

## **Volkswagen Jetta, Golf, GTI 1999, 2000**

**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**

**13 Engine-Crankshaft, Cylinder block (Page GR-13)**

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### **Engine, disassembling and assembling**

Removing and installing "V" ribbed belt

Valve timing, checking

Valve timing, setting

**Sealing flange and flywheel/drive plate, removing and installing**

**Drive plate, removing and installing**

**Oil seal on vibration damper end of crankshaft, replacing**

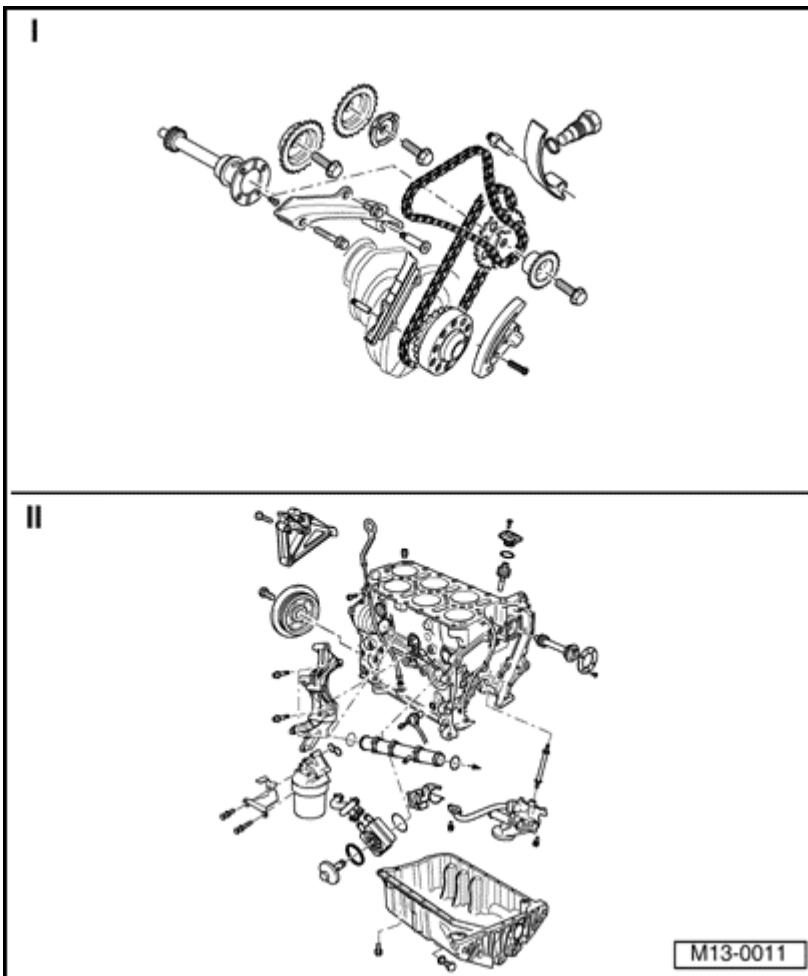
**Crankshaft, removing and installing**

**Pistons and connecting rods, disassembling and assembling**

**Piston and cylinder measurements**

**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Engine, disassembling and assembling (Page 13-1)**

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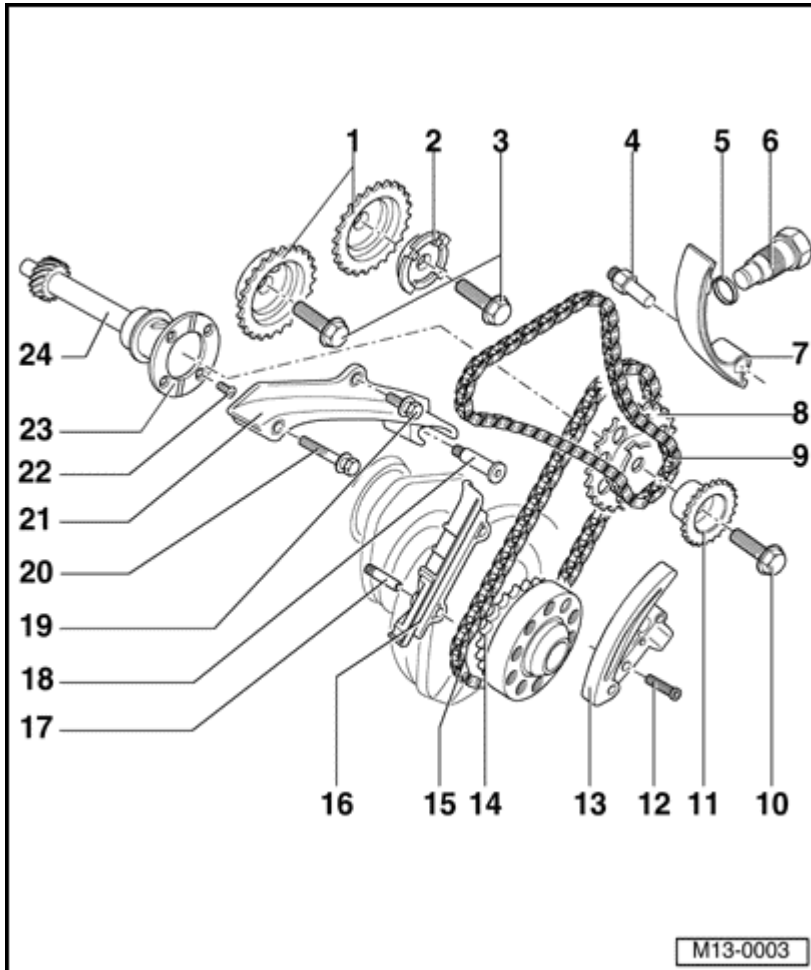
**Notes:**

- ◆ Use only assembly tool T10029 to pull and install the spark plug boots.
- ◆ To carry out assembly work, the engine must be attached to the mounting stand using engine brackets 3269.
- ◆ If large amounts of metal chips and rubbings caused by scoring damage such as crankshaft bearing and connecting rod bearing damage are discovered in the engine oil, it will be necessary to replace all oil splash nozzles, the oil return barrier, the oil cooler and the oil filter cartridge in addition to thorough cleaning of the oil passages to prevent subsequent damage.

I ⇒ [page 13-2](#)

II ⇒ [page 13-21](#)

## Section I



### 1 - Camshaft sprocket

- ◆ For roller chain -9-
- ◆ Removing and installing ⇒ [page 15-34](#)

### 2 - Pickup wheel

- ◆ The bearing surface on the cam wheel and pickup wheel must be dry when installed
- ◆ For Hall sensor (G40)
- ◆ Removing and installing ⇒ [page 15-34](#)

### 3 - 100 Nm

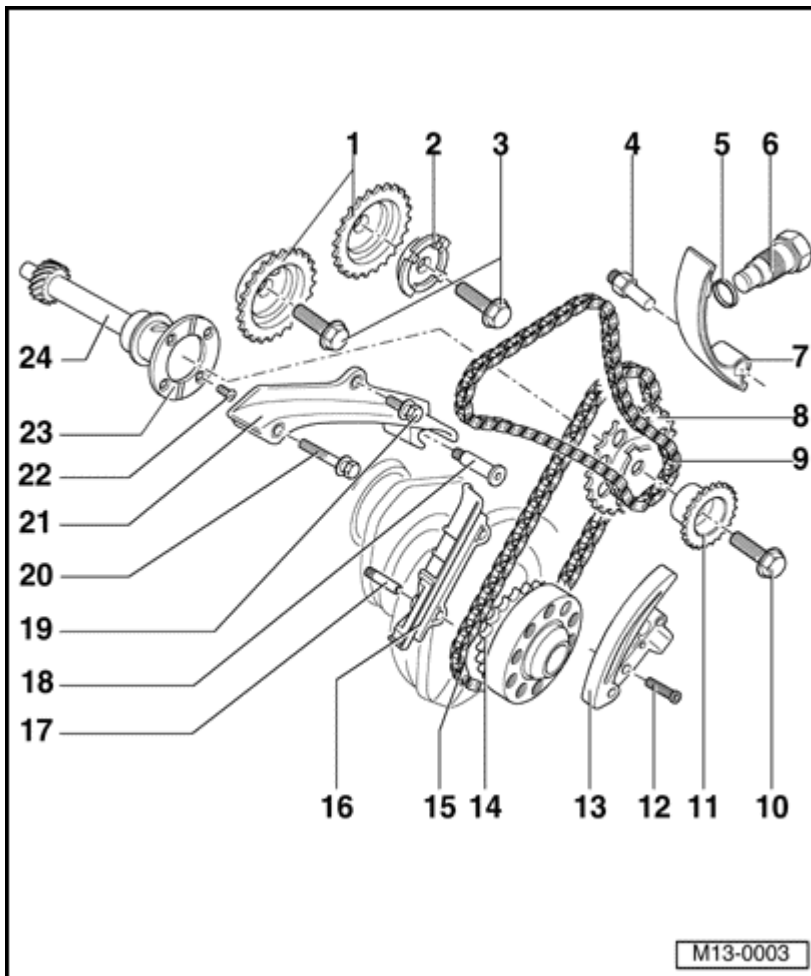
- ◆ Coat contact surface of the bolt head with oil when installing
- ◆ Hold camshaft with open-end wrench SW 24 when removing and installing ⇒ [page 15-34](#)

### 4 - Bearing bolt, 18 Nm

- ◆ For tension bar -7-

## Volkswagen Jetta, Golf, GTI 1999, 2000

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Engine, disassembling and assembling (Page 13-3)



### 5 - Oil seal

- ◆ Replace if damaged or leaky

### 6 - Chain tensioner, 40 Nm

- ◆ For camshaft roller chain -9-
- ◆ Rotate engine only with chain tensioner installed

### 7 - Tension bar

- ◆ For camshaft roller chain -9-

### 8 - Sprocket

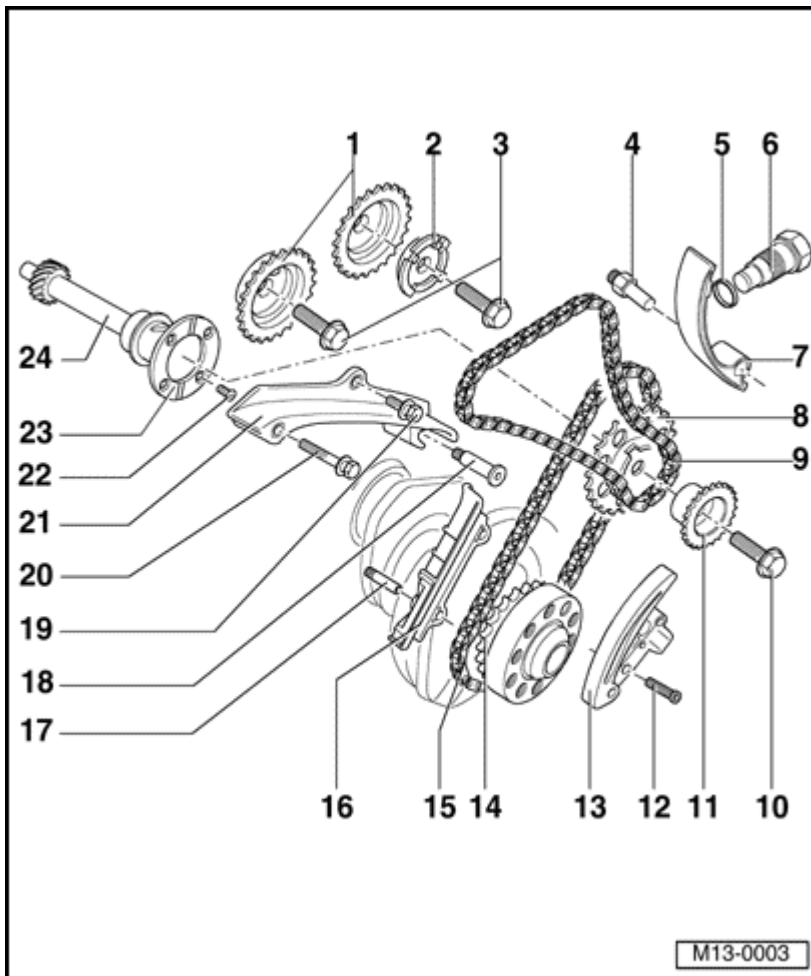
- ◆ For roller chain -15-
- ◆ Installing ⇒ [page 13-10](#)

### 9 - Camshaft roller chain

- ◆ Mark direction of travel (installation position) before removing ⇒ [Fig. 1](#) , [page 13-27](#)
- ◆ Installing ⇒ [page 13-10](#)

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP Engine, disassembling and assembling (Page 13-4)



#### 10 - 100 Nm

- ◆ Use locking bracket 3406 for tightening and loosening ⇒ [page 13-10](#)

#### 11 - Sprocket

- ◆ For camshaft roller chain -9-
- ◆ Install ⇒ [page 13-10](#)

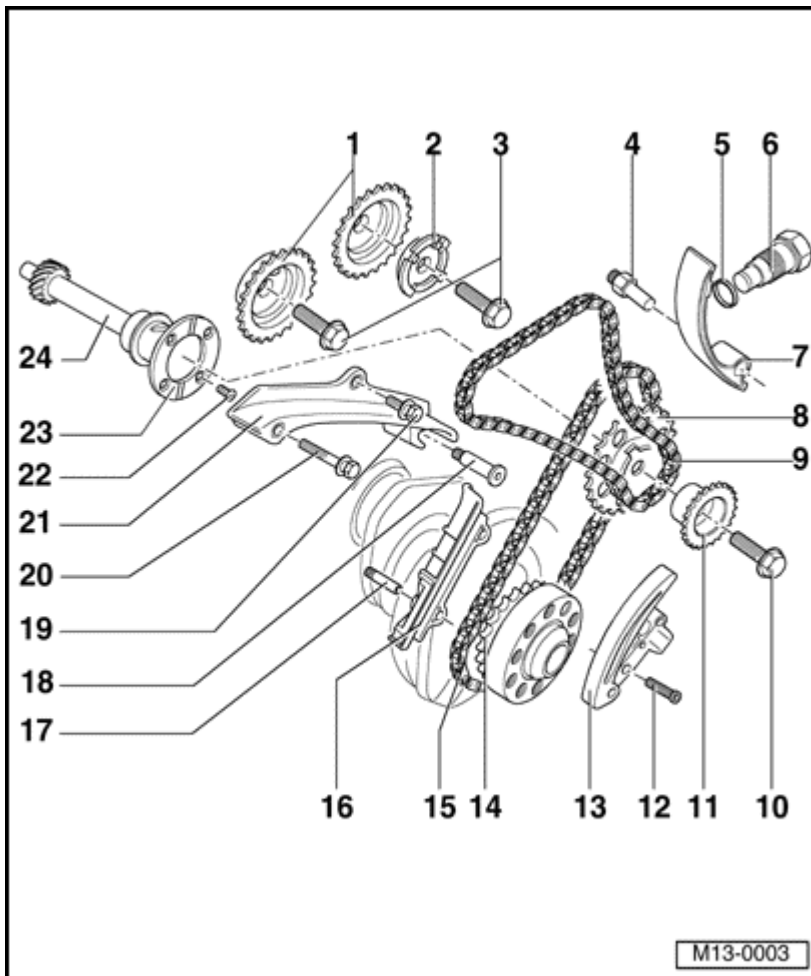
#### 12 - 10 Nm

#### 13 - Chain tensioner with tension bar

- ◆ For roller chain -15-
- ◆ Before installation, release tension on the stop teeth in the chain tensioner with a small screwdriver and press the tension bar against the chain tensioner
- ◆ Rotate engine only with chain tensioner installed

## Volkswagen Jetta, Golf, GTI 1999, 2000

2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP  
Engine, disassembling and assembling (Page 13-5)



### 14 - Drive gear sprocket

- ◆ Seated in crankshaft
- ◆ Ground tooth for bearing parting line = TDC cyl. 1 ⇒ [page 13-10](#)

### 15 - Roller chain

- ◆ Mark direction of travel (installation position) before removing ⇒ [Fig. 1](#) , [page 13-27](#)
- ◆ Install ⇒ [page 13-10](#)

### 16 - Sliding rail

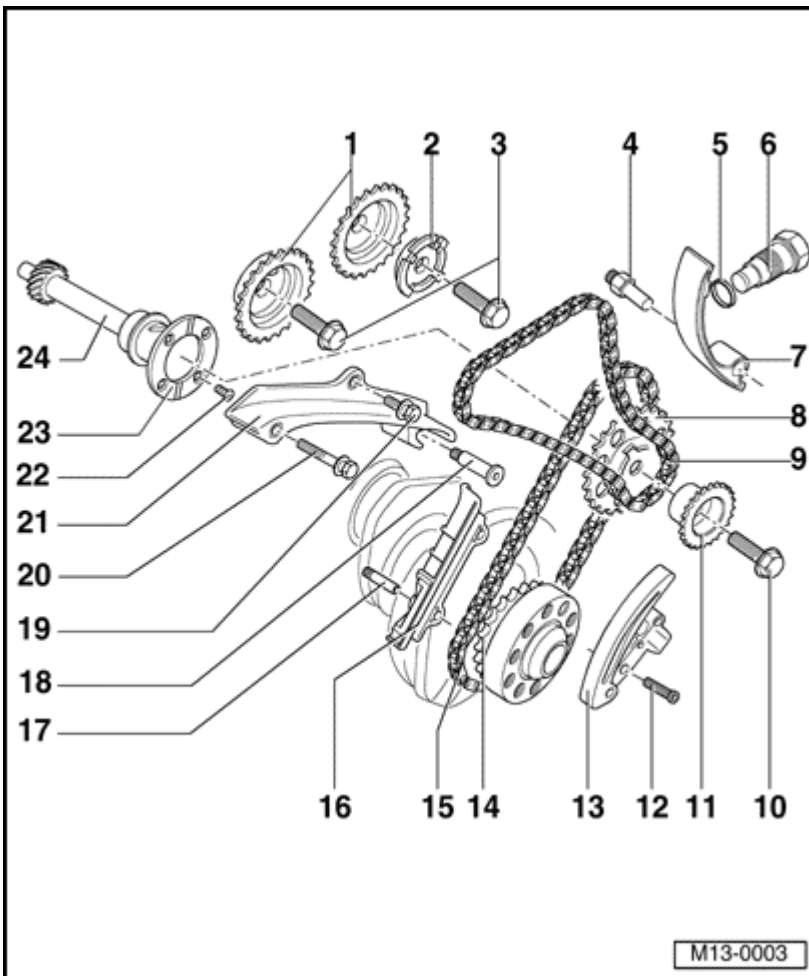
- ◆ For roller chain -15-
- ◆ Remove together with roller chain ⇒ [page 13-10](#)

### 17 - Bolt without collar, 10 Nm

- ◆ For sliding rail -16-

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Engine, disassembling and assembling (Page 13-6)**



**18 - Bolt with collar, 10 Nm**

- ◆ For sliding rail -21-

**19 - 20 Nm**

- ◆ Use with "D6" thread locking compound

**20 - 20 Nm**

**21 - Sliding rail**

- ◆ For camshaft roller chain -9-

**22 - 10 Nm**

- ◆ Use with "D6" thread locking compound

**23 - Thrust washer**

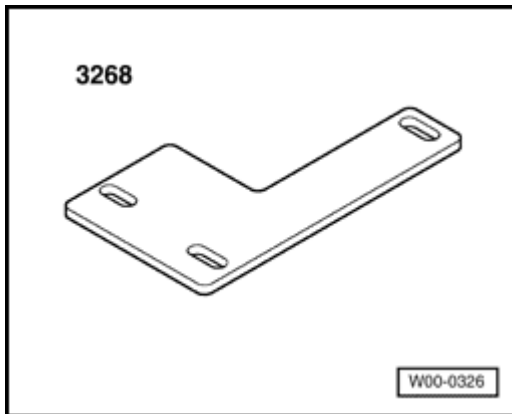
**24 - Intermediate shaft**

**Volkswagen Jetta, Golf, GTI 1999, 2000**  
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**Engine, disassembling and assembling (Page 13-7)**

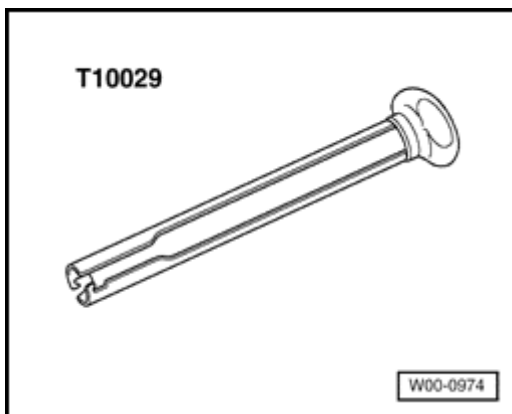
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**Valve timing, checking**

**Special tools, equipment, test and inspection devices; required accessories**



- ◆ 3268 Camshaft guide



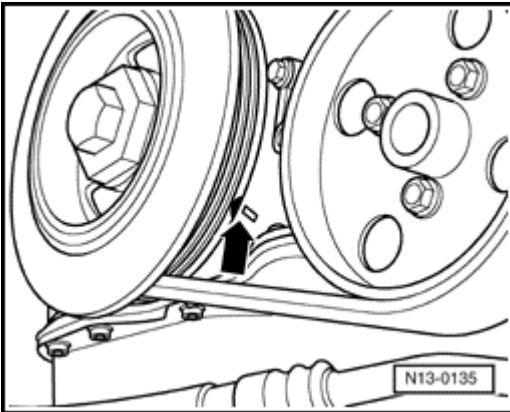
- ◆ T10029 Assembly tool

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**Engine, disassembling and assembling (Page 13-8)**

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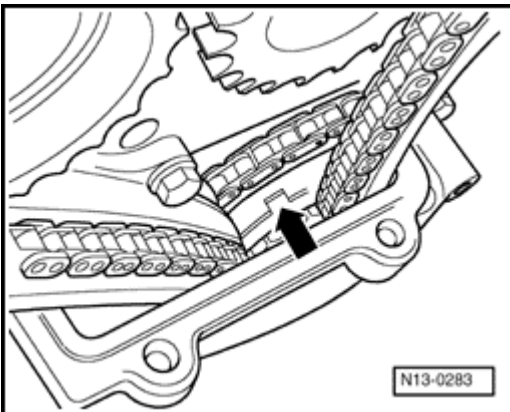
**Test sequence**

- Remove right sound damping tray:  
⇒ [Repair Manual, Body-Exterior, Repair Group 50](#)
- Remove valve cover ⇒ [page 15-8](#).



**A**

- Using the mounting bolt for the vibration damper, align the crankshaft with the TDC cyl. 1 position -arrow- by turning in the direction of rotation of the engine.



**A**

If TDC cyl. 1 position is correct, it will be possible to see a slot -arrow- on the sprockets of the intermediate shaft.

**Notes:**

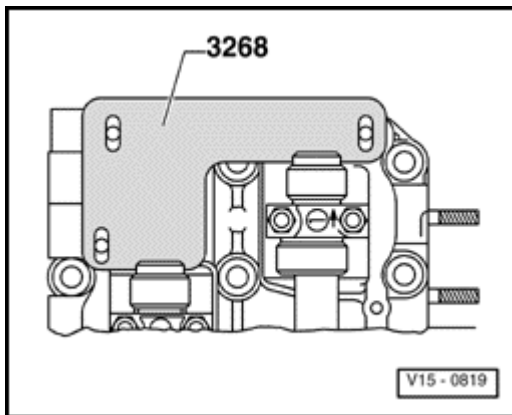
*This condition is only reached in every second TDC position.*

If the groove cannot be seen:

- Turn the crankshaft one turn further in the direction of rotation of the engine.

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**Engine, disassembling and assembling (Page 13-9)**

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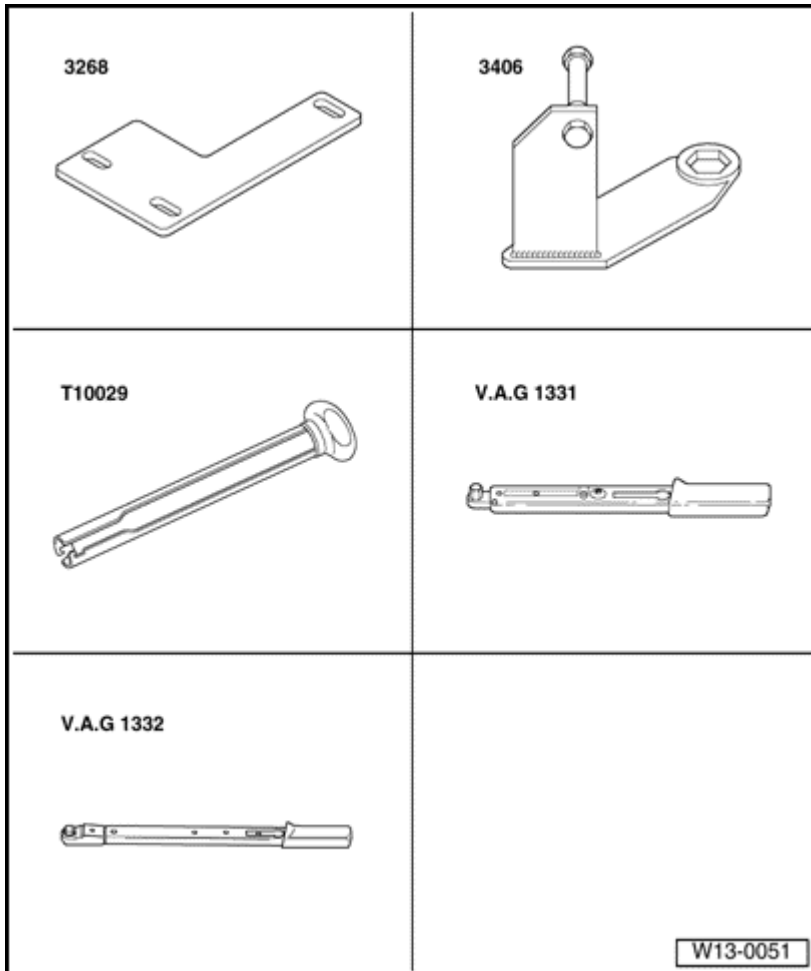


It must be possible to insert camshaft guide 3268 into both shaft slots.

**Volkswagen Jetta, Golf, GTI 1999, 2000**  
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**Engine, disassembling and assembling (Page 13-10)**

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**Valve timing, setting**



**(Installing timing chains)**

**Special tools, equipment, test and inspection devices; required accessories**

- ◆ 3268 Camshaft guide
- ◆ 3406 Locking bracket
- ◆ T10029 Assembly tool
- ◆ V.A.G 1331 torque wrench (5-50 Nm)
- ◆ V.A.G 1332 torque wrench (40-200 Nm)

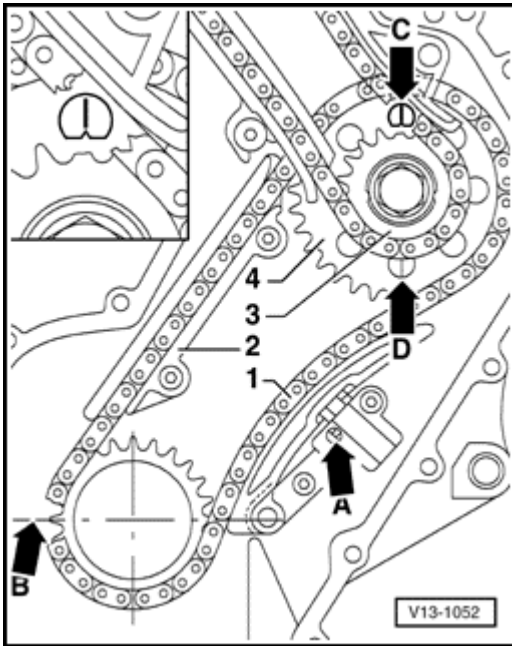
**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Engine, disassembling and assembling (Page 13-11)**

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**Procedure**

**With engine removed**

Install roller chain and chain tensioner with tension bar:

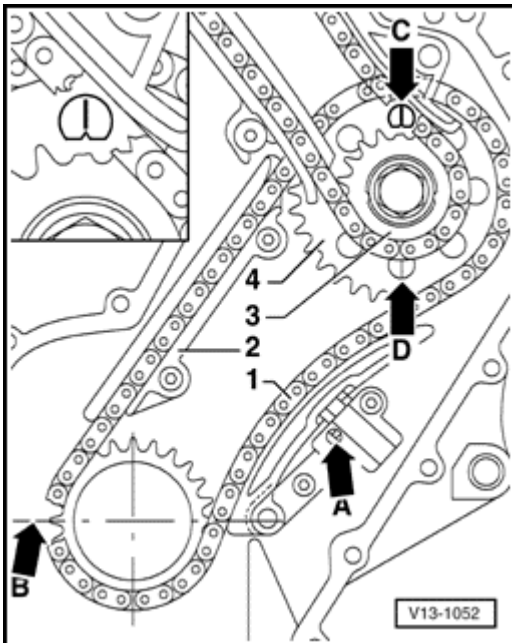


**A**

- Set and check the position of the crankshaft in relation to the intermediate shaft. The ground tooth of drive gear -B- must be aligned with the bearing parting line (TDC cyl. 1).
- Install bolt without collar for sliding rail -2- and tighten to 10 Nm.

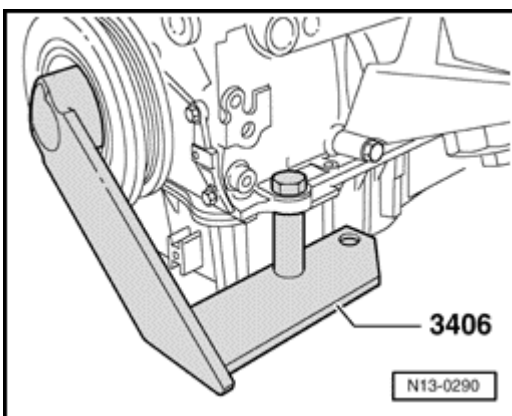
**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Engine, disassembling and assembling (Page 13-12)**

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**A**

- Install sliding rail -2- with roller chain -1- and both sprockets -3- and -4- (note direction of travel of the roller chain ⇒ [page 13-27](#) , [Fig. 1](#) ).  
The mark on the sprocket for roller chain -4- must be aligned with notches -C- or -D- on the thrust washer.
- Release stop teeth in the chain tensioner with a small screwdriver -A-.
- Press tension bar against the chain tensioner and tighten chain tensioner to 10 Nm.

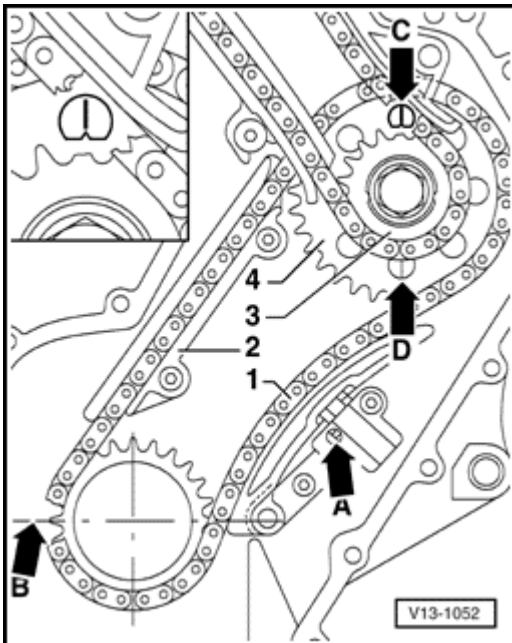


**A**

- Lock vibration damper in position with locking bracket 3406.

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**Engine, disassembling and assembling (Page 13-13)**

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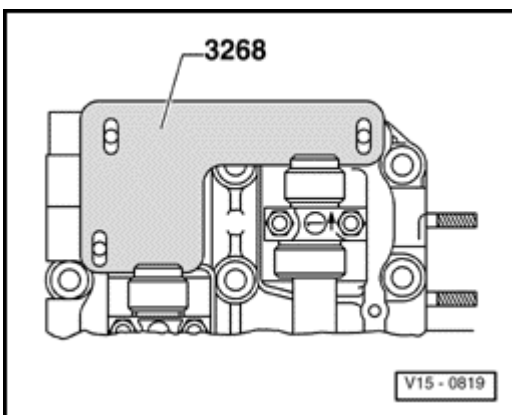


**A**

- Tighten sprockets 3 and 4 for the intermediate shaft to 100 Nm.
- Remove locking bracket 3406.
- Check position of the crankshaft in relation to the intermediate shaft.  
The ground tooth of drive gear -B- must be aligned with the bearing parting line (TDC cyl. 1).

Install camshaft roller chain and chain tensioner with tension bar:

- Set both camshafts to TDC cyl. 1.



**A**

- Align camshafts with camshaft guide 3268.
- Install bearing bolt for tension bar and tighten to 18 Nm.
- Install tension bar for chain tensioner (camshaft roller chain).
- Install bearing bolt with collar for sliding rail and tighten to 10 Nm.

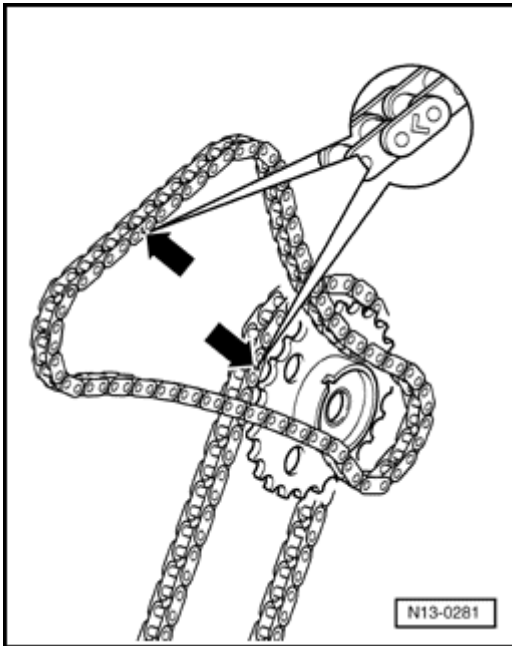
**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Engine, disassembling and assembling (Page 13-14)**

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**Notes:**

*If the cylinder head is removed:*

- Install cylinder head ⇒ [page 15-15](#)
- Push sliding rail onto bearing bolt. Insert short mounting screw with "D6" locking compound and tighten both bolts to 20 Nm.



**A**

- Place camshaft roller chain on intermediate shaft (note direction of travel).
- Mount camshaft sprocket and roller chain on camshaft for cylinder bank 1, 3 and 5 (long camshaft) and counter tighten by hand.
- Mount camshaft sprocket (with pickup wheel for Hall generator) and camshaft roller chain to the camshaft for cylinder bank 2, 4, and 6 and tighten by hand.

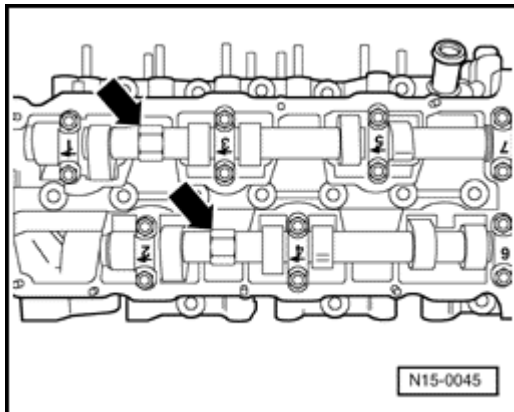
**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Engine, disassembling and assembling (Page 13-15)**

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**Notes:**

*Coat contact surfaces of the bolt heads with oil when installing.*

- Remove camshaft guide 3268.
- Tighten mounting bolts for camshaft sprockets to 100 Nm.



**Notes:**

*Hold camshaft -arrow- only with open-end wrench SW 24. The camshaft guide 3268 must not be inserted when tightening or loosening the sprockets.*

- Coat the sealing surface of the sealing flange with AMV 188 001 02 and install. Tighten mounting bolt to 10 Nm.
- Replace oil seal for sealing flange ⇒ [page 13-30](#).
- Prepare cylinder head gasket for assembly ⇒ [page 15-7](#) , [Fig. 2](#).
- Coat the sealing surface of the cover piece with AMV 188 001 02.

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP Engine, disassembling and assembling (Page 13-16)

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- Coat the O-ring for the oil passage seal and insert in cover piece.
- Install cover piece, insert all mounting bolts and turn in opposite direction slightly.
- Initially tighten 8 mm mounting bolts to 25 Nm, then tighten 6 mm mounting bolts to 10 Nm.
- Install chain tensioner for camshaft roller chain and tighten to 40 Nm.

#### **Notes:**

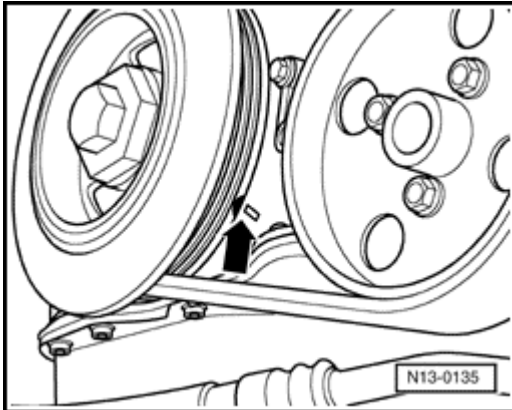
*Rotate engine only with chain tensioner installed. Otherwise, the camshaft roller chain will skip.*

- Rotate the crankshaft two turns in the direction of rotation of the engine and check valve timing ⇒ [page 13-7](#).

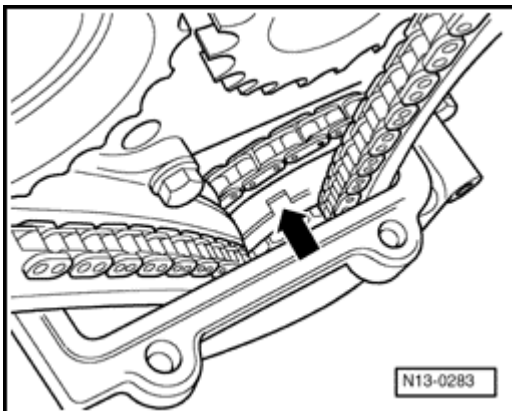
**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Engine, disassembling and assembling (Page 13-17)**

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**With engine installed, cylinder head removed**



- Using the mounting bolt for the vibration damper, align the crankshaft with the mark for TDC cyl. 1 -arrow-.



If cylinder 1 is correctly at TDC position, it will be possible to see a slot -arrow- on the intermediate shaft sprockets.

If the slot is not visible:

- Turn the crankshaft one turn in the direction of rotation of the engine.

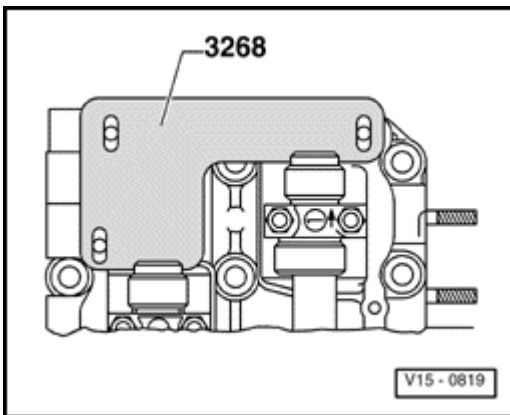
**Notes:**

*If the crankshaft is turned with the cylinder head removed, a second mechanic must guide the camshaft roller chain by hand to prevent blocking.*

- Set both camshafts to TDC of cyl. 1.

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**Engine, disassembling and assembling (Page 13-18)**

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**A**

- Align camshafts with camshaft guide 3268.
- Prepare cylinder head gasket for assembly ⇒ [page 15-7](#) , [Fig. 2](#).
- Install cylinder head ⇒ [page 15-15](#).
- Push sliding rail onto bearing bolt. Insert short mounting bolt with "D6" locking compound and tighten both bolts to 20 Nm.
- Mount camshaft sprocket with camshaft roller chain to camshaft for cylinder bank 1, 3 and 5 (long camshaft) and turn in opposite direction by hand.
- Mount camshaft sprocket (with pickup wheel for Hall generator) and camshaft roller chain to camshaft for cylinder bank 2, 4 and 6 and turn in opposite direction by hand.

**Notes:**

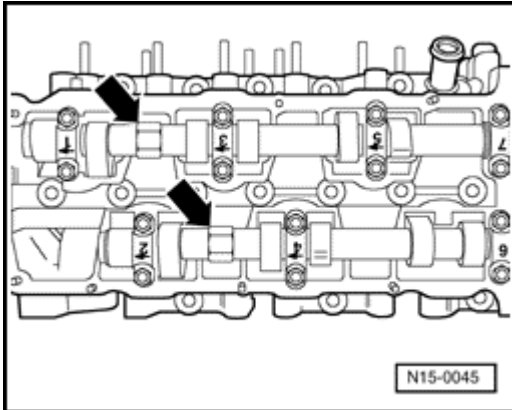
*Coat contact surfaces of the bolt heads with oil when installing.*

- Remove camshaft guide 3268.

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**Engine, disassembling and assembling (Page 13-19)**

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- Tighten mounting bolts for camshaft sprockets to 100 Nm.



**Notes:**

*Hold camshaft -arrow- only with open-end wrench SW 24. The camshaft guide 3268 must not be inserted when tightening or loosening the sprockets.*

- Coat the sealing surface of the sealing flange with AMV 188 001 02.
- Coat the O-ring for the oil passage seal and insert in cover piece.
- Install cover piece, insert all mounting bolts and turn in opposite direction slightly.
- Initially tighten 8 mm mounting bolts to 25 Nm, then tighten 6 mm mounting bolts to 10 Nm.
- Install chain tensioner for camshaft roller chain and tighten to 40 Nm.

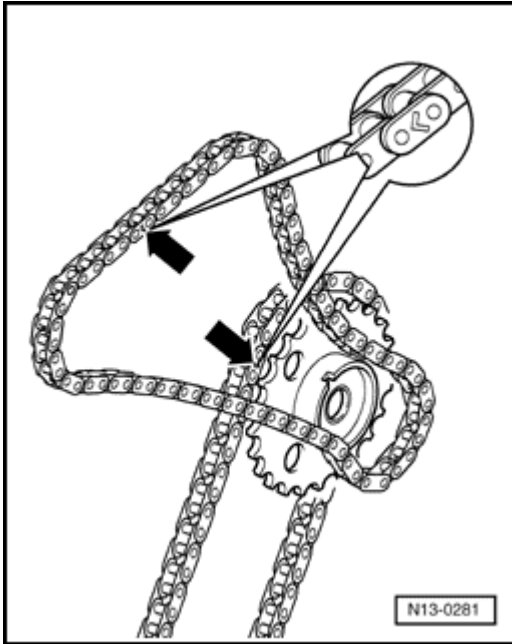
**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Engine, disassembling and assembling (Page 13-20)**

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**Notes:**

*Rotate engine only with chain tensioner installed. Otherwise, the camshaft roller chain will skip.*

- Rotate crankshaft twice in engine travel direction and check timing ⇒ [page 13-7](#).



**Marking roller chains**

- Mark the roller chains before removal (e.g., put an arrow in the direction of travel with paint).

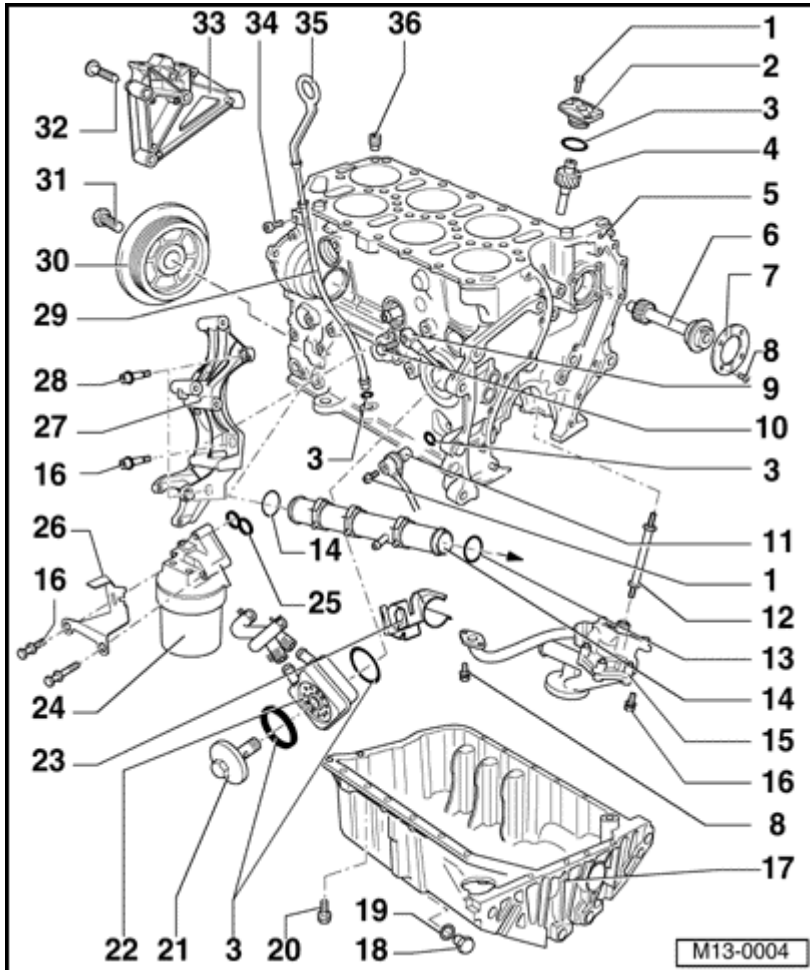
**Notes:**

*Do not mark the chain with a center punch, chisel, etc.*

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**Engine, disassembling and assembling (Page 13-21)**

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**Section II**



**1 - 10 Nm**

**2 - Oil pump drive cover**

**3 - O-Ring**

- ◆ Replace
- ◆ Coat with oil before assembly

**4 - Oil pump drive**

**5 - Cylinder block**

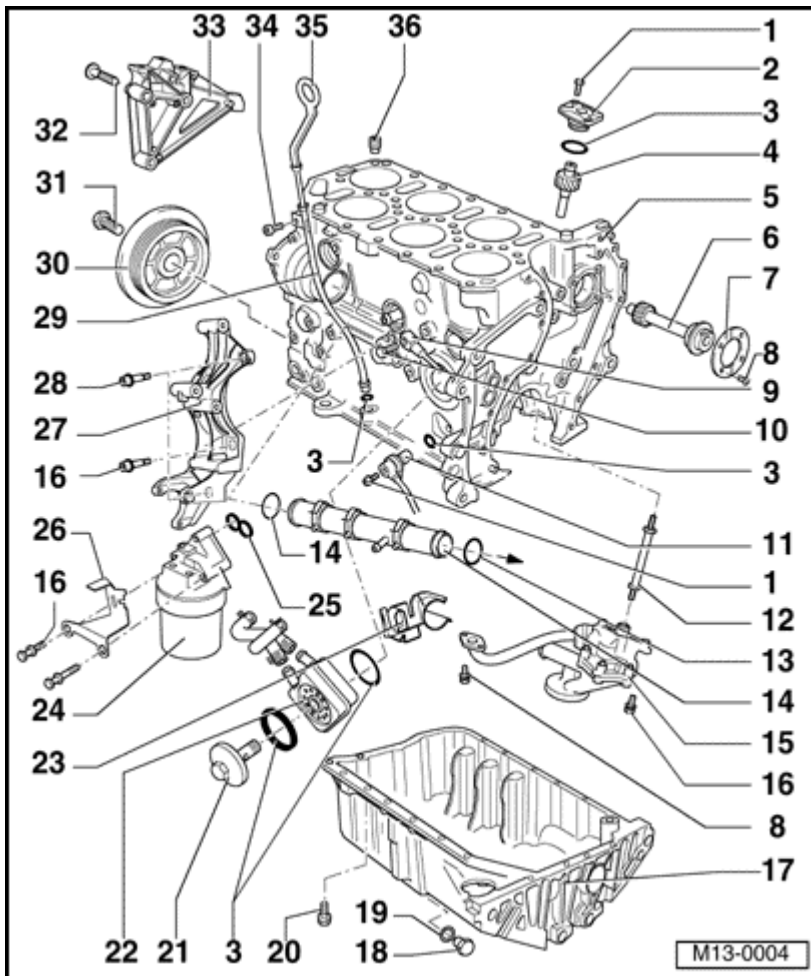
- ◆ Removing and installing sealing flange and flywheel/drive plate ⇒ [page 13-30](#)
- ◆ Removing and installing crankshaft ⇒ [page 13-40](#)
- ◆ Disassembling and assembling piston and connecting rod ⇒ [page 13-44](#)

**6 - Intermediate shaft**

**7 - Thrust washer**

## Volkswagen Jetta, Golf, GTI 1999, 2000

2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP  
Engine, disassembling and assembling (Page 13-22)



**8 - 10 Nm**

- ◆ Insert with "D6" locking compound

**9 - Knock sensor 2 (G66)**

- ◆ Checking:

⇒ [Repair Manual, 2.8 Liter VR6 OBD II Fuel Injection & Ignition , Repair Group 01](#)

**10 - 20 Nm**

- ◆ Tightening torque has influence on the function of the knock sensor

**11 - Engine rpm sensor (G28)**

- ◆ Checking:

⇒ [Repair Manual, 2.8 Liter VR6 OBD II Fuel Injection & Ignition , Repair Group 01](#)

**12 - Drive shaft**

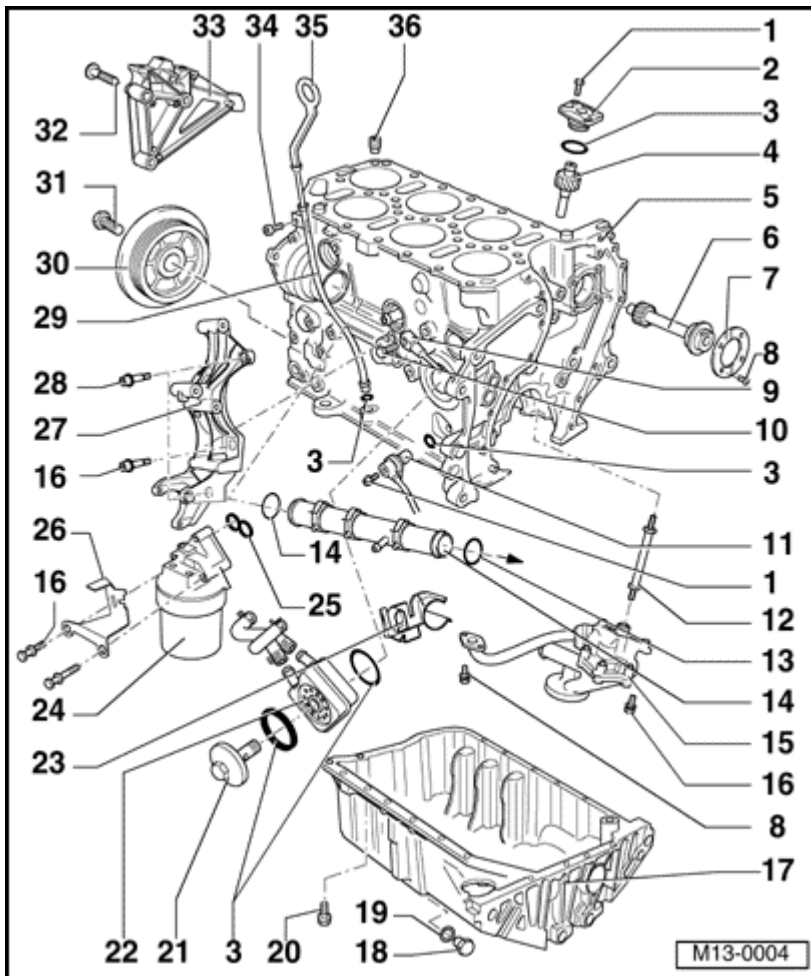
- ◆ For oil pump drive

**13 - O-Ring**

- ◆ Replace

## Volkswagen Jetta, Golf, GTI 1999, 2000

2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP  
Engine, disassembling and assembling (Page 13-23)



### 14 - Coolant pipe

- ◆ Removing and installing ⇒ [page 19-7](#)

### 15 - Oil pump

- ◆ Disassembling and assembling ⇒ [page 17-9](#)
- ◆ Coat oil pressure pipe on engine block and oil pump housing with AMV 188 001 02

### 16 - 25 Nm

### 17 - Oil pan

- ◆ Removing and installing ⇒ [page 17-12](#)

### 18 - Oil pan drain plug, 30 Nm

### 19 - Round gasket

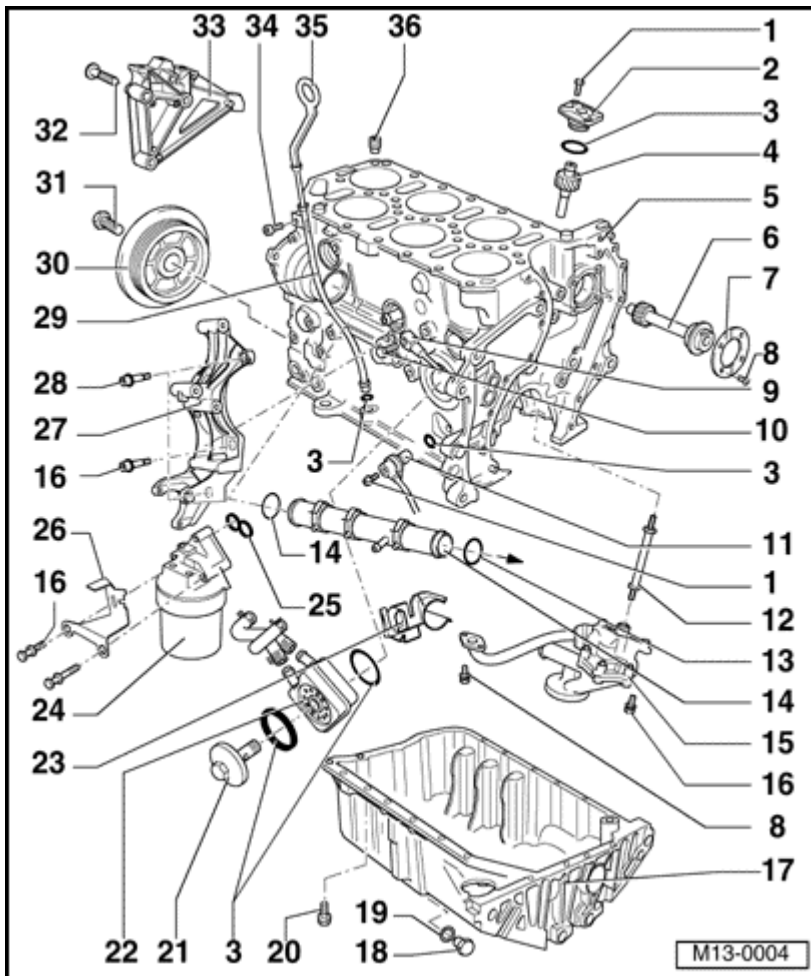
- ◆ Replace

### 20 - 15 Nm

### 21 - Oil cooler cover, 25 Nm

## Volkswagen Jetta, Golf, GTI 1999, 2000

2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP  
Engine, disassembling and assembling (Page 13-24)



### 22 - Oil cooler

- ◆ Coat contact surfaces outside the oil seal with AMV 188 001 02
- ◆ Check for free movement with the surrounding parts
- ◆ See note ⇒ [page 13-1](#)

### 23 - Bracket

### 24 - Oil filter housing

- ◆ Disassembling and assembling ⇒ [page 17-7](#)

### 25 - Gasket

- ◆ Replace
- ◆ Note installation position
- ◆ Coat with oil before installing

### 26 - Bracket

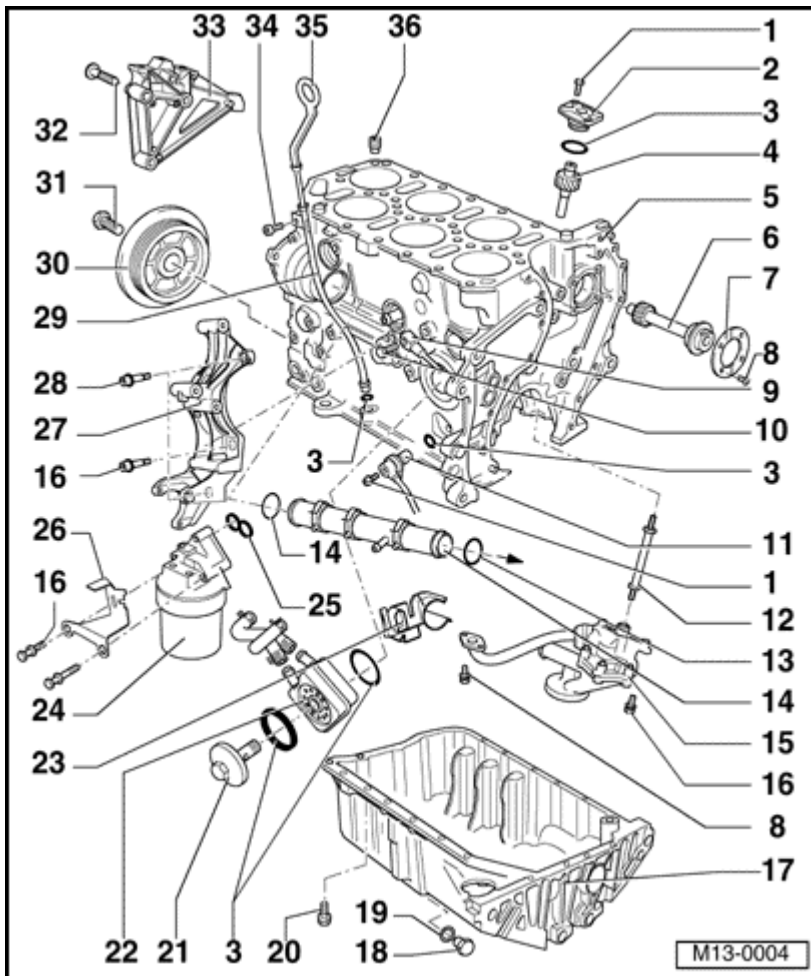
- ◆ For valve for two-stage intake pipe switch-over (N156)

### 27 - Compact bracket

- ◆ For alternator, air conditioning compressor and power steering pump

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2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP  
Engine, disassembling and assembling (Page 13-25)



**28 - Guide bolt, 25 Nm**

**29 - Guide tube**

- ◆ For oil dipstick
- ◆ Attached to intake pipe-top section with bolt

**30 - Vibration damper**

- ◆ Removing and installing "V" ribbed belt ⇒ [page 13-28](#)

**31 - 100 Nm plus additional 1 / 4 turn (90 ° )**

- ◆ Replace
- ◆ Use locking bracket 3406 for loosening and tightening ⇒ [Fig. 1](#)
- ◆ Tighten with torque-limiting wrench V.A.G 1601

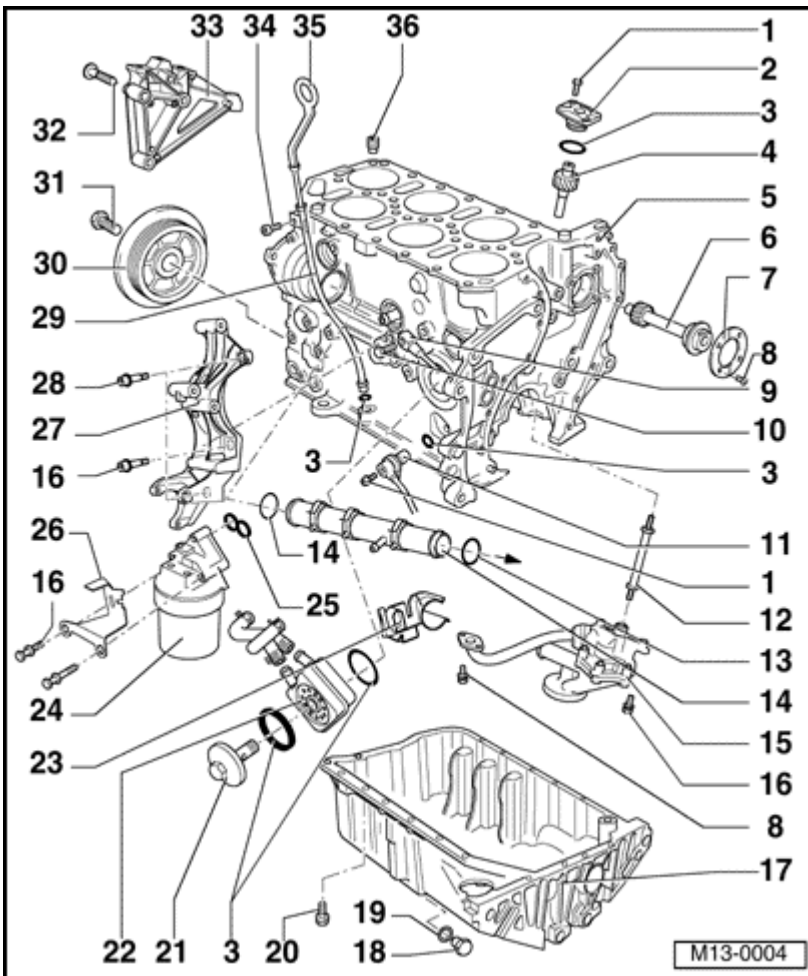
**32 - 45 Nm**

**33 - Engine bracket**

**34 - 10 Nm**

## Volkswagen Jetta, Golf, GTI 1999, 2000

2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP  
Engine, disassembling and assembling (Page 13-26)



### 35 - Oil dipstick

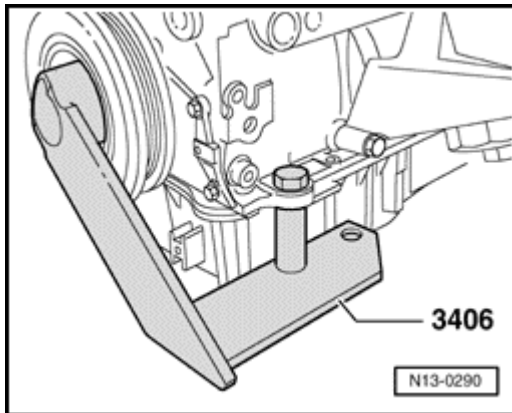
- ◆ Oil level must not exceed the max. mark.

### 36 - Oil return barrier, 5 Nm

- ◆ Note installation position
- ◆ Clean if severely contaminated
- ◆ See note ⇒ [page 13-1](#)

**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Engine, disassembling and assembling (Page 13-27)**

---



**A**

**Fig. 1 To loosen and tighten the mounting bolt, lock vibration damper in position with locking bracket 3406**

**Notes:**

*The mounting bolt for the vibration damper must be replaced.*

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP Engine, disassembling and assembling (Page 13-28)

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#### Removing and installing "V" ribbed belt

##### Special tools, equipment, test and inspection devices

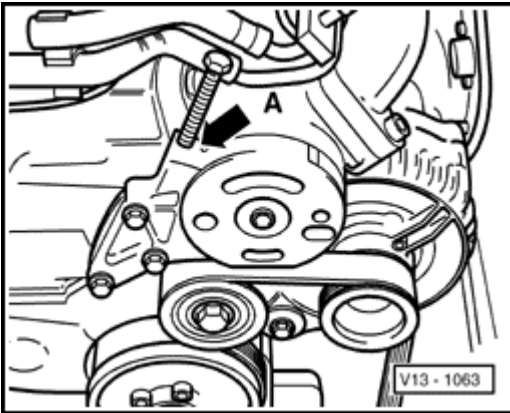
- ◆ Hex head bolt M8x80

##### Removing "V" ribbed belt

- Remove right sound damping tray:
  - ⇒ Exterior body assembly work; Rep. Manual 50; front body; assembly overview
  - ⇒ [Repair Manual, Body-Exterior, Repair Group 50](#)
- Mark the direction of travel of the "V" ribbed belt.

**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Engine, disassembling and assembling (Page 13-29)**

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**A**

- Screw the 8 mm x 80 bolt into tapped hole -A- of the belt tensioner until pressure on the "V" ribbed belt is released.

**Notes:**

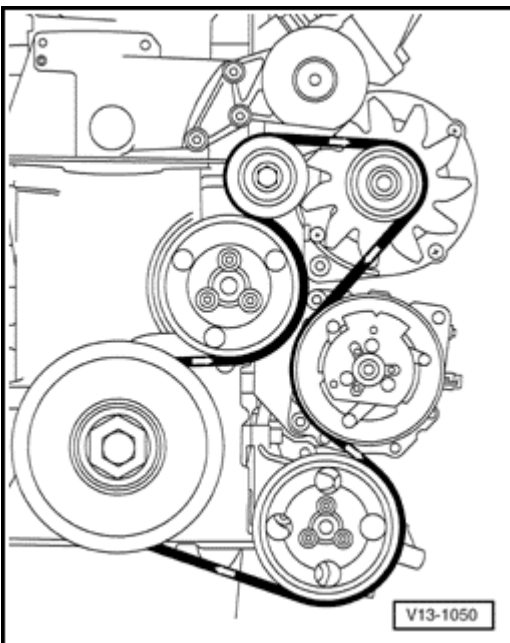
*Screw the bolt in only far enough to make it possible to remove the "V" ribbed belt. Otherwise, the belt tensioner housing can be damaged.*

- Remove "V" ribbed belt.

**Installing "V" ribbed belt**

**Notes:**

- ♦ *Before installing the "V" ribbed belt, make sure that all the assemblies (alternator, air conditioning compressor, power steering pump) are tightly mounted.*
- ♦ *When installing the "V" ribbed belt, note the direction of travel and make sure the belt is correctly seated in the belt pulleys.*



**A**

- Put on the "V" ribbed belt.
- Remove 8 mm bolt from the tensioner.

After work is completed, always:

- Start engine and check belt run.

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Sealing flange and flywheel/drive plate, removing and installing (Page 13-30)

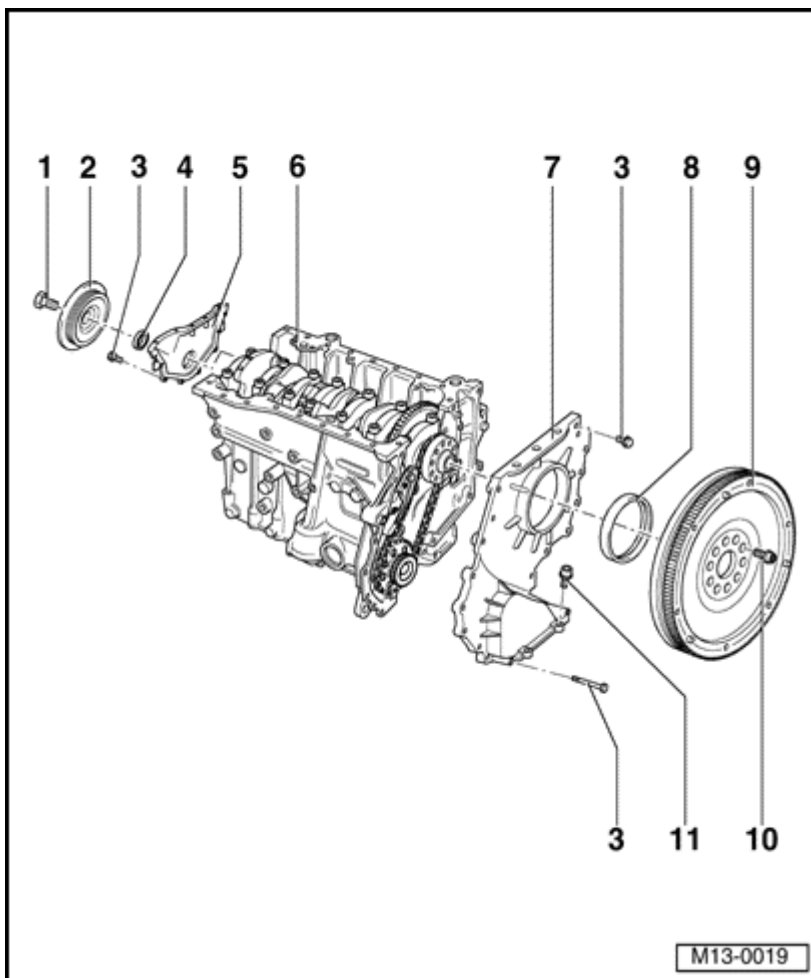
#### Notes:

Clutch repairs:

⇒ [Repair Manual, Manual Transmission 02J, Repair Group 30](#)

#### Notes:

- ◆ To carry out the assembly work, the engine must be attached to the engine stand with engine bracket 3269.



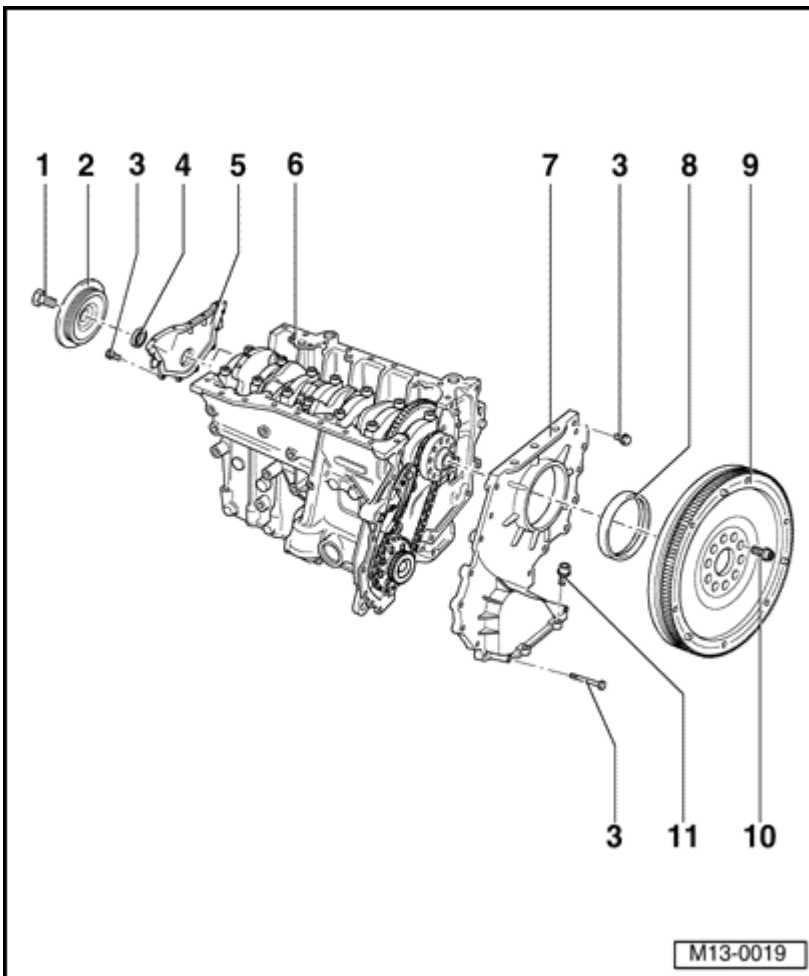
**1 - 100 Nm plus additional 1 / 4 turn (90 ° )**

- ◆ Replace
- ◆ Use locking bracket 3406 for loosening and tightening ⇒ [page 13-33](#)
- ◆ Tighten with torque wrench V.A.G 1601

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Sealing flange and flywheel/drive plate, removing and installing (Page 13-31)



**2 - Vibration damper**

**3 - 10 Nm**

**4 - Oil Seal**

- ◆ Replace ⇒ [page 13-33](#)

**5 - Sealing flange**

- ◆ Coat sealing surface with AMV 188 001 02

**6 - Cylinder block**

- ◆ Removing and installing crankshaft ⇒ [page 13-40](#)
- ◆ Disassembling and assembling piston and connecting rod ⇒ [page 13-44](#)

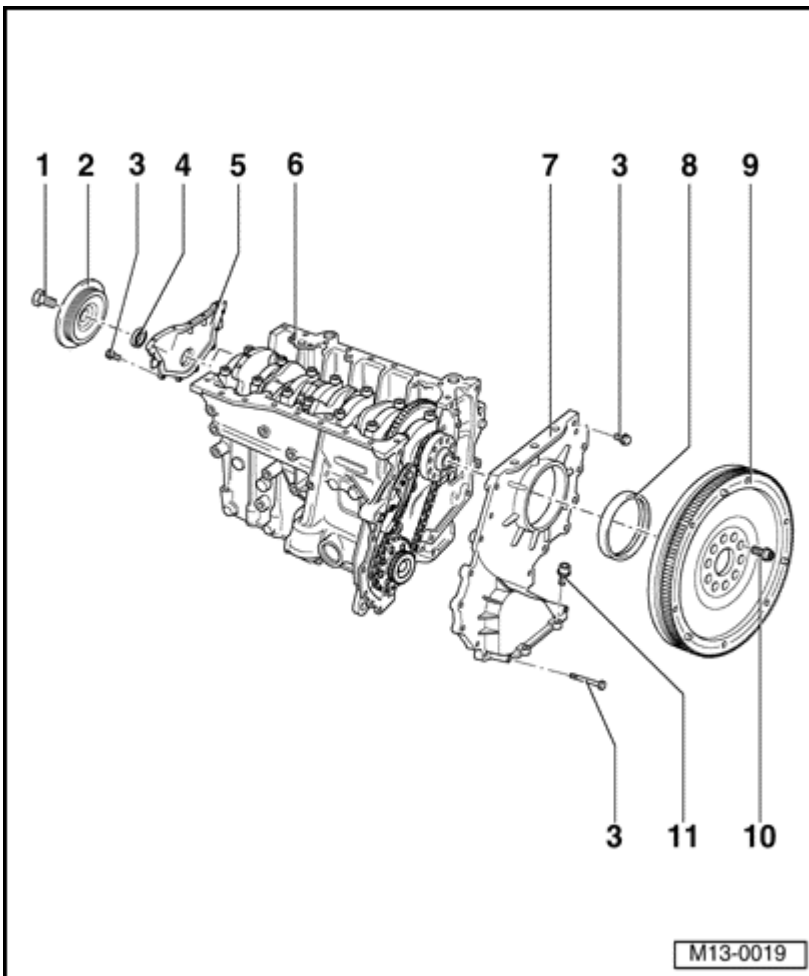
**7 - Oil seal**

- ◆ Coat sealing surfaces with AMV 188 001 02

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Sealing flange and flywheel/drive plate, removing and installing (Page 13-32)



#### 8 - Oil seal

- ◆ Remove with extractor 2086
- ◆ Slightly coat the sealing lip of the oil seal with oil
- ◆ To install, position with mounting sleeve 2003/2A
- ◆ Pull in to stop with 2003/3

#### 9 - Flywheel/drive plate

- ◆ Removing and installing drive plate ⇒ [page 13-37](#)

#### 10 - 60 Nm plus additional 1 / 4 turn (90°)

- ◆ Replace

#### 11 - 25 Nm

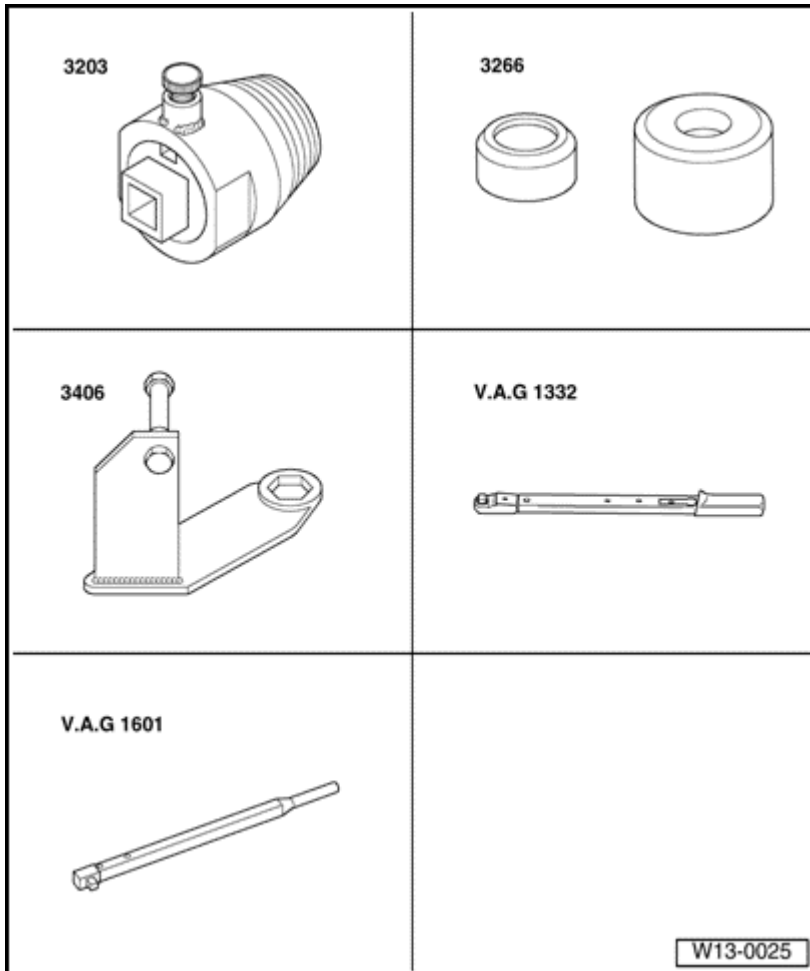
**Volkswagen Jetta, Golf, GTI 1999, 2000**

**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**

**Sealing flange and flywheel/drive plate, removing and installing (Page 13-33)**

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**Oil seal on vibration damper end of crankshaft, replacing**



**Special tools, equipment, test and inspection devices; required accessories**

- ◆ 3203 Oil seal extractor
- ◆ 3266 Guide sleeves
- ◆ 3406 Locking bracket
- ◆ V.A.G 1332 torque wrench (40-200 Nm)
- ◆ V.A.G 1601 torque wrench (150-800 Nm)

## Volkswagen Jetta, Golf, GTI 1999, 2000

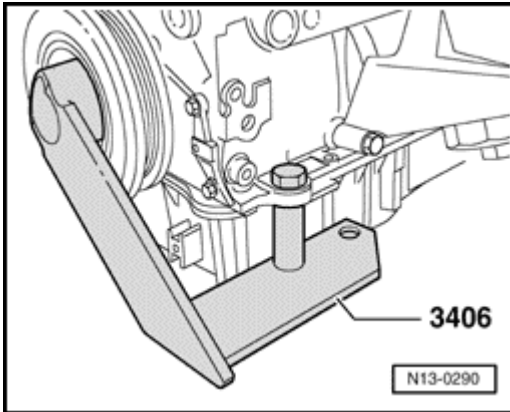
### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Sealing flange and flywheel/drive plate, removing and installing (Page 13-34)

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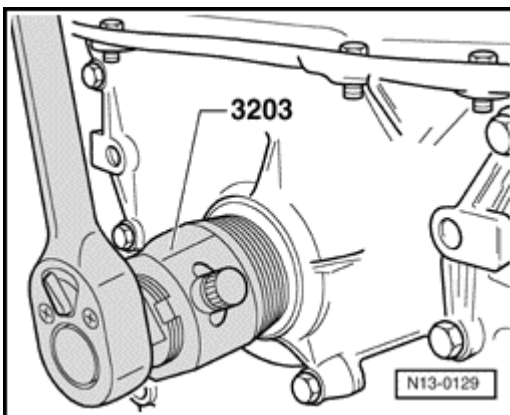
#### Removing

- Remove "V" ribbed belt ⇒ [page 13-28](#).



#### A

- Remove vibration damper. To do so, lock vibration damper in position with locking bracket 3406.
- Remove the vibration damper bolt.
- Turn the inner section of oil seal extractor 3203 three turns (approx. 4 mm) out of the outer section and lock in position with knurled screw.



#### A

- Coat the threaded head of oil seal extractor 3203 with oil, set in place and with heavy pressure, screw it as far as possible into the seal.
- Loosen the knurled screw and turn the inner part against the crankshaft until the seal is removed.

## Volkswagen Jetta, Golf, GTI 1999, 2000

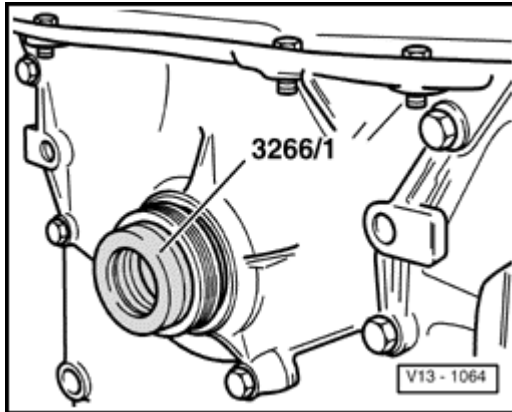
### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Sealing flange and flywheel/drive plate, removing and installing (Page 13-35)

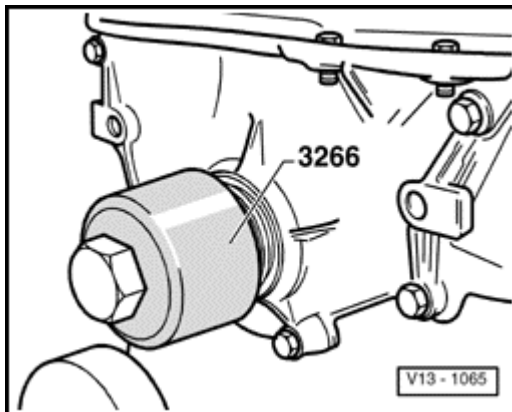
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#### Installing

- Lightly coat the sealing lip of the seal with oil.



- Place the guide sleeve from 3266 on the crankshaft nose.
- Push the oil seal over the guide sleeve.



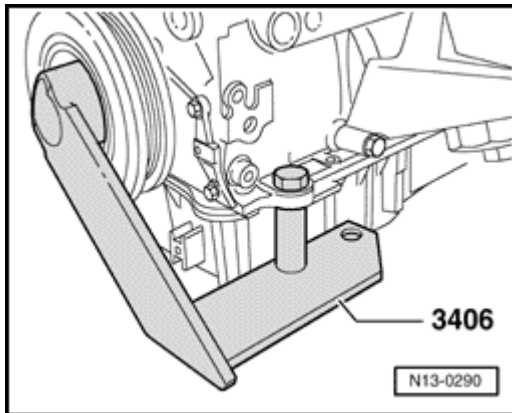
- Press the seal in with the pressure sleeve from 3266 until it reaches the stop. Use the old mounting bolt for the vibration damper.

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Sealing flange and flywheel/drive plate, removing and installing (Page 13-36)

---



**A**

- Install vibration damper and lock in place using locking bracket 3406.
- Tighten the new mounting bolt to 100 Nm and turn an additional 1/4 turn (90°).
- Install "V" ribbed belt ⇒ [page 13-28](#).

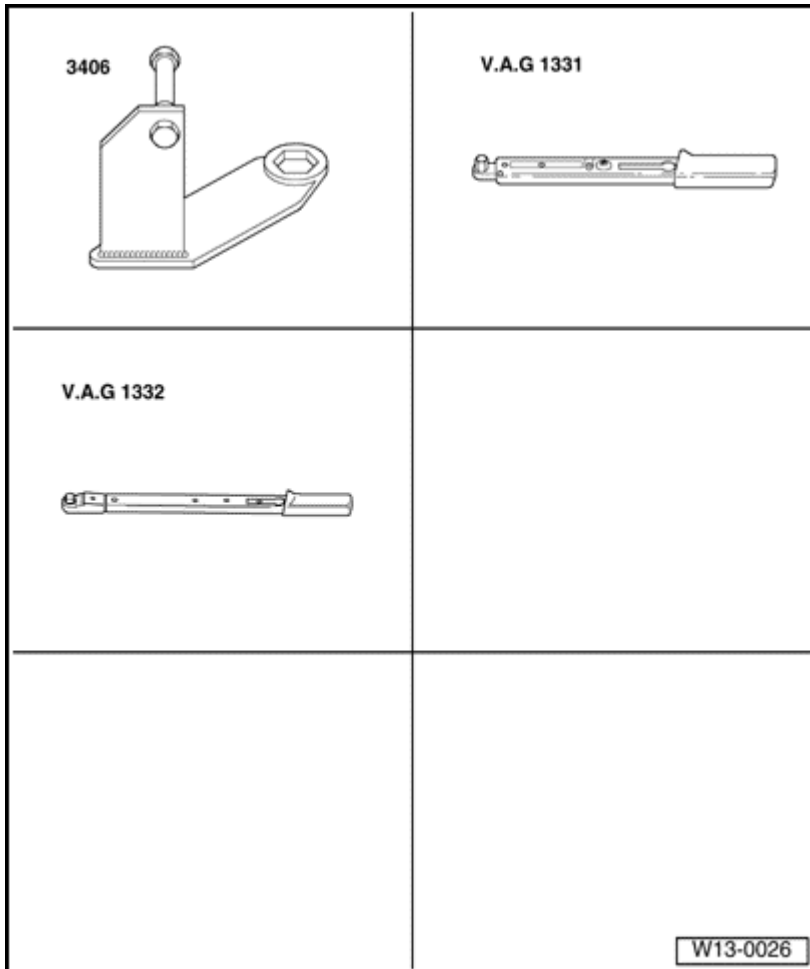
## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Sealing flange and flywheel/drive plate, removing and installing (Page 13-37)

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#### Drive plate, removing and installing



#### Special tools, equipment, test and inspection devices; required accessories

- ◆ 3406 Locking bracket
- ◆ V.A.G 1331 torque wrench (5-50 Nm)
- ◆ V.A.G 1332 torque wrench (40-200 Nm)
- ◆ Depth gauge
- ◆ Auxiliary ruler

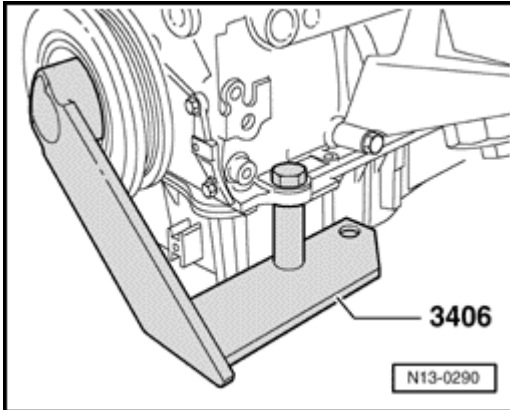
## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Sealing flange and flywheel/drive plate, removing and installing (Page 13-38)

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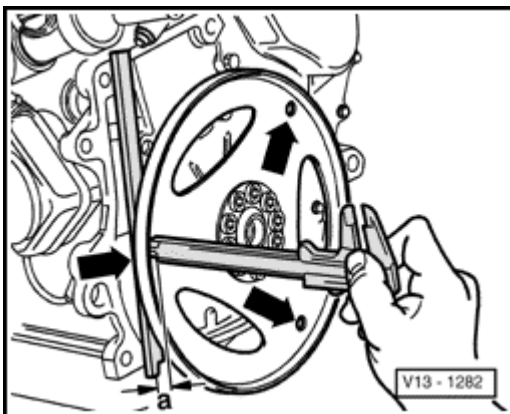
#### Removing



- Lock vibration damper in position with locking bracket 3406.
- Loosen the mounting bolts of the drive plate in crosswise pattern and remove.
- Remove drive plate.

#### Installing

- Place drive plate on the crankshaft.
- Insert at least 3 old mounting bolts and tighten to 30 Nm.



- Measure dimension -a- to the engine block through the 3 holes for the attachment of the torque converter using the auxiliary ruler and the depth gauge. Calculate the mean.
- Compare mean (measured distance plus thickness of ruler) with specification.  
Specification: 15.7-16.5 mm

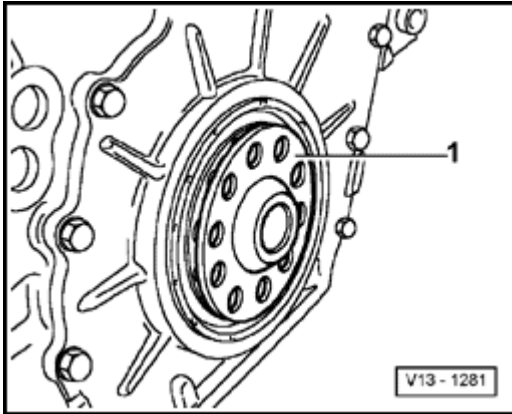
## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Sealing flange and flywheel/drive plate, removing and installing (Page 13-39)

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If the specification is not reached:



#### **A**

- Remove the drive plate once more and use the appropriate compensating shim -1-.

#### **Notes:**

*Only one compensating shim of the appropriate thickness may be used for compensation.*

If the specification is met:

- Insert new mounting bolts and hand tighten.
- Install drive plate; use new mounting bolts and tighten to 60 Nm plus an additional 1/4 turn (90°).

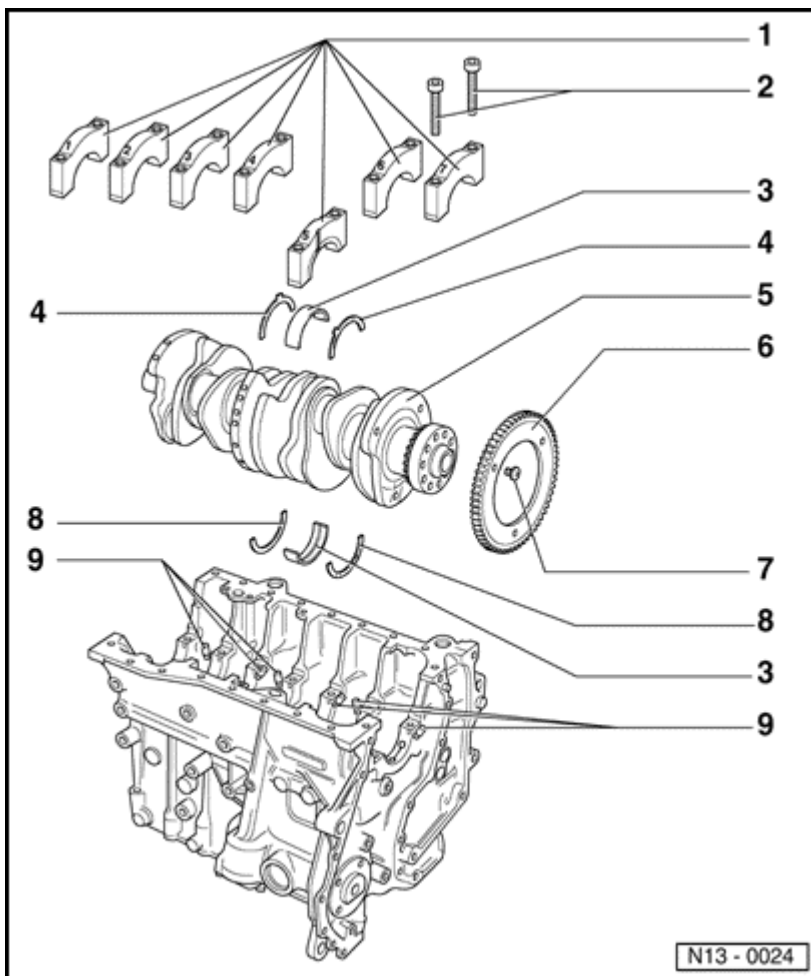
## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Crankshaft, removing and installing (Page 13-40)

#### Notes:

- ◆ Make sure that prior to removing the crankshaft you have provided a suitable place to put it, so that the pulse-generating wheel -6- does not rest on anything or become damaged.
- ◆ To perform assembly work, the engine must be fastened to the assembling stand with engine retainer 3269.
- ◆ When replacing bearing shells, use only bearing shells with the same color coding.



#### 1 - Bearing cover

- ◆ Bearing cover 1: oscillation damper side
- ◆ Bearing cover 5 with recesses for thrust bearings
- ◆ Cylinder block to bearing cover bearing shell retaining lips must be placed on top of each other

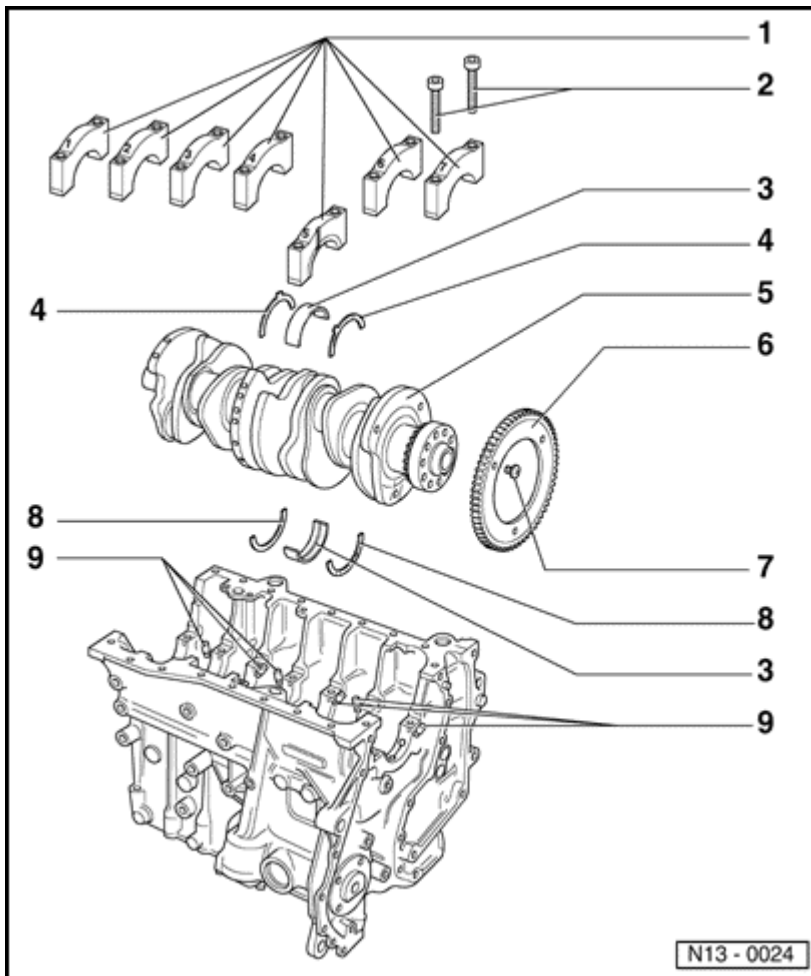
#### 2 - 30 Nm plus 1/2 turn (180°)

- ◆ Replace
- ◆ Additional tightening of 2 x 90° is allowable

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Crankshaft, removing and installing (Page 13-41)



#### 3 - Bearing shells 1-7

- ◆ For bearing covers without oil groove
- ◆ For cylinder block with oil groove
- ◆ Do not switch worn bearing shells (mark bearing shells)

#### 4 - Thrust bearing

- ◆ For bearing cover 5
- ◆ Note fastening

#### 5 - Crankshaft

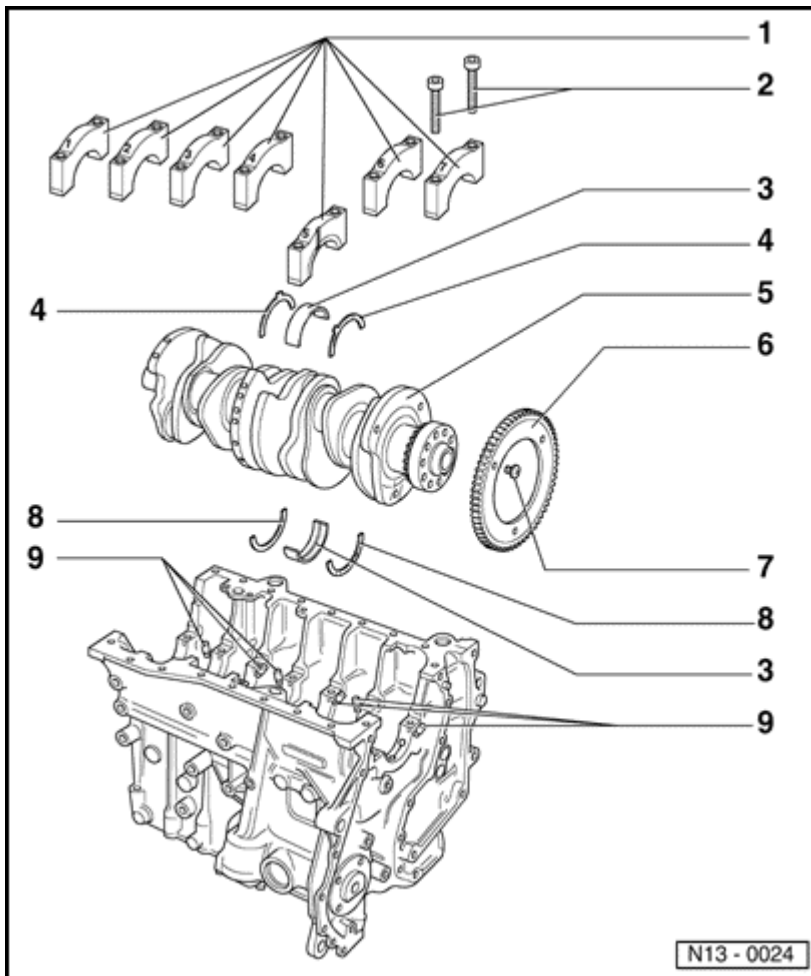
- ◆ See note prior to removal ⇒ [page 13-40](#)
- ◆ Axial play new: 0.07-0.23 mm, max. wear: 0.30 mm
- ◆ Measure radial play with Plastigage-new: 0.2-0.06 mm, max. wear: 0.10 mm
- ◆ Do not change the position of the crankshaft when measuring radial play

Crankshaft measurements:

- ◆ Main bearing: 59.958-59.978 mm
- ◆ Connecting rod bearing: 53.958-53.978 mm
- ◆ Finishing not allowable

**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Crankshaft, removing and installing (Page 13-42)**

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**6 - Pulse-generator wheel**

- ◆ For engine speed sensor (G28)
- ◆ Replace
- ◆ Installing ⇒ [Fig. 1](#)

**7 - 10 Nm plus 1 / 4 turn (90°)**

- ◆ Replace

**8 - Thrust bearing**

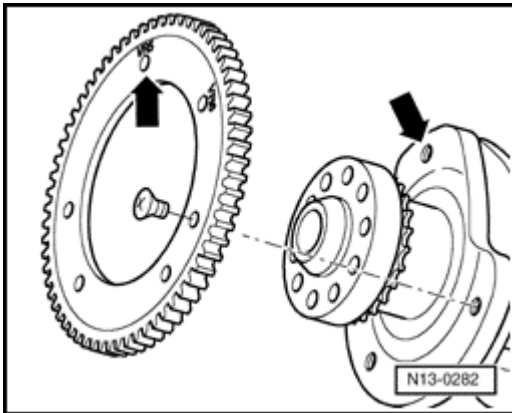
- ◆ For cylinder block, bearing 5
- ◆ Note fastening

**9 - Oil injector**

- ◆ For crankshaft bearings 2-7
- ◆ For piston cooling
- ◆ Opening pressure: 2.0 bar over pressure
- ◆ Removing and installing ⇒ [page 17-5](#) , [Fig. 1](#)
- ◆ Observe notice ⇒ [page 13-1](#)

**Volkswagen Jetta, Golf, GTI 1999, 2000**  
**2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP**  
**Crankshaft, removing and installing (Page 13-43)**

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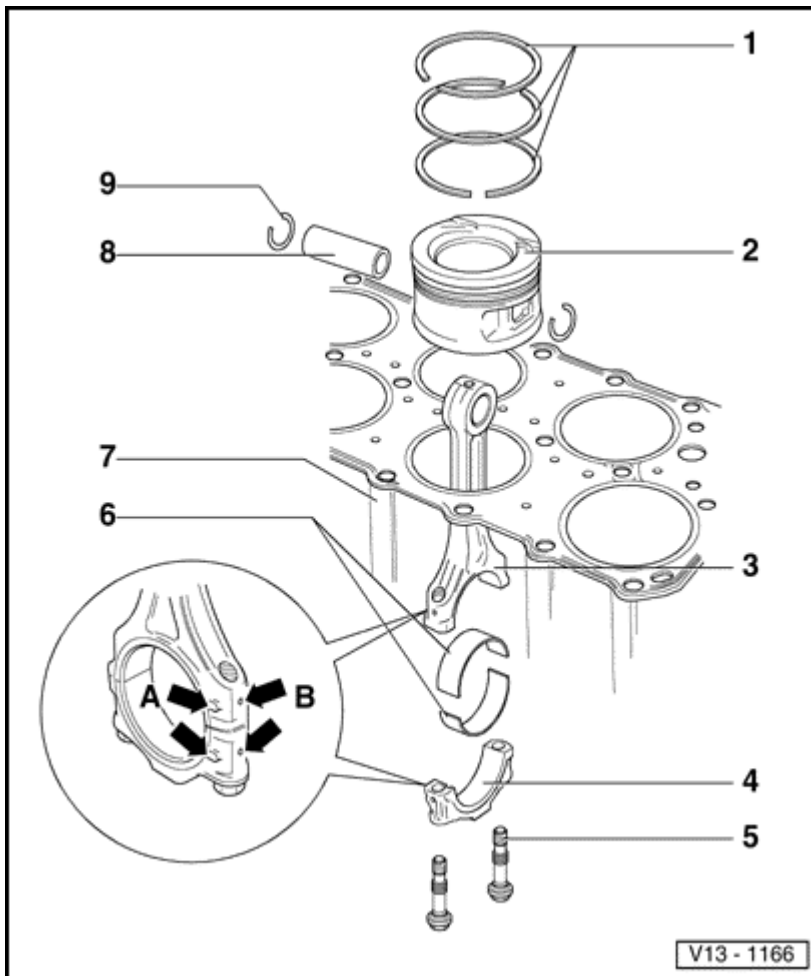


**A**

**Fig. 1 Installing pulse-generating wheel on crankshaft**

Make sure the crankshaft to pulse-generating wheel connecting surface is free of oil and grease.

- To provide additional fastening, apply a light coat of adhesive D 000 600 to the back of the pulse-generating wheel.
- Make sure that the marker -VR6- (arrow) is aligned with the single threaded bore.
- First, lightly tighten all fastening screws by hand.
- Next, tighten fastening screws to 10 Nm plus additional  $1/4$  turn ( $90^\circ$ ).



### 1 - Piston rings

- ◆ Offset joint by 120°
- ◆ Install and remove with piston ring pliers
- ◆ Marking "TOP" to piston top
- ◆ Check joint clearance ⇒ [Fig. 1](#)
- ◆ Check side clearance ⇒ [Fig. 2](#)

### 2 - Piston

- ◆ Checking ⇒ [Fig. 3](#)
- ◆ Mark installation location to connecting rod and respective cylinder belonging to piston
- ◆ Tall side of the piston top points toward the middle of the cylinder block
- ◆ Install using funnel 3278 ⇒ [Fig. 5](#)

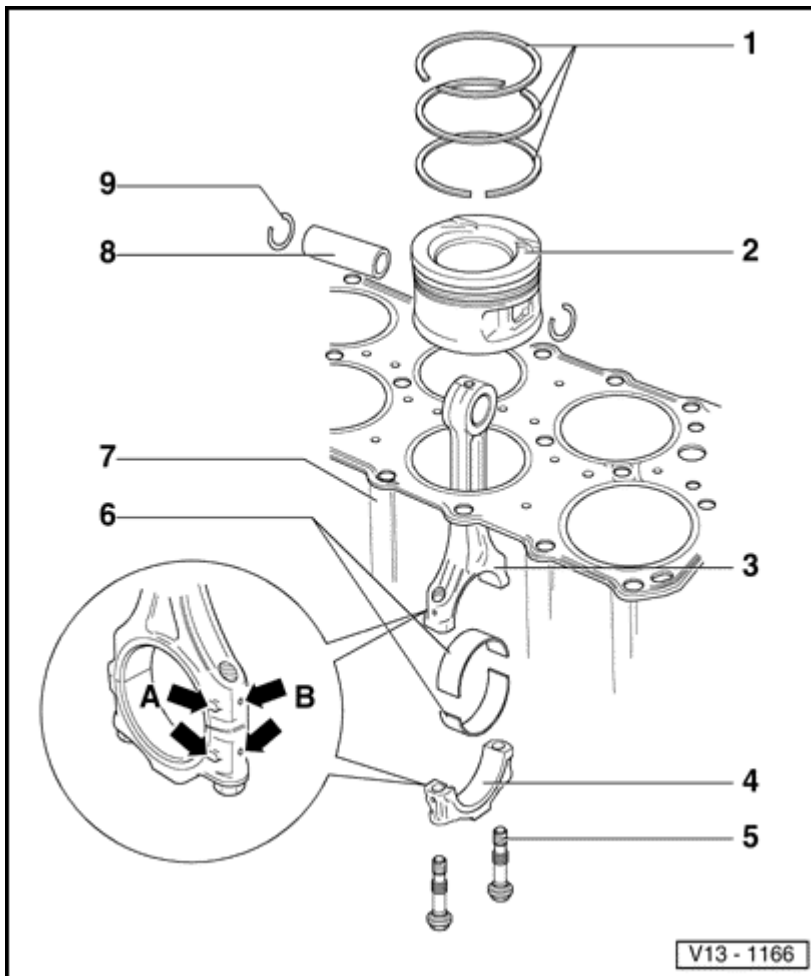
### 3 - Connecting rod

- ◆ Replace only as a set
- ◆ Mark respective cylinder to which the connecting rod belongs -B-
- ◆ Installation location: markers -A- must be positioned on top of each other

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Pistons and connecting rods, disassembling and assembling (Page 13-45)



#### 4 - Connecting rod cover

- ◆ Note installation location

#### 5 - 30 Nm plus 1 / 4 turn (90°)

- ◆ Replace
- ◆ Oil thread bearing surface
- ◆ To measure radial play tighten to 30 Nm, however, do not continue turning

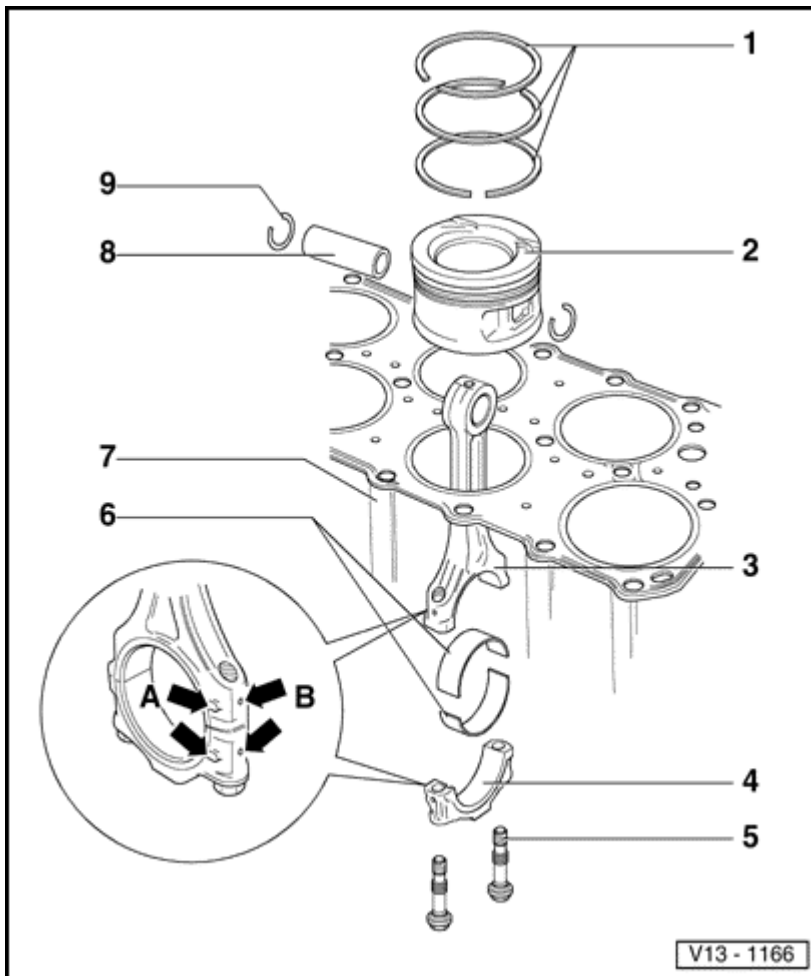
#### 6 - Bearing shell

- ◆ Note installation location
- ◆ Do not switch worn bearing shells
- ◆ Bearing shell retaining lips must be firmly placed in the recesses
- ◆ Axial clearance, new: 0.05-0.31 mm, max. wear: 0.40 mm
- ◆ Measure radial clearance with Plastigage. New: 0.02-0.07 mm, max. wear: 0.10 mm
- ◆ Do not change the position of the crankshaft when measuring radial play

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Pistons and connecting rods, disassembling and assembling (Page 13-46)



#### 7 - Cylinder block

- ◆ Check cylinder bore ⇒ [Fig. 4](#)
- ◆ Piston and cylinder measurements ⇒ [page 13-51](#)

#### 8 - Piston pins

- ◆ If binding occurs, heat piston to 60° C
- ◆ Remove and install with flaring tool VW 222 a

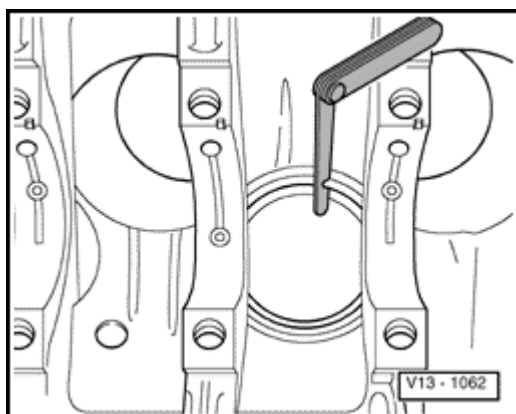
#### 9 - Locking ring

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Pistons and connecting rods, disassembling and assembling (Page 13-47)

---



**A**

**Fig. 1 Piston ring-checking joint clearance**

#### **Special tools, equipment, test and inspection devices; required accessories**

- ♦ Feeler gauge

#### **Test procedure**

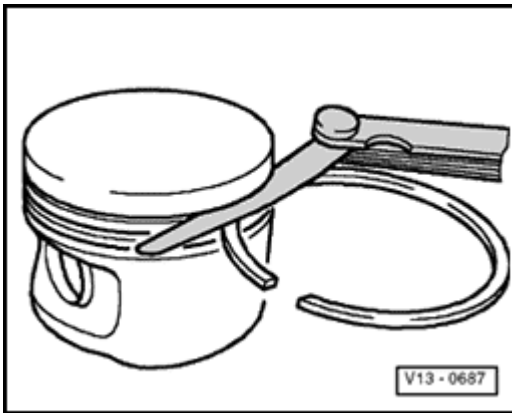
- Push the ring at a right angle to the cylinder wall, to the bottom of cylinder opening, approx. 15 mm away from the cylinder edge. In order to push in, use a piston without piston rings.

Piston ring		Joint clearance	
		New	Max. wear
Plain compression ring	mm	0.20-0.40	1.0
Tapered compression ring	mm	0.20-0.40	1.0
Oil control ring	mm	0.25-0.50	1.0

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Pistons and connecting rods, disassembling and assembling (Page 13-48)



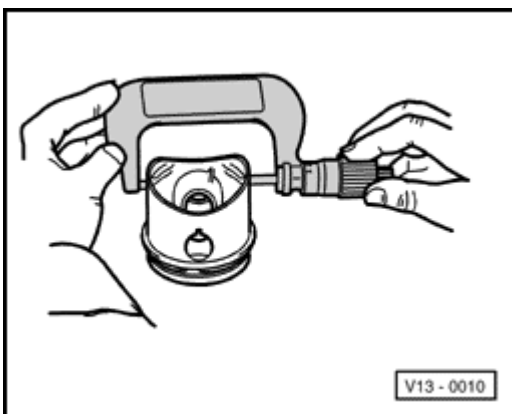
**A**

**Fig. 2 Piston ring-checking side clearance**

#### Special tools, equipment, test and inspection devices; required accessories

- ♦ Feeler gauge
- Clean piston ring groove before checking.

Piston ring		Side clearance	
		New	Max. wear
Plain compression ring	mm	0.04-0.09	0.15
Tapered compression ring	mm	0.03-0.06	0.15
Oil control ring	mm	0.02-0.06	0.15

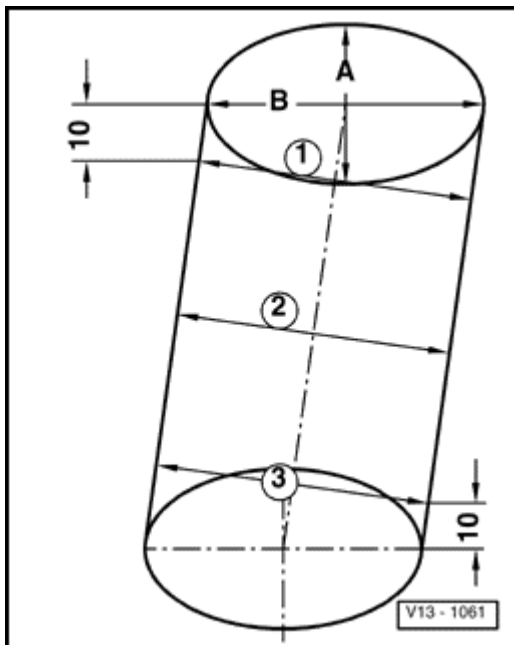


**A**

**Fig. 3 Checking piston**

#### Special tools, equipment, test and inspection devices; required accessories

- ♦ External micrometer 75-100 mm
- Measure approx. 6 mm from the bottom edge, offset 90° to the piston pin axis.  
Maximum deviation from nominal size is 0.04 mm



**A**

#### Fig. 4 Checking cylinder bore

##### Special tools, equipment, test and inspection devices; required accessories

- ◆ Internal micrometer 50-100 mm

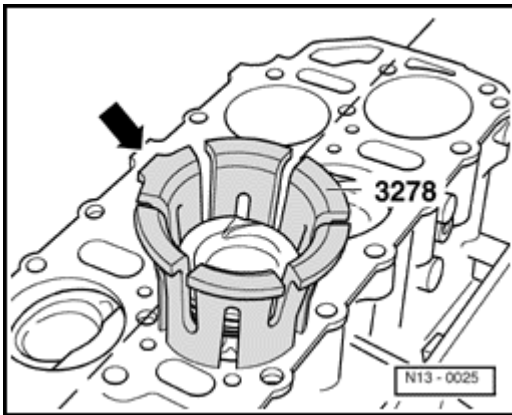
##### Test procedure

- Perform a crosswise measurement in 3 places in transverse direction -A- and lengthwise direction -B-.

Maximum deviation from nominal size is 0.08 mm

##### Notes:

*The cylinder bore measurement cannot be taken if the cylinder block is fastened to the assembling trestle with engine retainer 3269; faulty measurements are possible.*



**A**

**Fig. 5 Installing piston with funnel 3278**

**Special tools, equipment, test and inspection devices; required accessories**

- ♦ 3278 Funnel

**Notes:**

*If you are using a new funnel to install pistons, guide the piston with oiled piston rings through the funnel twice and, if necessary, remove resulting shavings. Only then should you install the piston with piston rings.*

**Procedure**

- Manually push the piston into the oiled funnel. The tall side of the piston top must point in the direction of the funnel spout -arrow-.
- Hold the funnel (with inserted piston) at the upper edge and push the piston in with both thumbs.
- Push the piston in until it protrudes approx. 15 mm below the bottom edge of the funnel.
- Start the piston in its respective cylinder bore. The funnel spout -arrow- must point toward the middle of the cylinder block.
- Firmly place the funnel on the cylinder block and push the piston in.

## Volkswagen Jetta, Golf, GTI 1999, 2000

### 2.8 Liter VR6 2V Engine Mechanical, Engine Code(s): AFP

#### Pistons and connecting rods, disassembling and assembling (Page 13-51)

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### Piston and cylinder measurements

<b>Bore measurement</b>		<b>Piston dia.</b>	<b>Cylinder bore dia.</b>
Base value	mm	80.985	81.01
Level I	mm	81.485	81.51
Level II	mm	81.985	82.01