



Service

Workshop Manual Golf 2004 > Golf Plus 2005 >

4-cylinder diesel engine (1.9 l engine)

Engine ID	BJB	BKC	BRU	BLS	BXE	BXF	BXJ		
-----------	-----	-----	-----	-----	-----	-----	-----	--	--

Edition 01.2009





List of Workshop Manual Repair Groups

Repair Group

- 00 - Technical data
- 10 - Removing and installing engine
- 13 - Crankshaft group
- 15 - Cylinder head, valve gear
- 17 - Lubrication
- 19 - Cooling
- 20 - Fuel supply system
- 21 - Turbocharging/supercharging
- 23 - Mixture preparation - injection
- 26 - Exhaust system
- 28 - Glow plug system

Technical information should always be available to the foremen and mechanics, because their careful and constant adherence to the instructions is essential to ensure vehicle road-worthiness and safety. In addition, the normal basic safety precautions for working on motor vehicles must, as a matter of course, be observed.

All rights reserved.
No reproduction without prior agreement from publisher.



Contents

00 - Technical data	1
1 Technical data	1
1.1 Engine number	1
1.2 Engine data	1
10 - Removing and installing engine	2
1 Removing and installing engine	2
1.1 Removing engine	2
1.2 Securing engine to assembly stand	7
1.3 Notes on installing	7
1.4 Assembly mountings	10
13 - Crankshaft group	12
1 Dismantling and assembling engine	12
1.1 Assembly overview - poly V-belt drive	12
1.2 Removing and installing poly V-belt	13
1.3 Assembly overview - toothed belt drive	15
1.4 Assembly overview - crankcase	19
2 Removing and installing sealing flange and flywheel	20
2.1 Assembly overview - sealing flanges and flywheel	20
2.2 Renewing crankshaft oil seal - pulley end	21
2.3 Removing and installing sealing flange - pulley end	23
2.4 Renewing crankshaft sealing flange - flywheel end	25
2.5 Removing and installing engine speed sender G28	31
3 Crankshaft	33
3.1 Assembly overview - crankshaft	33
3.2 Crankshaft dimensions	38
4 Pistons and conrods	39
4.1 Assembly overview - pistons and conrods	39
4.2 Separating new conrod	40
4.3 Checking piston projection at TDC	41
4.4 Piston and cylinder dimensions	42
4.5 Piston rings, cylinder bore and piston installation position	42
15 - Cylinder head, valve gear	44
1 Cylinder head	44
1.1 Assembly overview - cylinder head	45
1.2 Removing and installing cylinder head cover	48
1.3 Removing, installing and tensioning toothed belts	50
1.4 Removing and installing cylinder head	67
1.5 Checking compression	71
2 Valve gear	74
2.1 Assembly overview - valve gear	74
2.2 Checking valve guides	76
2.3 Renewing valve stem seals	78
2.4 Removing and installing camshaft	80
2.5 Removing and installing camshaft oil seal	84
17 - Lubrication	86
1 Engine oil	86
1.1 Oil capacities	86
1.2 Checking engine oil level	86



2	Parts of lubrication system	87
2.1	Assembly overview - oil pump, sump	87
2.2	Removing and installing sump	88
3	Oil filter bracket, oil pressure, engine oil cooler and oil supply line	92
3.1	Assembly overview - oil filter bracket and engine oil cooler	92
3.2	Checking oil pressure and oil pressure switch	93
3.3	Assembly overview - oil supply line to turbocharger	94
3.4	Removing and installing oil supply line to turbocharger	95
19 - Cooling		97
1	Parts of cooling system	97
1.1	Parts of cooling system, body side	98
1.2	Parts of cooling system, engine side	99
1.3	Coolant hose schematic diagram	101
1.4	Draining and filling with coolant	102
1.5	Removing and installing radiator	105
1.6	Removing and installing coolant pump	106
1.7	Removing and installing thermostat	108
1.8	Checking cooling system for leaks	110
1.9	Checking engine oil cooler for leaks	112
20 - Fuel supply system		114
1	Safety precautions when working on fuel supply system	114
2	Rules for cleanliness	115
3	Fuel tank, vehicles with front-wheel drive	116
3.1	Assembly overview - fuel tank	116
3.2	Emptying fuel tank	117
3.3	Removing and installing fuel tank	121
3.4	Removing and installing fuel delivery unit	123
3.5	Removing and installing fuel gauge sender	124
3.6	Checking fuel pump	125
4	Fuel tank, vehicles with four-wheel drive	127
4.1	Assembly overview - fuel tank	127
4.2	Emptying fuel tank	128
4.3	Removing and installing fuel tank	132
4.4	Removing and installing fuel gauge sender 2 G169	135
4.5	Removing and installing suction-jet pump	137
4.6	Checking fuel pump	138
5	Repairing fuel supply system	140
5.1	Assembly overview - fuel filter	140
5.2	Removing and installing fuel cooler	141
5.3	Assembly overview - accelerator mechanism	142
5.4	Checking tandem pump	143
5.5	Removing and installing tandem pump	147
21 - Turbocharging/supercharging		151
1	Charge air system with turbocharger	151
1.1	Safety precautions	151
1.2	Rules for cleanliness	151
1.3	Assembly overview - turbocharger	152
1.4	Removing and installing turbocharger	156
1.5	Assembly overview - parts of charge air cooling	158
1.6	Hose connections	161
1.7	Checking charge air system for leaks	162
1.8	Vacuum hose schematic diagram	164



23 - Mixture preparation - injection	166
1 Diesel direct injection system	166
1.1 Safety precautions	166
1.2 Rules for cleanliness	167
1.3 Assembly overview - unit injector	167
1.4 Removing and installing unit injector	169
1.5 Adjusting non-contact gap of unit injectors	171
1.6 Removing and installing O-rings for unit injector	172
1.7 Assembly overview - intake manifold	174
1.8 Cleaning the intake manifold flap support, Engine code BLS and BXJ	176
1.9 Assembly overview - air filter	177
2 Engine control unit	178
2.1 Reading and erasing engine control unit fault memory	178
2.2 Adapting functions and components	179
2.3 Removing and installing engine control unit, Golf	180
2.4 Removing and installing anti-theft engine control unit, Golf	180
2.5 Removing and installing engine control unit, Golf Plus	183
2.6 Removing and installing anti-theft engine control unit, Golf Plus	183
26 - Exhaust system	186
1 Exhaust system	186
1.1 Assembly overview - front exhaust pipe with catalytic converter	186
1.2 Assembly overview - front exhaust pipe with particulate filter	187
1.3 Assembly overview - silencer with mountings (vehicles with front wheel drive)	189
1.4 Assembly overview - silencer with mountings (vehicles with four-wheel drive)	191
1.5 Aligning exhaust system free of stress	192
2 Exhaust gas recirculation system	193
2.1 Assembly overview - parts of exhaust gas recirculation	193
28 - Glow plug system	198
1 Checking glow plug system	198
1.1 Removing, installing and checking glow plugs	198
1.2 Characteristics of ceramic glow plugs	199
1.3 Removing, installing and checking ceramic glow plugs	200





00 – Technical data

1 Technical data

Engine number ⇒ [page 1](#)

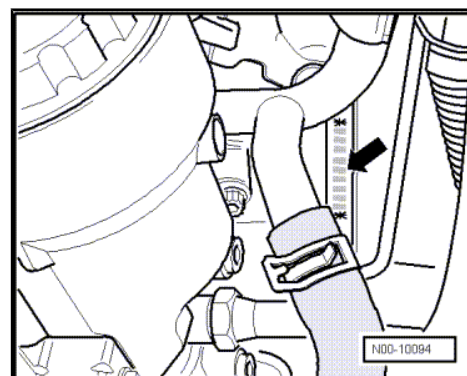
Engine data ⇒ [page 1](#)

1.1 Engine number

The engine number (“code letters” and “serial number”) can be found at the joint between engine and gearbox.

Additionally there is a sticker on the toothed belt guard with “engine code” and “serial number”.

The engine code is also included on the vehicle data sticker.



1.2 Engine data

Engine code	BJB	BKC	BRU	BLS	BXE	BXF	BXJ
Manufactured	10.03 ▶	10.03 ▶	04.04 ▶	02.06 ▶	03.06	03.06	11.07
Emissions fulfil	EU3 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard	EU4 standard
Capacity l	1.9	1.9	1.9	1.9	1.9	1.9	1.9
Output kW at rpm	77/4000	77/4000	66/4000	77/4000	77/4000	66/4000	66/4000
Torque Nm at rpm	250/1900	250/1900	210/1800...2500	250/1900	250/1900	210/1800	210/1800...2500
Bore Ø mm	79.5	79.5	79.5	79.5	79.5	79.5	79.5
Stroke mm	95.5	95.5	95.5	95.5	95.5	95.5	95.5
Valves per cylinder	2	2	2	2	2	2	2
Compression ratio	19.0	19.0	19.0	18.5	18.5	19.0	19.0
Fuel according to	DIN EN 590	DIN EN 590	DIN EN 590	DIN EN 590	DIN EN 590	DIN EN 590	DIN EN 590
Firing order	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2	1-3-4-2
Catalytic converter	yes	yes	yes	yes	yes	yes	yes
Exhaust gas recirculation	yes	yes	yes	yes	yes	yes	yes
Turbocharging/supercharging	yes	yes	yes	yes	yes	yes	yes
Charge air cooler	yes	yes	yes	yes	yes	yes	yes
Particulate filter	no	no	no	yes	no	no	no



10 – Removing and installing engine

1 Removing and installing engine

Removing engine ⇒ [page 2](#)

Securing engine to assembly stand ⇒ [page 7](#)

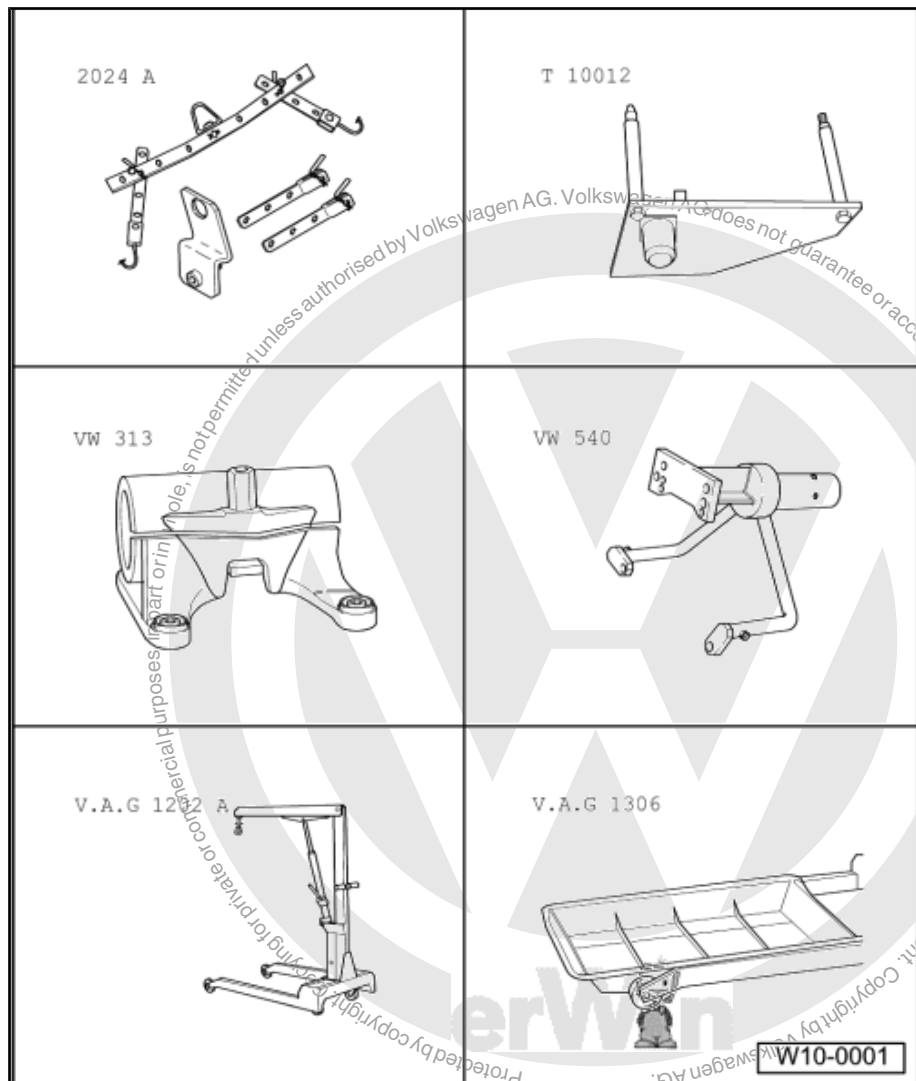
Notes on installing ⇒ [page 7](#) .

Assembly mountings ⇒ [page 10](#) .

1.1 Removing engine




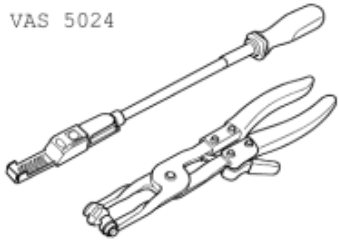

Special tools and workshop equipment required

- ◆ Lifting tackle -2024 A-
- ◆ Engine bracket -T10012-
- ◆ Support clamp -VW 313-
- ◆ Engine and gearbox support -VW 540-
- ◆ Workshop crane -V.A.G 1202 A-
- ◆ Drip tray -V.A.G 1306-





- ◆ Torque wrench -V.A.G 1331-
- ◆ Torque wrench -V.A.G 1332-
- ◆ Engine and gearbox jack - V.A.G 1383 A-
- ◆ Spring-type clip pliers -VAS 5024-
- ◆ Stepladder -VAS 5085-
- ◆ Guide rods -T10093-
- ◆ Cable ties

V.A.G 1331 	V.A.G 1332 
V.A.G 1383 A 	VAS 5024 
VAS 5085 	W10-0058



Note

- ◆ *Before carrying out further work, disconnect battery earth strap. First check whether a coded radio is fitted. Obtain anti-theft coding first if necessary.*
- ◆ *The engine is removed downwards together with the gearbox.*
- ◆ *All cable ties which are opened or cut through when engine is removed must be replaced in the same position when engine is installed.*





WARNING

When doing any repair work, especially in the engine compartment, pay attention to the following due to the cramped conditions:

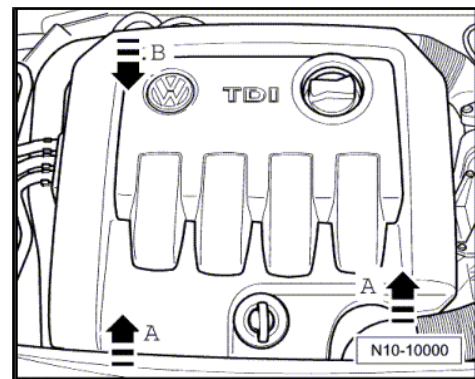
- ◆ *Route all the various lines (e.g. for fuel, hydraulics, activated charcoal filter system, coolant, refrigerant, brake fluid and vacuum) and electrical wiring in their original positions.*
- ◆ *Ensure that there is sufficient clearance to all moving or hot components.*

Procedure

- With ignition switched off, disconnect earth strap from battery.

One-piece engine cover

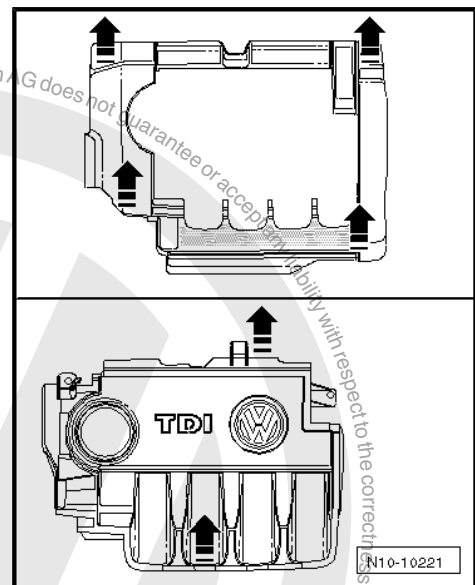
For one-piece engine cover, pull engine cover abruptly upwards at front and right -arrows A-, then pull forwards out of rear fastening -arrow B-.



Two-piece engine cover

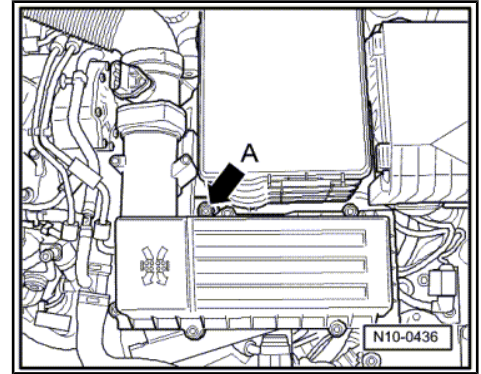
For two-piece engine cover, first pull outer engine cover abruptly upwards at -arrows-, then pull inner engine cover abruptly upwards at -arrows-.

- Remove plenum chamber bulkhead. ⇒ General body repairs, exterior; Rep. Gr. 50 ; Body - front, plenum chamber bulkhead .
- Remove air filter housing with air mass meter and connecting pipe.





- Remove bolt -arrow A- and pull air filter housing upwards out of mounting.
- Remove battery and battery tray.
- Disconnect fuel supply and return lines as well as coolant line on cylinder head.



WARNING

- ◆ **The fuel and the fuel lines in the fuel system can become very hot (danger of scalding)!**
- ◆ **The fuel system is also under pressure! Before opening the system, place cloths around the connections. Then carefully loosen connection to release the pressure!**
- ◆ **Wear eye and hand protection when performing any type of repair work on the fuel system!**

- Remove insulation tray ⇒ General body repairs, exterior; Rep. Gr. 50 ; Body - front; Assembly overview
- Bring lock carrier into service position ⇒ General body repairs, exterior; Rep. Gr. 50 ; Body - front; Lock carrier - service position .
- Drain coolant ⇒ [page 102](#) .

Vehicles with air conditioner



Note

To prevent damage to condenser or to refrigerant lines/hoses, ensure that the lines and hoses are not stretched, kinked or bent.

To facilitate removing and installing engine without opening refrigerant circuit:

- Remove poly V-belt ⇒ [page 13](#)
- Remove air conditioner compressor ⇒ Heating, air conditioning; Rep. Gr. 87 ; Removing and installing compressor bracket .
- Secure air conditioner compressor to lock carrier so that refrigerant lines are free of stress.
- Remove alternator ⇒ Electrical system; Rep. Gr. 27 ; Removing and installing alternator and poly V-belt .

Continuation for all vehicles

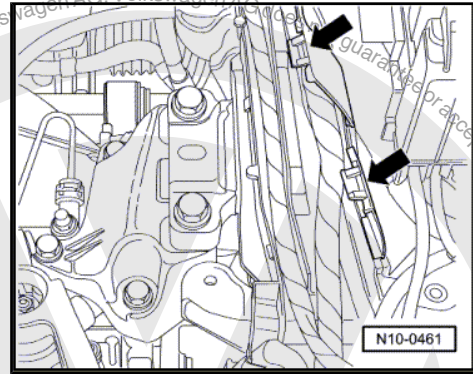
- Remove connecting pipes between charge air cooler and engine.
- Unbolt left and right-hand drive shafts from gearbox ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Removing and installing drive shaft .
- Remove front exhaust pipe ⇒ [page 186](#) .
- Release connectors on engine control unit and pull them off.



- Open all cable guide fasteners -arrows-.
- Remove wiring harness from cable guide on longitudinal member and lay to side on engine.
- Pull off or disconnect all other electrical connections from engine and gearbox as necessary and lay to side.
- Separate all connecting, coolant, vacuum and intake hoses from engine.

Vehicles with manual gearbox

- Remove slave cylinder for hydraulic clutch ⇒ 6-speed manual gearbox 02S; Rep. Gr. 30 ; Repairing clutch mechanism; Assembly overview - hydraulics .
- Unbolt gear selector mechanism from gearbox. ⇒ 6-speed manual gearbox 02S; Rep. Gr. 34 ; Repairing selector mechanism .



Vehicles with four-wheel drive:

- Remove selector mechanism from gearbox ⇒ 6-speed manual gearbox 02Q, four-wheel drive; Rep. Gr. 34 ; Repairing selector mechanism .
- Separate pressure line for hydraulic clutch control.
- Remove front propshaft ⇒ Final drive 02D, 0AV; Rep. Gr. 39 ; Assembly overview - repairing propshaft .

Continuation for all vehicles:

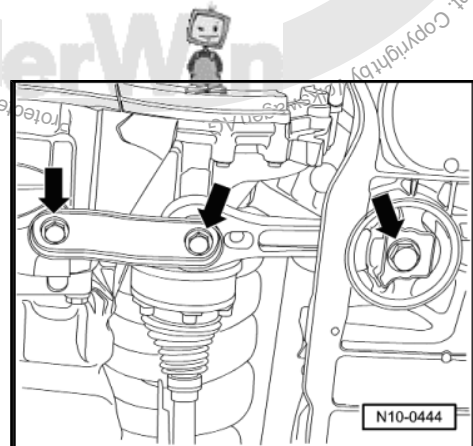
- Unbolt pendulum support -arrows-.

Vehicles with particulate filter

- Remove subframe ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Removing and installing subframe .
- Remove right drive shaft ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Removing and installing drive shafts .
- Remove steering box ⇒ Running gear, axles, steering; Rep. Gr. 48 ; Removing and installing steering box .

Continuation for all vehicles:

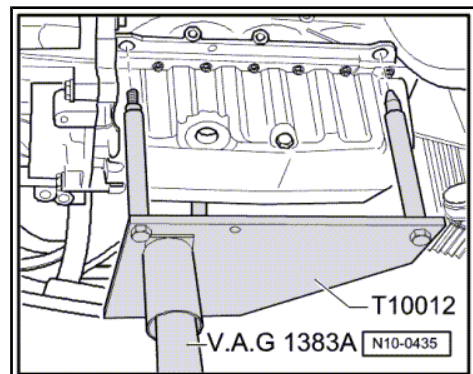
- Insert engine bracket -T10012- in engine and gearbox jack -V.A.G 1383 A- .



Note

Support pins must be secured to engine bracket -T10012- as shown.

- Fit engine bracket -T10012- to cylinder block with M10 x 25/ 8.8 bolt and tighten to approx. 40 Nm.
- Raise engine and gearbox slightly using engine and gearbox jack -V.A.G 1383 A- .

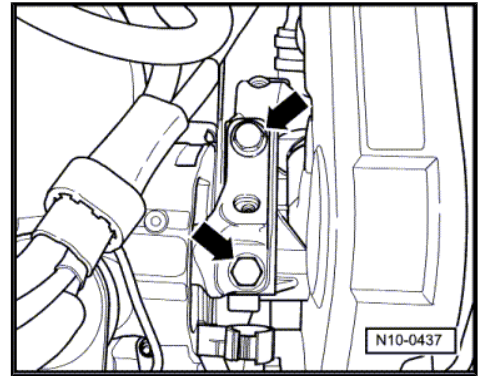




- Unbolt assembly mounting on engine side from engine bracket -arrows-

i Note

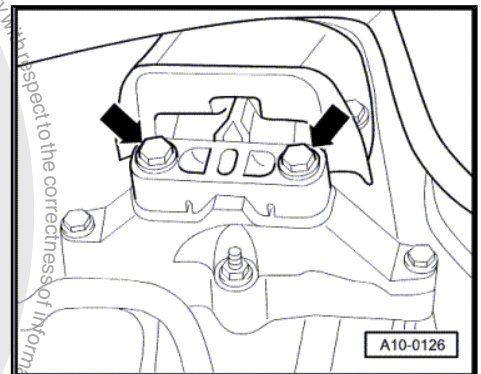
To remove securing bolts, use stepladder -VAS 5085- .



- Unbolt assembly mounting on gearbox side from gearbox bracket -arrows-
- Carefully lower engine with gearbox.

i Note

Engine with gearbox must be guided carefully when lowered to prevent damage to bodywork.



1.2 Securing engine to assembly stand

When working on the engine, secure it to support clamp -VW 313- of the assembly stand using engine and gearbox support -VW 540- .

Procedure

- Disconnect gearbox.
- Attach lifting tackle -2024 A- as shown and raise engine out of engine and gearbox jack -V.A.G 1383 A- using workshop hoist -V.A.G 1202 A- .

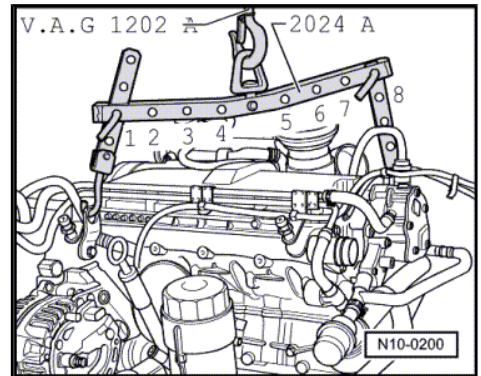
Pulley end: 2nd hole in hook rail at position 1

Flywheel end: 4th hole in hook at position 8



WARNING

The hooks and locating pins must be secured with locking pins.



i Note

- ◆ The positions marked 1...4 on the bar must be towards the pulley end.
- ◆ The holes in the hook rails are counted up from the hook.
- Secure engine on support clamp -VW 313- using engine and gearbox jack -VW 540- .

1.3 Notes on installing

Installation is carried out in the reverse order. When installing, note the following:



- Check clutch release bearing for wear and renew if necessary.
- Lubricate splines of input shaft lightly with G 000 100.
- Check whether dowel sleeves for centring engine and gearbox are in cylinder block and install if necessary.

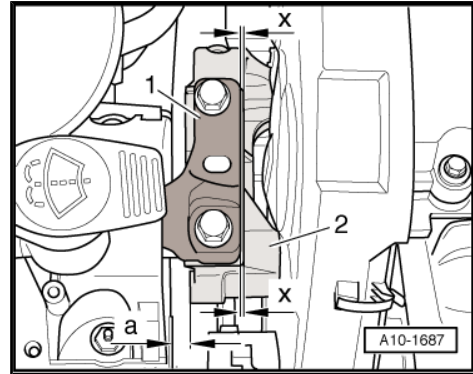
When installing engine, ensure correct position of assembly mountings:

- On belt pulley side, ensure that there is a distance -a- of at least 10 mm between engine support and right longitudinal member.
- The side surface of the engine support -2- should be located parallel to the support arm -1-. Dimension -x- must be identical at top and bottom.



Note

Distance -a- = 10 mm can also be checked with a metal rod of suitable size, or similar.

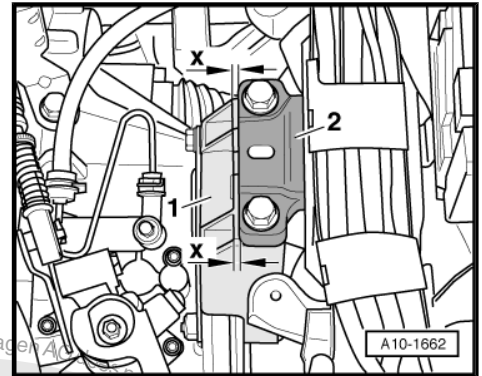




- Ensure that the edges of the support arm on the gearbox assembly mounting -2- and gearbox support -1- are parallel. Dimension -x- must be identical at top and bottom.

i Note

- ◆ *Torque specifications for assembly mounting* ⇒ [page 10](#) .
- ◆ *Electrical connections and routing.* ⇒ *Electrical system; Rep. Gr. 97*



- Install pendulum support.
- Install drive shafts ⇒ Running gear, axles, steering; Rep. Gr. 40 ; Removing and installing drive shafts .
- Install front exhaust pipe ⇒ [page 186](#) .

Vehicles with manual gearbox

- Install slave cylinder for hydraulic clutch ⇒ 6-speed manual gearbox 02S; Rep. Gr. 30 ; Repairing clutch mechanism; Assembly overview - hydraulics .
- Remove selector mechanism from gearbox ⇒ 6-speed manual gearbox 02S; Rep. Gr. 34 ; Repairing selector mechanism .

Vehicles with four-wheel drive:

- Install selector mechanism on gearbox ⇒ 6-speed manual gearbox 02Q, four-wheel drive; Rep. Gr. 34 ; Repairing selector mechanism .
- Install pressure line for hydraulic clutch control.
- Install front propshaft ⇒ Final drive 02D, 0AV; Rep. Gr. 39 ; Assembly overview - repairing propshaft .

Continuation for all vehicles:

- On vehicles with particulate filter install subframe ⇒ Running gear, axles, steering; Rep. Gr. 40
- Install alternator ⇒ Electrical system; Rep. Gr. 27 ; Removing and installing alternator and poly V- belt .
- Install air conditioner compressor ⇒ Heating, air conditioning; Rep. Gr. 87 ; Removing and installing compressor bracket.
- Install poly V-belt ⇒ [page 13](#) .
- Install insulation tray ⇒ General body repairs, exterior; Rep. Gr. 50 ; Body - front; Assembly overview.
- Install engine control unit ⇒ [page 178](#) .
- Install plenum chamber bulkhead ⇒ General body repairs, exterior; Rep. Gr. 50 ; Body - front; Plenum chamber bulkhead .
- Fill cooling system with coolant ⇒ [page 102](#) .
- Carry out road test and then read fault memory ⇒ [page 178](#) .



Specified torques

Threaded connection		Specified torque
Bolts, nuts	M6	10 Nm
	M8	20 Nm
	M10	45 Nm
	M12	60 Nm

1.4 Assembly mountings

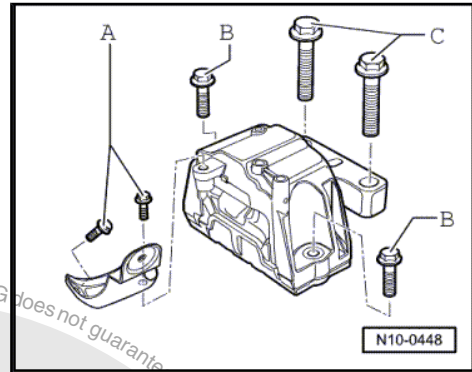
Engine assembly mounting

A = 20 Nm + 90° (1/4 turn) further ¹⁾

B = 40 Nm + 90° (1/4 turn) further ¹⁾

C = 60 Nm + 90° (1/4 turn) further ¹⁾

¹⁾ Renew

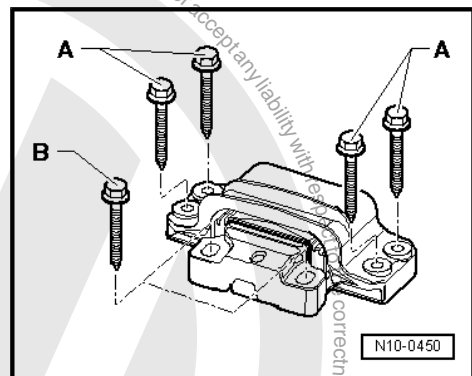


Gearbox assembly mounting

A = 40 Nm + 90° (1/4 turn) further ¹⁾

B = 60 Nm + 90° (1/4 turn) further ¹⁾

¹⁾ Renew





Pendulum support

Always note the size and strength class of bolt. Different specified torques are valid.

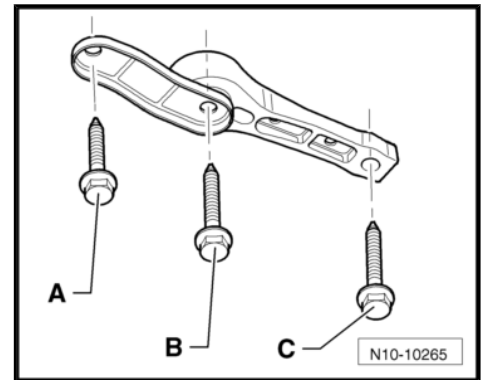


Caution

From model year 08, in manual gearboxes 02Q Heli Coil inserts are installed in the threaded connections to pendulum support. Difference \Rightarrow Rep. Gr. 34

For these and all other gearboxes bolts with strength class 10.9 must be used.

If Heli Coil inserts are not fitted in manual gearboxes 02Q, use bolts with strength class 8.8 and the specified torques.



Bolt -A-

M10 x 35 strength class 8.8: turn 40 Nm + 90° further

M10 x 35 strength class 10.9: turn 50 Nm + 90° further

Always renew after removing

Bolt -B-

M10 x 75 strength class 8.8: turn 40 Nm + 90° further

M10 x 75 strength class 10.9: turn 50 Nm + 90° further

Always renew after removing

Bolt -C-

M14 x 1.5 x 70

100 Nm + turn 90° further

Tighten only if pendulum support is bolted to gearbox

Always renew after removing



13 – Crankshaft group

1 Dismantling and assembling engine

Assembly overview - poly V-belt drive ⇒ [page 12](#)

Removing and installing poly V-belt ⇒ [page 13](#)

Assembly overview - toothed belt drive ⇒ [page 15](#)

Assembly overview - crankcase ⇒ [page 19](#)



Note

If large quantities of metal particles or other deposits (caused, for example, by partial seizure of the crankshaft or conrod bearings) are found in the engine oil when making repairs, clean the oil passages thoroughly and renew the engine oil cooler in order to prevent further damage from occurring later.

1.1 Assembly overview - poly V-belt drive

1 - Belt pulley and vibration damper

- ❑ Can only be installed in one position, holes are offset.

2 - 25 Nm

3 - Alternator

4 - Bracket

- ❑ For alternator and air conditioner compressor.

5 - Poly V-belt tensioning element

- ❑ Swing with ring spanner to slacken poly V-belt.

6 - 25 Nm

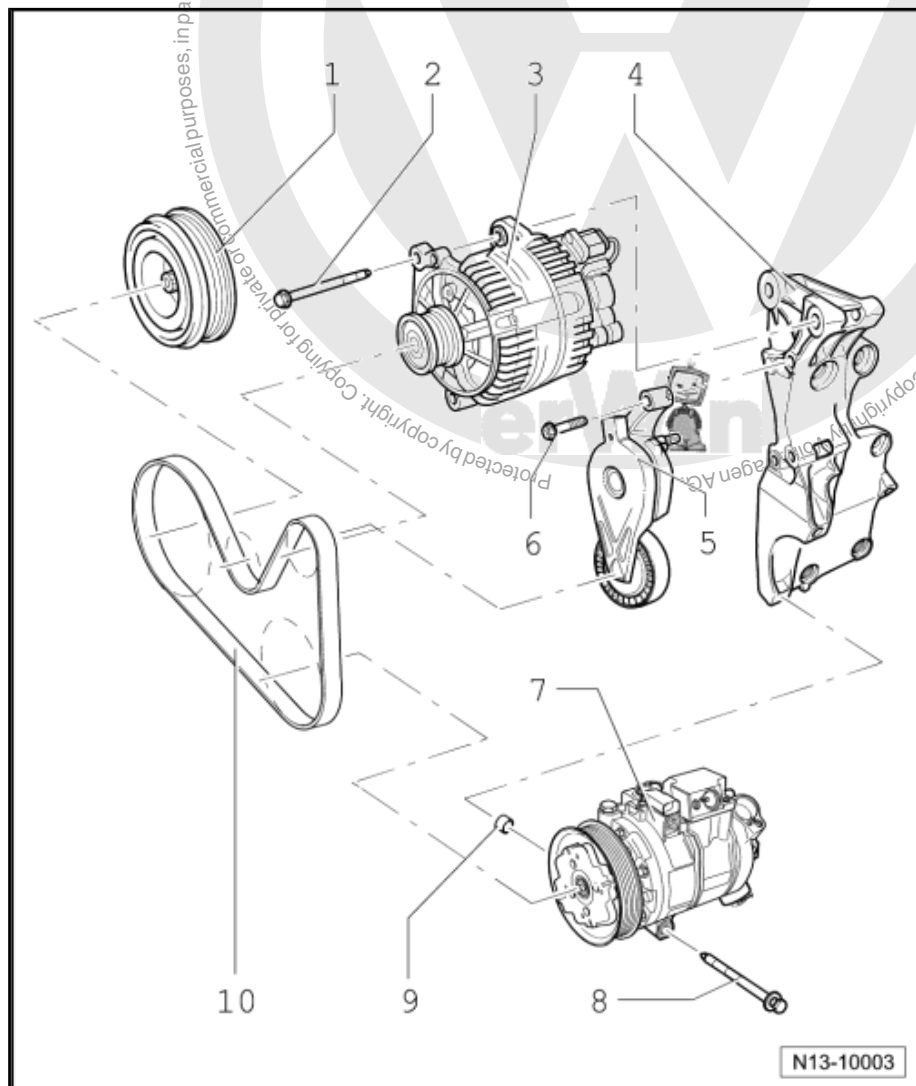
7 - Air conditioner compressor

8 - 25 Nm

9 - Dowel sleeves

10 - Poly V-belt

- ❑ Mark direction of rotation before removing.
- ❑ Check for wear.
- ❑ Do not kink.
- ❑ Removing and installing ⇒ [page 13](#).

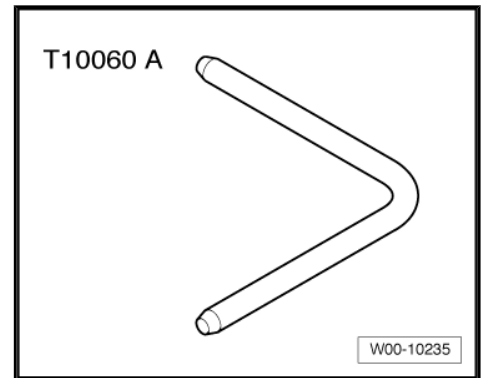




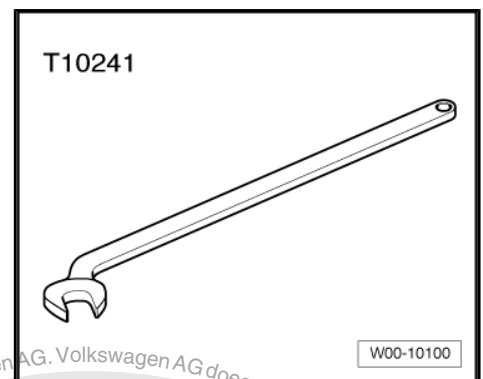
1.2 Removing and installing poly V-belt

Special tools and workshop equipment required

- ◆ Locking pin -T10060 A-



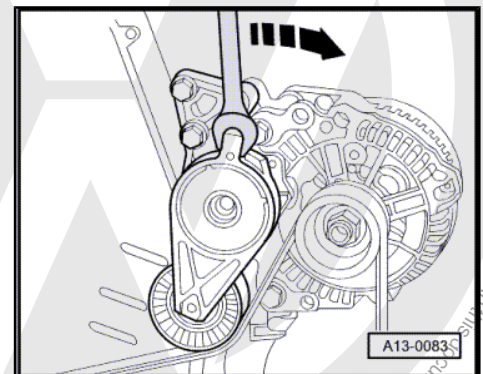
- ◆ 16 mm open-end spanner -T 10241-



1.2.1 Removing poly V-belt

- Remove insulation tray. ⇒ General body repairs, exterior; Rep. Gr. 50 ; Body - front; Assembly overview .
- Pull fuel filter out of bracket and lay it with hoses to side.
- Mark direction of rotation of poly V-belt.
- Swing tensioning element in direction of arrow to remove tension from poly V-belt.

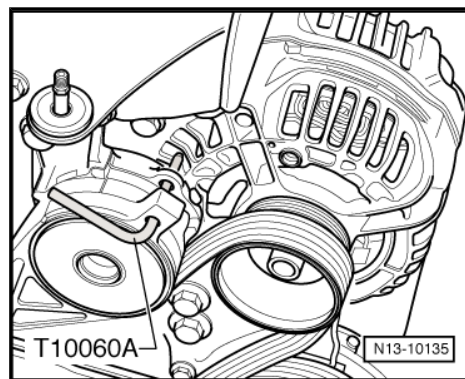
The open-end spanner 16 mm -T 10241- is particularly well suited to relieve tension.





Golf 2004 > , Golf Plus 2005 >
4-cylinder diesel engine (1.9 l engine) - Edition 01.2009

- Lock tensioning element in position with locking pin -T10060 A- .
- Remove poly V-belt.



1.2.2 Installing poly V-belt

- Installation is carried out in the reverse sequence of removal.



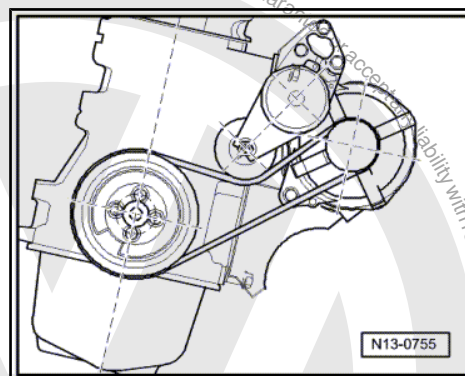
Note

- ◆ Before installing poly V-belt, ensure that all ancillaries (alternator, air conditioner compressor) are secured tightly.
- ◆ When fitting poly V-belt, check direction of belt rotation and ensure proper seating of belt in pulleys.
- ◆ Lastly, place poly V-belt over alternator.

After completing repairs always:

- Start engine and check belt running.

Belt drive without air conditioner compressor



Belt drive with air conditioner compressor

