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TO: Service Locations

FROM: Technical Support Development

SUBJECT: **Series 60® and Series 50® Camshaft Timing Specifications**

ISSUE

Camshaft timing, valve lash, injector height, and Jake Brake® lash are all very important specifications that must be followed closely in order to optimize the performance and service life of any Detroit Diesel engine. We have assembled four charts that bring together essential and current information for servicing the Series 60 and Series 50 diesel and gas engines. Most of the models listed in the attached charts are on-highway applications, but there are a few listed for off-highway. The attached camshaft timing charts should prove very helpful when servicing these engines.

Note: If the valve cover option label is missing, illegible or incorrect you will need to check to see what camshaft is in the engine. To determine the camshaft that is used in the engine check the part number stamped on the rear face of the camshaft or use DDCSN to enter the engine serial number. DDCSN will retrieve the model number which will provide the correct injector and valve adjustments.

CONTACT INFORMATION

Please contact the Detroit Diesel Customer Support Center at 800-445-1980 or email csc@detroitdiesel.com if you have any questions.

SERIES 60 DIESEL VALVE LASH, JAKE BRAKE LASH AND CAM TIMING SPECS

Model	Engine	Year	DDEC	Camshaft/Assembly Part Number	Injector Height mm (inches)	Intake Valve Lash mm (inches)	Exhaust Valve Lash mm (inches)	Ref.	Jake Brake Model	Jake Brake Lash mm (inches)	Cam Timing Range mm (inches)
Block	Model Digit 5	EDGM 14B07	Model Digit 6	BMSI 06X01B / Rear Cam Stamp	EDTA 06M06 06X01B Model	EDVL 06X03	EDVL 06X03	+	BMSI 06X03		
WU	11.1	88-89	II	8929484 / 485	78.2 (3.079)	0.203 (0.008)	0.508 (0.020)	a	760A	0.660 (0.026)	4.39-5.46 (0.173-0.215)
WU	11.1	90-93	II	8929484 / 485	78.2 (3.079)	0.203 (0.008)	0.660 (0.026)	a	760A	0.660 (0.026)	4.39-5.46 (0.173-0.215)
SK	11.1	94-97	III	23518717 / 718 23524899 / 900	78.8 (3.102)	0.203 (0.008)	0.660 (0.026)	a	760A	0.660 (0.026)	4.95-6.53 (0.195-0.257)
WK	11.1	94-97	III	23513563 / 562 25324897 / 898	78.8 (3.102)	0.203 (0.008)	0.660 (0.026)	a	760A	0.660 (0.026)	4.95-6.53 (0.195-0.257)
EK	11.1	1998	IV	23522199 / 200 23524903 / 904	81.0 (3.189)	0.203 (0.008)	0.660 (0.026)	a	760B	0.584 (0.023)	5.46-6.71 (0.215-0.264)
LK	11.1	1999	IV	23524654 / 655 23524913 / 914	81.0 (3.189)	0.203 (0.008)	0.660 (0.026)	a	760B	0.584 (0.023)	5.21-6.27 (0.205-0.247)
GU	12.7	88-89	II	8929472 / 473	78.2 (3.079)	0.203 (0.008)	0.508 (0.020)	a	760A	0.660 (0.026)	4.39-5.46 (0.173-0.215)
GU *	12.7	90-93	II	23505194 / 195	78.2 (3.079)	0.203 (0.008)	0.660 (0.026)	a	765	0.660 (0.026)	4.39-5.46 (0.173-0.215)
GK	12.7	94-97	III	23513565 / 564 23524905 / 906	78.8 (3.102)	0.203 (0.008)	0.660 (0.026)	a	765	0.660 (0.026)	4.95-6.53 (0.195-0.257)
GK	12.7	1998	III	23521680 / 681 23524907 / 908	80.3 (3.161)	0.203 (0.008)	0.660 (0.026)	a	765	0.660 (0.026)	5.36-6.76 (0.211-0.266)
PK, TK	12.7	1998	IV	23521680 / 681 23524907 / 908	80.3 (3.161)	0.203 (0.008)	0.660 (0.026)	a	765A	0.584 (0.023)	5.36-6.76 (0.211-0.266)
MK, BK	12.7	1999	IV	23524291 / 292 23524911 / 912	81.0 (3.189)	0.203 (0.008)	0.660 (0.026)	a	770	0.584 (0.023)	5.03-6.10 (0.198-0.240)
MK, BK **	12.7	2000	IV	23524291 / 292 23524911 / 912	81.0 (3.189)	0.203 (0.008)	0.660 (0.026)	a	790	0.660 (0.026)	5.03-6.10 (0.198-0.240)
MK, BK	12.7	2000-02	IV	23528308 / 309	82.1 (3.230)	0.203 (0.008)	0.660 (0.026)	a	795	0.813 (0.032)	6.527-7.594 (0.257-0.299)
BK	12.7	2002	IV	23528308 / 309	82.1 (3.230)	0.203 (0.008)	0.508 (0.020)	b	797A	0.508 (0.020)	6.527-7.594 (0.257-0.299)
MK	12.7	2002	IV	23528605 / 606	82.1 (3.230)	0.203 (0.008)	0.660 (0.026)	a	797	0.508 (0.020)	5.893-6.960 (0.232-0.274)
MK_E	12.7	2002-03	IV	23531130	82.1 (3.230)	0.203 (0.008)	0.508 (0.020)	a	797	0.508 (0.020)	6.452-7.214 (0.254-0.284)
MV_E	12.7	2004-06	V	23533694	***See Service Manual	0.203 (0.008)	0.508 (0.020)	a	797	0.508 (0.020)	6.655-7.214 (0.262-0.284)
Daewoo TK6K	12.7	2000-04	IV	23523982 / 983 23524917 / 918	80.3 (3.161)	0.203 (0.008)	0.660 (0.026)	a	797A	0.508 (0.020)	5.11-6.17 (0.201-0.243)
Marine-TK	12.7	Vary	IV	23525525 / 526	81.0 (3.189)	0.203 (0.008)	0.660 (0.026)	a	N/A	N/A	6.17-6.78 (0.243-0.267)
HK	14.0	1999	IV	23524291 / 292 23524911 / 912	81.0 (3.189)	0.203 (0.008)	0.660 (0.026)	a	770	0.584 (0.023)	5.03-6.10 (0.198-0.240)
HK	14.0	2000	IV	23524291 / 292 23524911 / 912	81.0 (3.189)	0.203 (0.008)	0.660 (0.026)	a	790A	0.660 (0.026)	5.03-6.10 (0.198-0.240)
HK	14.0	2000-02	IV	23528308 / 309	82.1 (3.230)	0.203 (0.008)	0.660 (0.026)	a	795	0.813 (0.032)	6.527-7.594 (0.257-0.299)
HK_E	14.0	2002-03	IV	23531130	82.1 (3.230)	0.203 (0.008)	0.508 (0.020)	a	797	0.508 (0.020)	6.452-7.214 (0.254-0.284)
HV_E	14.0	2004-06	V	23533694	***See Service Manual	0.203 (0.008)	0.508 (0.020)	a	797	0.508 (0.020)	6.655-7.214 (0.262-0.284)
HK62	14.0	2000	IV	23524911 / 912	81.0 (3.189)	0.203 (0.008)	0.660 (0.026)	a	790C	0.660 (0.026)	5.03-6.10 (0.198-0.240)
HK62	14.0	2000-03	IV	23528308 / 309	82.1 (3.230)	0.203 (0.008)	0.660 (0.026)	a	795	0.813 (0.032)	6.527-7.594 (0.257-0.299)
HK62	14.0	2004-06	IV	23528308 / 309	82.1 (3.230)	0.203 (0.008)	0.508 (0.020)	a	797A	0.508 (0.020)	6.527-7.594 (0.257-0.299)
Marine-HK	14.0	Vary	IV	23529007 / 008	81.0 (3.189)	0.203 (0.008)	0.660 (0.026)	a	N/A	N/A	6.12-7.19 (0.241-0.283)
HG_E	14	2007	IV	23535545 / 153J	***See Service Manual	0.203 (0.008)	0.508 (0.020)	a	797B	0.508 (0.020)	6.17-6.73 (0.243-0.265)

*GU40 is equipped with a Model 760A Jake Brake. Use 760A lash specs when servicing

**MK and BK models with 0712 Valve mech are equipped with a Model 770 Jake Brake. Use 770 lash specifications when servicing.

++ References: a[04TS43Rev3], b[06R2003113]

https://parts.jacobsvehiclesystems.com/files/support/docs-pdfs/24770_DDC_App_Guide.pdf

<https://parts.jacobsvehiclesystems.com/files/support/docs-pdfs/797-797A-797B-Jacobs-Tune-Up-Kit-00-032159-Rev-C.pdf>

The following is from the Series 60 Service Manual (6SE483).

*** Adjust the valves and N3 fuel injector settings as follows:

1. Disconnect starting power for engine.
2. Remove the engine valve rocker cover as outlined. Refer to "Removal and Cleaning of One-piece Rocker Cover for Diesel Engines Only" for one-piece, refer to "Removal and Cleaning of Two-piece Rocker Cover for Diesel Engines Only" for two-piece rocker cover, and refer to "Removal and Cleaning of Threepiece Rocker Cover" for three-piece rocker cover.
3. Insert a 3/4 in. drive breaker bar or ratchet into the square hole in the center of the crankshaft pulley.
4. Bar the engine in the direction of rotation and observe a cylinder where the injector rocker arm is just beginning to depress the injector plunger, both the intake and exhaust valves should be closed.
 - a. Stop turning the engine and mount a magnetic base dial indicator so you can monitor the upward lift of travel of that injector lobe.
 - b. Set the pedestal of the dial indicator on the top of the injector cam roller. Adjust the pedestal so it can travel the entire upward movement of the lobe.
 - c. Continue to slowly bar the engine over in the direction of rotation until the dial indicator shows no more upward lift. The needle of the dial indicator will stop moving indicating maximum lift.
 - d. This is the point of maximum injector roller lift, the injector can now be set.
 - e. If you rotate the engine beyond this point you will have to bar the engine over in the opposite direction at least 1/4 turn and then bar the engine over in the direction of rotation until maximum injector roller lift is obtained.
5. Stop engine rotation and note which cylinder this is, and follow the sequence listed in Table 1 to correctly set injector and valves.

Max. injector lobe travel on Cylinder No.	Adjust Injector on Cylinder No.	Adjust Valves on Cylinder No.
6	6	2
2	2	4
4	4	1
1	1	5
5	5	3
3	3	6

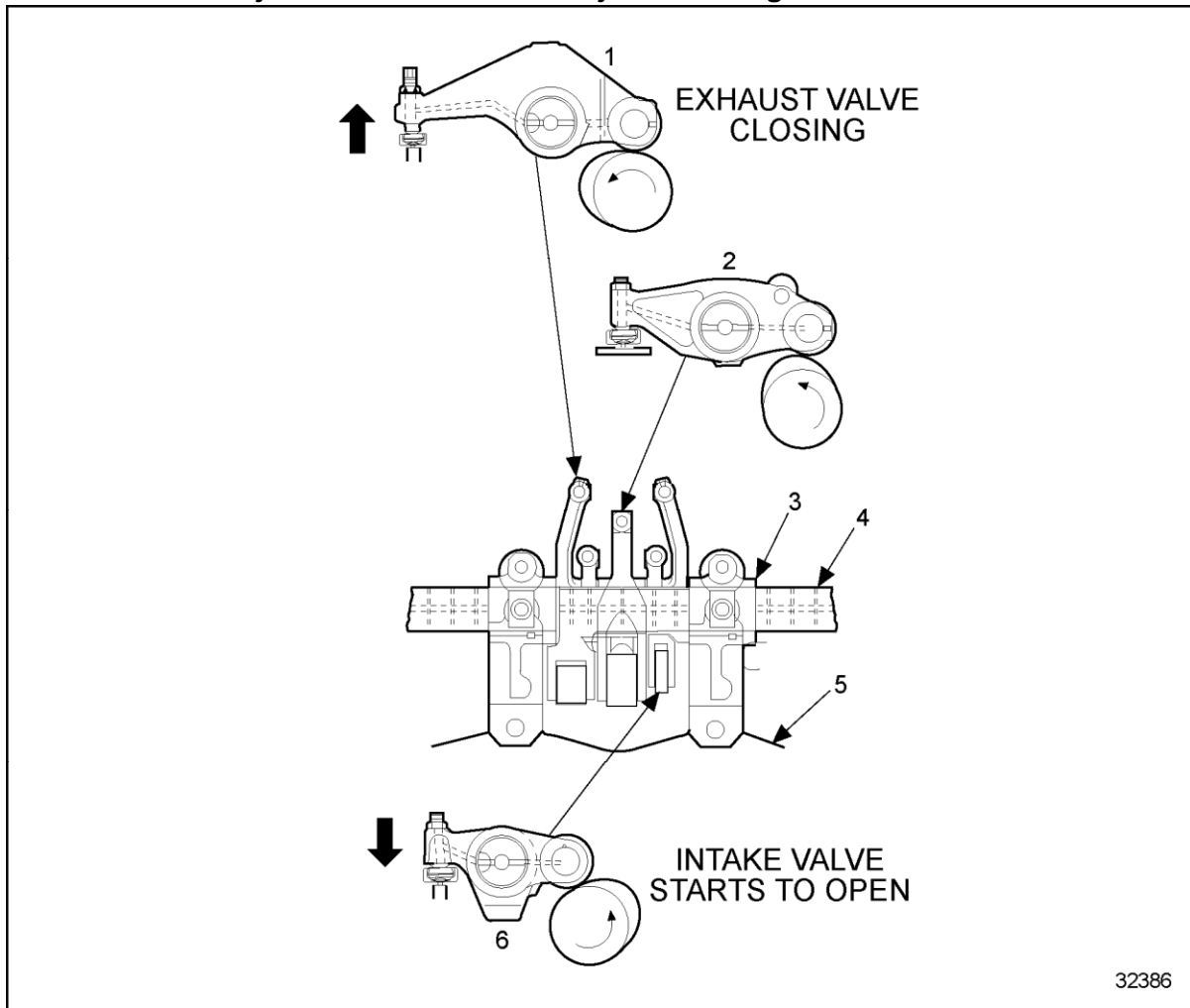
Table 1. Valve Lash and N3 Injector Setting Adjustment Sequence

6. This injector can now be set using this procedure:
 - a. Loosen the locknut on the adjusting screw at least two full turns.
 - b. Tighten the adjusting screw until the injector plunger bottoms out; torque value should be 4.51 N·m (40 in·lbs).

- c. Back the adjusting screw off 3/4 of a turn $0.75 \text{ mm} \pm 0.25 \text{ mm}$ ($0.03 \text{ in.} \pm 0.01 \text{ in.}$) and tighten the locknut to 41-47 N·m (30-35 lb·ft).
- d. The injector is now adjusted.

The following is from the EPA07 Series 60 Service Manual (6SE2007).

****** Valve Lash Adjustments and E3 Fuel Injector Setting**



- | | |
|--------------------------------------|-------------------------------|
| 1. Exhaust Valve Rocker Arm Assembly | 4. Rocker Arm Shaft |
| 2. Fuel Injector Rocker Arm Assembly | 5. Cylinder Head |
| 3. Camshaft | 6. Intake Rocker Arm Assembly |

Figure 1. Valve Overlap Period

Adjust the valves and fuel injector settings as follows:

1. Disconnect starting power for engine.

2. Remove the engine valve rocker cover as outlined. Refer to "Removal and Cleaning of Two-piece Rocker Cover for Diesel Engines Only" for two-piece rocker cover, and refer to "Removal and Cleaning of Three-piece Rocker Cover" for three-piece rocker cover.
3. Insert a 3/4 in. drive breaker bar or ratchet into the square hole in the center of the crankshaft pulley.
4. Bar the engine in the direction of rotation and observe a cylinder where the injector rocker arm is just beginning to depress the injector plunger, both the intake and exhaust valves should be closed. See Figure 1.
 - a. Stop turning the engine and mount a magnetic base dial indicator so you can monitor the upward lift of travel of that injector lobe.
 - b. Set the pedestal of the dial indicator on the top of the injector cam roller. Adjust the pedestal so it can travel the entire upward movement of the lobe.
 - c. Continue to slowly bar the engine over in the direction of rotation until the dial indicator shows no more upward lift. The needle of the dial indicator will stop moving indicating maximum lift.
 - d. This is the point of maximum injector roller lift, the injector can now be set.
 - e. If you rotate the engine beyond this point you will have to bar the engine over in the opposite direction at least 1/4 turn and then bar the engine over in the direction of rotation until maximum injector roller lift is obtained.
5. Stop engine rotation and note which cylinder this is, and follow the sequence listed in Table "Valve Lash and Injector Setting Adjustment Sequence" to correctly set injectors and valves.

Max. injector lobe travel on Cylinder No.	Adjust Injector on Cylinder No.	Adjust Valves on Cylinder No.
6	6	2
2	2	4
4	4	1
1	1	5
5	5	3
3	3	6

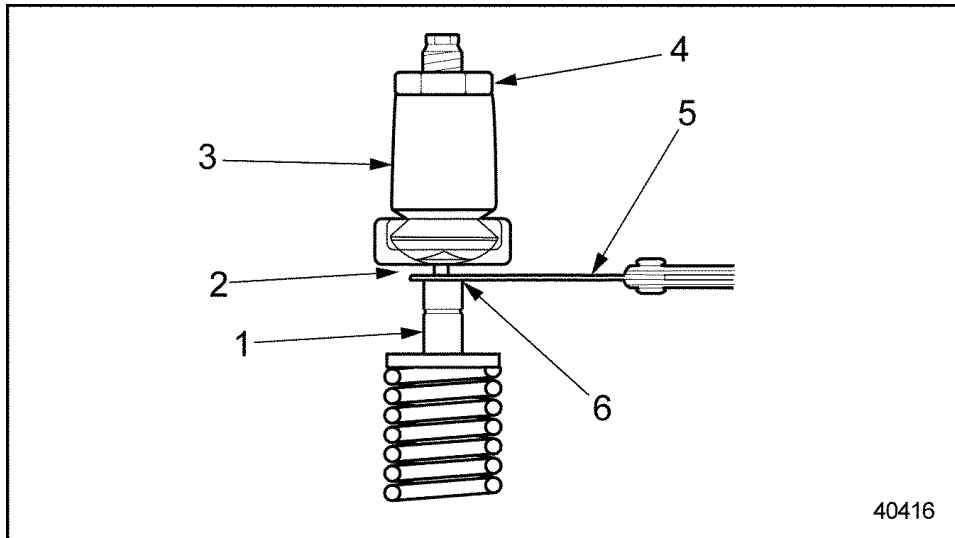
Table 1. Valve Lash and Injector Setting Adjustment Sequence

6. This injector can now be set using this procedure:
 - a. Loosen the locknut on the adjusting screw at least two full turns.
 - b. Tighten the adjusting screw until the injector plunger bottoms out; torque value should be 4.51 N·m (40 in·lbs).
 - c. Back the adjusting screw off 3/4 of a turn 0.75 mm ± 0.25 mm (0.03 in. ± 0.01 in.) and tighten the locknut to 41-47 N·m (30-35 lb·ft).
 - d. The injector is now adjusted.
7. Adjust the valves on the corresponding cylinders listed in Table "Valve Lash and Injector Setting Adjustment Sequence".

NOTICE:

Never set the valves and injector of the same cylinder at the same time. Doing this will result in engine damage.

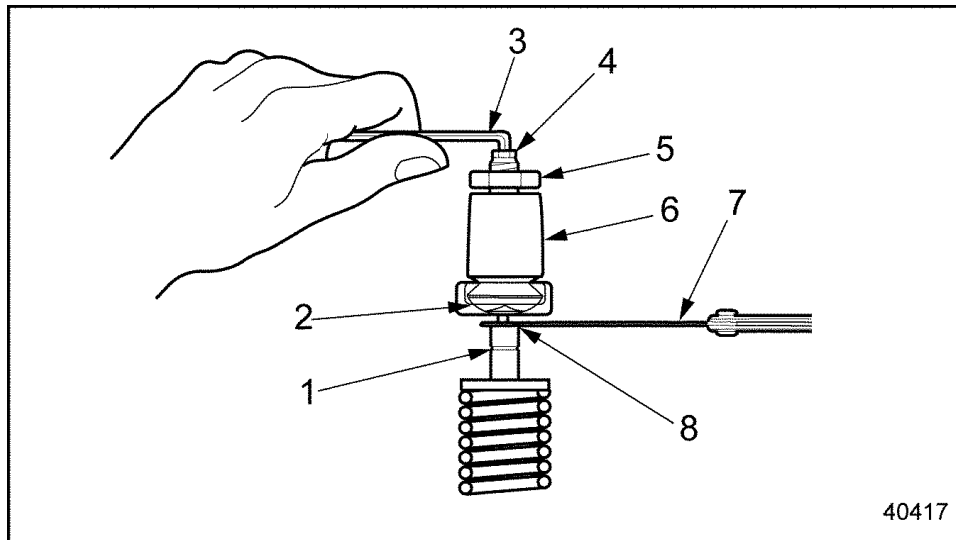
8. To adjust the intake valves, insert a 0.203 mm (0.008 in.) feeler gage between the tip of the valve stem and the valve button at the end of the rocker arm. See Figure 2.



- | | |
|-------------------------------|------------------------|
| 1. Intake Valve | 4. Locknut |
| 2. Valve Button | 5. Feeler Gage |
| 3. Intake Rocker Arm Assembly | 6. Tip of Intake Valve |

Figure 2. Intake Valve Adjustment

9. Loosen the locknut, and turn the adjusting set screw until the feeler gage produces an even smooth pull between the valve stem and valve button.
10. Torque the locknut to 41 - 47 N·m (30 - 35 lb·ft) and remove the feeler gage. Reinsert the feeler gage to ensure that the adjustment did not change when the locknut was tightened. Readjust as necessary.
11. The exhaust valves are adjusted the same way as the intake valves, except use a 0.508 mm (0.020 in.) feeler gage. See Figure 3.



- | | |
|--------------------------------------|--------------------------------|
| 1. Location of Identification Groove | 5. Locknut |
| 2. Valve Button | 6. Exhaust Rocker Arm Assembly |
| 3. Allen Wrench | 7. Feeler Gage |
| 4. Adjusting Screw | 8. Tip of Exhaust Valve |

Figure 3. Exhaust Valve Adjustment

12. Repeat steps 4-11 until all injectors and valves have been set.
13. Install the engine rocker cover. Refer to "Installation of Two-Piece and Three-Piece Rocker Covers" for two and three-piece rocker covers.
14. Reconnect starting power to the engine.

SERIES 50 DIESEL VALVE LASH, JAKE BRAKE LASH AND CAM TIMING SPECS

Model	Engine	Year	DDEC	Camshaft/Assembly Part Number	Injector Height mm (inches)	Intake Valve Lash mm (inches)	Exhaust Valve Lash mm (inches)	Jake Brake Model	Jake Brake Lash mm (inches)	Cam Timing Range mm (inches)
GU	8.5	1993-97	II	23511364 / 785 23524895 / 896	78.2 (3.078)	0.203 (0.008)	0.508 (0.020)	750	0.660 (0.026)	5.21-6.27 (0.205-0.247)
GK	8.5	1993-97	III	23511364 / 785 23524895 / 896	78.8 (3.103)	0.203 (0.008)	0.660 (0.026)*	750	0.660 (0.026)	5.21-6.27 (0.205-0.247)
GK	8.5	1993-97	III	23519870 / 871	78.8 (3.103)	0.203 (0.008)	0.660 (0.026)*	750	0.660 (0.026)	5.21-6.27 (0.205-0.247)
TK	8.5	1998-99	IV	23522197 / 198 23524893 / 894	80.3 (3.161)	0.203 (0.008)	0.660 (0.026)*	750A	0.584 (0.023)	5.54-6.60 (0.218-0.260)
MK,MK_E	8.5	1999-02	IV	23524421 / 422 23524915 / 916	81.0 (3.190)	0.203 (0.008)	0.660 (0.026)**	750B	0.584 (0.023)	4.92-5.99 (0.194-0.236)
MK_E	8.5	2003-04	IV	23527028 / 029	81.0 (3.190)	0.203 (0.008)	0.508 (0.020)	750B	0.584 (0.023)	5.02-6.09 (0.198-0.240)

* May be equipped with newer replacement cylinder head 23529994 or R23529994 containing Pyromet exhaust valves that require a 0.508 mm (0.020 in) lash setting. Check cylinder head part number before servicing exhaust valve lash.

** Models MK and MK_E with serial numbers after 04R39213 were built with cylinder head 23529994, which contains Pyromet exhaust valves requiring a 0.508 mm (0.020 in) lash setting.

SERIES 50 GAS VALVE LASH AND CAM TIMING SPECS

Model	Engine	Year	DDEC	Camshaft/Assembly Part Number	Intake Valve Lash mm (inches)	Exhaust Valve Lash mm (inches)	Service Cam Timing Range mm (inches)
GKG	8.5	1994-98	III	23519143 / 144 23524891 / 892	0.279 (0.011)	0.914 (0.036)	2.18-2.87 (0.086 -0.113)
TKG	8.5	1998-02	IV	23519143 / 144 23524891 / 892	0.279 (0.011)	0.914 (0.036)	2.18-2.87 (0.086 -0.113)
MKG	8.5	2002-04	IV	23530959 / 919	0.279 (0.011)	0.914 (0.036)	2.18-2.87 (0.086 -0.113)

SERIES 60 GAS VALVE LASH AND CAM TIMING SPECS

Model	Engine	Year	DDEC	Camshaft/Assembly Part Number	Intake Valve Lash mm (inches)	Exhaust Valve Lash mm (inches)	Service Cam Timing Range mm (inches)
TKG	12.7	1995-98	III	23520286 / 627 23524909 / 910	0.279 (0.011)	0.914 (0.036)	2.18-2.87 (0.086 -0.113)
TKG	12.7	1998-04	IV	23520286 / 627 23524909 / 910	0.279 (0.011)	0.914 (0.036)	2.18-2.87 (0.086 -0.113)