



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	8
3.1 Rules for cleanliness	8
3.2 Foreign objects in engine	8
3.3 Contact corrosion	8
3.4 Routing and attachment of lines	8
3.5 Fitting radiator and condensers	9
3.6 Checking vacuum system	9
10 - Removing and installing engine	10
1 Removing and installing motor	10
1.1 Removing motor	10
1.2 Separating engine and gearbox	31
1.3 Securing engine on engine and gearbox support	41
1.4 Installing engine	44
2 Assembly mountings	48
2.1 Assembly overview - assembly mountings	48
2.2 Supporting engine in installation position	52
2.3 Removing and installing engine mounting	73
2.4 Removing and installing gearbox mountings	75
2.5 Removing and installing pendulum support	77
2.6 Checking adjustment of assembly mountings (engine and gearbox mountings)	78
2.7 Adjusting assembly mountings	79
3 Engine cover panel	82
3.1 Removing and installing engine cover	82
13 - Crankshaft group	83
1 Cylinder block (pulley end)	83
1.1 Assembly overview - cylinder block (pulley end)	83
1.2 Removing and installing poly-V belt	86
1.3 Removing and installing tensioner for poly V-belt	88
1.4 Removing and installing vibration damper	89
1.5 Removing and installing bracket for ancillaries	96
1.6 Removing and installing engine support	99
1.7 Renewing seal for vibration damper	101
2 Cylinder block, gearbox end	104
2.1 Assembly overview - cylinder block, gearbox end	104
2.2 Removing and installing flywheel	105
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
4.3	Renewing oil seal for balance shaft (inlet side)	128
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	217
4.4	Removing and installing exhaust camshaft control valve 1 N318	217
4.5	Installing ball for sliding piece	217
4.6	Removing and installing valve stem seals	218
5	Inlet and exhaust valves	231
5.1	Checking valve guides	231
5.2	Checking valves	232
5.3	Valve dimensions	232
17 - Lubrication	233	
1	Sump, oil pump	233
1.1	Assembly overview - sump/oil pump	233
1.2	Removing and installing oil level and oil temperature sender G266	236
1.3	Removing and installing lower part of sump	237
1.4	Removing and installing oil pump	243
1.5	Removing and installing upper part of sump	246
1.6	Engine oil:	251
2	Engine oil cooler	252
2.1	Assembly overview - engine oil cooler	252
2.2	Removing and installing engine oil cooler	252



2.3	Removing and installing mechanical switching valve	254
3	Crankcase ventilation	255
3.1	Assembly overview - crankcase breather system	255
3.2	Removing and installing oil separator	256
4	Oil filter, oil pressure switch	257
4.1	Assembly overview - oil filter	257
4.2	Assembly overview - oil pressure switches/oil pressure control	257
4.3	Removing and installing piston cooling jet control valve N522	259
4.4	Removing and installing oil pressure regulating valve N428	260
4.5	Removing and installing oil pressure switch F1	261
4.6	Removing and installing oil pressure switch for reduced oil pressure F378	262
4.7	Removing and installing stage 3 oil pressure switch F447	263
4.8	Checking oil pressure	264
19 - Cooling	269	
1	Cooling system/coolant	269
1.1	Connection diagram - coolant hoses	269
1.2	Draining and adding coolant	279
1.3	Checking cooling system for leaks	288
1.4	Flushing cooling system	292
1.5	Flushing cooling system, quick reference guide	314
2	Coolant pump, regulation of cooling system	316
2.1	Assembly overview - coolant pump, thermostat	316
2.2	Assembly overview - electric coolant pump	318
2.3	Assembly overview - coolant temperature sender	322
2.4	Removing and installing toothed belt for coolant pump	323
2.5	Removing and installing coolant pump	325
2.6	Removing and installing auxiliary pump for heating V488	328
2.7	Removing and installing coolant shut-off valve N82	331
2.8	Removing and installing coolant valves	333
2.9	Removing and installing actuator for engine temperature regulation N493	338
2.10	Removing and installing coolant temperature sender G62	340
2.11	Removing and installing radiator outlet coolant temperature sender G83	342
3	Coolant pipes	344
3.1	Assembly overview - coolant pipes	344
3.2	Removing and installing front coolant pipe	344
3.3	Removing and installing upper coolant pipes	346
4	Radiator, radiator fan	349
4.1	Assembly overview – radiator	349
4.2	Assembly overview - auxiliary radiator	353
4.3	Assembly overview - radiator cowl and radiator fan	354
4.4	Removing and installing radiator	357
4.5	Removing and installing radiator cowl	365
4.6	Removing and installing radiator fan	368
4.7	Removing and installing auxiliary radiator	370
21 - Turbocharging/supercharging	375	
1	Turbocharger	375
1.1	Assembly overview - turbocharger	375
1.2	Removing and installing turbocharger	381
1.3	Removing and installing charge pressure positioner V465	393
1.4	Adjusting charge pressure positioner V465	394
2	Charge air system	398
2.1	Assembly overview - charge air system	398
2.2	Assembly overview - charge-air hose connections	402



2.3	Removing and installing charge air cooler	402
2.4	Removing and installing charge pressure sender G31	408
2.5	Checking charge air system for leaks	408
2.6	Removing and installing air intake pipe between turbocharger and charge air cooler	411
24 - Mixture preparation - injection	413
1	Injection system	413
1.1	Overview of fitting locations - injection system	413
2	Injectors	425
2.1	Assembly overview - fuel rail with injectors	425
2.2	Removing and installing fuel rail	427
2.3	Removing and installing injectors	428
2.4	Renewing seals on injectors	436
2.5	Cleaning injectors	439
3	Air filter	442
3.1	Assembly overview - air filter housing	442
3.2	Removing and installing air filter housing	444
4	Intake manifold	446
4.1	Assembly overview - intake manifold	446
4.2	Removing and installing intake manifold	448
4.3	Removing and installing throttle valve module GX3	454
4.4	Cleaning throttle valve module GX3	457
5	Senders and sensors	459
5.1	Assembly overview - actuator for structure-borne sound and control unit for structure-borne sound, Golf, Passat, Touran, Tiguan	459
5.2	Assembly overview - actuator for structure-borne sound and control unit for structure-borne sound, Arteon	460
5.3	Removing and installing fuel pressure sender G247	461
5.4	Checking fuel pressure sender G247	465
5.5	Removing and installing fuel pressure sender for low-pressure G410	470
5.6	Removing and installing intake manifold sender GX9	471
5.7	Removing and installing pressure differential sender for particulate filter G1037	472
6	Engine control unit	474
6.1	Removing and installing engine control unit J623	474
6.2	Removing and installing engine (motor) control unit J623 with protective housing	478
7	High-pressure pump	487
7.1	Assembly overview - high-pressure pump	487
7.2	Removing and installing high-pressure pump	489
7.3	Removing and installing high-pressure pipe	493
8	Lambda probe	497
8.1	Assembly overview - Lambda probe	497
8.2	Removing and installing Lambda probe	498
26 - Exhaust system	502
1	Exhaust pipes and silencers	502
1.1	Assembly overview - silencers	502
1.2	Removing and installing silencer	515
1.3	Separating exhaust pipes from silencers	526
1.4	Aligning exhaust system free of stress	533
1.5	Checking exhaust system for leaks	534
2	Emission control	535
2.1	Assembly overview - emission control	535
2.2	Assembly overview - bracket and pipes for pressure differential sender for particulate filter G1037	548
2.3	Removing and installing bracket for catalytic converter, Tiguan	549



2.4	Removing and installing catalytic converter	552
2.5	Removing and installing holder of pressure differential sender for particulate filter G1037 ..	569
2.6	Removing and installing exhaust flap control unit J883/J945, Passat CJXA, Arteon	570
3	Exhaust gas temperature regulation	571
3.1	Assembly overview - exhaust gas temperature regulation	571
3.2	Removing and installing parts of exhaust gas temperature regulation	572
4	Secondary air system	577
4.1	Assembly overview - secondary air system	577
4.2	Removing and installing secondary air pump motor V101	578
4.3	Removing and installing secondary air inlet valve N112	578
28 - Ignition system	580	
1	Ignition system	580
1.1	Assembly overview - ignition system	580
1.2	Removing and installing ignition coils with output stage	582
1.3	Removing and installing knock sensor 1 G61	584
1.4	Removing and installing Hall sender	586
1.5	Removing and installing engine speed sender G28	587