

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	24
1.3 Securing engine to engine and gearbox support	33
1.4 Installing engine	36
2 Assembly mountings	40
2.1 Assembly overview - assembly mountings	40
2.2 Supporting engine in installation position	42
2.3 Removing and installing engine mounting	46
2.4 Removing and installing gearbox mounting	50
3 Engine cover panel	51
13 - Crankshaft group	52
1 Cylinder block (pulley end)	52
1.1 Assembly overview - cylinder block (pulley end)	52
1.2 Assembly overview - sealing flange (pulley end)	52
1.3 Removing and installing poly V-belts	52
1.4 Removing and installing poly V-belt tensioner	52
1.5 Removing and installing vibration damper	52
1.6 Removing and installing bracket for ancillaries	53
1.7 Removing and installing engine support	57
1.8 Renewing crankshaft oil seal (pulley end)	58
1.9 Removing and installing sealing flange (pulley end)	58
2 Cylinder block (gearbox end)	60
3 Crankshaft	61
4 Balance shaft	62
5 Pistons and conrods	63
15 - Cylinder head, valve gear	64
1 Timing chain cover	64
1.1 Assembly overview - timing chain cover	64
1.2 Removing and installing timing chain cover	64
2 Chain drive	66
3 Cylinder head	67
3.1 Assembly overview - cylinder head	67
3.2 Assembly overview - cylinder head cover	67
3.3 Removing and installing cylinder head	67
3.4 Removing and installing cylinder head cover	67
3.5 Removing and installing seals for injectors	71
3.6 Checking compression	71
4 Valve gear	72
5 Inlet and exhaust valves	73
17 - Lubrication	74
1 Sump/oil pump	74



1.1	Assembly overview - sump/oil pump	74
1.2	Engine oil	74
1.3	Removing and installing lower part of sump	74
1.4	Removing and installing upper part of sump	76
1.5	Removing and installing oil pump	77
1.6	Removing and installing oil level and oil temperature sender G266	77
2	Engine oil cooler	78
3	Crankcase breather	79
4	Oil filter/oil pressure switches	80
4.1	Assembly overview - oil filter	80
4.2	Removing and installing oil filter housing	80
4.3	Removing and installing oil pressure sender G10	81
4.4	Checking oil pressure	82
4.5	Removing and installing valve for oil pressure control N428	82
4.6	Removing and installing oil temperature sender 2 G664	82
19	Cooling	85
1	Cooling system/coolant	85
1.1	Connection diagram - coolant hoses	85
1.2	Checking cooling system for leaks	89
1.3	Draining and filling cooling system	89
2	Coolant pump/thermostat assembly	97
2.1	Assembly overview - coolant pump	97
2.2	Assembly overview - electric coolant pump	97
2.3	Assembly overview - thermostat	99
2.4	Assembly overview - coolant temperature senders	99
2.5	Removing and installing electric coolant pump	99
2.6	Removing and installing coolant pump	102
2.7	Removing and installing thermostat	103
2.8	Removing and installing coolant temperature sender G62	104
2.9	Removing and installing temperature sender for engine temperature regulation G694	104
2.10	Removing and installing coolant valves	105
3	Coolant pipes	106
3.1	Assembly overview - coolant pipes	106
3.2	Removing and installing coolant pipes	111
4	Radiators/radiator fans	130
4.1	Assembly overview - radiators/radiator fan	130
4.2	Removing and installing radiator	133
4.3	Removing and installing radiator cowl	138
4.4	Removing and installing radiator fan V7	141
21	Turbocharging/supercharging	142
1	Turbocharger	142
1.1	Assembly overview - turbocharger	142
1.2	Assembly overview - electric compressor with control unit for electric compressor J1123	142
1.3	Removing and installing turbocharger	144
1.4	Removing and installing electric compressor with control unit for electric compressor J1123	145
1.5	Removing and installing sender 1 for turbocharger speed G688	148
2	Charge air system	150
2.1	Assembly overview - charge air system	150
2.2	Assembly overview - hose connections for charge air system	152
2.3	Removing and installing charge air cooler	152
2.4	Removing and installing charge pressure sender G31	153
2.5	Removing and installing charge air temperature sender before charge air cooler G810	154

2.6	Removing and installing charge air temperature sender after charge air cooler G811	155
2.7	Checking charge air system for leaks	155
23	Mixture preparation - injection	156
1	Injection system	156
1.1	Overview - fuel system	156
1.2	Overview of fitting locations - injection system	157
1.3	Filling and bleeding fuel system	166
1.4	Checking fuel system for leaks	166
2	Vacuum system	167
3	Air filter	168
3.1	Assembly overview - air filter housing	168
3.2	Removing and installing air filter housing	170
4	Intake manifold	172
4.1	Assembly overview - intake manifold	172
4.2	Removing and installing upper part of intake manifold	172
4.3	Removing and installing lower part of intake manifold	178
4.4	Removing and installing intake manifold flap motor V157	178
4.5	Removing and installing throttle valve module J338	180
5	Injectors/high-pressure reservoir (rail)	182
5.1	Assembly overview - injectors	182
5.2	Checking injectors	182
5.3	Performing adaption of correction values for injectors	182
5.4	Checking for injectors sticking open	182
5.5	Checking return flow rate of injectors with engine running	183
5.6	Checking return flow rate of injectors at starter cranking speed	184
5.7	Checking pressure retention valve in fuel return line	184
5.8	Removing and installing injectors	184
5.9	Removing and installing high-pressure pipes	186
5.10	Removing and installing high-pressure reservoir (rail)	186
6	Senders and sensors	188
6.1	Removing and installing actuator for engine sound generator	188
6.2	Removing and installing air mass meter G70	189
6.3	Removing and installing fuel temperature sender G81	190
6.4	Removing and installing fuel pressure sender G247	190
6.5	Removing and installing fuel pressure sender for low pressure G410	190
6.6	Checking fuel pressure regulating valve N276	190
6.7	Removing and installing fuel pressure regulating valve N276	192
6.8	Removing and installing pressure differential sender	193
7	High-pressure pump	197
7.1	Assembly overview - high-pressure pump	197
7.2	Removing and installing high-pressure pump	197
8	Lambda probe	198
8.1	Assembly overview - Lambda probe	198
8.2	Removing and installing Lambda probe	199
8.3	Removing and installing NOx senders	199
8.4	Removing and installing particulate sensor G784	202
9	Engine control unit	205
9.1	Assembly overview - engine control unit	205
9.2	Removing and installing engine control unit J623	205
26	Exhaust system	207
1	Exhaust pipes/silencers	207
1.1	Assembly overview - silencers	207



1.2	Removing and installing front exhaust pipe	209
1.3	Separating exhaust pipes/silencers	212
1.4	Removing and installing silencer	213
1.5	Stress-free alignment of exhaust system	214
1.6	Checking exhaust system for leaks	215
2	Emission control system	216
2.1	Assembly overview - emission control system	216
2.2	Removing and installing emission control module	216
2.3	Removing and installing ammonia trap	219
2.4	Removing and installing exhaust flap control unit J883	220
3	SCR (selective catalytic reduction) system	221
3.1	Assembly overview - reducing agent tank	221
3.2	Assembly overview - reducing agent supply line	223
3.3	Releasing pressure in SCR system	223
3.4	Draining reducing agent tank	223
3.5	Removing and installing reducing agent tank	227
3.6	Removing and installing injector for reducing agent N474	229
3.7	Removing and installing control unit for reducing agent metering system J880	229
3.8	Removing and installing reducing agent quality sensor G849	230
4	Exhaust gas temperature regulation	232
5	Exhaust gas recirculation	233
5.1	Assembly overview - exhaust gas recirculation system	233
5.2	Removing and installing exhaust gas recirculation cooler	235
5.3	Removing and installing exhaust gas recirculation valve 2 GX6	238
5.4	Removing and installing exhaust gas recirculation temperature sensor G98	239
6	Exhaust manifolds	240
6.1	Assembly overview - exhaust manifold	240
6.2	Removing and installing exhaust manifolds	240
28	Glow plug system	245
1	Glow plug system	245