



## SPECIFICATION

Description			Specification		Limit
			G6DB33	G6DA38	
Genera					
Type			V-type, DOHC		
Number of cylinders			6		
Bore			92mm (3.6220in)	96mm (3.7795in)	
Stroke			83.8mm (3.2992in)	87.0 mm(3.4252in)	
Total displacement			3,342cc (203.86cu.in)	3.778cc (230.55cu.in)	
Compression ratio			10.4		
Firing order			1-2-3-4-5-6		
Valve timing					
Intake	Opens(ATDC)		14°	10°	
	Closes(ABDC)		66°	66°	
Exhaust	Opens(BBDC)		52°	52°	
	Closes(ATDC)		0°	0°	
Cylinder head					
Flatness of gasket surface			Less than 0.05mm (0.0019in) [Less than 0.02mm (0.0008in) / 150x150]		
Flatness of manifold mounting	Intake		Less than 0.1mm(0.0039in) [Less than 0.03mm(0.001in)/110x110]		
	Exhaust		Less than 0.1mm(0.0039in) [Less than 0.03mm(0.001in)/110x110]		
Camshaft					
Cam height	LH Camshaft	Intake	46.3mm (1.8228in)	46.8mm (1.8425in)	
		Exhaust	45.8mm (1.8031in)		
	RH Camshaft	Intake	46.3mm (1.8228in)	46.8mm(1.8425in)	
		Exhaust	45.8mm (1.8031in)		
Journal outer diameter	LH ,RHcamshaft	Intake	No.1: 27.964 ~ 27.978mm (1.1009 ~ 1.1015in) No.2,3,4: 23.954 ~ 23.970mm (0.9430 ~ 0.9437in)		
		Exhaust	No.1: 27.964 ~ 27.978mm (1.1009 ~ 1.1015in)		



### G 3.3 DOHC > Engine Mechanical System > General Information > Specifications

			No.2,3,4: 23.954 ~ 23.970mm (0.9430 ~ 0.9437in)		
Bearing oil clearance	LH ,RHcamshaft	Intake	No.1: 0.027 ~ 0.057mm (0.0011 ~ 0.0022in) No.2,3,4: 0.030 ~ 0.067mm (0.0012 ~ 0.0026in)		
		Exhaust	No.1: 0.027 ~ 0.057mm (0.0011 ~ 0.0022in) No.2,3,4: 0.030 ~ 0.067mm (0.0012 ~ 0.0026in)		
End play			→	0.02 ~ 0.18mm (0.0008 ~ 0.0071in)	
Valve					
Valve length	Intake		105.27mm(4.1445in)		
	Exhaust		105.50mm (4.1535in)		
Stem outer diameter	Intake		5.465 ~ 5.480mm (0.2151 ~ 0.2157in)		
	Exhaust		5.458 ~ 5.470mm (0.2149 ~ 0.2153in)		
Face angle			45.25° ~ 45.75°		
Thickness of valvehead(margin)	Intake		1.56 ~ 1.86mm (0.06142 ~ 0.07323in)		
	Exhaust		1.73 ~ 2.03mm (0.06811 ~ 0.07992in)		
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					
Inner diameter	Intake		5.500 ~ 5.512mm (0.2165 ~ 0.2170in)		
	Exhaust		5.500 ~ 5.512mm (0.2165 ~ 0.2170in)		
Length	Intake		41.8 ~ 42.2mm (1.6457 ~ 1.6614in)		
	Exhaust		41.8 ~ 42.2mm (1.6457 ~ 1.6614in)		
Valve seat					
Width of seat contact	Intake		1.15 ~ 1.45mm (0.05118 ~ 0.05709in)		
	Exhaust		1.35 ~ 1.65mm (0.05315 ~ 0.06496in)		
Seat angle	Intake		44.75° ~ 45.20°		
	Exhaust		44.75° ~ 45.20°		
Valve spring					
Free length			43.86mm (1.7267in)		



Load		19.3±0.8kg/34.0mm (42.7±1.8 lb/1.3386in)		
		42.3±1.3kg/24.2mm (93.3±2.9 lb/0.9527in)		
Out of squareness		Less than 1.5°		
MLA				
MLA outer diameter	Intake	34.964 ~ 34.980mm (1.3765 ~ 1.3772in)		
	Exhaust	34.964 ~ 34.980mm (1.3765 ~ 1.3772in)		
Cylinder head tappet bore inner diameter	Intake	35.000 ~ 35.025mm (1.3779 ~ 1.3789in)		
	Exhaust	35.000 ~ 35.025mm (1.3779 ~ 1.3789in)		
MLA to tappet bore clearance	Intake	0.020 ~ 0.061mm (0.0008 ~ 0.0024in)		0.07mm (0.0027in)
	Exhaust	0.020 ~ 0.061mm (0.0008 ~ 0.0024in)		0.07mm (0.0027in)
Valve clearance				
Intake		0.17 ~ 0.23mm (0.0067 ~ 0.0090in)		0.10 ~ 0.30mm (0.0039 ~ 0.0118in)
Exhaust		0.27 ~ 0.33mm (0.0106 ~ 0.0129in)		0.20 ~ 0.40mm (0.0078 ~ 0.0157in)
Cylinder block				
Cylinder bore		92.00 ~ 92.03mm (3.6220 ~ 3.6232in)	96.00 ~ 96.03mm (3.7795 ~ 3.7807in)	
Flatness of gasket surface		Less than 0.05mm (0.0019in) [Less than 0.02mm (0.0008in) / 150x150]		
Piston				
Piston outer diameter		91.96 ~ 92.00mm (3.6205 ~ 3.6220in)	95.96 ~ 95.99mm (3.7779 ~ 3.7791in)	
Piston to cylinder clearance		→	0.03 ~ 0.05mm (0.0012 ~ 0.0020in)	
Ring groove width	No. 1 ring groove	→	1.22 ~ 1.24 (0.0480 ~ 0.0488in)	1.26mm (0.0496in)
	No. 2 ring groove	1.22 ~ 1.24mm (0.0480 ~ 0.0488in)		1.26mm (0.0496in)
	Oil ring groove	2.01 ~ 2.03mm (0.0791 ~ 0.0799in)		2.05mm



### G 3.3 DOHC > Engine Mechanical System > General Information > Specifications

				(0.0807in)
<b>Piston ring</b>				
Side clearance	No. 1 ring	→	0.03 ~ 0.07mm (0.0012 ~ 0.0027in)	0.1mm (0.004in)
	No. 2 ring		0.03 ~ 0.07mm (0.0012 ~ 0.0027in)	0.1mm (0.004in)
	Oil ring		0.06 ~ 0.15mm (0.0024 ~ 0.0059in)	0.2mm (0.008in)
End gap	No. 1 ring		0.17 ~ 0.32mm (0.0067 ~ 0.0126in)	0.6mm (0.0236in)
	No. 2 ring		0.32 ~ 0.47mm (0.0126 ~ 0.0185in)	0.7mm (0.0275in)
	Oil ring		0.20 ~ 0.70mm (0.0078 ~ 0.0275in)	0.8mm (0.0315in)
<b>Piston pin</b>				
Piston pin outer diameter		→	23.001 ~ 23.006mm (0.9055 ~ 0.9057in)	
Piston pin hole inner diameter		→	23.016 ~ 23.021mm (0.9061 ~ 0.9063in)	
Piston pin hole clearance		→	0.01 ~ 0.02mm (0.0039 ~ 0.0078in)	
Connecting rod small end inner diameter			22.974 ~ 22.985mm (0.9045 ~ 0.9049in)	
<b>Connecting rod</b>				
Connecting rod big end innerdiameter			58.000 ~ 58.018mm(2.2834 ~2.2842in)	
Connecting rod bearing oil clearance		→	0.038 ~ 0.056mm (0.0015 ~ 0.0022in)	
Side clearance			0.1 ~ 0.25mm (0.0039 ~ 0.0098in)	
<b>Crankshaft</b>				
Main journal outer diameter			68.942 ~ 68.960mm (2.7142 ~ 2.7149in)	
Pin journal outer diameter			54.954 ~ 54.972mm (2.1635 ~ 2.1642in)	
Main bearing oil clearance			0.022 ~ 0.040mm (0.0008 ~ 0.0016in)	
End play			0.10 ~ 0.28mm (0.0039 ~ 0.0110in)	
<b>Oil pump</b>				
Relief valve opening pressure			450 ~ 550kPa (4.59 ~ 5.61kgf/cm²,65.28 ~ 79.79psi)	
<b>Engine oil</b>				



### G 3.3 DOHC > Engine Mechanical System > General Information > Specifications

Oil quantity (Oil pan)		4.5 ~ 5.5L(4.76 ~ 5.81U.S.qus, 3.96 ~ 4.84Imp.qts)	
Oil quantity (Oil filter)		0.4L(0.42U.S.qus, 0.35Imp.qts)	
Oil quantity (Drain and refill)		5.2L(5.49U.S.qus, 4.58Imp.qts)	
Oil quality		Above SJ or SL	
Oil pressure		130kPa(1.32kgf/cm <sup>2</sup> , 18.77psi) [at 1000rpm, 110°C(230°F)]	
<b>Cooling system</b>			
Cooling method		Forced circulation with electrical fan	
Coolant quantity		9.0L(9.40U.S.qus, 7.83Imp.qts)	
Thermostat	Type	Wax pellet type	
	Opening temperature	82±2°C (179.6±35.6°F)	
	Fully opened temperature	95°C (203°F)	
	Full lift	more than 10mm (0.3937in)	
Radiator cap	Main valve opening pressure	93.16 ~ 122.58kpa (0.95 ~ 1.25kg/cm <sup>2</sup> , 13.51 ~ 17.78psi)	
	Vacuum valve opening pressure	0.98 ~ 4.90 kpa (0.01 ~ 0.05kg/cm <sup>2</sup> , 0.14 ~ 0.71 psi)	
<b>Water temperature sensor</b>			
Type		Thermister type	
Resistance	20°C (68°F)	2.31 ~ 2.59kΩ	
	80°C(176°F)	0.3222 kΩ	

### TIGHTENING TORQUE

Item	Quantity	Nm	kgf.m	lb.ft
Crankshaft pulley bolt	1	284.2 ~ 303.8	29.0 ~ 31.0	209.76 ~ 224.22
Timing chain cover bolt B	17	18.62 ~ 21.56	1.9 ~ 2.2	13.74 ~ 15.91
Timing chain cover bolt C	4	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Timing chain cover bolt D	1	58.80 ~ 68.80	6.0 ~ 7.0	43.40 ~ 50.63
Timing chain cover bolt E	1	58.80 ~ 68.80	6.0 ~ 7.0	43.40 ~ 50.63
Timing chain cover bolt F	2	24.50 ~ 26.46	2.5 ~ 2.7	18.08 ~ 19.53
Timing chain cover bolt G	4	21.56 ~ 23.52	2.2 ~ 2.4	15.91 ~ 17.36
Timing chain cover bolt H	1	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Timing chain cover bolt I	1	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68

Timing chain cover bolt J	1	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Cam to cam guide bolt	4	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Timing chain auto tensioner bolt	2	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Timing chain auto tensioner nut	2	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Timing chain guide bolt	4	19.60 ~ 24.50	2.0 ~ 2.5	14.17 ~ 18.08
Oil pump chain cover bolt	3	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Oil pump chain tensioner bolt	1	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Oil pump chain guide bolt	2	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Oil pump chain sprocket bolt	1	18.62 ~ 21.56	1.9 ~ 2.2	13.74 ~ 15.91
Lower oil pan bolt	13	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Drive belt auto tensioner bolt(M12)	1	81.4 ~ 85.3	8.3 ~ 8.7	60.0 ~ 62.9
Drive belt auto tensioner bolt(M8)	1	29.4 ~ 33.3	3.0 ~ 3.4	21.7 ~ 24.6
Drive belt idler bolt	1	53.90 ~ 57.82	5.5 ~ 5.9	39.78 ~ 42.67
OCV(oil control valve) bolt	2	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Cylinder head bolt	16	(37.3~41.2) + (118~122°) + (88~92°)	(3.8~4.2) + (118~122°) + (88~92°)	(27.5~30.4) + (118~122°) + (88~92°)
Cylinder head bolt	1	18.62 ~ 23.52	1.9 ~ 2.4	13.74 ~ 17.36
CVVT & exhaust cam sprocket bolt	4	64.68 ~ 76.44	6.6 ~ 7.8	47.74 ~ 56.42
Camshaft bearing cap bolt	32	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Cylinder head cover bolt	38	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Connecting rod bearing bolt	12	(17.7~21.6) + (88~92°)	(1.8~2.2) + (88~92°)	(13.0~15.9) + (88~92°)
Main bearing cap inner bolt(M11)	8	49.00 + 90°	5.0 + 90°	36.16 + 90°
Main bearing cap outer bolt(M8)	8	19.60 + 120°	2.0 + 120°	14.46 + 120°
Main bearing cap side bolt(M8)	6	29.40 ~ 31.36	3.0 ~ 3.2	21.70 ~ 23.14
Oil drain cover bolt	6	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Rear oil seal case bolt	6	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Baffle plate bolt	12	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Upper oil pan bolt	16	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Knock sensor bolt	2	15.68 ~ 23.52	1.6 ~ 2.4	11.57 ~ 17.36
Drive plate bolt	8	71.54 ~ 75.46	7.3 ~ 7.7	52.80 ~ 55.69
Oil filter cap	1	24.50	2.5	18.08
Oil drain bolt	1	24.20 ~ 44.40	2.5 ~ 4.5	25.21 ~ 22.55



G 3.3 DOHC > Engine Mechanical System > General Information > Specifications

Oil drain bolt	1	34.50 ~ 44.10	3.3 ~ 4.3	23.31 ~ 32.33
Oil pump bolt	3	19.60 ~ 23.52	2.0 ~ 2.4	14.47 ~ 17.36
Oil filter body bolt	10	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Oil filter body cover bolt	11	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Water vent hose bolt	2	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Water pump bolt(Timing chain cover bolt L)	1	21.56 ~ 26.46	2.2 ~ 2.7	15.91 ~ 19.53
Water pump bolt(Timing chain cover bolt K)	4	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Water pump pulley bolt	4	7.84 ~ 9.80	0.8 ~ 1.0	5.78 ~ 7.23
Water temp. control nut	4	19.6 ~ 23.52	2.0 ~ 2.4	14.5 ~ 17.36
Water temp. control bolt	2	19.6 ~ 23.52	2.0 ~ 2.4	14.5 ~ 17.36
Water inlet pipe bolt	3	16.66 ~ 19.60	1.7 ~ 2.0	12.30 ~ 14.47
Air vent pipe bolt	2	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Intake manifold bolt	6	26.5 ~ 31.4	2.7 ~ 3.2	19.5 ~ 23.1
Intake manifold nut	2	18.62 ~ 23.52	1.9 ~ 2.4	13.74 ~ 17.36
Surge tank bolt	1	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Surge tank nut	2	18.6 ~ 23.5	1.9 ~ 2.4	13.7 ~ 17.4
Exhaust manifold stay bolt	4	52.0 ~ 56.9	5.3 ~ 5.8	38.3 ~ 42.0
Surge tank bolt	3	18.6 ~ 23.5	1.9 ~ 2.4	13.7 ~ 17.4
Breather pipe bolt	2	9.80 ~ 11.76	1.0 ~ 1.2	7.23 ~ 8.68
Surge tank bracket bolt	2	27.44 ~ 31.36	2.8 ~ 3.2	20.25 ~ 23.14
ETC bracket bolt	2	15.68 ~ 25.48	1.6 ~ 2.6	11.57 ~ 18.80
Exhaust manifold nut	16	39.20 ~ 44.10	4.0 ~ 4.5	28.93 ~ 32.55
Heat protector bolt	6	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Front muffler	2	39.20 ~ 58.80	4.0 ~ 6.0	28.93 ~ 43.40

## INSPECTION

### COMPRESSION PRESSURE

If 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. (Refer to Ignition in FL Group)
3. Remove spark plugs.  
Using a 16mm plug wrench, remove the 6 spark plugs.
4. Check cylinder compression pressure.
  - A. Insert a compression gauge into the spark plug hole.
  - B. Fully open the throttle.
  - C. After 7 times of cranking the engine, measure the compression pressure.

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

- D. Repeat steps (a) through (c) for each cylinder.

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

Compression pressure :

1,225kPa (12.5kgf/cm<sup>2</sup>, 177psi) - 200 ~ 250rpm

Minimum pressure :

1,078kPa (11.0kgf/cm<sup>2</sup>, 156psi)

- 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)

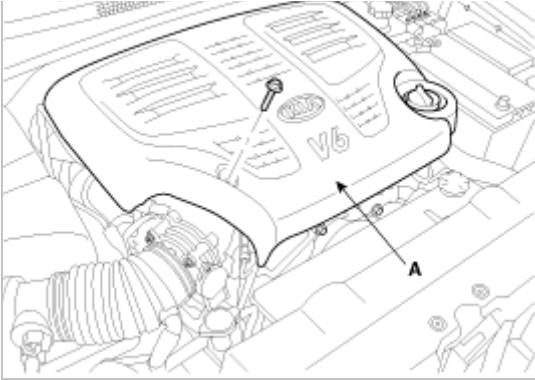
### VALVE CLEARANCE INSPECTION AND ADJUSTMENT

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.

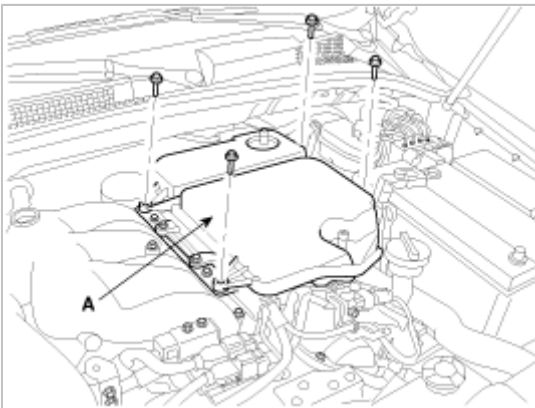
1. Remove the engine cover(A).



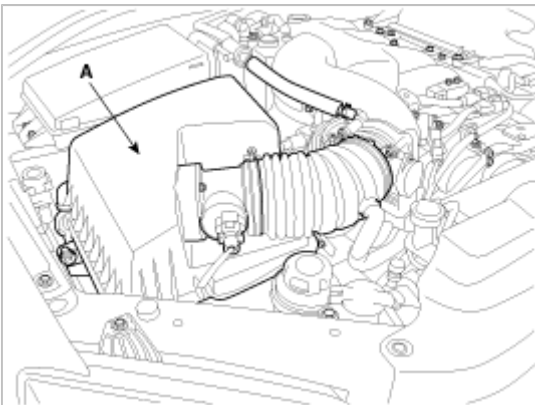




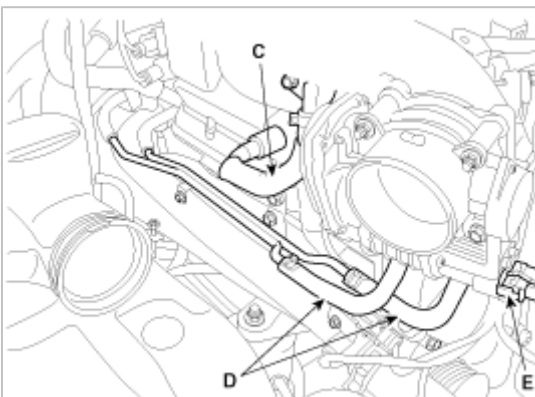
2. Remove the engine room resonator(A).

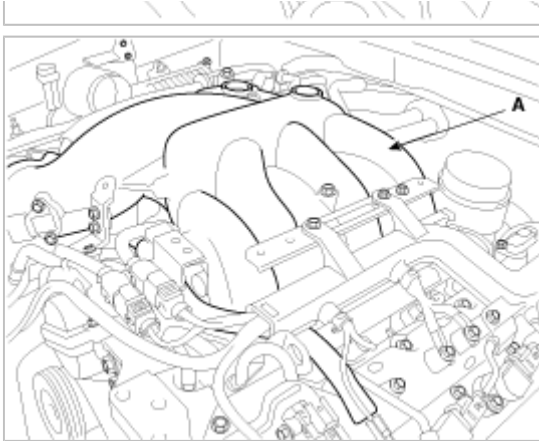


3. After disconnecting the MAF sensor connector(A) and the breather hose(B), remove the air cleaner assembly(C).



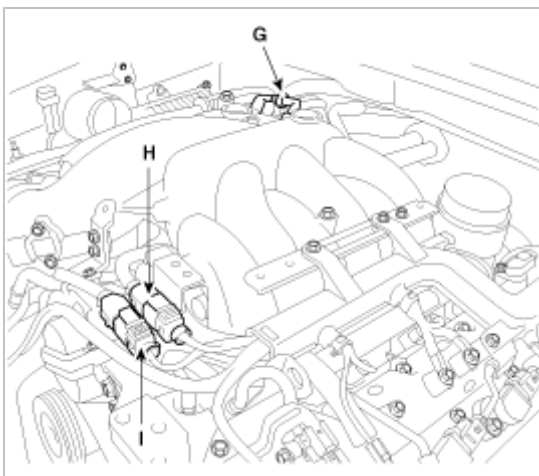
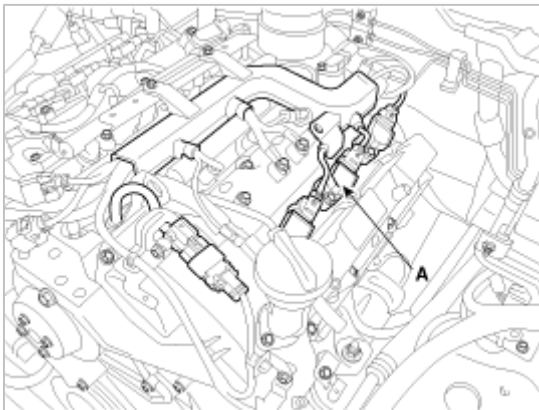
4. Disconnect the other breather hose(A), the Purge Control Solenoid Valve(PCSV) hose, the Positive Crankcase Ventilation (PCV) hose(C) and the Electronic Throttle Control(ETC) cooling hoses(D) and connector(E).





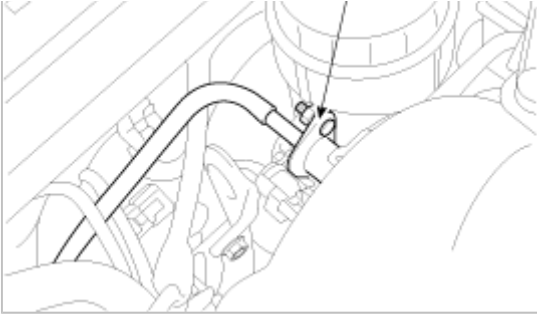
5. Remove the wiring over the surge tank.

- (1) Disconnect the injection harness connector(A).
- (2) Disconnect the camshaft position sensor(CMP) harness connector(B).
- (3) Disconnect the ground line(C).
- (4) Disconnect the ignition coil harness connector(D).
- (5) Disconnect the condensor connector(E).
- (6) Disconnect the variable induction system(VIS) solenoid valve connector(G).
- (7) Disconnect the oil control valve(OCV) harness connector(F).
- (8) Disconnect the injector wiring(H) and ignition coil wiring(I).

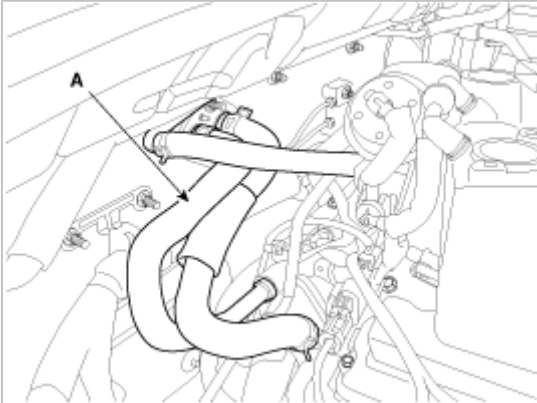


6. Disconnect the fuel hose tube(A).





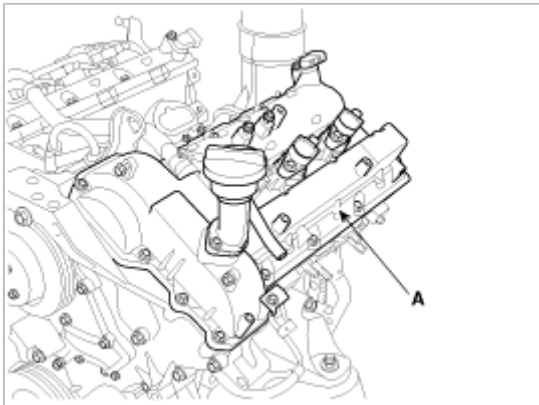
7. Remove heater hose(A) and disconnect the brake vacuum hose(B).



8. Disconnect the surge tank stay.

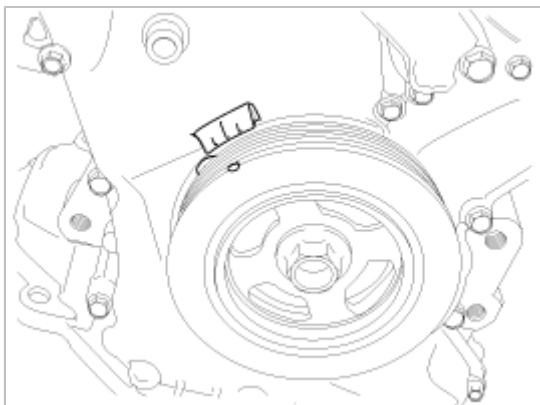
9. Remove the surge tank.

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



11. Set No.1 cylinder to TDC/compression.

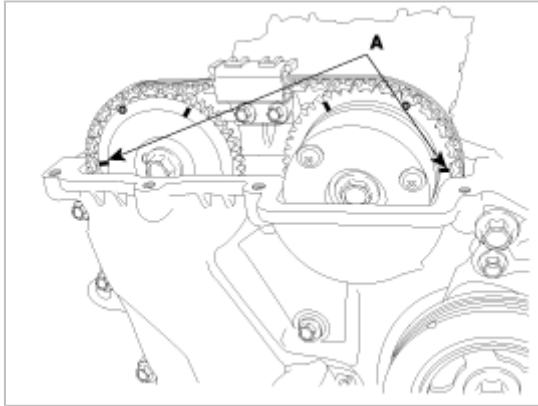
A. Turn the crankshaft pulley and align its groove with the timing mark "T" of the lower timing chain cover.



- B. Check that the mark(A) of the camshaft timing sprockets are in straight line on the cylinder head surface as shown in the illustration.

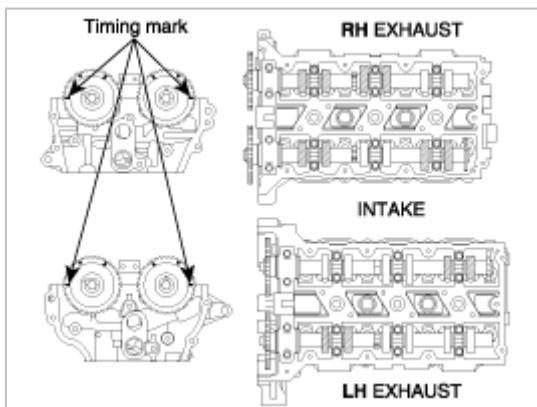
If not, turn the crankshaft one revolution (360°)

Do not rotate engine counterclockwise



## 12. Inspect the valve clearance.

- A. Check only the valve indicated as shown. [No. 1 cylinder : TDC/Compression] measure the valve clearance.



- Using a thickness gauge, measure the clearance between the tappet and the base circle of camshaft.
- Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting tappet.

### Valve clearance

#### Specification

Engine coolant temperature : 20°C [68°F]

#### Limit

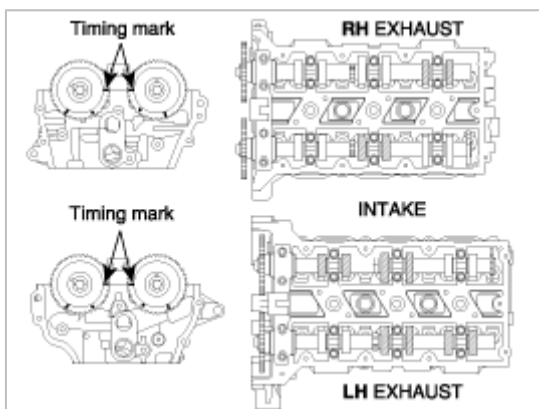
Intake : 0.17 ~ 0.23mm (0.0067 ~ 0.0090in.)

Exhaust : 0.27 ~ 0.33mm (0.0106 ~ 0.0129in.)

- B. Turn the crankshaft pulley one revolution (360°) and align the groove with timing mark "T" of the lower timing chain cover.

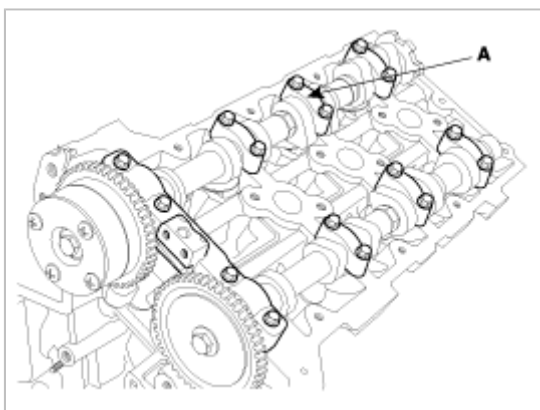
Do not rotate engine counterclockwise

- C. Check only valves indicated as shown. [NO. 4 cylinder : TDC/compression]. Measure the valve clearance.

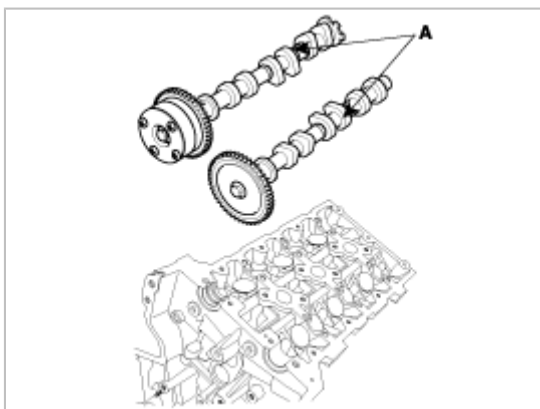


13. Adjust the intake and exhaust valve clearance.

- Set the No.1 cylinder to the TDC/compression.
- Mark on the timing chain on the basis of the marking on sprocket and CVVT.
- Remove the timing chain.
- Remove the camshaft bearing caps(A).

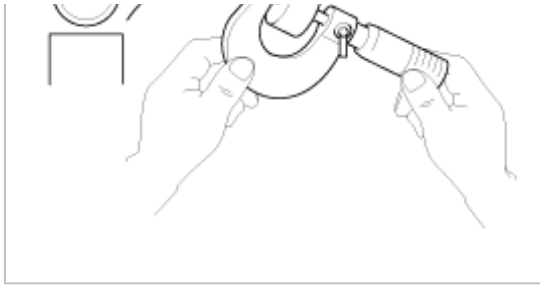


- Remove the camshaft assembly(A).



- Remove MLAs.
- Measure the thickness of the removed tappet using a micrometer.





- H. Calculate the thickness of a new tappet so that the valve clearance comes within the specified value.

Valve clearance(Engine coolant temperature: 20°C[68°F])

T : Thickness of removed tappet

A : Measured valve clearance

N : Thickness of new tappet

Intake :  $N = T + [A - 0.20\text{mm}(0.0079\text{in.})]$

Exhaust :  $N = T + [A - 0.30\text{mm}(0.0118\text{in.})]$

- I. Select a new tappet with a thickness as close as possible to the calculated value.

Tappets are available in 41 size increments of 0.015mm (0.0006in.) from 3.00mm (0.118in.) to 3.600mm (0.1417in.)

- J. Place a new tappet on the cylinder head.

Applying engine oil at the selected tappet on the periphery and top surface.

- K. Install the intake and exhaust camshaft.

- L. Install the bearing caps.

- M. Install the timing chain.

- N. Turn the crankshaft two turns in the operating direction(clockwise) and realign crankshaft sprocket and camshaft sprocket timing marks.

- O. Recheck the valve clearance.

Valve clearance (Engine coolant temperature: 20°C[68°F])

[Specification]

Intake : 0.17 ~ 0.23mm (0.0067 ~ 0.0090in.)

Exhaust : 0.27 ~ 0.33mm (0.0106 ~ 0.0129in.)