



Contents

00	Technical data	1
1	Technical data	1
1.1	Engine number	1
1.2	Engine data	1
10	Removing and installing engine	3
1	Removing and installing engine	3
1.1	Removing engine	3
1.2	Removing engine from scissor-type assembly platform VAS 6131	12
1.3	Securing engine on engine and gearbox support VAS 6095	13
1.4	Notes on installing	14
13	Crankshaft group	16
1	Dismantling and assembling engine	16
1.1	Assembly overview - components in the V space	16
1.2	Assembly overview - gear train assembly	18
1.3	Removing and installing gear train assembly	19
1.4	Removing and installing engine mounting and engine support (left and right)	22
1.5	Removing and installing drive plate	23
2	Balancer shaft	25
2.1	Assembly overview - balancer shaft	25
3	Crankshaft	26
3.1	Assembly overview - crankshaft	26
3.2	Removing and installing bearing saddle for crankshaft	27
3.3	Crankshaft dimensions	29
4	Sealing flange, seals and vibration damper	30
4.1	Assembly overview - front sealing flange and vibration damper	30
4.2	Renewing crankshaft oil seal, vibration damper end	31
4.3	Renewing crankshaft oil seal - engine timing end	32
4.4	Renewing alternator shaft oil seal	34
5	Timing housing	37
5.1	Assembly overview - timing housing	37
6	Pistons and conrods	39
6.1	Assembly overview - pistons and conrods	39
6.2	Checking piston projection at TDC	40
6.3	Piston and cylinder dimensions	40
6.4	Piston rings, cylinder bore and piston installation position	41
15	Cylinder head, valve gear	43
1	Cylinder head	43
1.1	Assembly overview - cylinder head	43
1.2	Removing and installing camshaft compensating gear and drive gear wheel	45
1.3	Checking valve timing	49
1.4	Adjusting valve timing	51
1.5	Removing and installing cylinder heads	53
1.6	Checking compression	55
2	Valve gear	58
2.1	Assembly overview - valve gear	58
2.2	Reworking valve seats	61
2.3	Checking valve guides	62
2.4	Renewing valve stem seals	63
2.5	Removing and installing camshaft	65



17 - Lubrication	67
1 Engine oil	67
1.1 Oil capacities	67
1.2 Checking engine oil level	67
2 Oil sump	68
2.1 Assembly overview - sump	68
2.2 Applying sealant	71
3 Oil pump, oil filter housing and oil pressure	72
3.1 Assembly overview - oil pump	72
3.2 Assembly overview - oil filter housing	74
3.3 Removing and installing oil filter housing	75
3.4 Checking oil pressure and oil pressure switch	75
3.5 Checking oil pressure at front of engine	77
19 - Cooling	79
1 Parts of cooling system	79
1.1 Assembly overview - radiator	80
1.2 Assembly overview - fans	81
1.3 Parts of cooling system - body side	82
1.4 Parts of cooling system - engine side and at top	83
1.5 Parts of alternator and fuel cooling system	84
1.6 Fitting location of continued coolant circulation pump and fuel cooling pump	85
1.7 Assembly overview - thermostat housing	85
1.8 Assembly overview - coolant pump	87
1.9 Coolant hose schematic diagram	88
1.10 Draining and filling coolant	89
1.11 Removing and installing fan support	92
1.12 Removing and installing radiator	92
1.13 Removing and installing coolant connection	93
1.14 Removing and installing coolant pump	94
20 - Fuel supply system	97
1 Parts of fuel supply system	97
1.1 Safety precautions when working on fuel supply system	98
1.2 Rules for cleanliness	98
1.3 Assembly overview - fuel tank with attachments	99
1.4 Assembly overview - fuel filter	101
1.5 Schematic diagram of fuel lines and components in fuel tank	103
1.6 Schematic diagram of fuel hoses in engine compartment	104
1.7 Emptying fuel tank	105
1.8 Removing and installing fuel delivery unit, fuel gauge sender and suction-jet pumps	107
1.9 Removing and installing fuel tank with attached components	109
1.10 Checking fuel pumps	113
1.11 Checking tandem pump and fuel pump	114
1.12 Removing and installing tandem pump and fuel pump	116
1.13 Assembly overview - accelerator mechanism	118
2 Additive tank	120
2.1 Safety precautions when working on additive tank	120
2.2 Assembly overview - additive tank	120
2.3 Removing and installing additive tank	122
21 - Turbocharging/supercharging	125
1 Charge air system with turbocharger	125
1.1 Safety precautions	125
1.2 Rules for cleanliness	125



1.3	Installing hose connections with connector couplings	126
1.4	Assembly overview - turbocharger	127
1.5	Assembly overview - parts of charge air cooling	129
1.6	Checking charge air system for leaks	130
23	Mixture preparation - injection	132
1	Repairing diesel direct injection system	132
1.1	Safety precautions	132
1.2	Rules for cleanliness	133
1.3	Removing and installing intake manifold	133
1.4	Assembly overview - intake connecting pipe	134
1.5	Assembly overview - air filter	136
1.6	Assembly overview - unit injector	138
1.7	Removing and installing unit injector	139
1.8	Checking and adjusting position of pump plungers in unit injectors	141
1.9	Renewing O-rings for unit injectors	143
2	Engine control units	145
2.1	Reading and clearing fault memory of engine control units	145
2.2	Adapting functions and components	146
2.3	Removing and installing engine control units	147
26	Exhaust system	148
1	Removing and installing parts of exhaust system	148
1.1	Assembly overview - exhaust manifold	149
1.2	Assembly overview - front exhaust pipe with catalytic converter, particulate filter and attachments	150
1.3	Assembly overview - silencers with mountings	152
2	Exhaust gas recirculation system	154
2.1	Safety precautions	154
2.2	Rules for cleanliness	154
2.3	Assembly overview - exhaust gas recirculation	155
2.4	Assembly overview - bypass flap with exhaust gas recirculation cooler	156
2.5	Removing and installing bypass flap with exhaust gas recirculation cooler	158
2.6	Vacuum hose schematic diagram	160
28	Glow plug system	162
1	Glow plugs	162
1.1	Removing, installing and checking glow plugs	162