

ENGINE MECHANICAL

Specifications

Engine tune-up	Engine coolant capacity					
	w/o Heater	M/T				
		A/T				
	w/ Front heater	M/T				
		A/T				
	w/ Front and rear heater	M/T				
		A/T				
	Engine oil capacity					
	Dry fill					
	Drain and refill					
	w/o Oil filter change					
	w/ Oil filter change					
	Battery specific gravity					
	High-tension cord resistance					
	Spark plug					
	Type	1RZ (Europe, Singapore)	ND	W16EXR-U		
			NGK	BPR5EY		
		1RZ (Others), 2RZ	ND	W16EX-U		
			NGK	BP5EY		
		2RZ-E	ND	P16R		
			NGK	BPR5EP 11		
	Gap	1RZ and 2RZ		0.8 mm	0.031 in.	
		2RZ-E		1.1 mm	0.043 in.	
	Drive belt deflection with 10 kg (22.1 lb, 98 N)	New belt		5 – 7 mm	0.20 – 0.28 in.	
		Used belt		7 – 8 mm	0.28 – 0.31 in.	
	Drive belt tension	New belt		70 – 80 kg		
		Used belt		30 – 45 kg		
	Valve clearance (cold)	Intake		0.20 – 0.30 mm	0.008 – 0.012 in.	
		Exhaust		0.25 – 0.35 mm	0.010 – 0.014 in.	
	Ignition timing					
		1RZ and 2RZ	Chaina	0° BTDC @ Max. 950 rpm		
			Ex. Chaina	5° BTDC @ Max. 950 rpm		
		2RZ-E		5° BTDC @ idle		
	Idle speed	1RZ and 2RZ	M/T	750 rpm		
			A/T	800 rpm		
		2RZ-E		800 rpm		
	Fast idle speed (Ex. 2RZ-E)					
		1RZ		2,600 rpm		
		2RZ		2,400 rpm		
	Dash Pot (DP) Setting Speed					
		1RZ and 2RZ		2,300 rpm		
		2RZ-E		2,000 rpm		
Intake manifold vacuum			at idle speed	More than 400 mmHg (15.75 in.Hg, 53.3 kPa)		
Compression pressure		STD		12.5 kg/cm ²	178 psi	1,226 kPa
		Limit		9.0 kg/cm ²	128 psi	883 kPa
	Differential of pressure between each cylinder			Less than 1.0 kg/cm ² (14 psi, 98 kPa)		

Specifications (Cont'd)

Cylinder head	Head surface warpage	Limit	0.15 mm	0.0059 in.
	Manifold surface warpage	Limit	0.20 mm	0.0079 in.
	Valve seat Refacing angle	Intake	30°, 45°, 60°	
		Exhaust	30°, 45°, 60°	

Specifications (Cont'd)

Cylinder block	Cylinder head surface warpage	Limit		0.05 mm	0.0020 in.
	Cylinder bore	STD	1RZ	85.99 – 86.00 mm	33.854 – 33.858 in.
			2RZ, 2RZ-E	94.99 – 95.00 mm	3.7398 – 3.7402 in.
	Cylinder bore wear				
	On standard sized piston	Limit	1RZ	86.06 mm	3.3882 in.
			2RZ, 2RZ-E	95.06 mm	3.7425 in.
	On oversized piston 0.50	Limit	1RZ	86.56 mm	3.479 in.
			2RZ, 2RZ-E	95.56 mm	3.7622 in.
	Taper and out-of-round	Limit		0.01 mm	0.004 in.
	Cylinder block main journal bore				
	STD	No. 1	64.000 – 64.008 mm	2.5197 – 2.5200 in.	
		No. 2	64.009 – 64.016 mm	2.5200 – 2.5203 in.	
		No. 3	64.017 – 64.024 mm	2.5203 – 2.5206 in.	
	U/S	0.25	64.000 – 64.024 mm	2.5197 – 2.5206 in.	
Piston and piston ring	Piston diameter	STD	1RZ	85.95 – 85.96 mm	3.3839 – 3.3842 in.
			2RZ, 2RZ-E	94.95 – 94.96 mm	3.7382 – 3.7386 in.
		O/S 0.50	1RZ	86.45 – 86.46 mm	3.4035 – 3.4039 in.
			2RZ, 2RZ-E	95.45 – 95.46 mm	3.7579 – 3.7583 in.
	Piston to cylinder clearance	STD		0.03 – 0.05 mm	0.0012 – 0.0020 in.
	Piston ring end gap	STD	No. 1 1RZ	0.22 – 0.35 mm	0.0087 – 0.0138 in.
			2RZ, 2RZ-E	0.30 – 0.43 mm	0.0118 – 0.0169 in.
			No. 2	0.45 – 0.60 mm	0.0177 – 0.0236 in.
			Oil	0.13 – 0.38 mm	0.0051 – 0.0150 in.
		Limit	No. 1 1RZ	0.95 mm	0.0374 in.
			2RZ, 2RZ-E	1.03 mm	0.0406 in.
			No. 2	1.20 mm	0.0472 in.
			Oil	0.98 mm	0.0386 in.
	Ring to ring groove clearance	STD	No. 1	0.03 – 0.08 mm	0.0012 – 0.0031 in.
(New piston ring)		No. 2	0.03 – 0.07 mm	0.0012 – 0.0028 in.	
	Limit		0.2 mm	0.008 in.	
	Piston pin installing temperature		Approx. 80°C (176°F)		
Connecting rod and bearing	Thrust clearance	STD		0.160 – 0.312 mm	0.0063 – 0.0123 in.
		Limit		0.35 mm	0.014 in.
	Big end inner diameter				
		STD	No. 1	56.000 – 56.008 mm	2.2047 – 2.2050 in.
			No. 2	56.009 – 56.016 mm	2.2051 – 2.2053 in.
			No. 3	56.017 – 56.024 mm	2.2054 – 2.2057 in.
		U/S	0.25	56.000 – 56.024 mm	2.2047 – 2.2057 in.
	Connecting rod bearing center wall thickness				
		STD	No. 1	1.481 – 1.485 mm	0.0583 – 0.0585 in.
			No. 2	1.486 – 1.489 mm	0.0585 – 0.0586 in.
			No. 3	1.490 – 1.493 mm	0.0587 – 0.0588 in.
		U/S	0.25	1.601 – 1.607 mm	0.0630 – 0.0633 in.
	Bearing oil clearance	STD		0.030 – 0.059 mm	0.0012 – 0.0023 in.
		Limit		0.1 mm	0.004 in.
Pin to bushing oil clearance	STD		0.005 – 0.011 mm	0.0002 – 0.0004 in.	
	Limit		0.015 mm	0.0006 in.	

Specifications (Cont'd)

Connecting rod and bearing	Piston pin diameter	STD	24.000 – 24.009 mm	0.9449 – 0.9452 in.
	Bushing inside diameter	STD	24.008 – 24.017 mm	0.9452 – 0.9455 in.
	Rod bend per 100 mm (3.94 in.)	Limit	0.05 mm	0.0020 in.
	Rod twist per 100 mm (3.94 in.)	Limit	0.15 mm	0.0059 in.
Crankshaft	Thrust clearance	STD	0.02 – 0.22 mm	0.0008 – 0.0087 in.
		Limit	0.3 mm	0.0012 in.
	Thrust washer thickness	STD	2.400 – 2.440 mm	0.0945 – 0.0961 in.
	Main journal oil clearance	STD	0.020 – 0.049 mm	0.0008 – 0.0019 in.
		Limit	0.1 mm	0.004 in.
	Main journal diameter	STD	59.987 – 60.000 mm	2.3617 – 2.3622 in.
	Main journal finished diameter U/S	0.25	59.745 – 59.755 mm	2.3522 – 2.3526 in.
	Main bearing center wall thickness	STD		
		No. 1	1.986 – 1.990 mm	0.0782 – 0.0783 in.
		No. 2	1.991 – 1.994 mm	0.0784 – 0.0785 in.
		No. 3	1.995 – 1.998 mm	0.0785 – 0.0787 in.
		U/S 0.25	1.601 – 1.607 mm	0.0630 – 0.0633 in.
	Crank pin diameter	STD	52.987 – 53.000 mm	2.0861 – 2.0866 in.
	Crank pin finished diameter U/S	0.25	52.745 – 52.755 mm	2.0766 – 2.0770 in.
	Circle runout	Limit	0.03 mm	0.0012 in.
Flywheel	Main journal taper and out-of round	Limit	0.005 mm	0.0002 in.
	Crank pin journal taper and out-of round	Limit	0.005 mm	0.0002 in.
	Runout	Limit	0.1 mm	0.004 in.

Torque Specifications

Part tightened		kg-cm	ft-lb	N-m
Cylinder head x Camshaft bearing cap		160	12	16
Cylinder head x Chain tensioner		210	15	21
Cylinder head x Spark plug		180	13	18
Cylinder head x Exhaust manifold		500	35	49
Cylinder head x Fuel pump		200	14	20
Cylinder block x Oil filter bracket	Nut	120	9	12
	Union bolt	700	51	67
Cylinder block x Drain cock		150	11	25
Cylinder block x Cylinder head	1st	400	33	44
	2nd	90° turns		
	3rd	90° turns		
Cylinder block x Crankshaft bearing cap	1st	400	33	44
	2nd	90° turns		
Connecting Rod x Connecting rod cap	1st	300	22	29
	2nd	90° turns		
Crankshaft x Crankshaft pulley		2,500	181	245
Camshaft x Distributor drive gear		750	54	74
Crankshaft x Flywheel		900	65	88
Crankshaft x Drive plate		750	54	74
Oil pan x Drain plug		250	18	25
Alternator x Alternator bracket		600	43	59
Engine mounting insulator x Engine mounting bracket		400	33	44
Intake manifold x TVSV		250	18	25
Water by-pass flange x Thermostat valve		250	18	25
EGR valve x Intake manifold		200	14	20
EGR valve x EGR pipe		200	14	20
Exhaust manifold x EGR pipe		200	14	20