

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
15 Engine- Cylinder head, Valvetrain (Page GR-15)

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Volkswagen New Beetle

2.0 Liter 4-cyl General, Engine (Engine Code AEG)

Cylinder head, removing and installing (Page 15-1)

Compression, checking

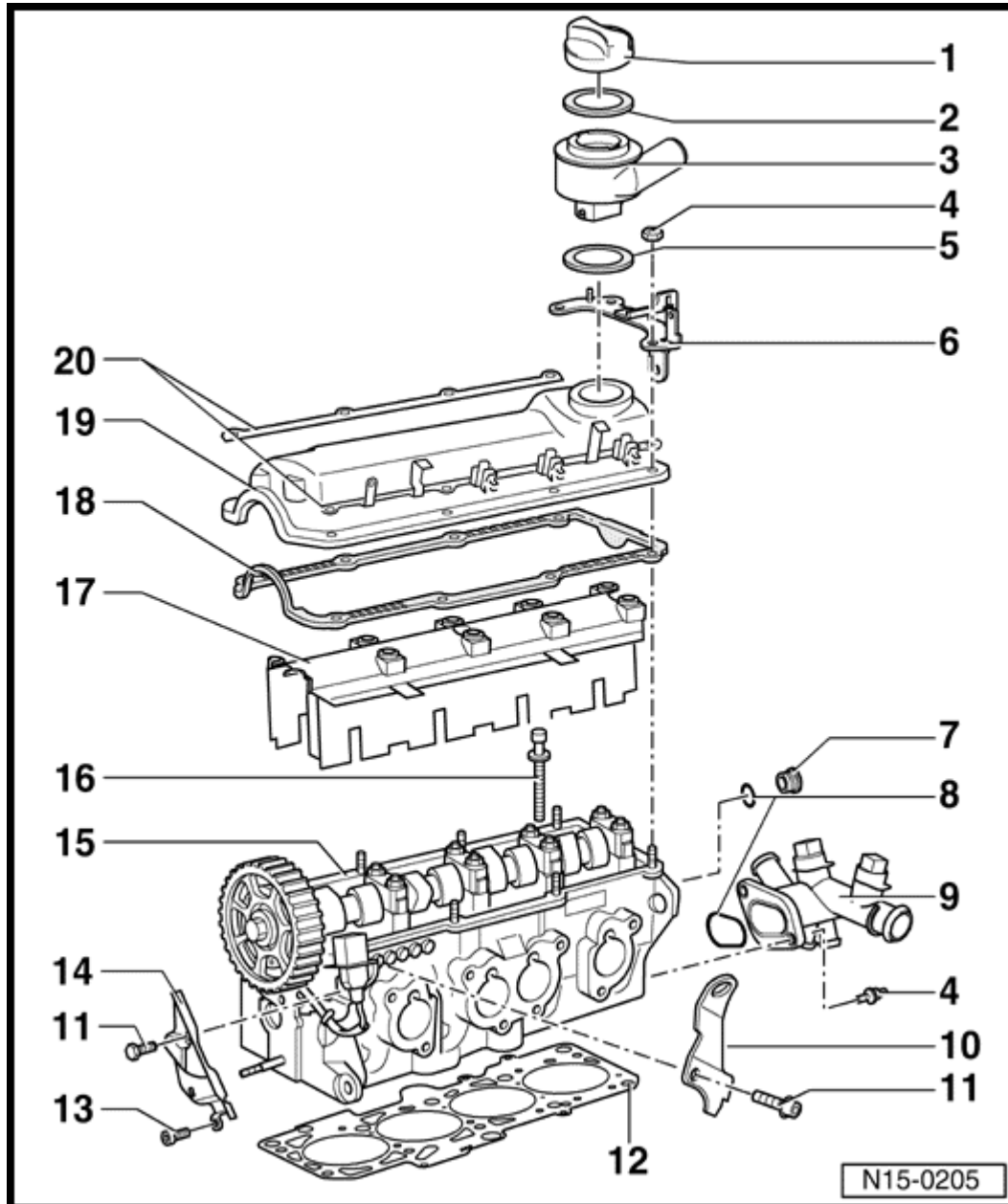
⇒ [Page 15-11](#)

Notes:

- ◆ *When installing an exchanged cylinder head (complete with camshaft); oil the contact surfaces between the hydraulic lifter and camlobe BEFORE installing the valve cover.*
- ◆ *Do NOT remove the plastic packing pieces used to protect the open valves until immediately before installing the cylinder head.*
- ◆ *If the cylinder head is replaced; also replace the ENTIRE engine coolant.*
- ◆ *Intake manifold, removing and installing:*

⇒ Repair group 24

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Cylinder head, removing and installing (Page 15-2)



- 1 - Cap
- 2 - Gasket
- 3 - Vent housing
 - Turn to the right to remove
- 4 - 10 Nm (7 ft lb)
- 5 - Gasket
 - Replace if damaged
- 6 - Bracket
- 7 - Sealing plug



15 Nm (11 ft lb)

- Replace

8 - Oil seal

- Replace

9 - Connection

10 - Lifting eye

11 - 20 Nm (15 ft lb)

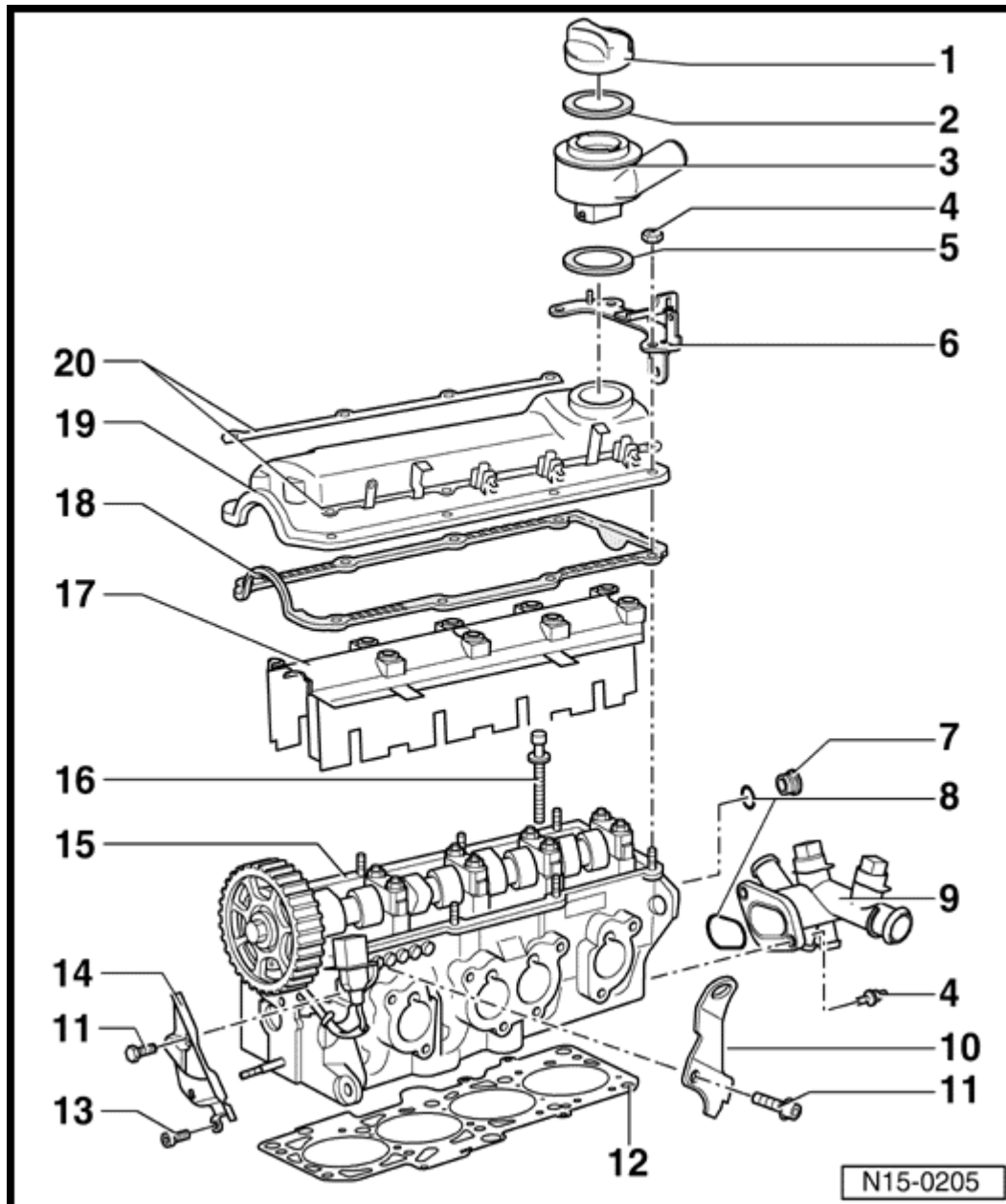
12 - Cylinder head gasket

- Replace

- If replaced, also replace complete engine coolant

13 - 15 Nm (11 ft lb)

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Cylinder head, removing and installing (Page 15-3)



14 - Toothed belt guard, rear

15 - Cylinder head

- ◆ Distortion, checking ⇒ [Fig. 1](#)
- ◆ Sealing surface, reworking: ⇒ [Page 15-17](#) , [Fig. 1](#)
- ◆ Removing and installing: ⇒ [Page 15-5](#)

- If replaced, also replace complete engine coolant

16 - Cylinder head bolt

- Replace

- ◆ Sequence when loosening and tightening ⇒ [Page 15-5](#)

17 - Oil deflector

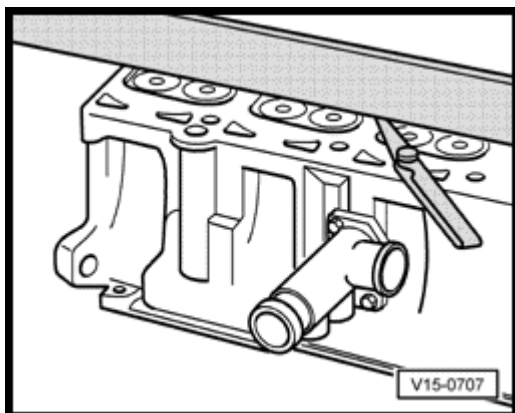
18 - Valve cover gasket

- Replace if damaged
- Before installing gasket, coat transition between bearing cap / cylinder head with "D2"

19 - Valve cover

20 - Reinforcing strip

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Cylinder head, removing and installing (Page 15-4)

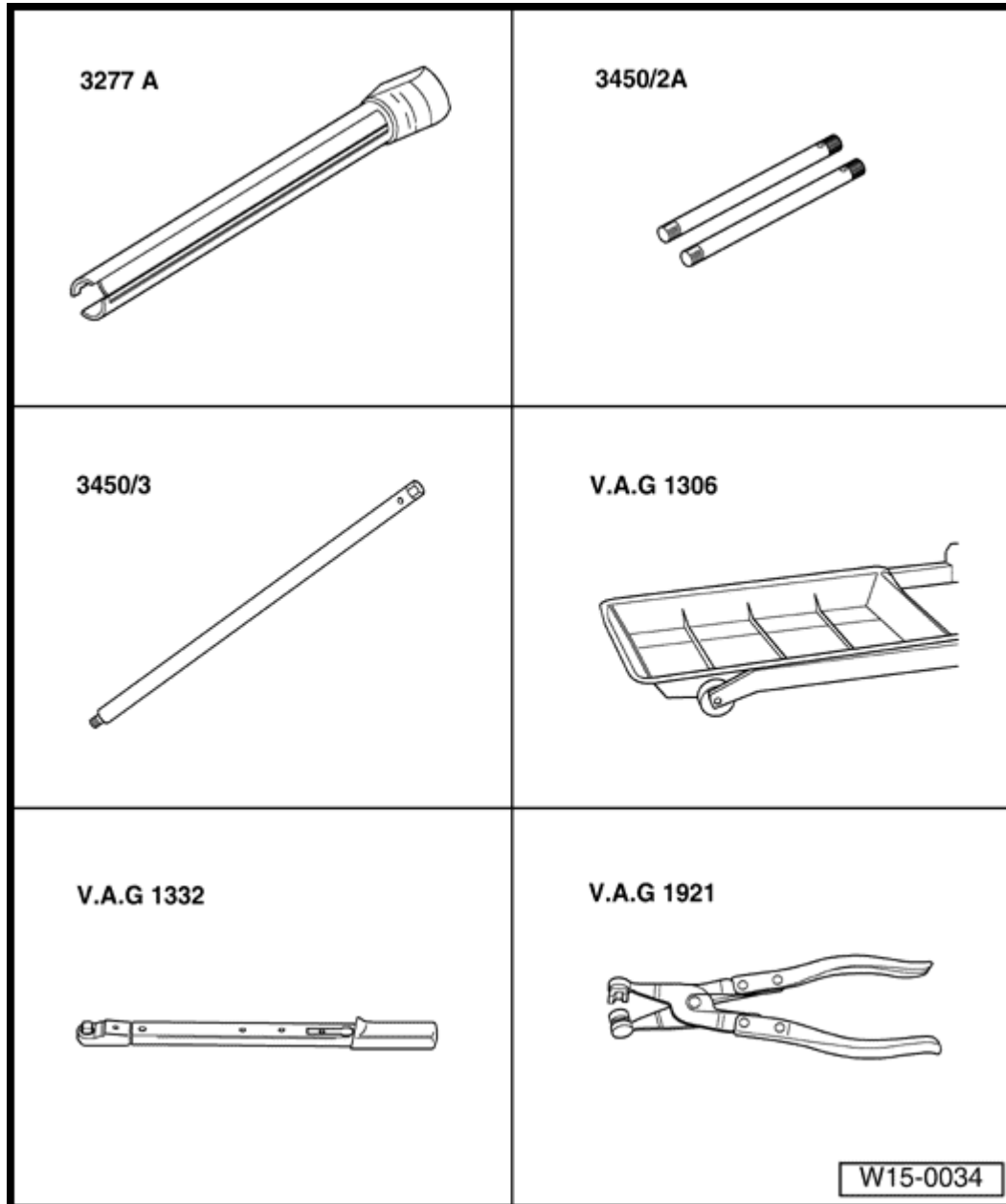


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Fig. 1 Cylinder head distortion, checking

- Maximum permissible distortion: 0.1 mm

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Cylinder head, removing and installing (Page 15-5)



Cylinder head, removing and installing

Special tools, workshop equipment, test and measuring appliances and auxiliary items required

- ◆ 3277A Installation tool
- ◆ 3450/2 Guide bolt
- ◆ 3450/3 Extractor
- ◆ VAG 1306 Drip tray
- ◆ VAG 1332 Torque wrench 40 to 200 Nm (30 to 148 ft lb)
- ◆ VAG 1921 Spring clip pliers

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)

Cylinder head, removing and installing (Page 15-6)

Requirements

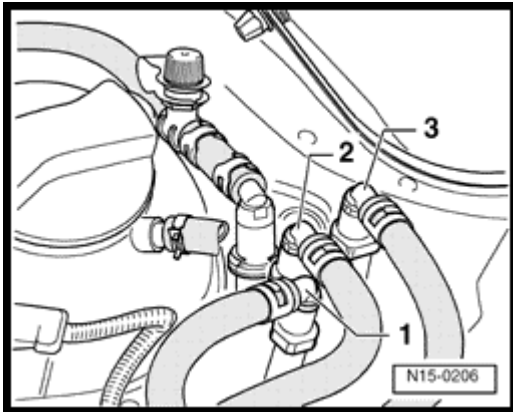
- Engine must not be hotter than warm to the touch.
- Pistons must NOT be positioned at TDC.

Cylinder head, removing

CAUTION!

Obtain radio anti - theft code from customer BEFORE disconnecting battery Ground strap!

- With ignition switched OFF, disconnect battery Ground strap
- Remove engine cover.
- Drain coolant ⇒ [Page 19-10](#) .



- Separate fuel supply line - 3 - , fuel return line - 2 - and vacuum line - 1 - (for LDP pump) at fuel rail connection.

WARNING!

Fuel system is under pressure! Cover over the connections with a cloth BEFORE disconnecting the hoses.

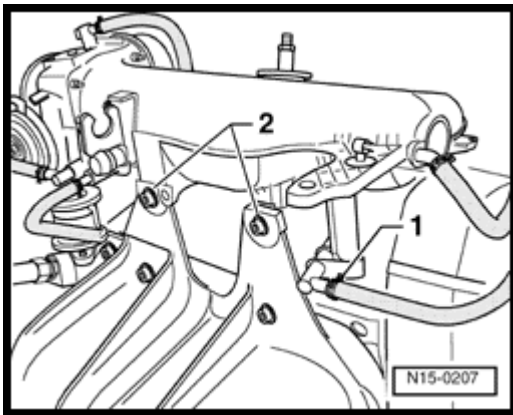
- Seal off fuel lines so system is not contaminated by dirt etc.
- Remove Air Cleaner

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)

Cylinder head, removing and installing (Page 15-7)

- Remove accelerator cable to Throttle Control Module and remove from retainers.
- Remove suction hose
- Remove connector to Throttle Control Module.
- Remove water hoses from Throttle Control Module to cylinder head or overflow reservoir.
- Remove vacuum hoses to brake booster and Secondary Air Injection valve.
- Unscrew front bolts for intake manifold upper and lower sections
 - Tightening torque: 10 Nm (7 ft lb)



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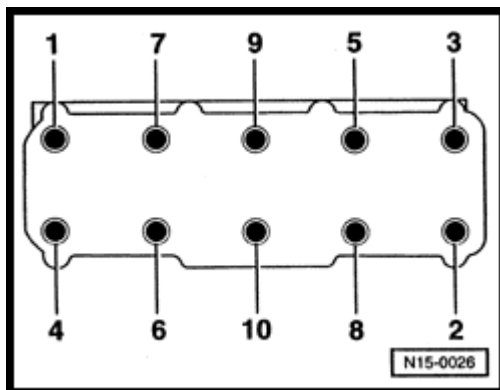
- Remove vent line - 1.
- Unscrew warm air deflector bolts - 2 - .
 - Tightening torque: 25 Nm (18 ft lb)
- Remove vacuum hose to fuel pressure regulator.
- Remove fuel supply and return lines from fuel pressure regulator and move wiring harness forward.
- Unscrew the connectors with coolant hoses.
- Remove Secondary Air Injection pump intake and pressure lines.

Volkswagen New Beetle

2.0 Liter 4-cyl General, Engine (Engine Code AEG)

Cylinder head, removing and installing (Page 15-8)

- Disconnect the following connections:
 - ◆ Secondary Air Injection pump
 - ◆ Fuel injectors (unclip cable routing)
 - ◆ Camshaft Position sensor
 - ◆ Spark plugs, using 3277A Spark plug removal tool
 - Remove ribbed belt tensioning element.
 - Remove toothed belt guard upper section.
 - Release tensioning roller and take toothed belt off camshaft sprocket.
 - Unscrew upper bolt from rear belt guard.
 - Separate front exhaust pipe from exhaust manifold
- ⇒ [Page 26-2](#)
- Remove valve cover.



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- Loosen socket head bolts in the sequence given and then remove completely.
- Carefully lift off cylinder head.

Volkswagen New Beetle

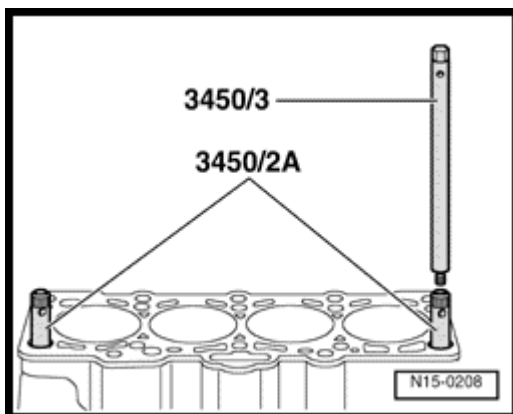
2.0 Liter 4-cyl General, Engine (Engine Code AEG)

Cylinder head, removing and installing (Page 15-9)

Cylinder head, installing

Notes:

- ◆ *There must NOT be any oil or coolant in the bolt pockets in the cylinder head or there is the danger of creating a hydro - lock while torquing which could lead to structural damage.*
- ◆ *Only remove the new cylinder head gasket from its packaging immediately before installing.*
- ◆ *Handle the new gasket with extreme care. Damage will lead to leaks.*
- Place a clean cloth over the cylinders so no dirt or abrasive particles can get between the cylinder wall and piston.
- Take whatever precautions are necessary to prevent dirt and abrasive particles from getting into the coolant system.
- Carefully clean the cylinder head and cylinder block sealing surfaces, ensuring that no scores or scratches are formed
 - ◆ When using abrasive paper, do NOT use any grades coarser than 100, such as 80.
- Carefully remove all traces of metal particles, emery remains and cloth.
- Position cyl. 1 piston to top dead center, then turn back crankshaft slightly.



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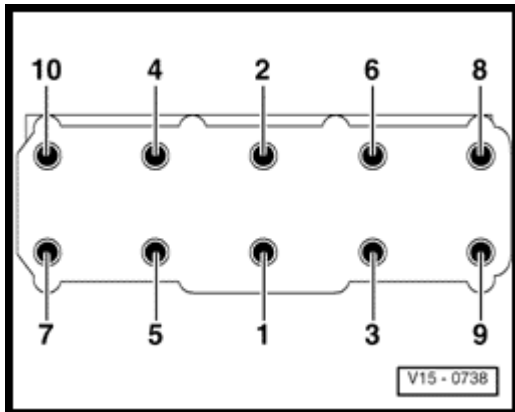
- Center 3450/2A guide pins into head bolt holes as shown.
- Install new cylinder head gasket.
 - Lettering (part number) must be readable.

Volkswagen New Beetle

2.0 Liter 4-cyl General, Engine (Engine Code AEG)

Cylinder head, removing and installing (Page 15-10)

- Install cylinder head, screw in 8 remaining head bolts and tighten by hand.
- Unscrew guide pins through bolt hole using 3450/3 pin driver by turning it anti - clockwise until pins are free.
- Install remaining cylinder head bolts and tighten hand - tight.



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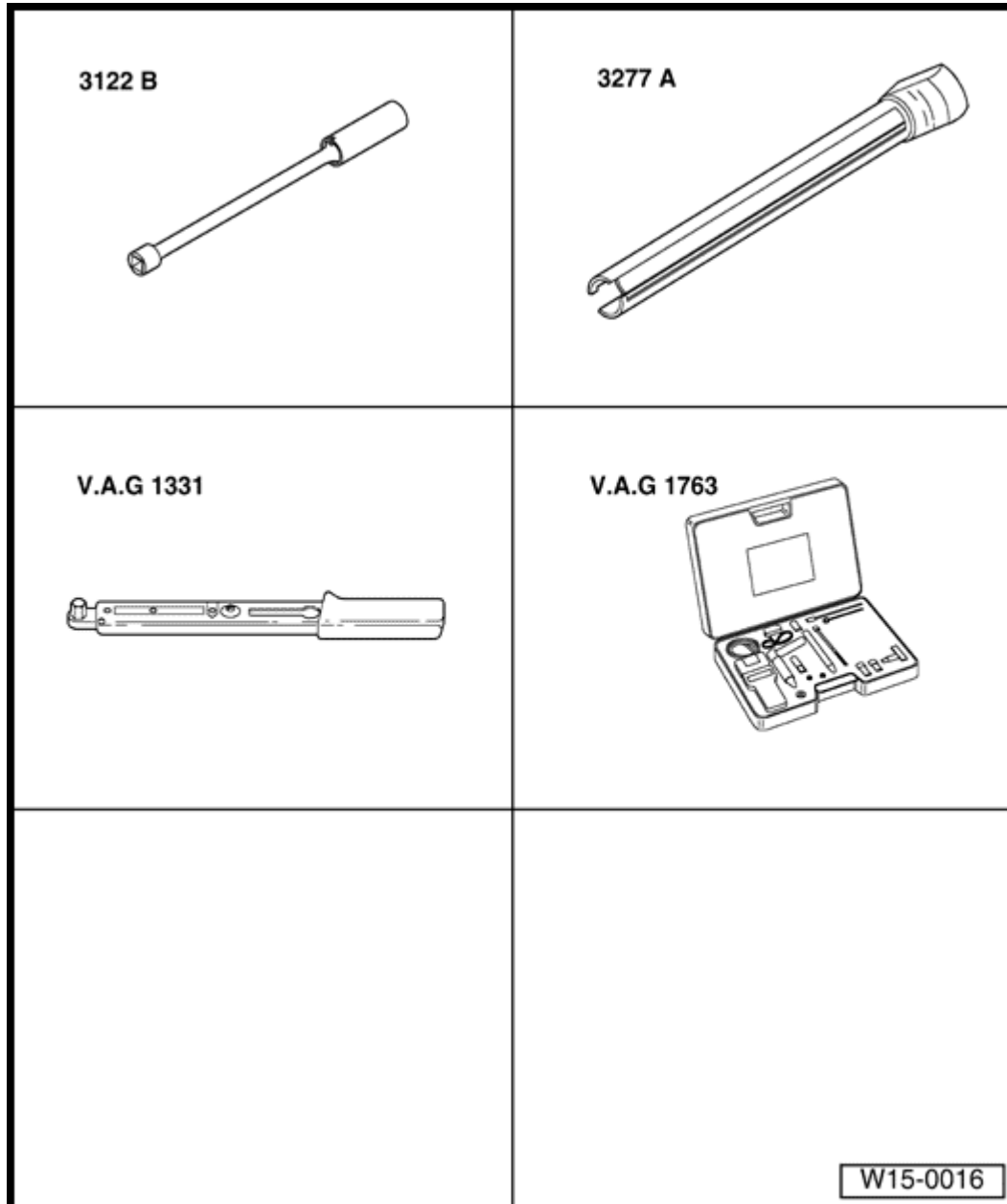
- Tighten cylinder head in sequence as follows:
- Pretighten all bolts to 40 Nm (30 ft lb).
- Tighten all bolts a $\frac{1}{4}$ turn (90°) further using a box wrench.
- Tighten all bolts a $\frac{1}{4}$ turn (90°) further.

Notes:

Assembly is basically a reverse of the disassembly procedure.

- Install toothed belt and adjust timing ⇒ [Page 13-11](#) .
- Fill with new coolant ⇒ [Page 19-10](#) .
- Check Diagnostic Trouble Code memory
⇒ Repair group 01
- If a malfunction occurred, read Readiness code
⇒ Repair group 01
- Match Engine Control Module to Throttle Control Module
⇒ Repair group 24

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Cylinder head, removing and installing (Page 15-11)



Compression, checking

Special tools, workshop equipment, test and measuring appliances and auxiliary items required

- ◆ 3122 B Spark plug wrench
- ◆ 3277 A Installation tool
- ◆ VAG 1331 Torque wrench 5 to 50 Nm (3.7 to 37 ft lb)
- ◆ VAG 1763 Compression tester

Volkswagen New Beetle

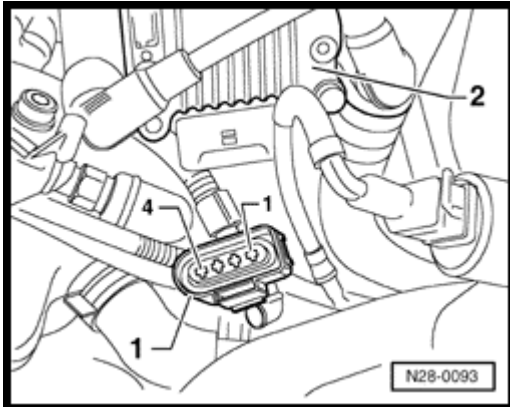
2.0 Liter 4-cyl General, Engine (Engine Code AEG)

Cylinder head, removing and installing (Page 15-12)

Test conditions

- Engine oil temperature must be 30 ° C minimum.

Work sequence



- Disconnect 4 - pin harness connector - 1 - for ignition coil power output stage - 2 - .
- Loosen and remove spark plugs using 3277 A tool
- Fully depress accelerator pedal using a second mechanic.
- Check compression using VAG 1381/VAG 1763 tester.
- Crank starter until tester shows no further increase in pressure.

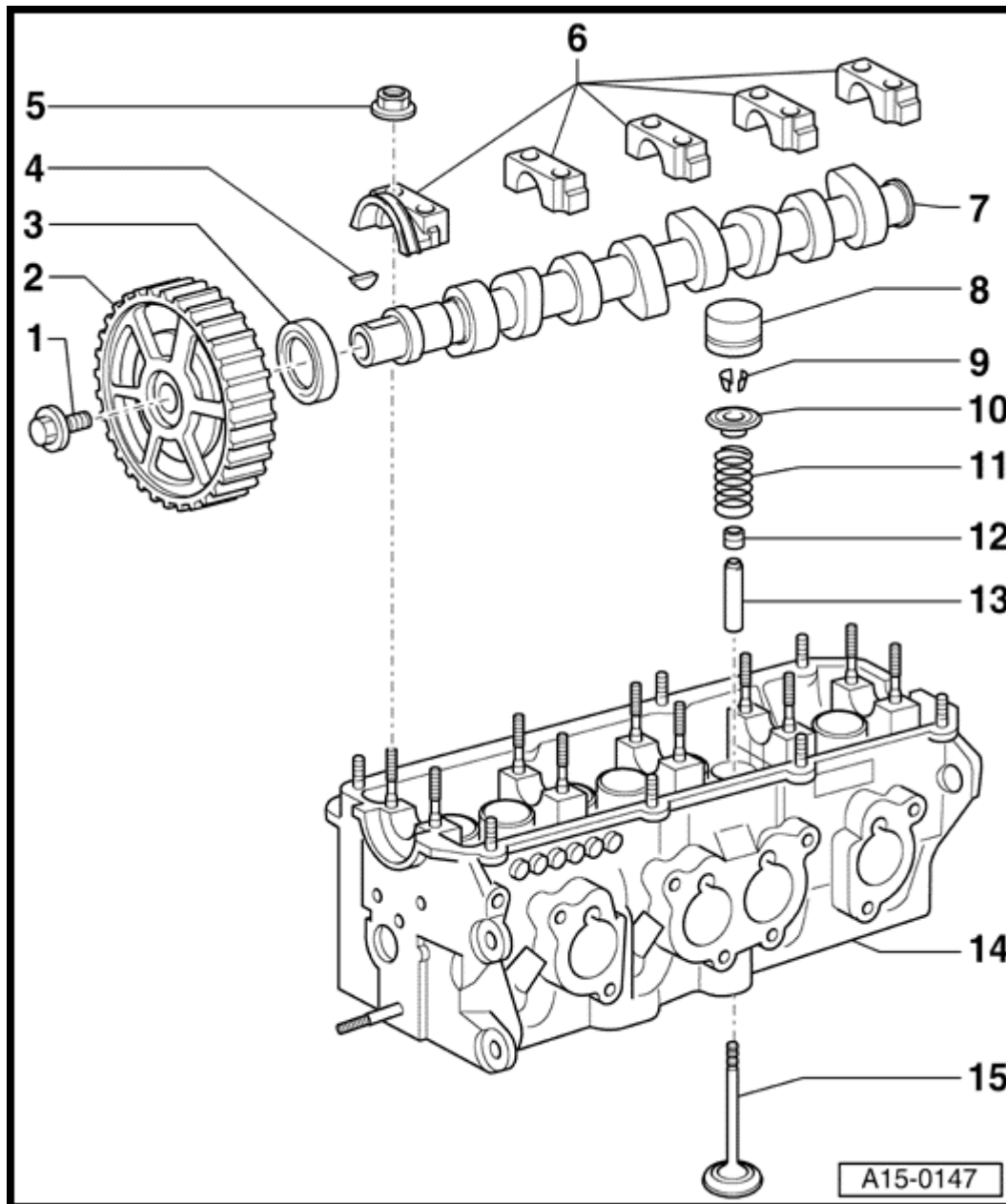
Compression pressure:

- New: 10 to 13 bar
- Wear limit: 7.5 bar

Maximum permissible difference between all cylinders:

- 3 bar
- Check Diagnostic Trouble Code memory
- ⇒ Repair group 01

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-13)



Notes:

- ♦ *Cylinder heads which have cracks between the valve seats or between valve seat inserts and the spark plug thread can continue to be used without reducing service life provided the cracks do not exceed a maximum of 0.3 mm in width, or when no more than the first four spark plug threads are cracked.*
- ♦ *After installing new hydraulic lifters, do NOT start the engine for approx. 30 minutes or the valves will strike the pistons. After 30 minutes manually turn the crankshaft two rotations before starting.*

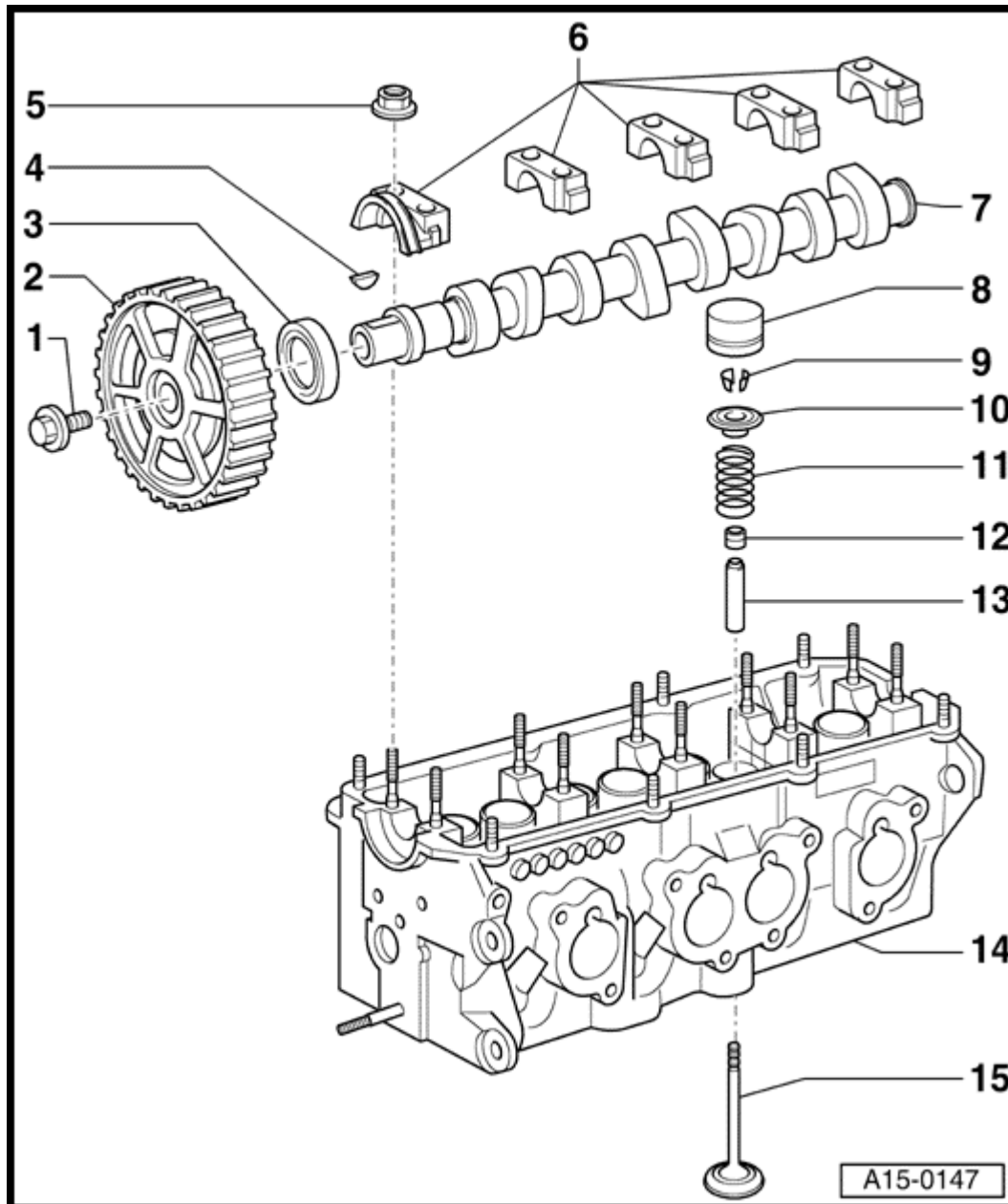
1 - 100 Nm (74 ft lb)

- Use 3415 counter - hold to loosen and tighten

2 - Camshaft sprocket

3 - Oil seal

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-14)



4 - Woodruff key

- Ensure tight fit

5 - 20 Nm (15 ft lb)

6 - Bearing cap

- ◆ Installation position ⇒ [Fig. 3](#)
- ◆ Installation sequence ⇒ [Page 15-26](#)

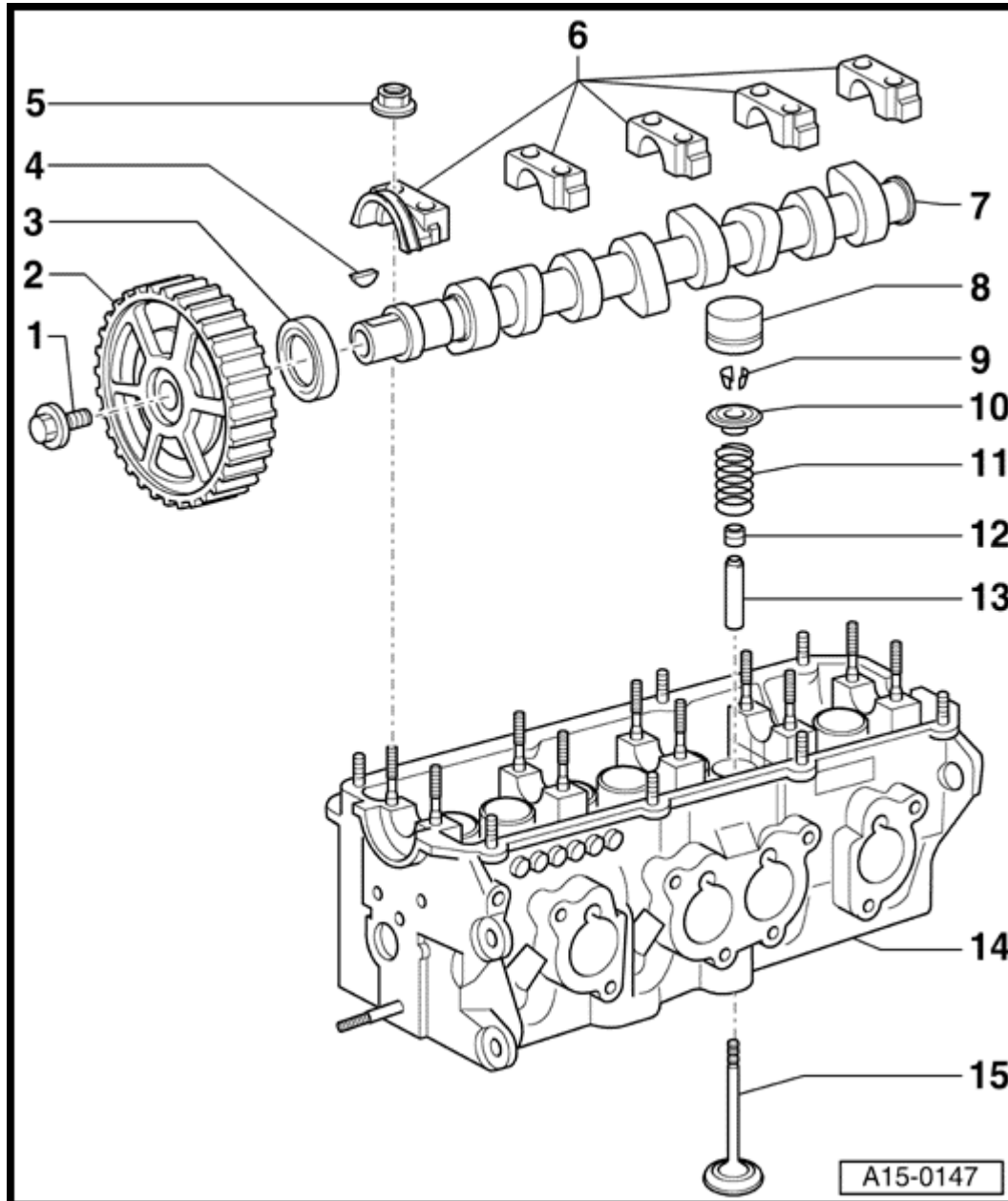
- Lightly coat bearing cap 1 contact surfaces with D 454 300 A2 sealant

7 - Camshaft

- ◆ Axial clearance, checking ⇒ [Fig. 2](#)
- ◆ Removing and installing: ⇒ [Page 15-26](#)

- ◆ Radial clearance, checking with plastigage: Wear limit: 0.1 mm
- ◆ Run - out: max. 0.01 mm
- ◆ Identification and valve timing ⇒ [Fig. 5](#)

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-15)



8 - Hydraulic lifter

- Do not interchange
 - ◆ with hydraulic clearance compensation
 - ◆ Checking ⇒ [Page 15-30](#)
- Store with cam contact surface facing downwards
- Check camshaft axial clearance before installing ⇒ [Fig. 2](#)
- Oil contact surfaces

9 - Keepers

10 - Valve spring retainer, upper

11 - Valve spring

- ◆ Removing and installing: with cylinder head removed: use 2037 with cylinder head installed: ⇒ [Page 15-35](#)

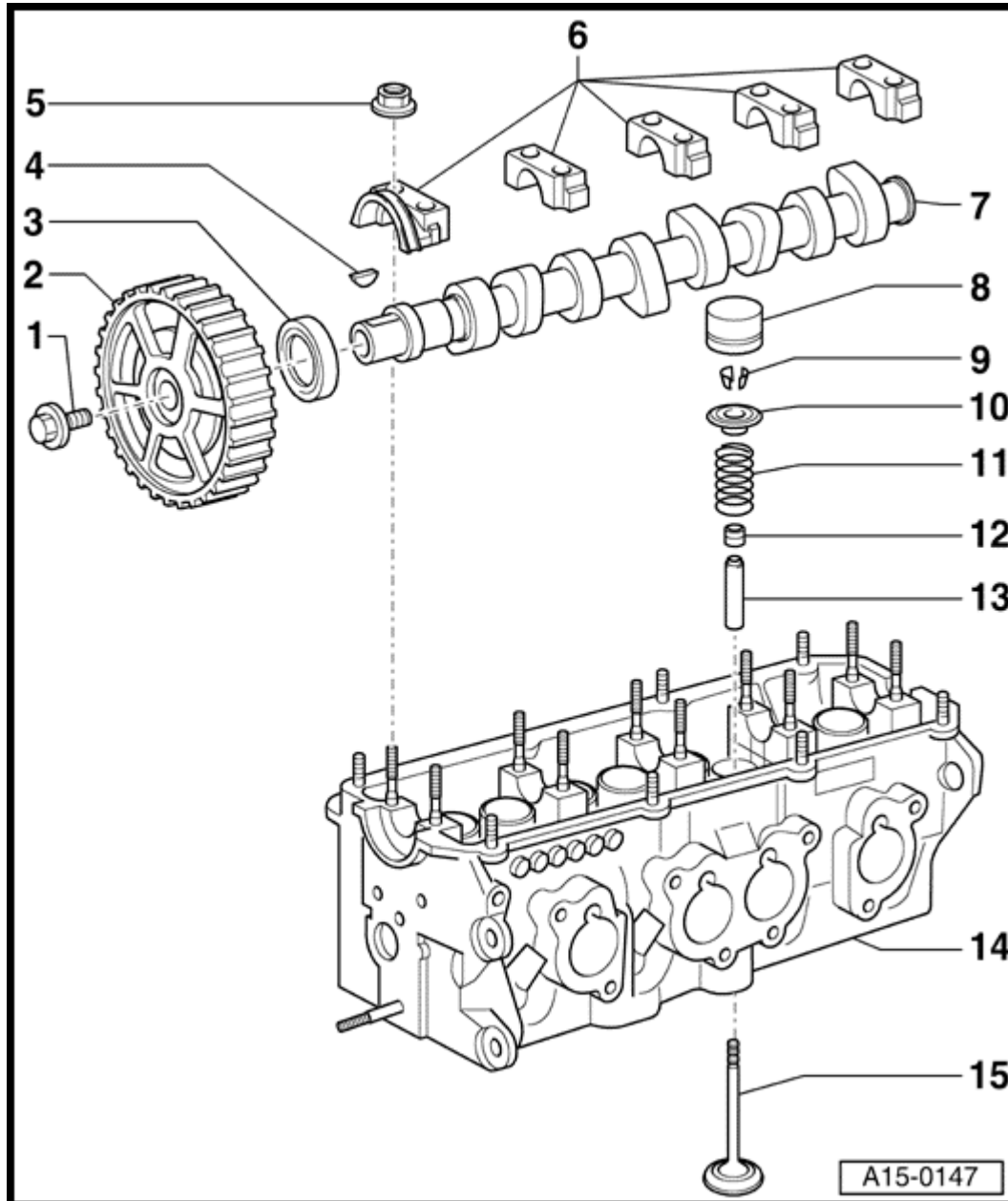
12 - Valve stem seal

- ◆ Replacing ⇒ [Page 15-35](#)

13 - Valve guide

- ◆ Checking ⇒ [Page 15-32](#)
- ◆ Replacing ⇒ [Page 15-33](#)
- ◆ Service version with collar

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-16)



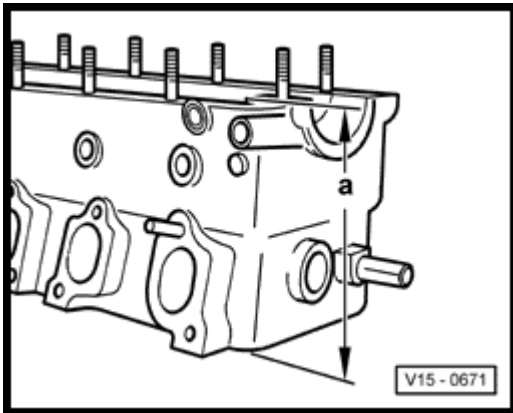
14 - Cylinder head

- ♦ Valve seats, reworking ⇒ [Page 15-20](#)

15 - Intake and exhaust valves

- Do not rework! Only lapping is permitted
- ♦ Valve dimensions ⇒ [Fig. 4](#)

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-17)



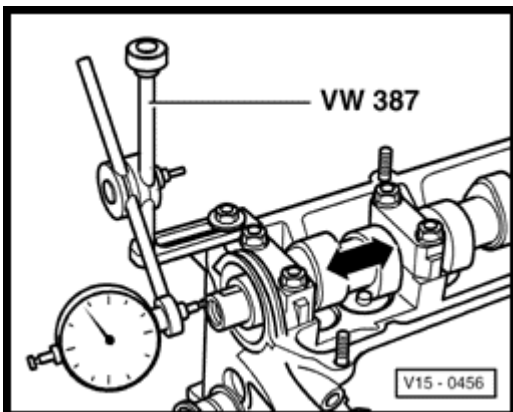
A

Fig. 1 Cylinder head sealing surface, reworking

- Cylinder head reworking dimension: $a = 132.6$ mm min.

Note:

When the sealing surface has been reworked, the valves must be set deeper by the same amount (rework valve seat inserts), otherwise the valves will contact the pistons. Ensure that the minimum permissible dimension is maintained while doing this ⇒ [Page 15-20](#) .



A

Fig. 2 Camshaft axial clearance, checking

Special tools, testers, measuring instruments and auxiliary items required

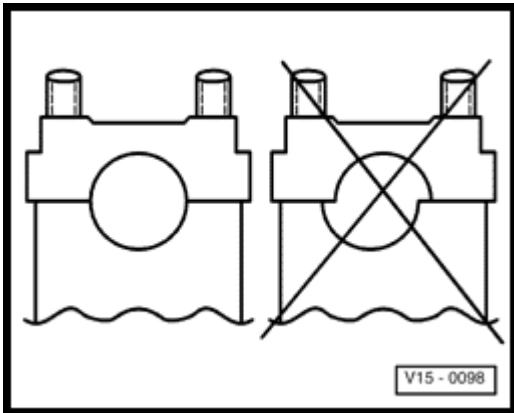
- ♦ VW 387 Universal dial gauge bracket
- ♦ Dial gauge

Note:

Check with hydraulic lifters removed and with first and last bearing caps installed.

- ♦ *Wear limit: max. 0.15 mm*

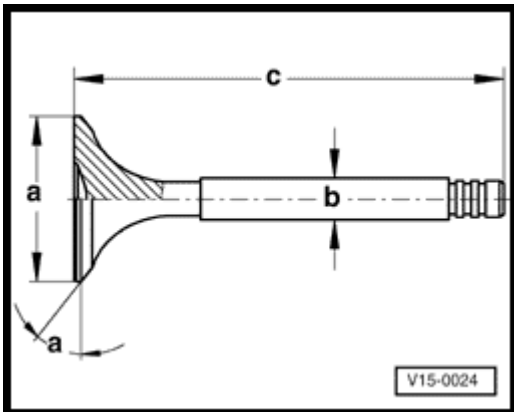
Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-18)



A

Fig. 3 Camshaft bearing caps, installed position

Note the offset. Before installing the camshaft; install the bearing caps to determine the correct installed position.



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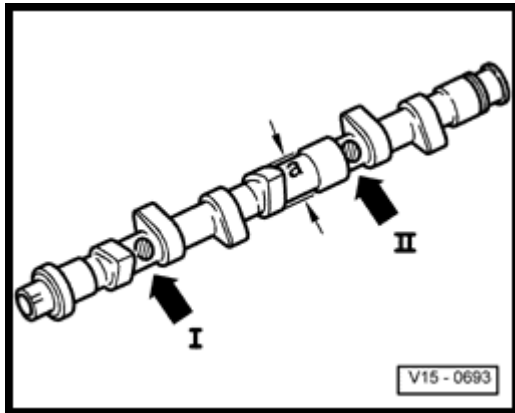
Fig. 4 Valves, dimensions

Notes:

Do NOT re - work the valves! Only lapping is permitted.

Dimension		Intake valve	Exhaust valve
∅ a	mm	39.5 ± 0.15	32.9 ± 0.15
∅ b	mm	6.92 ± 0.02	6.92 ± 0.02
c	mm	91.85	91.15
α	∠°	45	45

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-19)



A

Fig. 5 Camshaft identification, valve timing

Identification

- ◆ Cam base diameter: $a = 34 \text{ mm } \varnothing$
- ◆ Identification by stamped numbers and letters between intake and exhaust camlobes:

Engine code	AEG
Cylinder 1 -arrow I-	B
Cylinder 3 -arrow II-	050

Valve timing at 1 mm valve lift

Engine code	AEG
Intake opens ATDC	4.6 °
Intake closes ABDC	40.85 °
Exhaust opens BBDC	37.4 °
Exhaust closes BTDC	1.15 °

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-20)

Valve seats, reworking

Special tools, testers, measuring instruments and auxiliary items required

- ◆ Depth gauge
- ◆ Valve seat refacing tool

Notes:

- ◆ *When repairing engines with leaking valves, it is not always sufficient to reface or replace valve seats and valves. It is also necessary to check the valve guides for wear. This is particularly important on high mileage engines.*
- ◆ *The valve seats should only be reworked enough to produce a symmetrical seating pattern. The Maximum permissible reworking dimension must be calculated before reworking begins. If this dimension is exceeded, proper function of the hydraulic lifters can no longer be guaranteed and the cylinder head must be replaced.*

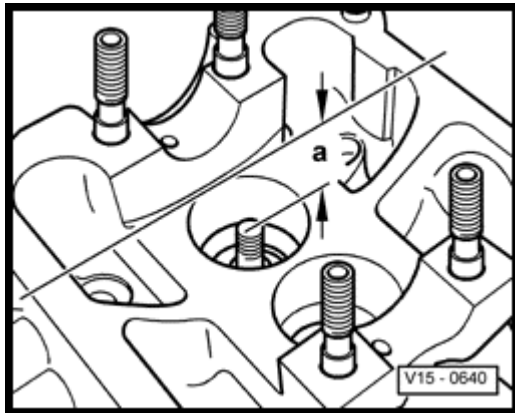
Maximum permissible reworking dimension, calculating

- Insert valve and press firmly against seat.

Note:

If the valve is to be replaced as part of a repair, use the new valve for the calculation.

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-21)



A

- Measure distance - a - between end of valve stem and upper edge of cylinder head.
- Calculate Max. permissible reworking dimension from measured distance - a - MINUS the minimum dimension.

Minimum dimension:

Intake valve 33.8 mm

Exhaust valve 34.1 mm

Measured distance MINUS the minimum dimension= Maximum permissible reworking dimension.

Example:

Measured distance -a-	35.1 mm
- Minimum dimension	34.1 mm
<hr/>	
= Max. perm. rework dimension*	1.0 mm

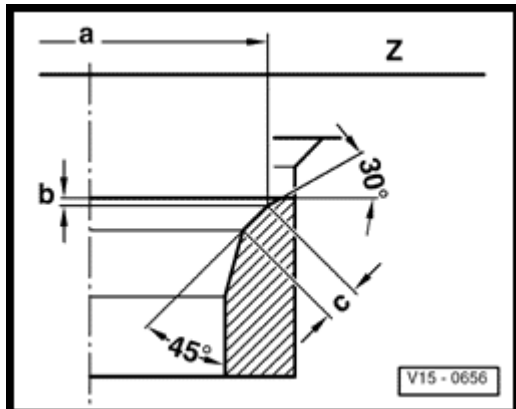
*) The Max. permissible reworking dimension is shown on illustrations for reworking valve seats as dimension "b".

Note:

Exhaust valve seat inserts also have an additional internal constriction. When reworking, ensure that the radius of the constriction is not damaged.

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Valve train, servicing (Page 15-22)

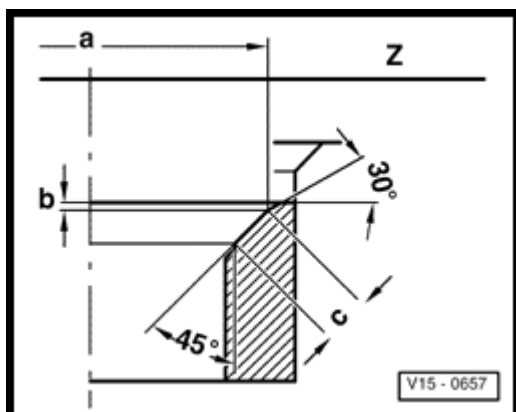
Intake valve seat, reworking



A

dim	Intake valve seat	
Ø a	mm	39.2
b	mm	Max. permissible reworking dim.
c	mm	approx. 2.0
Z		Cylinder head lower edge
45°		Valve seat angle
30°		Upper correction angle

Exhaust valve seat, reworking



A

dim	Exhaust valve seat
Ø a mm	32.4
Ø b mm	Max. permissible reworking dim.
c mm	approx. 2.4
Z	Cylinder head lower edge
45°	Valve seat angle
30°	Upper correction angle

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-23)

Camshaft oil seal, replacing

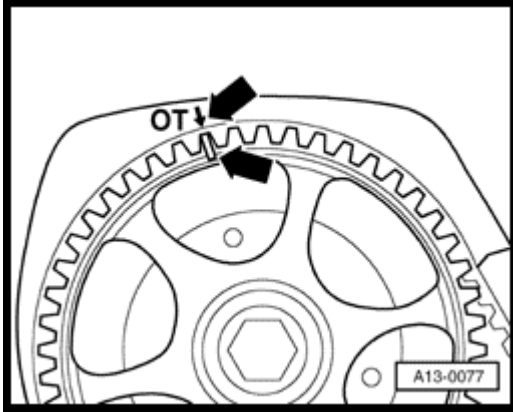
Special tools, workshop equipment, test and measuring appliances and auxiliary items required

- ◆ 10 - 203 puller
- ◆ 2085 Oil seal extractor
- ◆ 3083 Oil seal installation tool
- ◆ 3415 Counter support
- ◆ VAG 1331 Torque wrench 5 to 50 Nm (3.7 to 37 ft lb)
- ◆ VAG 1332 Torque wrench 40 to 200 Nm (30 to 148 ft lb)

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-24)

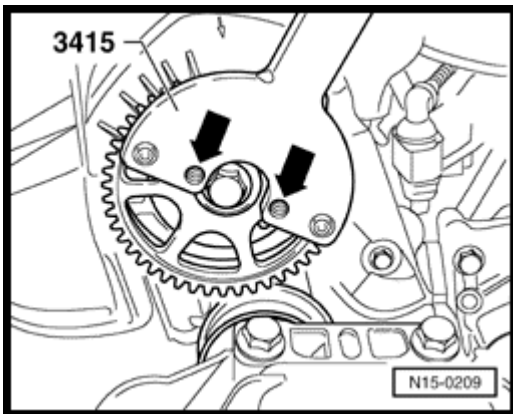
Camshaft oil seal, removing

- Remove toothed belt guard - upper section.



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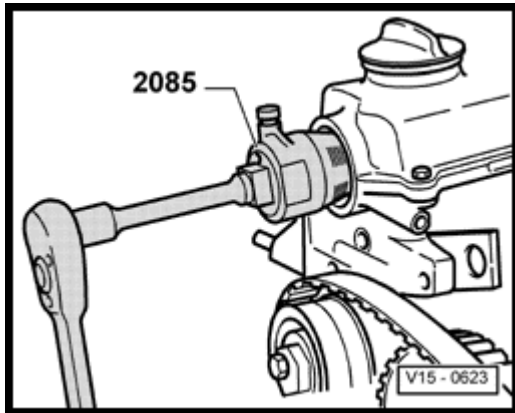
- Set camshaft sprocket to cyl. 1 TDC by turning crankshaft.
 - Mark on camshaft sprocket must align with arrow on toothed belt guard.
- Release tensioning roller and take toothed belt off camshaft sprocket.
- Turn crankshaft back slightly.



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- Remove camshaft sprocket.
 - Loosen bolt by counter - holding camshaft sprocket using 3415 counter - hold.
- Remove woodruff key from camshaft.
- Fully screw camshaft sprocket mounting bolt (with washer) into camshaft.
- Unscrew inner part of 2085 oil seal extractor two turns (approx. 3 mm) out of the outer section and lock in position using knurled screw.

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Valve train, servicing (Page 15-25)



A

- Lubricate threaded head of oil seal extractor, place in position and while exerting firm pressure, screw it into the oil seal as far as possible.
- Loosen knurled screw and turn inner section of extractor against camshaft until oil seal has been extracted.
- Clamp flats of oil seal extractor in vice.
- Remove oil seal with pliers.

Camshaft oil seal, installing

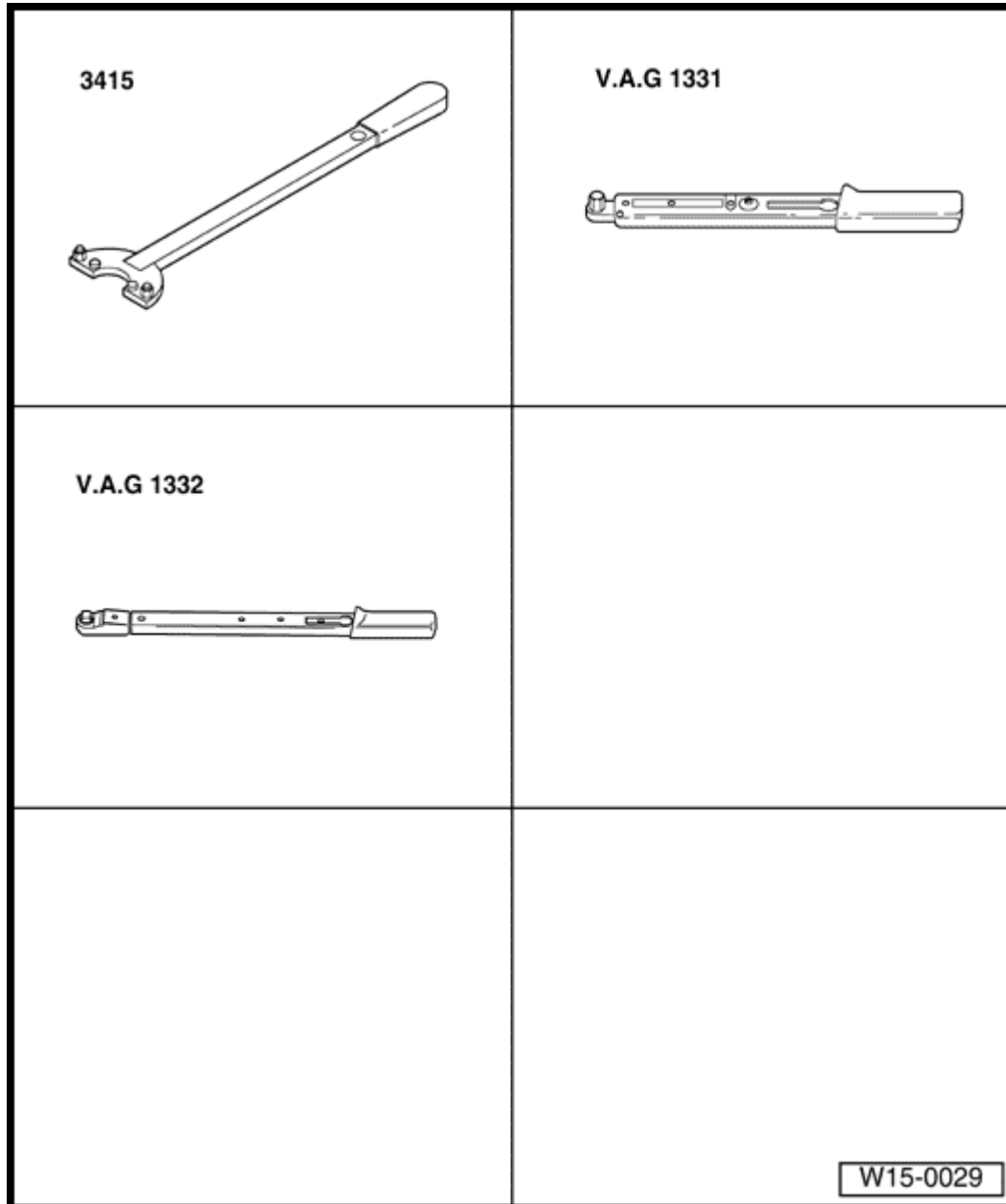
- Lightly oil sealing lip on oil seal.
- Start oil seal with sleeve from 10-203 and press in up to stop using 10-203.

Note:

Assembly is basically a reverse of the disassembly procedure.

- Install toothed belt and adjust timing ⇒ [Page 13-11](#) .

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-26)



Camshaft, removing and installing

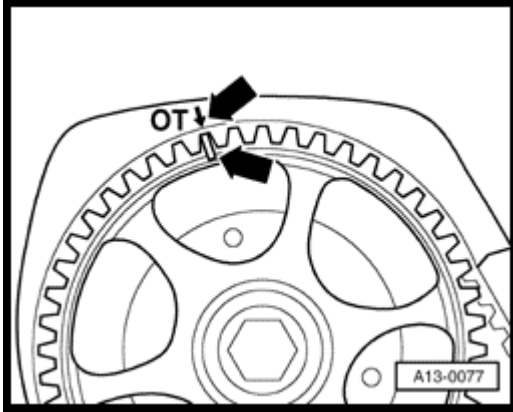
Special tools, workshop equipment, test and measuring appliances and aux. items required

- ◆ 3415 Counter support
- ◆ VAG 1331 Torque wrench 5 to 50 Nm (3.7 to 37 ft lb)
- ◆ VAG 1332 Torque wrench 40 to 200 Nm (30 to 148 ft lb)
- ◆ AMV 174 004 01 sealant

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2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-27)

Camshaft, removing

- Remove toothed belt guard upper section.



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- Set camshaft sprocket to cyl. 1 TDC by turning the crankshaft.
 - Mark on camshaft sprocket must align with arrow on toothed belt guard.
- Release tensioning roller and take toothed belt off camshaft sprocket.
- Turn crankshaft back slightly.
- Remove camshaft sprocket.
 - Loosen bolt by counter - holding camshaft sprocket using 3415 counter - hold.
- Remove woodruff key from camshaft.
- Remove Air Cleaner:
⇒ Repair group 24

Notes:

Seal off intake ports with clean cloth.

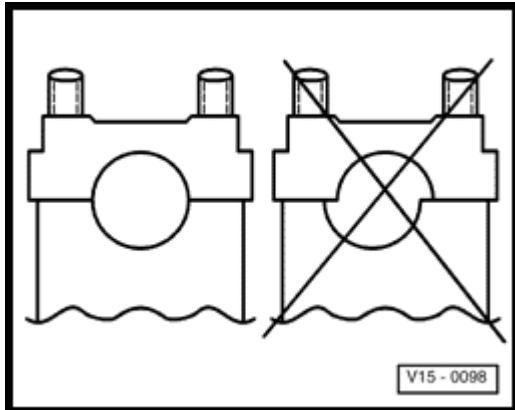
- Remove valve cover.
- First remove bearing caps 5, 1 and 3, then loosen bearing caps 2 and 4 alternately and diagonally.

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-28)

Camshaft, installing

Conditions

- Pistons must not be positioned at TDC.



A

Notes:

- ◆ *When installing the camshaft No. 1 cylinder cams must point upwards.*
- ◆ *When installing the bearing cap note offset, before installing camshaft fit bearing caps and determine fitting position.*
- Oil camshaft contact surfaces.
- Install camshaft.
- Tighten bearing caps 2 and 4 alternately and diagonally
 - Tightening torque: 20 Nm (15 ft lb)
- Lightly coat bearing cap 1 contact surfaces with sealant AMV 174 004 01.
- Install bearing caps 3, 1 and 5 and tighten
 - Tightening torque: 20 Nm (15 ft lb)
- Insert woodruff key in camshaft.
- Install camshaft sprocket and tighten by counterholding sprocket using 3415 counter hold.
 - Tightening torque: 100 Nm (74 ft lb)

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-29)

Note:

Assembly is basically a reverse of the disassembly procedure.

Installing toothed belt and adjusting timing ⇒ [Page 13-11](#) .

Note:

*When new lifters have been installed the engine must not be started for about 30 minutes.
Hydraulic compensation elements must settle (otherwise valves will strike pistons).*

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-30)

Hydraulic lifters, checking

Special tools, workshop equipment, testers, measuring instruments and auxiliary items required

- ◆ Feeler gauge
- ◆ Wood or plastic wedge

Notes:

- ◆ *Replace faulty lifter complete (cannot be adjusted or repaired).*
- ◆ *Irregular valve noises during engine warmup are normal.*

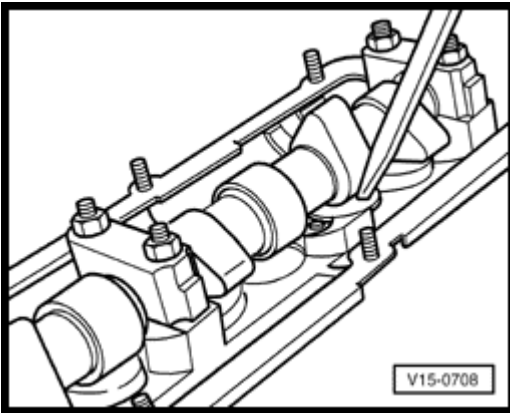
Test sequence

- Start engine and run until radiator fan has switched on once.
- Increase engine speed to about 2500 rpm for approx. 2 min.

If lifter(s) are still noisy, locate faulty lifter(s) as follows:

- Remove Air Cleaner:
 - ⇒ Repair group 24
- Remove valve cover.
- Rotate crankshaft clockwise, until cam of lifter to be checked is pointing upwards.

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-31)



A

- Push hydraulic lifter down lightly with a wooden or plastic wedge. If when pushed down a 0.2 mm thick feeler gauge can be pushed between the camshaft and lifter, replace that lifter.

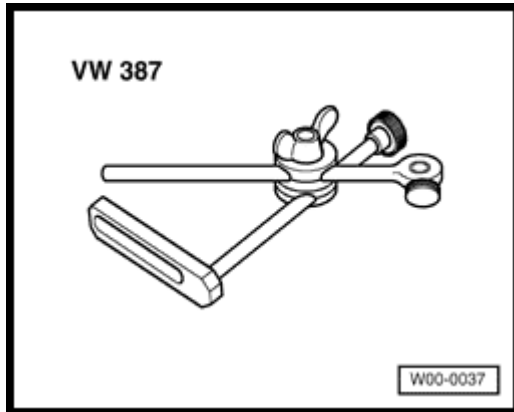
Note:

Do NOT start the engine for approx. 30 minutes after installing new lifters. Hydraulic compensation elements in the lifters must settle otherwise the valves will strike the pistons.

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-32)

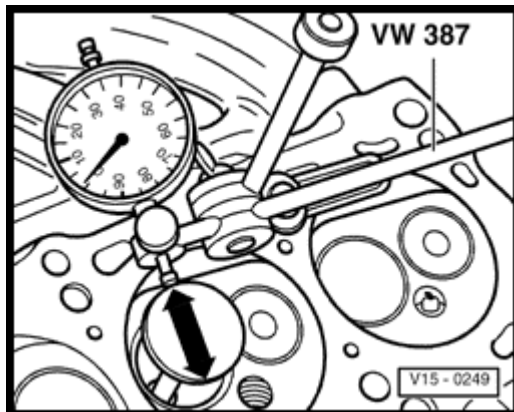
Valve guides, checking

Special tools, workshop equipment, testers, measuring instruments and auxiliary items required



- ◆ VW 387 Universal dial gauge bracket
- ◆ Dial gauge

Test sequence



- Insert new valve into guide until end of valve stem is flush with end of guide. Due to slight difference in stem diameters, ensure that an intake valve only is used in the intake guide and an exhaust valve only in the exhaust guide.
- Measure "rocking dimension".
 - Wear limit:

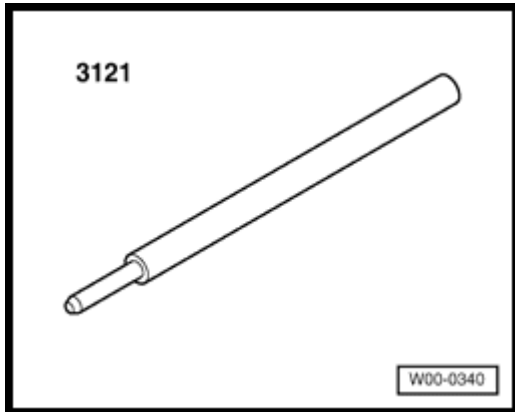
Intake valve guide = 1.0 mm

Exhaust valve guide = 1.3 mm

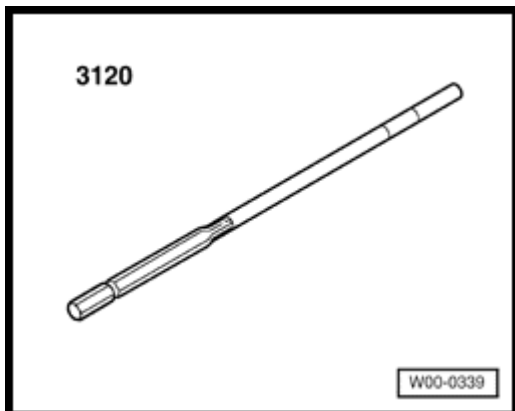
Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-33)

Valve guides, removing and installing

Special tools, workshop equipment, testers, measuring instruments and auxiliary items required



- ◆ 3121 Driver



- ◆ 3120 Reamer and cutting fluid

Volkswagen New Beetle

2.0 Liter 4-cyl General, Engine (Engine Code AEG)

Valve train, servicing (Page 15-34)

Removing

- Clean and check cylinder head. Cylinder heads in which the valve seats can no longer be reworked, or cylinder heads which have already been machined to the minimum dimension, should not have the valve guides replaced.
- Press out worn valve guides with 3121 from the camshaft side (valve guides with shoulder - repair version - from the combustion chamber side).

Installing

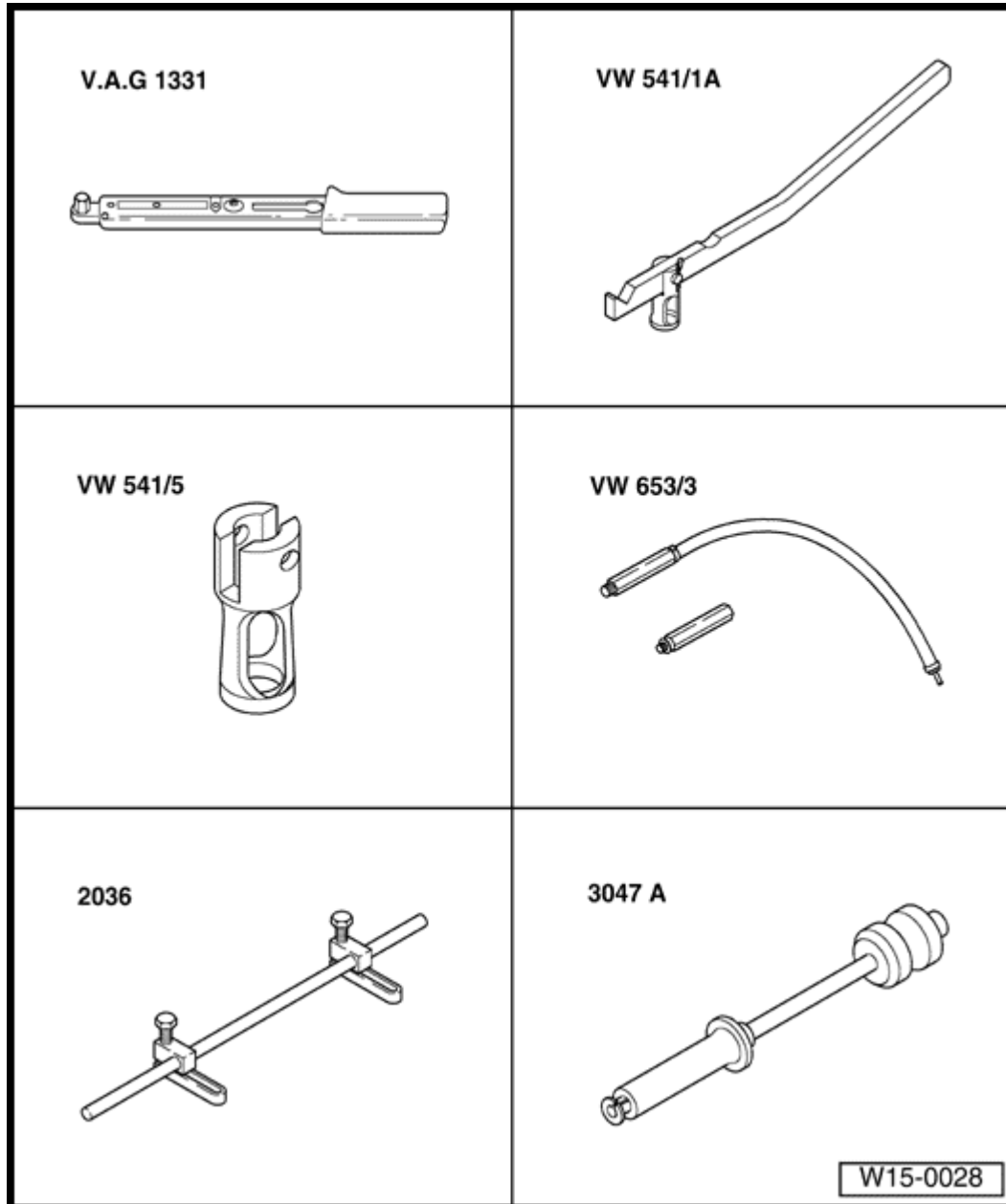
- Press in new guides, moistened with oil, from camshaft side onto shoulder in cold cylinder head using drift 3121.

Note:

Once the guide shoulder makes contact, do NOT allow the pressure to exceed 2000 psi otherwise the guide shoulder could break off.

- Ream out guides with 3120 hand reamer using plenty of cutting fluid.
- Rework valve seats ⇒ [Page 15-20](#) .

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-35)



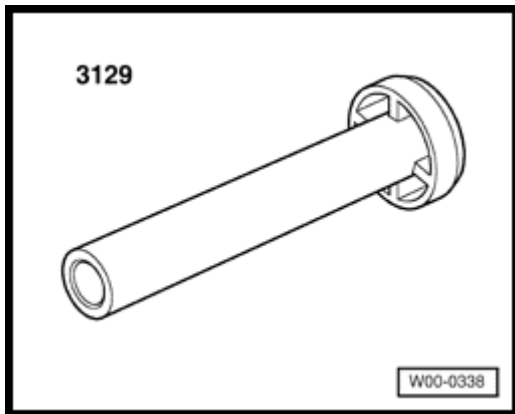
Valve stem seals, replacing

Special tools, workshop equipment, test and measuring appliances and auxiliary items required

- ◆ VAG 1331 Torque wrench 5 to 50 Nm (3.7 to 37 ft lb)
- ◆ VW 541/1A Valve lever
- ◆ VW 541/5 Thrust piece
- ◆ VW 653/3 Pressure hose
- ◆ 2036 Assembly fixture
- ◆ 3047A Removal tool

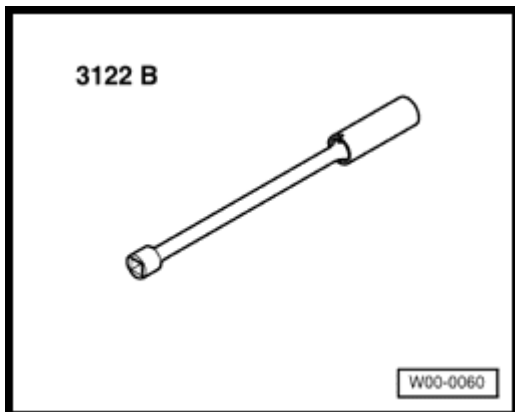
Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-36)

Special tools, workshop equipment, testers, measuring instruments and auxiliary items required



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- ♦ 3129 Installation tool



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- ♦ 3122 B Spark plug wrench

Valve stem seals, removing

(with cylinder head installed)

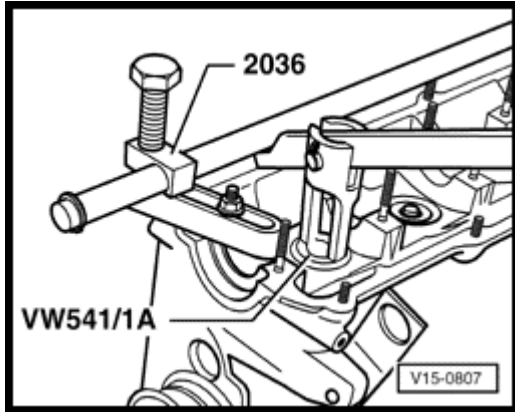
- Remove camshaft ⇒ [Page 15-26](#) .
- Remove hydraulic lifters and place them with contact surfaces facing downwards.

Note:

Ensure that the lifters are not interchanged during this step.

Volkswagen New Beetle 2.0 Liter 4-cyl General, Engine (Engine Code AEG) Valve train, servicing (Page 15-37)

- Remove spark plugs.
- Set piston of appropriate cylinder to "Bottom Dead Center".

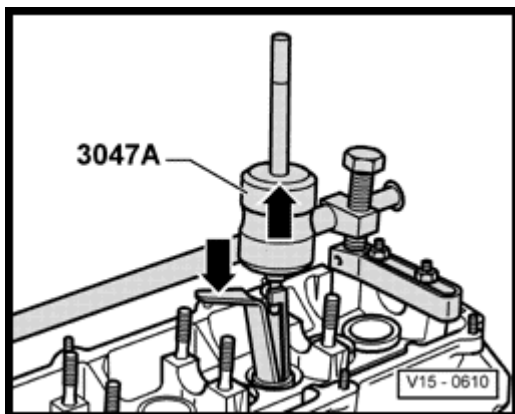


A

- Fit assembly tool 2036 and adjust mountings to height of studs.
- Screw pressure hose VW 653/3 into the spark plug thread.
- Connect pressure hose to an air system with at least 87 psi.
- Remove valve springs with VW 541/1A lever and VW 541/5 press piece.

Note:

Tight keepers can be loosened by lightly tapping on the lever.

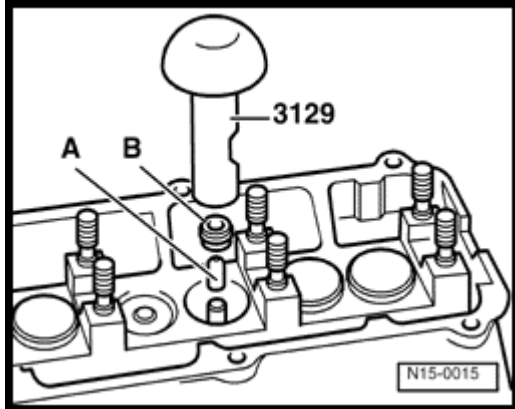


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- Pull off valve stem seals using tool 3047A.

Volkswagen New Beetle
2.0 Liter 4-cyl General, Engine (Engine Code AEG)
Valve train, servicing (Page 15-38)

Valve stem seals, installing



A

- Place plastic sleeve - A - (supplied) on the appropriate valve stem.
 - This will prevent the new valve stem seal - B - from being damaged.
- Insert new valve stem seal in 3129 installation tool.
- Oil valve stem seal sealing lip and press carefully onto the valve guide.