

Contents

00	Technical data	1
1	Engine number	1
2	Engine data	2
3	Safety precautions	3
3.1	Safety precautions when working on the fuel supply system	3
3.2	Safety precautions when using testers and measuring instruments during a road test	4
3.3	Safety precautions when working on the cooling system	4
3.4	Safety precautions when working on the ignition system	4
4	Repair instructions	6
4.1	Rules for cleanliness	6
4.2	Foreign particles in engine	6
4.3	Contact corrosion	6
4.4	Routing and attachment of pipes, hoses and wiring	7
4.5	Installing radiators and condensers	7
4.6	Checking vacuum system	7
10	Removing and installing engine	8
1	Removing and installing engine - vehicles with multitronic gearbox	8
1.1	Removing engine	8
1.2	Detaching multitronic gearbox from engine	26
1.3	Installing engine	32
2	Removing and installing engine - vehicles with automatic gearbox 09L	39
2.1	Removing engine	39
2.2	Separating engine from automatic gearbox 09L	58
2.3	Installing engine	66
3	Securing engine to engine and gearbox support	74
4	Assembly mountings	76
4.1	Assembly mountings - exploded view	76
4.2	Removing and installing engine mounting (left and right)	77
4.3	Removing and installing torque reaction support	81
13	Crankshaft group	83
1	Servicing work on pulley end	83
1.1	Poly V-belt drive - exploded view	83
1.2	Removing and installing coolant pump pulley	84
1.3	Removing and installing power steering pump pulley	85
1.4	Removing and installing poly V-belt	87
1.5	Removing and installing vibration damper	88
1.6	Renewing sealing flange (pulley end) with crankshaft oil seal	90
2	Servicing work on timing chain end	94
2.1	Flywheel for vehicles with multitronic gearbox - exploded view	94
2.2	Removing and installing damper unit	94
2.3	Removing and installing flywheel - vehicles with multitronic gearbox	95
2.4	Drive plate on vehicles with automatic gearbox 09L - exploded view	96
2.5	Removing and installing drive plate - vehicles with automatic gearbox 09L	97
2.6	Renewing crankshaft oil seal (timing chain end)	98
3	Timing chain covers	101
3.1	Timing chain covers - exploded view	101
3.2	Removing and installing timing chain covers (left and right)	101
3.3	Removing and installing timing chain cover (bottom)	106
4	Camshaft drive	113



4.1	Camshaft timing chains - exploded view	113
4.2	Detaching timing chains from camshafts, removing and installing chain tensioners	116
4.3	Drive chain for valve gear - exploded view	126
4.4	Removing and installing drive chain for valve gear	129
4.5	Drive chain for auxiliary drives on vehicles up to 04.2006 - exploded view	131
4.6	Removing and installing drive chain for auxiliary drives on vehicles up to 04.2006	133
4.7	Drive chain for auxiliary drives on vehicles from 04.2006 - exploded view	136
4.8	Removing and installing drive chain for auxiliary drives on vehicles from 04.2006	137
4.9	Balance shaft - exploded view	141
4.10	Removing and installing balance shaft	142
5	Removing and installing crankshaft	146
5.1	Crankshaft - exploded view	146
5.2	Crankshaft dimensions	150
5.3	Measuring axial clearance	150
5.4	Measuring radial clearance	151
6	Dismantling and assembling pistons and conrods	152
6.1	Pistons and conrods - exploded view	152
6.2	Piston and cylinder dimensions	155
6.3	Removing and installing pistons	155
6.4	Checking radial clearance of conrod bearings	157
15	Cylinder head, valve gear	158
1	Removing and installing cylinder head	158
1.1	Cylinder head - exploded view	158
1.2	Removing and installing cylinder head cover (left-side)	161
1.3	Removing and installing cylinder head cover (right-side)	162
1.4	Removing and installing cylinder head	164
1.5	Removing and installing vacuum pump for brake servo	169
1.6	Checking compression	170
2	Servicing valve gear	173
2.1	Valve gear - exploded view	173
2.2	Checking axial clearance of camshafts	175
2.3	Removing and installing camshafts	176
2.4	Renewing valve stem oil seals (cylinder head installed)	181
2.5	Renewing valve stem oil seals (cylinder head removed)	185
2.6	Checking hydraulic valve compensation elements	188
2.7	Valve dimensions	191
2.8	Checking valve guides	191
2.9	Checking valves	192
17	Lubrication	193
1	Removing and installing parts of lubrication system	193
1.1	Sump (bottom section), sump (top section), oil pump, engine oil cooler - exploded view	193
1.2	Removing and installing engine oil cooler	196
1.3	Removing and installing oil level and oil temperature sender G266	198
1.4	Removing and installing sump (bottom section)	199
1.5	Removing and installing oil pump	203
1.6	Removing and installing sump (top section)	203
1.7	Oil filter housing - exploded view	209
1.8	Removing and installing oil filter housing	211
1.9	Oil retention valves, oil separator - exploded view	212
1.10	Removing and installing crankcase breather hoses	213
1.11	Removing and installing oil pressure switch F1	214
1.12	Checking oil pressure	215
1.13	Engine oil	217

1.14	Checking oil level	217
19	- Cooling	219
1	Removing and installing parts of cooling system	219
1.1	Connection diagram - coolant hoses, vehicles with auxiliary heater and multitronic gearbox	219
1.2	Checking cooling system for leaks	220
1.3	Draining and filling cooling system	222
1.4	Thermostat, coolant pump and connection - exploded view	228
1.5	Removing and installing coolant pump	229
1.6	Removing and installing thermostat	231
1.7	Checking thermostat	232
1.8	Coolant pipes - exploded view	232
1.9	Removing and installing coolant temperature sender G62	233
1.10	Removing and installing coolant pipe (front)	234
1.11	Removing and installing coolant pipes (left-side)	237
1.12	Removing and installing coolant pipe (top)	240
1.13	Radiator and radiator fans - exploded view	244
1.14	Removing and installing radiator	244
1.15	Removing and installing radiator cowl	248
1.16	Removing and installing radiator fans	249
24	- Mixture preparation - injection	251
1	Servicing Simos injection system	251
1.1	Technical data	251
1.2	Overview of fitting locations	251
1.3	Procedure before opening high-pressure section of injection system	261
1.4	Checking fuel system for leaks	262
1.5	Air cleaner - exploded view	262
1.6	Removing and installing air filter element	264
1.7	Intake manifold (top section) - exploded view	265
1.8	Removing and installing intake manifold (top section)	267
1.9	Intake manifold (bottom section) - exploded view	269
1.10	Removing and installing intake manifold (bottom section) with fuel rail	272
1.11	Removing and installing injectors	275
1.12	Checking fuel pressure and residual pressure (up to high-pressure pump)	279
1.13	Removing and installing high-pressure pump	281
1.14	Bleeding fuel system	285
1.15	Wiring and component check with test box V.A.G 1598/42	285
1.16	Removing and installing engine control unit	287
1.17	Removing and installing Lambda probe before catalytic converter - bank 1 (right)	290
1.18	Removing and installing Lambda probe before catalytic converter - bank 2 (left)	292
1.19	Removing and installing Lambda probe after catalytic converter - bank 1 (right)	293
1.20	Removing and installing Lambda probe after catalytic converter - bank 2 (left)	295
26	- Exhaust system	297
1	Removing and installing parts of exhaust system	297
1.1	Exhaust system - exploded view	297
1.2	Separating front exhaust pipe with catalytic converter from front exhaust pipe	301
1.3	Separating front exhaust pipe and front silencer	302
1.4	Separating centre and rear silencers	303
1.5	Removing and installing front exhaust pipe (left-side) with catalytic converter	305
1.6	Removing and installing front exhaust pipe (right-side) with catalytic converter	309
1.7	Exhaust manifold - exploded view	312
1.8	Removing and installing exhaust manifold (left-side)	313
1.9	Removing and installing exhaust manifold (right-side)	317



1.10	Stress-free alignment of exhaust system	318
1.11	Aligning tailpipes	319
1.12	Checking exhaust system for leaks	319
28	- Ignition system	320
1	 Servicing ignition system	320
1.1	Technical data	320
1.2	Removing and installing ignition coils	320