

ENGINE MECHANICAL (2RZ-FE, 3RZ-FE)

SS040-06

SERVICE DATA

Compression pressure	at 250 rpm Difference of pressure between each cylinder	STD Minimum	1,230 kPa (12.5 kgf/cm ² , 178 psi) or more 880 kPa (9.0 kgf/cm ² , 127 psi) 98 kPa (1.0 kgf/cm ² , 14 psi) or less
Valve clearance	Adjusting shim (for repair part)	Intake Exhaust Mark 2.500 Mark 2.550 Mark 2.600 Mark 2.650 Mark 2.700 Mark 2.750 Mark 2.800 Mark 2.850 Mark 2.900 Mark 2.950 Mark 3.000 Mark 3.050 Mark 3.100 Mark 3.150 Mark 3.200 Mark 3.250 Mark 3.300	0.15 – 0.25 mm (0.006 – 0.010 in.) 0.25 – 0.35 mm (0.010 – 0.014 in.) 2.500 mm (0.0984 in.) 2.550 mm (0.1004 in.) 2.600 mm (0.1024 in.) 2.650 mm (0.1043 in.) 2.700 mm (0.1063 in.) 2.750 mm (0.1083 in.) 2.800 mm (0.1102 in.) 2.850 mm (0.1122 in.) 2.900 mm (0.1142 in.) 2.950 mm (0.1161 in.) 3.000 mm (0.1181 in.) 3.050 mm (0.1201 in.) 3.100 mm (0.1220 in.) 3.150 mm (0.1240 in.) 3.200 mm (0.1260 in.) 3.250 mm (0.1280 in.) 3.300 mm (0.1299 in.)
Ignition timing	w/ Terminals TE1 and E1 connected of DLC1		3 – 7° BTDC @ idle
Idle speed	Engine at normal operating temperature		650 – 750 rpm
Cylinder head	Warpage Cylinder block side Manifold side Valve seat Refacing angle Contacting angle Contacting width Cylinder head bolt outside diameter	Maximum Maximum Intake Exhaust 45° STD Minimum	0.05 mm (0.0020 in.) 0.10 mm (0.0039 in.) 30°, 45°, 60° 45°, 60° 45° 1.0 – 1.4 mm (0.039 – 0.055 in.) 10.76 – 10.97 mm (0.4236 – 0.4319 in.) 10.40 mm (0.4094 in.)
Valve guide bushing	Inside diameter Outside diameter (for repair part) Protrusion height Replacing temperature (Cylinder head side)	STD O/S 0.05	6.010 – 6.030 mm (0.2366 – 0.2374 in.) 11.000 – 11.027 mm (0.4331 – 0.4341 in.) 11.050 – 11.077 mm (0.4350 – 0.4361 in.) 8.2 – 8.6 mm (0.323 – 0.339 in.) 80 – 100°C (176 – 212°F)
Valve	Valve overall length Valve face angle Stem diameter Stem oil clearance Margin thickness	STD Intake Exhaust Minimum Intake Exhaust Intake Exhaust STD Intake Exhaust Maximum Intake Exhaust STD Minimum	103.45 mm (4.0728 in.) 103.60 mm (4.0787 in.) 102.95 mm (4.0531 in.) 103.10 mm (4.0590 in.) 44.5° 5.970 – 5.985 mm (0.2350 – 0.2356 in.) 5.965 – 5.980 mm (0.2348 – 0.2354 in.) 0.025 – 0.060 mm (0.0010 – 0.0024 in.) 0.030 – 0.065 mm (0.0012 – 0.0026 in.) 0.08 mm (0.0031 in.) 0.10 mm (0.0039 in.) 1.0 mm (0.039 in.) 0.5 mm (0.020 in.)

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Valve spring	Deviation Installed tension	Maximum at 35.7 mm (1.406 in.)	2.0 mm (0.079 in.) 177 – 204 N (18.0 – 20.8 kgf, 39.7 – 45.9 lbf)
Valve lifter	Lifter diameter Lifter bore diameter Oil clearance	STD Maximum	30.966 – 30.976 mm (1.1578 – 1.2195 in.) 31.000 – 31.016 mm (1.2205 – 1.2211 in.) 0.024 – 0.050 mm (0.0009 – 0.0020 in.) 0.07 mm (0.0028 in.)
Manifold	Warpage	Maximum Intake Exhaust	0.20 mm (0.0078 in.) 0.50 mm (0.0197 in.)
Air intake chamber	Warpage	Maximum	0.20 mm (0.0078 in.)
Camshaft	Thrust clearance Journal oil clearance Journal diameter Circle runout Cam lobe height Camshaft gear backlash Camshaft gear spring end free distance	STD Maximum STD Maximum Intake Exhaust STD Maximum	0.040 – 0.095 mm (0.0016 – 0.0037 in.) 0.12 mm (0.0047 in.) 0.025 – 0.062 mm (0.0010 – 0.0024 in.) 0.08 mm (0.0031 in.) 26.959 – 26.975 mm (1.0614 – 1.0620 in.) 0.06 mm (0.0024 in.) 45.31 – 45.41 mm (1.7839 – 1.7878 in.) 45.06 – 45.16 mm (1.7740 – 1.7779 in.) 0.020 – 0.200 mm (0.0008 – 0.0079 in.) 0.30 mm (0.0188 in.) 22.5 – 22.9 mm (0.886 – 0.902 in.)
Spark plug tube	Protrusion		47.0 mm (1.850 in.)
Chain and timing gear	Chain length at 16 links Camshaft timing gear wear (w/ chain) Crankshaft timing gear wear (w/ chain) Balance shaft drive gear wear (w/ chain) No.2 crankshaft timing sprocket wear (w/ chain)	Maximum (No.1) (No.2) Minimum Minimum Minimum Minimum	147.5 mm (5.807 in.) 123.6 mm (4.866 in.) 113.8 mm (4.480 in.) 59.4 mm (2.339 in.) 75.9 mm (2.988 in.) 96.7 mm (3.807 in.)
Chain tensioner slipper and vibration damper	Wear	Maximum	1.0 mm (0.039 in.)
Cylinder block	Cylinder head surface warpage Cylinder bore diameter Main bearing bolt outside diameter Cylinder block main journal bore diameter	Maximum STD Maximum STD Minimum STD Mark 1 Mark 2 Mark 3 U/S 0.25	0.05 mm (0.0020 in.) 94.990 – 95.003 mm (3.7400 – 3.7403 in.) 95.06 mm (3.7425 in.) 10.76 – 10.97 mm (0.4236 – 0.4319 in.) 10.40 mm (0.4094 in.) 64.004 – 64.010 mm (2.5198 – 2.5201 in.) 64.011 – 64.016 mm (2.5201 – 2.5203 in.) 64.017 – 64.022 mm (2.5203 – 2.5205 in.) 64.000 – 64.024 mm (2.5197 – 2.5206 in.)

Piston and piston ring	Piston diameter 2RZ-FE	STD	94.923 – 94.933 mm (3.7371 – 3.7375 in.)
		O/S 0.50	95.423 – 95.433 mm (3.7568 – 3.7572 in.)
	3RZ-FE	STD	94.933 – 94.943 mm (3.7375 – 3.7379 in.)
		O/S 0.50	95.433 – 95.443 mm (3.7572 – 3.7576 in.)
	Piston oil clearance 2RZ-FE		0.057 – 0.080 mm (0.0022 – 0.0031 in.)
		3RZ-FE	0.047 – 0.070 mm (0.0019 – 0.0028 in.)
	Piston ring groove clearance	No.1	0.020 – 0.070 mm (0.0008 – 0.0028 in.)
		No.2	0.030 – 0.070 mm (0.0012 – 0.0028 in.)
	Piston ring end gap	No.1	0.300 – 0.400 mm (0.0118 – 0.0157 in.)
		No.2	0.400 – 0.500 mm (0.0157 – 0.0197 in.)
Piston pin installing temperature		80 – 90 °C (176 – 194 °F)	
Connecting rod	Thrust clearance	STD	0.160 – 0.312 mm (0.0063 – 0.0123 in.)
		Maximum	0.35 mm (0.0138 in.)
	Connecting rod bearing center wall thickness	STD Mark 4	1.482 – 1.485 mm (0.0583 – 0.0585 in.)
		Mark 5	1.485 – 1.488 mm (0.0585 – 0.0586 in.)
		Mark 6	1.488 – 1.491 mm (0.0586 – 0.0587 in.)
		U/S 0.25	1.601 – 1.607 mm (0.0630 – 0.0633 in.)
	Connecting rod big end inside diameter	STD Mark 4	56.000 – 56.006 mm (2.2047 – 2.2050 in.)
		Mark 5	56.006 – 56.012 mm (2.2050 – 2.2052 in.)
		Mark 6	56.012 – 56.018 mm (2.2052 – 2.2054 in.)
		U/S 0.25	56.000 – 56.018 mm (2.2047 – 2.2054 in.)
	Connecting rod oil clearance	STD	0.030 – 0.055 mm (0.0012 – 0.0022 in.)
		U/S 0.25	0.031 – 0.071 mm (0.0012 – 0.0026 in.)
		Maximum	0.10 mm (0.0039 in.)
	Rod out-of-alignment	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)
Bushing inside diameter		24.008 – 24.017 mm (0.9452 – 0.9455 in.)	
Piston pin diameter		24.000 – 24.009 mm (0.9449 – 0.9452 in.)	
Piston pin oil clearance	STD	0.005 – 0.011 mm (0.0002 – 0.0004 in.)	
	Maximum	0.015 mm (0.0006 in.)	
Connecting rod bolt outside diameter	STD	7.80 – 7.90 mm (0.3071 – 0.3110 in.)	
	Minimum	7.60 mm (0.2992 in.)	

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Crankshaft	Thrust clearance	STD	0.020 – 0.220 mm (0.0008 – 0.0087 in.)	
		Maximum	0.30 mm (0.0118 in.)	
	Thrust washer thickness		2.440 – 2.490 mm (0.0961 – 0.0980 in.)	
	Main journal oil clearance	STD No.3	0.030 – 0.055 mm (0.0012 – 0.0022 in.)	
		Others	0.024 – 0.049 mm (0.0009 – 0.0019 in.)	
		U/S 0.25 No.3	0.030 – 0.070 mm (0.0012 – 0.0028 in.)	
		Others	0.025 – 0.065 mm (0.0010 – 0.0026 in.)	
	Main journal diameter	Maximum	0.10 mm (0.0039 in.)	
		STD No.3	59.981 – 59.994 mm (2.2615 – 2.3620 in.)	
		Others	59.987 – 60.000 mm (2.3617 – 2.3622 in.)	
		U/S 0.25 No.3	59.740 – 59.750 mm (2.3520 – 2.3524 in.)	
	Main bearing center wall thickness	STD	Mark 1	1.987 – 1.990 mm (0.0782 – 0.0783 in.)
			Mark 2	1.991 – 1.993 mm (0.0784 – 0.0785 in.)
			Mark 3	1.994 – 1.996 mm (0.0785 – 0.0786 in.)
U/S 0.25		2.106 – 2.112 mm (0.0829 – 0.0831 in.)		
Crank pin diameter		STD	52.987 – 53.000 mm (2.0861 – 2.0866 in.)	
	U/S 0.25	52.745 – 52.755 mm (2.0766 – 2.0770 in.)		
Circle runout	Maximum	0.03 mm (0.0012 in.)		
Main journal taper and out-of-round	Maximum	0.005 mm (0.0002 in.)		
Crank pin taper and out-of-round	Maximum	0.005 mm (0.0002 in.)		
Balance shaft	Thrust clearance	STD	0.07 – 0.13 mm (0.0027 – 0.0051 in.)	
		Maximum	0.20 mm (0.0079 in.)	
	Bearing inside diameter	No.1	38.025 – 38.045 mm (1.4970 – 1.4978 in.)	
		No.2	37.525 – 37.545 mm (1.4774 – 1.4781 in.)	
	Journal diameter	No.1	37.969 – 37.985 mm (1.4948 – 1.4955 in.)	
		No.2	37.449 – 37.465 mm (1.4744 – 1.4750 in.)	
	Journal oil clearance	STD No.1	0.040 – 0.076 mm (0.0016 – 0.0031 in.)	
No.2		0.060 – 0.096 mm (0.0024 – 0.0038 in.)		
Maximum		0.15 mm (0.0059 in.)		