



Contents

00 - Technical data	1
1 Technical data	1
1.1 Technical data	1
1.2 Engine number	1
1.3 Engine data	1
10 - Removing and installing engine	3
1 Removing and installing engine	3
1.1 Removing and installing engine	3
1.2 Notes on removing	5
1.3 Notes on installing	9
1.4 Tightening torques	11
1.5 Front engine mounting	13
1.6 Electro/hydraulic engine mounting, left and right	14
1.7 Additional information and removal instructions for vehicles with air conditioner	16
13 - Crankshaft group	17
1 Dismantling and assembling engine	17
1.1 Dismantling and assembling engine	17
1.2 Removing and installing ribbed belt	32
1.3 Removing and installing bracket for vane pump and oil cooler	35
1.4 Removing, installing and tensioning toothed belts	37
1.5 Removing toothed belt from camshaft sprockets	45
2 Removing and installing sealing flanges and flywheel/drive plate	53
2.1 Removing and installing sealing flanges and flywheel/drive plate	53
2.2 Renewing crankshaft oil seal -belt pulley end	57
2.3 Removing and installing front sealing flange	59
2.4 Removing and installing dual mass flywheel	62
2.5 Removing and installing drive plate	63
3 Removing and installing crankshaft	65
3.1 Removing and installing crankshaft	65
3.2 Crankshaft dimensions	70
3.3 Removing and installing sprocket	70
4 Dismantling and assembling pistons and conrods	72
4.1 Dismantling and assembling pistons and conrods	72
4.2 Checking piston projection at TDC	79
4.3 Piston and cylinder dimensions	80
15 - Cylinder head, Valve gear	82
1 Removing and installing cylinder head	82
1.1 Removing and installing cylinder head	82
1.2 Removing and installing front intake manifold	87
1.3 Removing and installing left intake manifold	88
1.4 Removing and installing right intake manifold	90
1.5 Removing and installing left cylinder head cover	92
1.6 Removing and installing cylinder head cover	94
1.7 Removing left cylinder head	97
1.8 Removing right cylinder head	100
1.9 Installing cylinder head	104
1.10 Checking compression pressures	107
2 Servicing valve mechanism	108
2.1 Servicing valve mechanism	108
2.2 Check axial clearance of camshafts	115



2.3	Replacing camshaft oil seal	116
2.4	Removing and installing camshafts	118
2.5	Checking hydraulic compensation elements	122
2.6	Renewing valve stem seals	123
2.7	Checking valve guides	125
17 - Lubrication	126	
1	Removing and installing parts of the lubrication system	126
1.1	Removing and installing parts of the lubrication system	126
1.2	Removing and installing oil filter bracket	135
1.3	Removing and installing oil sump - lower part	137
1.4	Removing and installing oil pump	139
1.5	Removing and installing oil sump - upper part	143
1.6	Renewing oil check valve	147
1.7	Removing and installing oil cooler	148
1.8	Checking oil pressure and oil pressure switch	150
19 - Cooling system	153	
1	Removing and installing parts of cooling system	153
1.1	Removing and installing parts of cooling system	153
1.2	Parts of cooling system body side	154
1.3	Coolant pump and thermostat	157
1.4	Coolant pipes - overview	159
1.5	Draining and filling coolant	161
1.6	Removing and installing coolant pump	165
1.7	Removing and installing thermostat	167
1.8	Removing and replacing front coolant pipe	173
1.9	Removing and replacing left upper and lower coolant pipe	174
1.10	Removing and replacing right coolant pipe	176
1.11	Removing and installing radiator	176
20 - Fuel supply system	178	
1	Removing and installing parts of fuel supply system	178
1.1	Removing and installing parts of fuel supply system	178
1.2	Removing and installing fuel tank with its attachments	179
1.3	Servicing fuel filter	193
1.4	Safety precautions when working on the fuel supply system	195
1.5	Rules for cleanliness	195
1.6	Emptying fuel tank	195
1.7	Removing and installing fuel tank	196
1.8	Checking low fuel level sender	198
1.9	Removing and installing fuel gauge sender	200
1.10	Removing and installing fuel delivery unit	201
1.11	Removing and installing suction jet pump	205
1.12	Checking fuel pump	208
1.13	Bleeding fuel system	211
2	Accelerator mechanism	213
2.1	Accelerator mechanism	213
2.2	Servicing accelerator mechanism	213
2.3	Checking accelerator pedal position sender	216
2.4	Adjusting pedal position sender (vehicles >05.99)	222
21 - Charging	223	
1	Charge air system with turbocharger	223
1.1	Charge air system with turbocharger	223
1.2	Removing and installing turbocharger with attachments	223
1.3	Removing and installing turbocharger	226



1.4	Removing and installing compensator	228
1.5	Removing and installing parts of charge air cooling system	230
1.6	Removing and installing charge air cooler	232
1.7	Charge pressure control hose routing diagram	233
1.8	Rules for cleanliness	234
2	Checking charge pressure system	235
2.1	Checking charge pressure system	235
2.2	Checking turbocharger and charge pressure control	235
2.3	Checking pressure unit for charge pressure regulating valve	240
2.4	Checking charge pressure control solenoid valve	242
26 - Exhaust system	246	
1	Removing and installing parts of exhaust system	246
1.1	Removing and installing parts of exhaust system	246
1.2	Front exhaust pipe with catalyst, centre silencer, rear silencer and fitting pieces	246
1.3	Front exhaust pipe and catalyst with attachments	250
1.4	Silencer with mountings	252
1.5	Removing and installing left exhaust manifold with front exhaust pipe	254
1.6	Removing and installing right exhaust manifold with front exhaust pipe	256
2	Exhaust gas recirculation system	258
2.1	Exhaust gas recirculation system	258
2.2	Vacuum hose connection diagram	258
2.3	Checking exhaust gas recirculation valve (mechanical)	259
2.4	Removing and installing exhaust gas recirculation valve	260
2.5	Checking exhaust gas recirculation	261

