



Contents

00 - Technical data	1
1 Safety information	1
1.1 Safety precautions when working on the fuel supply system	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 the ignition system	2
1.5 Safety precautions when working on the cooling system	2
1.6 Safety precautions when working on the exhaust system	3
2 Identification	4
2.1 Engine number/engine data	4
3 Repair notes	7
3.1 Rules for cleanliness	7
3.2 Foreign material 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 motor	9
1.2 Separating engine and gearbox	25
1.3 Securing engine on engine and gearbox support	34
1.4 Installing motor	36
2 Assembly mountings	39
2.1 Assembly overview - assembly mountings	39
2.2 Supporting engine in installation position	43
2.3 Removing and installing engine mounting	61
2.4 Removing and installing gearbox mounting	62
2.5 Removing and installing pendulum support	64
2.6 Checking adjustment of assembly mountings	65
2.7 Adjusting assembly mountings	65
3 Engine cover panel	67
3.1 Removing and installing engine cover	67
13 - Crankshaft group	68
1 Cylinder block, pulley end	68
1.1 Assembly overview – cylinder block, pulley end	68
1.2 Removing and installing poly-V belt	70
1.3 Removing and installing poly V-belt tensioner	73
1.4 Removing and installing vibration damper	73
1.5 Removing and installing bracket for ancillaries	78
1.6 Removing and installing engine support	80
1.7 Renewing seal for vibration damper	81
2 Cylinder block, gearbox side	84
2.1 Assembly overview – cylinder block, gearbox side	84
2.2 Removing and installing flywheel	85
2.3 Removing and installing sealing flange on gearbox side	87
3 Crankshaft	91
3.1 Assembly overview - crankshaft	91
3.2 Crankshaft dimensions	93
3.3 Allocation of main bearing shells	93



3.4	Renewing needle bearing in crankshaft	94
3.5	Measuring axial clearance of crankshaft	97
3.6	Measuring radial clearance of crankshaft	97
3.7	Removing and installing sender wheel	98
4	Balance shaft	100
4.1	Assembly overview - balance shaft	100
4.2	Removing and installing balance shaft	102
5	Pistons and conrods	108
5.1	Assembly overview – pistons and conrods	108
5.2	Removing and installing pistons	111
5.3	Checking piston and cylinder bore	113
5.4	Separating new conrod	115
5.5	Checking radial clearance of conrods	116
5.6	Removing and installing oil spray jets	116
15	- Cylinder head, valve gear	118
1	Cylinder head	118
1.1	Assembly overview – cylinder head	118
1.2	Removing and installing cylinder head	120
1.3	Removing and installing vacuum pump	126
1.4	Checking compression	128
2	Timing chain cover	130
2.1	Assembly overview - timing chain cover	130
2.2	Removing and installing timing chain cover	132
3	Chain drive	139
3.1	Assembly overview - camshaft timing chains	139
3.2	Removing and installing camshaft timing chain	141
3.3	Assembly overview - drive chain for balance shaft	155
3.4	Removing and installing drive chain for balance shaft	157
3.5	Checking timing chain	157
3.6	Checking valve timing	158
4	Valve gear	161
4.1	Assembly overview – valve gear	161
4.2	Removing and installing camshaft	166
4.3	Removing and installing camshaft control valve 1 N205	180
4.4	Removing and installing exhaust camshaft control valve 1 N318	180
4.5	Removing and installing valve stem oil seals	181
5	Inlet and exhaust valves	189
5.1	Checking valve guides	189
5.2	Checking valves	190
5.3	Valve dimensions	190
17	- Lubrication	191
1	Sump, oil pump	191
1.1	Assembly overview – sump/oil pump	191
1.2	Removing and installing oil level and oil temperature sender G266	193
1.3	Removing and installing lower part of sump	194
1.4	Removing and installing oil pump	199
1.5	Removing and installing upper part of sump	201
1.6	Engine oil	205
2	Engine oil cooler	206
2.1	Assembly overview - engine oil cooler	206
2.2	Removing and installing engine oil cooler	208
3	Crankcase breather	210



3.1	Assembly overview - crankcase breather system	210
3.2	Removing and installing oil separator	211
4	Oil filter, oil pressure switch	212
4.1	Assembly overview - oil filter	212
4.2	Assembly overview - oil pressure switches/oil pressure control	212
4.3	Removing and installing piston cooling jet control valve N522	214
4.4	Removing and installing valve for oil pressure control N428	214
4.5	Removing and installing oil pressure switch	216
4.6	Checking oil pressure	219
19	Cooling	223
1	Cooling system/coolant	223
1.1	Connection diagram – coolant hoses	223
1.2	Draining and filling cooling system	233
1.3	Checking cooling system for leaks	239
1.4	Flushing cooling system	242
2	Coolant pump, regulation of cooling system	265
2.1	Assembly overview – coolant pump/thermostat	265
2.2	Assembly overview – electric coolant pump	267
2.3	Assembly overview – coolant temperature sender	271
2.4	Removing and installing toothed belt for coolant pump	272
2.5	Removing and installing coolant pump	274
2.6	Removing and installing electric coolant pump	276
2.7	Removing and installing coolant valves	279
2.8	Removing and installing actuator for engine temperature regulation N493	286
2.9	Removing and installing coolant temperature sender G62	288
2.10	Removing and installing radiator outlet coolant temperature sender G83	289
3	Coolant pipes	291
3.1	Assembly overview – coolant pipes	291
3.2	Removing and installing coolant pipes	291
3.3	Removing and installing upper coolant pipes	293
4	Radiator, radiator fan	295
4.1	Assembly overview – radiator	295
4.2	Assembly overview - auxiliary radiator	298
4.3	Assembly overview - radiator cowl and radiator fans	300
4.4	Removing and installing radiator	303
4.5	Removing and installing radiator cowl	311
4.6	Removing and installing radiator fan	313
4.7	Removing and installing auxiliary radiator	314
21	Turbocharging/supercharging	319
1	Turbocharger	319
1.1	Assembly overview – turbocharger	319
1.2	Removing and installing turbocharger	325
1.3	Removing and installing charge pressure positioner V465	335
1.4	Adjusting charge pressure positioner V465	336
2	Charge air system	338
2.1	Assembly overview – charge air system	338
2.2	Assembly overview - hose connections for charge air system	342
2.3	Removing and installing charge air cooler	342
2.4	Removing and installing charge pressure sender G31	348
2.5	Checking charge air system for leaks	348
2.6	Removing and installing air intake pipe between turbocharger and charge air cooler	350
24	Mixture preparation - injection	352



1	Injection system	352
1.1	Overview of fitting locations - injection system	352
2	Injectors	362
2.1	Assembly overview - fuel rail with injectors	362
2.2	Removing and installing fuel rail	365
2.3	Removing and installing injectors	366
2.4	Renewing seals on injector	370
2.5	Cleaning injectors	373
3	Air filter	375
3.1	Assembly overview – air filter housing	375
3.2	Removing and installing air filter housing	377
4	Intake manifold	379
4.1	Assembly overview – intake manifold	379
4.2	Removing and installing intake manifold	381
4.3	Removing and installing throttle valve module GX3	386
4.4	Cleaning throttle valve module GX3	388
4.5	Removing and installing intake manifold flap valve N316	388
5	Senders and sensors	390
5.1	Assembly overview - actuator for structure-borne sound and control unit for structure-borne sound, Golf, Passat, Touran, Tiguan	390
5.2	Assembly overview - actuator for structure-borne sound and control unit for structure-borne sound, Arteon	391
5.3	Removing and installing fuel pressure sender G247	392
5.4	Checking fuel pressure sender G247	395
5.5	Removing and installing fuel pressure sender for low-pressure G410	399
5.6	Removing and installing intake manifold sender GX9	400
5.7	Removing and installing pressure differential sender for particulate filter G1037	400
6	Engine control unit	402
6.1	Removing and installing motor control unit J623	402
6.2	Removing and installing engine control unit J623 with protective housing	405
7	High-pressure pump	412
7.1	Assembly overview – high-pressure pump	412
7.2	Removing and installing high-pressure pump	414
7.3	Removing and installing high-pressure pipe	417
8	Lambda probe	420
8.1	Assembly overview – lambda probe	420
8.2	Removing and installing lambda probe	421
26	- Exhaust system	424
1	Exhaust pipes and silencers	424
1.1	Assembly overview – silencers	424
1.2	Removing and installing silencer	437
1.3	Separating exhaust pipes from silencers	445
1.4	Aligning exhaust system free of stress	452
1.5	Checking exhaust system for leaks	453
2	Emission control	454
2.1	Assembly overview – emission control	454
2.2	Assembly overview – bracket and pipes for pressure differential sender for particulate filter G1037	468
2.3	Removing and installing catalytic converter	469
2.4	Removing and installing holder of pressure differential sender for particulate filter G1037	484
2.5	Removing and installing exhaust flap control unit J883/J945 , Passat CJXA, Arteon	485
3	Exhaust gas temperature regulation	486
3.1	Assembly overview – exhaust gas temperature regulation	486
3.2	Removing and installing parts of exhaust gas temperature regulation	487



4	Secondary air system	491
4.1	Assembly overview - secondary air system	491
4.2	Removing and installing secondary air pump motor V101	492
4.3	Renewing stop buffer for secondary air pump	492
4.4	Removing and installing secondary air inlet valve N112	493
28	Ignition system	495
1	Ignition system	495
1.1	Assembly overview - ignition system	495
1.2	Removing and installing ignition coils with output stage	497
1.3	Removing and installing knock sensor 1 G61	499
1.4	Removing and installing Hall sender	500
1.5	Removing and installing engine speed sender G28	501