

VALVE CLEARANCE (1CD-FTV)

140DF-01

ADJUSTMENT

HINT:

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

NOTICE:

- Before removing the injection pipes, clean them up with a soft brush and compressed air.
- After removing the injection pipe, affix the gum tape on the supply pump, common rail and the whole injector installation area of the cylinder head cover for preventing dust from coming into them.
- After removing the cylinder head cover, put a vinyl bag and rubber band for preventing from mixing foreign objects over the injector inlet.

1. DRAIN ENGINE COOLANT (See page 16-19)

2. REMOVE HOOD SUB-ASSY

3. REMOVE FR WIPER ARM RH
(See page 66-9)

4. REMOVE FR WIPER ARM LH
(See page 66-9)

5. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSY

6. REMOVE WINDSHIELD WIPER MOTOR ASSY
(See page 66-9)

7. REMOVE COWL TOP PANEL SUB-ASSY OUTER
(See page 11-23)

8. REMOVE RADIATOR RESERVE TANK ASSY

9. REMOVE FRONT WHEEL RH

10. REMOVE ENGINE UNDER COVER RH

11. REMOVE ENGINE COVER SUB-ASSY NO.1

12. REMOVE AIR TUBE NO.1
(See page 3-6)

13. REMOVE TIMING BELT NO.2 COVER
(See page 4-114)

14. REMOVE INJECTION PIPE CLAMP NO.2
(See page 11-23)

15. REMOVE INJECTION PIPE SUB-ASSY NO.1
(See page 11-23)

SST 09023-12700, 09023-12900

16. REMOVE INJECTION PIPE SUB-ASSY NO.2
(See page 11-23)

SST 09023-12700, 09023-12900

17. REMOVE INJECTION PIPE SUB-ASSY NO.3
(See page 11-23)

SST 09023-12700, 09023-12900

18. REMOVE INJECTION PIPE SUB-ASSY NO.4

(See page 11-23)

SST 09023-12700, 09023-12900

19. REMOVE CYLINDER HEAD COVER SUB-ASSY

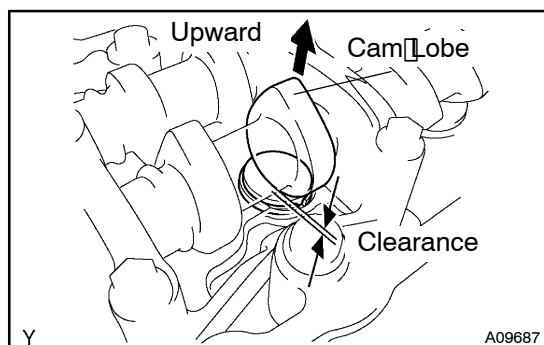
(See page 11-23)

20. REMOVE NOZZLE LEAKAGE PIPE ASSY

(See page 11-23)

21. REMOVE INJECTOR ASSY

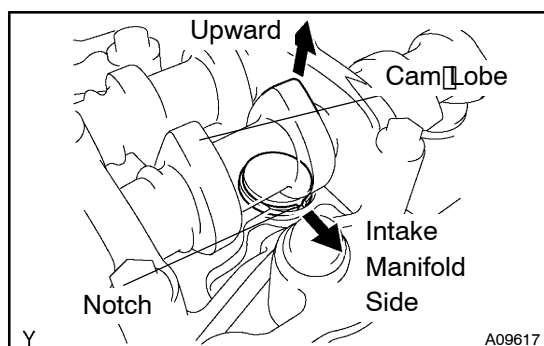
(See page 11-23)

**22. INSPECT VALVE CLEARANCE**

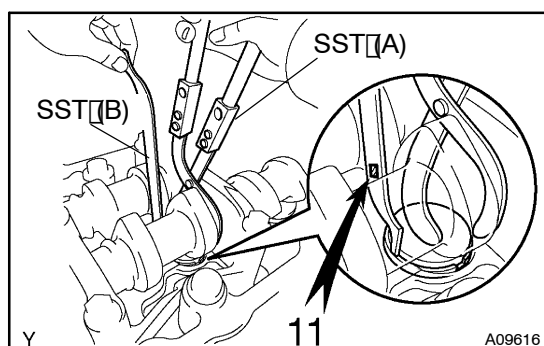
- Turn the crankshaft so that the cam lobe of the camshaft on the inspecting valve points upward.
- Using a feeler gauge, measure the clearance between the valve lifter and camshaft.
- Measure the clearance at 16 places.
- Record the out-of-specification valve clearance measurements. They will be used later to determine the required replacement adjusting shim.

Valve clearance (Cold):

Intake	0.20 – 0.30 mm (0.008 – 0.012 in.)
Exhaust	0.35 – 0.45 mm (0.014 – 0.018 in.)

**23. ADJUST VALVE CLEARANCE**

- Remove the adjusting shim.
 - Turn the crankshaft so that the cam lobe of the camshaft on the adjusting valve points upward.
 - Position the notch of the valve lifter facing the intake manifold side.

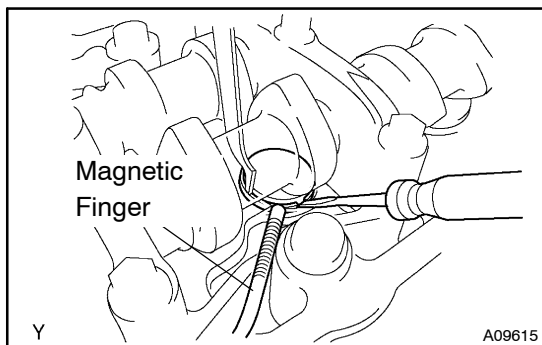


- Using SST (A), press down the valve lifter and place SST (B) between the camshaft and valve lifter. Remove SST (A).

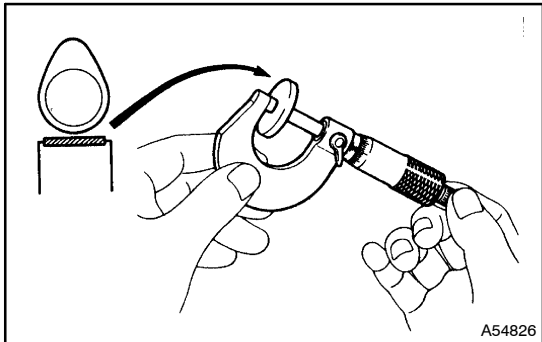
SST 09248-55050 (09248-05510, 09248-05520)

HINT:

Apply SST (B) on the side marked with "11".



- (4) Remove the adjusting shim with a small screwdriver and magnetic finger.



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

- (1) Using a micrometer, measure the thickness of the removed shim.
- (2) Calculate the thickness of a new shim so that the valve clearance comes within specified value.

HINT:

T Thickness of removed adjusting shim

A Measured valve clearance

N Thickness of new adjusting shim

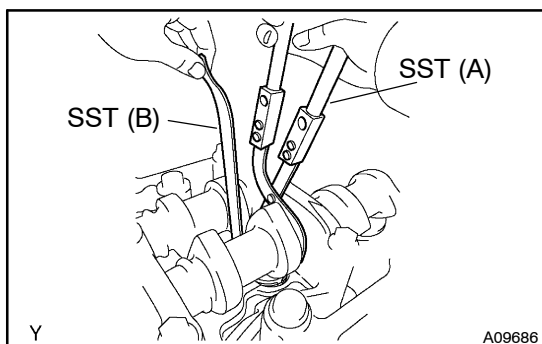
Intake: $N = T + (A - 0.25 \text{ mm (0.010 in.)})$

Exhaust: $N = T + (A - 0.40 \text{ mm (0.016 in.)})$

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

HINT:

Shims are available in 17 sizes 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.
- (1) Place a new adjusting shim on the valve lifter.
 - (2) Using SST (A), press down the valve lifter and remove SST (B).

SST 09248-55050 (09248-05510, 09248-05520)

- (d) Recheck the valve clearance.

SST 09248-55050 (09248-05510, 09248-05520)

24. INSTALL INJECTOR ASSY

(See page 1-23)

25. INSTALL NOZZLE LEAKAGE PIPE ASSY

(See page 1-23)

SST 09992-00242, 99999-70037

26. INSTALL CYLINDER HEAD COVER SUB-ASSY

(See page 1-23)

27. INSTALL INJECTION PIPE SUB-ASSY NO.1

(See page 1-23)

SST 09023-12700, 09023-12900

28. INSTALL INJECTION PIPE SUB-ASSY NO.2**(See page 1-23)**

SST 09023-12900, 09023-12700

29. INSTALL INJECTION PIPE SUB-ASSY NO.3**(See page 1-23)**

SST 09023-12700, 09023-12900

30. INSTALL INJECTION PIPE SUB-ASSY NO.4**(See page 1-23)**

SST 09023-12900, 09023-12700

31. INSTALL INJECTION PIPE CLAMP NO.2**(See page 1-23)****32. INSTALL TIMING BELT NO.2 COVER****(See page 4-114)****33. INSTALL ENGINE COVER SUB-ASSY NO.1**

Torque:

Bolt 8 N·m (81 kgf·cm, 5.6 ft·lbf)

Nut 12 N·m (122 kgf·cm, 8.8 ft·lbf)

34. INSTALL FRONT WHEEL RH

Torque: 103 N·m (1,050 kgf·cm, 76 ft·lbf)

35. INSTALL WINDSHIELD WIPER MOTOR ASSY**(See page 66-9)****36. INSTALL FR WIPER ARM RH****(See page 66-9)****37. INSTALL FR WIPER ARM LH****(See page 66-9)****38. ADJUST HOOD SUB-ASSY****(See page 75-1)****39. INSPECT HOOD SUB-ASSY****(See page 75-1)****40. ADD COOLANT (See page 6-19)****41. CHECK ENGINE COOLANT LEAK (See page 6-19)****42. INSPECT FUEL LEAK (See page 1-23)**

Adjusting Shim Selection Chart (Intake)

Installed shim thickness mm (in.)	Measured clearance mm (in.)																																	
	2.500 (0.0984)	2.525 (0.0994)	2.550 (0.1004)	2.575 (0.1014)	2.600 (0.1024)	2.625 (0.1033)	2.650 (0.1043)	2.675 (0.1053)	2.700 (0.1063)	2.725 (0.1073)	2.750 (0.1083)	2.775 (0.1093)	2.800 (0.1102)	2.825 (0.1112)	2.850 (0.1122)	2.875 (0.1132)	2.900 (0.1142)	2.925 (0.1152)	2.950 (0.1161)	2.975 (0.1171)	3.000 (0.1181)	3.025 (0.1191)	3.050 (0.1201)	3.075 (0.1211)	3.100 (0.1220)	3.125 (0.1230)	3.150 (0.1240)	3.175 (0.1250)	3.200 (0.1260)	3.225 (0.1270)	3.250 (0.1280)	3.275 (0.1289)	3.300 (0.1299)	
0.000 ~ 0.020 (0.0000 ~ 0.0008)									01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25
0.021 ~ 0.040 (0.0008 ~ 0.0016)								01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27
0.041 ~ 0.060 (0.0016 ~ 0.0024)								01	01	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27
0.061 ~ 0.080 (0.0024 ~ 0.0031)								01	01	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27
0.081 ~ 0.100 (0.0032 ~ 0.0039)						01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27
0.101 ~ 0.120 (0.0040 ~ 0.0047)					01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	27
0.121 ~ 0.140 (0.0048 ~ 0.0055)					01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29
0.141 ~ 0.160 (0.0056 ~ 0.0063)			01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	29	29
0.161 ~ 0.180 (0.0063 ~ 0.0071)			01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	29
0.181 ~ 0.199 (0.0071 ~ 0.0078)		01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31
0.200 ~ 0.300 (0.0079 ~ 0.0118)																																		
0.301 ~ 0.320 (0.0119 ~ 0.0126)	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33
0.321 ~ 0.340 (0.0126 ~ 0.0134)	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33
0.341 ~ 0.360 (0.0134 ~ 0.0142)	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33
0.361 ~ 0.380 (0.0142 ~ 0.0150)	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33
0.381 ~ 0.400 (0.0150 ~ 0.0157)	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33
0.401 ~ 0.420 (0.0158 ~ 0.0165)	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33
0.421 ~ 0.440 (0.0166 ~ 0.0173)	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33
0.441 ~ 0.460 (0.0174 ~ 0.0181)	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33
0.461 ~ 0.480 (0.0181 ~ 0.0189)	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33
0.481 ~ 0.500 (0.0189 ~ 0.0197)	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33
0.501 ~ 0.520 (0.0197 ~ 0.0205)	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33
0.521 ~ 0.540 (0.0205 ~ 0.0213)	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.541 ~ 0.560 (0.0213 ~ 0.0220)	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.561 ~ 0.580 (0.0221 ~ 0.0228)	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.581 ~ 0.600 (0.0229 ~ 0.0236)	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.601 ~ 0.620 (0.0237 ~ 0.0244)	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.621 ~ 0.640 (0.0244 ~ 0.0252)	17	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.641 ~ 0.660 (0.0252 ~ 0.0260)	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.661 ~ 0.680 (0.0260 ~ 0.0268)	17	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.681 ~ 0.700 (0.0268 ~ 0.0276)	19	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.701 ~ 0.720 (0.0276 ~ 0.0283)	19	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.721 ~ 0.740 (0.0284 ~ 0.0291)	21	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.741 ~ 0.760 (0.0292 ~ 0.0299)	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.761 ~ 0.780 (0.0300 ~ 0.0307)	21	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.781 ~ 0.800 (0.0307 ~ 0.0315)	23	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.801 ~ 0.820 (0.0315 ~ 0.0323)	23	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.821 ~ 0.840 (0.0323 ~ 0.0331)	25	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.841 ~ 0.860 (0.0331 ~ 0.0339)	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.861 ~ 0.880 (0.0339 ~ 0.0346)	25	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.881 ~ 0.900 (0.0347 ~ 0.0354)	27	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.901 ~ 0.920 (0.0355 ~ 0.0362)	27	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.921 ~ 0.940 (0.0363 ~ 0.0370)	29	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
0.941 ~ 0.960 (0.0370 ~ 0.0378)	29	31	31	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	3				

Intake valve clearance (Cold):

0.20 – 0.30 mm (0.008 – 0.012 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.450 mm (0.0177 in.).

Replace the 2.800 mm (0.1102 in.) shim with a new No.21 shim.

Measured clearance mm (in.)	Installed shim thickness mm (in.)																																		
	2.500 (0.0984)	2.525 (0.0994)	2.550 (0.1004)	2.575 (0.1014)	2.600 (0.1024)	2.625 (0.1033)	2.650 (0.1043)	2.675 (0.1053)	2.700 (0.1063)	2.725 (0.1073)	2.750 (0.1073)	2.775 (0.1083)	2.800 (0.1102)	2.825 (0.1112)	2.850 (0.1122)	2.875 (0.1132)	2.900 (0.1142)	2.925 (0.1152)	2.950 (0.1161)	2.975 (0.1171)	3.000 (0.1181)	3.025 (0.1191)	3.050 (0.1201)	3.075 (0.1211)	3.100 (0.1220)	3.125 (0.1230)	3.150 (0.1240)	3.175 (0.1250)	3.200 (0.1260)	3.225 (0.1270)	3.250 (0.1280)	3.275 (0.1289)	3.300 (0.1298)		
0.000 ~ 0.020 (0.0000 ~ 0.0008)															01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	
0.021 ~ 0.040 (0.0008 ~ 0.0016)															01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21
0.041 ~ 0.060 (0.0016 ~ 0.0024)														01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21
0.061 ~ 0.080 (0.0024 ~ 0.0031)													01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21
0.081 ~ 0.100 (0.0032 ~ 0.0039)												01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23
0.101 ~ 0.120 (0.0040 ~ 0.0047)											01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23
0.121 ~ 0.140 (0.0048 ~ 0.0055)										01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25
0.141 ~ 0.160 (0.0056 ~ 0.0063)									01	01	03	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25
0.161 ~ 0.180 (0.0063 ~ 0.0071)									01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25
0.181 ~ 0.200 (0.0071 ~ 0.0079)								01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27
0.201 ~ 0.220 (0.0079 ~ 0.0087)							01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27
0.221 ~ 0.240 (0.0087 ~ 0.0094)						01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29
0.241 ~ 0.260 (0.0095 ~ 0.0102)					01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21	21	23	23	25	25	27	27	29	29
0.261 ~ 0.280 (0.0103 ~ 0.0110)					01	01	01	03	03	05	05	07	07	09	09	11	11	13	13	15	15	17	17	19	19	21									

New shim thickness mm (in.)

Shim No.	Thickness	Shim No.	Thickness
01	2.500(0.0984)	19	2.950(0.1161)
03	2.550 (0.1004)	21	3.000(0.1181)
05	2.600 (0.1024)	23	3.050(0.1201)
07	2.650 (0.1043)	25	3.100(0.1220)
09	2.700 (0.1063)	27	3.150 (0.1240)
11	2.750 (0.1083)	29	3.200(0.1260)
13	2.800 (0.1102)	31	3.250 (0.1280)
15	2.850 (0.1122)	33	3.300 (0.1299)
17	2.900(0.1142)		

Exhaust valve clearance (Cold):

0.35 – 0.45 mm (0.014 – 0.018 in.)

EXAMPLE: The 2.800 mm (0.1102 in.) shim is installed, and the measured clearance is 0.590 mm (0.0232 in.). Replace the 2.800 mm (0.1102 in.) shim with a new No.21 shim.