

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	15
1.3 Removing engine from scissor-type assembly platform	20
1.4 Securing engine to engine and gearbox support	20
1.5 Installing engine	21
2 Assembly mountings	24
2.1 Assembly overview - assembly mountings	24
2.2 Supporting engine in installation position	26
2.3 Removing and installing engine mountings	29
2.4 Removing and installing gearbox mounting	31
3 Engine cover panel	33
13 - Crankshaft group	34
1 Cylinder block (pulley end)	34
1.1 Assembly overview - cylinder block (pulley end)	34
1.2 Assembly overview - sealing flange (pulley end)	34
1.3 Removing and installing poly V-belt	34
1.4 Removing and installing poly V-belt tensioner	34
1.5 Removing and installing vibration damper	34
1.6 Removing and installing bracket for ancillaries	37
1.7 Removing and installing engine support	37
1.8 Removing and installing sealing flange (pulley end)	39
1.9 Renewing cylinder block sealing cap (pulley end)	39
2 Cylinder block (gearbox end)	40
3 Crankshaft	41
4 Pistons and conrods	42
15 - Cylinder head, valve gear	43
1 Toothed belt drive	43
2 Cylinder head	44
2.1 Assembly overview - cylinder head cover	44
2.2 Assembly overview - cylinder head	44
2.3 Removing and installing cylinder head cover	44
2.4 Removing and installing seals for injectors	44
2.5 Removing and installing cylinder head	44
2.6 Removing and installing camshaft housing	45
2.7 Checking compression	45
3 Valve gear	46
4 Inlet and exhaust valves	47
17 - Lubrication	48
1 Sump/oil pump	48
1.1 Assembly overview - sump/oil pump	48
1.2 Engine oil	48



1.3	Removing and installing lower part of sump	48
1.4	Removing and installing upper part of sump	48
1.5	Removing and installing oil pump	49
1.6	Removing and installing oil level and oil temperature sender G266	49
2	Engine oil cooler	50
3	Oil filter/oil pressure switches	51
3.1	Assembly overview - oil filter	51
3.2	Assembly overview - oil pressure switches/oil pressure control	51
3.3	Removing and installing oil filter housing	51
3.4	Removing and installing oil pressure sender G10	51
3.5	Removing and installing valve for oil pressure control N428	52
3.6	Checking oil pressure	52
3.7	Removing and installing piston cooling jet control valve N522	52
19	- Cooling	53
1	Cooling system/coolant	53
1.1	Connection diagram - coolant hoses	53
1.2	Checking cooling system for leaks	57
1.3	Draining and filling cooling system	57
1.4	Checking filling quality	66
1.5	Removing and installing coolant expansion tank	66
2	Coolant pump/thermostat assembly	68
2.1	Assembly overview - coolant pump/thermostat	68
2.2	Assembly overview - electric coolant pump	68
2.3	Assembly overview - coolant valves	70
2.4	Assembly overview - coolant temperature senders	71
2.5	Removing and installing electric coolant pump	71
2.6	Removing and installing coolant pump	75
2.7	Removing and installing mixing valve for charge air cooler	75
2.8	Removing and installing coolant valve for cylinder head N489	77
2.9	Removing and installing coolant distribution module	77
2.10	Removing and installing temperature sensor G18	77
2.11	Removing and installing temperature sender for engine temperature regulation G694	78
2.12	Removing and installing coolant temperature sender G62	79
3	Coolant pipes	80
3.1	Assembly overview - coolant pipes	80
3.2	Removing and installing coolant pipes	81
3.3	Removing and installing coolant pipes for gearbox	83
4	Radiators/radiator fans	85
4.1	Assembly overview - radiators/radiator fan	85
4.2	Removing and installing radiator	89
4.3	Removing and installing water radiator for charge air cooling circuit	94
4.4	Removing and installing radiator cowl	96
4.5	Removing and installing radiator fans	99
21	- Turbocharging/supercharging	101
1	Turbocharger	101
2	Charge air system	102
2.1	Assembly overview - charge air system	102
2.2	Assembly overview - hose connections for charge air system	102
2.3	Removing and installing charge pressure sender G31	102
2.4	Removing and installing air intake pipe	102
2.5	Removing and installing charge air temperature sender	102
2.6	Checking charge air system for leaks	102

23 - Mixture preparation - injection	103
1 Injection system	103
1.1 Overview - fuel system	103
1.2 Overview of fitting locations - injection system	104
1.3 Filling and bleeding fuel system	114
1.4 Checking fuel system for leaks	114
2 Air filter	115
2.1 Assembly overview - air filter housing	115
2.2 Removing and installing air filter housing	117
3 Intake manifold	119
3.1 Assembly overview - intake manifold	119
3.2 Removing and installing throttle valve module GX3	119
3.3 Removing and installing intake manifold	119
4 Injectors/high-pressure reservoir (rail)	121
4.1 Assembly overview - injectors	121
4.2 Assembly overview - high-pressure reservoir (rail)	121
4.3 Checking injectors	121
4.4 Removing and installing injectors	121
4.5 Removing and installing high-pressure pipes	121
4.6 Removing and installing high-pressure reservoir (rail)	122
5 High-pressure pump	123
6 Senders and sensors	124
6.1 Removing and installing air mass meter G70	124
6.2 Removing and installing fuel pressure sender G247	125
6.3 Removing and installing temperature and pressure sender for low-pressure fuel system GX20	125
6.4 Removing and installing pressure differential sender G505	125
6.5 Checking fuel pressure regulating valve N276	125
6.6 Removing and installing fuel pressure regulating valve N276	126
7 Lambda probe	127
7.1 Assembly overview - Lambda probe	127
7.2 Removing and installing Lambda probe	128
7.3 Removing and installing NOx senders	128
7.4 Removing and installing particulate sensor G784	130
8 Engine control unit	131
8.1 Assembly overview - engine control unit	131
8.2 Removing and installing engine control unit J623	131
26 - Exhaust system	133
1 Exhaust pipes/silencers	133
1.1 Assembly overview - silencer	133
1.2 Removing and installing front exhaust pipe	137
1.3 Removing and installing silencers	137
1.4 Stress-free alignment of exhaust system	139
1.5 Checking exhaust system for leaks	140
2 Emission control system	141
2.1 Assembly overview - emission control system	141
2.2 Removing and installing catalytic converter	141
2.3 Removing and installing particulate filter	141
2.4 Removing and installing ammonia trap	141
2.5 Removing and installing exhaust flap control unit J883	141
3 SCR (selective catalytic reduction) system	142
3.1 Assembly overview - reducing agent tank	142



3.2	Assembly overview - reducing agent supply line	144
3.3	Assembly overview - injector for reducing agent	145
3.4	Assembly overview - delivery unit	145
3.5	Disconnecting reducing agent supply line	147
3.6	Releasing pressure in SCR system	147
3.7	Draining reducing agent tank	147
3.8	Removing and installing reducing agent tank	150
3.9	Removing and installing injector for reducing agent N474	151
3.10	Removing and installing injector 2 for reducing agent N758	151
3.11	Removing and installing control unit for reducing agent metering system J880	151
3.12	Removing and installing pump for reducing agent V437	152
3.13	Removing and installing pressure sender for reducing agent metering system G686	154
3.14	Removing and installing connection for SCR supply line	157
4	Exhaust gas temperature regulation	159
4.1	Assembly overview - exhaust gas temperature regulation	159
4.2	Removing and installing parts of exhaust gas temperature regulation	159
5	Exhaust gas recirculation	160
5.1	Assembly overview - exhaust gas recirculation system	160
5.2	Removing and installing exhaust gas recirculation control motor V338	160
5.3	Removing and installing exhaust gas recirculation control motor 2 V339	160
5.4	Removing and installing exhaust gas recirculation cooler	160
5.5	Checking exhaust gas recirculation cooler for leaks	161
28	Glow plug system	162
1	Glow plug system	162
1.1	Assembly overview - glow plug system	162
1.2	Removing and installing glow plug	162
1.3	Removing and installing automatic glow period control unit J179	162
1.4	Removing and installing Hall sender G40	162
1.5	Removing and installing engine speed sender G28	162