

Contents

00 - Technical data	1
1 Engine number	1
2 Engine data	2
3 Safety precautions	3
4 General repair instructions	5
4.1 Different types of glow plugs for the 6-cylinder 3.0 ltr. TDI engine	5
4.2 Handling ceramic glow plugs	5
4.3 Rules for cleanliness when working on fuel supply system, injection system and turbocharger	6
4.4 Checking for leaks in the fuel system	6
4.5 Foreign particles in engine	6
4.6 Contact corrosion!	6
4.7 Routing and attachment of pipes, hoses and wiring	7
4.8 Installing radiators, condensers and charge air coolers	7
4.9 Checking vacuum system	7
10 - Removing and installing engine	8
1 Removing and installing engine - vehicles with manual gearbox	8
1.1 Removing engine	8
1.2 Separating engine from manual gearbox	26
1.3 Installing engine	30
2 Removing and installing engine - vehicles with multitronic gearbox	36
2.1 Removing engine	36
2.2 Separating engine from multitronic gearbox	53
2.3 Installing engine	58
3 Removing and installing engine - vehicles with automatic gearbox	63
3.1 Removing engine	63
3.2 Separating engine and automatic gearbox	81
3.3 Installing engine	88
4 Securing engine to engine and gearbox support	95
5 Assembly mountings	98
5.1 Assembly mountings - exploded view	98
5.2 Removing and installing engine mounting (left-side)	99
5.3 Removing and installing engine mounting (right-side)	102
5.4 Removing and installing torque reaction support	107
13 - Crankshaft group	108
1 Cylinder block (pulley end)	108
1.1 Poly V-belt drive - exploded view	108
1.2 Removing and installing poly V-belt	111
1.3 Removing and installing tensioner for poly V-belt	114
1.4 Removing and installing idler roller for poly V-belt	115
1.5 Removing and installing vibration damper	116
1.6 Renewing crankshaft oil seal (pulley end)	116
1.7 Removing and installing sealing flange (front)	118
2 Cylinder block (gearbox end)	122
2.1 Dual-mass flywheel on vehicles with manual gearbox - exploded view	122
2.2 Removing and installing dual-mass flywheel	122
2.3 Extracting and driving in needle bearing for dual-mass flywheel	124
2.4 Flywheel and damper unit on vehicles with multitronic gearbox - exploded view	125
2.5 Removing and installing damper unit	125
2.6 Removing and installing flywheel	126



2.7	Drive plate on vehicles with automatic gearbox - exploded view	127
2.8	Removing and installing drive plate	128
2.9	Renewing crankshaft oil seal (gearbox end)	129
3	Crankshaft	132
3.1	Crankshaft - exploded view	132
3.2	Crankshaft dimensions	134
3.3	Measuring axial clearance	134
3.4	Measuring radial clearance	135
4	Pistons and conrods	136
4.1	Pistons and conrods - exploded view	136
4.2	Checking piston projection at TDC	139
4.3	Piston and cylinder dimensions	141
4.4	Checking radial clearance of conrod bearings	141
15	Cylinder head, valve gear	142
1	Chain drive	142
1.1	Timing chain covers - exploded view	142
1.2	Removing and installing timing chain covers	143
1.3	Camshaft timing chain - exploded view	148
1.4	Removing camshaft timing chain from camshafts	151
1.5	Removing and installing camshaft timing chains	160
1.6	Drive chain for valve gear - exploded view	168
1.7	Removing and installing drive chain for valve gear	170
1.8	Drive chain for oil pump and balance shaft - exploded view	171
1.9	Removing and installing drive chain for oil pump and balance shaft	173
1.10	Balance shaft - exploded view	177
1.11	Removing and installing balance shaft	177
2	Handling ceramic glow plugs	181
3	Cylinder head	182
3.1	Cylinder head - exploded view	182
3.2	Cylinder head cover - exploded view	185
3.3	Removing and installing cylinder head cover	188
3.4	Removing cylinder head - vehicles up to 10.2005	193
3.5	Removing cylinder head - vehicles from 10.2005 onwards	196
3.6	Installing cylinder head	200
3.7	Checking compression	204
4	Valve gear	207
4.1	Valve gear - exploded view	207
4.2	Measuring axial clearance of camshafts	209
4.3	Measuring radial clearance of camshafts	210
4.4	Renewing camshaft oil seal	210
4.5	Removing and installing camshafts - cylinder head (left-side)	213
4.6	Removing and installing camshafts - cylinder head (right-side)	219
4.7	Renewing valve stem oil seals with cylinder head installed	225
4.8	Renewing valve stem oil seals with cylinder head removed	230
4.9	Checking hydraulic valve compensation elements	233
4.10	Valve dimensions	234
4.11	Machining valve seats	234
4.12	Checking valve guides	234
4.13	Checking valves	235
17	Lubrication	236
1	Oil pump, sump (bottom section), sump (top section)	236
1.1	Oil pump, sump (bottom section) - exploded view	236
1.2	Removing and installing sump (bottom section)	237

1.3	Removing and installing oil pump	239
1.4	Sump (top section) - exploded view	240
1.5	Removing and installing sump (top section)	242
2	Engine oil cooler, oil filter housing, oil pressure switch	245
2.1	Engine oil cooler, pressure control valve and oil filter housing - exploded view	245
2.2	Removing and installing engine oil cooler	246
2.3	Removing and installing oil filter housing	247
2.4	Removing and installing pressure control valve for crankcase breather system	251
2.5	Removing and installing mounting plate for engine oil cooler, pressure control valve and oil filter housing	252
2.6	Removing and installing oil pressure switch F1	253
2.7	Checking oil pressure	254
2.8	Engine oil	255
2.9	Checking oil level	255
19	Cooling	256
1	Cooling system	256
1.1	Draining and filling cooling system	256
2	Coolant pump, thermostat, coolant pipes	264
2.1	Coolant pump and thermostat - exploded view	264
2.2	Removing and installing coolant pump	264
2.3	Removing and installing hose connection with thermostat	266
2.4	Removing and installing coolant temperature sender G62	267
2.5	Removing and installing coolant pipe (front)	268
2.6	Removing and installing coolant pipe (left-side)	270
2.7	Removing and installing coolant pipe (right-side)	275
2.8	Removing and installing coolant pipe (rear)	282
3	Radiator and radiator fans	286
3.1	Radiator and radiator fans - exploded view	286
3.2	Removing and installing radiator	287
3.3	Removing and installing radiator cowl	292
3.4	Removing and installing radiator fans	295
3.5	Checking cooling system for leaks	295
21	Turbocharging/supercharging	298
1	Turbocharger	298
1.1	Turbocharger for vehicles with 2.7 ltr. engine up to 12.2005 and 3.0 ltr. engine - exploded view	298
1.2	Removing and installing turbocharger - vehicles with 2.7 ltr. engine up to 12.2005 and 3.0 ltr. engine	300
1.3	Removing and installing turbocharger 1 control unit J724 - vehicles with 2.7 ltr. engine up to 12.2005 and 3.0 ltr. engine	305
1.4	Removing and installing intermediate flange - vehicles with 2.7 ltr. engine up to 12.2005 or 3.0 ltr. engine	314
1.5	Turbocharger for vehicles with 2.7 ltr. engine from 12.2005 onwards - exploded view	314
1.6	Removing and installing turbocharger - vehicles with 2.7 ltr. engine from 12.2005 onwards	317
1.7	Removing and installing turbocharger 1 control unit J724 - vehicles with 2.7 ltr. engine from 12.2005	322
1.8	Removing and installing intermediate flange - vehicles with 2.7 ltr. engine from 12.2005 onwards	332
2	Charge air cooling	333
2.1	Charge air cooler - exploded view	333
2.2	Removing and installing charge air coolers (left and right)	334
2.3	Removing and installing charge air cooler (centre)	335
2.4	Removing and installing charge pressure sender G31	336



26 - Exhaust system	338
1 Silencers - vehicles without particulate filter	338
1.1 Exhaust system - exploded view	338
1.2 Removing and installing starter catalytic converter - vehicles with manual gearbox	341
1.3 Removing and installing starter catalytic converter - vehicles with automatic gearbox	343
1.4 Removing and installing front exhaust pipe with catalytic converter - vehicles with manual gearbox	347
1.5 Removing and installing front exhaust pipe with catalytic converter - vehicles with automatic gearbox	349
2 Silencers - vehicles with particulate filter	352
2.1 Exhaust system - exploded view	352
2.2 Removing and installing starter catalytic converter	355
2.3 Removing and installing front exhaust pipe	359
2.4 Removing and installing particulate filter with catalytic converter	361
3 Y-pipe and rear silencers	364
3.1 Separating Y-pipe and rear silencers	364
3.2 Renewing tailpipe	365
3.3 Stress-free alignment of exhaust system	366
3.4 Aligning tailpipe	367
3.5 Checking exhaust system for leaks	367
4 Exhaust manifolds and intermediate pipes	369
4.1 Exhaust manifolds and intermediate pipes - exploded view	369
4.2 Removing and installing exhaust manifold (left-side)	370
4.3 Removing and installing exhaust manifold (right-side)	373
4.4 Removing and installing intermediate pipe (left-side)	376
4.5 Removing and installing intermediate pipe (right-side)	377
5 Exhaust gas temperature control	379
5.1 Removing and installing exhaust gas temperature sender 1 G235	379
5.2 Removing and installing exhaust gas temperature sender 2 G448	380
5.3 Removing and installing temperature sender before particulate filter G506	382
6 Exhaust gas recirculation system	383
6.1 Exhaust gas recirculation system - exploded view	383
6.2 Removing and installing mechanical exhaust gas recirculation valve	385
6.3 Removing and installing exhaust gas recirculation cooler	385