

ENGINE MECHANICAL

SERVICE DATA

030BF-01

Oil pump drive gear Gear diameter (w/chain)	Minimum	48.2 mm (1.898 in.)
Oil pump drive shaft gear Gear diameter (w/chain)	Minimum	48.2 mm (1.898 in.)
Crankshaft timing gear or sprocket Gear diameter (w/chain)	Minimum	51.6 mm (2.031 in.)
Chain tensioner slipper Wear	Maximum	1.0 mm (0.039 in.)
Chain vibration damper No.1 Wear	Maximum	1.0 mm (0.039 in.)
Cylinder head set bolt Bolt length	Standard Maximum	161.3 – 162.7 mm (6.350 – 6.406 in.) 164.2 mm (6.465 in.)
Chain sub-assy Elongation	Maximum	115.4 mm (4.543 in.)
Camshaft timing gear or sprocket Sprocket diameter (w/chain)	Minimum	97.3 mm (3.831 in.)
Camshaft Circle runout Cam lobe height	Maximum Standard Minimum	0.03 mm (0.0012 in.) 46.495 – 46.595 mm (1.8305 – 1.8345 in.) 46.385 mm (1.8262 in.)
No. 1 journal diameter Other journal diameter Thrust clearance		35.971 – 35.985 mm (1.4165 – 1.4167 in.) 22.959 – 22.975 mm (0.9039 – 0.9045 in.)
Intake	Standard Maximum	0.040 – 0.095 mm (0.0016 – 0.0037 in.) 0.11 mm (0.0043 in.)
Exhaust	Standard Maximum	0.080 – 0.135 mm (0.0032 – 0.0053 in.) 0.15 mm (0.0059 in.)
Oil clearance		
Intake No. 1 journal bearing mark 1	Standard	0.007 – 0.038 mm (0.0028 – 0.00150 in.)
Intake No. 1 journal bearing mark 2	Standard	0.008 – 0.038 mm (0.0031 – 0.00150 in.)
Intake No. 1 journal bearing mark 3	Standard	0.008 – 0.038 mm (0.0031 – 0.00150 in.)
Exhaust No. 1 journal	Standard	0.040 – 0.079 mm (0.0016 – 0.003 in.)
Other journals	Standard	0.025 – 0.062 mm (0.00098 – 0.00244 in.)
Intake No. 1 journal	Maximum	0.07 mm (0.0028 in.)
Other journals	Maximum	0.10 mm (0.0039 in.)
Camshaft No.2 Circle runout Cam lobe height	Maximum Standard Minimum	0.03 mm (0.0012 in.) 45.983 – 46.083 mm (1.8104 – 1.8143 in.) 45.873 mm (1.8060 in.)
No. 1 journal diameter Other journal diameter Thrust clearance		35.971 – 35.985 mm (1.4165 – 1.4167 in.) 22.959 – 22.975 mm (0.9039 – 0.9045 in.)
Intake	Standard Maximum	0.040 – 0.095 mm (0.0016 – 0.0037 in.) 0.11 mm (0.0043 in.)
Exhaust	Standard Maximum	0.080 – 0.135 mm (0.0032 – 0.0053 in.) 0.15 mm (0.0059 in.)
Oil clearance		
Intake No. 1 journal bearing mark 1	Standard	0.007 – 0.038 mm (0.0028 – 0.00150 in.)
Intake No. 1 journal bearing mark 2	Standard	0.008 – 0.038 mm (0.0031 – 0.00150 in.)
Intake No. 1 journal bearing mark 3	Standard	0.008 – 0.038 mm (0.0031 – 0.00150 in.)
Exhaust No. 1 journal	Standard	0.015 – 0.054 mm (0.0059 – 0.00213 in.)
Other journals	Standard	0.025 – 0.062 mm (0.00098 – 0.00244 in.)
Intake No. 1 journal	Maximum	0.07 mm (0.0028 in.)
Other journals	Maximum	0.10 mm (0.0039 in.)

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Valve clearance Intake Exhaust	(cold)	0.19 – 0.29 mm (0.0075 – 0.0114 in.) 0.30 – 0.40 mm (0.0118 – 0.0157 in.)
Cylinder head Warpage	Maximum Cylinder block side Intake manifold side Exhaust manifold side	0.05 mm (0.0020 in.) 0.08 mm (0.0031 in.) 0.08 mm (0.0031 in.)
Inner compression spring Free length Deviation Angle (reference)	Maximum Maximum	45.7 mm (1.799 in.) 1.6 mm (0.063 in.) 2°
Intake valve Overall length Valve stem diameter Margin thickness	Standard Minimum Standard Minimum	101.71 mm (4.0043 in.) 101.21 mm (3.9846 in.) 5.470 – 5.485 mm (0.2154 – 0.2159 in.) 1.05 – 1.45 mm (0.041 – 0.057 in.) 0.5 mm (0.020 in.)
Exhaust valve Overall length Valve stem diameter Margin thickness	Standard Minimum Standard Minimum	101.15 mm (3.9823 in.) 100.70 mm (3.9646 in.) 5.465 – 5.480 mm (0.2152 – 0.2157 in.) 1.2 – 1.6 mm (0.047 – 0.063 in.) 0.5 mm (0.020 in.)
Intake valve guide bush Bushing inside diameter Oil clearance Diameter Protrusion height	Standard Maximum	5.510 – 5.530 mm (0.2169 – 0.2177 in.) 0.025 – 0.060 mm (0.0010 – 0.0024 in.) 0.08 mm (0.0031 in.) 10.285 – 10.306 mm (0.4049 – 0.4057 in.) 9.6 – 10.0 mm (0.3779 – 0.3937 in.)
Exhaust valve guide bush Bushing inside diameter Oil clearance Diameter Protrusion height	Standard Maximum	5.510 – 5.530 mm (0.2169 – 0.2177 in.) 0.030 – 0.065 mm (0.0012 – 0.0026 in.) 0.10 mm (0.0039 in.) 10.285 – 10.306 mm (0.4049 – 0.4057 in.) 9.6 – 10.0 mm (0.3779 – 0.3937 in.)
Valve lifter Lifter diameter Lifter bore diameter Oil clearance	Standard Maximum	30.966 – 30.976 mm (1.2191 – 1.2195 in.) 31.009 – 31.025 mm (1.2208 – 1.2215 in.) 0.033 – 0.059 mm (0.0013 – 0.0023 in.) 0.07 mm (0.0028 in.)
Ring w/head pin Protrusion height		5.5 mm (0.2165 in.)
Connecting rod Thrust clearance Oil clearance Bushing inside diameter Out-of-alignment Rod twist	Standard Maximum Standard Maximum Maximum per 100 mm (3.94 in.) Maximum per 100 mm (3.94 in.)	0.160 – 0.362 mm (0.0063 – 0.0143 in.) 0.362 mm (0.0143 in.) 0.024 – 0.048 mm (0.0009 – 0.0019 in.) 0.08 mm (0.0031 in.) 22.005 – 22.014 mm (0.8663 – 0.8667 in.) 0.05 mm (0.0020 in.) 0.15 mm (0.0059 in.)
Connecting rod bolt Diameter	Standard Minimum	7.2 – 7.3 mm (0.283 – 0.287 in.) 7.0 mm (0.276 in.)

Crankshaft		
Thrust clearance	Standard	0.040 – 0.240 mm (0.0016 – 0.0094 in.)
	Maximum	0.30 mm (0.0118 in.)
Thrust washer thickness		1.930 – 1.980 mm (0.0760 – 0.0780 in.)
Circle runout	Maximum	0.03 mm (0.0012 in.)
Main journal diameter		54.988 – 55.000 (2.1648 – 2.1654 in.)
Crank pin taper and out-of-round	Maximum	0.003 mm (0.0001 in.)
Crank pin diameter		47.990 – 48.000 mm (1.8894 – 1.8898 in.)
Cylinder block		
Warpage	Maximum	0.05 mm (0.0020 in.)
Bore diameter	Standard	86.000 – 86.013 mm (3.4843 – 3.4848 in.)
	Maximum	86,013 mm (3.4848 in.)
Piston		
Piston diameter		85.927 – 85.937 mm (3.3829 – 3.3833 in.)
Piston oil clearance	Standard	0.063 – 0.086 mm (0.0025 – 0.0034 in.)
	Maximum	0.1 mm (0.0039 in.)
Piston ring		
Ring groove clearance	No. 1	0.020 – 0.070 mm (0.0008 – 0.0028 in.)
	No. 2	0.020 – 0.060 mm (0.0008 – 0.0024 in.)
End gap	Standard No. 1	0.30 – 0.40 mm (0.0118 – 0.0157 in.)
	No. 2	0.47 – 0.62 mm (0.0185 – 0.0244 in.)
	Oil (side rail)	0.10 – 0.35 mm (0.0039 – 0.0138 in.)
	Maximum No. 1	0.89 mm (0.0350 in.)
	No. 2	1.37 mm (0.0531 in.)
	Oil (side rail)	0.73 mm (0.0287 in.)
Piston pin		
Bushing inside diameter		22.001 – 22.010 mm (0.8662 – 0.8665 in.)
Piston pin diameter		21.997 – 22.009 mm (0.8660 – 0.8665 in.)
Oil clearance	Standard	0.005 – 0.011 mm (0.0002 – 0.0004 in.)
	Maximum	0.010 mm (0.0020 in.)
Crankshaft bearing cap set bolt		
Diameter	Standard	7.5 – 7.6 mm (0.295 – 0.299 in.)
	Minimum	7.2 mm (0.283 in.)