



Contents

00 - Technical data	1
1 Safety information	1
1.1 Safety regulations for working on fuel supply	1
1.2 Safety measures when working on vehicles with a start/stop system	1
1.3 Safety precautions when using testers and measuring instruments during a road test	2
1.4 Safety precautions when working on ignition system	2
1.5 Safety precautions when working on the cooling system	2
1.6 Safety precautions when working on exhaust system	3
2 Identification	4
2.1 Engine number/engine data	4
3 Repair instructions	7
3.1 Rules for cleanliness	7
3.2 Foreign objects in engine	7
3.3 Contact corrosion	7
3.4 Routing and attachment of lines	7
3.5 Fitting radiator and condensers	8
3.6 Checking vacuum system	8
10 - Removing and installing engine	9
1 Removing and installing engine	9
1.1 Removing engine	9
1.2 Separating engine and gearbox	30
1.3 Securing engine on engine and gearbox support	40
1.4 Installing engine	43
2 Assembly mountings	47
2.1 Assembly overview - assembly mountings	47
2.2 Supporting engine in installation position	51
2.3 Removing and installing engine mounting	72
2.4 Removing and installing gearbox mounting	74
2.5 Removing and installing pendulum support	76
2.6 Checking adjustment of assembly mountings	77
2.7 Adjusting assembly mountings	78
3 Engine cover panel	81
3.1 Removing and installing engine cover	81
13 - Crankshaft group	82
1 Cylinder block (pulley end)	82
1.1 Assembly overview - cylinder block (pulley end)	82
1.2 Removing and installing poly-V belt	85
1.3 Removing and installing tensioner for poly V-belt	87
1.4 Removing and installing vibration damper	88
1.5 Removing and installing bracket for ancillaries	95
1.6 Removing and installing engine support	98
1.7 Renewing seal for vibration damper	100
2 Cylinder block, gearbox end	103
2.1 Assembly overview - cylinder block, gearbox end	103
2.2 Removing and installing flywheel	104
2.3 Removing and installing sealing flange on gearbox side	106
3 Crankshaft	111
3.1 Assembly overview - crankshaft	111
3.2 Crankshaft dimensions	113
3.3 Allocation of main bearing shells	113



3.4	Renewing needle bearing in crankshaft	115
3.5	Measuring axial clearance of crankshaft	117
3.6	Measuring radial clearance of crankshaft	118
3.7	Removing and installing sender wheel	119
4	Balancer shaft	121
4.1	Assembly overview - balance shaft	121
4.2	Removing and installing balance shaft	123
5	Pistons and conrods	130
5.1	Assembly overview - pistons and conrods	130
5.2	Removing and installing pistons	134
5.3	Checking pistons and cylinder bores	136
5.4	Separating new conrod	139
5.5	Checking radial clearance of conrods	139
5.6	Removing and installing oil spray jets	140
15	- Cylinder head, valve gear	142
1	Cylinder head	142
1.1	Assembly overview - cylinder head	142
1.2	Removing and installing cylinder head	145
1.3	Removing and installing vacuum pump	152
1.4	Checking compression	154
2	Cover for timing chain	157
2.1	Assembly overview - cover for timing chain	157
2.2	Removing and installing timing chain cover	159
3	Chain drive	168
3.1	Assembly overview - camshaft timing chains	168
3.2	Removing and installing camshaft timing chain	171
3.3	Assembly overview - drive chain for balance shaft	187
3.4	Removing and installing drive chain for balance shaft	190
3.5	Checking timing chain	190
3.6	Checking valve timing	191
4	Valve gear	194
4.1	Assembly overview - valve gear	194
4.2	Removing and installing camshaft	199
4.3	Removing and installing camshaft control valve 1 N205	218
4.4	Removing and installing exhaust camshaft control valve 1 N318	218
4.5	Removing and installing valve stem seals	218
5	Inlet and exhaust valves	230
5.1	Checking valve guides	230
5.2	Checking valves	231
5.3	Valve dimensions	231
17	- Lubrication	232
1	Sump, oil pump	232
1.1	Assembly overview - sump/oil pump	232
1.2	Removing and installing oil level and oil temperature sender G266	235
1.3	Removing and installing lower part of sump	236
1.4	Removing and installing oil pump	242
1.5	Removing and installing upper part of sump	245
1.6	Engine oil:	250
2	Engine oil cooler	251
2.1	Assembly overview - engine oil cooler	251
2.2	Removing and installing engine oil cooler	251
3	Crankcase ventilation	254



3.1	Assembly overview - crankcase breather system	254
3.2	Removing and installing oil separator	255
4	Oil filter, oil pressure switch	256
4.1	Assembly overview - oil filter	256
4.2	Assembly overview - oil pressure switches/oil pressure control	256
4.3	Removing and installing piston cooling jet control valve N522	258
4.4	Removing and installing oil pressure regulating valve N428	259
4.5	Removing and installing oil pressure switch	260
4.6	Checking oil pressure	264
19	Cooling	268
1	Cooling system/coolant	268
1.1	Connection diagram - coolant hoses	268
1.2	Draining and adding coolant	278
1.3	Checking cooling system for leaks	287
1.4	Flushing cooling system	291
2	Coolant pump, regulation of cooling system	315
2.1	Assembly overview - coolant pump, thermostat	315
2.2	Assembly overview - electric coolant pump	317
2.3	Assembly overview - coolant temperature sender	321
2.4	Removing and installing toothed belt for coolant pump	322
2.5	Removing and installing coolant pump	324
2.6	Removing and installing electric coolant pump	327
2.7	Removing and installing coolant valves	330
2.8	Removing and installing actuator for engine temperature regulation N493	337
2.9	Removing and installing coolant temperature sender G62	340
2.10	Removing and installing radiator outlet coolant temperature sender G83	341
3	Coolant pipes	343
3.1	Assembly overview - coolant pipes	343
3.2	Removing and installing coolant pipes	343
3.3	Removing and installing upper coolant pipes	345
4	Radiator, radiator fan	348
4.1	Assembly overview - radiator	348
4.2	Assembly overview - auxiliary radiator	352
4.3	Assembly overview - radiator cowl and radiator fan	353
4.4	Removing and installing radiator	356
4.5	Removing and installing radiator cowl	364
4.6	Removing and installing radiator fan	367
4.7	Removing and installing auxiliary radiator	369
21	Turbocharging/supercharging	374
1	Turbocharger	374
1.1	Assembly overview - turbocharger	374
1.2	Removing and installing turbocharger	380
1.3	Removing and installing charge pressure positioner V465	392
1.4	Adjusting charge pressure positioner V465	393
2	Charge air system	397
2.1	Assembly overview - charge air system	397
2.2	Assembly overview - charge-air hose connections	401
2.3	Removing and installing charge air cooler	401
2.4	Removing and installing charge pressure sender G31	407
2.5	Checking charge air system for leaks	407
2.6	Removing and installing air intake pipe between turbocharger and charge air cooler	410
24	Mixture preparation - injection	412



1	Injection system	412
1.1	Overview of fitting locations - injection system	412
2	Injectors	424
2.1	Assembly overview - fuel rail with injectors	424
2.2	Removing and installing fuel rail	426
2.3	Removing and installing injectors	427
2.4	Renewing seals on injectors	435
2.5	Cleaning injectors	438
3	Air filter	441
3.1	Assembly overview - air filter housing	441
3.2	Removing and installing air filter housing	443
4	Intake manifold	445
4.1	Assembly overview - intake manifold	445
4.2	Removing and installing intake manifold	447
4.3	Removing and installing throttle valve module GX3	453
4.4	Cleaning throttle valve module GX3	456
5	Senders and sensors	458
5.1	Assembly overview - actuator for structure-borne sound and control unit for structure-borne sound, Golf, Passat, Touran, Tiguan	458
5.2	Assembly overview - actuator for structure-borne sound and control unit for structure-borne sound, Arteon	459
5.3	Removing and installing fuel pressure sender G247	460
5.4	Checking fuel pressure sender G247	464
5.5	Removing and installing fuel pressure sender for low-pressure G410	469
5.6	Removing and installing intake manifold sender GX9	470
5.7	Removing and installing pressure differential sender for particulate filter G1037	471
6	Engine control unit	473
6.1	Removing and installing engine control unit J623	473
6.2	Removing and installing engine (motor) control unit J623 with protective housing	477
7	High-pressure pump	486
7.1	Assembly overview - high-pressure pump	486
7.2	Removing and installing high-pressure pump	488
7.3	Removing and installing high-pressure pipe	492
8	Lambda probe	496
8.1	Assembly overview - Lambda probe	496
8.2	Removing and installing Lambda probe	497
26	Exhaust system	501
1	Exhaust pipes and silencers	501
1.1	Assembly overview - silencers	501
1.2	Removing and installing silencer	514
1.3	Separating exhaust pipes from silencers	525
1.4	Aligning exhaust system free of stress	532
1.5	Checking exhaust system for leaks	533
2	Emission control	534
2.1	Assembly overview - emission control	534
2.2	Assembly overview - bracket and pipes for pressure differential sender for particulate filter G1037	549
2.3	Removing and installing catalytic converter	550
2.4	Removing and installing holder of pressure differential sender for particulate filter G1037	567
2.5	Removing and installing exhaust flap control unit J883/J945, Passat CJXA, Arteon	568
3	Exhaust gas temperature regulation	569
3.1	Assembly overview - exhaust gas temperature regulation	569
3.2	Removing and installing parts of exhaust gas temperature regulation	570



4	Secondary air system	575
4.1	Assembly overview - secondary air system	575
4.2	Removing and installing secondary air pump motor V101	576
4.3	Renewing stop buffer for secondary air pump	576
4.4	Removing and installing secondary air inlet valve N112	577
28	Ignition system	579
1	Ignition system	579
1.1	Assembly overview - ignition system	579
1.2	Removing and installing ignition coils with output stage	581
1.3	Removing and installing knock sensor 1 G61	583
1.4	Removing and installing Hall sender	585
1.5	Removing and installing engine speed sender G28	586