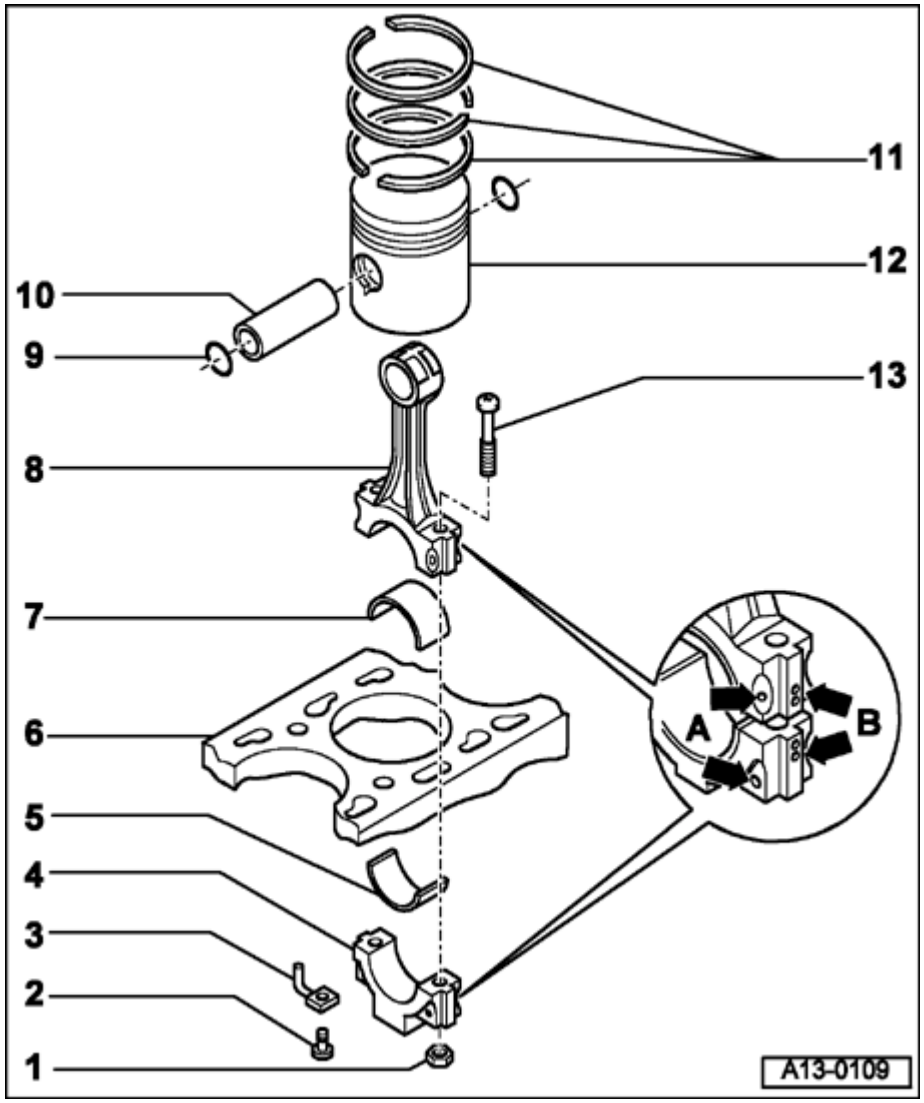
13-53



Pistons and connecting rods, disassembling and assembling

1 - Nut for connecting rod bolt

- 30 Nm (22 ft lb) + additional 1/4 turn (90°)
- Always replace connecting rod bolt -13-
- Grease thread and contact surface
- To measure radial play, tighten to 30 Nm (22 ft lb) but not any further

2 - Pressure relief valve

- Tightening torque: 27 Nm (20 ft lb)
- Opening pressure: 2.5-3.2 bar (36.25-46.4 psi)

3 - Oil spray nozzle

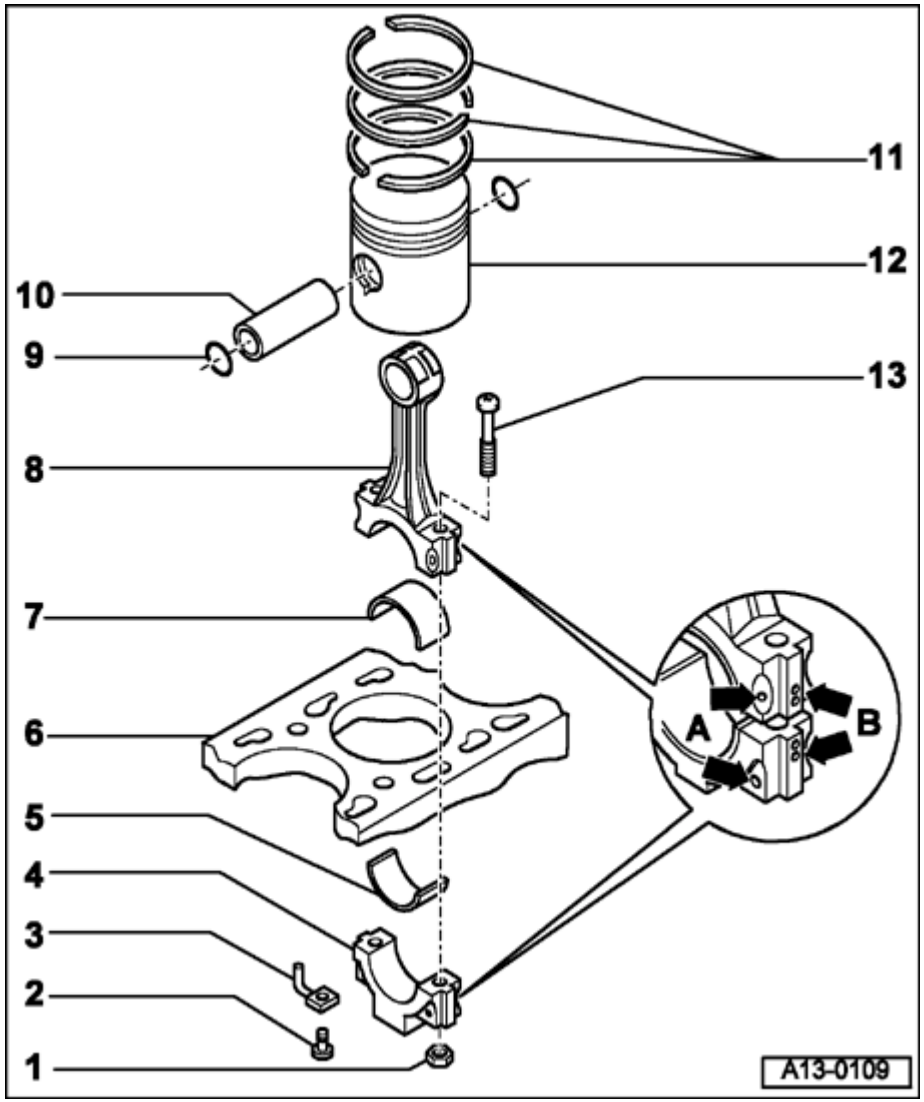
- For piston cooling

4 - Connecting rod bearing cap

- Mark -B- to indicate which cylinder each cap belongs to

Installed position:

- Marks -A- point toward belt pulley side



5 - Bearing shell

- Verify correct installation position
- Do not interchange used connecting rod bearing shells (mark accordingly)
- Check for proper securing in retaining tabs

Axial play:

- New: 0.10-0.35 mm (0.004-0.014 in.)
- Wear limit: 0.40 mm (0.016 in.)

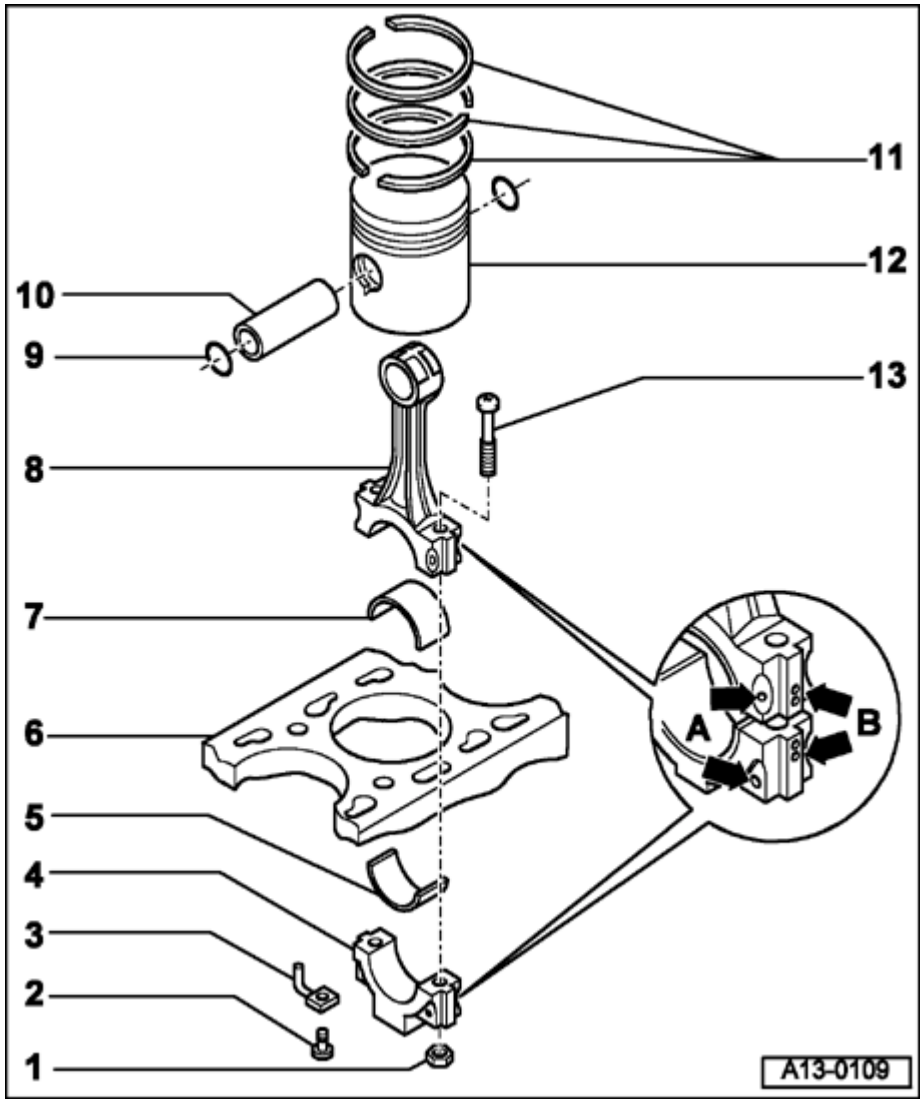
Measure radial play using Plastigage®:

- New: 0.01-0.05 mm (0.0004-0.0020 in.)
- Wear limit: 0.12 mm (0.0047 in.)
- Do not turn crankshaft when measuring radial play with Plastigage® in place
  - To measure radial play, tighten nut -1- to 30 Nm (22 ft lb) but not any further

6 - Cylinder block

- Check bore ⇒ Fig. ⇒ 4
- Piston and cylinder bore dimensions ⇒ Page 13-60

13-55



7 - Bearing shell

- With oil bore for piston pin lubrication
- Verify correct installation position
- Do not interchange used connecting rod bearing shells (mark accordingly)

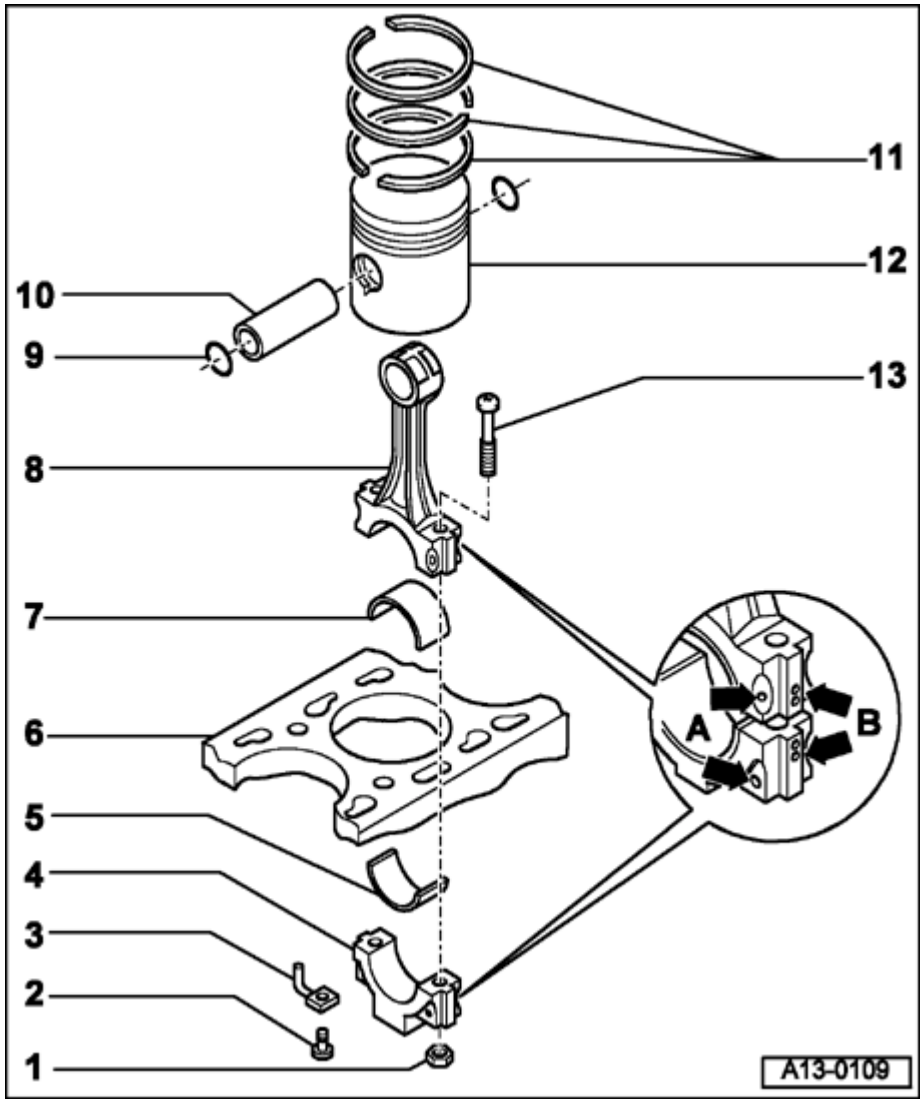
Axial play:

- New: 0.10-0.35 mm (0.004-0.014 in.)
- Wear limit: 0.40 mm (0.016 in.)

Measure radial play using Plastigage®:

- New: 0.01-0.05 mm (0.0004-0.0020 in.)
- Wear limit: 0.12 mm (0.0047 in.)
- Do not turn crankshaft when measuring radial play with Plastigage® in place
- To measure radial play, tighten nut -1- to 30 Nm (22 ft lb) but not any further

13-56



8 - Connecting rod

- Replace only as a set
- Markings -B- indicate which cylinder each rod belongs to

Installed position:

- Marks -A- point toward belt pulley side
- With oil bore for piston pin lubrication

9 - Circlip

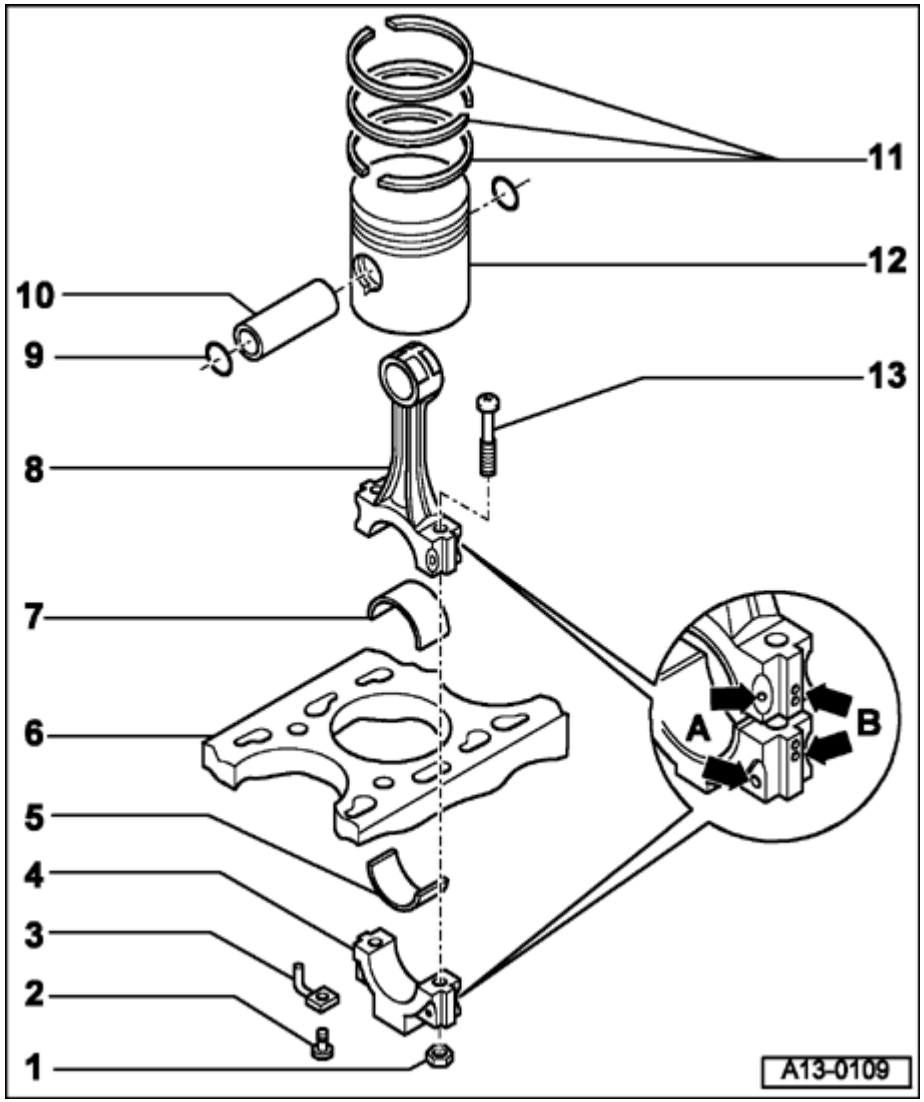
10 - Piston pin

- If stiff, warm pistons to approx. 60 ° C (140 ° F)
- When removing and installing, use VW222a pilot drift

11 - Piston rings

- Offset by 120 °
- Use piston ring pliers to remove and install
- Marking "TOP" must point to piston head
- Checking piston ring end gap ⇒Fig. ⇒ 1
- Checking piston ring side clearance ⇒ Fig. ⇒ 2

13-57



12 - Pistons

- Checking
- Mark installation position and matching cylinder
- Arrow on piston head points toward belt pulley side
- Install using piston ring compressor

13 - Connecting rod bolt

- Always replace

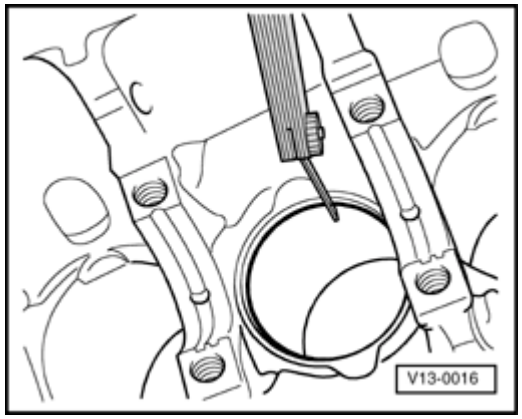


Fig. 1 Checking piston ring end gap

- Insert ring at right angle from top and slide down until approx. 15 mm (19/32 in.) from lower edge of cylinder. To insert, use piston without rings.

Piston ring	End gap, new mm (in.)	Wear limit mm (in.)
1. Compression ring	0.20-0.40 (0.0078-0.0157)	0.8 (0.0315)
2. Compression ring	0.20-0.40 (0.0078-0.0157)	0.8 (0.0315)
3. Oil scraper ring	0.25-0.50 (0.0098-0.0197)	0.8 (0.0315)

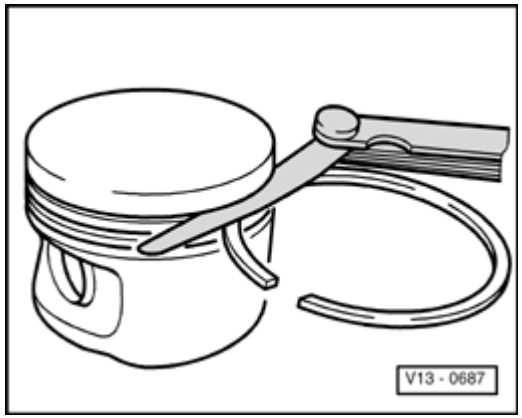


Fig. 2 Checking piston ring side clearance

- Before checking, clean ring groove.

Piston ring	Side clearance, new mm (in.)	Wear limit mm (in.)
1. Compression ring	0.06-0.09 (0.0023-0.0035)	0.20 (0.0078)

2. Compression ring	0.05-0.08 (0.0019-0.0315)	0.20 (0.0078)
3. Oil scraper ring	0.03-0.06 (0.0011-0.0023)	0.15 (0.0059)

13-59

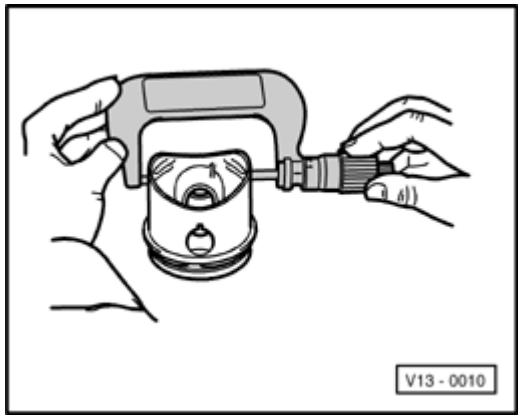


Fig. 3 Checking piston diameter

- Measure approx. 10 mm (3/8 in.) from bottom edge, at points offset by 90° from piston pin axis.

  Deviation from nominal size: max. 0.04 mm (0.0016 in.)

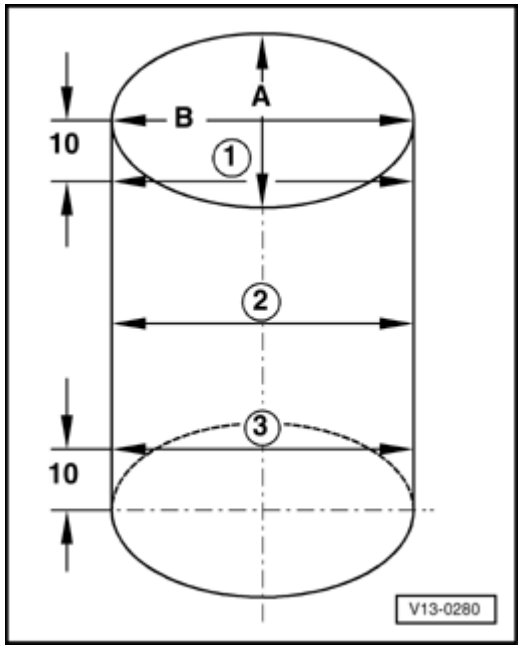


Fig. 4 Checking cylinder bore

Special tools and equipment

Inner bore gauge 50-100 mm (2-4 in.)

CAUTION!

DO NOT have the cylinder block mounted to the assembly stand while measuring the cylinder bores. The block is deformed by its own weight under these conditions and this stress will result in false measurements that are not accurate after the tension has been relieved.

- Measure at three locations diagonally in crosswise direction -A- and lengthwise direction -B-.

  Deviation from nominal size: max. 0.08 mm (0.0031 in.)

Piston and cylinder bore dimensions

Reconditioning dimension	Piston diameter	Cylinder bore diameter
Basic dimension	80.975mm[1)] (3.1180 in.)	81.01 mm (3.1894 in.)
Repair step	81.475mm[1)] (3.2076 in.)	81.51 mm (3.2090 in.)

[1)] Measurement does not include graphite coating, thickness 0.02 mm (0.0008 in.). The graphite coating wears away.