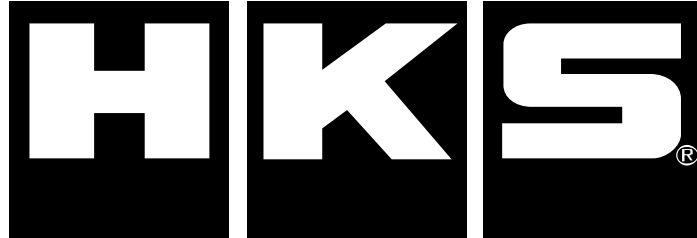


# PISTON KIT

## INSTRUCTION MANUAL



Read this manual before use.

Installation must be done by a professional.

Keep this manual after installation.

NAME OF PRODUCT	PISTON KIT 4B11 2.2L $\phi$ 86.5 (Only for HKS 2.2L)
USAGE	AUTOMOBILE PART
PART NUMBER	21003-AM004
MANUAL NUMBER	E04131-M40030-00
APPLICATION	MITSUBISHI LANCER EVOLUTION X (GZ4A)
ENGINE	4B11 TURBO
YEAR	2007/10 ~
REMARKS	<ul style="list-style-type: none"><li>• The following HKS Con'rod and Crankshaft are required to use this kit. 23004-AM002 CONROD SET 4B11 I-BEAM (Only for HKS 2.2L Kit) 23004-AM003 CONROD SET 4B11 H-BEAM (Possible to assemble to this kit.) 23006-AM003 CRANKSHAFT 4B11 2.2L (Only for HKS 2.2L)</li><li>• Boring and honing of the cylinder bore are required.</li><li>• The following head gasket is recommended to use with this kit. t1.0 23001-AM006 / t1.2 23001-AM007 / t1.5 23001-AM008</li></ul>

## PREFIX

- Thank you for purchasing the HKS PISTON KIT 4B11 2.2L  $\phi$ 86.5.
- Installation must be done by a professional.
- After installation, follow the instructions in this manual.
- Please read this manual before installation.

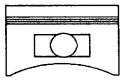



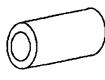


## NOTICE

- This manual assumes that you have and know how to use the tools and equipment necessary to safely perform service operations on your vehicle.
- This manual assumes that you are familiar with typical automotive systems and basic service and repair procedures.
- Do not attempt to carry out the operations shown in this manual unless these assumptions are correct.
- Always have access to a factory repair manual.
- To avoid injury, follow the safety precautions contained in the factory repair manual.

## REVISION OF MANUAL

Rev. Number	Date	Details
3-3.01	2010/05	・First edition

## PARTS LIST

No.	Parts name	QTY	Fig	Remarks
1	PISTON 2.2L $\phi$ 86.5	4		0.5 mm Over size
2	TOP RING $\phi$ 86.5, PISTON	4		Mark 1T
3	SECOND RING $\phi$ 86.5, PISTON	4		Mark 2T
4	OIL RING $\phi$ 86.5, PISTON	4		2 pieces
5	PIN $\phi$ 23, PISTON	4		Lightweight
6	SNAP RING $\phi$ 23	8		
7	MANUAL OF HKS	1		JP + EN

## SPECIFICATIONS

HKS Kit				HKS PISTON (2.2L)	MITSUBISHI
PISTON	Cylinder bore dia.			$\phi$ 86.5	$\phi$ 86.0
	Overall height	mm		48.8	55.0
	Compression height	mm		30.80	33.35
	Vol. of top (凹)	cc		12.1	4.5
	Recession of valve			UP Depth	-
PIN	DIA. x Length			$\phi$ 23 x 60 Light weight	$\phi$ 23 x 60
SNAP RING	Type			Dedication of HKS	-
RING	TOP	B x T	mm	1.2 x 3.1	1.2 x -
	SECOND	B x T	mm	1.2 x 3.1	1.5 x -
	OIL	B x T	mm	2.0 x 2.0	2.0 x -

Other HKS Kit				HKS Kit (2.2L)	MITSUBISHI
CONROD I-BEAM 23004-AM002 (2.2L)	Small end Inside dia. / Width			$\phi$ 23.0 / 20.0~20.5	$\phi$ 23.0 / 20.0
	Big end Inside dia. / Width			$\phi$ 55.0 / 21.9	$\phi$ 55.0 / 21.9
	Center-distance			143.75	143.75
	Size of bolt			M8 x P1.0 x 42 mm	M8 x P1.0 x 42 mm
CONROD H-BEAM 23004-AM003 (Option)	Small end Inside dia. / Width			$\phi$ 23.0 / 20.0	/
	Big end Inside dia. / Width			$\phi$ 55.0 / 21.9	
	Center-distance			143.75	
	Size of bolt			3/8-24 UNF x 41 mm	
CRANKSHAFT 23006-AM003 (2.2L)	Stroke length			91.0	86.0
	Plate sensor			STD + Drilling	STD
	Bolt of mounting plate			flush M6 x 20 mm 4pcs.	flush M6 x 14 mm 4pcs.

## COMPRESSION

※ HKS HEAD GASKET is not included in this kit.

COMP.	(HKS GKT)			HKS kit (2.2L)	MITSUBISHI
COMP. Ratio	23001-AM006	t1.0		8.7	9.0 STD t1.2
	23001-AM007	t1.2	$\epsilon$	8.6	
	23001-AM008	t1.5		8.4	
Process-vol.			cc	534.8	499.6
	Cylinder bore dia.		$\phi$	86.5	86.0
	Stroke length		mm	91.0	86.0
Clearance-vol.		t1.0		69.5	62.5
		t1.2	cc	70.4	
		t1.5		72.2	
	Comb. chamber-vol.		cc	50.8	50.8
	Vol. of top (凹)		cc	12.1 凹	4.5 凹
	Vol. of piston down (TDC)		cc	0.3 0.05mm down	0.0 None down
	COMP. height		mm	30.80	33.35
Vol. GKT		t1.0	cc	6.3	7.1 STD t1.2
		t1.2		7.2	
		t1.5		9.0	
GKT bore dia.			$\phi$	87.5	87.0

## INSTALLATION

### 1. Removal of factory parts.

Remove factory parts referring to the factory service manual.

### 2. Boring and honing of cylinder.

This piston kit includes the piston 0.5mm oversized of the factory size.

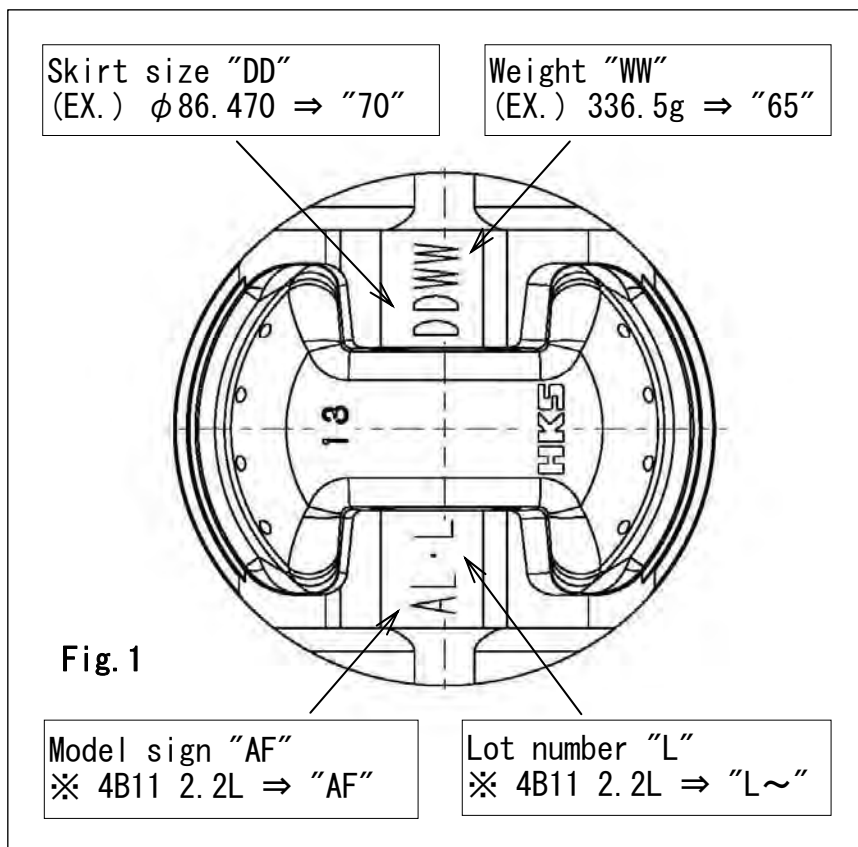
Please follow the procedures below.

#### 2.1 The size of Piston skirt is recorded on the back of the piston.

(Example / Fig. 1)

$\phi 86.470 \text{ mm} \Rightarrow \text{"70"}$  display

Skirt size	$\phi 86.460 \sim \phi 86.470$
Measurement position	10 mm from bottom
Measurement temp.	20 °C



#### 2.2 Calculate the inside diameter of each cylinder bore from the "DD" of the piston skirt and the piston bore clearance specified value.

Piston clearance (mm)	0.035 ~ 0.045
Cylinder bore dia. = Piston skirt dia. + Piston clearance	

#### 2.3 Please do boring and honing each cylinder to the calculated bore dia.

## CAUTION

- The cylinder bore has to be within the range of the designated diameter.  
If the size is out of the range, HKS piston kit and piston rings cannot perform properly.

## ADVICE

- It is recommended to use a dummy head when measuring the cylinder bores to ensure an accurate bore finish.

### 3. Chamfering cylinder bore bottom edge.

When honing is done, a burr usually remains on the cylinder bore's bottom edge.

If the burr is on the bottom edge, file off the cylinder bore bottom edge as shown in the Fig.2.

Chamfering volume (mm)	C 0.3 ~ C 0.5
------------------------	---------------

## CAUTION

- Do not chamfer off more than the volume above. Over chamfering will cause a piston to move inside the cylinder.
- Be careful not to scratch other parts.

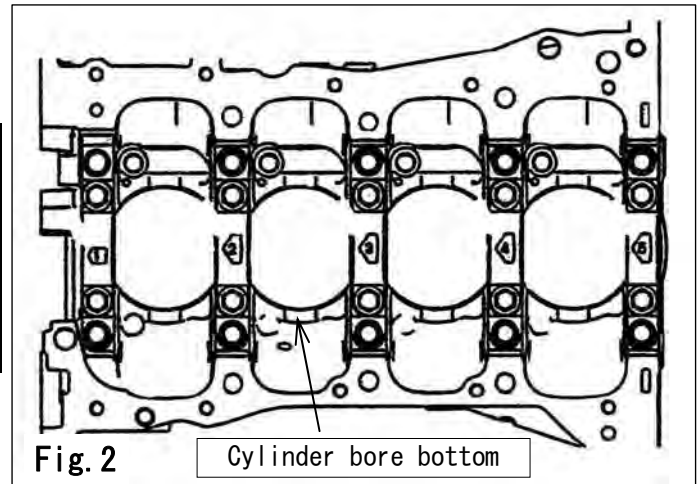


Fig. 2

Cylinder bore bottom

### 4. Chamfering Piston Skirt Bottom Edge.

Chamfer the piston skirt bottom edge as shown in the Fig.3 using waterproof sanding paper.

It is not necessary to chamfer the skirt if chamfering has already been done.

Chamfering volume (mm)	R 0.1 ~ R 0.2
------------------------	---------------

## CAUTION

- Do not chamfer off more than the volume above. Over chamfering will cause a piston move inside the cylinder.
- Be careful not to scratch other parts.

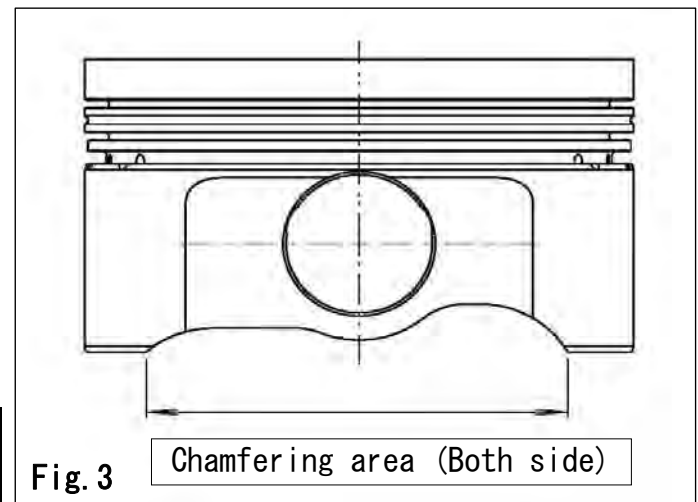


Fig. 3

Chamfering area (Both side)

### 5. Adjust the clearance of piston rings openings.

Designated Clearance (mm)	Top ring	C1	0.25 ~ 0.40
	Second ring	C2	0.40 ~ 0.55
	Oil ring	C3	0.15 ~ 0.45

The clearance of piston rings included in the kit is adjusted to be within the range shown above along with  $\phi 86.5$  cylinder bore.

The ring opening clearance changes depending on the cylinder bore.

The following shows how to measure the clearance.

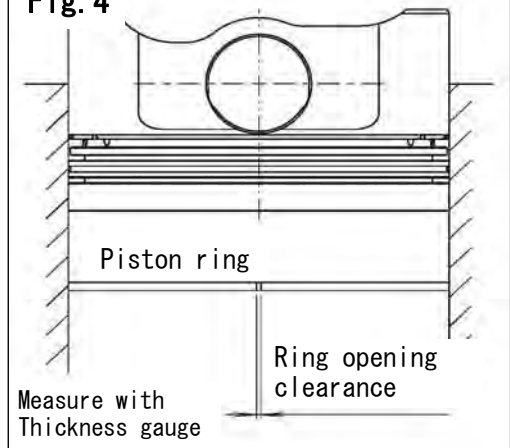
Adjust the clearance if necessary.

- 5.1 Place the piston ring in the middle of the cylinder using a piston as shown in the Fig. 4.  
Measure the clearance of the ring opening with a thickness gauge.
- 5.2 File off the opening edge with a file or an oil stone to make the clearance within the designated value and  $C1 < C2$ . (See the table above.)

## CAUTION

- Adjust the clearance of the top and the second rings to be  $C1 < C2$  to reduce the oil consumption. If the clearance is  $C1 > C2$ , the oil consumption may be extremely high.
- If the clearance of the piston ring opening is not correct, it may cause blowby or over consumption of oil.
- Be careful not to scratch other parts when adjusting the clearance.

Fig. 4



## 6. Installing piston rings.

- 6.1 Install piston rings onto pistons using a piston ring expander. (See the Fig. 5)  
Ensure the seal on the top and second ring is facing toward the top of the piston. (See the Fig. 6)

MARK (TOP FACE)	TYPE
1T	TOP RING
2T	SECOND RING

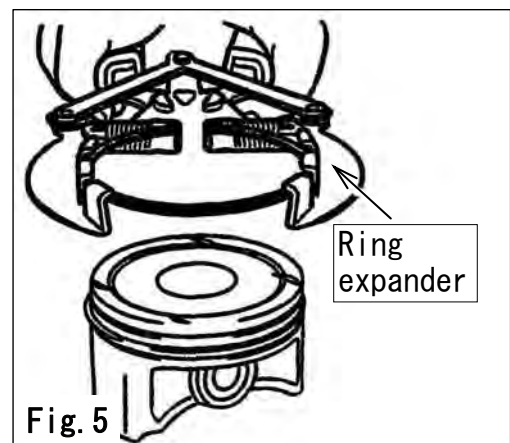


Fig. 5

## CAUTION

- Use a piston ring expander to install piston rings. Do not widen the clearance by hand. It may cause deformation of rings or change of the ring tension. Because it is easy to compromise when 2 pieces oil ring widens it, please warn the handling.
- Align the gap of the top and second ring to prevent over consumption of the oil or excessive blow-by.
- Make sure not to scratch any other parts when aligning rings' gaps.
- Handle the 2 pieces oil ring with care.

Mark of top ring (Top face) 1T  
Mark of second ring (Top face) 2T

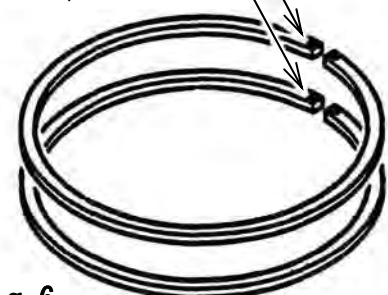
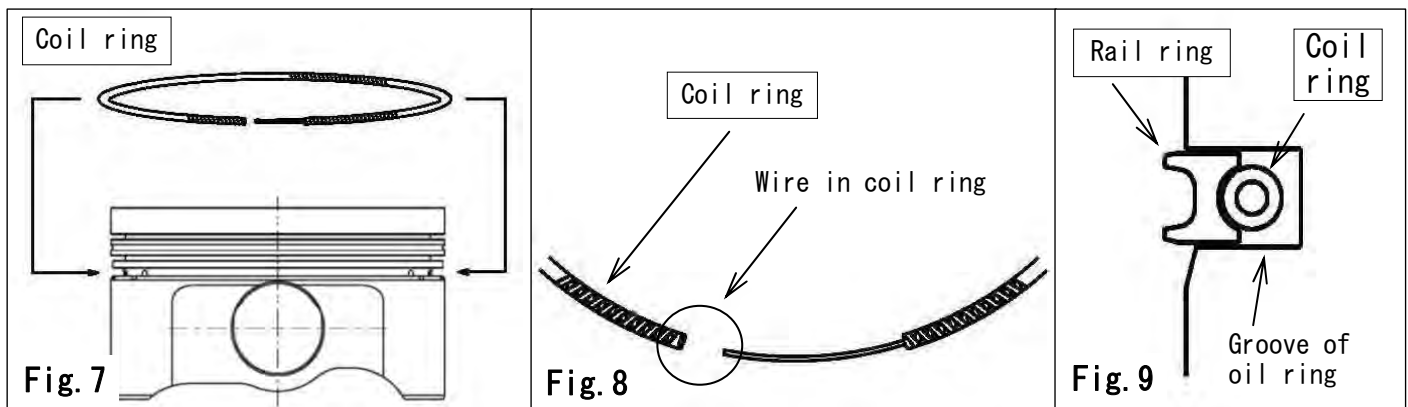
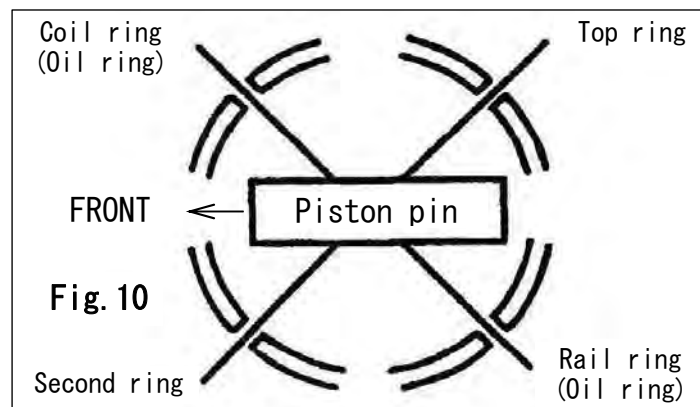


Fig. 6

- 6.2 Install the coil ring of two pieces oil ring onto the oil ring groove of the piston as shown in Fig. 7.  
Then, insert the wire of the coil ring tip into the inside the coil on the other side as shown in Fig. 8.  
Install the rail ring on to the piston oil ring groove that the coil ring was placed using the piston expander as shown in Fig. 5.  
The outside of the coil ring must be inserted to the R groove of inside the rail ring as shown in Fig. 9.



- 6.3 Adjust the position of the ring opening not to come on top of other rings.  
(See the Fig. 10.)



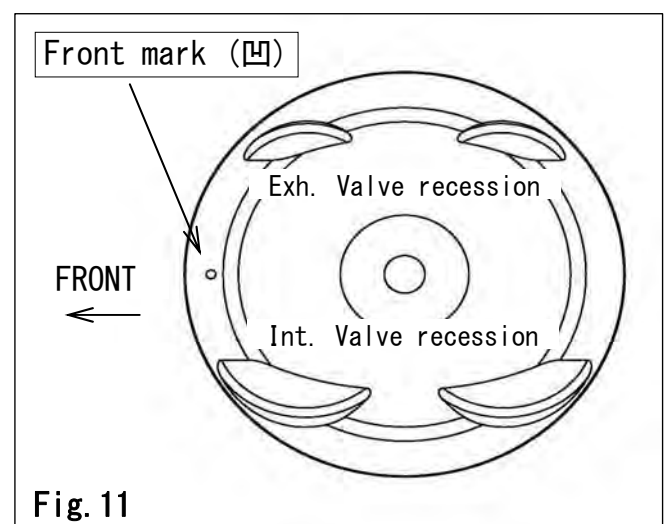
7. Oil clearance of piston pin hole, connecting rod small end pin hole and piston pin.  
The oil clearance of the conrod and piston for the 2.2L kit is pre-adjusted to the following oil clearance within the standard value.

Piston pin hole / Oil clearance (mm)	0.005 ~ 0.015
Conrod I-beam (2.2L) small end pin hole / Oil clearance (mm)	0.012 ~ 0.025
Conrod H-beam (Option) small end pin hole / Oil clearance (mm)	0.015 ~ 0.025

## 8. Assembling parts

- 8.1 The piston has the mark (凹) in front as shown in Fig. 1  
Make sure this mark in front of the piston comes to the front of the engine when assembling.  
(Fig. 11)

<b>CAUTION</b>
<ul style="list-style-type: none"> <li>● Make sure the direction of the piston is correct. If not, the valve may come in contact with the piston, and this may cause the engine damage.</li> </ul>

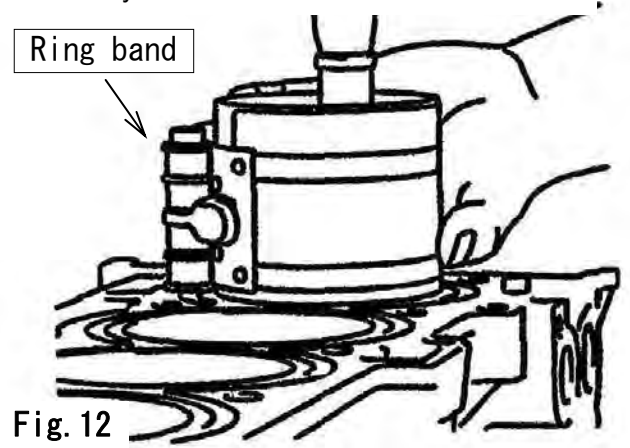


- 8.2 When inserting the piston, tighten the piston ring with the ring band securely and carefully. (Fig. 12.)

## CAUTION

- Do not hammer the piston hardly. It may cause damage to the piston rings and/or the crank pins.

Hammer the piston lightly and insert it carefully.



## 9. Valve timing

This HKS Piston Kit is using pistons with the increased valve recession (depth up) to use with the HKS Camshaft and VALCON Kit. When using this kit with HKS Camshaft, adjust the valve timing carefully not to go beyond the limit.

## CAUTION

- Do not set the valve timing beyond the limit. If it goes beyond the limit, the valve comes in contact with the piston; it may damage the engine.

## Confirmation after Installation.

- Check the following before starting the engine.

Check item	Result
• Make sure pipes and hoses are routed and connected correctly.	
• Make sure hoses are not twisted or bent.	
• Make sure the negative cable terminal is securely attached to the battery.	
• Make sure the level gauge for the engine oil is between H (F) - L.	
• Make sure all bolts and nuts are tightened.	
• Make sure all installed components do not come in contact with other parts.	

- Start the engine and check the following.  
Do not raise the engine rpm when the engine reaches the normal operation temperature. (Let it idle.)

Check item	Result
• Make sure oil is not leaking.	
• Make sure air is not leaking.	
• Make sure fuel, traction oil, coolant, and air are not leaking after revving the engine 2-3 times while in neutral.	
• Make sure the installed parts are not hitting each other.	
• Make sure the level gauge for the engine oil is between H (F) - L.	



## Maintenance

Make sure to properly maintain the operation of the vehicle.

- Maintenance of the vehicle is the driver's responsibility.
- Ask a professional installer for procedures not mentioned in this Users Manual.

## Trouble shooting

- If any problems should occur, consult a professional immediately.
- In case of any abnormal noise, smell or vibration, refer to the Mitsubishi Service Manual.



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