

ENGINE MECHANICAL

SERVICE DATA

031H1-05

Chain sub-assy Length at 15 links	Maximum	115.3 mm (4.539 in.)
Camshaft timing gear or sprocket Diameter (w/ chain)	Minimum	96.8 mm (3.811 in.)
Crankshaft timing gear or sprocket Diameter (w/ chain)	Minimum	51.0 mm (2.008 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 Length	Standard Maximum	146.8 to 148.2 mm (5.780 to 5.835 in.) 148.5 mm (5.846 in.)
Camshaft Circle runout Lobe height	Maximum Standard	0.03 mm (0.0012 in.) Intake 44.333 to 44.433 mm (1.7454 to 1.7493 in.) Exhaust 43.761 to 43.861 mm (1.7229 to 1.7268 in.)
Journal diameter	Minimum Intake Exhaust No. 1 Others	44.18 mm (1.7394 in.) 43.61 mm (1.7169 in.) 34.449 to 34.465 mm (1.3563 to 1.3569 in.) 22.949 to 22.965 mm (0.9035 to 0.9041 in.)
Thrust clearance	Standard Maximum	0.040 to 0.095 mm (0.0009 to 0.0023 in.) 0.110 mm (0.0043 in.)
Oil clearance	Standard Maximum	0.035 to 0.072 mm (0.0014 to 0.0028 in.) 0.10 mm (0.0039 in.)
Valve clearance (Cold)	Intake Exhaust	0.15 to 0.25 mm (0.0059 to 0.0098 in.) 0.25 to 0.35 mm (0.0098 to 0.0138 in.)
Cylinder head sub-assy Warpage	Maximum Cylinder block side Intake manifold side Exhaust manifold side	0.05 mm (0.0020 in.) 0.10 mm (0.0039 in.) 0.10 mm (0.0039 in.)
Valve guide bushing Inside diameter Oil clearance	Standard Intake Exhaust Maximum Intake Exhaust	5.510 to 5.530 mm (0.2169 to 0.2177 in.) 0.025 to 0.060 mm (0.0010 to 0.0024 in.) 0.030 to 0.065 mm (0.0012 to 0.0026 in.) 0.08 mm (0.0031 in.) 0.10 mm (0.0039 in.)
Bore diameter Protrusion height		10.285 to 10.306 mm (0.4049 to 0.4058 in.) 8.7 to 9.1 mm (0.342 to 0.358 in.)
Valve stem Diameter	Intake Exhaust	5.470 to 5.485 mm (0.2154 to 0.2159 in.) 5.465 to 5.480 mm (0.2152 to 0.2158 in.)
Inner compression spring Free length Deviation Angle (reference)	Maximum Maximum	43.40 mm (1.7087 in.) 1.6 mm (0.063 in.) 2°

SERVICE SPECIFICATIONS – ENGINE MECHANICAL

Valve Overall length	Standard Intake Exhaust Minimum Intake Exhaust	88.65 mm (3.4902 in.) 88.69 mm (3.4917 in.) 88.35 mm (3.4784 in.) 88.39 mm (3.4799 in.)
Head margin thickness	Standard Minimum	1.0 mm (0.039 in.) 0.7 mm (0.028 in.)
Valve lifter Diameter Bore diameter Oil clearance	Standard Maximum	30.966 to 30.976 mm (1.2191 to 1.2195 in.) 31.000 to 31.025 mm (1.2205 to 1.2215 in.) 0.024 to 0.059 mm (0.0009 to 0.0023 in.) 0.079 mm (0.0031 in.)
Straight pin Protrusion height		5 mm (0.20 in.)
Union protrusion Protrusion height	Standard A B C	14 mm (0.551 in.) 23.2 mm (0.913 in.) 9 mm (0.354 in.)
Connecting rod sub-assy Thrust clearance Oil clearance Out-of-alignment Twist	Standard Maximum Standard Maximum Maximum per/100 mm (3.94 in.) Maximum per/100 mm (3.94 in.)	0.160 to 0.342 mm (0.063 to 0.0135 in.) 0.342 mm (0.0135 in.) 0.028 to 0.060 mm (0.0011 to 0.0024 in.) 0.080 mm (0.0031 in.) 0.05 mm (0.0020 in.) 0.05 mm (0.0020 in.)
Connecting rod bearing Center wall thickness	Reference Mark 1 Mark 2 Mark 3	1.486 to 1.490 mm (0.0585 to 0.0587 in.) 1.491 to 1.494 mm (0.0587 to 0.0588 in.) 1.495 to 1.498 mm (0.0589 to 0.0590 in.)
Crankshaft Thrust clearance Circle runout Main journal diameter Oil clearance	Standard Maximum Maximum Maximum taper and out-of-round Standard Maximum	0.04 to 0.24 mm (0.0016 to 0.0094 in.) 0.30 mm (0.0118 in.) 0.03 mm (0.0012 in.) 47.988 to 48.000 mm (1.8893 to 1.8898 in.) 0.02 mm (0.0008 in.) 0.015 to 0.032 mm (0.0006 – 0.0012 in.) 0.05 mm (0.0020 in.)
Cylinder block sub-assy Warpage Bore diameter	Maximum Standard Maximum	0.05 mm (0.0020 in.) 79.000 to 79.013 mm (3.1073 to 3.1107 in.) 79.133 mm (3.1155 in.)
Piston Diameter (at 29.8 mm (1.173 in.) from the piston head) Oil clearance	1ZZ-FE 3ZZ-FE Standard Maximum	78.955 to 78.965 mm (3.1085 to 3.1089 in.) 78.960 to 78.975 mm (3.1087 to 3.1091 in.) 0.073 to 0.096 mm (0.0029 to 0.0038 in.) 0.10 mm (0.0039 in.)
Piston ring Groove clearance End gap	No. 1 No. 2 Oil Standard No. 1 No. 2 Oil Maximum No. 1 No. 2	0.020 to 0.070 mm (0.0008 to 0.0028 in.) 0.030 to 0.070 mm (0.0012 to 0.0028 in.) 0.03 to 0.011 mm (0.0012 to 0.0043 in.) 0.25 to 0.35 mm (0.0098 to 0.0138 in.) 0.35 to 0.50 mm (0.0138 to 0.0197 in.) 0.15 to 0.40 mm (0.0059 to 0.0157 in.) 0.74 mm (0.029 in.) 0.89 mm (0.035 in.)
Piston pin Diameter		20.006 to 20.015 mm (0.7876 to 0.7880 in.)

Connecting rod bolt Diameter	Standard Maximum	6.6 to 6.7 mm (0.260 to 0.264 in.) 6.4 mm (0.252 in.)
Crank pin Diameter	Maximum taper and out-of-round	43.992 to 44.000 mm (1.7320 to 1.7323 in.) 0.02 mm (0.0008 in.)
Crankshaft bearing cap set bolt Diameter	Standard Maximum	7.3 to 7.5 mm (0.287 to 0.295 in.) 7.3 mm (0.287 in.)
Connecting rod small end bush Oil clearance	Standard Maximum	0.005 to 0.011 mm (0.0002 to 0.0004 in.) 0.011 mm (0.0004 in.)