

SERVICE SPECIFICATIONS

SERVICE DATA

Compression pressure	at 250 rpm STD Minimum Difference of pressure between each cylinder	1,176 kPa (12.0 kgf/cm ² , 171 psi) or more 883 kPa (9.0 kgf/cm ² , 128 psi) 98 kPa (1.0 kgf/cm ² , 14 psi) or less
Valve clearance	at cold Intake Exhaust	0.15–0.25 mm (0.006–0.010 in.) 0.25–0.35 mm (0.010–0.014 in.)
Ignition timing	w/ Terminals TE1 and E1 connected	3° BTDC @ idle
Idle speed	–	650 ± 50 rpm
Intake manifold vacuum	at idle speed	63 kPa (473 mmHg, 18.6 in.Hg)
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 Intake Exhaust STD Limit 0.15 mm (0.0059 in.) 0.10 mm (0.0039 in.) 30°, 45°, 75° 45°, 75° 45° 1.2–1.6 mm (0.047–0.063 in.) 1.0–1.4 mm (0.039–0.055 in.) 10.85–11.00 mm (0.4272–0.4331 in.) 10.6 mm (0.417 in.)
Valve guide bushing	Inside diameter Outside diameter (for repair part) Protrusion height	STD O/S 0.05 7.010–7.030 mm (0.2760–0.2768 in.) 11.492–11.513 mm (0.4524–0.4533 in.) 11.542–11.563 mm (0.4544–0.4552 in.) 8.2–8.6 mm (0.323–0.339 in.)
Valve	Valve overall length Vale 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 98.4 mm (3.874 in.) 97.9 mm (3.854 in.) 97.9 mm (3.854 in.) 97.4 mm (3.835 in.) 44.5° 6.970–6.985 mm (0.2744–0.2750 in.) 6.965–6.980 mm (0.2742–0.2748 in.) 0.025–0.060 mm (0.0010–0.0024 in.) 0.030–0.065 mm (0.0012–0.0028 in.) 0.08 mm (0.0031 in.) 0.10 mm (0.0039 in.) 1.2 mm (0.047 in.) 1.0 mm (0.039 in.)
Valve spring	Deviation Free length Installed tension at 36.5 mm (1.437 in.)	Maximum 43.94–45.06 mm (1.7299–1.7740 in.) 214–238 N (21.8–24.2 kgf, 48.1–53.4 lbf)
Valve lifter	Lifter diameter Lifter bore diameter Oil clearance	STD Maximum 33.966–33.976 mm (1.3372–1.3376 in.) 34.000–34.021 mm (1.3386–1.3394 in.) 0.024–0.055 mm (0.0009–0.0022 in.) 0.07 mm (0.0028 in.)
Manifold	Warpage	Maximum 0.30 mm (0.0118 in.)

Air intake chamber	Warpage	Maximum	0.30 mm (0.0118 in.)
Camshaft	Thrust clearance	STD	0.030 – 0.080 mm (0.0012 – 0.0031 in.)
		Maximum	0.10 mm (0.0039 in.)
	Journal oil clearance	STD	0.025 – 0.062 mm (0.0010 – 0.0024 in.)
		Maximum	0.10 mm (0.0039 in.)
	Journal diameter		26.959 – 26.975 mm (1.0614 – 1.0620 in.)
	Circle runout	Maximum	0.06 mm (0.0024 in.)
	Cam lobe height	STD	50.61 – 50.71 mm (1.9925 – 1.9965 in.)
		Minimum	50.51 mm (1.9886 in.)
	Camshaft gear backlash	STD	0.020 – 0.200 mm (0.0008 – 0.0079 in.)
		Maximum	0.30 mm (0.0188 in.)
	Camshaft gear spring end free distance		18.2 – 18.8 mm (0.717 – 0.740 in.)
Spark plug tube	Protrusion		45.5 mm (1.791 in.)
Oil pump drive shaft gear	Thrust clearance	STD	0.040 – 0.160 mm (0.0016 – 0.0063 in.)
		Maximum	0.30 mm (0.0118 in.)
Chain and timing gear	Chain length at 16 links	Maximum	146.6 mm (5.772 in.)
	Camshaft timing gear wear (w/chain)	Minimum	126.0 mm (4.961 in.)
	Crankshaft timing gear wear (w/chain)	Minimum	65.4 mm (2.575 in.)
Chain tensioner slipper and vibration damper	Wear	Maximum	1.0 mm (0.039 in.)
Cylinder block	Cylinder head surface warpage	Maximum	0.05 mm (0.0020 in.)
	Cylinder bore diameter	STD Mark 1	100.000 – 100.010 mm (3.9370–3.9374 in.)
		Mark 2	100.010 – 100.020 mm (3.9374–3.9378 in.)
		Mark 3	100.020 – 100.030 mm (3.9378–3.9382 in.)
		Maximum STD	100.23 mm (3.9461 in.)
		O/S 0.50	100.73 mm (3.9658 in.)
		O/S 1.00	101.23 mm (3.9854 in.)
	Main bearing bolt outside diameter	STD	10.85 – 11.00 mm (0.4271 – 0.4331 in.)
		Minimum	10.6 mm (0.417 in.)
Piston and piston ring	Piston diameter	STD Mark 1	99.950 – 99.960 mm (3.9350 – 3.9354 in.)
		Mark 2	99.960 – 99.970 mm (3.9354 – 3.9358 in.)
		Mark 3	99.970 – 99.980 mm (3.9358 – 3.9362 in.)
		O/S 0.50	100.450 – 100.480 mm (3.9547 – 3.9559 in.)
		O/S 1.00	100.950 – 100.980 mm (3.9744 – 3.9756 in.)
	Piston oil clearance	STD	0.040 – 0.060 mm (0.0016 – 0.0024 in.)
	Piston ring groove clearance	No.1	0.040 – 0.080 mm (0.0016 – 0.0031 in.)
		No.2	0.030 – 0.070 mm (0.0012 – 0.0028 in.)
	Piston ring end gap	STD No.1	0.300 – 0.520 mm (0.0118 – 0.0205 in.)
		No.2	0.450 – 0.670 mm (0.0177 – 0.0264 in.)
		Oil	0.150 – 0.520 mm (0.0059 – 0.0205 in.)
		Maximum No.1	1.12 mm (0.0441 in.)
		No.2	1.17 mm (0.0461 in.)
		Oil	1.12 mm (0.0441 in.)

Connecting rod	Thrust clearance	STD	0.160 – 0.262 mm (0.0063 – 0.0103 in.)
		Maximum	0.362 mm (0.0143 in.)
	Connecting rod bearing center wall thickness		
	Reference	STD Mark 2	1.744 – 1.747 mm (0.0687 – 0.0688 in.)
		Mark 3	1.747 – 1.750 mm (0.0688 – 0.0689 in.)
		Mark 4	1.750 – 1.753 mm (0.0689 – 0.0690 in.)
		Mark 5	1.753 – 1.756 mm (0.0690 – 0.0691 in.)
		Mark 6	1.756 – 1.759 mm (0.0691 – 0.0693 in.)
	Connecting rod oil clearance	STD STD	0.032 – 0.050 mm (0.0013 – 0.0020 in.)
		U/S 0.25	0.033 – 0.073 mm (0.0013 – 0.0029 in.)
		Maximum	0.10 mm (0.0039 in.)
	Rod bend	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		26.008 – 26.020 mm (1.0239 – 1.0244 in.)
	Piston pin diameter		26.000 – 26.012 mm (1.0236 – 1.0241 in.)
Crankshaft	Piston pin oil clearance	STD	0.004 – 0.012 mm (0.0002 – 0.0005 in.)
		Limit	0.05 mm (0.0020 in.)
	Connecting rod bolt outside diameter	STD	8.40 – 8.60 mm (0.3307 – 0.3386 in.)
		Minimum	8.00 mm (0.3150 in.)
	Thrust clearance	STD	0.020 – 0.220 mm (0.0008 – 0.0087 in.)
		Maximum	0.30 mm (0.0118 in.)
	Thrust washer thickness	STD	2.440 – 2.490 mm (0.0961 – 0.0980 in.)
		O/S 0.125	2.503 – 2.553 mm (0.0985 – 0.1005 in.)
		O/S 0.250	2.565 – 2.615 mm (0.1010 – 0.1030 in.)
	Main journal oil clearance	STD STD	0.042 – 0.060 mm (0.0017 – 0.0024 in.)
		U/S 0.25	0.041 – 0.081 mm (0.0016 – 0.0032 in.)
		Maximum	0.10 mm (0.0039 in.)
	Main journal diameter	STD	68.982 – 69.000 mm (2.7158 – 2.7165 in.)
		U/S 0.25	68.745 – 68.755 mm (2.7065 – 2.7069 in.)
	Main bearing center wall thickness		
Crankshaft	Reference	STD 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.)
		Mark 6	2.501 – 2.504 mm (0.0985 – 0.0986 in.)
	Crank pin diameter	STD	56.982 – 57.000 mm (2.2434 – 2.2441 in.)
		U/S 0.25	56.745 – 56.755 mm (2.2341 – 2.2344 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.)

TORQUE SPECIFICATIONS

Part tightened		N·m	kgf·cm	ft·lbf
Distributor x Cylinder head		18	180	13
No.1 engine hanger x Cylinder head		41	420	30
No.2 engine hanger x Cylinder head		41	420	30
Air intake chamber x Intake manifold		21	210	15
Intake manifold x Cylinder head		21	210	15
Heater inlet pipe x Intake manifold		21	210	15
EGR pipe x Cylinder head		21	210	15
EGR pipe x EGR valve	Union nut	78	800	58
Water outlet x Cylinder head		21	210	15
Generator bracket x Cylinder head		43	440	32
Cylinder head x Cylinder block	1st	39	400	29
	2nd	Turn 90°	Turn 90°	Turn 90°
	3rd	Turn 90°	Turn 90°	Turn 90°
Cylinder head x Timing chain cover		21	210	15
Camshaft bearing cap x Cylinder head		16	160	12
Camshaft timing gear x Camshaft		74	750	54
Chain tensioner x Cylinder head		21	210	15
Water bypass outlet x Cylinder head		21	210	15
Heater pipe x Timing chain cover		21	210	15
Heater pipe x Cylinder head		20	200	14
Exhaust manifold x Cylinder head		39	400	29
Heat insulator x Exhaust manifold		19	195	14
Front exhaust pipe x Exhaust manifold		63	630	46
No.1 support bracket x Transmission		24	240	17
No.1 support bracket clamp bolt		19.5	195	14
Front exhaust pipe x Rear TWC		46	470	34
No. 2 water bypass pipe x Cylinder head		20	200	14
No. 2 water bypass pipe x No.1 engine hanger		20	200	14
Fuel inlet hose x Fuel filter		29	300	22
Intake manifold stay x Air intake chamber		36	360	26
Intake manifold stay x Cylinder block		36	360	26
Oil dipstick guide x Intake manifold		20	200	14
Oil dipstick guide x No.1 oil pan		20	200	14
PS reservoir tank x Air intake chamber		20	200	14
Oil jet X Cylinder block		20	200	14
Vibration damper x Cylinder block		20	200	14
Chain tensioner slipper x Cylinder block		69	700	51
Timing chain cover x Cylinder block		21	210	15
Drive belt idler pulley x Timing chain cover		43	440	32
Crankshaft pulley x Crankshaft		412	4,200	304
Transmission housing x No.1 oil pan		72	730	53
Oil level sensor x No.1 oil pan		5.4	55	48 in.·lbf
Water pump x Cylinder block		21	210	15
Radiator pipe x No.1 oil pan		21	210	15
A/C compressor bracket x No.1 oil pan		37	375	27
A/C compressor bracket x Cylinder block		37	375	27
A/C compressor x A/C compressor bracket		25	250	18

Oil check valve x Cylinder block		25	250	18
Main bearing cap x Cylinder block	1st	74	750	54
	2nd	Turn 90°	Turn 90°	Turn 90°
Connecting rod cap x Connecting rod	1st	48	490	35
	2nd	Turn 90°	Turn 90°	Turn 90°
Rear oil seal retainer x Cylinder block		21	210	15
Oil cooler cover x Cylinder block		21	210	15
LH engine mounting bracket x Cylinder block		69	700	51
LH insulator x LH engine mounting bracket		72	730	43
RH engine mounting bracket x Cylinder block		69	700	51
RH insulator x RH engine mounting bracket		72	730	43
PS pump x Cylinder block		36	370	27
Knock sensor x Cylinder block		44	450	33
Oil filter union x Cylinder block		44	450	33
Drive plate x Crankshaft		100	1,000	74
Transmission x Cylinder block		72	730	53
Transmission x No.1 oil pan		72	730	53
Torque converter clutch x Drive plate		55	550	41
A/T oil cooler pipe x Union (Transmission)		34	350	25
Starter x Transmission		39	400	29
Frame crossmember x Frame		61	620	45
Frame crossmember x Engine rear mounting insulator		74	750	54
Engine front mounting insulator x Frame		74	750	54
Transfer shift lever x Transmission		18	185	13
Transmission shift lever assembly x Body		5.4	55	48 in.·lbf
Transmission control rod x Control shaft lever		13	130	9
Front propeller shaft x Front differential		74	750	54
Front propeller shaft x Transfer		74	750	54
Rear propeller shaft x Rear differential		88	900	65
Rear propeller shaft x Transfer		88	900	65
Stabilizer bar bracket mounting bolt		18	185	13
Stabilizer bar x Axle carrier		25	260	19
PS pressure hose x PS pump		56	575	42
Rear TWC x Center pipe		40	400	29
Center pipe x Tail pipe		40	400	29
Heated oxygen sensor (Bank 1 Sensor 1) x Front exhaust pipe		20	200	14
Heated oxygen sensor (Bank 1 Sensor 2) x Center pipe		20	200	14
No.2 support bracket x Frame		18.5	185	13
No.3 support bracket x Frame		18.5	185	13
No.4 support bracket x Frame		18.5	185	13
Exhaust pipe damper x Tail pipe		19.5	195	14