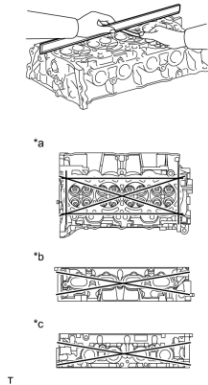


Last Modified: 5-3-2010	6.4 G	From: 200904
Model Year: 2010	Model: Prius	Doc ID: RM000002XA202DX
Title: 2ZR-FXE ENGINE MECHANICAL: CYLINDER HEAD: INSPECTION (2010 Prius)		

INSPECTION

1. INSPECT CYLINDER HEAD FOR FLATNESS

- (a) Using a precision straightedge and feeler gauge, measure the warpage of the contact surfaces where the cylinder head contacts the cylinder block and manifold.



Text in Illustration	
*a	Cylinder Head Lower Side:
*b	Intake Manifold Side:
*c	Exhaust Manifold Side:

Maximum Warpage:

ITEM	SPECIFIED CONDITION
Cylinder block side	0.05 mm (0.00197 in.)
Intake manifold side	0.10 mm (0.00394 in.)
Exhaust manifold side	0.10 mm (0.00394 in.)

If the warpage is more than the maximum, replace the cylinder head.

2. INSPECT CYLINDER HEAD FOR CRACKS

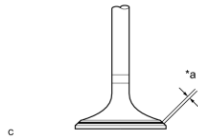


- (a) Using a dye penetrant, check the intake ports, exhaust ports and cylinder surface for cracks.

If cracked, replace the cylinder head.

3. INSPECT VALVE SEATS

(a) Apply a light coat of Prussian blue to the valve face.



Text in Illustration

*a

Width

(b) Lightly press the valve face against the valve seat.

HINT:

Do not rotate the valve while pressing the valve.

(c) Check the valve face and valve seat.

(1) Intake Side:

Check that the contact surfaces of the valve seat and valve face are in the middle area of their respective surfaces, with the width between 1.0 and 1.4 mm (0.0433 and 0.0551 in.).

If not, correct the valve seat.

(2) Exhaust Side:


Check that the contact surfaces of the valve seat and valve face are in the middle area of their respective surfaces, with the width between 1.0 and 1.4 mm (0.0433 and 0.0551 in.).

If not, correct the valve seat.

(3) Check that the contact surfaces of the valve seat and valve face are even around the entire valve seat.

If not, correct the valve seat.

4. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Install the camshafts .

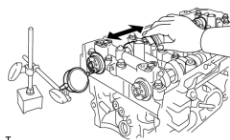
(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance:

0.06 to 0.155 mm (0.00236 to 0.00610 in.)

Maximum thrust clearance:

0.17 mm (0.00669 in.)

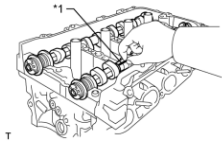


If the thrust clearance is greater than the maximum, replace the camshaft housing. If the thrust surface is damaged, replace the camshaft.

5. INSPECT CAMSHAFT OIL CLEARANCE

(a) Clean the bearing caps and camshaft journals.

(b) Place the camshafts on the camshaft housing.



(c) Lay a strip of Plastigage across each of the camshaft journals.

Text in Illustration	
*1	Plastigage

(d) Install the bearing caps INFO.

NOTICE:

Do not turn the camshaft.

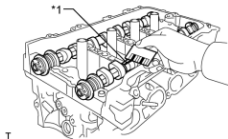
(e) Remove the bearing caps INFO.

(f) Measure the Plastigage at its widest point.

Text in Illustration	
*1	Plastigage

Standard Oil Clearance:

ITEM	SPECIFIED CONDITION
Camshaft No. 1 Journal	0.030 to 0.063 mm (0.00118 to 0.00248 in.)
Camshaft Other Journals	0.035 to 0.072 mm (0.00138 to 0.00283 in.)



Maximum Oil Clearance:

ITEM	SPECIFIED CONDITION
Camshaft No. 1 Journal	0.085 mm (0.00335 in.)
Camshaft Other Journals	0.09 mm (0.00354 in.)

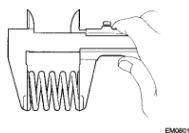
NOTICE:

Completely remove the Plastigage after the inspection.

If the oil clearance is more than the maximum, replace the camshaft. If necessary, replace the camshaft housing.

6. INSPECT COMPRESSION SPRING

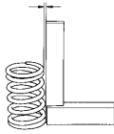
(a) Using a vernier caliper, measure the free length of the compression spring.



Standard free length:
53.36 mm (2.10 in.)

If the free length is not as specified, replace the compression spring.

(b) Using a steel square, measure the deviation of the compression spring.



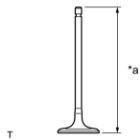
Maximum deviation:

1.0 mm (0.0394 in.)

If the deviation is more than the maximum, replace the compression spring.

7. INSPECT INTAKE VALVE

(a) Using a vernier caliper, measure the overall length of the valve.



Text in Illustration

*a

Overall Length

Standard overall length:

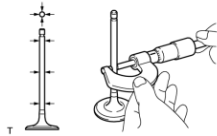
109.34 mm (4.30 in.)

Minimum overall length:

108.84 mm (4.29 in.)

If the overall length is less than the minimum, replace the valve.

(b) Using a micrometer, measure the diameter of the valve stem.

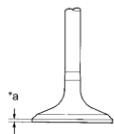


Standard valve stem diameter:

5.470 to 5.485 mm (0.215 to 0.216 in.)

If the valve stem diameter is not as specified, check the oil clearance.

(c) Using a vernier caliper, measure the valve head margin thickness.



Text in Illustration

*a

Margin Thickness

Standard margin thickness:

1.0 mm (0.0394 in.)

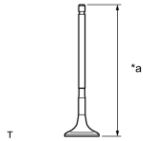
Minimum margin thickness:

0.5 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

8. INSPECT EXHAUST VALVE

(a) Using a vernier caliper, measure the overall length of the valve.



Text in Illustration	Overall Length
*a	

Standard overall length:

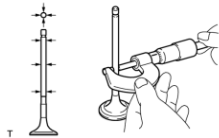
108.25 mm (4.26 in.)

Minimum overall length:

107.75 mm (4.24 in.)

If the overall length is less than the minimum, replace the valve.

(b) Using a micrometer, measure the diameter of the valve stem.

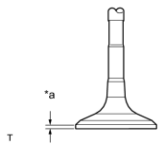


Standard valve stem diameter:

5.465 to 5.480 mm (0.215 to 0.216 in.)

If the valve stem diameter is not as specified, check the oil clearance.

(c) Using a vernier caliper, measure the valve head margin thickness.



Text in Illustration	Margin Thickness
*a	

Standard margin thickness:

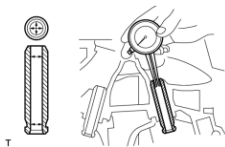
1.0 mm (0.0394 in.)

Minimum margin thickness:

0.5 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

9. INSPECT VALVE GUIDE BUSH OIL CLEARANCE



(a) Using a caliper gauge, measure the inside diameter of the guide bush.

Standard bushing inside diameter:

5.510 to 5.530 mm (0.217 to 0.218 in.)

(b) Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.

Standard Oil Clearance:

ITEM	SPECIFIED CONDITION
Intake	0.025 to 0.060 mm (0.000984 to 0.00236 in.)

Exhaust	0.030 to 0.065 mm (0.00118 to 0.00256 in.)
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Maximum Oil Clearance:

ITEM	SPECIFIED CONDITION
Intake	0.080 mm (0.00315 in.)
Exhaust	0.085 mm (0.00335 in.)

If the clearance is more than the maximum, replace the valve and guide bush.

