ENGINE MECHANICAL

SERVICE DATA

030NP–03

Valve clearance	at cold Intake		0.30 mm (0.012 in.)
	Exhaust		0.45 mm (0.018 in.)
Timing gear	Main idler gear		
	Outside diameter of main idler gear shaft	STD	56.94 – 56.97 mm (2.2417 – 2.2429 in.)
	Inside diameter of main idler gear bushing	STD	57.00 – 57.03 mm (2.2441 – 2.2453 in.)
	Oil clearance between bushing and shaft	STD	0.030 – 0.090 mm (0.0012 – 0.0035 in.)
		Maximum	0.20 mm (0.0079 in.)
	Thrust clearance	STD	0.114 – 0.160 mm (0.0045 – 0.0063 in.)
		Maximum	0.20 mm (0.0078 in.)
	Sub idler gear		
	Outside diameter of sub idler gear shaft	STD	49.950 – 49.975 mm (1.9665 – 1.9675 in.)
	Inside diameter of sub idler gear	STD	50.000 – 50.025 mm (1.9685 – 1.9695 in.)
	Oil clearance between bushing and shaft	STD	0.025 – 0.075 mm (0.0010 – 0.0030 in.)
		Maximum	0.20 mm (0.0079 in.)
	Thrust clearance	STD	0.040 – 0.095 mm (0.0016 – 0.0037 in.)
		Maximum	0.30 mm (0.0118 in.)
	Camshaft idler gear		
	Outside diameter of camshaft idler gear shaft	STD	33.950 – 33.975 mm (1.3366 – 1.3376 in.)
		Minimum	33.80 mm (1.3307 in.)
	Inside diameter of camshaft idler gear	STD	34.000 – 34.015 mm (1.3386 – 1.3392 in.)
		Maximum	34.20 mm (1.3464 in.)
	Oil clearance between bushing and shaft	STD	0.025 – 0.065 mm (0.0010 – 0.0026 in.)
		Maximum	0.20 mm (0.0079 in.)
	Thrust clearance	STD	0.040 – 0.095 mm (0.0016 – 0.0037 in.)
		Maximum	0.30 mm (0.0118 in.)
	Backlash		
	Crankshaft gear x Main idler gear	STD	0.028 – 0.163 mm (0.0011 – 0.0064 in.)
		Maximum	0.30 mm (0.0118 in.)
	Main idler gear x Injection pump drive gear	STD	0.030 – 0.218 mm (0.0012 – 0.0086 in.)
		Maximum	0.30 mm (0.0118 in.)
	Injection pump drive gear x PS pump gear	STD	0.030 – 0.183 mm (0.0012 – 0.0072 in.)
		Maximum	0.30 mm (0.0118 in.)
	Main idler gear x Sub idler gear	STD	0.030 – 0.162 mm (0.0012 – 0.0064 in.)
		Maximum	0.30 mm (0.0118 in.)
	Sub idler gear x Oil pump gear	STD	0.030 – 0.131 mm (0.0012 – 0.0052 in.)
		Maximum	0.30 mm (0.0118 in.)
	Sub idler gear x Camshaft idler gear	STD	0.030 – 0.299 mm (0.0012 – 0.0118 in.)
		Maximum	0.30 mm (0.0118 in.)
	Camshaft timing gear x Camshaft idler gear	STD	0.028 – 0.163 mm (0.0011 – 0.0064 in.)
		Maximum	0.30 mm (0.0118 in.)
	Sub idler gear x Vacuum pump gear	STD	0.029 – 0.187 mm (0.0011 – 0.0074 in.)
		Maximum	0.30 mm (0.0118 in.)
Cyliner head	Warpage	STD	0.04 mm (0.0016 in.) or less for longitudinal direction 0.03 mm (0.0012 in.) or less for lateral direction
Cylinder head bolt	Length (Bolt number position: See page 14–3)		
	Maximum No. 1, 2, 8, 9, 10, 15, 16, 17		126.5 mm (4.9803 in.)
	No. 4, 5, 12, 13		156.5 mm (6.1614 in.)
	No. 3, 6, 11, 14, 18		187.5 mm (7.3819 in.)

Valve	Valve seat angle	Intake	30˚00' – 30˚30'
		Exhaust	44˚15' – 45˚45'
	Valve face angle	Intake	29˚45' – 30˚00'
		Exhaust	44˚45' – 45˚00'
	Valve sink dimension	STD Intake	0.55 – 0.85 mm (0.0217 – 0.0335 in.)
		Exhaust	1.30 – 1.60 mm (0.0512 – 0.0630 in.)
		Maximum Intake	1.20 mm (0.0472 in.)
		Exhaust	1.80 mm (0.0708 in.)
	Valve stem diameter	STD Intake	6.957 – 6.977 mm (0.2739 – 0.2747 in.)
		STD Exhaust	6.932 – 6.950 mm (0.2730 – 0.2736 in.)
		Minimum Intake	6.92 mm (0.2724 in.)
		Exhaust	6.85 mm (0.2700 in.)
	Valve stem oil clearance	STD Intake	0.023 – 0.058 mm (0.0009 – 0.0023 in.)
		Exhaust	0.050 – 0.083 mm (0.0020 – 0.0033 in.)
		Maximum Intake	0.12 mm (0.0047 in.)
		Exhaust	0.15 mm (0.0059 in.)
Valve spring	Deviation	Maximum	2.0 mm (0.079 in.)
	Free length	STD Inner	64.6 mm (2.543 in.)
		Outer	75.7 mm (2.980 in.)
		Minimum Inner	61.6 mm (2.425 in.)
		Outer	72.7 mm (2.862 in.)
	Installed tension	Inner at 44.8 mm (1.764 in.)	128.5 N (13.1 kgf, 28.9 lb)
		Outer at 46.8 mm (1.843 in.)	313.8 N (32.0 kgf, 70.5 lb)
Manifold	Warpage	Maximum	0.20 mm (0.0079 in.)
Camshaft	Cam lobe height	STD Intake	50.600 mm (1.9921 in.)
		Exhaust	51.185 mm (2.0151 in.)
		Minimum Intake	49.967 mm (1.9672 in.)
		Exhaust	52.004 mm (2.0474 in.)
	Journal diameter	STD	39.959 – 39.975 mm (1.5732 – 1.5738 in.)
		Minimum	39.85 mm (1.5689 in.)
	Inside diameter of camshaft bearing	STD	40.00 mm (1.5748 in.)
		Maximum	40.15 mm (1.5807 in.)
	Oil clearance	STD	0.020 – 0.063 mm (0.0008 – 0.0025 in.)
		Maximum	0.063 mm (0.0025 in.)
	Circle runout	Maximum	0.10 mm (0.0039 in.)
	Thrust clearance	STD	0.110 – 0.296 mm (0.0043 – 0.0116 in.)
		Maximum	0.296 mm (0.0116 in.)
Camshaft gear bolt	Length		30.0 mm (1.181 in.)
Valve rocker arm and shaft	Valve rocker arm bushing inside diameter	STD	22.00 – 22.051 mm (0.8661 – 0.8681 in.)
		Maximum	22.08 mm (0.8693 in.)
	Valve rocker arm shaft outside diameter	STD	21.959 – 21.980 mm (0.8645 – 0.8654 in.)
		Minimum	21.92 mm (0.8630 in.)
	Oil clearance	STD	0.020 – 0.092 mm (0.0007 – 0.0036 in.)
		Maximum	0.16 mm (0.0063 in.)
Injection nozzle	Protrusion	STD	2.25 – 2.75 mm (0.0886 – 0.1083 in.)
		Maximum	2.75 mm (0.1083 in.)
Connecting rod	Rod bent	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Rod twist	Maximum per 100 mm (3.94 in.)	0.05 mm (0.0020 in.)
	Bushing inside diameter	STD	37.015 – 37.025 mm (1.4573 – 1.4577 in.)
		Maximum	37.10 mm (1.4606 in.)
	Bushing oil clearance	STD	0.015 – 0.036 mm (0.0006 – 0.0014 in.)
		Maximum	0.08 mm (0.0031 in.)
	Rod big end inside diameter (w/o bearing)	STD	68.985 – 69.000 mm (2.7159 – 2.7165 in.)
		Maximum	69.00 mm (2.7165 in.)
	Rod big end inside diameter (w/ bearing)	STD	64.991 – 65.022 mm (2.5587 – 2.5599 in.)
		Maximum	65.022 mm (2.5599 in.)
	Rod big end oil clearance	STD	0.031 – 0.082 mm (0.0012 – 0.0032 in.)
		Maximum	0.20 mm (0.0079 in.)
	Thrust clearance	STD	0.20 – 0.52 mm (0.0079 – 0.0205 in.)
		Maximum	1.00 mm (0.0394 in.)

Connecting rod bolt	Length		82.5 mm (3.280 in.)
Piston and piston ring	Piston pin diameter	STD	36.989 – 37.000 mm (1.4563 – 1.4567 in.)
		Minimum	36.96 mm (1.4551 in.)
	Piston diameter		
	S05C–B:	STD	113.920 – 113.944 mm (4.4850 – 4.4860 in.)
		Minimum	113.920 mm (4.4860 in.)
	S05C–TA, S05C–TB:	STD	113.869 – 113.885 mm (4.4830 – 4.4837 in.)
		Minimum	113.869 mm (4.4830 in.)
	Piston oil clearance	STD	0.0515 – 0.0715 mm (0.0020 – 0.0028 in.)
	Piston pin boss inside diameter	STD	36.987 – 37.003 mm (1.4562 – 1.4568 in.)
		Minimum	37.05 mm (1.4587 in.)
	Clearance between piston pin boss and piston pin	STD	0.013 (T) – 0.014 (L) mm (0.0051 (T) – 0.0055 (L) in.)
		Maximum	–0.05 mm (–0.0020 in.)
	Piston ring groove width		
	S05C–B:	STD 1st	2.55 – 2.57 mm (0.1004 – 0.1012 in.)
		2nd	2.03 – 2.05 mm (0.0799 – 0.0807 in.)
		Oil	4.01 – 4.03 mm (0.1579 – 0.1586 in.)
		Maximum 1st	2.70 mm (0.1063 in.)
		2nd	2.20 mm (0.0866 in.)
		Oil	4.10 mm (0.1614 in.)
	S05C–TA, S05C–TB:	STD 1st	2.58 – 2.60 mm (0.1015 – 0.1023 in.)
		2nd	2.06 – 2.08 mm (0.0811 – 0.0818 in.)
		Oil	4.01 – 4.03 mm (0.1578 – 0.1586 in.)
		Maximum 1st	2.70 mm (0.1062 in.)
		2nd	2.20 mm (0.0866 in.)
		Oil	4.10 mm (0.1614 in.)
	Piston ring thickness	STD 1st	2.47 – 2.49 mm (0.0972 – 0.0980 in.)
		2nd	1.97 – 1.99 mm (0.0776 – 0.0783 in.)
		Oil	3.97 – 3.99 mm (0.1563 – 0.1571 in.)
		Maximum 1st	2.40 mm (0.0945 in.)
		2nd	1.90 mm (0.0748 in.)
		Oil	3.90 mm (0.1535 in.)
	Piston ring groove clearance		
	S05C–B:	STD 1st	0.06 – 0.10 mm (0.0024 – 0.0039 in.)
		2nd	0.04 – 0.08 mm (0.0016 – 0.0031 in.)
		Oil	0.02 – 0.06 mm (0.0008 – 0.0023 in.)
		Maximum 1st	0.30 mm (0.0118 in.)
		2nd	0.30 mm (0.0118 in.)
		Oil	0.20 mm (0.0079 in.)
	S05C–TA,S05C–TB:	STD 1st	0.09 – 0.13 mm (0.0035 – 0.0051 in.)
		2nd	0.07 – 0.11 mm (0.0016 – 0.0031 in.)
		Oil	0.02 – 0.06 mm (0.0007 – 0.0023 in.)
		Maximum 1st	0.20 mm (0.0078 in.)
		2nd	0.18 mm (0.0070 in.)
		Oil	0.13 mm (0.0051 in.)
	Piston ring end gap	STD 1st	0.30 – 0.40 mm (0.0118 – 0.0157 in.)
		2nd	0.50 – 0.65 mm (0.0197 – 0.0255 in.)
		Oil	0.15 – 0.30 mm (0.0059 – 0.0118 in.)
		Maximum 1st	1.50 mm (0.0591 in.)
		2nd	1.20 mm (0.0472 in.)
		Oil	1.20 mm (0.0472 in.)
Crankshaft	Crank pin diameter	STD	64.940 – 64.960 mm (2.5567 – 2.5575 in.)
		Minimum	63.80 mm (2.5118 in.)
	Circle runout	Maximum	0.15 mm (0.0059 in.)
	Main journal diameter	STD	79.94 – 79.96 mm (3.1472 – 3.1480 in.)
		Minimum for repair	79.80 mm (3.1417 in.)
		for use	78.80 mm (3.1024 in.)
	Main journal oil clearance	STD	0.051 – 0.102 mm (0.0020 – 0.0040 in.)
		Maximum	0.20 mm (0.0079 in.)
	Thrust clearance	STD	0.050 – 0.239 mm (0.0020 – 0.0094 in.)
		Maximum	0.50 mm (0.0197 in.)

Cylinder block	Warpage	STD	0.05 mm (0.0020 in.) or less
		Maximum	0.20 mm (0.0079 in.)
	Main bearing bore diameter (w/o bearing)	STD	84.985 – 85.000 mm (3.3459 – 3.3465 in.)
		Maximum	85.20 mm (3.3543 in.)
	Main bearing bore diameter (w/ bearing)	STD	80.00 mm (3.1496 in.)
		Maximum	80.30 mm (3.1614 in.)
Main bearing cap bolt	Length	STD	106.80 mm (4.2047 in.)
		Maximum	108.00 mm (4.2520 in.)
Cylinder liner	Protrusion		
	S05C–B:	STD	0.056 – 0.080 mm (0.0022 – 0.0031 in.)
		Maximum	0.15 mm (0.0059 in.)
	S05C–TA, S05CTB:	STD	0.052 – 0.072 mm (0.0020 – 0.0028 in.)
		Maximum	0.15 mm (0.0059 in.)
	Inside diameter		
		STD	113.988 – 114.012 mm (4.4877 – 4.4887 in.)
		Maximum	114.15 mm (4.4941 in.)
Flywheel	Grind limit		1.00 mm (0.0394 in.)
		Maximum deflection	0.04 mm (0.0016 in.)
	Warpage	STD	0.05 mm (0.0020 in.) or less
		Maximum	1.00 mm (0.0394 in.)
	Sliding surface play	Maximum	0.15 mm (0.0059 in.)