

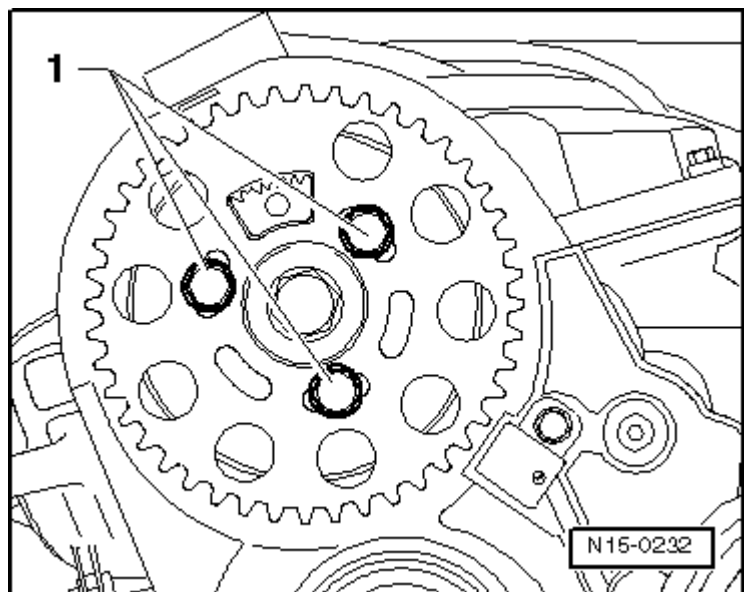
Camshaft

Special tools and workshop equipment required

- ◆ Diesel Injection Pump Locking Pin -3359-
- ◆ Counterhold - Camshaft Gear -T10051-
- ◆ Puller - Camshaft Sprocket -T10052-
- ◆ Camshaft Fitting Tool -T40094- part of Camshaft Fitting Tool - T40094A-
- ◆ Camshaft Fitting Tool -T40095- part of Camshaft Fitting Tool - T40094A-
- ◆ Camshaft Fitting Tool - T40096 -T40096- part of Camshaft Fitting Tool -T40094A-
- ◆ Torque Wrench 1331 5-50Nm -VAG 1331-
- ◆ Torque Wrench 1332 40-200Nm -VAG 1332-
- ◆ Silicone Adhesive Sealant -D 176 501 A1-

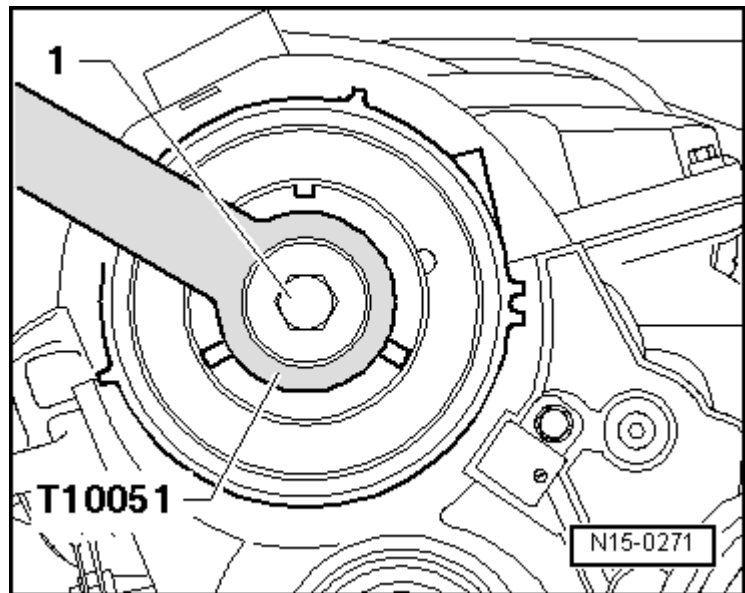
Removing

- Remove the engine cover. Refer to → [Chapter „Engine Cover“](#).
- Remove the fuel filter. Refer to →[Fuel Supply System; Rep. Gr.20](#).
- Remove the Auxiliary Fuel Pump -V393- or the Fuel Pump 2 - V277-. Refer to →[Fuel Supply System; Rep. Gr.20](#).
- Remove the toothed belt from the camshaft and high pressure pump gears. Refer to → [Chapter „Toothed Belt“](#).
- Remove the cylinder head cover. Refer to → [Chapter „Cylinder Head Cover“](#).
- Remove the bolts -1- for the camshaft gear.
- Remove the camshaft gear from the hub.



Counter hold the hub using the Counterhold - Camshaft Gear -T10051- and loosen the hub bolt -1-.

- Unscrew the hub bolt approximately 2 turns.

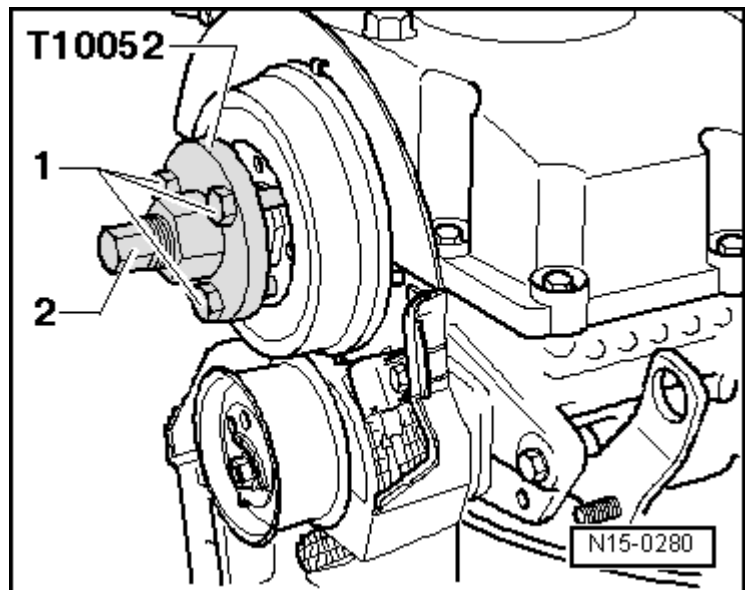


- Install the Puller - Camshaft Sprocket - T10052- and align it to the bores in the hub.
- Tighten the bolts -1-.
- Tighten the puller -2- evenly to tension the hub until the hub loosens from the camshaft.

 **Note**

Hold the valve stem removal tool with a 30 mm wrench.

- Remove the hub from the camshaft.
- Remove the vacuum pump. Refer to → Chapter „Vacuum Pump“.



- Remove the bearing frame bolts/nuts in sequence -24 through 1-.
- Remove the bearing frame.
- Carefully remove the camshafts.

Installing

 **Note**

Seal the surfaces between the bearing frame and the cylinder head with silicone adhesive sealant -D 176 501 A1-.

 **Caution**

The camshafts may only be installed using the Camshaft Fitting Tool -T40094- as described. Otherwise the axial bearings inside the bearing frame will get permanently damaged and it will be necessary to replace the cylinder head.

- Remove any sealant still on the cylinder head and on the bearing frame with a rotating plastic brush.

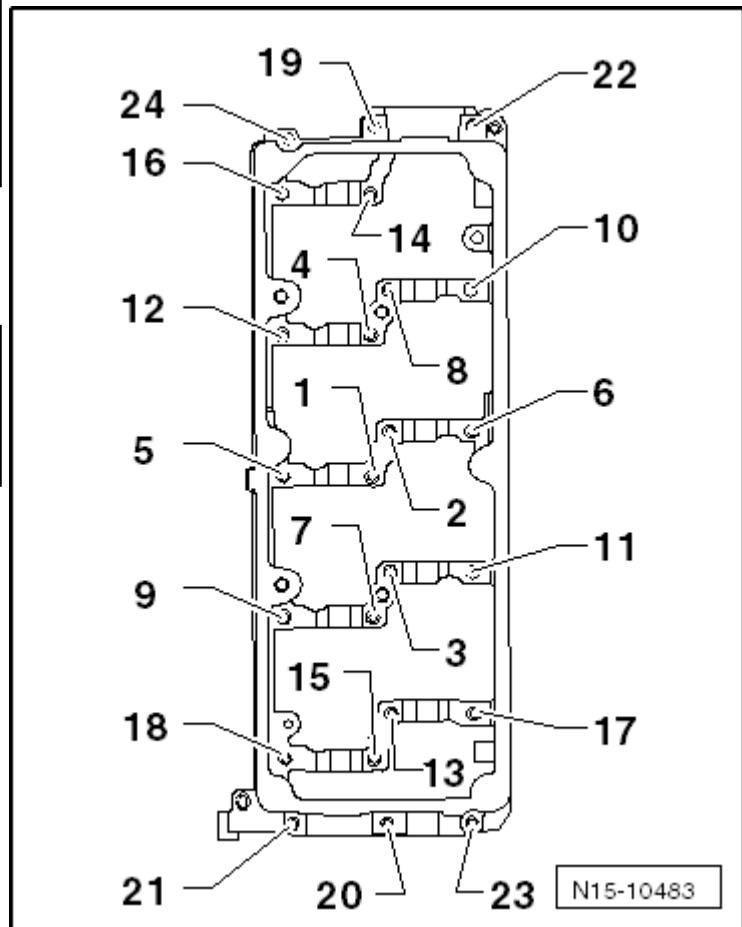


Caution

Make sure that no sealant residue enters the cylinder head and bearings.

- Clean the sealing surfaces, they must be free of oil and grease.
- Oil the journal surfaces of the camshafts.

Assemble the Camshaft Fitting Tool -T40094- part of Camshaft Fitting Tool -T40094A- as follows:

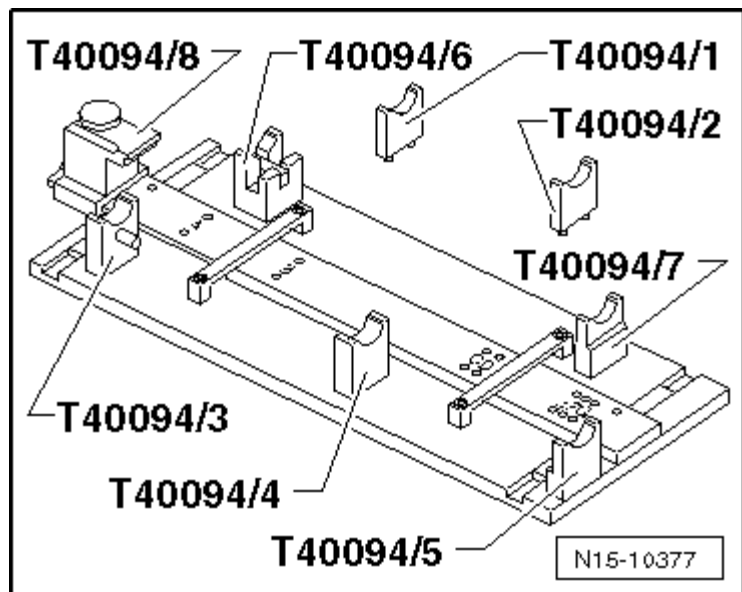


- Remove the -T40094/3-, -T40094/4- and -T40094/5- from the base plate. Loosen the threaded connections from below.



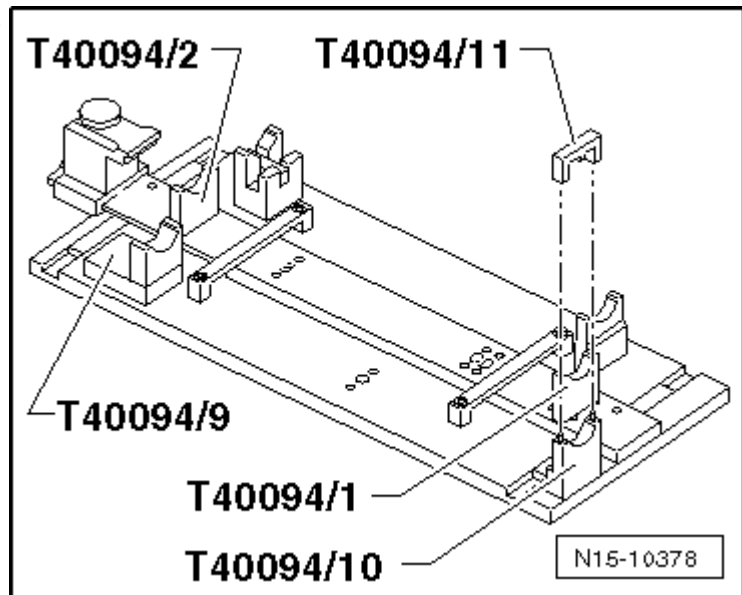
Note

If the Camshaft Fitting Tool -T40094- part of Camshaft Fitting Tool -T40094A-, mounts are not marked, mark the removed mounts, for example, with numbers, to assure it can be assembled later.

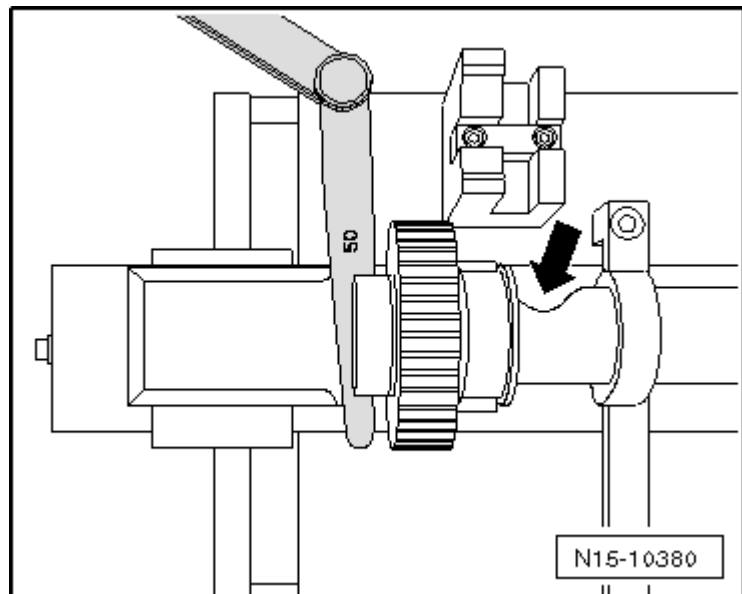


- Instead, mount the -T40094/9- and -T40094/10- part of Camshaft Fitting Tool -T40094A-, in the empty outer locations.
- Position the -T40094/2- on “A” and -T40094/1- on “F”.

- First, install the intake camshaft as illustrated. Make sure the indentation -arrow- for the cylinder head bolt faces “outward”.



- Install a 0.55 mm feeler gauge and push the -T40094/8- into the groove in the intake camshaft.



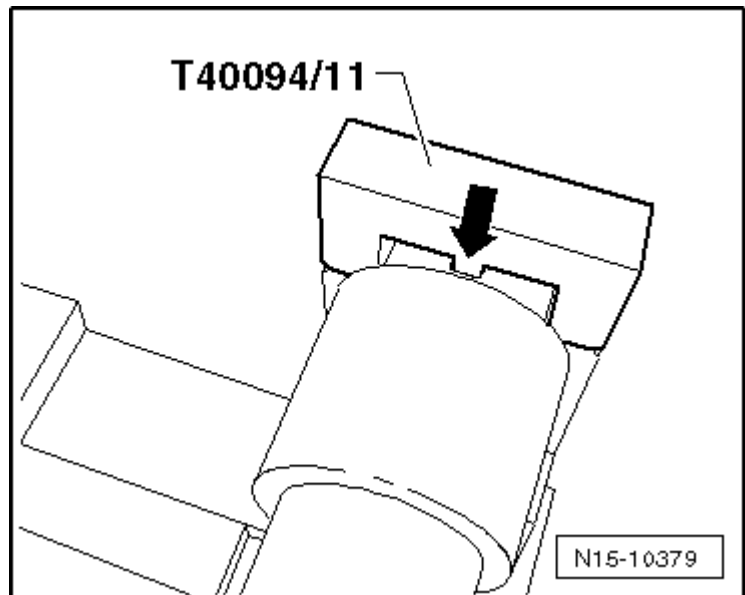
- Install the exhaust camshaft and lock it by the groove -arrow- using the -T40094/11-.

Exhaust camshafts with two-piece gear wheel

- Mount the -T40096/1- part of Camshaft Fitting Tool -T40094A-, on the toothed gears of the exhaust camshaft.

Caution

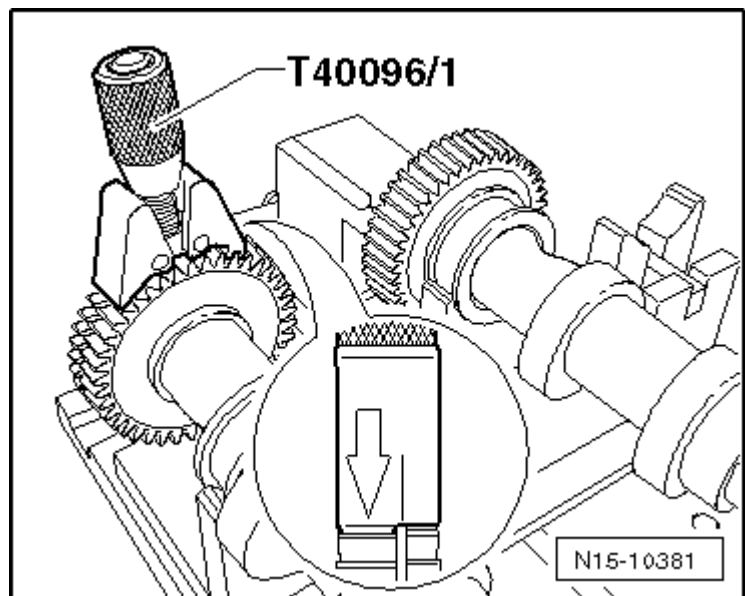
Make sure the clamping jaw marked with an arrow is on the wider sprocket.



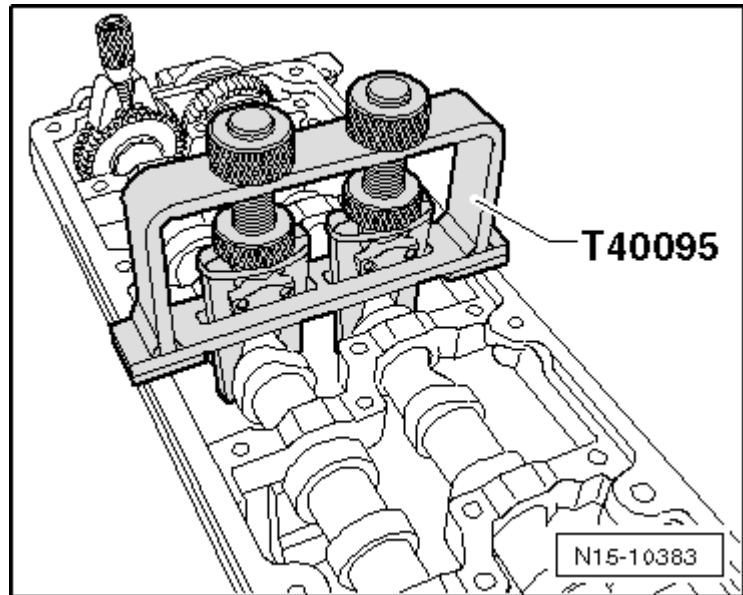
- Tighten the -T40096/1- part of Camshaft Fitting Tool -T40094A-, with the thumb wheel until the tooth faces align. Use a 13 mm open end wrench if necessary.

All Vehicles

- Slide the exhaust camshaft toward the intake camshaft until the splines mesh.
- Position the bearing frame on the camshafts.
- All the camshaft bearings must lie on the camshafts.



- Position the Camshaft Fitting Tool -T40095- as illustrated and secure the camshafts in the bearing frame.
- Remove the -T40094/11-.
- Remove the -T40094/8- from the groove in the intake camshaft.



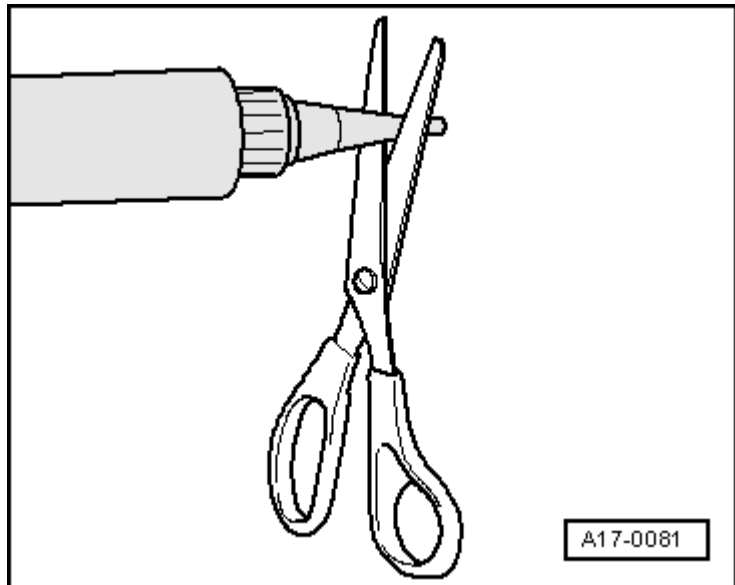
- Cut the sealant tube nozzle at the front mark (nozzle diameter: approximately 2 mm).
- Apply a bead of sealant (approximately 2 to 3 mm thick) -arrow- on the sealing surfaces of the cylinder head as illustrated.



Caution

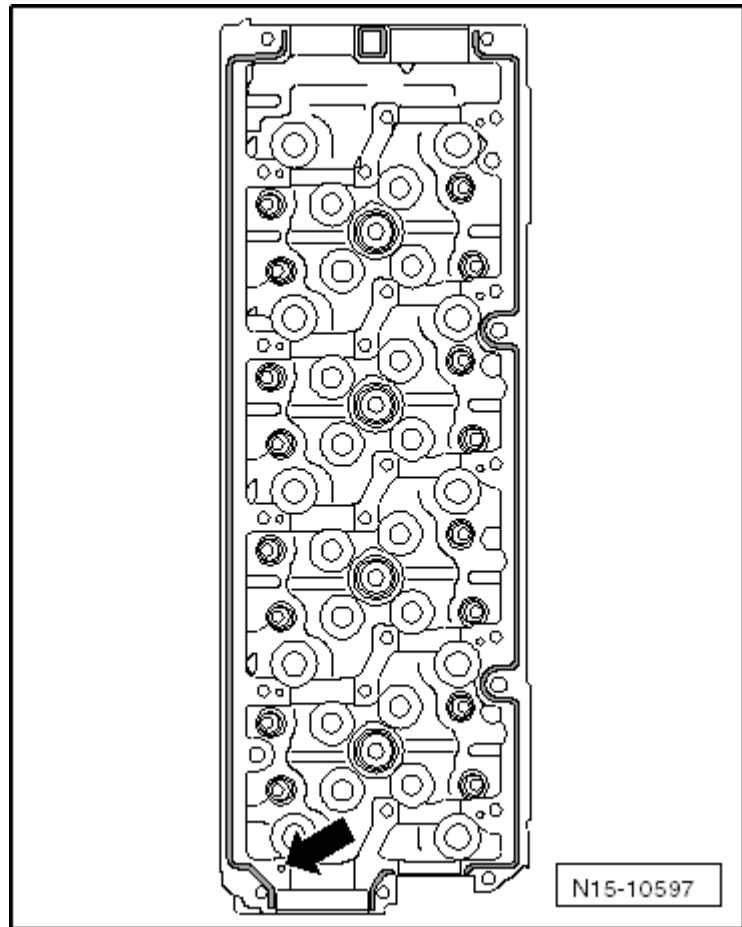
Excess sealant could get on the camshaft bearings or seal off the oil supply holes.

- ◆ **Do not apply the sealant bead thicker than indicated.**
- ◆ **Make sure that the excess sealant does not seal off the oil supply holes - arrow- for the bearing frame.**



Sealant Bead for the Bearing Frame

- Remove the camshafts with the bearing frame and the Camshaft Fitting Tool - T40095- part of Camshaft Fitting Tool - T40094A-.
- Carefully install the camshafts and bearing frame on the cylinder head.



- First, tighten the bearing frame bolts/nuts hand tight in sequence -1 through 24-.
- The bearing frame must be touching the entire contact surface of the cylinder head.
- Fasten the bearing frame bolts/nuts in sequence -1 through 24- until they stop. Tightening specification: 10 Nm
- Remove the Camshaft Fitting Tool -T40095 - and, on the exhaust camshaft with a two-piece gear wheel, -T40096/1-.
- Replace the camshaft seal. Refer to → [Chapter „Camshaft Seal“](#).
- Drive a new sealing cap (-item 15- in the → [Chapter „Valvetrain Overview“](#)) into the cylinder head with a suitable drift until it is flush.

Further installation is performed in the reverse order of removal. Note the following:

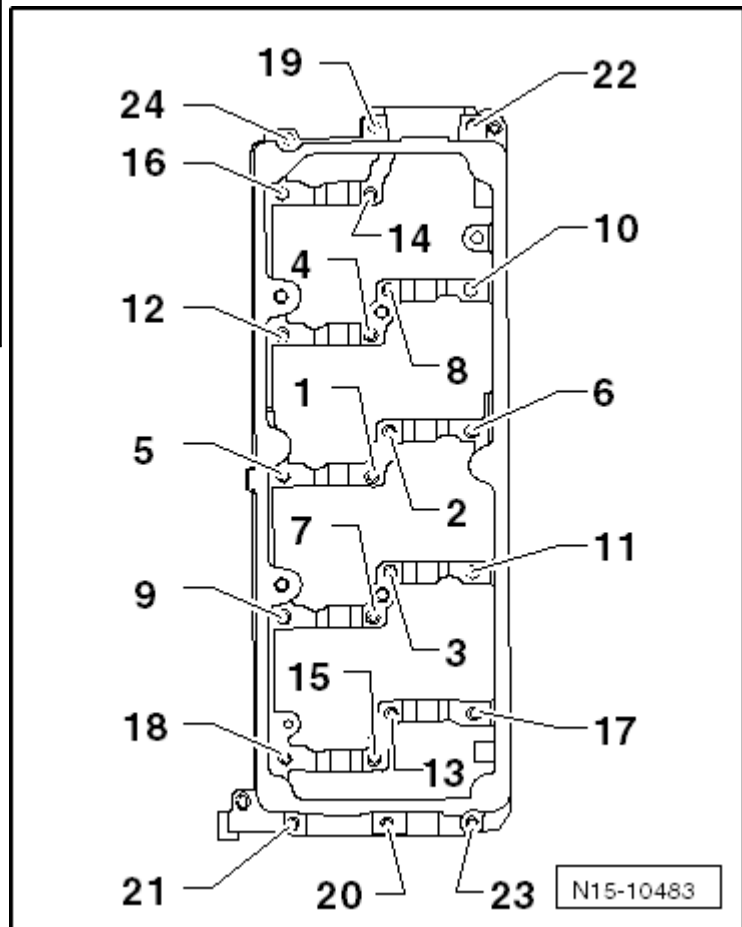


Caution

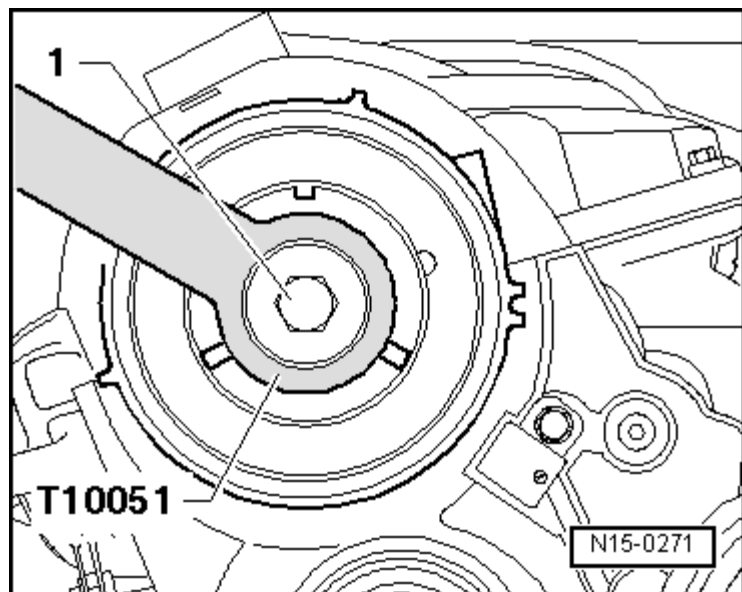
Risk of damaging valves and piston heads after working on the valvetrain.

- ◆ **The engine must not be started for about 30 minutes after installing the camshafts because the hydraulic lash adjusters must seat themselves.**
- ◆ **To ensure the valves do not strike the pistons when starting, carefully rotate the crankshaft at least two revolutions.**

- Place the hub onto the camshaft.



- Tighten the bolt -1- for the hub to 100 Nm. To do this, use the Counterhold - Camshaft Gear -T10051-.



- Push the camshaft gear onto the hub.



Note

The toothed segment -arrow- of the camshaft gear must face upward.

- Install the bolts -1- for the camshaft gear by hand to eliminate play.
- Lock the hub using the Diesel Injection Pump Locking Pin -3359-.
- Install the toothed belt and adjust the valve timing. Refer to → Chapter „Toothed Belt“.
- Install the vacuum pump. Refer to → Chapter „Vacuum Pump“.
- Install the cylinder head cover. Refer to → Chapter „Cylinder Head Cover“.
- Install the fuel filter. Refer to → Fuel Supply System; Rep. Gr.20.
- Install the auxiliary fuel pump/fuel pump 2. Refer to → Fuel Supply System; Rep. Gr.20.

