

Contents

00 - Technical data	1
1 Identification	1
2 Safety information	2
3 Repair instructions	3
10 - Removing and installing engine	4
1 Removing and installing engine	4
1.1 Removing engine	4
1.2 Separating engine and gearbox	23
1.3 Securing engine to engine and gearbox support	30
1.4 Installing engine	30
2 Assembly mountings	34
2.1 Assembly overview - assembly mountings	34
2.2 Supporting engine in installation position	36
2.3 Removing and installing engine mountings	38
2.4 Removing and installing gearbox mounting	39
2.5 Removing and installing pendulum support	40
2.6 Checking adjustment of assembly mountings	40
2.7 Adjusting assembly mountings	41
3 Engine cover panel	43
13 - Crankshaft group	44
1 Cylinder block (pulley end)	44
1.1 Assembly overview - cylinder block (pulley end)	44
1.2 Removing and installing poly V-belt	44
1.3 Removing and installing poly V-belt tensioner	44
1.4 Removing and installing vibration damper	44
1.5 Removing and installing bracket for ancillaries	45
1.6 Removing and installing engine support	45
2 Cylinder block (gearbox end)	46
3 Crankshaft	47
4 Balance shaft	48
5 Pistons and conrods	49
15 - Cylinder head, valve gear	50
1 Timing chain cover	50
1.1 Assembly overview - timing chain cover	50
1.2 Removing and installing timing chain cover	50
1.3 Renewing oil seal for vibration damper	51
2 Chain drive	52
3 Cylinder head	53
3.1 Assembly overview - cylinder head	53
3.2 Removing and installing cylinder head	53
3.3 Checking compression	62
4 Valve gear	63
4.1 Assembly overview - valve gear	63
4.2 Removing and installing camshaft	63
4.3 Installing ball for slider	65
4.4 Removing and installing cam adjustment actuators	65
4.5 Removing and installing camshaft control valve 1 N205	65
4.6 Removing and installing valve stem oil seals	65



5	Inlet and exhaust valves	66
17	- Lubrication	67
1	Sump/oil pump	67
1.1	Assembly overview - sump/oil pump	67
1.2	Engine oil	67
1.3	Removing and installing lower part of sump	67
1.4	Removing and installing oil pump	67
1.5	Removing and installing upper part of sump	67
1.6	Removing and installing oil level and oil temperature sender G266	67
2	Engine oil cooler	69
3	Crankcase breather	70
4	Oil filter/oil pressure switches	71
4.1	Assembly overview - oil filter	71
4.2	Assembly overview - oil pressure switches/oil pressure control	71
4.3	Removing and installing oil pressure switch F22	71
4.4	Removing and installing oil pressure switch for reduced oil pressure F378	71
4.5	Removing and installing stage 3 oil pressure switch F447	71
4.6	Removing and installing valve for oil pressure control N428	73
4.7	Removing and installing piston cooling jet control valve N522	73
4.8	Checking oil pressure	74
19	- Cooling	75
1	Cooling system/coolant	75
1.1	Connection diagram - coolant hoses	75
1.2	Checking cooling system for leaks	76
1.3	Draining and filling cooling system	76
2	Coolant pump/thermostat assembly	83
2.1	Assembly overview - coolant pump/thermostat	83
2.2	Assembly overview - electric coolant pump	83
2.3	Assembly overview - coolant valves	84
2.4	Assembly overview - coolant temperature senders	85
2.5	Removing and installing electric coolant pump	86
2.6	Removing and installing coolant pump	90
2.7	Removing and installing toothed belt for coolant pump	92
2.8	Removing and installing actuator for engine temperature regulation N493	95
2.9	Removing and installing coolant temperature sender G62	95
2.10	Removing and installing radiator outlet coolant temperature sender G83	95
2.11	Removing and installing coolant valves	96
3	Coolant pipes	98
3.1	Assembly overview - coolant pipes	98
3.2	Removing and installing coolant pipes	99
4	Radiator/radiator fan	103
4.1	Assembly overview - radiator/radiator fan	103
4.2	Removing and installing radiator	105
4.3	Removing and installing radiator cowl	107
4.4	Removing and installing radiator fan V7	108
21	- Turbocharging/supercharging	110
1	Turbocharger	110
1.1	Assembly overview - turbocharger	110
1.2	Removing and installing turbocharger	114
1.3	Removing and installing turbocharger air recirculation valve N249	123
1.4	Removing and installing charge pressure positioner V465	124

2	Charge air system	127
2.1	Assembly overview - charge air system	127
2.2	Assembly overview - hose connections for charge air system	129
2.3	Removing and installing charge air cooler	129
2.4	Removing and installing charge pressure sender G31	132
2.5	Checking charge air system for leaks	132
24	Mixture preparation - injection	134
1	Injection system	134
1.1	Overview of fitting locations - injection system	134
2	Air filter	146
2.1	Assembly overview - air filter housing	146
2.2	Removing and installing air filter housing	148
3	Intake manifold	150
3.1	Assembly overview - intake manifold	150
3.2	Removing and installing intake manifold	150
3.3	Removing and installing throttle valve module GX3	157
3.4	Cleaning throttle valve module GX3	158
3.5	Checking intake manifold change-over function	159
4	Injectors	160
5	Senders and sensors	161
5.1	Removing and installing intake manifold sender GX9	161
5.2	Removing and installing fuel pressure sender G247	161
5.3	Checking fuel pressure sender G247	162
6	High-pressure pump	163
6.1	Assembly overview - high-pressure pump	163
6.2	Removing and installing high-pressure pump	163
7	Lambda probe	165
7.1	Assembly overview - Lambda probe	165
7.2	Removing and installing Lambda probe	165
8	Engine control unit	167
8.1	Removing and installing engine control unit J623	167
26	Exhaust system	169
1	Exhaust pipes/silencer	169
1.1	Assembly overview - silencer	169
1.2	Removing and installing silencer	170
1.3	Stress-free alignment of exhaust system	171
1.4	Checking exhaust system for leaks	172
2	Emission control system	173
2.1	Assembly overview - emission control system	173
2.2	Removing and installing catalytic converter	175
2.3	Removing and installing particulate filter	178
3	Exhaust gas temperature regulation	184
3.1	Assembly overview - exhaust gas temperature regulation	184
3.2	Removing and installing parts of exhaust gas temperature regulation	184
28	Ignition system	185
1	Ignition system	185