

Fastener Tightening Specifications

Application	Specification	
	Metric	English
Camshaft Adjuster Bolts	65 N·m + 120° + 15°	47.9 lb ft + 120° + 15°
Camshaft Bearing Cap Bolts	8 N·m	70.8 lb in
Camshaft Sprocket Bolt Cap	50 N·m	36.8 lb ft
Camshaft Sprocket Bolts	65 N·m	47.9 lb ft
Closure Bolt	15 N·m	11 lb ft
Connecting-rod Cap Bolts	35 N·m + 45° + 15°	25.8 lb ft + 45° + 15°
Coolant Pipe To Coolant Distributor Case Bolts	8 N·m	70.8 lb in
Crankshaft Cap Bolts	50 N·m + 50°	36.8 lb ft + 50°
Crankshaft Pulley Bolt	25 N·m	18.4 lb ft
Cylinder Head Bolts	25 N·m + 90° + 90° + 45°	18.4 lb ft + 90° + 90° + 45°
Drive Belt Tensioner Bolt	50 N·m	36.8 lb ft
Engine Front Cover Assembly Bolts	20 N·m	14.7 lb ft
Engine Mount Bolts and Nuts	55 N·m	40.5 lb ft
Engine Mount Bracket Bolt	65 N·m	47.9 lb ft
Exhaust Manifold Lower Bracket Bolts	20 N·m	14.7 lb ft
Exhaust Manifold Nuts	20 N·m	14.7 lb ft
Flex Plate Bolts	35 N·m + 30° + 15°	25.8 lb ft + 30° + 15°
Generator B+ Nut	15 N·m	11 lb ft
Ground Nut	12 N·m	8.8 lb ft
Heat Exchanger Bolts	8 N·m	70.8 lb in
Heat Shield Bolts	8 N·m	70.8 lb in
Ignition Coil Bolt	8 N·m	70.8 lb in
Intake Manifold Bolts	20 N·m	14.7 lb ft
Intake Manifold Lower Bracket Bolt	8 N·m	70.8 lb in
Oil Cooler Bolts	25 N·m	18.4 lb ft
Oil Level Indicator Tube Bolt	10 N·m	7.3 lb ft
Oil Pan Baffle Bolts	10 N·m	7.3 lb ft
Oil Pan Bolts	14 N·m	10.3 lb ft
Oil Pan Heater Bolt	8 N·m	70.8 lb in
Oil Pan-to-Transmission Bolts	40 N·m	29.5 lb ft
Reaction Rod-to-Bracket Bolt and Nut	80 N·m	59 lb ft
Reaction Rod-to-Crossmember Bolts	55 N·m	40.5 lb ft
Spark Plug	25 N·m	18.4 lb ft

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Starter Solenoid B+ Nut	10.5 N·m	7.7 lb ft
Starter Solenoid Ground Nut	38 N·m	28 lb ft
Timing Belt Idler Bolt	50 N·m	36.8 lb ft
Timing Belt Lower Cover Bolts	6 N·m	53.1 lb in
Timing Belt Rear Cover Bolts	6 N·m	53.1 lb in
Timing Belt Tensioner Bolt	55 N·m	40.6 lb ft
Timing Belt Upper Cover Bolts	4 N·m	35.4 lb in
Transmission Bolt	60 N·m	44.2 lb ft
Valve Rocker Arm Cover Bolts	8 N·m	70.8 lb in

Engine Mechanical Specifications

Application	Specification	
	Metric	English
Camshaft		
• Lift - Intake	46.3 mm	1.8228 in
• Lift - Exhaust	45.3 mm	1.7835 in
• Bending	0.04 mm	0.0016 in
• Journal Outer Diameter : No. 1	27.939-27.960 mm	1.1000-1.1008 in
• Journal Outer Diameter : No. 2	27.939-27.960 mm	1.1000-1.1008 in
• Journal Outer Diameter : No. 3	27.939-27.960 mm	1.1000-1.1008 in
• Journal Outer Diameter : No. 4	27.939-27.960 mm	1.1000-1.1008 in
• Journal Outer Diameter : No. 5	27.939-27.960 mm	1.1000-1.1008 in
• Trust Clearance (End Play)	0.13-0.215 mm	0.0051-0.0085 in
Connecting Rod		
• Thrust Clearance - End Play	0.07-0.242 mm	0.0028-0.0095 in
• Width	21.838-21.890 mm	0.8598-0.8618 in
• Diameter - Piston Pin	19.012-19.020 mm	0.7485-0.7488 in
• Diameter - Crankshaft	45.999-46.013 mm	1.8110-1.8115 in
• Bending	0.04 mm	0.0016 in
• Twist	0.016 mm	0.0006 in
• Journal Bearing Oil Clearance	0.018-0.064 mm	0.0007-0.0025 in
Crankshaft		
• Thrust Clearance - End Play	0.1-0.202 mm	0.0039-0.0080 in
• Journal Outer Diameter	Main: 54.980-54.997 mm Pin: 42.971-42.987 mm	Main: 2.1646-2.1652 in Pin: 1.6918-1.6924 in
• Journal Bearing Oil Clearance	Main: 0.0155-0.047 mm Pin: 0.019-0.067 mm	Main: 0.0006-0.0019 in Pin: 0.0007-0.0026 in
• Bending	0.03 mm	0.0012 in
Cylinder Block		
• Diameter	79 mm	3.1102 in
• Deck Surface Flatness	0.025/65 mm	0.0010/2.5591 in
• Cylindricity	0.0065 mm	0.0003 in
Cylinder Head		

• Journal Inner Diameter: No. 1	28.000-28.021 mm	1.1024-1.1032 in
• Journal Inner Diameter: No. 2	28.000-28.021 mm	1.1024-1.1032 in
• Journal Inner Diameter: No. 3	28.000-28.021 mm	1.1024-1.1032 in
• Journal Inner Diameter: No. 4	28.000-28.021 mm	1.1024-1.1032 in
• Journal Inner Diameter: No. 5	28.000-28.021 mm	1.1024-1.1032 in
• Journal Clearance	0.04-0.082 mm	0.0016-0.0032 in
• Height	135.55 mm	5.3366 in
• Surface Flatness Deformation Cover/Block	0.02/50-0.025/150 mm	0.0008/1.9685-0.0010/5.9055 in
• Manifolds Surface Deformation	0.05 mm	0.002 in
Valve		
• Deviation	0.3 mm	0.0118 in
• Seat Inner Diameter - Intake	30.7 mm	1.2087 in
• Seat Inner Diameter - Exhaust	27.2 mm	1.0709 in
• Face Diameter - Intake	30.92-31.12 mm	1.2173-1.2252 in
• Face Diameter - Exhaust	27.4-27.6 mm	1.0787-1.0866 in
• Guide Inner Diameter - Intake	5.0-5.016 mm	0.1969-0.1975 in
• Guide Inner Diameter - Exhaust	5.0-5.016 mm	0.1969-0.1975 in
• Valve Stem Outer Diameter - Intake	4.965-4.980 mm	0.1955-0.1961 in
• Valve Stem Outer Diameter - Exhaust	4.950-4.965 mm	0.1945-0.1955 in
• Valve Length - Intake	117.10-117.30 mm	4.6102-4.6181 in
• Valve Length - Exhaust	116.16-116.36 mm	4.5732-4.5811 in
• Valve Spring - Free Length	41.6 mm	1.6378 in
• Valve Spring - Straightness	1.5°	1.5°
• Clearance - Intake	0.21-0.29 mm (Nominal 0.25 mm)	0.0083-0.0114 in (Nominal 0.0098 in)
• Clearance - Exhaust	0.27-0.35 mm (Nominal 0.25 mm)	0.0106-0.0138 in (Nominal 0.0098 in)
Oil Pump Axial Clearance	0.02-0.058 mm	0.0008-0.0023 in
Piston		
• Piston	79 mm	3.1102 in
• Diameter	0.030-0.060 mm	0.0012-0.0024 in
Piston Ring		
• Groove Clearance - Top Ring	0.04-0.08 mm	0.0016-0.0031 in
• Groove Clearance - 2nd Ring	0.03-0.07 mm	0.0012-0.0028 in
• Groove Clearance - Oil Ring	0.06-0.15 mm	0.0024-0.0059 in
• End Gap - Top Ring	0.15-0.30 mm	0.0059-0.0118 in

• End Gap - 2nd Ring	0.30-0.50 mm	0.0118-0.0197 in
• End Gap - Oil Ring	0.20-0.70 mm	0.0079-0.0276 in
Piston Pin		
• Diameter	19.000-19.005 mm	0.7480-0.7482 in
• Length	49.84 mm	1.9268 in
• Clearance	0.007-0.020 mm	0.0003-0.0008 in