

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	29
1.3 Removing engine from scissor-type assembly platform	34
1.4 Securing engine to engine and gearbox support	34
1.5 Installing engine	34
2 Assembly mountings	38
2.1 Assembly overview - assembly mountings	38
2.2 Supporting engine in installation position	41
2.3 Removing and installing engine mountings	43
2.4 Removing and installing gearbox mounting	45
3 Engine cover panel	46
13 - Crankshaft group	47
1 Cylinder block (pulley end)	47
1.1 Assembly overview - cylinder block (pulley end)	47
1.2 Assembly overview - sealing flange (pulley end)	47
1.3 Removing and installing poly V-belt	47
1.4 Removing and installing poly V-belt tensioner	47
1.5 Removing and installing vibration damper	48
1.6 Removing and installing bracket for ancillaries	52
1.7 Removing and installing engine support	53
1.8 Removing and installing sealing flange (pulley end)	55
1.9 Renewing cylinder block sealing cap (pulley end)	55
2 Cylinder block (gearbox end)	56
3 Crankshaft	57
4 Pistons and conrods	58
15 - Cylinder head, valve gear	59
1 Toothed belt drive	59
1.1 Assembly overview - toothed belt guard	59
1.2 Assembly overview - toothed belt	59
1.3 Removing and installing toothed belt guard	59
1.4 Detaching toothed belt from camshaft	60
1.5 Removing and installing toothed belt	60
2 Cylinder head	61
2.1 Assembly overview - cylinder head cover	61
2.2 Assembly overview - cylinder head	61
2.3 Removing and installing cylinder head cover	61
2.4 Removing and installing seals for injectors	61
2.5 Removing and installing cylinder head	61
2.6 Removing and installing camshaft housing	63
2.7 Checking compression	63
3 Valve gear	64
4 Inlet and exhaust valves	65



17 - Lubrication	66
1 Sump/oil pump	66
1.1 Assembly overview - sump/oil pump	66
1.2 Engine oil	66
1.3 Removing and installing lower part of sump	66
1.4 Removing and installing upper part of sump	67
1.5 Removing and installing oil pump	67
1.6 Removing and installing oil level and oil temperature sender G266	67
2 Engine oil cooler	68
3 Oil filter/oil pressure switches	69
3.1 Assembly overview - oil filter	69
3.2 Assembly overview - oil pressure switches/oil pressure control	69
3.3 Removing and installing oil filter housing	69
3.4 Removing and installing oil pressure sender G10	69
3.5 Removing and installing valve for oil pressure control N428	70
3.6 Checking oil pressure	70
3.7 Removing and installing piston cooling jet control valve N522	70
19 - Cooling	71
1 Cooling system/coolant	71
1.1 Connection diagram - coolant hoses	71
1.2 Checking cooling system for leaks	79
1.3 Draining and filling cooling system	79
1.4 Checking filling quality	88
1.5 Removing and installing coolant expansion tank	88
2 Coolant pump/thermostat assembly	91
2.1 Assembly overview - coolant pump/thermostat	91
2.2 Assembly overview - electric coolant pump	91
2.3 Assembly overview - coolant valves	95
2.4 Assembly overview - coolant temperature senders	97
2.5 Removing and installing electric coolant pump	98
2.6 Removing and installing coolant pump	102
2.7 Removing and installing coolant valves	103
2.8 Removing and installing coolant valve for cylinder head N489	106
2.9 Removing and installing coolant distribution module	106
2.10 Removing and installing coolant temperature sender G62	106
2.11 Removing and installing temperature sender for engine temperature regulation G694	107
2.12 Removing and installing coolant temperature sender 2 G802	108
3 Coolant pipes	109
3.1 Assembly overview - coolant pipes	109
3.2 Removing and installing coolant pipes	110
3.3 Removing and installing coolant pipes for gearbox	112
4 Radiators/radiator fans	114
4.1 Assembly overview - radiators/radiator fans	114
4.2 Assembly overview - radiator cowl and radiator fans	118
4.3 Assembly overview - radiator blind	120
4.4 Removing and installing radiator	122
4.5 Removing and installing radiator blind	130
4.6 Removing and installing radiator blind control motor V544	132
4.7 Removing and installing water radiator for charge air cooling circuit	135
4.8 Removing and installing radiator cowl	138
4.9 Removing and installing radiator fan(s)	142
21 - Turbocharging/supercharging	144

1	Turbocharger	144
1.1	Assembly overview - turbocharger	144
1.2	Removing and installing turbocharger	144
2	Charge air system	145
2.1	Assembly overview - charge air system	145
2.2	Assembly overview - hose connections for charge air system	145
2.3	Removing and installing charge pressure sender G31	145
2.4	Removing and installing air intake pipe	145
2.5	Removing and installing charge air temperature sender	145
2.6	Checking charge air system for leaks	146
23	- Mixture preparation - injection	147
1	Injection system	147
1.1	Overview - fuel system	147
1.2	Overview of fitting locations - injection system	148
1.3	Filling and bleeding fuel system	160
1.4	Checking fuel system for leaks	161
2	Air filter	162
2.1	Assembly overview - air filter housing	162
2.2	Removing and installing air filter housing	166
3	Intake manifold	168
3.1	Assembly overview - intake manifold	168
3.2	Removing and installing throttle valve module J338	168
3.3	Removing and installing intake manifold	168
4	Injectors/high-pressure reservoir (rail)	170
4.1	Assembly overview - injectors	170
4.2	Assembly overview - high-pressure reservoir (rail)	170
4.3	Checking injectors	170
4.4	Removing and installing injectors	170
4.5	Removing and installing high-pressure pipes	170
4.6	Removing and installing high-pressure reservoir (rail)	171
5	High-pressure pump	172
6	Senders and sensors	173
6.1	Removing and installing air mass meter G70	173
6.2	Removing and installing temperature and pressure sender for low-pressure fuel system GX20	174
6.3	Removing and installing fuel pressure sender G247	174
6.4	Checking fuel pressure regulating valve N276	174
6.5	Removing and installing fuel pressure regulating valve N276	175
6.6	Removing and installing pressure differential sender G505	175
7	Lambda probe	176
7.1	Assembly overview - Lambda probe	176
7.2	Removing and installing Lambda probe	176
7.3	Removing and installing NOx senders	177
7.4	Removing and installing particulate sensor G784	180
8	Engine control unit	181
8.1	Assembly overview - engine control unit	181
8.2	Removing and installing engine control unit J623	182
26	- Exhaust system	184
1	Exhaust pipes/silencers	184
1.1	Assembly overview - silencers	184
1.2	Removing and installing front exhaust pipe	190
1.3	Separating exhaust pipes/silencers	190



1.4	Removing and installing silencers	193
1.5	Stress-free alignment of exhaust system	196
1.6	Checking exhaust system for leaks	197
2	Emission control system	198
2.1	Assembly overview - emission control system	198
2.2	Removing and installing catalytic converter	198
2.3	Removing and installing particulate filter	198
2.4	Removing and installing ammonia trap	198
2.5	Removing and installing exhaust flap control unit J883	198
3	SCR (selective catalytic reduction) system	199
3.1	Assembly overview - reducing agent tank	199
3.2	Assembly overview - reducing agent supply line	203
3.3	Assembly overview - injector for reducing agent	205
3.4	Assembly overview - delivery unit for reducing agent	205
3.5	Disconnecting reducing agent supply line	207
3.6	Releasing pressure in SCR system	207
3.7	Draining reducing agent tank	207
3.8	Removing and installing reducing agent tank	211
3.9	Removing and installing injector for reducing agent N474	215
3.10	Removing and installing injector 2 for reducing agent N758	215
3.11	Removing and installing control unit for reducing agent metering system J880	215
3.12	Removing and installing pump for reducing agent V437	216
3.13	Removing and installing pressure sender for reducing agent metering system G686	219
3.14	Removing and installing connection for SCR supply line	221
3.15	Removing and installing reducing agent quality sensor G849	223
4	Exhaust gas temperature regulation	224
5	Exhaust gas recirculation	225
5.1	Assembly overview - exhaust gas recirculation system	225
5.2	Removing and installing exhaust gas recirculation control motor V338	225
5.3	Removing and installing exhaust gas recirculation control motor 2 V339	225
5.4	Removing and installing exhaust gas recirculation cooler	226
5.5	Checking exhaust gas recirculation cooler for leaks	226
28	Glow plug system	227
1	Glow plug system	227
1.1	Assembly overview - glow plug system	227
1.2	Removing and installing glow plug	227
1.3	Removing and installing automatic glow period control unit J179	227
1.4	Removing and installing Hall sender G40	227
1.5	Removing and installing engine speed sender G28	227