SPECIFICATIONS 1GR-FE ENGINE MECHANICAL SERVICE DATA

Engine

Ignition timing	Terminal TC and CG of DLC3 connected (Transmission in neutral position and A/C switch OFF)	8 to 12° BTDC @ idle
	Terminals TC and CG of DLC3 disconnected (Transmission in neutral position and A/C switch OFF)	7 to 24° BTDC @ idle
Idle speed (Transmission in neutral position and A/C switch OFF)		650 to 750 rpm
Compression	Standard	1300 kPa (13.3 kgf/cm^2, 189 psi) or higher
	Minimum	1000 kPa (10.2 kgf/cm^2, 145 psi)
	Difference	100 kPa (1.0 kgf/cm^2, 15 psi) or less

Valve clearance

Ignition timing	Intake	Standard	0.15 to 0.25 mm (0.00591 to 0.00984 in.)
	Exhaust	Standard	0.29 to 0.39 mm (0.0114 to 0.0154 in.)

Engine Unit

Cylinder head set bolt	Length		Standard	141.3 to 142.7 mm (5.56 to 5.62 in.)
			Maximum	143.7 mm (5.66 in.)
	Outside diameter		Standard	10.85 to 11.0 mm (0.427 to 0.433 in.)
			Minimum	10.7 mm (0.421 in.)
Camshaft	Thrust clearance (for Bank 1)	Intake	Standard	0.04 to 0.09 mm (0.00157 to 0.00354 in.)
			Maximum	0.11 mm (0.00433 in.)
		Exhaust	Standard	0.08 to 0.13 mm (0.00315 to 0.00512 in.)
			Maximum	0.15 mm (0.00591 in.)
	Thrust clearance (for Bank 2)	Intake	Standard	0.05 to 0.10 mm (0.00197 to 0.00394 in.)
			Maximum	0.12 mm (0.00472 in.)
		Exhaust	Standard	0.08 to 0.13 mm (0.00315 to 0.00512 in.)
			Maximum	0.15 mm (0.00591 in.)
	Oil clearance (for Bank 1)	No. 1 Journal (Intake Side)	Standard	0.028 to 0.048 mm (0.00110 to 0.00189 in.)
		No. 1 Journal (Exhaust Side)	Standard	0.040 to 0.079 mm (0.00157 to 0.00311 in.)
		Others	Standard	0.025 to 0.062 mm (0.000984 to 0.00244 in.)

		No. 1 Journal (Intake Side)	Maximum	0.07 mm (0.00276 in.)
		Others	Maximum	0.10 mm (0.00394 in.)
	Oil clearance (for Bank 2)	No. 1 Journal (Intake Side)	Standard	0.050 to 0.089 mm (0.00197 to 0.00350 in.)
		No. 1 Journal (Exhaust Side)	Standard	0.040 to 0.079 mm (0.00157 to 0.00311 in.)
		Others	Standard	0.025 to 0.062 mm (0.000984 to 0.00244 in.)
		No. 1 Journal (Intake Side)	Maximum	0.08 mm (0.00315 in.)
		Others	Maximum	0.10 mm (0.00394 in.)
	Circle runout		Maximum	0.06 mm (0.00236 in.)
	Cam lobe height	Intake	Standard	44.168 to 44.268 mm (1.739 to 1.743 in.)
			Minimum	44.018 mm (1.73 in.)
		Exhaust	Standard	44.580 to 44.680 mm (1.755 to 1.759 in.)
			Minimum	44.430 mm (1.75 in.)
	Journal diameter	No. 1 journal	Standard	35.971 to 35.985 mm (1.416 to 1.417 in.)
		Other journal	Standard	22.959 to 22.975 mm (0.904 to 0.905 in.)
Chain sub-assembly	Chain elongation		Maximum	146.8 mm (5.78 in.)
No. 2 chain sub-assembly	Chain elongation		Maximum	146.8 mm (5.78 in.)
Camshaft timing gear assembly	Gear diameter (with chain)		Minimum	115.5 mm (4.55 in.)
	Gear diameter (with No. 2 chain)		Minimum	73.1 mm (2.88 in.)
Camshaft timing sprocket	Gear diameter (with No. 2 chain)		Minimum	73.1 mm (2.88 in.)
Crankshaft timing sprocket	Gear diameter (with chain)		Minimum	61.0 mm (2.40 in.)
Idle sprocket assembly	Gear diameter (with chain)		Minimum	61.0 mm (2.40 in.)
	Inside diameter		Standard	23.02 to 23.03 mm (0.906 to 0.907 in.)
	No. 1 idle gear shaft diameter		Standard	22.987 to 23.000 mm (0.905 to 0.906 in.)
	Oil clearance		Standard	0.020 to 0.043 mm (0.000787 to 0.00169 in.)
			Maximum	0.093 mm (0.00366 in.)
No. 2 chain tensioner assembly	Depth		Maximum	1.0 mm (0.0394 in.)
No. 3 chain tensioner assembly	Depth		Maximum	1.0 mm (0.0394 in.)
Chain tensioner slipper	Depth		Maximum	1.0 mm (0.0394 in.)
No. 1 chain vibration damper	Depth		Maximum	1.0 mm (0.0394 in.)
No. 2 chain vibration damper	Depth		Maximum	1.0 mm (0.0394 in.)
Exhaust manifold	Warpage		Maximum	0.70 mm (0.0276 in.)
Intake manifold	Warpage	Intake air surge tank	Maximum	0.80 mm (0.0315 in.)

		side		
		Cylinder head side		0.20 mm (0.00787 in.)

Cylinder Head

Cylinder Head	Warpage	Cylinder block side	Standard	0.05 mm (0.00197 in.)
			Maximum	0.10 mm (0.00394 in.)
		Intake side	Standard	0.08 mm (0.00315 in.)
			Maximum	0.10 mm (0.00394 in.)
		Exhaust side	Standard	0.05 mm (0.00197 in.)
			Maximum	0.10 mm (0.00394 in.)
Inner compression spring	Free length		Standard	47.8 mm (1.88 in.)
	Deviation		Maximum	2.0 mm (0.0787 in.)
	Installed tension		Standard	186 to 206 N (19 to 21 kgf, 41.8 to 46.3 lbf) at 36.2 mm (1.43 in.)
Intake valve	Valve stem diameter		Standard	5.470 to 5.485 mm (0.2154 to 0.2159 in.)
	Valve face angle		Standard	44.5°
	Margin thickness		Standard	1.0 mm (0.0394 in.)
			Minimum	0.5 mm (0.0197 in.)
	Overall length		Standard	106.95 mm (4.21 in.)
			Minimum	106.40 mm (4.19 in.)
Exhaust valve	Valve stem diameter		Standard	5.465 to 5.480 mm (0.2152 to 0.2157 in.)
	Valve face angle		Standard	44.5°
	Margin thickness		Standard	1.0 mm (0.0394 in.)
			Minimum	0.5 mm (0.0197 in.)
	Overall length		Standard	105.80 mm (4.17 in.)
			Minimum	105.30 mm (4.15 in.)
Valve guide bush	Inside diameter		Standard	5.51 to 5.53 mm (0.217 to 0.218 in.)
	Oil clearance	Intake	Standard	0.025 to 0.060 mm (0.000984 to 0.00236 in.)
			Maximum	0.08 mm (0.00315 in.)
		Exhaust	Standard	0.030 to 0.065 mm (0.00118 to 0.00256 in.)
			Maximum	0.10 mm (0.00394 in.)
Valve seat	Contacts width		Standard	1.0 to 1.4 mm (0.0394 to 0.0551 in.)
Valve lifter	Diameter		Standard	30.966 to 30.976 mm (1.219 to 1.220 in.)
	Bore diameter		Standard	31.009 to 31.025 mm (1.220 to 1.221 in.)
	Oil clearance		Standard	0.033 to 0.059 mm (0.00130 to 0.0232 in.)
			Maximum	0.08 mm (0.00315

				in.)

Cylinder Block

Connecting rod thrust clearance	Thrust clearance		Standard	0.15 to 0.30 mm (0.00591 to 0.0118 in.)
			Maximum	0.35 mm (0.0138 in.)
Connecting rod oil clearance	Oil clearance		Standard	0.040 to 0.066 mm (0.00157 to 0.00260 in.)
			Maximum	0.086 mm (0.00339 in.)
Crankshaft thrust clearance	Thrust clearance		Standard	0.04 to 0.24 mm (0.00157 to 0.00945 in.)
			Maximum	0.30 mm (0.0118 in.)
Cylinder block sub-assembly	Warpage		Maximum	0.05 mm (0.00197 in.)
	Cylinder bore		Reference (New parts)	94.000 to 94.012 mm (3.7008 to 3.7013 in.)
			Maximum	94.132 mm (3.7060 in.)
Piston	Diameter		Reference (New parts)	93.910 to 93.920 mm (3.6972 to 3.6976 in.)
	Pin hole inside diameter	Mark A	Standard	22.001 to 22.004 mm (0.86618 to 0.86630 in.)
		Mark B	Standard	22.005 to 22.007 mm (0.86634 to 0.86642 in.)
		Mark C	Standard	22.008 to 22.010 mm (0.86645 to 0.86653 in.)
Piston oil clearance	Oil clearance		Reference (New parts)	0.080 to 0.102 mm (0.00315 to 0.00402 in.)
			Maximum	0.13 mm (0.00512 in.)
Piston ring groove clearance	Groove clearance	No. 1 compression ring	Standard	0.02 to 0.07 mm (0.000787 to 0.00276 in.)
		No. 2 compression ring	Standard	0.02 to 0.06 mm (0.000787 to 0.00236 in.)
		Oil ring	Standard	0.07 to 0.15 mm (0.00276 to 0.00590 in.)
Piston ring	End gap (for Type A)	No. 1 compression ring	Standard	0.30 to 0.40 mm (0.0118 to 0.0157 in.)
			Maximum	1.0 mm (0.0394 in.)
		No. 2 compression ring	Standard	0.40 to 0.50 mm (0.0157 to 0.0197 in.)
			Maximum	1.1 mm (0.0433 in.)
		Oil ring	Standard	0.10 to 0.40 mm (0.00394 to 0.0157 in.)
			Maximum	1.0 mm (0.0394 in.)
	End gap (for Type B)	No. 1 compression ring	Standard	0.22 to 0.32 mm (0.00866 to 0.0126 in.)
			Maximum	1.0 mm (0.0394 in.)
		No. 2 compression	Standard	0.35 to 0.45 mm

		ring		(0.0138 to 0.0177 in.)
			Maximum	1.1 mm (0.0433 in.)
		Oil ring	Standard	0.10 to 0.40 mm (0.00394 to 0.0157 in.)
			Maximum	1.0 mm (0.0394 in.)
Piston pin	Diameter	Mark A	Standard	21.997 to 22.000 mm (0.86602 to 0.86614 in.)
		Mark B	Standard	22.001 to 22.003 mm (0.86618 to 0.86626 in.)
		Mark C	Standard	22.004 to 22.006 mm (0.86630 to 0.86638 in.)
		Mark D	Standard	22.007 to 22.009 mm (0.86642 to 0.86649 in.)
Piston pin oil clearance	Oil clearance	between Piston	Standard	0.001 to 0.007 mm (0.0000394 to 0.000276 in.)
			Maximum	0.040 mm (0.00157 in.)
		between Connecting rod	Standard	0.005 to 0.011 mm (0.000197 to 0.000433 in.)
			Maximum	0.050 mm (0.00197 in.)
Connecting rod sub-assembly	Rod bush inside diameter	Mark A	Standard	22.005 to 22.008 mm (0.86634 to 0.86645 in.)
		Mark B	Standard	22.009 to 22.011 mm (0.86649 to 0.86657 in.)
		Mark C	Standard	22.012 to 22.014 mm (0.86661 to 0.86669 in.)
	Band		Maximum	0.05 mm (0.00197 in.) per 100 mm (3.94 in.)
	Twist		Maximum	0.15 mm (0.00597 in.) per 100 mm (3.94 in.)
Crankshaft	Circle runout		Maximum	0.06 mm (0.00236 in.)
	Diameter	Main journal	Standard	71.988 to 72.000 mm (2.8342 to 2.8346 in.)
		Crank pin	Standard	55.992 to 56.000 mm (2.2044 to 2.2047 in.)
	Taper and out-of-round	Main journal	Maximum	0.02 mm (0.000787 in.)
		Crank pin	Maximum	0.02 mm (0.000787 in.)
Crankshaft oil clearance	Oil clearance		Standard	0.018 to 0.030 mm (0.000709 to 0.00118 in.)
			Maximum	0.046 mm (0.00181 in.)
Connecting rod set bolt	Diameter		Standard	7.2 to 7.3 mm (0.283 to 0.287 in.)
			Minimum	7.0 mm (0.276 in.)
Crankshaft bearing cap set bolt	Diameter		Standard	10.0 to 10.2 mm (0.394 to 0.402 in.)