Engine (G4KC-GSL 2.4)

GENERAL

SPECIFICATIONS E925C1E3

Description	Specifications	Limit
General		
Type	In-line, Double Overhead Camshaft	
Number of cylinder	4	
Bore	88mm (3.464in)	
Stroke	97mm (3.819in.)	
Total displacement	2359cc (143.90cu.in.)	
Compression ratio	10.5	
Firing order	1-3-4-2	
Valve timing		
Intake valve		
Opens	ATDC 11° ~ BTDC 34°	
Closes	ABDC 22° ~ ABDC 67°	
Exhaust		
Opens (BBDC)	34°	
Closes (ATDC)	10°	
Valve		
Valve length		
Intake	113.18mm (4.4559in.)	112.93mm (4.4460in)
Exhaust	105.89mm (4.1689in.)	105.74mm (4.1629in)
Stem O.D.		
Intake	5.465 ~ 5.480mm (0.2151 ~ 0.2157in.)	
Exhaust	5.458 ~ 5.470mm (0.2149 ~ 0.2153in.)	
Face angle	45.25° ~ 45.75°	
Margin		
Intake	1.02mm (0.0401in.)	
Exhaust	1.09mm (0.0429in.)	
Valve stem to valve guide clearance		
Intake	0.020 ~ 0.047mm (0.00078 ~ 0.00185in.)	0.07mm (0.00275in.)
Exhaust	0.030 ~ 0.054mm (0.00118 ~ 0.00212in.)	0.09mm (0.00354in.)
Valve guide		
Length		
Intake	43.8 ~ 44.2mm (1.7244 ~ 1.7401in.)	
Exhaust	43.8 ~ 44.2mm (1.7244 ~ 1.7401in.)	
Valve seat		
Width of seat contact		
Intake	1.16 ~ 1.46mm (0.0457 ~ 0.0575in.)	
Exhaust	1.35 ~ 1.65mm (0.0531 ~ 0.0649in.)	
Seat angle	44.75° ~ 45.10°	
Valve spring		
Free length	47.44mm (1.8677in.)	
Load	19.0 ± 0.6kg/35.0mm (41.88 ± 1.32lb/1.3779in.)	
	39.8 ± 1.2kg/26.0mm (87.74 ± 2.64lb/1.0236in.)	
Squarences	1.5° MAX.	

Description	Specifications	Limit
Valve clearance Cold (20°C[68°F]) Intake Exhaust	 0.17 ~ 0.23mm (0.0067 ~ 0.0090in.) 0.27 ~ 0.33mm (0.0106 ~ 0.0129in,)	 0.10 ~ 0.30mm (0.0039 ~ 0.0118in.) 0.20 ~ 0.40mm (0.0078 ~ 0.0157in.)
Cylinder head Flatness of gasket surface Flatness of manifold mounting surface Oversize rework dimensions of	 Max. 0.05mm (0.0019in.) Max. 0.10mm (0.0039in.)	
Cylinder block Cylinder bore Out-of-round and taper of cylinder bore Clearance with piston (To set limits to new parts)	 88.00 ~ 88.03mm (3.4645 ~ 3.4657in.) Less than 0.05mm (0.0019in.) 0.02 ~ 0.04mm (0.0008 ~ 0.0016in.)	
Piston O.D (To set limits to new parts) Ring groove width No.1 No.2 Oil ring Service oversize	 87.97 ~ 88.00mm (3.4634 ~ 3.4645in.) 1.22 ~ 1.24mm (0.0480 ~ 0.0488in.) 1.22 ~ 1.24mm (0.0480 ~ 0.0488in.) 2.01 ~ 2.03mm (0.0791 ~ 0.0799in.) 0.25, 0.50mm (0.010, 0.020in.) oversize	 1.26mm (0.0496in.) 1.26mm (0.0496in.) 2.05mm (0.0807in.)
Piston ring Side clearance No.1 No.2 Oil ring End gap No.1 No.2 Oil ring side rail Service oversize	 0.03 ~ 0.07mm (0.0012 ~ 0.0027in.) 0.03 ~ 0.07mm (0.0012 ~ 0.0027in.) 0.06 ~ 0.15mm (0.0024 ~ 0.0059in.) 0.15 ~ 0.30mm (0.0059 ~ 0.0118in.) 0.30 ~ 0.45mm (0.0118 ~ 0.0177in.) 0.20 ~ 0.70mm (0.0078 ~ 0.0275in.) 0.25, 0.50mm(0.010, 0.020in.) oversize	 0.1mm (0.004in.) 0.1mm (0.004in.) 0.2mm (0.008in.) 0.6mm (0.0236in.) 0.7mm (0.0275in.) 0.8mm (0.0315in.)
Connecting rod Bend Twist Connecting rod big end to crankshaft side clearance	 0.05mm (0.0020in.) or less 0.1mm (0.004in.) or less 0.100 ~ 0.250mm (0.0039 ~ 0.010in.)	 0.35mm (0.0138in.)
Connecting rod bearing Oil clearance (To seat limits to new parts)	 0.028 ~ 0.046mm (0.0011 ~ 0.0018in.)	 0.05mm (0.0019in.)

Description	Specifications	Limit
Camshaft		
Cam height		
Intake	43.80mm (1.7244in.)	
Exhaust	45.00mm (1.7716in.)	
Journal O.D.		
Intake	No.1 : 30mm (1.1811in.) No.2,3,4,5 : 24mm (0.9449in.)	
Exhaust	No.1 : 40mm (1.5748in.) No.2,3,4,5 : 24mm (0.9449in.)	
Bearing oil clearance		
Intake	No.1 : 0.020 ~ 0.057mm (0.00078 ~ 0.00224in.) No.2,3,4,5 : 0.045 ~ 0.082mm (0.00177 ~ 0.00323in.)	0.09mm (0.0035in.) 0.12mm (0.0047in.)
Exhaust	No.1,2,3,4,5 : 0.045 ~ 0.082mm (0.00177 ~ 0.00323in.)	0.12mm (0.0047in.)
End play	0.1 ~ 0.22mm (0.0039 ~ 0.0086in.)	0.24mm (0.0094in.)
Crankshaft		
Pin O.D.	47.954 ~ 47.972mm (1.8879 ~ 1.8886in.)	
Journal O.D.	51.942 ~ 51.960mm (2.0449 ~ 2.0456in.)	
End play	0.07 ~ 0.25mm (0.0027 ~ 0.0098in.)	
Crankshaft bearing		
Oil clearance	0.026 ~ 0.048mm (0.0010 ~ 0.0019in.)	
Cooling method	Water-cooled, pressurized. Forced circulation with electrical fan	
Radiator		
Type	Pressurized corrugated fin type	
Radiator cap		
Main valve opening pressure	83 ~ 110kpa (12 ~ 16psi, 0.83 ~ 1.1kg/cm²)	
Vacuum valve opening pressure	-7kpa (-100psi, -0.07kg/cm²) or less	
Thermostat		
Type	Wax pellet type with jiggle valve	
Valve opening temperature	82°C (177°F)	
Full-opening temperature	95°C (201°F)	
Coolant pump	Centrifugal type impeller	
Drive belt		
Type	V-ribbed belt	
Engine coolant temperature sensor		
Type	Heat-sensitive thermistor type	
Resistance	2.31 ~ 2.59KΩ at 20°C (68°F)	
Air cleaner		
Type	Dry type	
Element	Unwoven cloth type	
Exhaust pipe		
Muffler	Expansion resonance type	
Suspension system	Rubber hangers	

SERVICE STANDRDS

Standard value	
Antifreeze	Maxture ratio of anti-freeze in coolant
ETHYLENE GLYCOL BASE FOR ALUMINUM	50%

TIGHTENING TORQUE

Item	Quantity	N.m	kgf.m	lbf.ft
Ladder frame bolt (M8 x 55)	4	23.52 ~ 27.44	2.4 ~ 2.8	17.35 ~ 20.24
Ladder frame bolt (M8 x 103)	6	23.52 ~ 27.44	2.4 ~ 2.8	17.35 ~ 20.24
Balance shaft module bolt	4	16.66 + 60° + 60°	1.7 + 60° + 60°	12.29 + 60° + 60°
Timing chain cover bolt (M8)	6	18.62 ~ 22.54	1.9 ~ 2.3	13.74 ~ 16.63
Timing chain cover bolt (M6)	7	7.84 ~ 9.8	0.8 ~ 1.0	5.78 ~ 7.23
Oil pan bolt (M6 x 10)	16	9.8 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.67
Oil pan bolt (M8 x 103)	2	26.46 ~ 30.38	2.7 ~ 3.1	19.52 ~ 22.41
Engine support bracket bolt (M10 x 40)	1	39.2 ~ 44.1	4.0 ~ 4.5	28.92 ~ 32.53
Engine support bracket bolt (M10 x 45)	2	39.2 ~ 44.1	4.0 ~ 4.5	28.92 ~ 32.53
Engine support bracket bolt (M8 x 30)	1	19.6 ~ 24.5	2.0 ~ 2.5	14.46 ~ 18.07
Camshaft bearing cap bolt (M6)	16	10.78 ~ 12.74	1.1 ~ 1.3	7.95 ~ 9.39
Camshaft bearing cap bolt (M8)	4	27.44 ~ 31.36	2.8 ~ 3.2	20.24 ~ 23.14
Cylinder head bolt	10	34.3 + 90° + 90°	3.5 + 90° +90°	25.3 + 90° + 90°
Engine hanger bolt	2	19.6 ~ 26.46	2.0 ~ 2.7	14.46 ~ 19.52
Cylinder head cover bolt	18	7.84 ~ 9.8	0.8 ~ 1.0	5.78 ~ 7.23
Crankshaft pulley bolt	1	166.6 ~ 176.4	17 ~ 18	122.9 ~ 130.13
Flywheel bolt	7	117.6 ~ 127.4	12 ~ 13	86.75 ~ 93.98
Drive plate bolt	7	117.6 ~ 127.4	12 ~ 13	86.75 ~ 93.98
Timing chain tensioner bolt	2	9.8 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.67
Timing chain tensioner arm bolt	1	9.8 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.67
Timing chain guide bolt	3	9.8 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.67
OCV bolt	1	9.8 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.67
CVVT & camshaft sprocket bolt	1	53.9 ~ 63.7	5.5 ~ 6.5	39.7 ~ 47.0
Balance shaft chain tensioner arm bolt	1	9.8 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.67
Balance shaft chain guide bolt	2	9.8 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.67
Balance shaft chain tensioner bolt	2	9.8 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.67
Water pump bolt	5	19.6 ~ 26.46	2.0 ~ 2.7	14.46 ~ 19.52
A/C bracket bolt	4	19.6 ~ 23.52	2.0 ~ 2.4	14.46 ~ 17.35
P/S bracket bolt	2	44.1 ~ 53.9	4.5 ~ 5.5	32.53 ~ 39.70
Tensioner & idler bracket bolt	7	39.2 ~ 44.1	4.0 ~ 4.5	28.92 ~ 32.53
Water temp. control bolt	2	14.7 ~ 21.56	1.5 ~ 2.2	10.84 ~ 15.90
Water temp. control nut	1	19.6 ~ 26.46	2.0 ~ 2.7	14.46 ~ 19.52

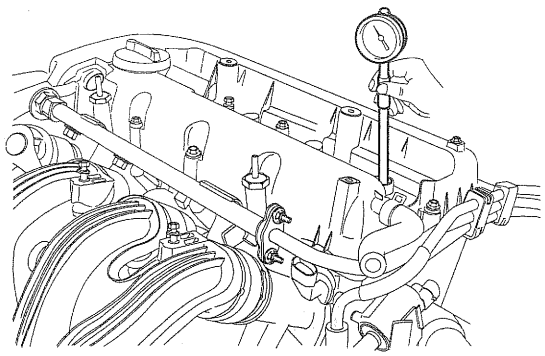
Item	Quantity	N.m	kgf.m	lbf.ft
Water inlet pipe bolt	2	19.6 ~ 26.46	2.0 ~ 2.7	14.46 ~ 19.52
Oil level gauge assembly bolt	1	7.84 ~ 11.76	0.8 ~ 1.2	5.78 ~ 8.67
Ignition coil bolt	4	3.92 ~ 5.88	0.4 ~ 0.6	2.89 ~ 4.34
Intake manifold bolt	3	18.62 ~ 27.44	1.9 ~ 2.8	13.73 ~ 20.24
Intake manifold nut	2	18.62 ~ 27.44	1.9 ~ 2.8	13.73 ~ 20.24
Intake manifold stay bolt	4	18.62 ~ 27.44	1.9 ~ 2.8	13.73 ~ 20.24
Exhaust manifold heat protector bolt	4	18.62 ~ 27.44	1.9 ~ 2.8	13.73 ~ 20.24
Exhaust manifold nut	7	39.2 ~ 44.1	4.0 ~ 4.5	28.92 ~ 32.53
Exhaust manifold stay bolt (M8)	2	18.62 ~ 27.44	1.9 ~ 2.8	13.74 ~ 20.24
Exhaust manifold stay bolt (M10)	1	51.94 ~ 57.82	5.4 ~ 5.9	38.3 ~ 42.6
Front muffler bolt	2	39.2 ~ 58.8	4.0 ~ 6.0	28.92 ~ 43.37
Engine cover nut	2	3.92 ~ 5.88	0.4 ~ 0.6	2.89 ~ 4.34
Engine cover mounting bracket bolt	2	7.84 ~ 11.76	0.8 ~ 1.2	5.78 ~ 8.67
Crankshaft position sensor bolt	1	3.92 ~ 5.88	0.4 ~ 0.6	2.89 ~ 4.34
Oxygen sensor	1	34.3 ~ 44.1	3.5 ~ 4.5	25.30 ~ 32.53
Knock sensor	1	16.66 ~ 25.48	1.7 ~ 2.6	12.29 ~ 18.79
Oil temperature sensor	1	19.6 ~ 39.2	2.0 ~ 4.0	14.46 ~ 28.92
Camshaft position sensor	1	3.92 ~ 5.88	0.4 ~ 0.6	2.89 ~ 4.34
Oil pressure switch	1	7.84 ~ 11.76	0.8 ~ 1.2	5.78 ~ 8.67
Main bearing cap bolt	10	26.46 + 45°	2.7 + 45°	19.52 + 45°
Oil filter	1	11.76 ~ 15.68	1.2 ~ 1.6	8.67 ~ 11.57
Connecting rod bearing cap bolt	8	19.6 + 90°	2.0 + 90°	14.46 + 90°

COMPRESSION E6F7C0C1

NOTE

If the there is lack of power, excessive oil consumption or poor fuel economy, measure the compression pressure.

1. Warm up and stop engine.
   Allow the engine to warm up to normal operating temperature.
2. Remove ignition coils. (See EE group - ignition)
3. Remove spark plugs.
   Using a 16mm plug wrench, remove the 4 spark plugs.
4. Check cylinder compression pressure.
   a. Insert a compression gauge into the spark plug hole.



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   b. Fully open the throttle.
   c. While cranking the engine, measure the compression pressure.

NOTE

Always use a fully charged battery to obtain engine speed of 200 rpm or more.

   d. Repeat steps (a) through (c) for each cylinder.

NOTE

This measurement must be done in as short a time as possible.

Compression pressure : 1,283kPa (13.0kgf/cm², 185psi) Minimum pressure : 1,135kPa (11.5kgf/cm², 164psi) Difference between each cylinder : 100kPa (1.0kgf/cm², 15psi) or less

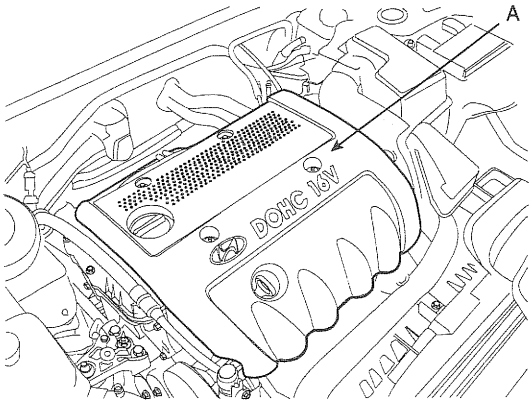
   e. If the cylinder compression in 1 or more cylinders is low, pour a small amount of engine oil into the cylinder through the spark plug hole and repeat steps (a) through (c) for cylinders with low compression.
      - If adding oil helps the compression, it is likely that the piston rings and/or cylinder bore are worn or damaged.
      - If pressure stays low, a valve may be sticking or seating is improper, or there may be leakage past the gasket.
5. Reinstall spark plugs.
6. Install ignition coils. (See EE group - ignition)

VALVE CLEARANCE INSPECTION AND ADJUSTMENT

NOTE

Inspect and adjust the valve clearance when the engine is cold (Engine coolant temperature : 20°C) and cylinder head is installed on the cylinder block.

1. Remove the engine cover(A).



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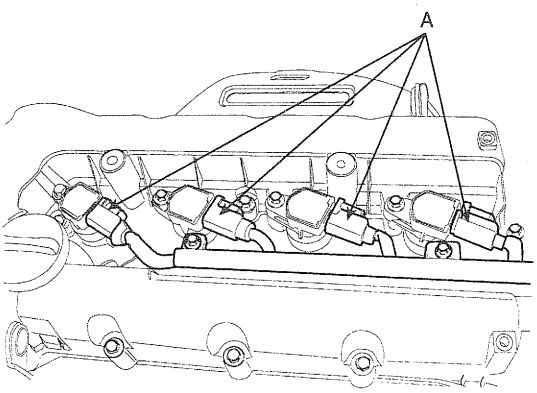
2. Remove the cylinder head cover.
   a. Disconnect the ignition coil connect(A) and remove the ignition coil.



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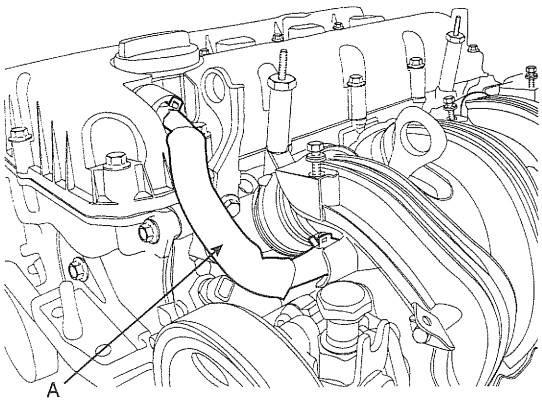
   b. Disconnect the P.C.V hose(A) and the breather hose from the cylinder head cover.



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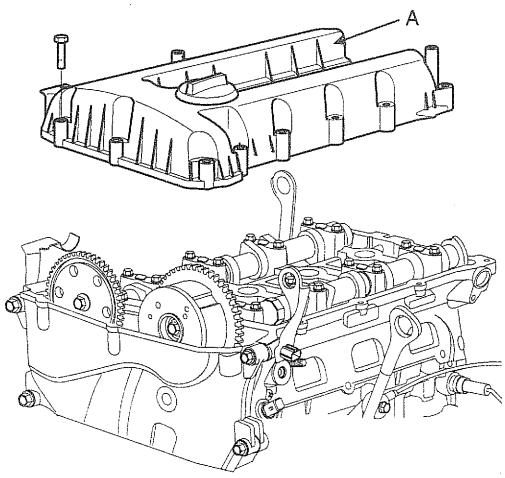
   c. Loosen the cylinder head cover bolts and then remove the cover(A) and gasket.



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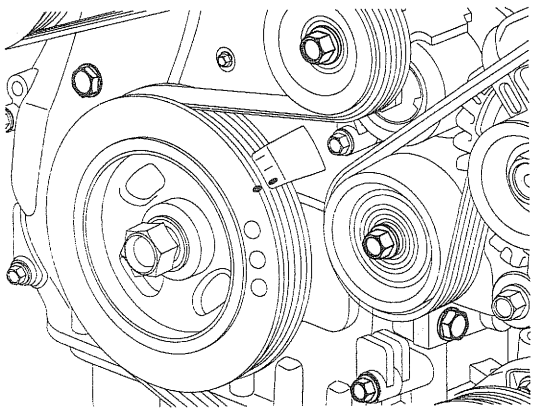
3. Set No.1 cylinder to TDC/compression.
   a. Turn the crankshaft pulley and align its groove with the timing mark "T" of the lower timing chain cover.



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