

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 Removing - vehicles with engine codes AEH, AKL	4
1.3 Removing - vehicles with engine code APF	18
1.4 Detaching engine from gearbox	35
1.5 Attaching engine to repair stand	38
1.6 Installing	39
2 Adjusting engine mounting	45
2.1 Adjusting engine mounting	45
13 - Crankshaft group	49
1 Dismantling and assembling engine	49
1.1 Dismantling and assembling engine	49
1.2 Removing and installing ribbed belt	49
1.3 Removing and installing crankshaft pulley	53
1.4 Removing and installing ribbed belt	55
1.5 Removing and installing bracket for auxiliary assemblies	57
1.6 Removing and installing toothed belt	61
1.7 Removing and installing complete toothed belt	67
1.8 Removing toothed belt from camshaft sprocket	73
1.9 Positioning crankshaft to TDC for cylinder 1 with engine installed	76
1.10 Positioning crankshaft to TDC for cylinder 1 with engine removed	78
1.11 Checking semi-automatic toothed belt tensioning roller	79
2 Removing and installing sealing flanges and flywheel/drive plate	80
2.1 Removing and installing sealing flanges and flywheel/drive plate	80
2.2 Replacing crankshaft oil seal on pulley end	83
2.3 Removing and installing front sealing flange	86
2.4 Removing and installing rear sealing flange	89
2.5 Removing and installing pressure plate	92
2.6 Removing and installing drive plate	93
3 Removing and installing crankshaft	95
3.1 Removing and installing crankshaft	95
3.2 Crankshaft dimensions	101
3.3 Removing and installing chain sprocket	101
4 Dismantling and assembling pistons and conrods	102
4.1 Dismantling and assembling pistons and conrods	102
4.2 Different conrods and conrod bolts	102
4.3 Sawn conrods	103
4.4 Cracked conrods	107
4.5 Piston and cylinder dimensions	112
15 - Cylinder head, Valve gear	113
1 Removing and installing cylinder head	113
1.1 Removing and installing cylinder head	113
1.2 Removing and installing upper section of intake manifold - vehicles with engine codes AEH, AKL	122



1.3	Removing and installing upper section of intake manifold - vehicles with engine code APF	126
1.4	Removing and installing lower section of intake manifold	130
1.5	Removing and installing cylinder head cover	133
1.6	Removing cylinder head - vehicles with engine codes AEH, AKL	135
1.7	Removing cylinder head - vehicles with engine code APF	138
1.8	Installing cylinder head	142
1.9	Checking compression	145
2	Servicing valve gear	147
2.1	Servicing valve gear	147
2.2	Checking camshaft axial play	152
2.3	Replacing camshaft oil seal	153
2.4	Removing and installing camshaft	155
2.5	Checking hydraulic bucket tappets	157
2.6	Replacing valve stem seals	159
2.7	Checking valve guides	162
2.8	Checking valves	163
2.9	Replacing valve guides	163
2.10	Reworking valve seats	165
17	Lubrication	168
1	Removing and installing parts of the lubrication system	168
1.1	Removing and installing parts of the lubrication system	168
1.2	Overview of components	169
1.3	Removing and installing oil pan	176
1.4	Removing and installing oil pump	179
1.5	Checking oil pressure and oil pressure switch	180
1.6	Engine oil	183
1.7	Checking oil level	183
19	Cooling system	184
1	Removing and installing cooling system components - vehicles with engine codes AEH, AKL	184
1.1	Removing and installing cooling system components - vehicles with engine codes AEH, AKL	184
1.2	Parts of cooling system	185
1.3	Removing and installing coolant pump	187
1.4	Removing and installing coolant thermostat	189
1.5	Removing and installing coolant pipe	191
2	Removing and installing cooling system components - vehicles with engine code APF	193
2.1	Removing and installing cooling system components - vehicles with engine code APF	193
2.2	Parts of cooling system	194
2.3	Removing and installing coolant pump	196
2.4	Electronically controlled cooling system	198
2.5	Performing diagnosis of the map-controlled engine cooling system	198
2.6	Performing electrical check of map-controlled engine cooling system	202
2.7	Disassembling and assembling coolant distributor housing	205
2.8	Checking thermostat for map-controlled engine cooling system	207
2.9	Checking coolant temperature sender -G83 (radiator outlet)	209
2.10	Removing and installing thermostat for map-controlled engine cooling system	211
2.11	Removing and installing coolant pipe	212
3	Cooling system - all engine codes	215
3.1	Cooling system - all engine codes	215
3.2	Draining and filling cooling system	215
3.3	Radiator and radiator fan - Assembly overview	219
3.4	Removing and installing radiator	221
3.5	Checking cooling system for leaks	225

26 - Exhaust system .....	.227
1 Removing and installing parts of exhaust system .....	.227
1.1 Removing and installing parts of exhaust system .....	.227
1.2 Separating centre and rear silencers .....	.233
1.3 Removing and installing exhaust manifold - vehicles with engine codes AEH, AKL .....	.234
1.4 Removing and installing exhaust manifold - vehicles with engine code APF .....	.235
1.5 Removing and installing front exhaust pipe with catalytic converter .....	.236
1.6 Stress free alignment of exhaust system .....	.238
1.7 Checking exhaust system for leaks .....	.240
2 Exhaust gas recirculation system - vehicles with engine code APF .....	.240
2.1 Exhaust gas recirculation system - vehicles with engine code APF .....	.240
2.2 Removing and installing exhaust gas recirculation components .....	.241
2.3 Checking adaption of zero position for exhaust gas recirculation valve -N18 .....	.243
2.4 Performing electrical check of exhaust gas recirculation valve -N18 and exhaust gas recirculation potentiometer -G212 .....	.246
2.5 Removing and installing exhaust gas recirculation valve -N18 with exhaust gas recirculation potentiometer -G 212 .....	.252
3 Secondary air system - vehicles with engine code APF .....	.255
3.1 Secondary air system - vehicles with engine code APF .....	.255
3.2 Performing diagnosis of secondary air system .....	.259
3.3 Checking secondary air inlet valve -N112 .....	.262
3.4 Checking secondary air pump relay -J299 and actuation .....	.267
3.5 Checking combination valve for secondary air inlet for function and leaks .....	.273
3.6 Removing and installing combination valve for secondary air inlet .....	.274
3.7 Removing and installing secondary air pump .....	.277