

## Contents

<b>00 - Technical data</b>	<b>1</b>
<b>1</b> Engine number .....	1
<b>2</b> Engine data .....	2
<b>3</b> <b>Safety precautions</b> .....	<b>3</b>
3.1 Safety precautions when working on the fuel supply system .....	3
3.2 Safety precautions when working on vehicles with start/stop system .....	3
3.3 Safety precautions when using testers and measuring instruments during a road test .....	4
3.4 Safety precautions when working on the ignition system .....	4
3.5 Safety precautions when working on the cooling system .....	4
3.6 Safety precautions when working on the exhaust system .....	5
<b>4</b> <b>General repair instructions</b> .....	<b>6</b>
4.1 Rules for cleanliness when working on fuel supply system and injection system .....	6
4.2 Checking fuel system for leaks .....	6
4.3 Foreign particles in engine .....	6
4.4 Contact corrosion! .....	7
4.5 Routing and attachment of pipes, hoses and wiring .....	7
4.6 Checking vacuum system .....	7
4.7 Installing radiators and condensers .....	8
<b>10 - Removing and installing engine</b> .....	<b>9</b>
<b>1</b> <b>Removing and installing engine - vehicles with manual gearbox</b> .....	<b>9</b>
1.1 Removing engine .....	9
1.2 Separating engine and manual gearbox .....	27
1.3 Securing engine to engine and gearbox support .....	31
1.4 Installing engine .....	33
<b>2</b> <b>Removing and installing engine - vehicles with multitronic gearbox</b> .....	<b>39</b>
2.1 Removing engine .....	39
2.2 Detaching multitronic gearbox from engine .....	56
2.3 Securing engine to engine and gearbox support .....	60
2.4 Installing engine .....	62
<b>3</b> <b>Removing and installing engine - vehicles with automatic gearbox 09L</b> .....	<b>67</b>
3.1 Removing engine .....	67
3.2 Separating engine from automatic gearbox 09L .....	85
3.3 Securing engine to engine and gearbox support .....	91
3.4 Installing engine .....	93
<b>13 - Crankshaft group</b> .....	<b>99</b>
<b>1</b> <b>Cylinder block (pulley end)</b> .....	<b>99</b>
1.1 Exploded view - poly V-belt drive .....	99
1.2 Removing and installing poly V-belt .....	101
1.3 Removing and installing vibration damper .....	102
1.4 Renewing sealing flange (pulley end) with crankshaft oil seal .....	102
<b>2</b> <b>Cylinder block (gearbox end)</b> .....	<b>106</b>
2.1 Dual-mass flywheel on vehicles with manual gearbox - exploded view .....	106
2.2 Removing and installing dual-mass flywheel - vehicles with manual gearbox .....	107
2.3 Extracting and driving in needle bearing for dual-mass flywheel - vehicles with manual gearbox .....	108
2.4 Flywheel for vehicles with multitronic gearbox - exploded view .....	110
2.5 Removing and installing damper unit .....	111
2.6 Removing and installing flywheel - vehicles with multitronic gearbox .....	112
2.7 Exploded view - drive plate, vehicles with automatic gearbox 09L .....	113
2.8 Removing and installing drive plate - vehicles with automatic gearbox 09L .....	114

2.9	Renewing crankshaft oil seal (gearbox end) . . . . .	115
<b>3</b>	<b>Removing and installing crankshaft . . . . .</b>	<b>118</b>
3.1	Exploded view - crankshaft . . . . .	118
3.2	Crankshaft dimensions . . . . .	121
3.3	Measuring axial clearance . . . . .	121
3.4	Measuring radial clearance . . . . .	122
<b>4</b>	<b>Dismantling and assembling pistons and conrods . . . . .</b>	<b>124</b>
4.1	Exploded view - pistons and conrods . . . . .	124
4.2	Measuring radial clearance of conrods . . . . .	127
4.3	Piston and cylinder dimensions . . . . .	127
<b>15 - Cylinder head, valve gear . . . . .</b>	<b>128</b>	
1	<b>Chain drive . . . . .</b>	<b>128</b>
1.1	Exploded view - timing chain covers . . . . .	128
1.2	Removing and installing timing chain covers (left and right) . . . . .	130
1.3	Removing and installing timing chain cover (bottom) . . . . .	135
1.4	Exploded view - camshaft timing chains . . . . .	140
1.5	Removing timing chains from camshafts . . . . .	143
1.6	Removing and installing camshaft timing chains . . . . .	150
1.7	Exploded view - drive chain for valve gear . . . . .	153
1.8	Removing and installing drive chain for valve gear . . . . .	155
1.9	Exploded view - drive chain for auxiliary drives . . . . .	157
1.10	Removing and installing drive chain for auxiliary drives . . . . .	158
1.11	Exploded view - balance shaft . . . . .	161
1.12	Removing and installing balance shaft . . . . .	162
<b>2</b>	<b>Removing and installing cylinder head . . . . .</b>	<b>165</b>
2.1	Exploded view - cylinder head . . . . .	165
2.2	Removing and installing cylinder head cover (left-side) . . . . .	168
2.3	Removing and installing cylinder head cover (right-side) . . . . .	170
2.4	Removing and installing cylinder heads . . . . .	173
2.5	Checking compression . . . . .	190
<b>3</b>	<b>Servicing valve gear . . . . .</b>	<b>195</b>
3.1	Exploded view - valve gear . . . . .	195
3.2	Checking axial clearance of camshafts . . . . .	198
3.3	Removing and installing camshafts . . . . .	198
3.4	Checking hydraulic valve compensation elements . . . . .	204
3.5	Renewing valve stem oil seals with cylinder head installed . . . . .	205
3.6	Renewing valve stem oil seals with cylinder head removed . . . . .	208
3.7	Valve dimensions . . . . .	212
3.8	Checking valve guides . . . . .	212
3.9	Checking valves . . . . .	213
<b>17 - Lubrication . . . . .</b>	<b>214</b>	
<b>1</b>	<b>Sump (bottom section), sump (top section), oil pump, engine oil cooler . . . . .</b>	<b>214</b>
1.1	Exploded view - sump (bottom section), sump (top section), oil pump, engine oil cooler . . . . .	214
1.2	Removing and installing oil level and oil temperature sender G266 . . . . .	217
1.3	Removing and installing sump (bottom section) . . . . .	218
1.4	Removing and installing oil pump . . . . .	221
1.5	Removing and installing sump (top section) . . . . .	221
1.6	Removing and installing engine oil cooler . . . . .	225
<b>2</b>	<b>Oil filter housing, oil pressure switch . . . . .</b>	<b>228</b>
2.1	Exploded view - oil filter housing, oil pressure switch . . . . .	228
2.2	Removing and installing oil filter housing . . . . .	229
2.3	Removing and installing oil pressure switch F22 . . . . .	231
2.4	Removing and installing oil pressure switch for reduced oil pressure F378 . . . . .	232

2.5	Removing and installing valve for oil pressure control N428 .....	233
2.6	Checking oil pressure .....	234
<b>3</b>	<b>Oil retention valves, oil separator .....</b>	<b>235</b>
3.1	Exploded view - oil retention valves, oil separator .....	235
3.2	Removing and installing crankcase breather hoses - not on USA models .....	236
3.3	Removing and installing cover with oil separator .....	237
3.4	Engine oil .....	237
3.5	Checking oil level .....	237
<b>19 - Cooling .....</b>	<b>239</b>	
<b>1</b>	<b>Cooling system .....</b>	<b>239</b>
1.1	Connection diagram - coolant hoses .....	239
1.2	Draining and filling cooling system .....	241
<b>2</b>	<b>Coolant pump, thermostat, coolant pipes .....</b>	<b>247</b>
2.1	Exploded view - coolant pump, thermostat and connection .....	247
2.2	Removing and installing coolant pump .....	248
2.3	Removing and installing thermostat .....	249
2.4	Exploded view - coolant pipes .....	249
2.5	Removing and installing coolant temperature sender G62 .....	251
2.6	Removing and installing coolant pipe (front) .....	251
2.7	Removing and installing coolant pipes (left-side) .....	253
2.8	Removing and installing coolant pipe (top) .....	256
<b>3</b>	<b>Radiator and radiator fan .....</b>	<b>259</b>
3.1	Removing and installing radiator .....	259
3.2	Removing and installing radiator cowl .....	263
3.3	Removing and installing radiator fan .....	264
3.4	Checking cooling system for leaks .....	265
<b>26 - Exhaust system .....</b>	<b>267</b>	
<b>1</b>	<b>Silencers .....</b>	<b>267</b>
1.1	Silencers on vehicles with front-wheel drive - exploded view .....	267
1.2	Silencers on vehicles with four-wheel drive - exploded view .....	270
1.3	Removing and installing front exhaust pipe (left-side) with catalytic converter .....	272
1.4	Removing and installing front exhaust pipe (right-side) with catalytic converter .....	275
1.5	Separating centre and rear silencers .....	277
1.6	Renewing tailpipe .....	279
1.7	Stress-free alignment of exhaust system .....	279
1.8	Aligning tailpipes .....	280
1.9	Checking exhaust system for leaks .....	281
<b>2</b>	<b>Exhaust manifolds .....</b>	<b>282</b>
2.1	Exploded view - exhaust manifold .....	282
2.2	Removing and installing exhaust manifold (left-side) .....	283
2.3	Removing and installing exhaust manifold (right-side) .....	285
<b>3</b>	<b>Secondary air system .....</b>	<b>286</b>
3.1	Exploded view - secondary air system .....	286
3.2	Removing and installing secondary air pump motor V101 - vehicles without air suspension .....	287
3.3	Removing and installing secondary air pump motor V101 - vehicles with air suspension .....	288
3.4	Checking combination valves for secondary air system for correct operation and leakage .....	289
3.5	Removing and installing combination valve for secondary air system (left-side) .....	291
3.6	Removing and installing combination valve for secondary air system (right-side) .....	292