.010-0.020 in)
Oil Control (Steel Rails)	0.254-1.270 mm (0.010-0.050 in)
Ring Side Clearance	
Compression Rings	0.038-0.076 mm (0.0015-0.0030 in)
Oil Ring (Steel Rails)	0.06-0.21 mm (0.002-0.008 in)
Ring Width	
Compression Rings	1.971-1.989 mm (0.0776-0.0783 in)
Oil Ring (Steel Rails)	3.848-3.975 mm (0.1515-0.1565 in)

Valves

Face Angle	43.25° - 43.75°
Head Diameter	
Intake	48.666 mm (1.916 in)
Exhaust	41.250 mm (1.624 in)
Length (Overall)	
Intake	124.28-125.92 mm (4.893-4.918 in)
Exhaust	124.64-125.27 mm (4.907-4.932 in)
Lift (Zero Lash)	10.973 mm (0.432 in)
Stem Diameter	7.899-7.925 mm (0.311-0.312 in)
Stem-to-Guide Clearance	0.0254-0.0762 mm (0.001-0.003 in)
Max. Allowable (Rocking Method)	0.4318 mm (0.017 in)
Guide Bore Diameter (Std)	7.950-7.976 mm (0.313-0.314 in)

ENGINE SPECIFICATIONS (CONT.)

Valve Springs

Free Length (Approx.)	49.962 mm (1.967 in)
Spring Tension (Valve Closed)	@ 41.66 mm = 378 N (@ 1.64 in = 85 lbs)
Spring Tension (Valve Open)	@ 30.89 mm = 890 N (@ 1.212 in = 200 lbs)
Number of Coils	6.8
Installed Height (Spring Seat to Retainer)	41.66 mm (1.64 in)
Wire Diameter	4.50 mm (0.177 in)

Valve Timing

Exhaust Valve	
Closes (ATC)	16°
Opens (BBC)	52°
Duration	248°
Intake Valve	
Closes (ABC)	50°
Opens (BTC)	10°
Duration	240°
Valve Overlap	26°

J9309-33

OVERSIZE AND UNDERSIZE ENGINE COMPONENT MARKINGS

CONDITION	IDENTIFICATION	LOCATION OF IDENTIFICATION
CRANKSHAFT JOURNALS (UNDERSIZE) 0.0254 mm (0.001 in.)	R or M M-2-3 etc. (indicating no. 2 and 3 main bearing journal) and/or R-1-4 etc. (indicating no. 1 and 4 connecting rod journal)	Steel stamped (near notch) on no. 6 crankshaft counterweight.
HYDRAULIC TAPPETS (OVERSIZE) 0.2032 mm (0.008 in.)	♦	Diamond-shaped stamp Top pad – front of engine and flat ground on outside surface of each O/S tappet bore.
VALVE STEMS (OVERSIZE) 0.127 mm (0.005 in.)	X	Milled pad adjacent to two tapped holes (3/8 in.) on each end of cylinder head.

J9309-81

TORQUE SPECIFICATIONS

DESCRIPTION	TORQUE
Adjusting Strap Bolt	23 N·m (200 in. lbs.)
Camshaft Bolt	68 N·m (50 ft. lbs.)
Camshaft Thrust Plate Bolts	24 N·m (210 in. lbs.)
Chain Case Cover Bolts	41 N·m (30 ft. lbs.)
Connecting Rod Cap Bolts	61 N·m (45 ft. lbs.)
Crankshaft Main Bearing Cap Bolts	115 N·m (85 ft. lbs.)
Cylinder Head Bolts	
1st Step	68 N·m (50 ft. lbs.)
2nd Step	143 N·m (105 ft. lbs.)
Cylinder Head Cover Bolts	11 N·m (95 in. lbs.)
Exhaust Manifold-to-Cylinder Head Bolts/Nuts	34 N·m (25 ft. lbs.)
Front Bracket-to-Block Bolts	88 N·m (65 ft. lbs.)
Front Insulator Stud Nuts	102 N·m (75 ft. lbs.)
Front Support Bracket Bolts	41 N·m (30 ft. lbs.)
Generator Mounting Bolt	41 N·m (30 ft. lbs.)
Intake Manifold Bolts	Refer to Procedure in Service Manual.
Oil Pan Bolts	24 N·m (215 in. lbs.)
Oil Pan Drain Plug	34 N·m (25 ft. lbs.)
Oil Pump Attaching Bolts	41 N·m (30 ft. lbs.)
Oil Pump Cover Bolts	11 N·m (95 in. lbs.)

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DESCRIPTION	TORQUE
Rear Insulator-to-Bracket Through-Bolt (2WD)	68 N·m (50 ft. lbs.)
Rear Insulator-to-Crossmember Support Bracket Nut (2WD)	41 N·m (30 ft. lbs.)
Rear Insulator Mounting Plate-to-Rail Assembly Nuts (4WD)	41 N·m (30 ft. lbs.)
Rear Support Bracket-to-Crossmember Flange Nuts	41 N·m (30 ft. lbs.)
Rear Support Plate-to-Insulator Mounting Plate Bolts (4WD)	41 N·m (30 ft. lbs.)
Rear Support Plate-to-Transfer Case Bolts	41 N·m (30 ft. lbs.)
Rocker Arm Bolts	28 N·m (21 ft. lbs.)
Spark Plugs	41 N·m (30 ft. lbs.)
Starter Mounting Bolts	68 N·m (50 ft. lbs.)
Throttle Body Bolts (MPI)	23 N·m (200 in. lbs.)
Torque Converter Drive Plate Bolts	31 N·m (270 in. lbs.)
Transfer Case-to-Insulator Mounting Plate Nuts	204 N·m (150 ft. lbs.)
Transmission Support Bracket Bolts (2WD)	68 N·m (50 ft. lbs.)
Transmission Support Spacer Bolts (4WD)	68 N·m (50 ft. lbs.)
Transmission Support Spacer-to-Insulator Mounting Plate Nuts (4WD)	204 N·m (150 ft. lbs.)
Vibration Damper Retainer Bolt	183 N·m (135 ft. lbs.)
Water Pump-to-Chain Case Cover Bolt	41 N·m (30 ft. lbs.)