



Contents

00 - Technical data	1
1 Technical data	1
1.1 Engine number	1
1.2 Engine data	1
2 Safety instructions	2
2.1 Safety precautions when working on fuel supply system	2
2.2 Safety precautions for when using test and measuring equipment during a road test	3
2.3 Safety precautions when working on cooling system	3
3 General repair notes	4
3.1 Rules for cleanliness	4
3.2 Foreign objects in engine	4
10 - Removing and installing engine	5
1 Removing and installing engine	5
1.1 Removing engine	5
1.2 Removing engine from scissor-type assembly platform	13
1.3 Securing engine to assembly stand	15
1.4 Additional information and assembly work for vehicles with air conditioner	16
1.5 Installing engine	17
2 Assembly mountings	18
2.1 Assembly overview - engine mountings	18
2.2 Specified torques - Assembly mountings	18
13 - Crankshaft group	19
1 Dismantling and assembling engine	19
1.1 Dismantling and assembling engine, parts I-III	19
1.2 Removing and installing crankshaft	24
1.3 Removing and installing drive plate	25
1.4 Crankshaft bearing cap identification	26
1.5 Crankshaft dimensions	27
1.6 Renewing crankshaft oil seal - engine timing end	27
1.7 Renewing alternator shaft oil seal	28
2 Dismantling and assembling pistons and conrods	30
2.1 Assembly overview - pistons and conrods	30
2.2 Separating new conrods	31
2.3 Installation position and allocation of piston to cylinder	32
2.4 Checking piston ring gap	32
2.5 Checking ring-to-groove clearance	32
2.6 Checking cylinder bores	33
2.7 Piston and cylinder dimensions	33
15 - Cylinder head, valve gear	34
1 Overview - cylinder head	34
1.1 Assembly overview - cylinder head	34
1.2 Renewing pipe connection for coolant	36
1.3 Removing and installing camshaft drive gear	37
1.4 Setting engine to TDC No. 1 cylinder	41
1.5 Removing and installing cylinder head	42
1.6 Checking compression	44
2 Repairing valve gear	47
2.1 Assembly overview - valve gear	47
2.2 Reworking valve seats	51



2.3	Checking valve guides	53
2.4	Renewing valve stem seals	53
2.5	Removing and installing camshaft	55
17	- Lubrication	57
1	Engine oil	57
1.1	Oil capacities	57
1.2	Checking engine oil level	57
2	Parts of lubrication system	58
2.1	Assembly overview - oil pump, sump	58
2.2	Assembly overview - oil filter housing	59
2.3	Removing and installing oil sump	62
2.4	Checking oil pressure and oil pressure switch	64
19	- Cooling	67
1	Removing and installing parts of cooling system	67
1.1	Parts of cooling system, body side	68
1.2	Assembly overview - radiator fan	69
1.3	Removing and installing fan support	69
1.4	Parts of cooling system, engine side	70
1.5	Coolant hose schematic diagram	72
1.6	Draining and filling coolant	72
1.7	Removing and installing radiator	75
1.8	Removing and installing coolant pump	77
1.9	Checking oil cooler for leaks	82
20	- Fuel supply system	85
1	Removing and installing parts of fuel supply system	85
1.1	Rules for cleanliness	85
1.2	Safety precautions when working on fuel supply system	86
1.3	Assembly overview - fuel tank with attachments (► model year 08)	86
1.4	Assembly overview - fuel tank with attachments (model year 08 ►)	88
1.5	Assembly overview - fuel filter with fuel cooler	90
1.6	Emptying fuel tank	91
1.7	Removing and installing fuel pump unit, fuel gauge sender and suction jet pumps (for vehicles ► model year 08)	95
1.8	Removing and installing fuel pump unit, fuel gauge sender and suction jet pumps (for vehicles model year 08 ►)	97
1.9	Removing and installing fuel tank with attached components	99
1.10	Checking fuel pumps	102
1.11	Checking tandem pump	104
1.12	Removing and installing tandem pump	107
1.13	Assembly overview - accelerator mechanism	109
21	- Turbocharging/supercharging	110
1	Charge air system with turbocharger	110
1.1	Rules for cleanliness	110
1.2	Turbocharger with attachments for engine codes BAC and BLK	110
1.3	Removing and installing turbocharger for engine codes BAC and BLK	111
1.4	Turbocharger with attachments (engine codes BPD and BPE)	114
1.5	Removing and installing turbocharger (engine codes BPD and BPE)	116
1.6	Removing and installing parts of charge air cooling	119
1.7	Checking charge air system for leaks	120
1.8	Hose connections	122
1.9	Vacuum hose schematic diagram	123
23	- Mixture preparation - injection	126



1	Repairing diesel direct injection system	126
1.1	Safety precautions	126
1.2	Rules for cleanliness	127
1.3	Removing and installing wiring harness for unit injectors	127
1.4	Removing and installing unit injector	130
1.5	Assembly overview - unit injector	133
1.6	Removing and installing O-rings for unit injector	134
1.7	Assembly overview - intake manifold and fuel rail	135
1.8	Repairing intake manifold flap	137
1.9	Dismantling and assembling air filter	139
2	Engine control unit	140
2.1	Reading and deleting engine control unit event memory	140
2.2	Removing and installing engine control unit J623	141
2.3	Removing and installing anti-theft engine control unit J623	141
26	- Exhaust system	145
1	Exhaust system	145
1.1	Assembly overview - front exhaust pipe with catalytic converters	145
1.2	Assembly overview - front exhaust pipe with particulate filter	146
1.3	Removing and installing particulate filter	148
1.4	Assembly overview - exhaust manifold (engine codes BPD, BPE)	149
1.5	Removing and installing exhaust manifold (engine codes BPD, BPE)	151
1.6	Silencer with mountings	153
2	Exhaust gas recirculation system	155
2.1	Assembly overview - exhaust gas recirculation	155
2.2	Checking exhaust gas recirculation valve (mechanical)	159
28	- Glow plug system	161
1	Glow plug system	161
1.1	Characteristics of glow plugs	161
1.2	Checking metal glow plugs	161
1.3	Removing, installing and checking ceramic glow pin plugs	162