

SERVICE SPECIFICATIONS

SERVICE DATA

Engine tune-up	Battery specific gravity			1.27–1.29 (when fully charged at 20°C (68°F))	
	High-tension cord resistance			25 kΩ per cord	
	Valve clearance			0.15 – 0.25 mm 0.006 – 0.010 in.	
	Ignition timing			8–12° BTDC @ idle (w/ Terminals TE1 and E1 connected)	
	Idle speed			700 ± 50 rpm	
Intake manifold vacuum	at Idle speed			60 kPa 450 mmHg 17.7 in.Hg	
Compression pressure	at 250 rpm STD Limit			1,226 kPa (12.5 kgf/cm, 178 psi) or more 981 kPa 10.0 kgf/cm 142 psi	
	Difference of pressure between each cylinder			98 kPa (1.0 kgf/cm, 14 psi) or less	
Timing belt tensioner	Protrusion from housing end			10.5 – 11.5 mm 0.413 – 0.453 in.	
Cylinder head	Warpage	Cylinder block side	Limit	0.10 mm	0.0039 in.
		Manifold side	Limit	0.10 mm	0.0039 in.
	Valve seat	Refacing angle		30°, 45°, 75°	
		Contacting angle		45°	
		Contacting width		1.0 – 1.4 mm	0.039 – 0.055 in.
	Cylinder head bolt thread outside diameter			9.770 – 9.960 mm	0.3846 – 0.3921 in.
				9.60 mm	0.3780 in.
Valve guide bushing	Inside diameter			6.010 – 6.030 mm	0.2366 – 0.2374 in.
	Outside diameter (for repair part) STD			11.048 – 11.059 mm	0.4350 – 0.4354 in.
	O/S 0.05			11.098 – 11.109 mm	0.4369 – 0.4374 in.
Valve	Valve overall length	STD	Intake	94.95 mm	3.7382 in.
			Exhaust	96.90 mm	3.8150 in.
		Limit	Intake	94.45 mm	3.7185 in.
			Exhaust	96.40 mm	3.7953 in.
	Valve face angle			44.5°	
	Stem diameter	Intake	Exhaust	5.970 – 5.985 mm	0.2350 – 0.2356 in.
				5.965 – 5.980 mm	0.2356 – 0.2354 in.
	Stem oil clearance	STD	Intake	0.025 – 0.060 mm	0.0010 – 0.0024 in.
			Exhaust	0.030 – 0.065 mm	0.0012 – 0.0026 in.
		Limit	Intake	0.08 mm	0.0031 in.
			Exhaust	0.10 mm	0.0039 in.
	Margin thickness	STD	Limit	1.0 mm	0.039 in.
				0.5 mm	0.020 in.
Valve spring	Squareness			2.0 mm	0.079 in.
	Free length			43.6 mm	1.717 in.
	Installed tension at 32.9 mm (1.295 in.)			186–206 N (19.0 – 21.0 kgf, 41.9 – 46.3 lbf)	
Valve lifter	Lifter diameter			30.966–30.976 mm	1.2191–1.2195 in.
	Lifter bore diameter			31.000–31.016 mm	1.2205–1.2211 in.
	Oil clearance	STD	Limit	0.024–0.050 mm	0.0009–0.0020 in.
				0.07 mm	0.0028 in.

SERVICE DATA (Cont'd)

Camshaft	Thrust clearance		STD	0.040–0.090 mm	0.0016–0.0035 in.
			Limit	0.12 mm	0.0047 in.
	Journal oil clearance				
	STD Exhaust camshaft thrust portion			0.025–0.061 mm	0.0010–0.0024 in.
	Others			0.030–0.067 mm	0.0012–0.0026 in.
	Limit			0.10 mm	0.0039 in.
	Journal diameter				
	Exhaust camshaft thrust portion			23.959–23.975 mm	0.9433–0.9439 in.
	Others			26.954–26.970 mm	1.0612–1.0618 in.
	Circle runout		Limit	0.08 mm	0.0031 in.
	Cam lobe height	STD	Intake	41.710–41.810 mm	1.6421–1.6461 in.
			Exhaust	41.910–42.010 mm	1.6500–1.6539 in.
		Limit	Intake	41.56 mm	1.6362 in.
			Exhaust	41.76 mm	1.6441 in.
Camshaft gear backlash		STD	0.020–0.200 mm	0.0008–0.0079 in.	
		Limit	0.30 mm	0.0188 in.	
	Camshaft gear spring end free distance			18.2–18.8 mm	0.712–0.740 in.
Manifold	Warpage	Limit	Intake	0.15 mm	0.0059 in.
			Exhaust	1.00 mm	0.0394 in.
Air intake chamber	Warpage	Limit	0.15 mm	0.0059 in.	
Cylinder block	Cylinder head surface warpage		Limit	0.07 mm	0.0028 in.
	Cylinder bore diameter	STD	Mark 1	87.500–87.510 mm	3.4449–3.4453 in.
			Mark 2	87.510–87.520 mm	3.4453–3.4457 in.
			Mark 3	87.520–87.530 mm	3.4457–3.4461 in.
			Limit		87.73 mm
	Main bearing cap stud bolt tension portion diameter		STD	7.500–7.600 mm	0.2953–0.2992 in.
		Limit		7.40 mm	0.2913 in.
Piston and piston ring	Piston diameter		Mark 1	87.470–87.480 mm	3.4437–3.4441 in.
			Mark 2	87.480–87.490 mm	3.4441–3.4445 in.
			Mark 3	87.490–87.500 mm	3.4445–3.4449 in.
	Piston oil clearance		STD	0.020–0.040 mm	0.0008–0.0016 in.
			Limit	0.06 mm	0.0024 in.
	Piston ring groove clearance		No.1	0.020–0.060 mm	0.0008–0.0024 in.
			No.2	0.015–0.055 mm	0.0006–0.0022 in.
	Piston ring end gap	STD	No.1	0.250–0.450 mm	0.0098–0.0177 in.
			No.2	0.350–0.600 mm	0.0138–0.0236 in.
			Oil	0.150–0.500 mm	0.0059–0.0197 in.
		Limit	No.1	1.05 mm	0.0413 in.
			No.2	1.20 mm	0.0472 in.
			Oil	1.10 mm	0.0433 in.

SERVICE DATA (Cont'd)

Connecting rod	Thrust clearance	STD	0.160–0.330 mm	0.0063–0.0114 in.
		Limit	0.35 mm	0.138 in.
	Connecting rod thickness		22.880–22.920 mm	0.9008–0.9024 in.
	Connecting rod bearing center wall thickness			
		Mark 2	1.484–1.487 mm	0.0584–0.0585 in.
		Mark 3	1.487–1.490 mm	0.0585–0.0587 in.
		Mark 4	1.490–1.493 mm	0.0587–0.0588 in.
		Mark 5	1.493–1.496 mm	0.0588–0.0589 in.
		Mark 6	1.496–1.499 mm	0.0589–0.0590 in.
		Mark 7	1.499–1.502 mm	0.0590–0.0591 in.
	Connecting rod oil clearance	STD	0.027–0.053 mm	0.0011–0.0021 in.
		Limit	0.065 mm	0.0026 in.
	Rod bending Limit per 100 mm (3.94 in.)		0.05 mm	0.0020 in.
	Rod twist Limit per 100 mm (3.94 in.)		0.15 mm	0.0059 in.
	Connecting rod bushing inside diameter		22.005–22.017 mm	0.8663–0.8668 in.
	Piston pin diameter		21.997–22.009 mm	0.8660–0.8665 in.
Crankshaft	Connecting rod bushing oil clearance	STD	0.005–0.011 mm	0.0002–0.0004 in.
		Limit	0.05 mm	0.0020 in.
	Connecting rod tension portion diameter			
		STD	7.200–7.300 mm	0.2835–0.2874 in.
		Limit	7.00 mm	0.2756 in.
	Thrust clearance	STD	0.020–0.220 mm	0.0008–0.0087 in.
		Limit	0.30 mm	0.0118 in.
	Thrust washer thickness	STD	2.440–2.490 mm	0.0961–0.0980 in.
	Main journal bore diameter on cylinder block (with main bearing)		67.026–67.033 mm	2.6388–2.6391 in.
	Main journal oil clearance	STD	0.026–0.045 mm	0.0010–0.0018 in.
		Limit	0.055 mm	0.0022 in.
	Main journal diameter		66.988–67.000 mm	2.6373–2.6378 in.
	Main bearing center wall thickness	Mark 1	2.486–2.489 mm	0.0979–0.0980 in.
		Mark 2	2.489–2.492 mm	0.0980–0.0981 in.
		Mark 3	2.492–2.495 mm	0.0981–0.0982 in.
		Mark 4	2.495–2.498 mm	0.0982–0.0983 in.
		Mark 5	2.498–2.501 mm	0.0983–0.0985 in.
	Crank pin diameter		51.982–52.000 mm	2.0465–2.0472 in.
	Circle runout	Limit	0.08 mm	0.0031 in.
	Main journal taper and out-of-round	Limit	0.02 mm	0.0008 in.
	Crank pin taper and out-of-round	Limit	0.02 mm	0.0008 in.

TORQUE SPECIFICATIONS

Part tightened		N·m	kgf·cm	ft·lbf
No.1 idler pulley X Cylinder block		34	350	25
No.2 idler pulley X Cylinder block		34	350	25
Hydraulic pump X Cylinder block	12 mm head	16	160	12
	14 mm head	30	310	22
Crankshaft pulley X Crankshaft		245	2,500	181
Camshaft timing pulley X Camshaft		108	1,100	80
Timing belt tensioner X Oil pump		26	270	20
Spark plug X Cylinder head		18	180	13
Drive belt tensioner X Cylinder block		16	160	12
Alternator X Alternator bracket		37	380	27
Alternator X Cylinder block		37	380	27
Distributor housing X Cylinder head		18	185	13
Distributor rotor X Distributor housing		3.8	39	34 in·lbf
Distributor cap X Camshaft timing pulley		3.8	39	34 in·lbf
RH No.2 timing belt cover X Cylinder block (for 12 mm head)		16	160	12
Drive belt idler pulley X Hydraulic pump		37	380	27
A/C compressor X Hydraulic pump		49	500	36
A/C compressor X Cylinder block	49	500	36	
A/C compressor stay X Oil filter bracket		29	300	22
Exhaust manifold X Cylinder head		39	400	29
Main oxygen sensor X Exhaust manifold		44	450	33
Cylinder head X Cylinder block	1st	39	400	29
	2nd	Turn 90°		
Camshaft bearing cap X Cylinder head		16	160	12
Cylinder head cover X Cylinder head		5.9	60	52 in·lbf
Engine hanger X Cylinder head		37	380	27
EGR pipe X Exhaust manifold		18	185	13
Rear water by-pass joint X Cylinder head		18	185	13
Front water by-pass joint X Cylinder head		18	185	13
Intake manifold X Cylinder head		18	185	13
Delivery pipe X Intake manifold		18	185	13
Fuel return pipe X RH delivery pipe(for union bolt)		35	360	26
Fuel inlet hose X LH delivery pipe		39	400	29
	for SST	33	340	24
Cold start injector X Air intake chamber		7.8	80	69 in·lbf
Air intake chamber X Intake manifold		18	185	13
EGR pipe X Air intake chamber		18	185	13
EGR pipe X RH cylinder head		18	185	13
Cold start injector tube X RH delivery pipe		15	150	11
Brake booster union X Air intake chamber		29	300	22
Throttle body X Air intake chamber		18	185	13
ISC valve X Air intake chamber		18	185	13
EGR valve adapter X Air intake chamber		18	185	13
EGR valve X EGR valve adapter		18	185	13
Timing belt rear plate X Cylinder head		7.8	80	69 in·lbf
Water inlet housing X Water pump		18	185	13
Catalytic converter (main) X Exhaust manifold		62	630	46
Catalytic converter (main) X Front exhaust pipe		43	440	32
Front exhaust pipe support bracket X Transmission		43	440	32
PS pump X RH cylinder head	Bolt	39	400	29
	Nut	43	440	32
Main bearing cap X Cylinder block	Nut 1st	27	275	20
	2nd	Turn 90°		
	Bolt	49	500	36

TORQUE SPECIFICATIONS (Cont'd)

Part tightened			N·m	kgf·cm	ft·lbf
Connecting rod cap X Connecting rod	1st		25	250	18
	2nd		Turn 90°		
Rear oil seal retainer X Cylinder block			7.8	80	69 in.·lbf
Water seal plate X Cylinder block			14	145	10
Alternator bracket X Cylinder block			18	185	13
Oil pump X Cylinder block	12 mm head		16	160	12
	14 mm head		30	310	22
Water pump X Cylinder block			18	185	13
Water by-pass pipe X Cylinder block			18	185	13
Knock sensor X Cylinder block			44	450	33
Starter X Cylinder block			39	400	29
Engine mounting bracket X Cylinder block			37	380	27
Drive plate X Crankshaft			98	1,000	72
A/T oil cooler pipe X Transmission			34	350	25
Rear engine mounting member X Body			25	260	19
Rear engine mounting member X Engine mounting insulator			13	135	10
Front engine mounting insulator X Suspension crossmember			59	600	43
Center floor brace X Body			13	130	9
Tailpipe X Center exhaust pipe			43	440	32
Front exhaust pipe X Center exhaust pipe			43	440	32
Sub-oxygen sensor X Front exhaust pipe			44	450	33