



Contents

00 - Technical data	1
1 Safety information	1
1.1 Safety regulations for working on fuel supply	1
1.2 Safety measures when working on vehicles with a start/stop system	1
1.3 Safety precautions when using testers and measuring instruments during a road test	2
1.4 Safety precautions when working on the cooling system	2
1.5 Safety precautions when working on ignition system	2
2 Identification	3
2.1 Engine number/engine data	3
3 Repair instructions	5
3.1 Rules for cleanliness	5
3.2 General information	5
3.3 General repair instructions	5
3.4 Foreign objects in engine	6
3.5 Contact corrosion	6
3.6 Routing and attachment of lines	6
3.7 Fitting radiator and condensers	6
3.8 Checking vacuum system	7
10 - Removing and installing engine	8
1 Removing and installing engine	8
1.1 Removing motor	8
1.2 Separating engine and gearbox	30
1.3 Securing engine on engine and gearbox support	31
1.4 Installing engine	34
2 Assembly mountings	38
2.1 Assembly overview - assembly mountings	38
2.2 Removing and installing engine mounting	44
2.3 Removing and installing gearbox mountings	46
2.4 Removing and installing pendulum support	50
2.5 Supporting engine in installation position	51
2.6 Adjusting assembly mountings	60
2.7 Checking adjustment of assembly mountings (engine and gearbox mountings)	62
13 - Crankshaft group	64
1 Cylinder block (pulley end)	64
1.1 Assembly overview - poly V-belt drive	64
1.2 Removing and installing poly-V belt	68
1.3 Removing and installing tensioner for poly V-belt	72
1.4 Removing and installing vibration damper	73
1.5 Removing and installing engine support	77
1.6 Renewing crankshaft oil seal - belt pulley end	79
1.7 Removing and installing sealing flange on pulley end	82
2 Cylinder block, gearbox end	86
2.1 Assembly overview - cylinder block, gearbox end	86
2.2 Removing and installing flywheel	87
2.3 Removing and installing sealing flange on gearbox side	89
3 Crankshaft	100
3.1 Crankshaft dimensions	100
4 Pistons and conrods	101
4.1 Assembly overview - pistons and conrods	101
4.2 Checking pistons and cylinder bores	103



4.3	Separating new conrod	106
4.4	Removing and installing oil spray jets	106
4.5	Setting piston to TDC position	108
15 - Cylinder head, valve gear	111
1	Cylinder head	111
1.1	Assembly overview - cylinder head	111
1.2	Removing and installing cylinder head	114
1.3	Removing and installing camshaft housing	120
1.4	Checking compression	125
2	Toothed belt drive	128
2.1	Assembly overview - toothed belt cover	128
2.2	Assembly overview - toothed belt	129
2.3	Removing and installing toothed belt guard	132
2.4	Removing and installing toothed belt	133
2.5	Preassembling and installing valve timing tool	143
2.6	Checking valve timing	151
2.7	Adjusting valve timing	154
2.8	Removing toothed belt from camshaft	165
3	Valve gear	173
3.1	Assembly overview - valve gear	173
3.2	Removing and installing camshaft oil seal	176
3.3	Removing and installing camshaft adjuster	187
3.4	Removing and installing camshaft control valve 1 N727	197
3.5	Removing and installing exhaust camshaft control valve 1 N318	198
3.6	Removing and installing valve stem seals	198
3.7	Removing and installing holder for oil seal	208
4	Inlet and exhaust valves	212
4.1	Checking valve guides	212
17 - Lubrication	214
1	Sump, oil pump	214
1.1	Assembly overview - sump/oil pump	214
1.2	Engine oil:	220
1.3	Removing and installing oil sump	221
1.4	Removing and installing oil pump	225
1.5	Removing and installing oil level and oil temperature sender G266	229
2	Crankcase ventilation	230
2.1	Assembly overview - crankcase breather system	230
2.2	Removing and installing oil separator	231
3	Oil filter, oil pressure switch	232
3.1	Assembly overview - oil pressure switches/oil pressure control	232
3.2	Removing and installing oil pressure sender G10	233
3.3	Checking oil pressure and oil pressure switch	234
3.4	Removing and installing oil filter housing	234
3.5	Removing and installing oil pressure regulating valve N428	235
19 - Cooling	237
1	Cooling system/coolant	237
1.1	Connection diagram - coolant hoses	237
1.2	Checking cooling system for leaks	237
1.3	Draining and adding coolant	241
2	Coolant pump, regulation of cooling system	259
2.1	Assembly overview - coolant pump, thermostat	259
2.2	Assembly overview - coolant temperature sender	261



2.3	Removing and installing coolant pump	261
2.4	Removing and installing toothed belt pulley for coolant pump	266
2.5	Removing and installing coolant temperature sender G62	268
2.6	Removing and installing engine outlet coolant temperature sender G82	271
2.7	Removing and installing engine temperature regulation module GX33	273
2.8	Checking coolant pump	276
3	Coolant pipes	282
3.1	Assembly overview - coolant pipes	282
3.2	Removing and installing coolant pipes	283
4	Radiator, radiator fan	284
4.1	Assembly overview - radiator/radiator fan	284
4.2	Assembly overview - radiator cowl and radiator fan	287
4.3	Removing and installing radiator	288
4.4	Removing and installing radiator cowl with radiator fan	299
4.5	Removing and installing radiator fan VX57	303
24 - Mixture preparation - injection	304	
1	Injection system	304
1.1	Overview of fitting locations - injection system	304
2	Injectors	308
2.1	Assembly overview - fuel rail with injectors	308
2.2	Removing and installing injectors	309
2.3	Checking injectors	313
3	Air filter	319
3.1	Assembly overview - air filter housing	319
3.2	Removing and installing air filter housing	322
3.3	Removing and installing resonator for intake air	324
3.4	Removing air duct on lock carrier	324
4	Intake manifold	325
4.1	Assembly overview - intake manifold	325
4.2	Removing and installing intake manifold	327
4.3	Removing and installing throttle valve module GX3	330
4.4	Cleaning throttle valve module GX3	332
5	Senders and sensors	334
5.1	Removing and installing intake manifold sender GX9	334
5.2	Removing and installing fuel pressure sender for low-pressure G410	335
6	Engine control unit	336
6.1	Assembly overview - engine control unit	336
6.2	Removing and installing engine control unit J623	337
6.3	Removing and installing engine (motor) control unit J623 with protective housing	339
7	Lambda probe	344
7.1	Assembly overview - Lambda probe	344
7.2	Removing and installing Lambda probe	345
26 - Exhaust system	350	
1	Exhaust pipes and silencers	350
1.1	Assembly overview - silencers	350
1.2	Separating exhaust pipes from silencers	352
1.3	Removing and installing silencer	354
1.4	Aligning exhaust system free of stress	359
1.5	Checking exhaust system for leaks	359
1.6	Installation position of clamp	360
2	Emission control	364
2.1	Assembly overview - emission control	364



2.2	Removing and installing catalytic converter	367
28 - Ignition system	371
1	Ignition system	371
1.1	Assembly overview - ignition system	371
1.2	Removing and installing ignition coils with output stage	373
1.3	Removing and installing knock sensor 1 G61	376
1.4	Removing and installing engine speed sender G28	376
1.5	Removing and installing inlet camshaft position sender G1002	381
1.6	Removing and installing exhaust camshaft position sender G1003	382