Specifications

Description	Specifications	Limit
General		
Type	In-line, Double Overhead Camshaft	
Number of cylinder	4	
Bore	86mm (3.385in)	
Stroke	86mm (3.385in)	
Total displacement	1998cc (121.92cu.in.)	
Compression ratio	9.4 : 1	
Firing order	1-3-4-2	
Valve timing		
Intake valve		
Opens (ATDC / BTDC)	ATDC 11° ~ BTDC 34°	
Closes (ABDC)	ABDC 67° ~ 22°	
Exhaust		
Opens (BBDC)	BBDC 54° ~ 14°	
Closes (ATDC)	ATDC -10° ~ 30°	
Valve		
Valve length		
Intake	113.18mm (4.4559in.)	112.93mm (4.4460in)
Exhaust	105.79mm (4.1649in.)	105.59mm (4.1570in)
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		
MLA		
MLA outer diameter	31.964 ~ 31.980mm (1.2584 ~ 1.2590in.)	
Cylinder head tappet bore inner diameter	32.000 ~ 32.025mm (1.2598 ~ 1.2608in.)	

MLA to tappet bore clearance	0.020 ~ 0.061mm (0.0008 ~ 0.0024in.)	0.07mm (0.0027in.)
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 guide		
Length	43.8 ~ 44.2mm (1.7244 ~ 1.7401in.)	
Inner diameter	5.500 ~ 5.512mm (0.2165 ~ 0.2170in.)	
Valve spring		
Free length	47.44mm (1.8677in.)	
Load	19.0 ± 0.6kg/35.0mm (41.88 ± 1.32lb/1.3779in.)	
Square	39.8 ± 1.2kg/26.0mm (87.74 ± 2.64lb/1.0236in.)	
	1.5° MAX.	
Valve clearance		
Cold (20°C[68°F])		
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 head		
Flatness of gasket surface	Max. 0.05mm (0.0019in.)	
Flatness of manifold mounting surface	Max. 0.10mm (0.0039in.)	
Cylinder block		
Cylinder bore	86.00 ~ 86.03mm (3.3853 ~ 3.3871in.)	
Out-of-round and taper of cylinder bore	Less than 0.05mm (0.0019in.)	
Clearance with piston (To set limits to new parts)	0.015 ~ 0.035mm (0.0005 ~ 0.0013in.)	
Piston		
O.D (To set limits to new parts)	87.975 ~ 88.005mm (3.4635 ~ 3.4647in.)	
Ring groove width		
No.1	1.235 ~ 1.250mm (0.0486 ~ 0.0492in.)	1.26mm (0.0496in.)
No.2	1.230 ~ 1.250mm (0.0484 ~ 0.0492in.)	1.26mm (0.0496in.)
Oil ring	2.01 ~ 2.03mm (0.0791 ~ 0.0799in.)	2.05mm (0.0807in.)
Piston ring		
Side clearance		
No.1	0.05 ~ 0.08mm (0.0019 ~ 0.0031in.)	0.1mm (0.004in.)
No.2	0.04 ~ 0.08mm (0.0015 ~ 0.0031in.)	0.1mm (0.004in.)
Oil ring	0.06 ~ 0.13mm (0.0023 ~ 0.0051in.)	0.2mm (0.008in.)
End gap		

No.1			0.15 ~ 0.30mm (0.0059 ~ 0.0118in.)	0.6mm (0.0236in.)
No.2			0.37 ~ 0.52mm (0.0145 ~ 0.0204in.)	0.7mm (0.0275in.)
Oil ring side rail			0.20 ~ 0.70mm (0.0078 ~ 0.0275in.)	0.8mm (0.0315in.)
Piston pin				
Piston pin outer diameter			21.997 ~ 22.000mm (0.8660 ~ 0.8661in.)	
Piston pin hole inner diameter			22.030 ~ 22.070mm (0.8673 ~ 0.8688in.)	
Piston pin hole clearance			0.003 ~ 0.010mm (0.0001 ~ 0.0004in.)	
Connecting rod small end inner diameter			22.005 ~ 22.011mm (0.8663 ~ 0.8666in.)	
Connecting rod				
Bend			0.05mm (0.0020in.) or less	
Twist			0.1mm (0.004in.) or less	
Connecting rod big end to crankshaft side clearance			0.100 ~ 0.250mm (0.0039 ~ 0.010in.)	0.35mm (0.0138in.)
Connecting rod bearing				
Oil clearance (To seat limits to new parts)			0.025 ~ 0.043mm (0.0009 ~ 0.0016in.)	0.05mm (0.0078in.)
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	¢ 36mm (1.4173in.)	
		No.2, 3, 4, 5	¢ 24mm (0.9449in.)	
Bearing oil clearance	Intake	No.1	0.022 ~ 0.057mm (0.0008 ~ 0.0022in.)	0.09mm (0.0035in.)
		No.2, 3, 4, 5	0.045 ~ 0.082mm (0.0017 ~ 0.0032in.)	0.12mm (0.0047in.)
	Exhaust	No.1	0 ~ 0.032mm (0 ~ 0.0012in.)	
		No.2, 3, 4, 5	0.045 ~ 0.082mm (0.0017 ~ 0.0032in.)	0.12mm (0.0047in.)
End play			0.04 ~ 0.16mm (0.0015 ~ 0.0062in.)	0.20mm (0.0047in.)
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			0.020 ~ 0.038mm (0.0007 ~ 0.0014in.)	
Cooling method			Water-cooled, pressurized. Forced circulation with water pump	
Engine oil				
Oil quantity	Total		5.9L (6.23US qt, 5.19Imp qt)	When replacing a short engine or a block assembly
	Oil pan		5.0L (5.28US qt, 4.41Imp qt)	

	Drain and refill	5.3L (5.60US qt, 4.66Imp qt)	Including oil filter
Oil grade	Classification	API SL, SM or above ILSAC GF3, GF4 or above	Satisfy the requirement of the API or ILSAC classification.
	SAE viscosity grade	5W-20, 5W-30, 5W-40	
Oil pressure (at 1000rpm)		127kPa (1.3kg/cm², 18.49psi) or above	Oil temperature in oil pan : 110±2°C (230±36°F)
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		Paper type	
Exhaust pipe			
Muffler		Expansion resonance type	
Suspension system		Rubber hangers	

Service Standrds

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

Tightening Torques

Item	N.m	kgf.m	lb-ft
Ladder frame bolt (M8 x 55)	23.5 ~ 27.4	2.4 ~ 2.8	17.4 ~ 20.2
Oil pump bolt (BSM)	8.8 + 16.6 + 25.5	0.9 + 1.7 + 2.6	6.5 + 12.3 + 18.8
Timing chain cover bolt (M8)	18.6 ~ 22.5	1.9 ~ 2.3	13.7 ~ 16.6

Timing chain cover bolt (M6)	7.8 ~ 9.8	0.8 ~ 1.0	5.8 ~ 7.2
Oil pan bolt	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Engine support bracket bolt (LH/RH)	49.0 ~ 63.7	5.0 ~ 6.5	36.1 ~ 47.0
Camshaft bearing cap bolt (M6)	10.8 ~ 12.7	1.1 ~ 1.3	7.9 ~ 9.4
Camshaft bearing cap bolt (M8)	27.4 ~ 31.4	2.8 ~ 3.2	20.3 ~ 23.1
Cylinder head bolt	(32.4~36.3) + (90~95°) + (90~95°)	(3.3~3.7) + (90~95°) + (90~95°)	(23.9~26.8) + (90~95°) + (90~95°)
Engine hanger bolt	27.5 ~ 31.4	2.8 ~ 3.2	20.3 ~ 23.1
Cylinder head cover bolt	7.8 ~ 9.8	0.8 ~ 1.0	5.8 ~ 7.2
Crankshaft pulley bolt	166.6 ~ 176.4	17.0 ~ 18.0	122.9 ~ 130.1
Connecting rod bearing cap bolt	(17.7~21.6) + (88~92°)	(1.8~2.2) + (88~92°)	(13.0~15.9) + (88~92°)
Main bearing cap bolt	14.7 + (27.5~31.4) + (120~125°)	1.5 + (2.8~3.2) + (120~125°)	10.8 + (20.3~23.1) + (120~125°)
Flywheel bolt	117.6 ~ 127.4	12.0 ~ 13.0	86.8 ~ 93.9
Drive plate bolt	117.6 ~ 127.4	12.0 ~ 13.0	86.8 ~ 93.9
Timing chain tensioner bolt	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Timing chain tensioner arm bolt	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Timing chain guide bolt	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
OCV bolt	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
CVVT bolt	53.9 ~ 63.7	5.5 ~ 6.5	39.7 ~ 47.0
BSM chain tensioner arm bolt	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
BSM chain guide bolt	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
BSM chain tensioner bolt	9.8 ~ 11.8	1.0 ~ 1.2	7.2 ~ 8.7
Water pump bolt	18.6 ~ 23.5	1.9 ~ 2.4	13.7 ~ 17.4
P/S pump bracket bolt	19.6 ~ 23.5	2.0 ~ 2.4	14.5 ~ 17.4
Tensioner ASSY intergrated bracket bolt	39.2 ~ 44.1	4.0 ~ 4.5	28.9 ~ 32.5
Water temp. control nut	18.6 ~ 23.5	1.9 ~ 2.4	13.7 ~ 17.4
Water inlet pipe nut	18.6 ~ 23.5	1.9 ~ 2.4	13.7 ~ 17.4
Water temp. control bolt	14.7 ~ 19.6	1.5 ~ 2.0	10.8 ~ 14.4
Oil level gauge assembly bolt	7.8 ~ 11.8	0.8 ~ 1.2	5.8 ~ 8.7
Ignition coil bolt	3.9 ~ 5.9	0.4 ~ 0.6	2.9 ~ 4.3
Intake manifold bolt	18.6 ~ 27.4	1.9 ~ 2.8	13.7 ~ 20.2
Intake manifold nut	18.6 ~ 27.4	1.9 ~ 2.8	13.7 ~ 20.2
Intake manifold stay bolt	18.6 ~ 23.5	1.9 ~ 2.4	13.7 ~ 17.4
Exhaust manifold heat protector bolt	18.6 ~ 27.4	1.9 ~ 2.8	13.7 ~ 20.2
Exhaust manifold nut	49.0 ~ 53.9	5.0 ~ 5.5	36.1 ~ 39.7
Exhaust manifold stay bolt (M8)	18.6 ~ 27.4	1.9 ~ 2.8	18.6 ~ 20.2
Exhaust manifold stay bolt (M10)	49.0 ~ 53.9	5.0 ~ 5.5	36.1 ~ 39.8
Muffler bolt	39.2 ~ 58.8	4.0 ~ 6.0	28.9 ~ 43.4

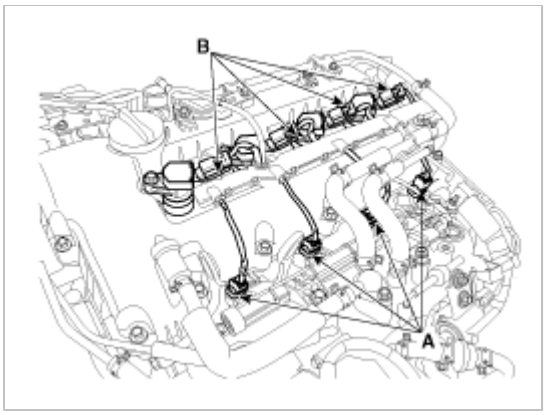
Crankshaft position sensor bolt	3.9 ~ 5.9	0.4 ~ 0.6	2.9 ~ 4.3
Oxygen sensor	39.2 ~ 49.0	4.0 ~ 5.0	28.9 ~ 36.1
Knock sensor	16.7 ~ 25.5	1.7 ~ 2.6	12.3 ~ 18.8
Camshaft position sensor	3.9 ~ 5.9	0.4 ~ 0.6	2.9 ~ 4.3
Oil pressure switch	7.8 ~ 11.8	0.8 ~ 1.2	5.8 ~ 8.7
Oil filter	11.8 ~ 15.7	1.2 ~ 1.6	8.7 ~ 11.6

Compression Pressure Inspection

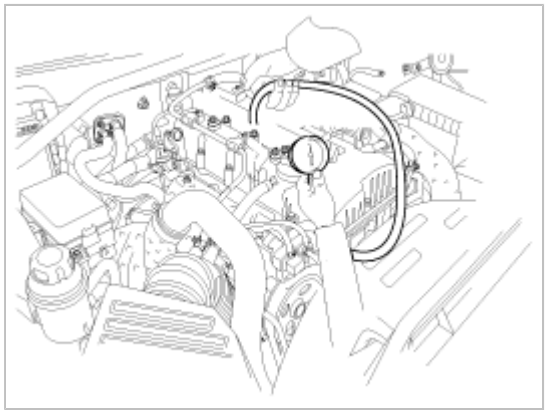
NOTE

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. Disconnect the injector connectors (A), ignition coil connectors (B) and ignition coils.



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.



   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.

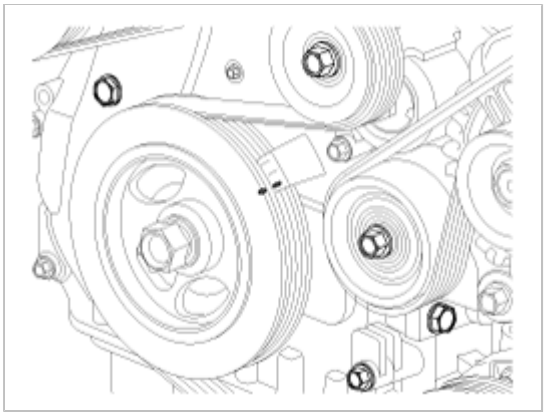
5. Reinstall spark plugs.
6. Connect the injector connectors and ignition coil connectors.

Valve Clearance Inspection And Adjustment

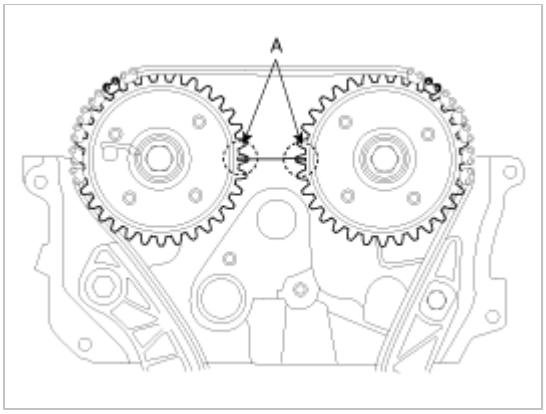
NOTE

Inspect and adjust the valve clearance when the engine is cold (Engine coolant temperature : 20°C (68°F)) and cylinder head is installed on the cylinder block.

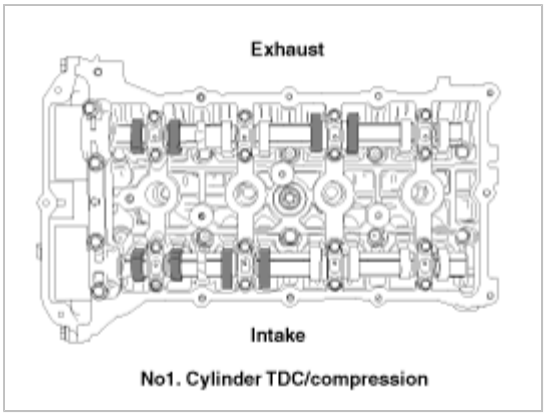
1. Remove the cylinder head cover. (Refer to Timing system)
2. Set No.1 cylinder to TDC/compression.
   A. Turn the crankshaft pulley and align its groove with the timing mark "T" of the lower timing chain cover.



   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°)



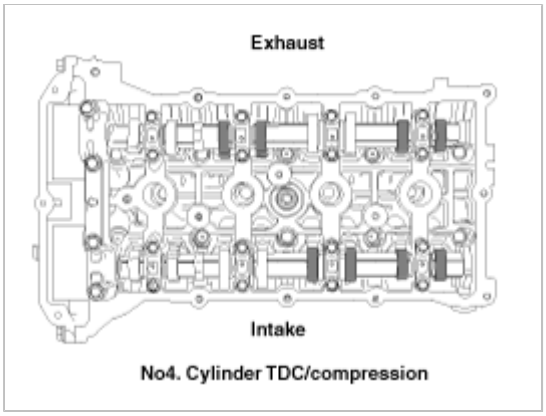
3. Inspect the valve clearance.
   A. Check only the valve indicated as shown. [No. 1 cylinder : TDC/Compression] measure the valve clearance.



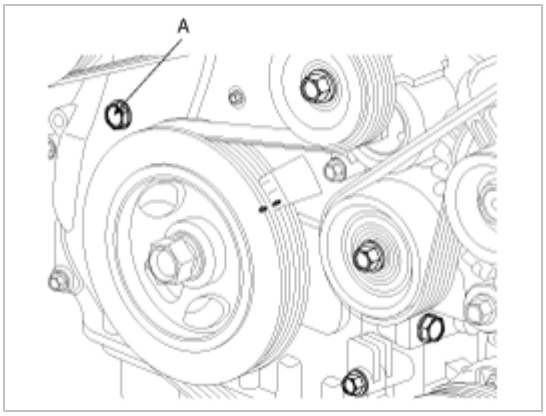
·Using a thickness gauge, measure the clearance between the tappet and the base circle of camshaft.
·Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting tappet.

Valve clearance
Specification
Engine coolant temperature : 20°C [68°F]
Limit
Intake : 0.10 ~ 0.30mm (0.0039 ~ 0.0118in.)
Exhaust : 0.20 ~ 0.40mm (0.0079 ~ 0.0157in.)

B. Turn the crankshaft pulley one revolution (360°) and align the groove with timing mark "T" of the lower timing chain cover.
C. Check only valves indicated as shown. [NO. 4 cylinder : TDC/compression]. Measure the valve clearance.



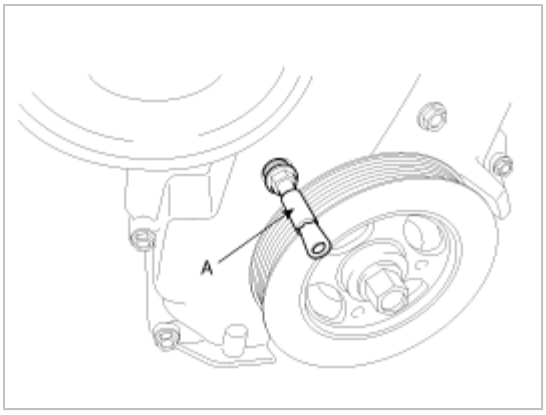
4. Adjust the intake and exhaust valve clearance.
   A. Set the No.1 cylinder to the TDC/compression.
   B. Marks on the timing chain and camshaft timing sprockets.
   C. Remove the service hole bolt(A) of the timing chain cover.



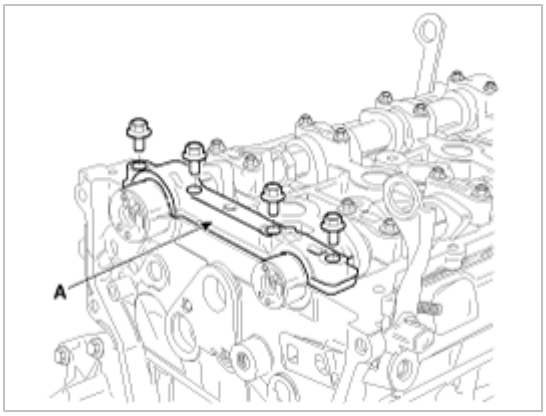
CAUTION

The bolt must not be reused once it has been assembled.

D. Insert the SST(A) (09240-2G000) in the service hole of the timing chain cover and release the ratchet.



E. Remove the front camshaft bearing cap(A).



F. Remove the exhaust camshaft bearing cap and exhaust camshaft.

G. Remove the intake camshaft bearing cap and intake camshaft.

CAUTION

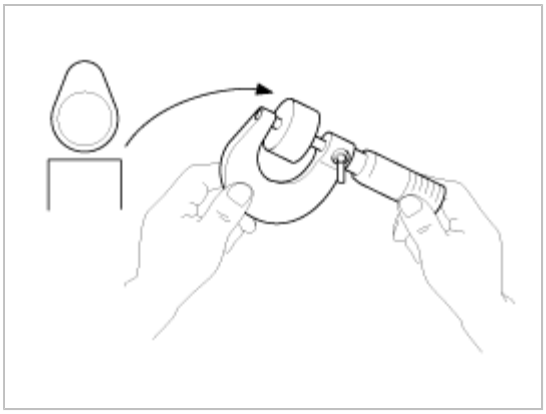
When disconnect the timing chain from the camshaft timing sprocket, hold the timing chain.

H. Tie down timing chain so that it dosen't move.

CAUTION

Be careful not to drop anything inside timing chain cover.

I. Measure the thickness of the removed tappet using a micrometer.



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

Valve clearance (Engine coolant temperature : 20°C)
T : Thickness of removed tappet
A : Measured valve clearance
N : Thickness of new tappet
Intake : N = T + [A - 0.20mm(0.0079in.)]
Exhaust : N = T + [A-0.30mm (0.0118in.)]

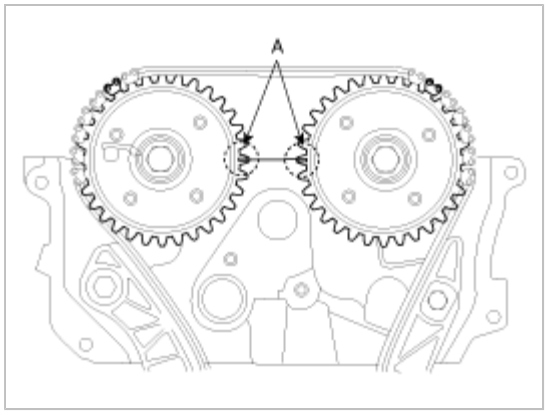
K. Select a new tappet with a thickness as close as possible to the calculated value.

> NOTE
>
> Shims are available in 47size increments of 0.015mm (0.0006in.) from 3.00mm (0.118in.) to 3.690mm (0.1452in.)

L. Place a new tappet on the cylinder head.
M. Hold the timing chain, and install the intake camshaft and timing sprocket assembly.
N. Align the matchmarks on the timing chain and camshaft timing sprocket.
O. Install the intake and exhaust camshaft.
P. Install the front bearing cap.
Q. Install the sevice hole bolt.

Tightening torque :
11.8 ~ 14.7N.m (1.2 ~ 1.5kgf.m, 8.7 ~ 10.8lb-ft)

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



S. Recheck the valve clearance.

Valve clearance (Engine coolant temperature : 20°C)
[Specification]
Intake : 0.17 ~ 0.23mm (0.0067 ~ 0.0090in.)
Exhaust : 0.27 ~ 0.33mm (0.0106 ~ 0.0129in.)

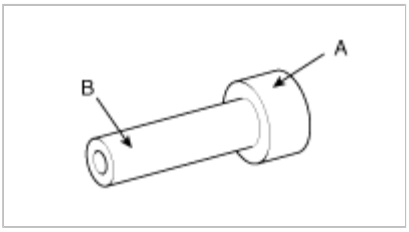
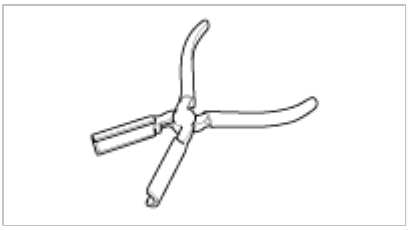
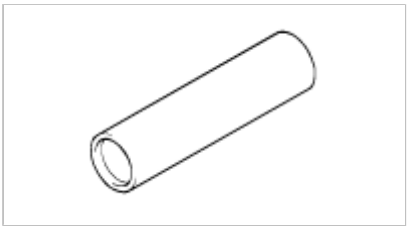
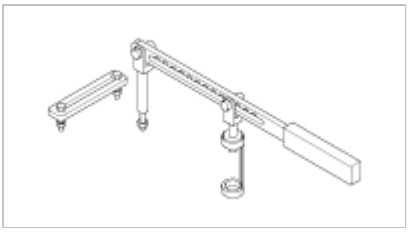
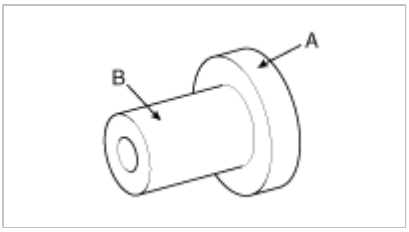
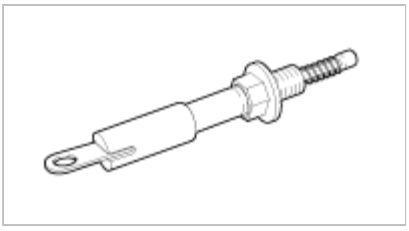
Troubleshooting

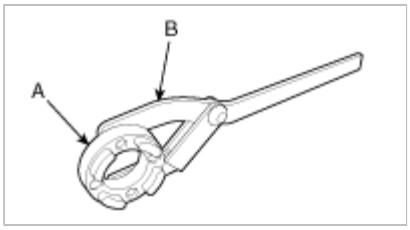
Symption	Suspect area	Remedy
Engine misfire with abnormal internal lower engine noises.	Worn crankshaft bearings Loose or improperly engine filwheel	Replace the crankshaft and bearings as required. Repair or replace the flywheel as required.
	Worn piston rings (Oil consumption may or may not cause the engine to misfire.)	Inspect the cylinder for a loss of compression. Repair or replace as required.
	Worn crankshaft thrust bearings	Replace the crankshaft and bearings as required
Engine misfire with abnormal valve train noise.	Stuck valves. (Carbon buidup on the valve stem)	Repair or replace as required
	Excessive worn or mis-aligned timing chain	Replace the timing chain and sprocket as required.
	Worn camshaft lobes.	Replace the camshaft and valve lifters.
Engine misfire with coolant consumption	• Faulty cylinder head gasket or other damage to the cylinder head and engine block cooling system. • Coolant consumption may or may not cause the engine to overheat.	• Inspect the cylinder head and engine block for damage to the coolant passages and/or a faulty head gasket. • Repair or replace as required.
Engine misfire with excessive oil consumption	Worn valves, guides and/or valve stem oil seals.	Repair or replace as required.
	Worn piston rings. (Oil consumption may or may not cause the engine to misfire)	• Inspect the cylinder for a loss of compression. • Repair or replace as required.
Engine noise on start-up, but only lasting a few seconds.	Incorrect oil viscosity	• Drain the oil. • Install the correct viscosity oil.
	Worn crankshaft thrust bearing.	• Inspect the thrust bearing and crankshaft. • Repair or replace as required.
Upper engine noise, regardless of engine speed.	Low oil pressure	Repair or replace as required.
	Broken valve spring.	Replace the valve spring.
	Worn or dirty valve lifters.	Replace the valve lifters.
	Stetched or broken timing chain and/or damaged sprocket teeth.	Replace the timing chain and sprockets.
	Worn timing chain tensioner, if applicable.	Replace the timing chain tensioner as required.
	Worn camshaft lobes.	• Inspect the camshaft lobes. • Replace the timing camshaft and valve lifters as required.
	Worn valve guides or valve stems.	Inspect the valves and valve guides, then repair or replace as required.
	Stuck valves. (Carbon on the valve stem or valve seat may cause the valve to	Inspect the valves and valve guides, then repair or replace as required.

	stay open.	
	Worn drive belt, idler, tensioner and bearing.	Replace as required
Lower engine noise, regardless of engine speed	Low oil pressure	Repair or required.
	Loose or damaged flywheel.	Repair or replace the flywheel.
	Damaged oil pan, contacting the oil pump screen.	• Inspect the oil pan. • Inspect the oil pump screen. • Repair or replace as required.
	Oil pump screen loose, damaged or restricted.	• Inspect the oil pump screen. • Repair or replace as required.
	Excessive piston-to-cylinder bore clearance.	• Inspect the piston, piston pin and cylinder bore. • Repair or replace as required.
	Excessive piston pin-to-piston clearance	• Inspect the piston, piston pin and the connecting rod. • Repair or replace as required.
	Excessive connecting rod bearing clearance	Inspect the following components and repair or replace as required. • The connecting rod bearings. • The connecting rods. • The crankshaft pin journals.
	Excessive crankshaft bearing clearance	Inspect the following components, and repair or replace as required. • The crankshaft bearings. • The crankshaft main journals. • The cylinder block
	Incorrect piston, piston pin and connecting rod installation	• Verify the piston pins and connecting rods are installed correctly. • Repair as required.
Engine noise under load	Low oil pressure	Repair or replace as required.
	Excessive connecting rod bearing clearance	Inspect the following components and repair or replace as required : • The connecting rod bearings. • The connecting rods. • The crankshaft
	Excessive crankshaft bearing clearance	Inspect the following components, and repair or replace as required. • The crankshaft bearings. • The crankshaft main journals. • The cylinder block.
Engine will not crank-crankshaft will not rotate	Hydraulically locked cylinder • Coolant/antifreeze in cylinder. • Oil in cylinder. • Fuel in cylinder	1. Remove spark plugs and check for fluid. 2. Inspect for broken head gasket. 3. Inspect for cracked engine block or cylinder head. 4. Inspect for a sticking fuel injector and/or leaking fuel regulator.

	Broken timing chain and/or timing chain and/or timing chain gears.	1. Inspect timing chain and gears. 2. Repair as required.
	Material in cylinder • Broken valve • Piston material • Foreign material	1. Inspect cylinder for damaged components and/or foreign materials. 2. Repair or replace as required.
	Seized crankshaft or connecting rod bearings.	1. Inspect crankshaft and connecting rod bearing. 2. Repair as required.
	Bent or broken connecting rod.	1. Inspect connecing rods. 2. Repair as required.
	Broken crankshaft	1. Inspect crankshaft. 2. Repair as required.

Special Service Tools

Tool (Number and name)	Illustration	Use
Crankshaft front oil seal installer (09214-3K000) (09231-H1100)		Installation of the front oil seal A : 09214-3K000 B : 09231-H1100
Valve stem seal		Removal of the valve stem seal
Torque angle adapter (09221-4A000)		Installtion of bolts & nuts needing an angular method of adjustment.
Valve stem oil seal installer (09222-4A000)		Installation of the valve stem oil seal
Valve spring compressor & holder (09222-3K000) (09222-3K100)		Removal and installation of the intake or exhaust valve 09222-3K100 (holder)
Crankshaft rear oil seal installer (09214-3K100) (09231-H1100)		Installation of the crankshaft rear oil seal A : 09214-3K100 B : 09231-H1100
Timing chain tensioner ratchet holder (09240-2G000)		Timing chain tension release. In vehicle inspection and adjustment of valve clearance.

Crankshaft pulley adapter (09231-2M100) Crankshaft pulley adapter holder (09231-2J210)		Removal and installation of crankshaft pulley from the vehicle A : 09231-2M100 B : 09231-2J210 (Holder)