SERVICE SPECIFICATIONS

SERVICE DATA

Compression pressure	at 250 rpm	STD	3,628 kPa (37.0 kgf/cm², 526 psi) or more
		Minimum	2,648 kPa (27.0 kgf/cm², 384 psi)
	Difference of pressure between each cylinder		490 kPa (5.0 kgf/cm², 71 psi) or less
Valve clearance	at cold	Intake	0.15 — 0.25 mm (0.006 — 0.010 in.)
		Exhaust	0.35 — 0.45 mm (0.014 — 0.018 in.)
Injection timing Plunger stroke	—		1.03 — 1.09 mm (0.0406 — 0.0429 in.)
Idle speed		M/T	650 ± 50 rpm
		A/T	710 ± 50 rpm
Maximum speed	—		4,600 rpm
PS idle—up speed	—		950±50 rpm
A/C idle—up speed	—		950±50 rpm
Timing belt tensioner	—		72.7 mm (2.862 in.)
Timing gear	Idler gear inside diameter		45.000 — 45.025 mm (1.7717 — 1.7726 in.)
	Idler gear shaft diameter		44.950 — 44.957 mm (1 7679 — 1.7707 in.)
	Idler gear oil clearance	STD	0.025 — 0.075 mm (0.0010 — 0.0030 in.)
		Maximum	0.20 mm (0.0079 in.)
	Gear backlash	STD	0.05 — 0.15 mm (0.0020 — 0.0059 in.)
		Maximum	0.30 mm (0.0118 in.)
	Idler geaer thrust clearance	STD	0.05 — 0.15 mm (0.0020 — 0.0059 in.)
		Maximum	0.30 mm (0.0118 in.)
Cylinder head	Warpage	Maximum	0.20 mm (0.079 in.)
	Valve seat		
	Refacing angle	Intake	25°, 45°, 70°
		Exhaust	25°, 45°, 60°
	Contacting angle		45°
	Contacting width	Intake	1.5 — 1.9 mm (0.059 — 0.075 in.)
		Exhaust	1.8 — 2.2 mm (0.071 — 0.087 in.)
	Cylinder head bolt thread inside diameter	STD	10.800 — 11.000 mm (0.4252 — 0.4331 in.)
		Minimum	10.55 mm (0.4154 in.)
Valve guide bushing	Inside diameter		8.010 — 8.030 mm (0.3154 — 0.3161 in.)
	Outsid diameter	STD	13.004 — 13.025 mm (0.5112 — 0.5128 in.)

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Valve	Valve overall length	STD Intake	103.29 — 103.69 mm (4.0655 — 4.0823 in.)
		Exhaust	103.14 — 103.54 mm (4.0606 — 4.0764 in.)
		Minimum Intake	102.79 mm (4.0468 in.)
		Exhaust	102.64 mm (4.0409 in.)
	Valve face angle		44.5 °
	Stem diameter	Intake	7.975 — 7.990 mm (0.3140 — 0.3146 in.)
		Exhaust	7.960 — 7.975 mm (0.3134 — 0.3140 in.)
	Stem oil clearance	STD Intake	0.020 — 0.055 mm (0.0008 — 0.0022 in.)
		Exhaust	0.035 — 0.0070 mm (0.0014 — 0.0028 in.)
		Maximum Intake	0.08 mm (0.0031 in.)
		Exhaust	0.10 mm (0.0039 in.)
	Margin thickness	STD Intake	1.6 mm (0.063 in.)
		Exhaust	1.7 mm (0.067 in.)
		Minimum Intake	1.1 mm (0.043 in.)
		Exhaust	1.2 mm (0.047 in.)
Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Free length	Yellow painted	46.20 mm (1.8189 in.)
		Blue painted	49.14 mm (1.9346 in.)
	Installed tension at 32.9 mm (1.295 in.)		301 — 332 N (30.7 — 33.9 kgf, 67.7 — 74.7 lbf)
Valve rocker arm and shaft	Valve rocker arm inside diameter		40.892 — 40.902 mm (1.6099 — 1.6103 in.)
	Valve rocker shaft diameter		40.960 — 40.980 mm (1.6126 — 1.6134 in.)
	Oil clearance	STD	0.0580 — 0.083 mm (0.0023 — 0.0033 in.)
		Maximum	0.10 mm (0.0039 in.)
Camshaft	Thrust clearance	STD	0.100 — 0.200 mm (0.0039 — 0.0079 in.)
		Maximum	0.30 mm (0.0118 in.)
	Journal oil clearance	STD No.1	0.022 — 0.074 mm (0.0009 — 0.0029 in.)
		Others	0.030 — 0.066 mm (0.0012 — 0.0026 in.)
		Maximum	0.10 mm (0.0039 in.)
	Journal diameter	No.1	34.969 — 34.985 mm (1.3767 — 1.3774 in.)
		Others	27.986 — 27.998 mm (1.1018 — 1.1023 in.)
	Circle runout	Maximum	0.10 mm (0.0039 in.)
	Cam lobe height	STD Intake	55.090 — 55.110 mm (2.1689 — 2.1697 in.)
		Exhaust	55.940 — 55.960 mm (2.2024 — 2.2031 in.)
		Minimum Intake	54.59 mm (2.1419 in.)
		Exhaust	55.44 mm (2.1827 in.)
Manifold	Warpage	Maximum	0.40 mm (0.0157 in.)
Cylinder block	Cylinder head surface warpage	Maximum	0.20 mm (0.0079 in.)
	Cylinder bore diameter	STD Mark 1	94.000 — 94.010 mm (3.7001 — 3.7012 in.)
		Mark 2	94.010 — 94.020 mm (3.7012 — 3.7016 in.)
		Mark 3	94.020 — 94.030 mm (3.7016 — 3.7020 in.)
		Maximum STD	94.23 mm (3.7098 in.)
		O/S 0.50	94.73 mm (3.7295 in.)
	Main journal bore diameter (Reference)	Mark 1	71.000 — 71.006 mm (2.7953 — 2.7955 in.)
		Mark 2	71.006 — 71.012 mm (2.7955 — 2.7957 in.)
		Mark 3	71.012 — 71.018 mm (2.7957 — 2.7960 in.)

Piston and piston ring	Piston diameter	STD Mark 1	93.95 — 93.96 mm (3.6988 — 3.6992 in.)
		Mark 2	93.96 — 93.97 mm (3.6992 — 3.7000 in.)
		Mark 3	93.97 — 93.98 mm (3.7000 — 3.7179 in.)
		O/S 0.50	94.45 — 94.48 mm (3.7185 — 3.7197 in.)
	Piston oil clearance	STD	0.04 — 0.06 mm (0.0016 — 0.0024 in.)
		Minimum	0.14 mm (0.0055 in.)
	Piston ring groove clearance	STD No.1	0.050 — 0.095 mm (0.0020 — 0.0037 in.)
		No.2	0.060 — 0.100 mm (0.0024 — 0.0039 in.)
		Oil	0.030 — 0.070 mm (0.0012 — 0.0028 in.)
	Piston ring end gap	STD No.1	0.270 — 0.540 mm (0.0106 — 0.0213 in.)
		No.2	0.400 — 0.622 mm (0.0118 — 0.0244 in.)
		Oil	0.200 — 0.520 mm (0.0079 — 0.0205 in.)
		Maximum No.1	1.34 mm (0.0591 in.)
		No.2	1.42 mm (0.0551 in.)
		Oil	1.32 mm (0.0520 in.)
Connecting rod	Thrust clearance	STD	0.10 — 0.20 mm (0.0039 — 0.0079 in.)
		Maximum	0.30 mm (0.0118 in.)
	Connecting rod oil clearance	STD	0.036 — 0.054 mm (0.0014 — 0.0021 in.)
		U/S 0.25, U/S 0.50	0.037 — 0.077 mm (0.0015 — 0.0030 in.)
		Maximum	0.10 mm (0.0039 in.)
	Connecting rod bearing center wall thickness		
	(Reference)	STD Mark 2	1.486 — 1.489 mm (0.0585 — 0.0586 in.)
		Mark 3	1.489 — 1.492 mm (0.0586 — 0.0587 in.)
		Mark 4	1.492 — 1.495 mm (0.0587 — 0.0589 in.)
		Mark 5	1.495 — 1.498 mm (0.0589 — 0.0590 in.)
		Mark 6	1.498 — 1.501 mm (0.0590 — 0.0591 in.)
	Rod bend	Maximum per 100 mm (3.94 in.)	0.03 mm (0.0012 in.)
	Twist	Maximum per 100 mm (3.94 in.)	0.15 mm (0.0059 in.)
	Connecting rod bolt outer diameter	STD	83.000 — 84.000 mm (0.3268 — 0.3307 in.)
		Minimum	7.95 mm (0.3130 in.)
	Bushing inside diameter		29.008 — 29.020 mm (1.1420 — 1.1425 in)
	Piston pin diameter		29.000 — 29.012 mm (1.1417 — 1.1422 in)
	Piston pin oil diameter	STD	0.004 — 0.012 mm (0.0002 — 0.0005 in.)
		Maximum	0.03 mm (0.0012 in.)
	Big end inner diameter		
	(Reference)	STD Mark 1	62.014 — 62.020 mm (2.4415 — 2.4417 in.)
		Mark 2	62.020 — 62.026 mm (2.4417 — 2.4420 in.)
		Mark 3	62.026 — 62.032 mm (2.4420 — 2.4422 in.)

Crankshaft	Thrust clearance	STD	0.040 – 0.240 mm (0.0016 – 0.0094 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness		2.930 – 2.980 mm (0.1154 – 0.1173 in.)
	Main journal oil clearance STD	STD	0.036 – 0.054 mm (0.0014 – 0.0021 in.)
		U/S 0.25, U/S 0.50	0.037 – 0.077 mm (0.0015 – 0.0030 in.)
		Maximum	0.10 mm (0.0039 in.)
	Main journal diameter STD	Mark 1	66.994 – 57.000 mm (2.7953 – 2.7955 in.)
		Mark 2	66.988 – 66.994 mm (2.7955 – 2.7957 in.)
		Mark 3	66.982 – 66.988 mm (2.7957 – 2.7960 in.)
		U/S 0.25	66.745 – 66.755 mm (2.6278 – 2.3132 in.)
		U/S 0.50	66.495 – 66.505 mm (2.6179 – 2.3033 in.)
	Main bearing center wall thickness (Reference)		
	STD	Mark 2	1.486 – 1.489 mm (0.0585 – 0.0586 in.)
		Mark 3	1.489 – 1.492 mm (0.0586 – 0.0587 in.)
		Mark 4	1.492 – 1.495 mm (0.0587 – 0.0589 in.)
		Mark 5	1.495 – 1.498 mm (0.0589 – 0.0590 in.)
		Mark 6	1.498 – 1.501 mm (0.0590 – 0.0591 in.)
	Crank pin diameter STD	Mark 1	58.994 – 59.000 mm (2.3226 – 2.3228 in.)
		Mark 2	58.988 – 58.994 mm (2.3224 – 2.3226 in.)
		Mark 3	58.982 – 58.988 mm (2.3221 – 2.3224 in.)
		U/S 0.25	58.745 – 58.755 mm (2.3128 – 2.3132 in.)
		U/S 0.50	58.495 – 58.505 mm (2.3029 – 2.3033 in.)
	Circle runout	Maximum	0.06 mm (0.0024 in.)
	Main journal taper and out–of–round	Maximum	0.02 mm (0.0008 in.)
	Crank pin taper and out–of–round	Maximum	0.02 mm (0.0008 in.)
Main bearing	Main bearing cap bolt outer diameter	STD	11.800 – 12.000 mm (0.4646 – 0.4724 in.)
		Minimum	11.50 mm (0.4528 in.)

TORQUE SPECIFICATION

Part tightened	N·m	kgf·cm	ft·lbf
Injection pump x Timing gear case	18	185	13
Injection pump x Injection pump stay	69	700	51
Plug bolt x Distributive head plug on injection pump	17	170	12
Injection pump x Injection pipes	15	150	11
No.1 camshaft timing pulley x Camshaft	98	1,000	72
No.2 camshaft timing pulley x Injection pump drive gear	31	315	23
Idler pulley bolt x Cylinder head	26	270	20
Spring bolt x Cylinder head	26	270	20
Injection pump drive gear x Injection pump	98	1,000	27
Idler gear (thust plate) x Cylinder block	39	400	29
Timing gear cover x Timing gear case	20	200	14
Timing gear cover x Cylinder block	20	200	14
No.1 crankshaft pulley x Crankshaft	490	5,000	362
No.2 crankshaft pulley x No.1 crankshaft pulley	25	250	18
Vacuum pump x Timing gear case	39	400	29
Oil pipe x Vacuum pump	18	185	13
Oil pipe x Cylinder block	18	185	13

Cylinder head x Cylinder block	1st	69	700	51
	2nd	Turn 90°	Turn 90°	Turn 90°
	3rd	Turn 90°	Turn 90°	Turn 90°
Camshaft bearing cap x Cylinder head		25	250	18
Camshaft oil seal retainer x Cylinder head		20	200	14
Exhaust manifold x Cylinder head		39	400	29 in.-lbf
Water outlet x Cylinder head		20	200	14
Intake manifold x Cylinder head		20	200	14
Oil dipstick guide x Intake manifold		20	200	14
Oil dipstick guide x Oil cooler cover		20	200	14
Main bearing cap x Cylinder head		103	1,050	76
Connecting rod cap x Connecting rod	1st	37	375	27
	2nd	Turn 90°	Turn 90°	Turn 90°
Main bearing cap x Cylinder block	1st	103	1,050	76
	2nd	Turn 90°	Turn 90°	Turn 90°
Rear oil seal retainer x Cylinder block		6.4	65	56in.-lbf
Rear end plate x Cylinder block		18	185	13
Flywheel (M/T), Drive plate (A/T) x Crankshaft		127	1,300	94