

Contents

00 - Technical data	1
1 Engine number	1
2 Safety precautions	2
2.1 Working on the fuel system	2
2.2 Working on the cooling system	2
2.3 Working on vehicles with start/stop system	2
2.4 Using testers and measuring instruments during a road test	3
2.5 Working on the exhaust system	3
3 General repair instructions	4
3.1 Rules for cleanliness when working on fuel supply system, injection system and turbocharger	4
3.2 Checking fuel system for leaks	4
3.3 Foreign particles in engine	5
3.4 Contact corrosion	5
3.5 Routing and attachment of pipes, hoses and wiring	5
3.6 Installing radiators, condensers and charge air coolers	5
3.7 Nuts, bolts	5
3.8 Identification plates	6
3.9 Use of impact wrenches	6
3.10 Checking vacuum system	6
10 - Removing and installing engine	8
1 Removing engine	8
2 Separating engine and manual gearbox	25
3 Separating engine and dual clutch gearbox	27
4 Securing engine to engine and gearbox support	29
5 Installing engine	31
6 Assembly mountings	36
6.1 Exploded view - assembly mountings	36
6.2 Checking adjustment of assembly mountings (engine/gearbox mountings)	37
6.3 Adjusting assembly mountings	38
13 - Crankshaft group	42
1 Cylinder block (pulley end)	42
1.1 Exploded view - poly V-belt drive	42
1.2 Removing and installing poly V-belt	43
1.3 Removing and installing idler roller for poly V-belt	45
1.4 Removing and installing poly V-belt pulley for crankshaft	45
1.5 Renewing crankshaft oil seal	50
2 Cylinder block (gearbox end)	53
2.1 Exploded view - flywheel and sealing flange	53
2.2 Removing and installing flywheel	54
2.3 Renewing sealing flange	55
3 Crankshaft	66
3.1 Exploded view - crankshaft	66
3.2 Crankshaft dimensions	67
3.3 Measuring axial clearance of crankshaft	67
3.4 Measuring radial clearance of crankshaft	68
3.5 Extracting and driving in needle bearing for crankshaft - vehicles with dual clutch gearbox	69
4 Pistons and conrods	71
4.1 Exploded view - pistons and conrods	71



4.2	Piston and cylinder dimensions	74
4.3	Measuring radial clearance of conrods	74
15	- Cylinder head, valve gear	75
1	Chain drive	75
1.1	Exploded view - timing chain cover	75
1.2	Removing and installing timing chain cover	76
1.3	Exploded view - camshaft timing chain	80
1.4	Removing and installing camshaft timing chain	82
1.5	Checking valve timing	94
1.6	Checking timing chain	97
2	Cylinder head	103
2.1	Exploded view - cylinder head	103
2.2	Removing and installing cylinder head	105
2.3	Checking compression	120
3	Valve gear	123
3.1	Exploded view - camshaft housing	123
3.2	Checking axial clearance of camshafts	125
3.3	Removing and installing camshaft housing	125
3.4	Removing and installing camshafts	130
3.5	Exploded view - valves	131
3.6	Renewing valve stem oil seals with cylinder head installed	132
3.7	Renewing valve stem oil seals with cylinder head removed	135
3.8	Valve dimensions	139
3.9	Checking valve guides	139
3.10	Checking valves	140
3.11	Machining valve seats	141
17	- Lubrication	144
1	Sump and oil pump	144
1.1	Exploded view - sump, oil pump	144
1.2	Removing and installing oil level and oil temperature sender G266	146
1.3	Removing and installing sump	147
1.4	Removing and installing drive chain for oil pump	151
1.5	Removing and installing oil pump	152
2	Oil filter housing and engine oil cooler	155
2.1	Exploded view - oil filter housing	155
2.2	Exploded view - engine oil cooler	157
2.3	Removing and installing engine oil cooler	157
2.4	Removing and installing oil pressure switch F1	158
2.5	Checking oil pressure switch F1 and oil pressure	159
2.6	Engine oil	161
2.7	Checking oil level	161
19	- Cooling	162
1	Removing and installing parts of cooling system	162
1.1	Connection diagram - coolant hoses	162
1.2	Draining and filling cooling system	164
2	Coolant pump and thermostat	170
2.1	Exploded view - coolant pump	170
2.2	Removing and installing coolant pump pulley	171
2.3	Removing and installing coolant pump	172
2.4	Removing and installing coolant circulation pump V50	172
2.5	Exploded view - thermostat housing	173
2.6	Removing and installing coolant temperature sender G62	174

2.7	Removing and installing thermostat	175
2.8	Removing and installing thermostat housing and coolant pipe (rear)	176
3	Coolant pipes	181
3.1	Exploded view - coolant pipes	181
3.2	Removing and installing coolant pipes (left-side)	182
3.3	Removing and installing coolant pipe (right-side)	183
3.4	Removing and installing coolant pipes (front)	185
4	Radiator and radiator fans	187
4.1	Exploded view - radiator and radiator fans	187
4.2	Removing and installing radiator outlet coolant temperature sender G83	188
4.3	Removing and installing radiator	189
4.4	Removing and installing water radiator for charge air cooling circuit	191
4.5	Removing and installing radiator cowl	193
4.6	Removing and installing radiator fan V7 and radiator fan 2 V177	194
4.7	Checking cooling system for leaks	194
21	Turbocharging/supercharging	196
1	Turbocharger	196
1.1	Exploded view - turbocharger	196
1.2	Checking vacuum unit for turbocharger	198
1.3	Removing and installing vacuum unit for turbocharger	200
1.4	Adjusting vacuum unit for turbocharger	202
1.5	Removing and installing compressor housing and turbine housing	209
1.6	Removing and installing turbocharger	213
2	Charge air cooler	219
2.1	Exploded view - charge air cooler	219
2.2	Removing and installing charge pressure sender G31 / intake air temperature sender 2 G299	220
2.3	Removing and installing charge air cooler	220
2.4	Checking charge air system for leaks	221
26	Exhaust system	225
1	Silencers	225
1.1	Exploded view - silencers	225
1.2	Removing and installing front exhaust pipe	227
1.3	Removing and installing catalytic converter	228
1.4	Separating centre and rear silencers	230
1.5	Stress-free alignment of exhaust system	231
1.6	Checking exhaust system for leaks	232
2	Exhaust manifold	233