

Contents

00 - Technical data	1
1 Identification	1
1.1 Engine identification number/engine data	1
2 Safety precautions	3
2.1 Safety precautions when working on the fuel supply system	3
2.2 Safety precautions when using testers and measuring instruments during a road test	5
2.3 Safety precautions when working on the cooling system	6
2.4 Safety precautions when working on the ignition system	7
2.5 Reducing fuel pressure in high-pressure section	7
3 Repair instructions	9
3.1 Rules for cleanliness	9
3.2 Checking fuel system for leaks	9
3.3 Foreign particles in engine	9
3.4 Contact corrosion	10
3.5 Routing and attachment of pipes, hoses and wiring	10
3.6 Installing radiators and condensers	10
3.7 Checking vacuum system	10
10 - Removing and installing engine	12
1 Removing and installing engine	12
1.1 Removing engine	12
1.2 Separating engine and gearbox	30
1.3 Securing engine to engine and gearbox support	35
1.4 Installing engine	36
2 Assembly mountings	43
2.1 Exploded view - assembly mountings	43
2.2 Adjusting assembly mountings	45
2.3 Checking adjustment of assembly mountings (engine/gearbox mountings)	49
3 Engine cover panel	50
3.1 Removing and installing engine cover panel	50
13 - Crankshaft group	51
1 Cylinder block (pulley end)	51
1.1 Exploded view - poly V-belt drive	51
1.2 Exploded view - sealing flange (pulley end)	53
1.3 Removing and installing poly V-belt	54
1.4 Removing and installing tensioner for poly V-belt	56
1.5 Removing and installing vibration damper	57
1.6 Removing and installing bracket for ancillaries	58
1.7 Renewing crankshaft oil seal (pulley end)	59
1.8 Removing and installing sealing flange (pulley end)	61
2 Cylinder block (gearbox end)	65
2.1 Exploded view - cylinder block (gearbox end)	65
2.2 Removing and installing flywheel	66
2.3 Removing and installing sealing flange (gearbox end)	67
3 Crankshaft	70
3.1 Exploded view - crankshaft	70
3.2 Crankshaft dimensions	73
3.3 Renewing needle bearing in crankshaft	73
3.4 Measuring axial clearance of crankshaft	74
3.5 Measuring radial clearance of crankshaft	75
3.6 Removing and installing drive chain sprocket	76



4	Pistons and conrods	79
4.1	Exploded view - pistons and conrods	79
4.2	Removing and installing pistons	80
4.3	Checking pistons and cylinder bores	82
4.4	Checking axial clearance of conrods	83
4.5	Checking radial clearance of conrod bearings	83
15	- Cylinder head, valve gear	84
1	Cylinder head	84
1.1	Exploded view - cylinder head	84
1.2	Removing and installing cylinder head	86
1.3	Removing and installing cylinder head cover	93
1.4	Checking compression	95
2	Toothed belt drive	97
2.1	Exploded view - toothed belt	97
2.2	Removing and installing toothed belt	98
3	Valve gear	106
3.1	Exploded view - valve gear	106
3.2	Measuring axial clearance of camshaft	108
3.3	Measuring radial clearance of camshaft	109
3.4	Removing and installing camshaft oil seal	110
3.5	Removing and installing camshaft	112
3.6	Removing and installing camshaft adjuster	116
3.7	Removing and installing camshaft control valve 1 N205	122
3.8	Removing and installing valve stem oil seals	123
4	Inlet and exhaust valves	131
4.1	Checking valve guides	131
4.2	Checking valves	132
4.3	Valve dimensions	132
17	- Lubrication	133
1	Sump/oil pump	133
1.1	Exploded view - sump/oil pump	133
1.2	Removing and installing sump	135
1.3	Engine oil	138
1.4	Checking engine oil level	138
1.5	Removing and installing oil level and oil temperature sender G266	139
2	Engine oil cooler	140
2.1	Removing and installing engine oil cooler	140
3	Oil filter/oil pressure switch	143
3.1	Exploded view - oil filter housing/oil pressure switch	143
3.2	Removing and installing oil pressure switch F1	144
3.3	Checking oil pressure and oil pressure switch	146
3.4	Draining oil filter housing	148
3.5	Removing and installing oil filter housing	149
4	Balance shaft assembly	150
4.1	Exploded view - balance shaft assembly	150
4.2	Removing and installing balance shaft assembly	151
19	- Cooling	157
1	Cooling system/coolant	157
1.1	Connection diagram - coolant hoses	157
1.2	Checking cooling system for leaks	158
1.3	Draining and filling cooling system	160

2	Coolant pump/thermostat assembly	166
2.1	Exploded view - coolant pump and thermostat	166
2.2	Exploded view - electric coolant pump	168
2.3	Removing and installing electrical coolant pump	168
2.4	Removing and installing coolant pump	169
2.5	Removing and installing coolant temperature sender G62	170
2.6	Removing and installing radiator outlet coolant temperature sender G83	171
2.7	Removing and installing thermostat	172
3	Coolant pipes	174
3.1	Exploded view - coolant pipes	174
3.2	Removing and installing coolant pipes	175
4	Radiator/radiator fans	180
4.1	Exploded view - radiator/radiator fans	180
4.2	Removing and installing radiator	181
4.3	Removing and installing radiator cowl with radiator fan	182
4.4	Removing and installing radiator fans	182
21 - Turbocharging/supercharging		183
1	Turbocharger	183
1.1	Exploded view - turbocharger	183
1.2	Removing and installing turbocharger	186
1.3	Checking vacuum unit for turbocharger	191
1.4	Adjusting vacuum unit for turbocharger	193
1.5	Renewing vacuum unit for turbocharger	197
2	Charge air system	198
2.1	Overview - charge air system	198
2.2	Exploded view - charge air system	200
2.3	Exploded view - hose connections for charge air system	201
2.4	Removing and installing charge air cooler	202
2.5	Removing and installing charge pressure sender G31	203
2.6	Removing and installing turbocharger air recirculation valve N249	204
2.7	Checking charge air system for leaks	204
26 - Exhaust system		207
1	Exhaust pipes/silencers	207
1.1	Exploded view - silencers	207
1.2	Removing and installing front exhaust pipe	209
1.3	Stress-free alignment of exhaust system	212
1.4	Aligning tailpipes	213
1.5	Checking exhaust system for leaks	213
1.6	Checking vacuum unit for exhaust flap	213
2	Exhaust manifold	215