

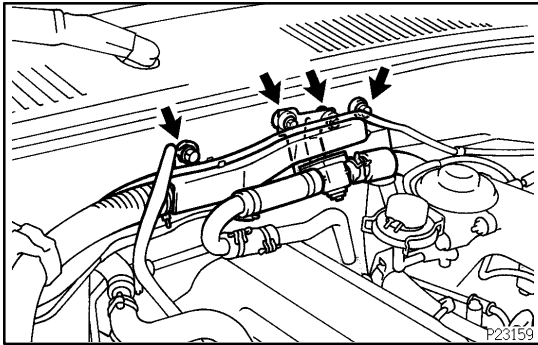
# VALVE CLEARANCE INSPECTION

EM1Q4-01

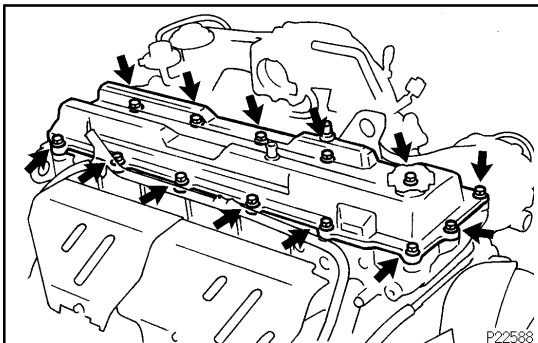
## HINT:

Inspect and adjust the valve clearance when the engine is cold.

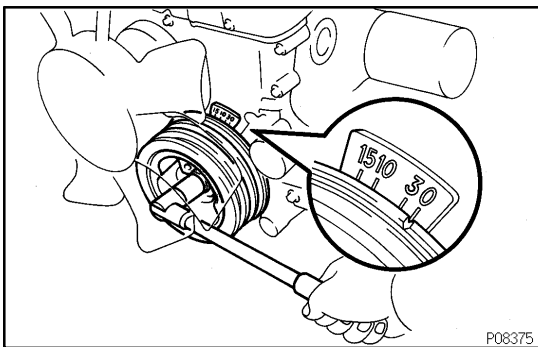
1. **DRAIN ENGINE COOLANT**
2. **REMOVE THROTTLE BODY** (See page [SF-45](#))



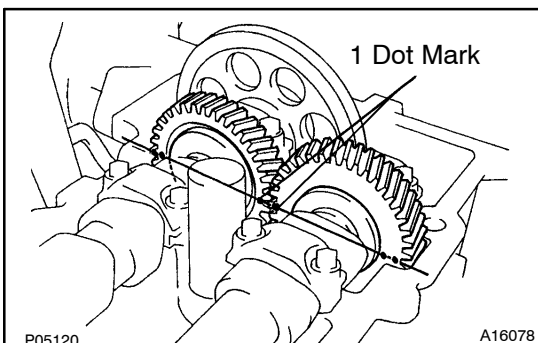
3. **DISCONNECT ENGINE WIRE AND HEATER VALVE FROM COWL PANEL**
  - (a) Remove the 2 bolts and disconnect the ground strap and engine wire.
  - (b) Remove the 2 bolts and disconnect the heater valve.
4. **DISCONNECT HIGH-TENSION CORDS FROM SPARK PLUGS** (See page [IG-1](#))



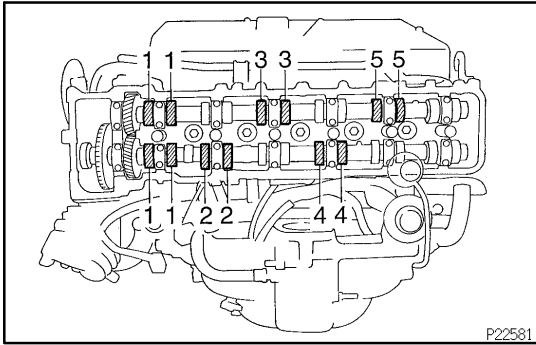
5. **REMOVE CYLINDER HEAD COVER**  
Remove the 13 bolts, cylinder head cover and gasket.



6. **SET NO. 1 CYLINDER TO TDC/COMPRESSION**
  - (a) Turn the crankshaft pulley, and align its groove with the timing mark "0" of the timing chain cover.



- (b) Check that the timing marks (1 and 2 dots) of the camshaft drive and driven gears are in straight line on the cylinder head surface as shown in the illustration. If not, turn the crankshaft 1 revolution (360°) and align the marks as above.

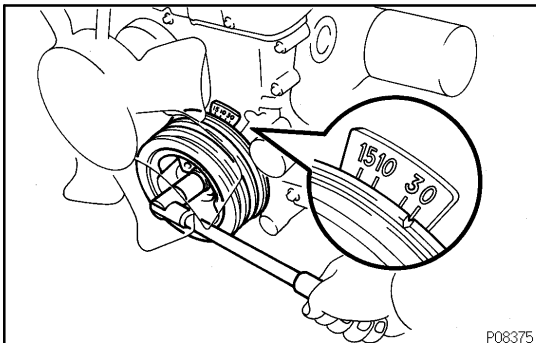


## 7. INSPECT VALVE CLEARANCE

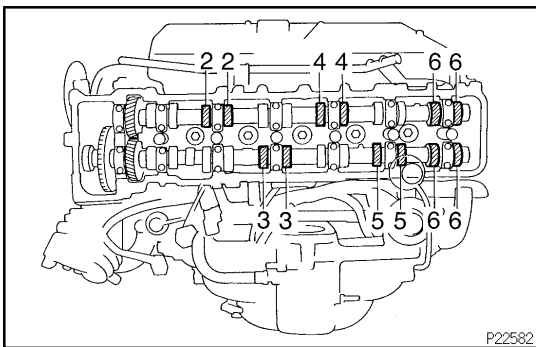
- (a) Check only the valves indicated.
- Using a thickness gauge, measure the clearance between the valve lifter and camshaft.
  - Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

### Valve clearance (Cold):

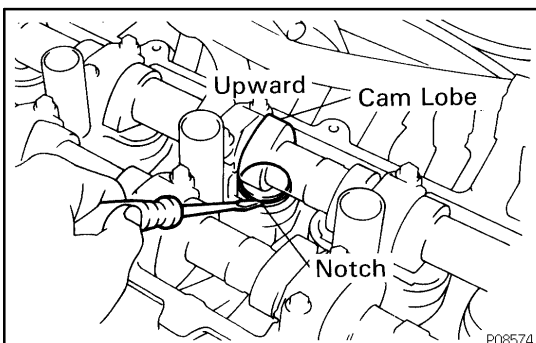
|         |                                    |
|---------|------------------------------------|
| Intake  | 0.15 – 0.25 mm (0.006 – 0.010 in.) |
| Exhaust | 0.25 – 0.35 mm (0.010 – 0.041 in.) |



- (b) Turn the crankshaft pulley 1 revolution (360°) and align the its groove with timing mark "0" of the timing chain cover.

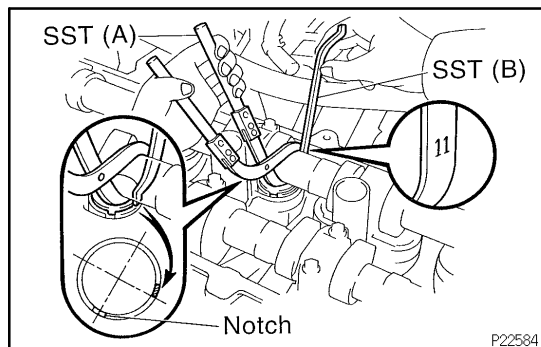


- (c) Check only the valves indicated as shown. Measure the valve clearance (See procedure in step (a) above).



## 8. Except for rear valves of No. 6 cylinder ADJUST VALVE CLEARANCE

- (a) Remove the adjusting shim.
- Turn the crankshaft to position the cam lobe of the camshaft on the adjusting valve upward.
  - Position the notch of the valve lifter toward the spark plug side.

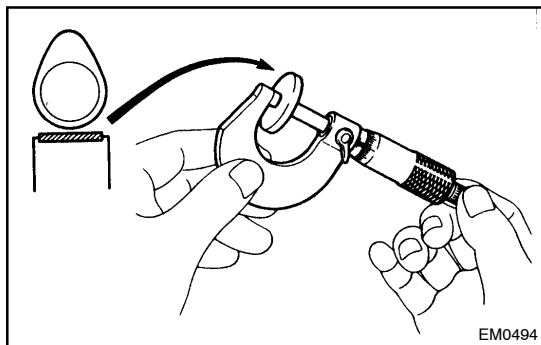
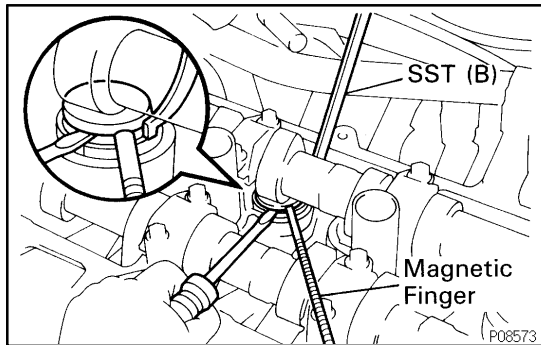


- Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter flange. Remove SST (A).

SST 09248-06020, 09248-55050 (09248-05510)

**HINT:**

- Apply SST (B) at slight angle on the side marked with "11", at the position shown in the illustration.
- When SST (B) is inserted too deeply, it will get pinched by the shim. To prevent it from being stuck, insert it shallowly from the outside of the cylinder head, at a slight angle.
- Remove the adjusting shim with a small screwdriver and magnetic finger.



- (b) Determine the replacement adjusting shim size by following the Formula or Charts:

- Using a micrometer, measure the thickness of the removed shim.
  - Calculate the thickness of a new shim so that the valve clearance comes within specified value.
- T ..... Thickness of removed shim  
 A ..... Measured valve clearance  
 N ..... Thickness of new shim

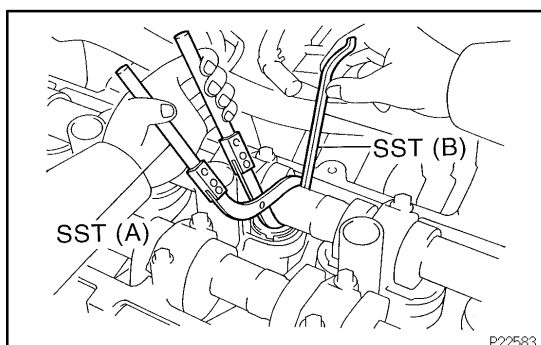
**Intake:  $N = T + (A - 0.20 \text{ mm (0.008 in.)})$**

**Exhaust:  $N = T + (A - 0.30 \text{ mm (0.012 in.)})$**

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

**HINT:**

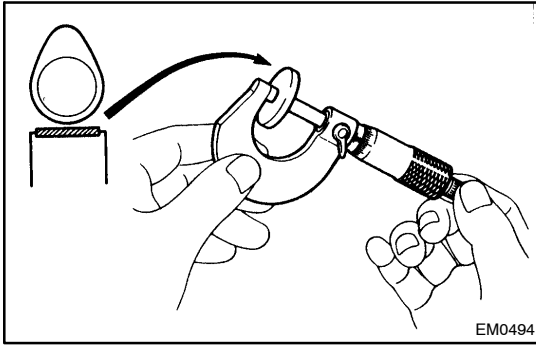
Shims are available in 17 sized in increments of 0.05 mm (0.0020 in.), from 2.50 mm (0.0984 in.) to 3.30 mm (0.1299 in.).



- (c) Install a new adjusting shim.
- Place a new adjusting shim on the valve lifter.
  - Using SST (A), press down the valve lifter and remove SST (B).

SST 09248-06020, 09248-55050 (09248-05510)

- (d) Recheck the valve clearance.



### 9. Rear valves of No. 6 cylinder ADJUST VALVE CLEARANCE

- (a) Remove the distributor (See page [IG-10](#)).
- (b) Remove the camshafts (See page [EM-28](#)).
- (c) Remove the adjusting shim with a small screwdriver.
- (d) Determine the replacement adjusting shim size by following the Formula or Charts:
  - Using a micrometer, measure the thickness of the removed shim.
  - Calculate the thickness of a new shim so that the valve clearance comes within specified value.

T ..... Thickness of removed shim

A ..... Measured valve clearance

N ..... Thickness of new shim

**Intake:  $N = T + (A - 0.20 \text{ mm (0.008 in.)})$**

**Exhaust:  $N = T + (A - 0.30 \text{ mm (0.012 in.)})$**

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

#### HINT:

Shims are available in 17 sized in increments of 0.05 mm (0.0020 in.), from 2.50 mm (0.0984 in.) to 3.30 mm (0.1299 in.).

- (e) Place a new adjusting shim on the valve lifters.
- (f) Install the camshafts (See page [EM-54](#)).
- (g) Recheck the valve clearance.
- (h) Install the distributor (See page [IG-11](#)).

### 10. REINSTALL CYLINDER HEAD COVER

- (a) Install the gasket to the cylinder head cover.
- (b) Install the cylinder head cover with the 13 bolts.

### 11. RECONNECT HIGH-TENSION CORDS TO SPARK PLUGS (See page [IG-1](#))

### 12. RECONNECT HEATER VALVE AND ENGINE WIRE TO COWL PANEL

- (a) Connect the heater valve with the 2 bolts.
- (b) Connect the ground strap and engine wire with the 2 bolts.

### 13. REINSTALL THROTTLE BODY (See page [SF-48](#))

### 14. REFILL RADIATOR WITH ENGINE COOLANT

### 15. CHECK AND ADJUST IGNITION TIMING (See page [EM-10](#))

## 1996 LAND CRUISER (RM451U)

**Author :** **Date :** **511**

V00831

## Adjusting Shim Selection Chart (Exhaust)

Installed shim thickness  
mm (in.)

Measured clearance  
mm (in.)

0.000 - 0.030 (0.0000 - 0.0012)

0.031 - 0.050 (0.0012 - 0.0020)

0.051 - 0.070 (0.0020 - 0.0028)

0.071 - 0.090 (0.0028 - 0.0035)

0.091 - 0.110 (0.0035 - 0.0043)

0.111 - 0.130 (0.0044 - 0.0051)

0.131 - 0.150 (0.0052 - 0.0059)

0.151 - 0.170 (0.0059 - 0.0067)

0.171 - 0.190 (0.0067 - 0.0075)

0.191 - 0.210 (0.0075 - 0.0083)

0.211 - 0.230 (0.0083 - 0.0091)

0.231 - 0.249 (0.0091 - 0.0098)

0.250 - 0.350 (0.0098 - 0.0138)

0.351 - 0.370 (0.0138 - 0.0146)

0.371 - 0.390 (0.0146 - 0.0154)

0.391 - 0.410 (0.0154 - 0.0161)

0.411 - 0.430 (0.0162 - 0.0169)

0.431 - 0.450 (0.0170 - 0.0177)

0.451 - 0.470 (0.0178 - 0.0185)

0.471 - 0.490 (0.0185 - 0.0193)

0.491 - 0.510 (0.0193 - 0.0201)

0.511 - 0.530 (0.0201 - 0.0209)

0.531 - 0.550 (0.0209 - 0.0217)

0.551 - 0.570 (0.0217 - 0.0224)

0.571 - 0.590 (0.0225 - 0.0232)

0.591 - 0.610 (0.0233 - 0.0240)

0.611 - 0.630 (0.0241 - 0.0248)

0.631 - 0.650 (0.0248 - 0.0256)

0.651 - 0.670 (0.0256 - 0.0264)

0.671 - 0.690 (0.0264 - 0.0272)

0.691 - 0.710 (0.0272 - 0.0280)

0.711 - 0.730 (0.0280 - 0.0287)

0.731 - 0.750 (0.0288 - 0.0295)

0.751 - 0.770 (0.0296 - 0.0303)

0.771 - 0.790 (0.0304 - 0.0311)

0.791 - 0.810 (0.0311 - 0.0319)

0.811 - 0.830 (0.0319 - 0.0327)

0.831 - 0.850 (0.0327 - 0.0335)

0.851 - 0.870 (0.0335 - 0.0343)

0.871 - 0.890 (0.0343 - 0.0350)

0.891 - 0.910 (0.0351 - 0.0358)

0.911 - 0.930 (0.0359 - 0.0366)

0.931 - 0.950 (0.0367 - 0.0374)

0.951 - 0.970 (0.0374 - 0.0382)

0.971 - 0.990 (0.0382 - 0.0390)

0.991 - 1.010 (0.0390 - 0.0398)

1.011 - 1.030 (0.0398 - 0.0406)

1.031 - 1.050 (0.0406 - 0.0413)

1.051 - 1.070 (0.0414 - 0.0421)

1.071 - 1.090 (0.0422 - 0.0429)

1.091 - 1.110 (0.0430 - 0.0437)

1.111 - 1.130 (0.0437 - 0.0445)

1.131 - 1.150 (0.0445 - 0.0453)

2.500 (0.0984)

2.550 (0.1004)

2.600 (0.1024)

2.650 (0.1043)

2.700 (0.1063)

2.750 (0.1083)

2.800 (0.1103)

2.850 (0.1123)

2.900 (0.1143)

2.950 (0.1163)

3.000 (0.1183)

3.050 (0.1203)

3.100 (0.1223)

3.150 (0.1243)

3.200 (0.1263)

3.250 (0.1283)

3.300 (0.1303)

3.350 (0.1323)

3.400 (0.1343)

3.450 (0.1363)

3.500 (0.1383)

3.550 (0.1403)

3.600 (0.1423)

3.650 (0.1443)

3.700 (0.1463)

3.750 (0.1483)

3.800 (0.1503)

3.850 (0.1523)

3.900 (0.1543)

3.950 (0.1563)

4.000 (0.1583)

4.050 (0.1603)

4.100 (0.1623)

4.150 (0.1643)

4.200 (0.1663)

4.250 (0.1683)

4.300 (0.1703)

4.350 (0.1723)

4.400 (0.1743)

4.450 (0.1763)

4.500 (0.1783)

4.550 (0.1803)

4.600 (0.1823)

4.650 (0.1843)

4.700 (0.1863)

4.750 (0.1883)

4.800 (0.1903)

4.850 (0.1923)

4.900 (0.1943)

4.950 (0.1963)

5.000 (0.1983)

5.050 (0.2003)

5.100 (0.2023)

5.150 (0.2043)

5.200 (0.2063)

5.250 (0.2083)

5.300 (0.2103)

5.350 (0.2123)

5.400 (0.2143)

5.450 (0.2163)

5.500 (0.2183)

5.550 (0.2203)

5.600 (0.2223)

5.650 (0.2243)

5.700 (0.2263)

5.750 (0.2283)

5.800 (0.2303)

5.850 (0.2323)

5.900 (0.2343)

5.950 (0.2363)

6.000 (0.2383)

6.050 (0.2403)

6.100 (0.2423)

6.150 (0.2443)

6.200 (0.2463)

6.250 (0.2483)

6.300 (0.2503)

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6.400 (0.2543)

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6.500 (0.2583)

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6.600 (0.2623)

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6.800 (0.2703)

6.850 (0.2723)

6.900 (0.2743)

6.950 (0.2763)

7.000 (0.2783)

7.050 (0.2803)

7.100 (0.2823)

7.150 (0.2843)

7.200 (0.2863)

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7.300 (0.2903)

7.350 (0.2923)

7.400 (0.2943)

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7.550 (0.3003)

7.600 (0.3023)

7.650 (0.3043)

7.700 (0.3063)

7.750 (0.3083)

7.800 (0.3103)

7.850 (0.3123)

7.900 (0.3143)

7.950 (0.3163)

8.000 (0.3183)

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8.100 (0.3223)

8.150 (0.3243)

8.200 (0.3263)

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8.400 (0.3343)

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8.500 (0.3383)

8.550 (0.3403)

8.600 (0.3423)

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9.400 (0.3743)

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9.550 (0.3803)

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9.650 (0.3843)

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9.750 (0.3883)

9.800 (0.3903)

9.850 (0.3923)

9.900 (0.3943)

9.950 (0.3963)

10.000 (0.3983)

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10.100 (0.4023)

10.150 (0.4043)

10.200 (0.4063)

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10.500 (0.4183)

10.550 (0.4203)

10.600 (0.4223)

10.650 (0.4243)

10.700 (0.4263)

10.750 (0.4283)

10.800 (0.4303)

10.850 (0.4323)

10.900 (0.4343)

10.950 (0.4363)

11.000 (0.4383)

11.050 (0.4403)

11.100 (0.4423)

11.150 (0.4443)

11.200 (0.4463)

11.250 (0.4483)

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11.350 (0.4523)

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11.550 (0.4603)

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11.900 (0.4743)

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13.850 (0.5523)

13.900 (0.5543)

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14.200 (0.5663)

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14.350 (0.5723)

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14.600 (0.5823)

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14.700 (0.5863)

14.750 (0.5883)

14.800 (0.5903)

14.850 (0.5923)

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15.050 (0.6003)

15.100 (0.6023)

15.150 (0.6043)

15.200 (0.6063)

15.250 (0.6083)

15.300 (0.6103)

15.350 (0.6123)

15.400 (0.6143)

15.450 (0.6163)

15.500 (0.6183)

15.550 (0.6203)

15.600 (0.6223)

15.650 (0.6243)

15.700 (0.6263)

15.750 (0.6283)

15.800 (0.6303)

15.850 (0.6323)

15.900 (0.6343)

15.950 (0.6363)

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16.350 (0.6523)

16.400 (0.6543)

16.450 (0.6563)

16.500 (0.6583)

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16.600 (0.6623)

16.650 (0.6643)

16.700 (0.6663)

16.750 (0.6683)

16.800 (0.6703)

16.850 (0.6723)

16.900 (0.6743)

16.950 (0.6763)

17.000 (0.6783)

17.050 (0.6803)

17.100 (0.6823)

17.150 (0.6843)

17.200 (0.6863)

17.250 (0.6883)

17.300 (0.6903)

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17.800 (0.7103)

17.850 (0.7123)

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17.950 (0.7163)

18.000 (0.7183)

18.050 (0.7203)

18.100 (0.7223)

18.150 (0.7243)

18.200 (0.7263)

18.250 (0.7283)

18.300 (0.7303)

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18.550 (0.7403)

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18.650 (0.7443)

18.700 (0.7463)

18.750 (0.7483)

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18.850 (0.7523)

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19.200 (0.7663)

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19.300 (0.7703)

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19.450 (0.7763)

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19.600 (0.7823)

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19.700 (0.7863)

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19.800 (0.7903)

19.850 (0.7923)

19.900 (0.7943)

19.950 (0.7963)

20.000 (0.7983)

20.050 (0.8003)

20.100 (0.8023)

20.150 (0.8043)

20.200 (0.8063)

20.250 (0.8083)

20.300 (0.8103)

20.350 (0.8123)

20.400 (0.8143)

20.450 (0.8163)

20.500 (0.8183)

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20.600 (0.8223)

20.650 (0.8243)

20.700 (0.8263)

20.750 (0.8283)

20.800 (0.8303)

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20.900 (0.8343)

20.950 (0.8363)

21.000 (0.8383)

21.050 (0.8403)

21.100 (0.8423)

21.150 (0.8443)

21.200 (0.8463)

21.250 (0.8483)

21.300 (0.8503)

21.350 (0.8523)

21.400 (0.8543)

21.450 (0.8563)

21.500 (0.8583)

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21.600 (0.8623)

21.650 (0.8643)

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21.750 (0.8683)

21.800 (0.8703)

21.850 (0.8723)

21.900 (0.8743)

21.950 (0.8763)

22.000 (0.8783)

22.050 (0.8803)

22.100 (0.8823)

22.150 (0.8843)

22.200 (0.8863)

22.250 (0.8883)

22.300 (0.8903)

22.350 (0.8923)

22.400 (0.8943)

22.450 (0.8963)

22.500 (0.8983)

22.550 (0.9003)

22.600 (0.9023)

22.650 (0.9043)

22.700 (0.9063)

22.750 (0.9083)

22.800 (0.9103)

22.850 (0.9123)

22.900 (0.9143)

22.950 (0.9163)

23.000 (0.9183)

23.050 (0.9203)

23.100 (0.9223)

23.150 (0.9243)

23.200 (0.9263)

23.250 (0.9283)

23.300 (0.9303)

23.350 (0.9323)

23.400 (0.9343)

23.450 (0.9363)

23.500 (0.9383)

23.550 (0.9403)

23.600 (0.9423)

23.650 (0.9443)

23.700 (0.9463)

23.750 (0.9483)

23.800 (0.9503)

23.850 (0.9523)

23.900 (0.9543)

23.950 (0.9563)

24.000 (0.9583)

24.050 (0.9603)

24.100 (0.9623)

24.150 (0.9643)

24.200 (0.9663)

24.250 (0.9683)

24.300 (0.9703)

24.350 (0.9723)

24.400 (0.9743)

24.450 (0.9763)

24.500 (0.9783)

24.550 (0.9803)

24.600 (0.9823)

24.650 (0.9843)

24.700 (0.9863)

24.750 (0.9883)

24.800 (0.9903)

24.850 (0.9923)

24.900 (0.9943)

24.950 (0.9963)

25.000 (0.9983)

25.050 (1.0003)

25.100 (1.0023)

25.150 (1.0043)

25.200 (1.0063)

25.250 (1.0083)

25.300 (1.0103)

25.350 (1.0123)

25.400 (1.0143)

25.450 (1.0163)

25.500 (1.0183)

25.550 (1.0203)

25.600 (1.0223)

25.650 (1.0243)

25.700 (1.0263)

25.750 (1.0283)

25.800 (1.0303)

25.850 (1.0323)

25.900 (1.0343)

25.950 (1.0363)

26.000 (1.0383)

26.050 (1.0403)

26.100 (1.0423)

26.150 (1.0443)

26.200 (1.0463)

26.250 (1.0483)

26.300 (1.0503)

26.350 (1.0523)

26.400 (1.0543)

26.450 (1.0563)

26.500 (1.0583)

26.550 (1.0603)

26.600 (1.0623)

26.650 (1.0643)

26.700 (1.0663)

26.750 (1.0683)

26.800 (1.0703)

26.850 (1.0723)

26.900 (1.0743)

26.950 (1.0763)

27.000 (1.0783)

27.050 (1.0803)

27.100 (1.0823)

27.150 (1.0843)

27.200 (1.0863)

27.250 (1.0883)

27.300 (1.0903)

27.350 (1.0923)

27.400 (1.0943)

27.450 (1.0963)

27.500 (1.0983)

27.550 (1.1003)

27.600 (1.1023)

27.650 (1.1043)

27.700 (1.1063)

27.750 (1.1083)

27.800 (1.1103)

27.850 (1.1123)

27.900 (1.1143)

27.950 (1.1163)

28.000 (1.1183)

28.050 (1.1203)

28.100 (1.1223)

28.150 (1.1243)

28.200 (1.1263)

28.250 (1.1283)

28.300 (1.1303)

28.350 (1.1323)

28.400 (1.1343)

28.450 (1.1363)

28.500 (1.1383)

28.550 (1.1403)

28.600 (1.1423)

28.650 (1.1443)

28.700 (1.1463)

28.750 (1.1483)

28.800 (1.1503)

28.850 (1.1523)

28.900 (1.1543)

28.950 (1.1563)

29.000 (1.1583)

29.050 (1.1603)

29.100 (1.1623)

29.150 (1.1643)

29.200 (1.1663)

29.250 (1.1683)

29.300 (1.1703)

29.350 (1.1723)

29.400 (1.1743)

29.450 (1.1763)

29.500 (1.1783)

29.550 (1.1803)

29.600 (1.1823)

29.650 (1.1843)

29.700 (1.1863)

29.750 (1.1883)

29.800 (1.1903)

29.850 (1.1923)

29.900 (1.1943)

29.950 (1.1963)

30.000 (1.1983)

30.050 (1.2003)

30.100 (1.2023)

30.150 (1.2043)

30.200 (1.2063)

30.250 (1.2083)

30.300 (1.2103)

30.350 (1.2123)

30.400 (1.2143)

30.450 (1.2163)

30.500 (1.2183)

30.550 (1.2203)

30.600 (1.2223)

30.650 (1.2243)

30.700 (1.2263)

30.750 (1.2283)

30.800 (1.2303)

30.850 (1.2323)

30.900 (1.2343)

30.950 (1.2363)

31.000 (1.2383)

31.050 (1.2403)

31.100 (1.2423)

31.150 (1.2443)

31.200 (1.2463)

31.250 (1.2483)

31.300 (1.2503)

31.350 (1.2523)

31.400 (1.2543)

31.450 (1.2563)

31.500 (1.2583)

31.550 (1.2603)

31.600 (1.2623)

31.650 (1.2643)

31.700 (1.2663)

31.750 (1.2683)

31.800 (1.2703)

31.850 (1.2723)

31.900 (1.2743)

31.950 (1.2763)

32.000 (1.2783)

32.050 (1.2803)

32.100 (1.2823)

32.150 (1.2843)

32.200 (1.2863)

32.250 (1.2883)

32.300 (1.2903)

32.350 (1.2923)

32.400 (1.2943)

32.450 (1.29

**HINT:** New shims have the thickness in millimeter imprinted on the face

**Exhaust valve clearance (Cold):**  
**0.25 – 0.35 mm (0.010 – 0.014 in.)**  
**EXAMPLE:**

The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.440 mm (0.0173 in.). Replace the 2.800 mm (0.1102 in.) shim with a No. 10 shim.