

# Special tools

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- Crankshaft pulley/hub puller - No.000589653300/000589883300.
- Crankshaft sprocket puller - No.102589053300.
- Flywheel/drive plate holding tool - No.901589026300.
- Flywheel/drive plate locking tool - No.601589024000.
- Injection pump drive pinion holder - No.602589000700.
- Injection pump drive pinion puller - No.602589013300.
- Timing chain link kit - No.602589024000.
- Timing chain link separator (item 1) - No.602589023300.
- Timing chain link separator (item 2) - No.602589046300.
- Timing chain link separator (item 3) - No.602589046301.
- Timing chain link installer - No.602589003900.
- Timing chain link installer die kit 1 - No.602589026300.
- Timing chain link installer die kit 2 - No.602589036300.
- Timing chain to camshaft sprocket holder - No.602589014000.
- Tool case - No.602589009800.
- Viscous coupling pulley holder - No.120589140700.
- Water pump pulley holder - No.603589004000.

# General precautions

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- Disconnect battery earth lead.
- Remove glow plugs to ease turning engine.
- Turn engine in normal direction of rotation (unless otherwise stated).
- Observe tightening torques.
- If fitted: Mark position of crankshaft position (CKP) sensor before removal.
- Do NOT turn crankshaft via camshaft or other sprockets.
- Do NOT turn crankshaft or camshaft with timing chain removed.
- Check diesel injection pump timing after resetting valve timing.

# Valve timing procedures

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**NOTE: Timing chain can be changed without dismantling engine. Using the tools listed above, the new chain can be linked to the old, passed round the sprockets and then joined.**

- Engine at TDC on No.1 cylinder [1].
- Ensure camshaft timing marks aligned [2].
- Remove tensioner assembly before carrying out engine repairs [3].
- During removal/installation of injection pump: Crankshaft position set at 12° BTDC on No.1 cylinder [4].
- Before installing injection pump, carry out basic setting:
- Remove coupling sleeve.
- Turn injection pump pinion until slot [5] aligned with outlet port [6] for No.1 cylinder.
- Turn pinion clockwise until resistance is felt (start of injection).
- Install coupling sleeve.
- Fill chain tensioner with oil before installation:
- Submerge tensioner vertically in SAE 10 engine oil with plunger pointing downwards.
- Compress plunger 7-10 times.
- After filling, ensure tensioner plunger can be compressed slowly and evenly with considerable effort.
- Install tensioner after repairs [3]. Tightening torque: 80 Nm.
- Camshaft sprocket bolt MUST be replaced if length 'X' exceeds 53,6 mm [7].

NOTE: Crankshaft pulley central bolt MUST only be used once [8].

