



## Contents

<b>00 - Technical data</b>	1
1 <b>Technical data</b>	1
1.1    Engine number	1
<b>10 - Removing and installing engine</b>	2
1 <b>Removing and installing engine</b>	2
1.1    Removing engine	3
1.2    Securing engine to assembly stand	7
1.3    Installing engine	8
1.4    Specified torques for assembly mountings	9
1.5    Additional information and assembly work for vehicles with air conditioner	11
<b>13 - Crankshaft group</b>	12
1 <b>Dismantling and assembling engine</b>	12
1.1    Assembly overview - part I, belt drive	12
1.2    Assembly overview - part II, cylinder block	15
1.3    Removing and installing poly-V belt	15
2 <b>Removing and installing sealing flanges and flywheel or drive plate</b>	17
2.1    Assembly overview	17
2.2    Renewing seal for crankshaft poly V-belt pulley end	19
2.3    Tightening procedure for poly V-belt pulley securing bolt	20
2.4    Renewing crankshaft sealing flange - flywheel end	21
2.5    Crankshaft dimensions	29
3 <b>Dismantling and assembling pistons and conrods</b>	30
3.1    Assembly overview	30
3.2    Piston and cylinder dimensions	33
<b>15 - Cylinder head, valve gear</b>	34
1 <b>Dismantling and assembling cylinder head</b>	34
1.1    Assembly overview	34
1.2    Checking valve timing	36
1.3    Removing, installing and tensioning toothed belt	37
1.4    Checking semi-automatic toothed belt tensioning roller	42
1.5    Removing and installing camshaft housing	45
1.6    Removing and installing cylinder head	49
1.7    Checking compression	56
2 <b>Repairing valve gear</b>	59
2.1    Assembly overview	59
2.2    Reworking valve seats	63
2.3    Renewing camshaft oil seals	64
2.4    Checking valve guides	67
2.5    Renewing valve stem seals	68
<b>17 - Lubrication</b>	70
1 <b>Removing and installing parts of lubrication system</b>	70
1.1    Engine oil:	70
1.2    Assembly overview	70
1.3    Assembly overview - coolant heated oil separator	73
1.4    Removing and installing coolant heated oil separator	73
1.5    Assembly overview - oil filler neck, engine code BCA	75
1.6    Removing and installing oil sump	76
1.7    Removing and installing oil pump	78
1.8    Checking oil pressure and oil pressure switch	81



<b>19 - Cooling</b> . . . . .	<b>83</b>
1 <b>Removing and installing parts of cooling system</b> . . . . .	83
1.1 General notes on cooling system . . . . .	83
1.2 Assembly overview - parts of cooling system, body side . . . . .	84
1.3 Assembly overview - parts of cooling system, engine side . . . . .	85
1.4 Coolant hose schematic diagram (engines with no coolant heated oil separator) . . . . .	88
1.5 Coolant hose schematic diagram (engines with coolant heated oil separator) . . . . .	89
1.6 Draining and adding coolant . . . . .	90
1.7 Removing and installing radiator fan V7 and radiator fan 2 V177 . . . . .	97
1.8 Removing and installing radiator . . . . .	98
1.9 Removing and installing coolant pump . . . . .	100
1.10 Checking cooling system for leaks . . . . .	101
<b>24 - Mixture preparation - injection</b> . . . . .	<b>104</b>
1 <b>Repairing injection system</b> . . . . .	104
1.1 General notes on injection . . . . .	104
1.2 Safety precautions . . . . .	105
1.3 Rules for cleanliness . . . . .	106
1.4 Assembly overview - dismantling and assembling intake manifold . . . . .	107
1.5 Assembly overview - dismantling and assembling fuel rail with injectors . . . . .	108
1.6 Assembly overview - air filter housing, engine code BCA . . . . .	108
1.7 Assembly overview - air filter housing, engine code BUD . . . . .	110
1.8 Cleaning throttle valve module J338 . . . . .	112
1.9 Removing and installing injectors . . . . .	113
2 <b>Checking components</b> . . . . .	116
2.1 Checking intake air preheating . . . . .	116
2.2 Checking injectors for leaks and quantity injected (vehicles model year ▶ 2005) . . . . .	116
2.3 Checking injectors for leaks and quantity injected (vehicles model year 2006 ▶) . . . . .	119
2.4 Checking fuel pressure regulator and holding pressure . . . . .	122
3 <b>Engine (motor) control unit</b> . . . . .	125
3.1 Removing and installing anti-theft engine control unit . . . . .	125
3.2 Removing and installing engine control unit . . . . .	126
3.3 Adapting function and components . . . . .	128
3.4 Reading and erasing engine control unit fault memory . . . . .	128
<b>26 - Exhaust system</b> . . . . .	<b>130</b>
1 <b>Removing and installing parts of exhaust system</b> . . . . .	130
1.1 Assembly overview - engine code BCA . . . . .	130
1.2 Assembly overview - engine code BUD . . . . .	132
1.3 Assembly overview - silencers with mountings . . . . .	133
1.4 Separating front and rear silencers . . . . .	134
2 <b>Exhaust gas recirculation system</b> . . . . .	136
2.1 Assembly overview - repairing parts of the exhaust gas recirculation system . . . . .	136
<b>28 - Ignition system</b> . . . . .	<b>137</b>
1 <b>Repairing ignition system</b> . . . . .	137
1.1 General notes on ignition system . . . . .	137
1.2 Assembly overview - parts of ignition system . . . . .	137
1.3 Removing and installing ignition coils with output stage . . . . .	138
1.4 Safety precautions . . . . .	140
1.5 Test data, spark plugs . . . . .	141