2013

Eos

Quick Reference Specification Book

2013 Volkswagen Eos
Quick Reference Specification Book

TABLE OF CONTENTS

General Information 1

Decimal and Metric Equivalents 1

Tightening Torque 2

Warnings and Cautions 4

Vehicle Identification 9

Vehicle Identification Number (VIN) Location 9

VIN Decoder 10

VIN on Longitudinal Member Extension 11

Vehicle Data Label 12

Sales Codes 13

Engine Codes 13

Transmission Codes 13

Vehicle Lifting 14

Hoist and Jack Mounting Points 14

Front 14

Rear 15

ENGINES

Engine Mechanical – 2.0L CBFA 16

General, Technical Data 16

Engine Number Location 16

Engine Data 17

Engine Assembly – 2.0L CBFA 18

Fastener Tightening Specifications 18

Crankshaft, Cylinder Block – 2.0L CBFA 19

Cylinder Block Bearing Shell Identification 19

Bearing Cap Bearing Shell Identification 21

Fastener Tightening Specifications 22

Crankshaft Dimensions 22

Piston Ring End Gaps 22

Piston Ring Clearance 22

Piston and Cylinder Dimensions 23

Accessory Assembly Bracket Tightening Specifications 23

Sealing Flange Tightening Specifications 24

Crankshaft Assembly Tightening Specifications 25

Cylinder Head, Valvetrain – 2.0L CBFA....26
Fastener Tightening Specifications....26
Valve Dimensions....27
Compression Pressures....27
Cylinder Head Tightening Specifications....28
Cylinder Head Cover Tightening Specifications....29
Crankcase Ventilation Tightening Specification....30
Upper Timing Chain Cover Tightening Specifications....31
Lower Timing Chain Cover with 15 Bolts Tightening Specifications....32
Lower Timing Chain Cover with 8 Bolts Tightening Specifications....33
Lubrication – 2.0L CBFA....34
Fastener Tightening Specifications....34
Upper Oil Pan Tightening Specifications....34
Lower Oil Pan Tightening Specifications....35
Oil Separator Tightening Specification....36
Cooling System – 2.0L CBFA....36
Fastener Tightening Specifications....36
Coolant Pump Tightening Specification....37
Fuel Supply – 2.0L CBFA....38
Fastener Tightening Specifications....38
Turbocharger, G-Charger – 2.0L CBFA....39
Fastener Tightening Specifications....39
Turbocharger Tightening Specifications....40
Exhaust System- 2.0L CBFA....41
Fastener Tightening Specifications....41
Multiport Fuel Injection – 2.0L CBFA....41
Technical Data....41
Fastener Tightening Specifications....42
Ignition – 2.0L CBFA....43
Technical Data....43
Fastener Tightening Specifications....43

TRANSMISSIONS

Manual Transmission – 02Q....44

General, Technical Data....44
Transmission Identification....44
Codes Letters, Transmission Allocation and Capacities....45
Clutch – 02Q....46
Fastener Tightening Specifications....46

Determining Clutch Manufacturer 47
Controls, Housing – 02Q 49
Transmission to Engine Tightening Specifications 49
Fastener Tightening Specifications 50
Direct Shift Gearbox (DSG) Transmission – 02E 51
General, Technical Data 51
Identification on Transmission 51
Transmission Allocation Codes 53
Clutch – 02E 53
Fastener Tightening Specifications 53
Controls, Housing (DSG) – 02E 54
Fastener Tightening Specifications 54
Mechatronic Tightening Specifications 55
Oil Pump Tightening Specification
Without Countersunk Bolt 56
With Countersunk Bolt 56
Oil Pump Cover Tightening Specification 57
Transmission Mount Tightening Specifications 58
Transmission to Engine Tightening Specifications 59

CHASSIS

Suspension, Wheels, Steering 60
Front Suspension 60
Fastener Tightening Specifications 60
Rear Suspension 62
Fastener Tightening Specifications 62
Self-Leveling Suspension 64
Fastener Tightening Specifications 64
Wheels, Tires, Wheel Alignment 65
Fastener Tightening Specifications 65
Wheel Alignment Data 66
Wheel Alignment Specified Values 66
Steering 68
Fastener Tightening Specifications 68
Steering Column Tightening Specification 69
Brake System 70
General, Technical Data 70
Vehicle Data Sticker PR Number Allocation 70
Front Brakes 71

Rear Brakes....71
Brake Master Cylinder and Brake Booster....71
Front Brakes, FS III....72
Front Brakes, FN 3....73
Front Brakes FNR-G....74
Rear Brakes CI 38....75
Rear Brakes CII 38....76
Rear Brakes CII 41....77
Bosch ZOH 38, 16”....79
Anti-lock Brake System (ABS)....80
Fastener Tightening Specifications....80
Fastener Tightening Specifications....80
Front Brakes, FNR-G Caliper Tightening Specification for the Ribbed Bolts....82
Hydraulic Components....82
Fastener Tightening Specifications....82
Body....83
Air Gap Body Dimensions....83
Body, Front....83
Body, Center....86
Body, Rear....87
Body Exterior....89
Lock Carrier Tightening Specifications....89
Front Fender Tightening Specifications....89
Bulkhead and Plenum Chamber Bulkhead Tightening Specifications....89
Tension Strut and Tunnel Bridge Tightening Specifications....89
Front Hood Tightening Specifications....89
Rear Lid Tightening Specifications....90
Front and Rear Door Tightening Specifications....90
Convertible Top Tightening Specifications....91
Front Bumper Tightening Specifications....92
Rear Bumper Tightening Specifications....92
Side Window Tightening Specifications....92
Wheel Housing Liner, Front Grille Tightening Specifications....92
Exterior Mirror Tightening Specifications....92
Body Interior....93
Storage Compartments, Covers and Trim Tightening Specifications....93
Instrument Panel Tightening Specifications....93
Passenger Protection Fastener Tightening Specifications....93
Seat Frames Tightening Specifications....94

Heating, Ventilation and Air Conditioning..... 95
General Information.....95
Refrigerant Oil Distribution 95
Refrigerant R134a Vapor Pressure Table.....96
Heating, Ventilation.....97
Fastener Tightening Specifications.....97
Air Conditioning 97
Fastener Tightening Specifications.....97
Electrical System..... 98
Electrical Equipment.....98
Fastener Tightening Specifications.....98
Battery and Jump Start Point Tightening Specifications.....98
Generator Tightening Specifications.....98
Main Fuse Box Tightening Specifications.....99
Starter Tightening Specifications 99
Windshield Wiper/Washer Tightening Specifications.....99
Tail Lamps Tightening Specifications.....99
Exterior Lights, Switches Tightening Specifications 100
Wiring Tightening Specifications.....100
Left Engine Compartment E-Box Tightening Specifications 101
DTC Chart..... 102
Fuel and Air Mixture,
Additional Emissions Regulations 102
Ignition System 114
Additional Exhaust Regulation.....115
Speed and Idle Control.....117
Control Module and Output Signals.....119
Fuel and Air Ratios Control Module.....121
Ignition System 125
Additional Emissions Regulations 126

GENERAL INFORMATION

Decimal and Metric Equivalents

Distance/Length

To calculate: mm x 0.03937 = in.

mm	in.	mm	in.	mm	in.	mm	in.
0.002	0.00008	0.01	0.0004	0.1	0.004	1	0.04
0.004	0.00016	0.02	0.0008	0.2	0.008	2	0.08
0.006	0.00024	0.03	0.0012	0.3	0.012	3	0.12
0.008	0.00031	0.04	0.0016	0.4	0.016	4	0.16
0.010	0.00039	0.05	0.0020	0.5	0.020	5	0.20
0.020	0.00079	0.06	0.0024	0.6	0.024	6	0.24
0.030	0.00118	0.07	0.0028	0.7	0.028	7	0.28
0.040	0.00157	0.08	0.0031	0.8	0.031	8	0.31
0.050	0.00197	0.09	0.0035	0.9	0.035	9	0.35
0.060	0.00236	0.10	0.0039	1.0	0.039	10	0.39
0.070	0.00276	0.20	0.0079	2.0	0.079	20	0.79
0.080	0.00315	0.30	0.0118	3.0	0.118	30	1.18
0.090	0.00354	0.40	0.0157	4.0	0.157	40	1.57
0.100	0.00394	0.50	0.0197	5.0	0.197	50	1.97
0.200	0.00787	0.60	0.0236	6.0	0.236	60	2.36
0.300	0.01181	0.70	0.0276	7.0	0.276	70	2.76
0.400	0.01575	0.80	0.0315	8.0	0.315	80	3.15
0.500	0.01969	0.90	0.0354	9.0	0.354	90	3.54
0.600	0.02362	1.00	0.0394	10.0	0.394	100	3.94
0.700	0.02756	2.00	0.0787	20.0	0.787		
0.800	0.03150	3.00	0.1181	30.0	1.181		
0.900	0.03543	4.00	0.1575	40.0	1.575		
1.000	0.03937	5.00	0.1969	50.0	1.969		
2.000	0.07874	6.00	0.2362	60.0	2.362		
3.000	0.11811	7.00	0.2756	70.0	2.756		
4.000	0.15748	8.00	0.3150	80.0	3.150		
5.000	0.19685	9.00	0.3543	90.0	3.543		
6.000	0.23622	10.00	0.3937	100.0	3.937		
7.000	0.27559	20.00	0.7874				
8.000	0.31496	30.00	1.1811				
9.000	0.35433	40.00	1.5748				
10.000	0.39370	50.00	1.9685				
20.000	0.78740	60.00	2.3622				
30.000	1.18110	70.00	2.7559				
40.000	1.57480	80.00	3.1496				
50.000	1.96850	90.00	3.5433				
60.000	2.36220	100.00	3.9370				
70.000	2.75591						
80.000	3.14961						
90.000	3.54331						
100.000	3.93701						

Tightening Torque

Nm-to-lb·ft (ft·lb)

To calculate: Nm x 0.738 = lb·ft

Nm	lb·ft (ft·lb)	Nm	lb·ft (ft·lb)	Nm	lb·ft (ft·lb)
10	7	55	41	100	74
11	8	56	41	105	77
12	9	57	42	110	81
13	10	58	43	115	85
14	10	59	44	120	89
15	11	60	44	125	92
16	12	61	45	130	96
17	13	62	46	135	100
18	13	63	46	140	103
19	14	64	47	145	107
20	15	65	48	150	111
21	15	66	49	155	114
22	16	67	49	160	118
23	17	68	50	165	122
24	18	69	51	170	125
25	18	70	52	175	129
26	19	71	52	180	133
27	20	72	53	185	136
28	21	73	54	190	140
29	21	74	55	195	144
30	22	75	55	200	148
31	23	76	56	205	151
32	24	77	57	210	155
33	24	78	58	215	159
34	25	79	58	220	162
35	26	80	59	225	166
36	27	81	60	230	170
37	27	82	60	235	173
38	28	83	61	240	177
39	29	84	62	245	181
40	30	85	63	250	184
41	30	86	63	260	192
42	31	87	64	270	199
43	32	88	65	280	207
44	32	89	66	290	214
45	33	90	66	300	221
46	34	91	67	310	229
47	35	92	68	320	236
48	35	93	69	330	243
49	36	94	69	340	251
50	37	95	70	350	258
51	38	96	71	360	266
52	38	97	72	370	273
53	39	98	72	380	280
54	40	99	73	390	288
55	41	100	74	400	295

Nm-to-lb·in (in·lb), kg·cm

To calculate: Nm x 8·85 = lb·in • Nm x 10.20 = kg·cm

Nm	lb·in (in·lb)	kg·cm	Nm	lb·in (in·lb)	kg·cm
1	9	10	26	230	265
2	18	20	27	239	275
3	27	31	28	248	286
4	35	41	29	257	296
5	44	51	30	266	306
6	53	61	31	274	316
7	62	71	32	283	326
8	71	82	33	292	337
9	80	92	34	301	347
10	89	102	35	310	357
11	97	112	36	319	367
12	106	122	37	327	377
13	115	133	38	336	387
14	124	143	39	345	398
15	133	153	40	354	408
16	142	163	41	363	418
17	150	173	42	372	428
18	159	184	43	381	438
19	168	194	44	389	449
20	177	204	45	398	459
21	186	214	46	407	469
22	195	224	47	416	479
23	204	235	48	425	489
24	212	245	49	434	500
25	221	255	50	443	510

N·cm-to-lb·in (in·lb), kg·cm

To calculate: N·cm x 0.089 = lb·in • N·cm x 0.102 = kg·cm

N·cm	lb·in (in·lb)	kg·cm	N·cm	lb·in (in·lb)	kg·cm
50	4	5	250	22	25
60	5	6	300	27	31
70	6	7	350	31	36
80	7	8	400	35	41
90	8	9	450	40	46
100	9	10	500	44	51
110	10	11	550	49	56
120	11	12	600	53	61
130	12	13	650	58	66
140	12	14	700	62	71
150	13	15	750	66	76
160	14	16	800	71	82
170	15	17	850	75	87
180	16	18	900	80	92
190	17	19	950	84	97
200	18	20	1000	89	102

kg·cm-to-lb·in (in·lb), N·cm

To calculate: kg·cm x 0.868 = lb·in • kg·cm x 9.81 = N·cm

kg·cm	lb·in (in·lb)	N·cm		kg·cm	lb·in (in·lb)	N·cm
5	4	49		110	95	1079
6	5	59		120	104	1177
7	6	69		130	113	1275
8	7	78		140	122	1373
9	8	88		150	130	1471
10	9	98		160	139	1569
20	17	196		170	148	1667
30	26	294		180	156	1765
40	35	392		190	165	1863
50	43	490		200	174	1961
60	52	588		210	182	2059
70	61	686		220	191	2157
80	69	785		230	200	2256
90	78	883		240	208	2354
100	87	981		250	217	2452

Warnings and Cautions

WARNINGS

- Some repairs may be beyond your capability. If you lack the skills, tools and equipment, or a suitable workplace for any procedure described in this manual, we suggest you leave such repairs to an authorized dealer service department or other qualified shop.
- Do not reuse any fasteners that have become worn or deformed during normal use. Many fasteners are designed to be used only once and become unreliable and may fail when used a second time. This includes, but is not limited to, nuts, bolts, washers, self-locking nuts or bolts, circlips and cotter pins. Always replace these fasteners with new parts.
- Never work under a lifted car unless it is solidly supported on stands designed for the purpose. Do not support a car on cinder blocks, hollow tiles or other props that may crumble under continuous load. Never work under a car that is supported solely by a jack. Never work under the car while the engine is running.
- If you are going to work under a car on the ground, make sure the ground is level. Block the wheels to keep the car from rolling. Disconnect the battery negative (-) terminal (ground strap) to prevent others from starting the car while you are under it.

- Never run the engine unless the work area is well ventilated. Carbon monoxide kills.
- Remove rings, bracelets and other jewelry so they cannot cause electrical shorts, get caught in running machinery, or be crushed by heavy parts.
- Tie back long hair. Do not wear a necktie, a scarf, loose clothing, or a necklace when you work near machine tools or running engines. If your hair, clothing, or jewelry were to get caught in the machinery, severe injury could result.
- Do not attempt to work on your car if you do not feel well. You increase the danger of injury to yourself and others if you are tired, upset, or have taken medication or any other substance that may keep you from being fully alert.
- Illuminate your work area adequately but safely. Use a portable safety light for working inside or under the car. Make sure the bulb is enclosed by a wire cage. The hot filament of an accidentally broken bulb can ignite spilled fuel, vapors or oil.
- Use a suitable container to catch draining fuel, oil, or brake fluid. Do not use food or beverage containers that might mislead someone into drinking from them. Store flammable fluids away from fire hazards. Wipe up spills at once, but do not store oily rags which can ignite and burn spontaneously.
- Always observe good workshop practices. Wear goggles when you operate machine tools or work with battery acid. Wear gloves or other protective clothing whenever the job requires working with harmful substances.
- Greases, lubricants and other automotive chemicals contain toxic substances, many of which are absorbed directly through the skin. Read the manufacturer's instructions and warnings carefully. Use hand and eye protection. Avoid direct skin contact
- Disconnect the battery negative (-) terminal (ground strap) whenever you work on the fuel or electrical system. Do not smoke or work near heaters or other fire hazards. Keep an approved fire extinguisher handy.
- Friction materials (such as brake pads or shoes or clutch discs) contain asbestos fibers or other friction materials. Do not create dust by grinding, sanding, or cleaning with compressed air. Avoid breathing dust. Breathing any friction material dust can lead to serious diseases and may result in death.

(WARNINGS cont'd on next page)

WARNINGS *(cont'd)*

- Batteries give off explosive hydrogen gas during charging. Keep sparks, lighted matches and open flame away from the top of the battery. If hydrogen gas escaping from the cap vents is ignited, it ignites the gas trapped in the cells and causes the battery to explode.
- Connect and disconnect battery cables, jumper cables or a battery charger only with the ignition off. Do not disconnect the battery while the engine is running.
- Do not quick-charge the battery (for boost starting) for longer than one minute. Wait at least one minute before boosting the battery a second time.
- Do not allow battery charging voltage to exceed 16.5 volts. If the battery begins producing gas or boiling violently, reduce the charging rate. Boosting a sulfated battery at a high charging rate can cause an explosion.
- The A/C system is filled with chemical refrigerant, which is hazardous. The A/C system should be serviced only by trained technicians using approved refrigerant recovery/recycling equipment, trained in related safety precautions, and familiar with regulations governing the discharging and disposal of automotive chemical refrigerants.
- Do not expose any part of the A/C system to high temperatures such as open flame. Excessive heat increases system pressure and may cause the system to burst.
- Some aerosol tire inflators are highly flammable. Be extremely cautious when repairing a tire that may have been inflated using an aerosol tire inflator. Keep sparks, open flame or other sources of ignition away from the tire repair area. Inflate and deflate the tire at least four times before breaking the bead from the rim. Completely remove the tire from the rim before attempting any repair.
- Some cars are equipped with a Supplemental Restraint System (SRS) that automatically deploys airbags and pyrotechnic seat belt tensioners in the event of a frontal or side impact. These are explosive devices. Handled improperly or without adequate safeguards, they can be accidentally activated and cause serious injury.
- The ignition system produces high voltages that can be fatal. Avoid contact with exposed terminals and use extreme care when working on a car with the engine running or the ignition on.

- Place jack stands only at locations specified by manufacturer. The vehicle lifting jack supplied with the vehicle is intended for tire changes only. Use a heavy duty floor jack to lift the vehicle before installing jack stands.
- Battery acid (electrolyte) can cause severe burns. Flush contact area with water, seek medical attention.
- Aerosol cleaners and solvents may contain hazardous or deadly vapors and are highly flammable. Use only in a well ventilated area. Do not use on hot surfaces (such as engines or brakes).
- Do not remove coolant reservoir or radiator cap with the engine hot. Burns and engine damage may occur.

CAUTIONS

- If you lack the skills, tools and equipment, or a suitable workshop for any procedure described in this manual, we suggest you leave such repairs to an authorized dealer or other qualified shop.
- Before starting a job, make certain that you have all the necessary tools and parts on hand. Read all the instructions thoroughly and do not attempt shortcuts. Use tools appropriate to the work and use only replacement parts meeting original specifications. Makeshift tools, parts and procedures will not make good repairs.
- Use pneumatic and electric tools only to loosen threaded parts and fasteners. Never use these tools to tighten fasteners, especially on light alloy parts. Always use a torque wrench to tighten fasteners to the tightening torque specification listed.
- Be mindful of the environment and ecology. Before you drain the crankcase, find out the proper way to dispose of the oil. Do not pour oil onto the ground, down a drain, or into a stream, pond or lake. Dispose of in accordance with Federal, State and Local laws.
- The control module for the Anti-lock Brake System (ABS) cannot withstand temperatures from a paint-drying booth or a heat lamp in excess of 95°C (203°F) and should not be subjected to temperatures exceeding 85°C (185°F) for more than two hours.
- Before doing any electrical welding on cars equipped with ABS, disconnect the battery negative (-) terminal (ground strap) and the ABS control module connector.
- Always make sure the ignition is off before disconnecting battery.

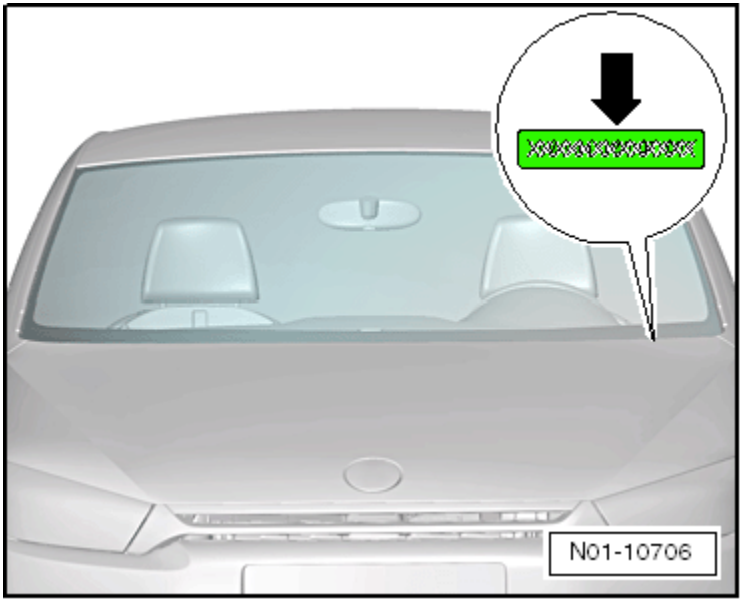
(CAUTIONS cont'd on next page)

CAUTIONS *(cont'd)*

- Label battery cables before disconnecting. On some models, battery cables are not color coded.
- Disconnecting the battery may erase fault code(s) stored in control module memory. Check for fault codes prior to disconnecting the battery cables.
- If a normal or rapid charger is used to charge the battery, disconnect the battery and remove it from the vehicle to avoid damaging paint and upholstery.
- Do not quick-charge the battery (for boost starting) for longer than one minute. Wait at least one minute before boosting the battery a second time.
- Connect and disconnect a battery charger only with the battery charger switched off.
- Sealed or "maintenance free" batteries should be slow-charged only, at an amperage rate that is approximately 10% of the battery's ampere-hour (Ah) rating.
- Do not allow battery charging voltage to exceed 16.5 volts. If the battery begins producing gas or boiling violently, reduce the charging rate. Boosting a sulfated battery at a high charging rate can cause an explosion.

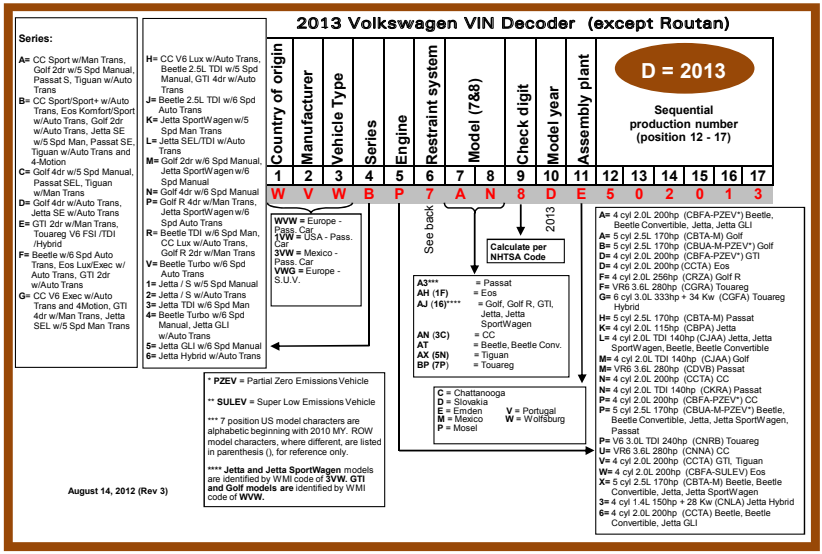
VEHICLE IDENTIFICATION

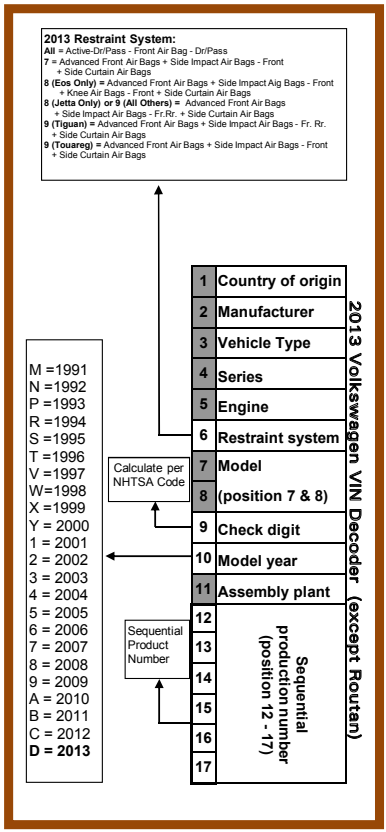
Vehicle Identification Number (VIN) Location



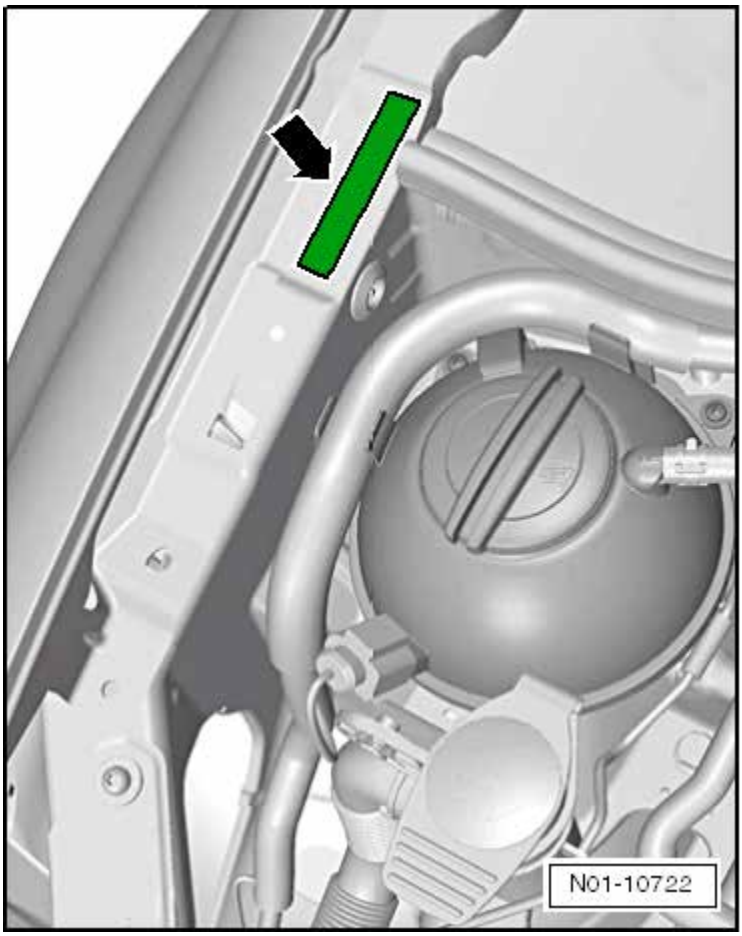
The VIN (➡) is on the left side of the vehicle in the area of the windshield wiper mount. It is visible from the outside.

VIN Decoder


2013 Volkswagen VIN Decoder (except Routan)
Series:
A= CC Sport w/Man Trans, Golf 2dr w/5 Spd Manual, Passat S, Tiguan w/Auto Trans
B= CC Sport/Sport+ w/Auto Trans, Eos Komfort/Sport w/Auto Trans, Golf 2dr w/Auto Trans, Jetta SE w/5 Spd Man, Passat SE, Tiguan w/Auto Trans and 4-Motion
C= Golf 4dr w/5 Spd Manual, Passat SEL, Tiguan w/Man Trans
D= Golf 4dr w/Auto Trans, Jetta SE w/Auto Trans
E= GTI 2dr w/Man Trans, Touareg V6 FSI /TDI /Hybrid
F= Beetle w/6 Spd Auto Trans, Eos Lux/Exec w/ Auto Trans, GTI 2dr w/Auto Trans
G= CC V6 Exec w/Auto Trans and 4Motion, GTI 4dr w/Man Trans, Jetta SEL w/5 Spd Man Trans
H= CC V6 Lux w/Auto Trans, Beetle 2.5L TDI w/5 Spd Manual, GTI 4dr w/Auto Trans
J= Beetle 2.5L TDI w/6 Spd Auto Trans
K= Jetta SportWagen w/5 Spd Man Trans
L= Jetta SEL/TDI w/Auto Trans
M= Golf 2dr w/6 Spd Manual, Jetta SportWagen w/6 Spd Manual
N= Golf 4dr w/6 Spd Manual
P= Golf R 4dr w/Man Trans, Jetta SportWagen w/6 Spd Auto Trans
R= Beetle TDI w/6 Spd Man, CC Lux w/Auto Trans, Golf R 2dr w/Man Trans
V= Beetle Turbo w/6 Spd Auto Trans
1= Jetta / S w/5 Spd Manual
2= Jetta / S w/Auto Trans
3= Jetta TDI w/6 Spd Man
4= Beetle Turbo w/6 Spd Manual, Jetta GLI w/Auto Trans
5= Jetta GLI w/6 Spd Manual
6= Jetta Hybrid w/Auto Trans
Country of origin
Manufacturer
Vehicle Type
Series
Engine
Restraint system
Model (7&8)
Check digit
Model year
Assembly plant
D = 2013
Sequential production number (position 12 - 17)
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17
W V W B P 7 A N 8 D E 5 0 2 0 1 3
WVW = Europe - Pass. Car
1VW = USA - Pass. Car
3VW = Mexico - Pass. Car
VWG = Europe - S.U.V.
See back
2013
Calculate per NHTSA Code
A3*** = Passat
AH (1F) = Eos
AJ (16)**** = Golf, Golf R, GTI, Jetta, Jetta SportWagen
AN (3C) = CC
AT = Beetle, Beetle Conv.
AX (5N) = Tiguan
BP (7P) = Touareg
C = Chattanooga
D = Slovakia
E = Emden
M = Mexico
P = Mosel
V = Portugal
W = Wolfsburg
A= 4 cyl 2.0L 200hp (CBFA-PZEV*) Beetle, Beetle Convertible, Jetta, Jetta GLI
A= 5 cyl 2.5L 170hp (CBTA-M) Golf
B= 5 cyl 2.5L 170hp (CBUA-M-PZEV*) Golf
D= 4 cyl 2.0L 200hp (CBFA-PZEV*) GTI
D= 4 cyl 2.0L 200hp (CCTA) Eos
F= 4 cyl 2.0L 256hp (CRZA) Golf R
F= VR6 3.6L 280hp (CGRA) Touareg
G= 6 cyl 3.0L 333hp + 34 Kw (CGFA) Touareg Hybrid
H= 5 cyl 2.5L 170hp (CBTA-M) Passat
K= 4 cyl 2.0L 115hp (CBPA) Jetta
L= 4 cyl 2.0L TDI 140hp (CJAA) Jetta, Jetta SportWagen, Beetle, Beetle Convertible
M= 4 cyl 2.0L TDI 140hp (CJAA) Golf
M= VR6 3.6L 280hp (CDVB) Passat
N= 4 cyl 2.0L 200hp (CCTA) CC
N= 4 cyl 2.0L TDI 140hp (CKRA) Passat
P= 4 cyl 2.0L 200hp (CBFA-PZEV*) CC
P= 5 cyl 2.5L 170hp (CBUA-M-PZEV*) Beetle, Beetle Convertible, Jetta, Jetta SportWagen, Passat
P= V6 3.0L TDI 240hp (CNRB) Touareg
U= VR6 3.6L 280hp (CNNA) CC
V= 4 cyl 2.0L 200hp (CCTA) GTI, Tiguan
W= 4 cyl 2.0L 200hp (CBFA-SULEV) Eos
X= 5 cyl 2.5L 170hp (CBTA-M) Beetle, Beetle Convertible, Jetta, Jetta SportWagen
3= 4 cyl 1.4L 150hp + 28 Kw (CNLA) Jetta Hybrid
6= 4 cyl 2.0L 200hp (CCTA) Beetle, Beetle Convertible, Jetta GLI
* PZEV = Partial Zero Emissions Vehicle
** SULEV = Super Low Emissions Vehicle
*** 7 position US model characters are alphabetic beginning with 2010 MY. ROW model characters, where different, are listed in parenthesis (), for reference only.
**** Jetta and Jetta SportWagen models are identified by WMI code of 3VW. GTI and Golf models are identified by WMI code of WWW.
August 14, 2012 (Rev 3)

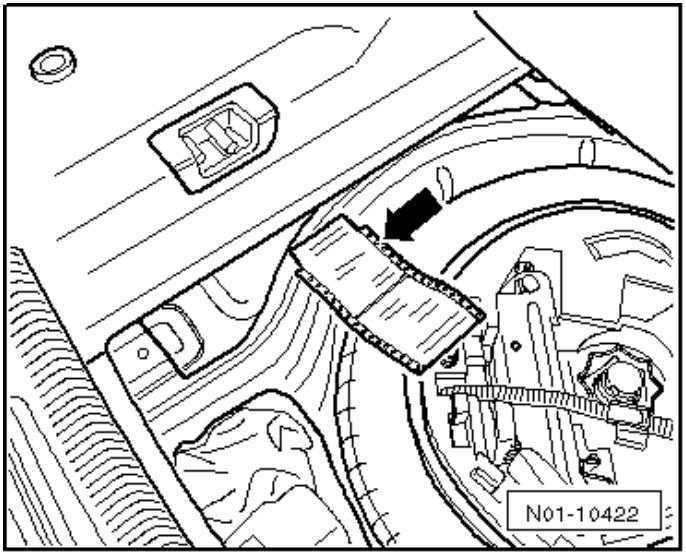

2013 Restraint System:
All = Active-Dr/Pass - Front Air Bag - Dr/Pass
7 = Advanced Front Air Bags + Side Impact Air Bags - Front + Side Curtain Air Bags
8 (Eos Only) = Advanced Front Air Bags + Side Impact Aig Bags - Front + Knee Air Bags - Front + Side Curtain Air Bags
8 (Jetta Only) or 9 (All Others) = Advanced Front Air Bags + Side Impact Air Bags - Fr.Rr. + Side Curtain Air Bags
9 (Tiguan) = Advanced Front Air Bags + Side Impact Air Bags - Fr. Rr. + Side Curtain Air Bags
9 (Touareg) = Advanced Front Air Bags + Side Impact Air Bags - Front + Side Curtain Air Bags
M =1991
N =1992
P =1993
R =1994
S =1995
T =1996
V =1997
W=1998
X =1999
Y = 2000
1 = 2001
2 = 2002
3 = 2003
4 = 2004
5 = 2005
6 = 2006
7 = 2007
8 = 2008
9 = 2009
A = 2010
B = 2011
C = 2012
D = 2013
Calculate per NHTSA Code
Sequential Product Number
1 Country of origin
2 Manufacturer
3 Vehicle Type
4 Series
5 Engine
6 Restraint system
7 Model
8 (position 7 & 8)
9 Check digit
10 Model year
11 Assembly plant
12 13 14 15 16 17 Sequential production number (position 12 - 17)
2013 Volkswagen VIN Decoder (except Routan)

VIN on Longitudinal Member Extension



The Vehicle Identification Number (VIN) is located on the longitudinal member extension (➡).

Vehicle Data Label



The vehicle data label (➡) is located in the left rear of the vehicle in the spare wheel well. The vehicle data sticker can also be found in the customer's service schedule.

SALES CODES

Engine Codes

CCTA	2.0L 4-cylinder

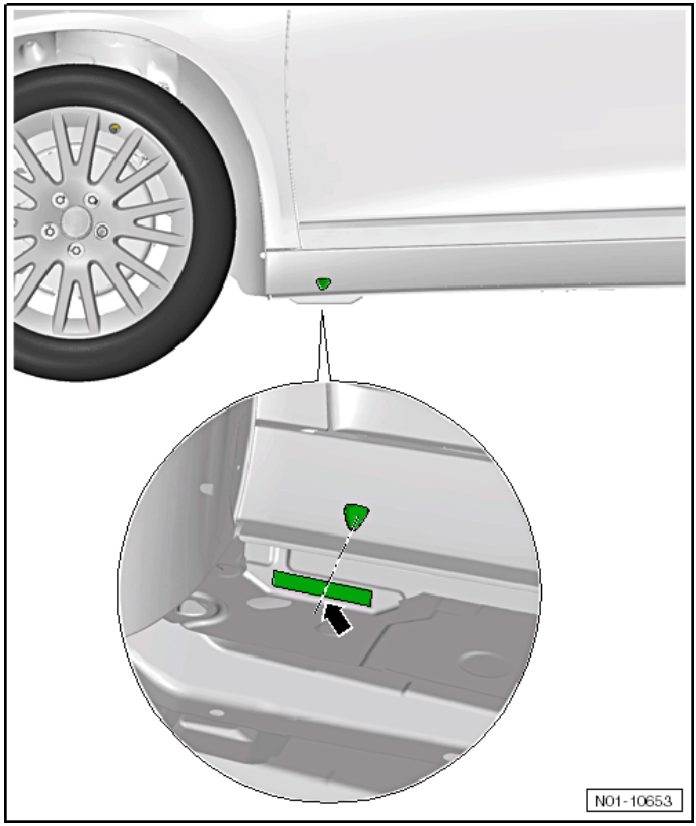
Transmission Codes

02Q	6-speed manual
02E	6-speed Direct Shift Gearbox (DSG)

VEHICLE LIFTING

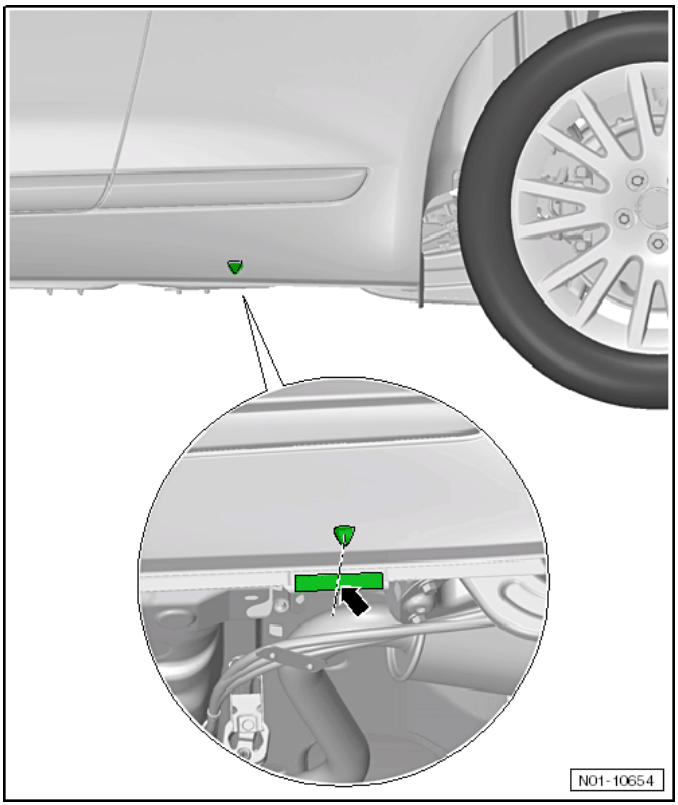
Hoist and Jack Mounting Points

Front



Position the support plate in the side member vertical reinforcement area (➡).

Rear

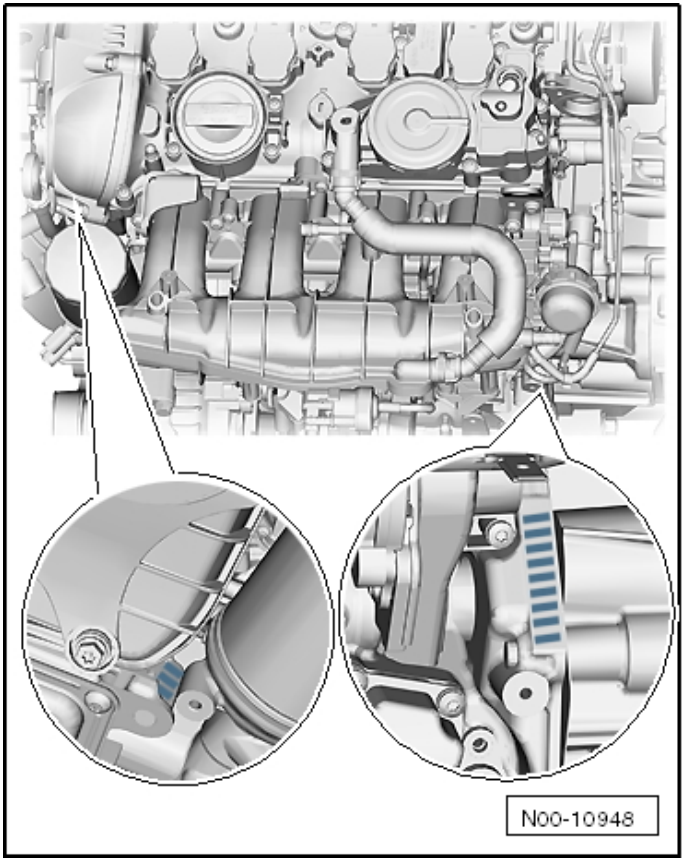


Position the support plate in the side member vertical reinforcement area (➡).

ENGINE MECHANICAL – 2.0L CBFA

General, Technical Data

Engine Number Location



The engine number (engine code and serial number) are located at the engine/transmission joint.

The engine code is also printed on the cylinder block behind the oil filter.

Engine Data

Code Letters		**CBFA**
Manufactured		from 05.08
Emissions values		SULEV [1)]
Displacement	liter	2.0
Output	kW at RPM	147 @ 5100
Torque	Nm at RPM	280 @ 1700
Bore	diameter mm	82.5
Stroke	mm	92.8
Compression ratio		9.6:1
Research Octane Number (RON)		95
Injection system/ignition system		FSI
Ignition sequence		1-3-4-2
Turbocharger, Supercharger		Turbocharger
Variable valve timing		Yes
Secondary Air Injection (AIR)		Yes
Valves per cylinder		4
Oil pressure control		No

[1)] SULEV = Super Ultra Low Emissions Vehicle

Engine Assembly – 2.0L CBFA

Fastener Tightening Specifications

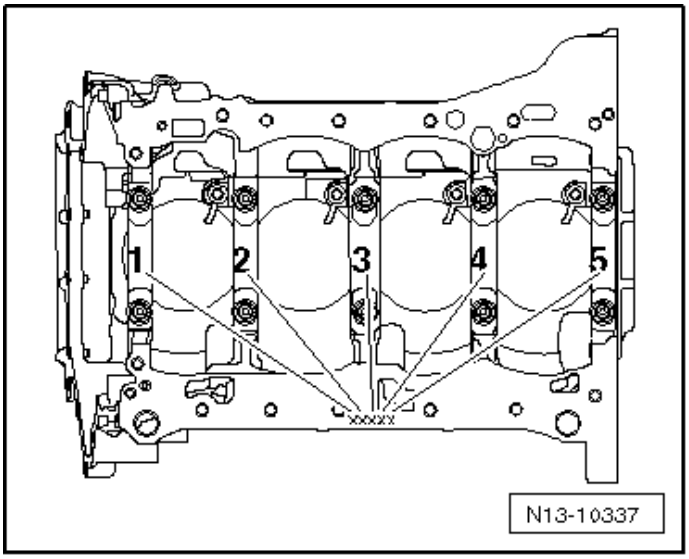
Component	Fastener size	Nm
Bolts and nuts	M6	10
	M7	15
	M8	25
	M10	40
	M12	60
Engine mount-to-body bolt [1]	-	40 plus an additional 90° (¼ turn)
Engine mount bracket-to-engine bolt [1]	-	40 plus an additional 180° (½ turn)
Engine mount-to-engine mount bracket bolt [1]	-	60 plus an additional 90° (¼ turn)
Pendulum support-to-subframe bolt [1] [2]	-	100 plus an additional 90° (¼ turn)
Support-to-body bolt [1]	-	20 plus an additional 90° (¼ turn)
Support-to-engine mount bolt [1]	-	20 plus an additional 90° (¼ turn)
Transmission mount-to-body bolt [1]	-	40 plus an additional 90° (¼ turn)
Transmission mount-to-transmission mount bracket bolt [1]	-	60 plus an additional 90° (¼ turn)

[1] Replace fastener(s).

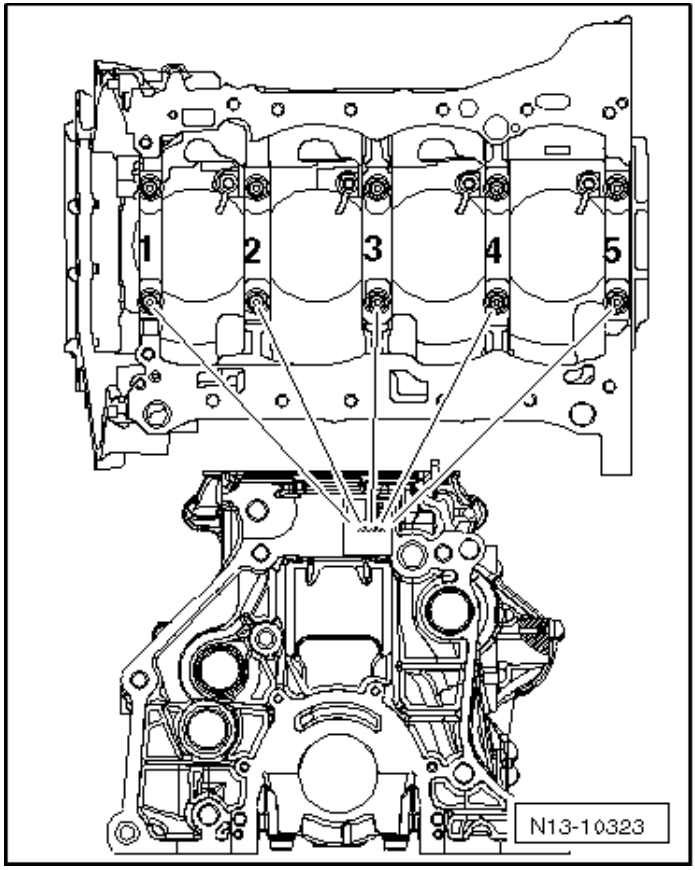
[2] Install the pendulum support to the transmission bolts first then install the pendulum support to subframe bolt.

Crankshaft, Cylinder Block – 2.0L CBFA

Cylinder Block Bearing Shell Identification



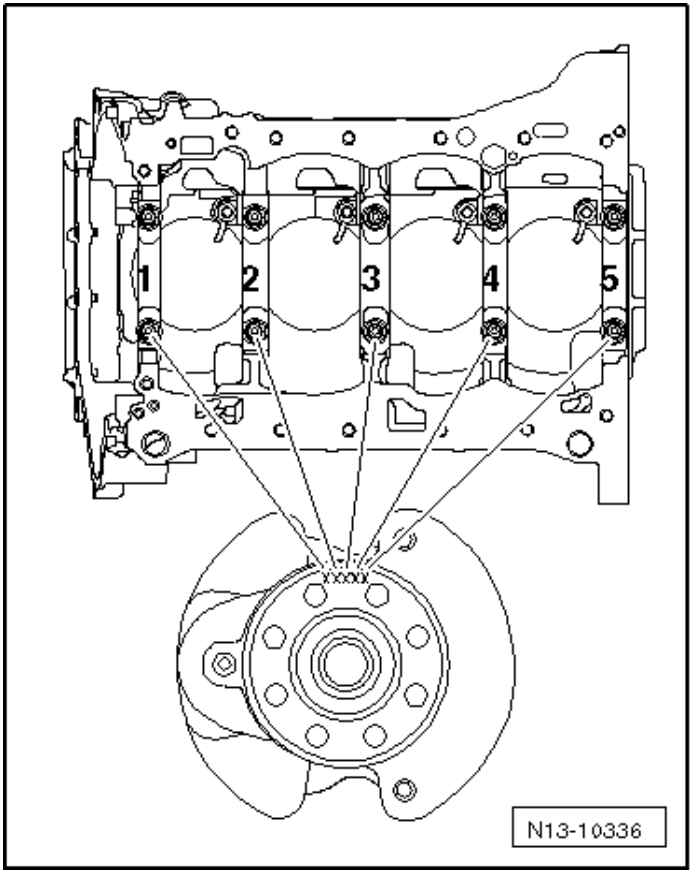
The cylinder block bearing shell identification is located either on the oil pan sealing surface or on the top (transmission side) of the cylinder block.



The identification on the cylinder block is for the upper bearing shell. Note the letter and match it to the color identification in the table.

Letter on cylinder block	Color of bearing
S	Black
R	Red
G	Yellow
B	Blue
W	White

Bearing Cap Bearing Shell Identification



The identification on the crankshaft is for the lower bearing shell. Note the letter and match it to the color identification in the table.

Letter on crankshaft	Color of bearing
S	Black
R	Red
G	Yellow
B	Blue
W	White

Fastener Tightening Specifications

Component	Fastener size	Nm
Air conditioning compressor-to-accessory bracket bolt	-	25
Connecting rod bearing cap-to-connecting rod bolt [1)]	-	45 plus an additional 90° (¼ turn)
Dual mass flywheel/drive plate-to-crankshaft bolt [1)]	-	60 plus an additional 90° (¼ turn)
Generator-to-accessory bracket bolt	-	23
Pressure relief valve	-	27
Ribbed belt tensioner-to-accessory bracket bolt	-	10
Sensor wheel-to-crankshaft screw [1)]	-	10 plus an additional 90° (¼ turn)
Vibration damper-to-crankshaft bolt [1)]	-	150 plus an additional 90° (¼ turn)

[1)] Replace fastener(s).

Crankshaft Dimensions

Reconditioning dimension in mm [1)]	Crankshaft bearing pin diameter	Connecting rod bearing pin diameter
Basic dimension	58.00	47.80

[1)] The preparation of worn crankshafts is not provided.

Piston Ring End Gaps

Piston ring dimensions in mm	New	Wear limit
Compression ring	0.20 to 0.40	0.8
Oil scraping ring	0.25 to 0.50	0.8

Piston Ring Clearance

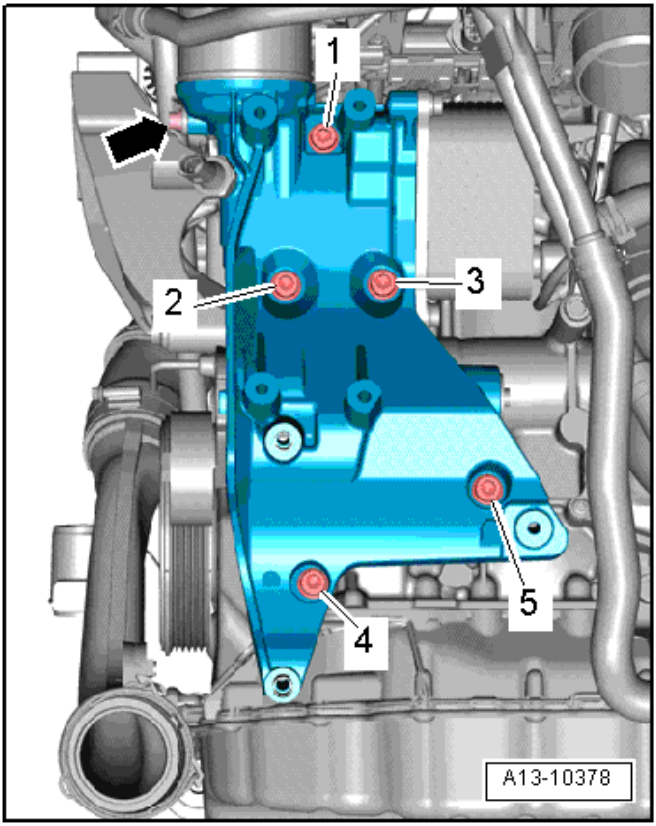
Piston ring dimensions in mm	New	Wear limit
1st compression ring	0.06 to 0.09	0.20
2nd compression ring	0.03 to 0.06	0.15
Oil scraping rings	Cannot be measured	

Piston and Cylinder Dimensions

Honing dimension in mm	Piston diameter	Cylinder bore diameter
Basic dimension	82.465 [1)]	82.51

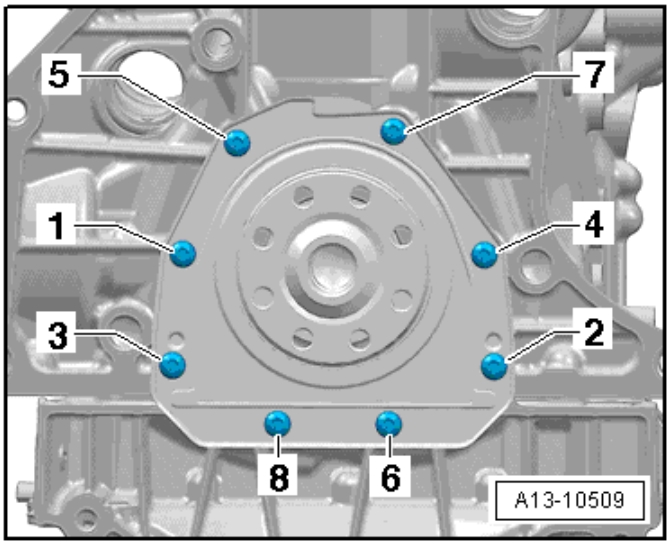
[1)] Measurements without graphite coating (thickness = 0.02 mm). The graphite coating wears off.

Accessory Assembly Bracket Tightening Specifications



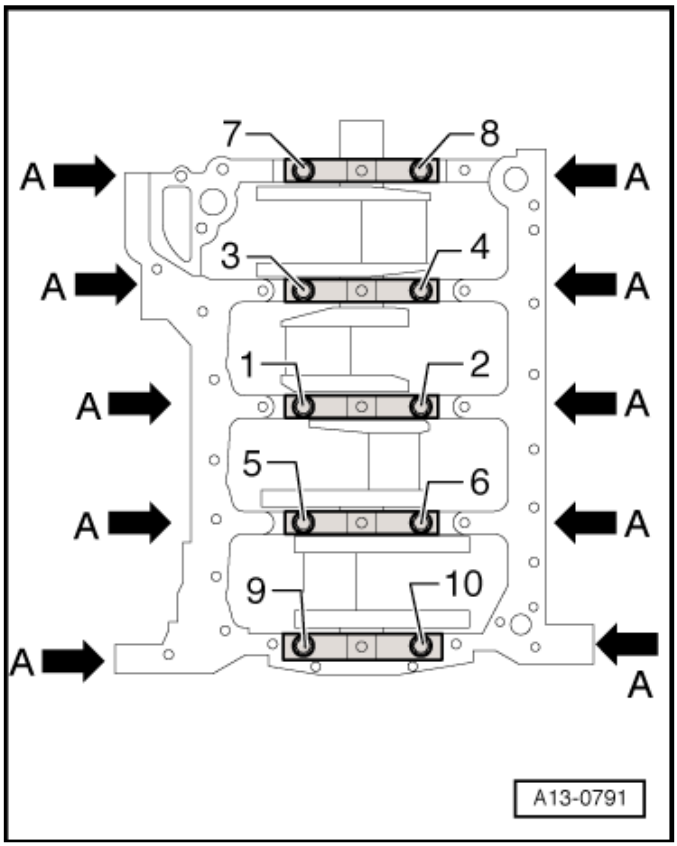
Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	Hand-tighten
2	Tighten bolts 1 through 5 in sequence	20
3	Tighten bolts 1 through 5 in sequence	an additional 90° (¼ turn)

Sealing Flange Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	Hand-tighten
2	Tighten bolts 1 through 8 in sequence	9

Crankshaft Assembly Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 10 and A in sequence	Hand-tighten
2	Tighten bolts 1 through 10 in sequence	65
3	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)
4	Tighten bolts A	20
5	Tighten bolts A	an additional 90° (¼ turn)

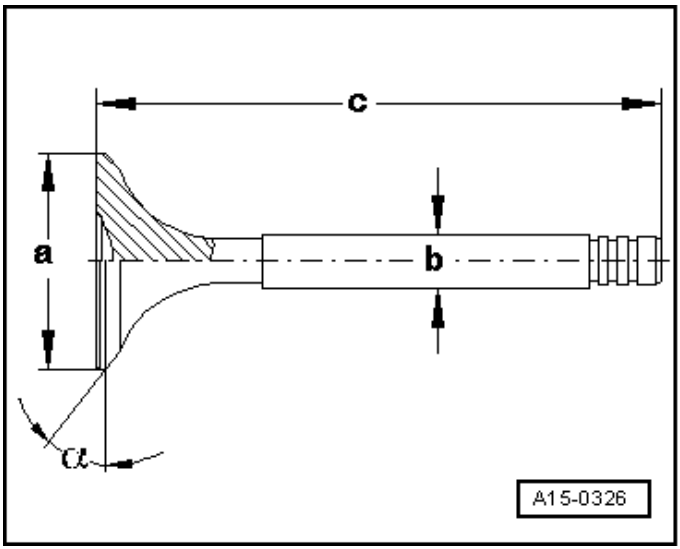
Cylinder Head, Valvetrain – 2.0L CBFA

Fastener Tightening Specifications

Component	Fastener size	Nm
Balance shaft-to-cylinder block bolt	-	9
Balance shaft timing chain guide rail-to-cylinder block guide pin	-	20
Balance shaft timing chain tensioner-to-cylinder block [2]	-	85
Balance shaft timing chain tensioning rail-to-cylinder block guide pin	-	20
Ball stud-to-cylinder head cover	-	5
Bearing bracket-to-cylinder head bolt	-	9
Bearing bracket-to-exhaust camshaft bolt [1]	M6	8 plus an additional 90° (¼ turn)
	M8	20 plus an additional 90° (¼ turn)
Camshaft adjustment valve 1-to-upper timing chain cover bolt	-	9
Camshaft Position (CMP) sensor-to-cylinder block bolt	-	9
Camshaft timing chain tensioner-to-cylinder block bolt	-	9
Camshaft timing chain guide rail-to-cylinder block guide pin	-	20
Camshaft timing chain tensioning rail-to-cylinder block guide pin	-	20
Control valve-to-intake camshaft [3]	-	35
Cylinder head mounting plate/connecting piece bolt	-	9
Heat shield-to-bracket bolt	-	9
Heat shield-to-cylinder head bolt	-	20
Oil dipstick guide tube/camshaft adjustment valve 1-to-upper timing chain cover bolt	-	9
Oil dipstick guide tube-to-cylinder head bolt	-	9
Secondary Air Injection (AIR) solenoid valve-to-cylinder head bolt [2]	-	9
Transport strap-to-cylinder head bolt	-	25
Vacuum pump-to-cylinder head bolt	-	9

[1] Replace fastener(s).
[2] Engine code CBFA only.
[3] Left hand threads.

Valve Dimensions



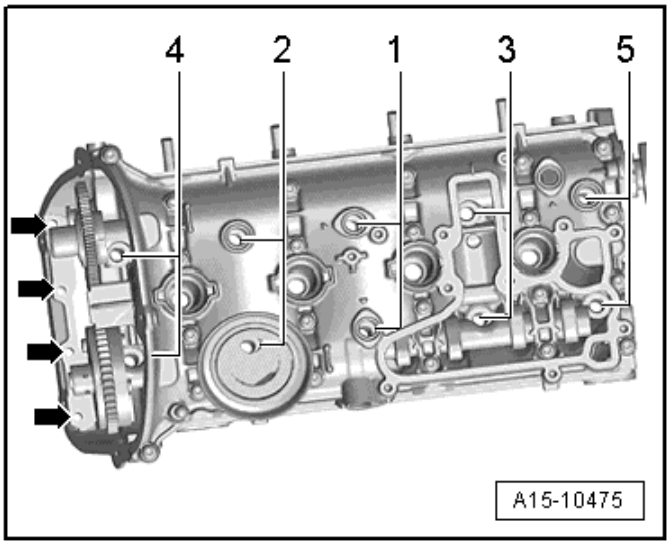
Dimension		Intake valve	Exhaust valve
Diameter a	mm	33.85 ± 0.10	28.0 ± 0.1
Diameter b	mm	5.98 ± 0.007	5.955 ± 0.007
c	mm	103.97	101.87
α	∠°	45	45

NOTE: Intake and exhaust valves must not be refaced by grinding. Only lapping is permitted.

Compression Pressures

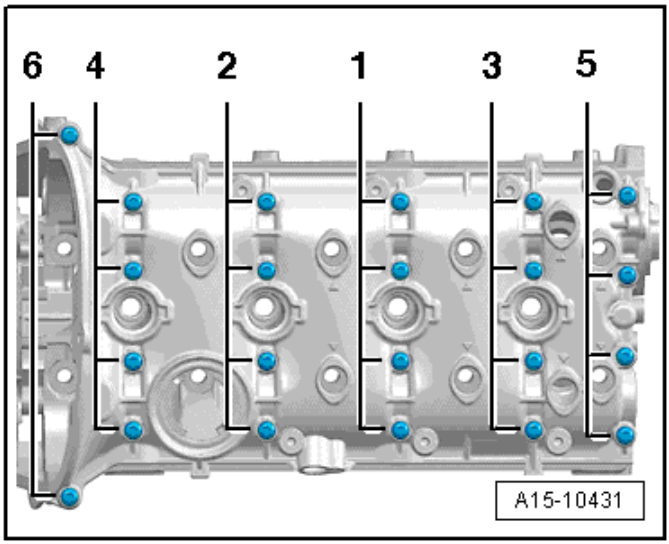
New bar positive pressure	Wear limit bar positive pressure	Difference between cylinders bar positive pressure
11.0 to 14.0	7.0	Max. 3.0

Cylinder Head Tightening Specifications



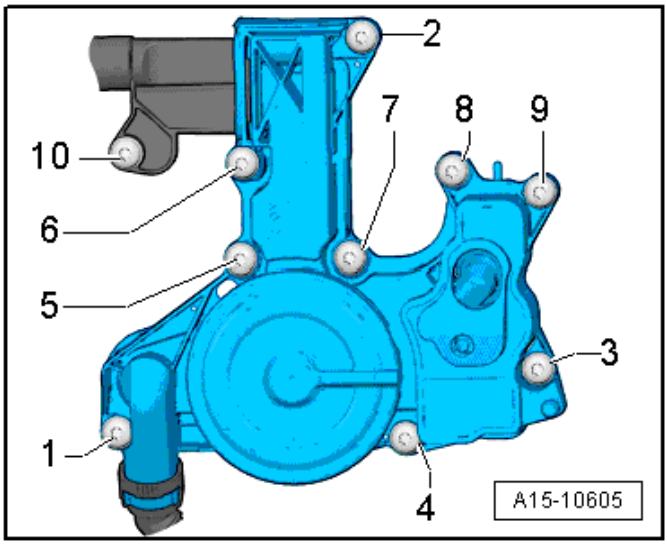
Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	40
2	Tighten bolts 1 through 5 in sequence	an additional 90° (¼ turn)
3	Tighten bolts 1 through 5 in sequence	an additional 90° (¼ turn)
4	Tighten bolts (➡)	8
5	Tighten bolts (➡)	an additional 90° (¼ turn)

Cylinder Head Cover Tightening Specifications



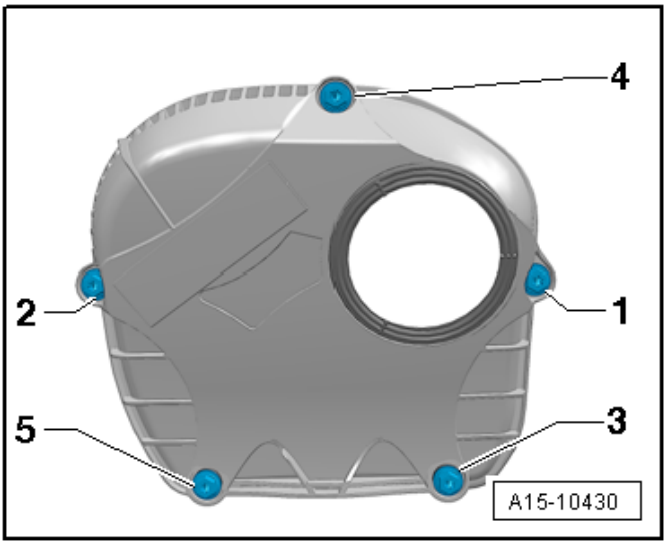
Step	Component	Nm
1	Tighten bolts 1 through 6 in sequence in several stages	Hand-tighten
2	Tighten bolts 1 through 6 in sequence	8
3	Tighten bolts 1 through 6 in sequence	an additional 90° (¼ turn)

Crankcase Ventilation Tightening Specification



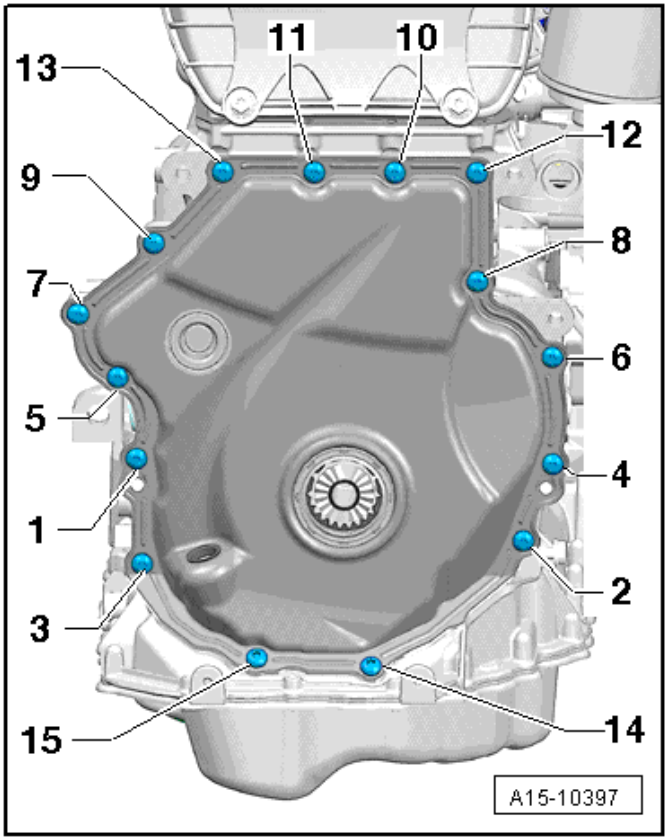
Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence	11

Upper Timing Chain Cover Tightening Specifications



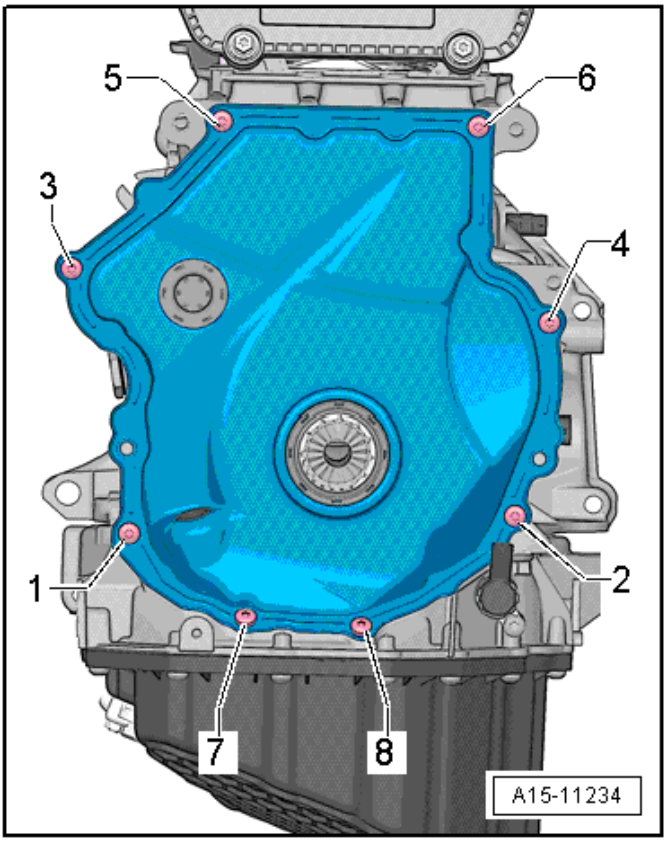
Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence in several stages	Hand-tighten
1	Tighten bolts 1 through 5 in sequence	9

Lower Timing Chain Cover with 15 Bolts Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 15 in sequence	8
2	Tighten bolts 1 through 15 in sequence	an additional 45° (⅛ turn)

Lower Timing Chain Cover with 8 Bolts Tightening Specifications



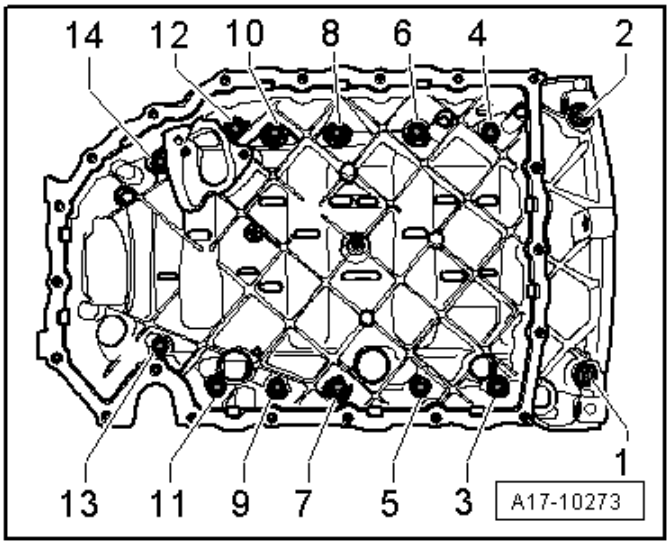
Step	Component	Nm
1	Tighten bolts 1 through 8 in sequence	4
2	Tighten bolts 1 through 8 in sequence	an additional 45° (⅛ turn)

Lubrication – 2.0L CBFA

Fastener Tightening Specifications

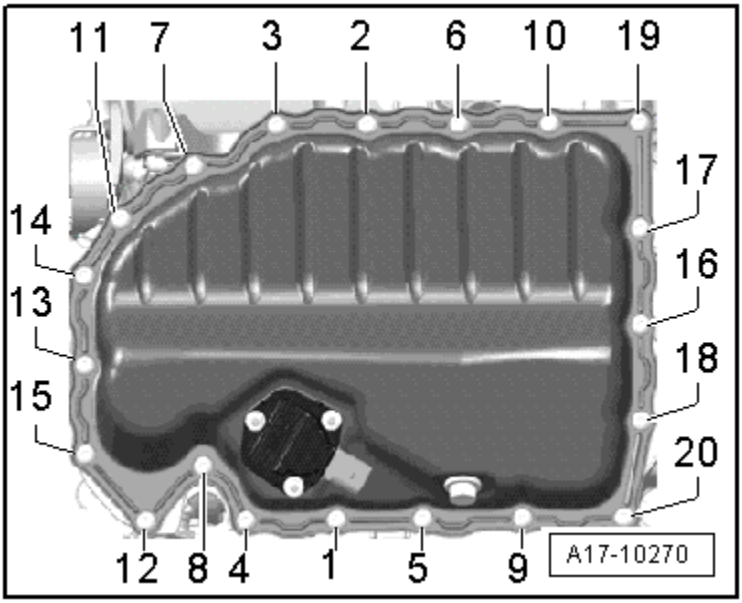
Component	Fastener size	Nm
Oil baffle-to-upper oil pan bolt	-	9
Oil cooler-to-accessory bracket bolt	-	15
Oil drain plug-to-lower oil pan	-	30
Oil filter element-to-accessory bracket	-	22
Oil intake pipe-to-oil pump bolt	-	9
Oil pressure switch-to-accessory bracket	-	20
Oil pump drive chain tensioner guide pin-to-cylinder block bolt	-	9
Oil pump-to-upper oil pan bolt	M6	9
	M8	20

Upper Oil Pan Tightening Specifications



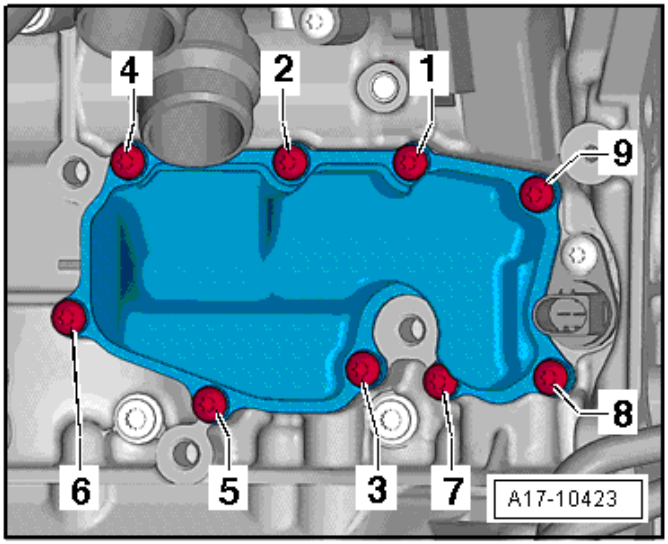
Step	Component	Nm
1	Tighten bolts 1 through 14 in sequence	Hand-tighten
2	Tighten bolts 1 through 14 in sequence	15
3	Tighten bolts 1 through 14 in sequence	an additional 90° (¼ turn)

Lower Oil Pan Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 20 in sequence	Hand-tighten
2	Tighten bolts 1 through 20 in sequence	8
3	Tighten bolts 1 through 20 in sequence	an additional 45° (⅛ turn)

Oil Separator Tightening Specification



Step	Component	Nm
1	Tighten bolts 1 through 9 in sequence	9

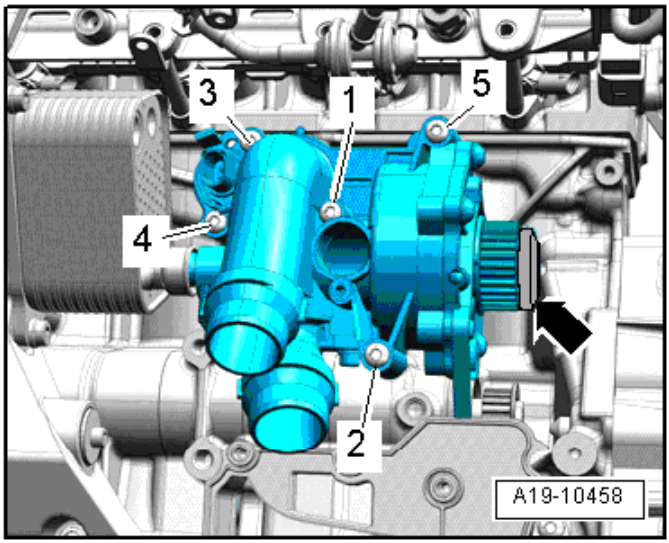
Cooling System – 2.0L CBFA

Fastener Tightening Specifications

Component	Nm
After run coolant pump bracket bolt	8
After run coolant pump bracket-to-upper oil pan bolt	40
Coolant expansion tank bolt	5
Coolant pump connecting piece bolt	9
Coolant pump toothed belt guard bolt	9
Coolant fan shroud nut	10
Engine coolant temperature sensor retaining plate-to-coolant pump bolt	4
Front coolant pipe bolt	3.5
Radiator fan shroud bolt	5
Radiator-to-charge air pipe bolt	5
Small coolant pipe bolt	9
Toothed belt drive gear-to-balance shaft bolt [1) 2)]	10 plus an additional 90° (¼ turn)

[1)] Replace fastener(s).
[2)] Has left hand threads.

Coolant Pump Tightening Specification



Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	9

Fuel Supply – 2.0L CBFA

Fastener Tightening Specifications

Component	Fastener size	Nm
Accelerator Pedal Position (APP) sensor with Accelerator Pedal Position 2 (APP2) sensor-to-body bolt	-	10
Air filter housing-to-Leak Detection Pump (LDP) bracket bolt	-	2
Fuel filler tube-to-body bolt	-	11
Fuel tank-to-chassis	M6	10
Fuel tank securing strap-to-underbody bolt [1)]	-	25
Leak Detection Pump (LDP)-to-Leak Detection Pump (LDP) bracket bolt [3)]	-	2
Leak Detection Pump (LDP) bracket-to-body nut	-	6
Fuel tank locking ring	-	110
Leak Detection Pump (LDP) mounting plate bolt	-	3
Leak Detection Pump (LDP) mounting plate bracket bolt	-	8

[1)] Replace fastener(s).

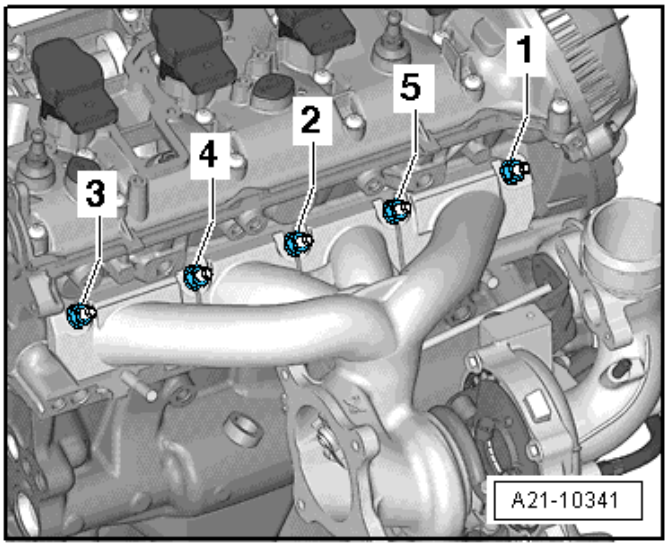
Turbocharger, G-Charger – 2.0L CBFA

Fastener Tightening Specifications

Component	Nm
Charge Air Cooler (CAC) mounting bolt	5
Charge air pipe bolt	10
Charge air pipe clamp	5.5
Charge air pressure sensor-to-charge air pipe bolt	5
Coolant return pipe-to-turbocharger banjo bolt	38
Coolant return pipe-to-turbocharger bolt	9
Coolant supply pipe-to-cylinder block banjo bolt	38
Coolant supply pipe-to-cylinder block bolt	9
Coolant supply pipe-to-turbocharger banjo bolt	38
Cylinder block bracket bolt [2]	30
Cylinder head fastening strip nut [1] [3]	30
Cylinder head heat shield bolt	20
Drive axle heat shield bolt	20
Oil return pipe-to-cylinder block bolt	9
Oil return pipe-to-turbocharger bolt	9
Oil supply pipe-to-cylinder block bolt	9
Oil supply pipe-to-turbocharger banjo bolt	33
Oil supply pipe-to-turbocharger bolt	9
Turbocharger bracket bolt [2]	30
Turbocharger connection bolt	9
Turbocharger recirculation valve-to-turbocharger bolt	7
Vacuum diaphragm-to-turbocharger bolt	10
Wastegate bypass regulator valve-to-turbocharger bolt	3

[1] Replace fastener(s).
[2] Lubricate the bolt with hot bolt paste. Refer to the Electronic Parts Catalog (ETKA).
[3] Lubricate the studs of the exhaust manifold with hot bolt paste. Refer to the Electronic Parts Catalog (ETKA).

Turbocharger Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 5 in sequence	5
2	Tighten bolts 1 through 5 in sequence	12
3	Tighten bolts 1 through 5 in sequence	16
4	Tighten bolts 1 through 5 in sequence	25

Exhaust System- 2.0L CBFA

Fastener Tightening Specifications

Component	Nm
Clamping sleeve nut	
- Individual clamp	25
- Continuous clamp	35
Front exhaust pipe with catalytic converter-to-exhaust manifold/turbocharger nut [1) 2)]	40
Oxygen Sensor (O2S)	55
Secondary Air Injection (AIR) pump motor bracket-to-underbody nut	25
Secondary Air Injection (AIR) pump motor-to-bracket nut	9
Secondary Air Injection (AIR) solenoid valve bolt	9
Suspended mount bracket bolt	20
Suspended mount-to-subframe bolt	25
Suspended mount-to-underbody bolt	25
Tunnel bridge-to-underbody bolt	25

1) Replace fastener(s).
2) Lubricate the stud bolts on the exhaust manifold/turbocharger with hot bolt paste (G 052 112 A3)

Multiport Fuel Injection – 2.0L CBFA

Technical Data

Engine codes	CBFA
Idle check	
Idle speed (RPM) [1)]	640 to 800
Engine speed (RPM) limitation	Approximately 6500

1) If the Engine Control Module (ECM) voltage supply drops below 12 volts, the idle speed is increased in stages up to 990 RPM. Idle speed is not adjustable.

Fastener Tightening Specifications

Component	Fastener size	Nm
Fuel pressure sensor-to-pressure sensor tester (VAS 6394/1)	-	27
Fuel pressure sensor-to-fuel rail [2]	-	27
Fuel rail adapter (VAS 6394/2)	-	27
Fuel supply line union nut-to-high pressure pump	-	18
Fuel supply line union nut-to-fuel rail	-	18
Fuel supply line connection-to-fuel rail [1]	-	22
High pressure fuel line connection-to-high pressure pump [1]		
- With inner threads	-	40
- With outer threads	-	25
High pressure pump-to-cylinder head bolt [1]	M6	8 plus an additional 90° (¼ turn)
	M8	20
Intake Air Temperature (IAT) sensor-to-intake manifold bolt	-	5
Intake manifold-to-cylinder head bolt		
- First pass, tighten to	-	3
- Final pass, tighten to	-	9
Intake manifold support-to-cylinder block bolt	-	23
Intake manifold support-to-intake manifold nut	-	10
Knock Sensor (KS) bolt	-	20
Lower air filter housing-to-body bolt	-	8
Throttle valve control module-to-intake manifold bolt	-	5
Upper air filter housing-to-lower air filter housing bolt	-	1.5

[1] Replace fastener(s).
[2] Coat the threads with clean engine oil.

Ignition – 2.0L CBFA

Technical Data

Engine codes	**CBFA**
Ignition sequence	1-3-4-2
Spark plugs	
VW/Audi	101 905 631 H
Electrode gap	1.0 to 1.1 mm
Tightening specifications	25 Nm
Change intervals	Refer to Maintenance Intervals Rep. Gr. 03

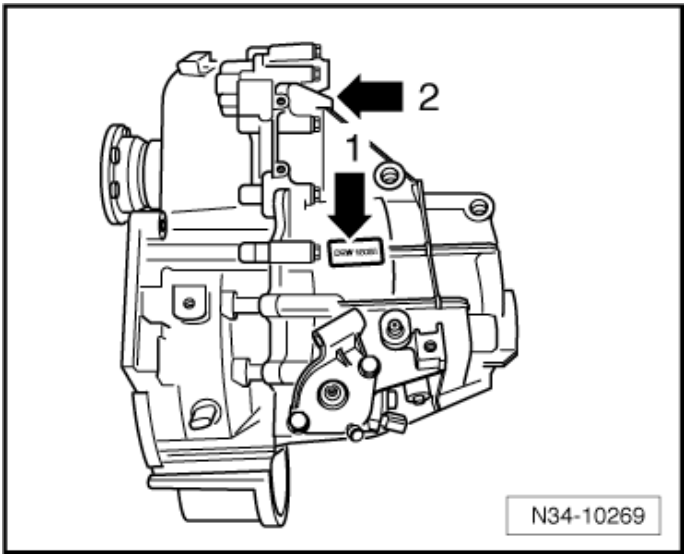
Fastener Tightening Specifications

Component	**Nm**
Camshaft Position (CMP) sensor bolt	10
Engine Speed (RPM) sensor bolt	10
Knock Sensor (KS) bolt	20
Spark plug	25

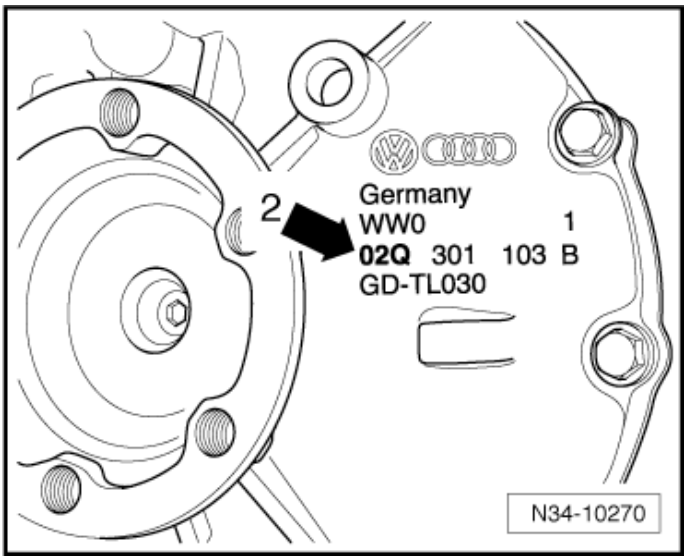
MANUAL TRANSMISSION – 02Q

General, Technical Data

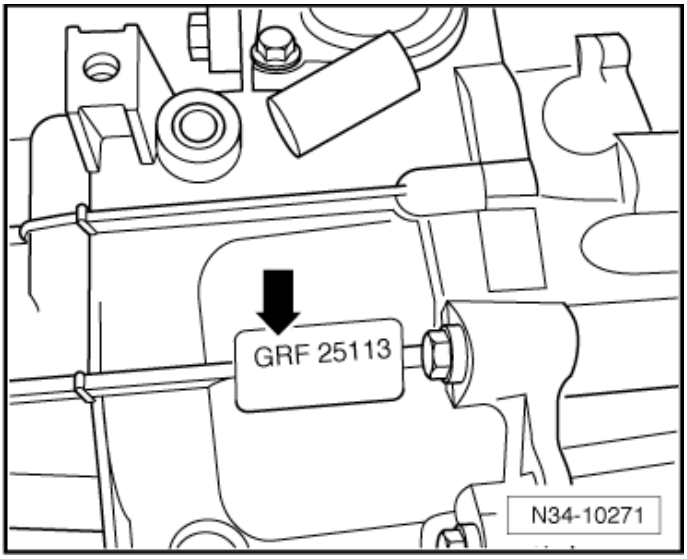
Transmission Identification



Code letters and build date (1) for the manual transmission 02Q (2).



Manual transmission 02Q (2).



Transmission code letters and build date (➡).

Example:

GRF	25	11	3
Identification codes	Day	Month	Year (2003) of manufacture

Codes Letters, Transmission Allocation and Capacities

Manual transmission		**6 Speed Transmission (02Q)**
Identification codes		KZS
Manufactured	from through	05.09
Allocation	Engine	2.0L - 147 kW
Ratio: Z_2: Z_1	Final drive I	71:18 = 3.944
	Final drive II	71:23 = 3.087
Capacities for the manual transmission		Refer to the Fluid Capacity Tables Rep. Gr. 03
Drive axle flange diameter		107 mm

Refer to the Electronic Parts Catalog (ETKA) for the following:
- Individual gear ratios
- Transmission fluid specifications
- Clutch disc and pressure plate allocation

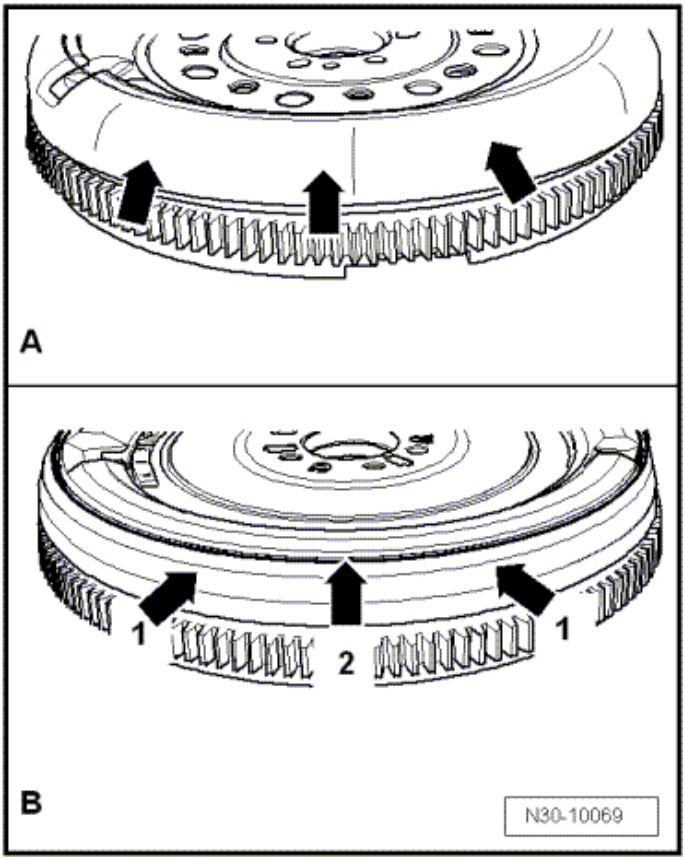
Clutch – 02Q

Fastener Tightening Specifications

Component	Fastener size	Nm
Clutch pedal mounting bracket through bolt nut [1]	-	25
Impact bolster support-to-steering column bracket bolt [1]		
- Secured with one bolt	-	20
- Secured with two bolts	-	10
Mounting bracket-to-bulkhead nut [1]	-	25
Dual mass flywheel pressure plate bolt [3]	M6	13
	M7	20
Slave cylinder with release bearing-to-transmission bolt [1] [2]		
- Without locking fluid (slave cylinder with metal housings only)	-	12
- With locking fluid	-	15

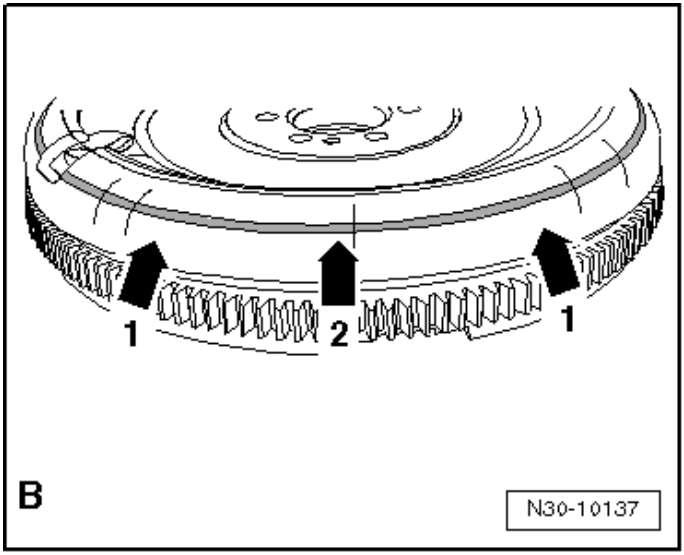
[1] Replace fastener(s).
[2] Carefully tighten diagonally and in small stages so that the slave cylinder bolt tabs do not break off.
[3] Loosen and tighten in small steps and in a diagonal sequence.

Determining Clutch Manufacturer



A) Round outer contour (➡) indicates a clutch manufactured by Sachs.

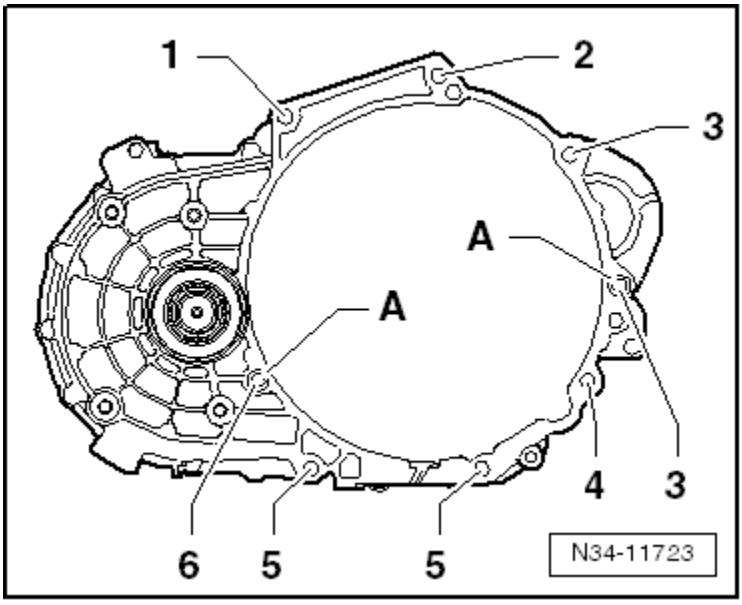
B) Squared outer contour (1) and a depression all the way around (2) indicates a clutch manufactured by LuK.



B) Round outer contour (1) and a depression all the way around (2) indicates a clutch manufactured by LuK.

Controls, Housing – 02Q

Transmission to Engine Tightening Specifications



Item	Bolt	Qty.	Nm
1	M12 x 55 with a short M8 threaded pin	1	80
2	M12 x 55 with a long M8 threaded pin Or M12 x 50 without threaded pin	1	80
3	M12 x 65 with a long M8 threaded pin Also starter to transmission	2	80
4	M10 x 105	1	40
5	M10 x 50	2	40
6	M12 x 70 or M12 x 65	1	80
-	M6 x 8 small flywheel cover plate (not present on all engines)	1	10
A	Alignment sleeves for centering		

Fastener Tightening Specifications

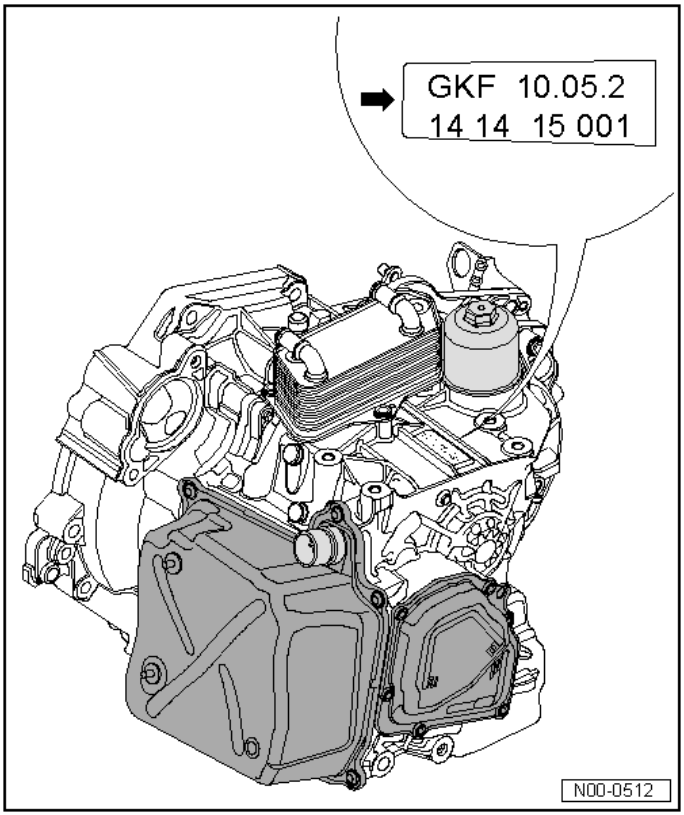
Component	Fastener size	Nm
Backup lamp switch-to-transmission housing	-	20
Cable mounting bracket-to-transmission bolt/nut	-	20
Gearshift unit-to-transmission housing bolt [1)]	-	20
Transmission housing locking screw	-	45
Oil fill or drain plug		
- Multi-point socket head	-	45
- Hex socket head	-	30
Transmission housing-to-clutch housing bolt		
- Round head socket bolt	M9 aluminum	15 plus an additional 180° (½ turn)
- Hex head steel bolt	-	15 plus an additional 90° (¼ turn)
Transmission shift lever-to-shift unit nut [1)]	-	23
Shift lever and housing (from 11.06)		
Shift housing-to-body nut	M6	8
	M8	25

[1)] Replace fastener(s).

DIRECT SHIFT GEARBOX (DSG) TRANSMISSION – 02E

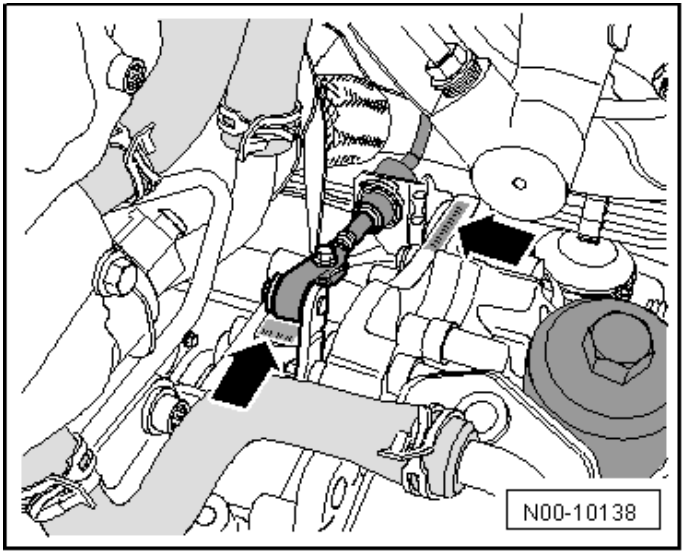
General, Technical Data

Identification on Transmission

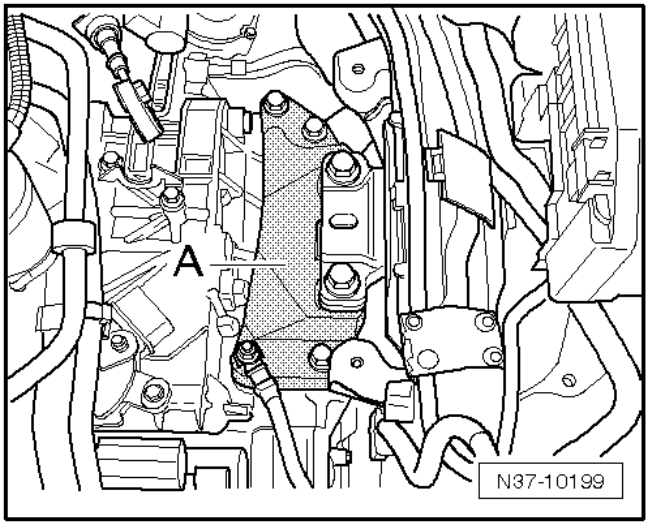


Example:

GKF	10	05	2
Identification codes	Day	Month	Year (2002) of manufacture



The transmission code letters can be found on the transmission near the selector lever cable (➡) or under the transmission mount bracket.



To read the transmission code letters under the transmission mount bracket, support the engine and transmission and remove the transmission mount bracket (A). Refer to ElsaWeb for the transmission mount bracket removal procedure.

Transmission Allocation Codes

DSG® Transmission 02E (Front Wheel Drive (FWD))
KNH, HYD, MLZ, JPR, LTK, KDB, KPU, HQP, LQY and HQR
2.0L - 147 kW FSI-Turbo

Clutch – 02E

Fastener Tightening Specifications

Component	Nm
Inspection Plug	45
Oil Filter Housing	20
Overflow Tube	3

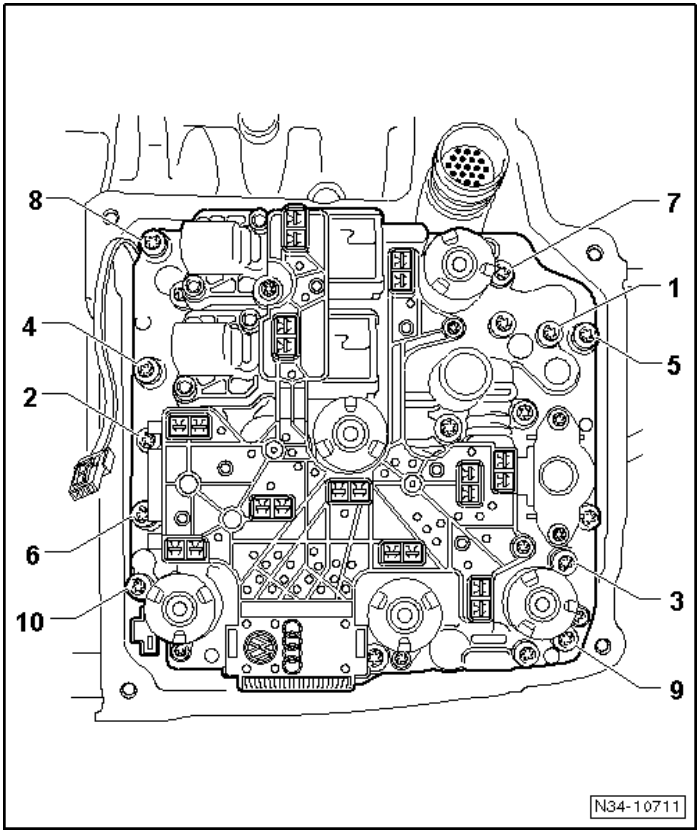
Controls, Housing (DSG) – 02E

Fastener Tightening Specifications

Component	Nm
Drive axle heat shield-to-bevel box bolt [2)]	25
Mechatronic cover bolt [1)]	16
Oil filter housing	20
Oil pump cover bolt [1)]	8
Overflow tube-to-transmission	3
Selector housing-to-body nut	8
Selector lever cable adjustment bolt	13
Selector mechanism with selector lever and selector lever cable-to-body bolt	8
Selector shaft lever-to-selector shaft nut	20
Transmission drain plug	45
Transmission input speed and clutch oil temperature sensor bolt	10
Transmission oil cooler-to-transmission bolt	20 plus an additional 90° (¼ turn)
Transmission overflow tube	3
Wire bracket-to-mechatronic cover nut	10

[1)] Tighten the bolts diagonally and in multiple stages.

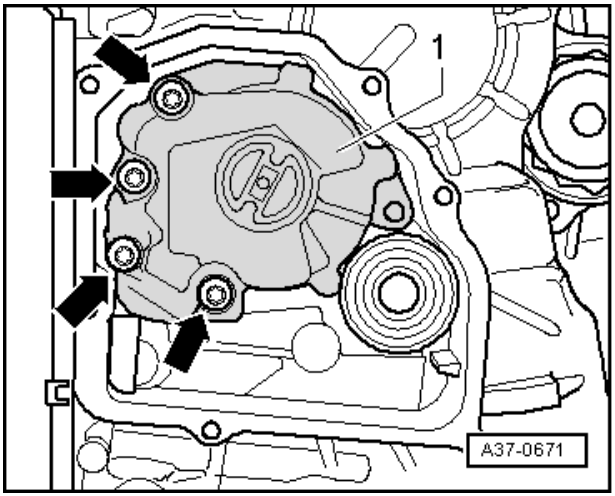
Mechatronic Tightening Specifications



Step	Component	Nm
1	Tighten bolts 1 through 10 in sequence [1)]	Hand-tighten
2	Tighten bolts 1 through 10 in sequence	5
3	Tighten bolts 1 through 10 in sequence	an additional 90° (¼ turn)

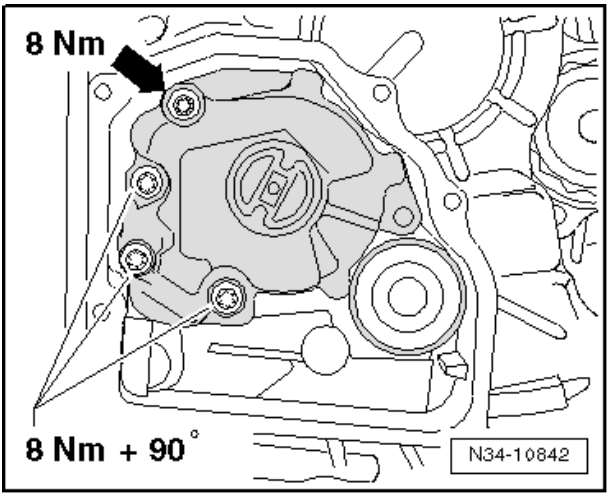
[1)] Replace fastener(s).

Oil Pump Tightening Specification
Without Countersunk Bolt



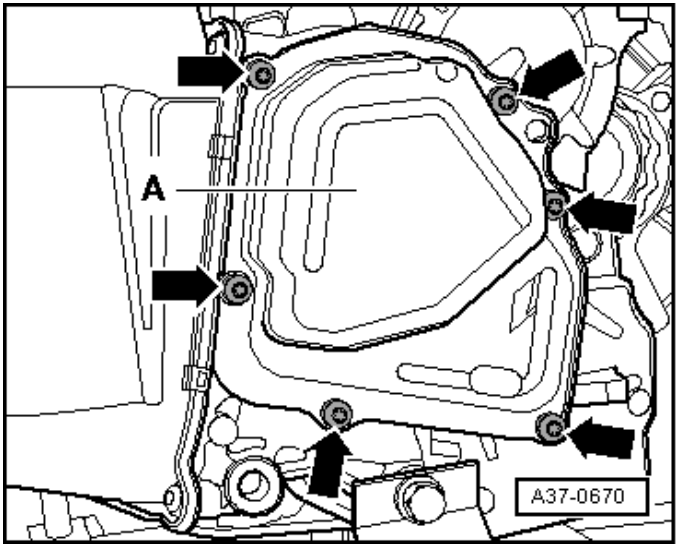
Component	Nm
Oil pump bolts (➡) with flat heads	5 plus an additional 90° (¼ turn)

With Countersunk Bolt



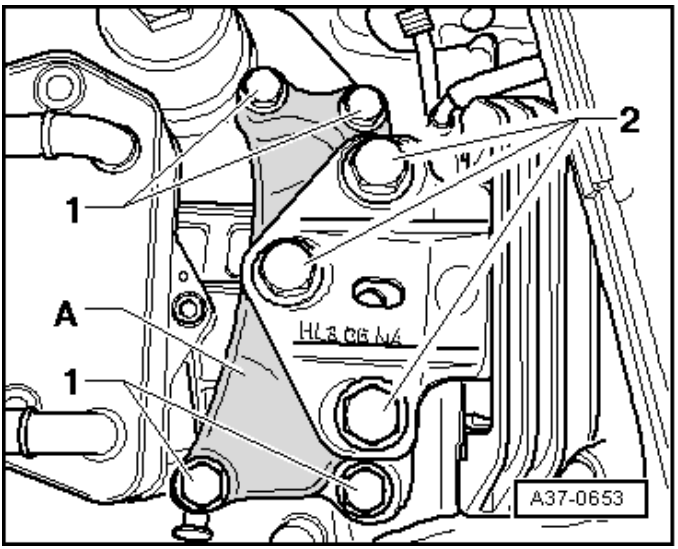
Component	Nm
Oil pump countersunk bolt	8
3 remaining oil pump bolts	8 plus an additional 90° (¼ turn)

Oil Pump Cover Tightening Specification



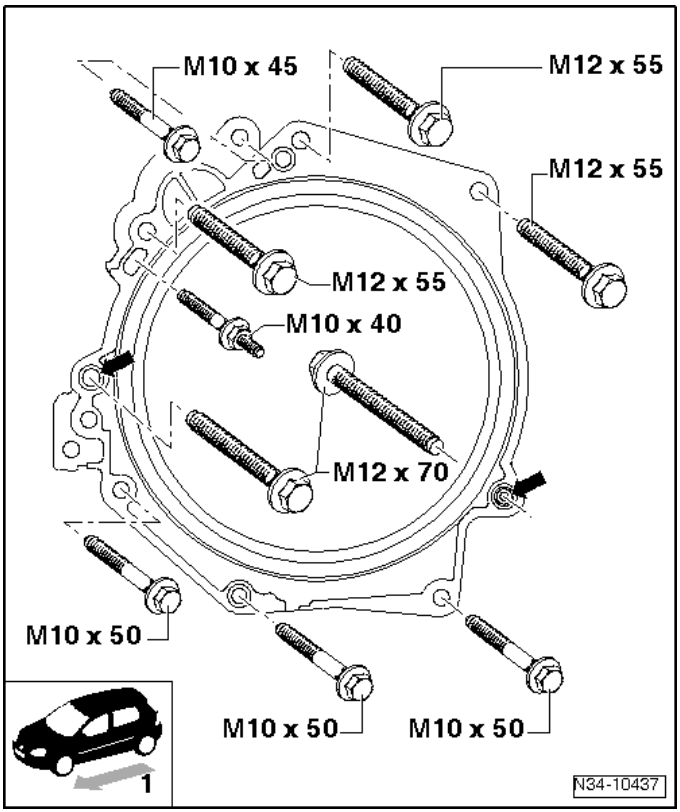
Component	Nm
Tighten bolts (➡) in several steps in a diagonal sequence [1)]	8

Transmission Mount Tightening Specifications



Fastener	Component	Nm
1 and 2	Install all new bolts and tighten	Hand-tighten
1	Transmission mount-to-body	40 plus an additional 90° (¼ turn)
2	Transmission mount-to-transmission support	60 plus an additional 90° (¼ turn)

Transmission to Engine Tightening Specifications



Component	Fastener size	Nm
Bolts	M12	80 or 65 if using T10179
Bolts	M10	40
Alignment pins for centering (➡)		

SUSPENSION, WHEELS, STEERING

Front Suspension

Fastener Tightening Specifications

Component	Fastener size	Nm
ABS wheel speed sensor-to-wheel bearing housing bolt	-	8
Ball joint-to-control arm nut [1]		
- Cast steel control arm	-	60
- Sheet steel and aluminum control arms	-	100
Ball joint-to-wheel bearing housing nut [1]	M12 x 1.5 x 60	60
Control arm-to-console bolt [1] [3]	M12 x 1.5 x 110	70 plus an additional 180° (½ turn)
Console-to-body bolt [1]	M12 x 1.5 x 90	70 plus an additional 90° (¼ turn)
Coupling rod-to-stabilizer bar nut [1]	-	65
Coupling rod-to-strut nut [1]	-	65
Cover plate-to-wheel bearing housing bolt	-	12
Constant Velocity (CV) joint boot clamp	-	25
Drive axle-to-flange shaft bolt [4] [6]	M8	40
	M10	70
Drive axle heat shield bolt	-	25
Drive axle-to-wheel hub bolt [1] [2]		
- Hex head bolt	-	200 plus an additional 180° (½ turn)
- Twelve-point bolt with ribs	-	70 plus an additional 90° (¼ turn)
- Twelve-point bolt without ribs	-	200 plus an additional 180° (½ turn)
Level control system sensor-to-bracket bolt	M6 x 16	9
Level control system sensor-to-control arm nut [1]	-	9
Mounting bracket-to-body bolt [1]	M12 x 1.5 x 90	70 plus an additional 90° (¼ turn)

Fastener Tightening Specifications *(cont'd)*

Component	Fastener size	Nm
Mounting bracket-to-console bolt [1]	-	50 plus an additional 90° (¼ turn)
Pendulum support bracket-to-transmission bolt [1]		
- Strength class 8.8	-	40 plus an additional 90° (¼ turn)
- Strength class 10.9	-	50 plus an additional 90° (¼ turn)
Pendulum support-to-subframe bolt [1] [5]	M14 x 1.5 x 70	100 plus an additional 90° (¼ turn)
Steering gear-to-subframe bolt [1]	-	50 plus an additional 90° (¼ turn)
Strut-to-strut bearing nut [1]	M14 x 1.5	60
Strut-to-strut dome bolt [1]	-	15 plus an additional 90° (¼ turn)
Strut-to-wheel bearing housing pinch bolt nut [1]	M12 x 1.5 x 80	70 plus an additional 90° (¼ turn)
Subframe-to-body bolt [1]	-	70 plus an additional 90° (¼ turn)
Subframe shield bolt	-	6
Subframe-to-stabilizer bar clamp bolt [1]	-	20 plus an additional 90° (¼ turn)
Tie rod end-to-wheel bearing housing nut [1]	M12 x 1.5	20 plus an additional 90° (¼ turn)
Universal joint-to-steering gear bolt [1]	-	30
Wheel hub with bearing-to-wheel bearing housing bolt [1]	M12 x 1.5 x 45	70 plus an additional 90° (¼ turn)

[1] Replace fastener(s).
[2] Vehicle must not sit on the ground when tightening.
[3] Tighten in curb weight position.
[4] Replace fastener(s) and backing plates if equipped.
[5] Only tighten if the pendulum support is bolted to the transmission.
[6] Pre-tighten to 10 Nm in a diagonal sequence, then tighten in a diagonal sequence.

Rear Suspension

Fastener Tightening Specifications

Component	Fastener size	Nm
ABS wheel speed sensor-to-wheel bearing housing bolt	-	8
Brake disc-to-wheel hub bolt	-	4
Coupling rod-to-stabilizer bar nut [1]	-	45
Coupling rod-to-wheel bearing housing nut [1]	-	45
Cover plate -to-wheel bearing housing bolt	-	12
Level control system sensor bolt	-	5
Level control system sensor-to-subframe bolt	-	5
Lower transverse link-to-subframe nut [1] [2]	M12 x 1.5	95
Lower transverse link-to-wheel bearing housing nut [1] [2]	M12 x 1.5	90 plus an additional 90° (¼ turn)
Shock absorber-to-body bolt [1]	-	50 plus an additional 90° (¼ turn)
Shock absorber mount-to-shock absorber nut [1]	M10 x 1.0	25
Shock absorber-to-wheel bearing housing bolt	M14 x 1.5 x 70	180
Stabilizer bar clamp-to-subframe bolt [1], [2]	-	25 plus an additional 90° (¼ turn)
Stone protection plate-to-lower transverse link bolt	-	8
Subframe-to-body bolt [1]	M12 x 1.5 x 90	90 plus an additional 90° (¼ turn)
Tension strut-to-body bolt	-	40 plus an additional 90° (¼ turn)
Tension strut-to-subframe bolt [3]	M12 x 1.5 x 25	90 plus an additional 45° (⅛ turn)
Tie rod-to-subframe nut [1] [2]	M12 x 1.5 x 90	90 plus an additional 90° (¼ turn)
Tie rod-to-wheel bearing housing nut [1] [2]	M14 x 1.5	130 plus an additional 90° (¼ turn)

Fastener Tightening Specifications *(cont'd)*

Component	Fastener size	Nm
Trailing arm-to-mounting bracket bolt [1]	M12 x 1.5 x 80	90 plus an additional 90° (¼ turn)
Trailing arm-to-wheel bearing housing bolt [1]	-	90 plus an additional 90° (¼ turn)
Trailing arm mounting bracket-to-body bolt [1]	-	50 plus an additional 90° (¼ turn)
Upper transverse link-to-subframe nut [1] [2]	M12 x 1.5	95
Upper transverse link-to-wheel bearing housing nut [1] [2]	M14 x 1.5	130 plus an additional 90° (¼ turn)
Wheel hub with bearing-to-wheel bearing housing bolt [1]	M16 x 1.5 x 70	200 plus an additional 180° (½ turn)

[1] Replace fastener(s).
[2] Always tighten the threaded connection in curb weight position.
[3] When tightening, the vehicle must be resting on the ground.

Self-Leveling Suspension

Fastener Tightening Specifications

Component	Fastener size	Nm
Ball joint-to-control arm [1]		
- Steel control arm	-	60
- Sheet steel and aluminum control arms	-	100
Coupling rod-to-strut nut [1]	-	65
Front body acceleration sensor-to-bracket bolt/nut [1]	-	5
Front level control system sensor-to-control arm nut [1]	-	9
Front level control system sensor-to-subframe bolt	M6 x 16	9
Front shock absorber-to-strut bearing nut [1]	M14 x 1.5	60
Front strut-to-body bolt [1]	M8 x 26	15 plus an additional 90° (¼ turn)
Front strut-to-wheel bearing housing nut [1]	-	70 plus an additional 90° (¼ turn)
Rear body acceleration sensor-to-bracket bolt [1]	-	5
Rear level control system sensor-to-lower transverse link bolt	M5 x 20	5
Rear level control system sensor-to-subframe bolt	M5 x 20	5
Rear shock absorber-to-body bolt [1]	M10 x 35	50 plus an additional 90° (¼ turn)
Rear shock absorber mount-to-shock absorber nut	M10 x 1.0	25
Rear shock absorber-to-wheel bearing housing bolt	M14 x 1.5 x 85	180

[1] Replace fastener(s).

Wheels, Tires, Wheel Alignment

Fastener Tightening Specifications

Component	Nm
Front console-to-body bolt [1]	70 plus an additional 90° (¼ turn)
Front subframe-to-body bolt [1]	70 plus an additional 90° (¼ turn)
Front tie rod end-to-tie rod nut	70
Metal valve-to-alloy wheel nut	4
Rear lower transverse link-to-subframe nut [1] [2]	95
Rear upper transverse link-to-subframe nut [1] [2]	95
Tire pressure sensor union nut	8
Wheel bolts-to-wheel hub	120

[1] Replace fastener(s).
[2] Always tighten the threaded connection in curb weight position.

Wheel Alignment Data

Wheel Alignment Specified Values

Front Suspension	Sport suspension except 18" wheels	Sport suspension with 18" wheels
Production Relevant No. (PR. No.)	2UC	G07, 2UC
Total toe (wheels not pressed)	10' ± 10′	10' ± 10′
Camber (wheels in straight ahead position)	-41′ ± 30′	-41′ ± 30′
Maximum permissible difference between both sides	30'	30'
Toe-out angle with steering wheel turned 20° to left and right [1)]	1°40′ ± 20′	1°40′ ± 20′
Caster	7° 47′ ± 30′	7° 47′ ± 30′
Maximum permissible difference between both sides	30'	30'
Standing height	368 ± 10 mm	368 ± 10 mm

1) Depending on the manufacturer, the toe out angle difference can also be indicated negatively in the alignment computer.

Front Suspension	Basic suspension with adaptive chassis DCC	Basic suspension with adaptive chassis DCC and 18" wheels
Production Relevant No. (PR. No.)	G01	G01
Total toe (wheels not pressed)	10' ± 10′	10' ± 10′
Camber (wheels in straight ahead position)	-37′ ± 30′	-37′ ± 30′
Maximum permissible difference between both sides	30'	30'
Toe-out angle with steering wheel turned 20° to left and right [1)]	1°27′ ± 20′	1°27′ ± 20′
Caster	7° 40′ ± 30′	7° 40′ ± 30′
Maximum permissible difference between both sides	30'	30'
Standing height	373 ± 10 mm	373 ± 10 mm

1) Depending on the manufacturer, the toe out angle difference can also be indicated negatively in the alignment computer.

Wheel Alignment Specified Values *(cont'd)*

Front Suspension	Basic suspension US Version	Basic suspension with 18" wheels US Version
Production Relevant No. (PR. No.)	2UA	2UA
Total toe (wheels not pressed)	10' ± 10′	10' ± 10′
Camber (wheels in straight ahead position)	-36′ ± 30′	-36′ ± 30′
Maximum permissible difference between both sides	30'	30'
Toe-out angle with steering wheel turned 20° to left and right [1)]	1°38′ ± 20′	1°38′ ± 20′
Caster	7° 34′ ± 30′	7° 34′ ± 30′
Maximum permissible difference between both sides	30'	30'
Standing height	383 ± 10 mm	383 ± 10 mm

1) Depending on the manufacturer, the toe out angle difference can also be indicated negatively in the alignment computer.

Rear Suspension	Sport suspension except 18" wheels	Sport suspension with 18" wheels
Camber	-1° 20′ ± 30′	-1°45' ± 30'
Maximum permissible difference between both sides	30'	30'
Total toe (at prescribed camber)	+10′ ± 10′	+10′ ± 10′
Maximum permissible deviation from direction of rotation	20'	20'
Standing height	364 ± 10 mm	364 ± 10 mm

Rear Suspension	Basic suspension with adaptive chassis DCC	Basic suspension with adaptive chassis DCC and 18" wheels
Camber	-1°20' ± 30'	-1°45' ± 30'
Maximum permissible difference between both sides	30'	30'
Total toe (at prescribed camber)	+10′ ± 10′	+10′ ± 10′
Maximum permissible deviation from direction of rotation	20'	20'
Standing height	369 ± 10 mm	369 ±10 mm

Wheel Alignment Specified Values *(cont'd)*

Rear Suspension	Basic suspension US version	Basic suspension with 18" wheels US version
Camber	-1° 20′ ± 30′	-1°45' ± 30'
Maximum permissible difference between both sides	30'	30'
Total toe (at prescribed camber)	+10′ ± 10′	+10′ ± 10′
Maximum permissible deviation from direction of rotation	20'	20'
Standing height	379 ± 10 mm	379 ± 10 mm

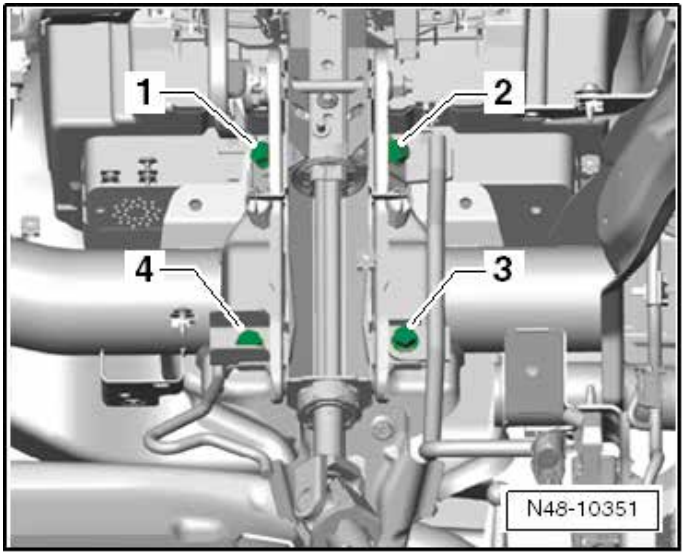
Steering

Fastener Tightening Specifications

Component	Fastener size	Nm
Ball joint-to-control arm nut 1)		
- Cast steel control arm	-	60
- Sheet steel and aluminum control arms	-	100
Shield-to-steering gear bolt	-	6
Stabilizer bar-to-subframe bolt 1)	-	20 plus an additional 90° (¼ turn)
Stabilizer bar-to-coupling rod nut 1)	-	65
Steering column-to-mounting bracket bolt	-	20
Steering column-to-steering gear bolt 1)	-	30
Steering gear-to-subframe bolt 1)	-	50 plus an additional 90° (¼ turn)
Steering wheel-to-steering column bolt 1)	-	30 plus an additional 90° (¼ turn)
Subframe-to-body bolt 1)	-	70 plus an additional 90° (¼ turn)
Tie rod-to-steering gear	-	100
Tie rod end-to-tie rod nut	-	50
Tie rod end-to-wheel bearing housing nut 1)	M12 x 1.5	20 plus an additional 90° (¼ turn)
Universal joint-to-steering gear 1)	-	30

1) Replace fastener(s).

Steering Column Tightening Specification

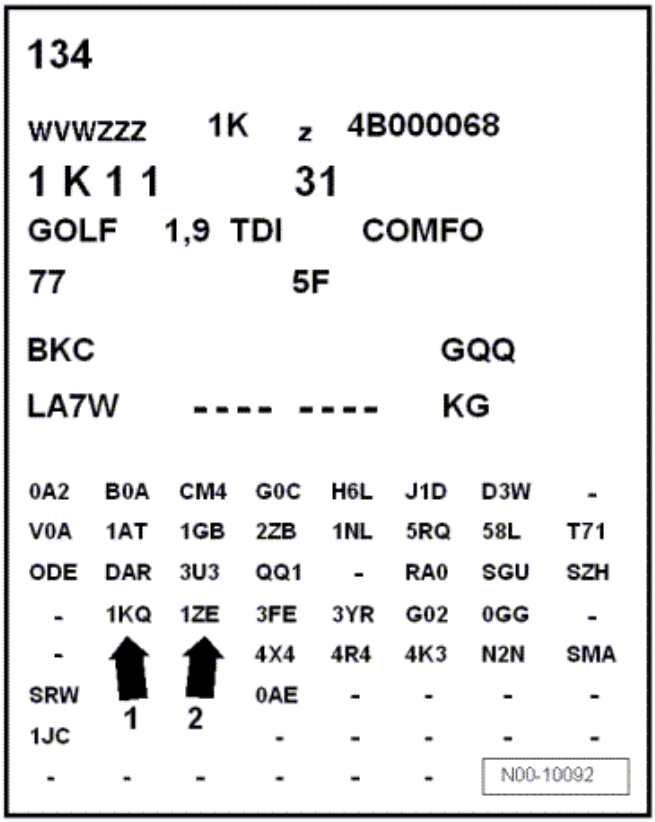


Step	Component	Nm
1	Tighten bolts 1 through 4 in sequence	20

BRAKE SYSTEM

General, Technical Data

Vehicle Data Sticker PR Number Allocation



The Production Relevant No. (PR. No.) on the vehicle data label describes which brake system is installed in the vehicle.

Example:
(1) Rear brakes - 1KQ
(2) Front brakes - 1ZE

The vehicle data label can be found in the spare wheel well and the maintenance booklet.

Allocation, refer to the Electronic Parts Catalog (ETKA).

The following tables show the PR number code key. This is important in order to know the brake caliper/ brake disc and brake pad combination.

Front Brakes

Engine version	PR number	Front wheel brake
2.0L - 147 kW FSI	1ZD	FN3 (16”)

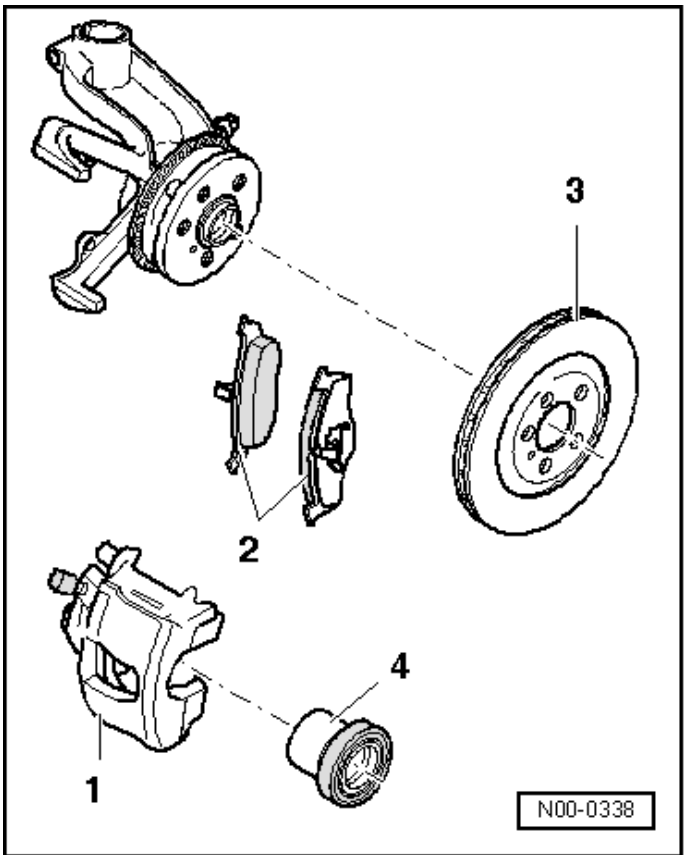
Rear Brakes

Engine version	PR number	Rear wheel brake
2.0L - 147 kW FSI	1KJ	CII 41 (16”)

Brake Master Cylinder and Brake Booster

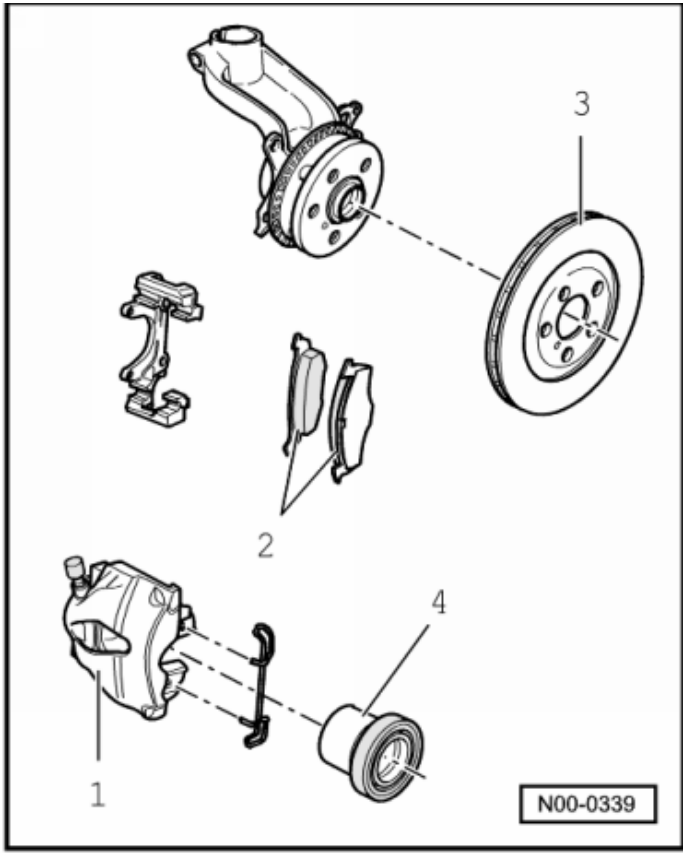
Component	Diameter (mm)
Brake master cylinder	22
Brake booster (left hand drive)	10

Front Brakes, FS III



Item	PR Number		1ZE/1ZP
1	Brake caliper		FS III (15”)
2	Brake pad thickness	mm	14
	Brake pad wear limit without back plate	mm	2
3	Brake rotor	Dia. in mm	280
	Brake disc thickness	mm	22
	Brake disc wear limit	mm	19
4	Brake caliper, piston	Dia. in mm	54

Front Brakes, FN 3

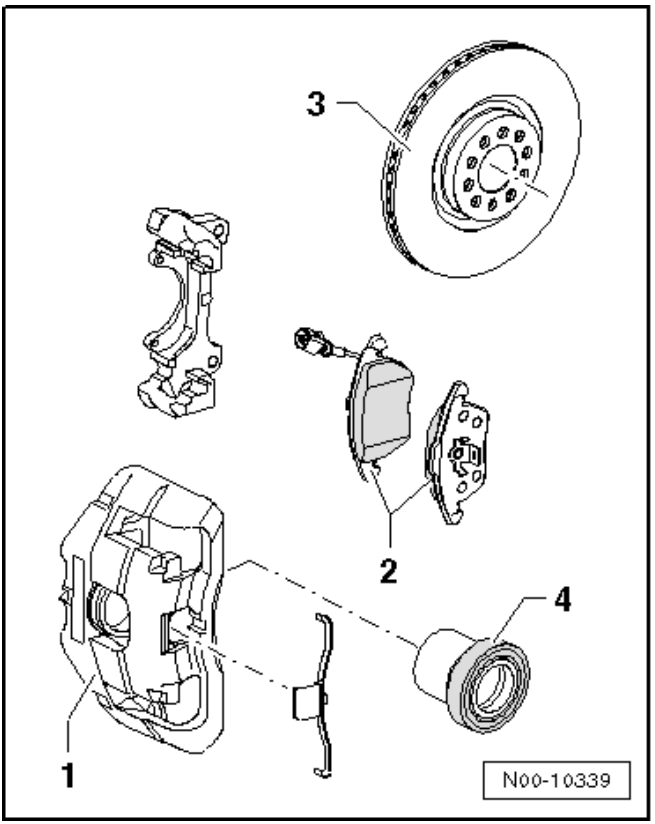


Item	PR Number		1ZE/1ZP
1	Brake caliper		FN 3 (15”)
2	Brake pad thickness	mm	14
	Brake pad wear limit without back plate	mm	2
3	Brake rotor	Dia. in mm	288
	Brake disc thickness	mm	25
	Brake disc wear limit	mm	22
4	Brake caliper, piston	Dia. in mm	54

Front Brakes, FN 3 *(cont'd)*

Item	PR number		1LJ/1LL/ 1ZD/1LV
1	Brake caliper		FN 3 (16")
2	Brake pad thickness	mm	14
	Brake pad wear limit without back plate	mm	2
3	Brake rotor	Dia. in mm	312
	Brake disc thickness	mm	25
	Brake disc wear limit	mm	22
4	Brake caliper, piston	Dia. in mm	54

Front Brakes FNR-G

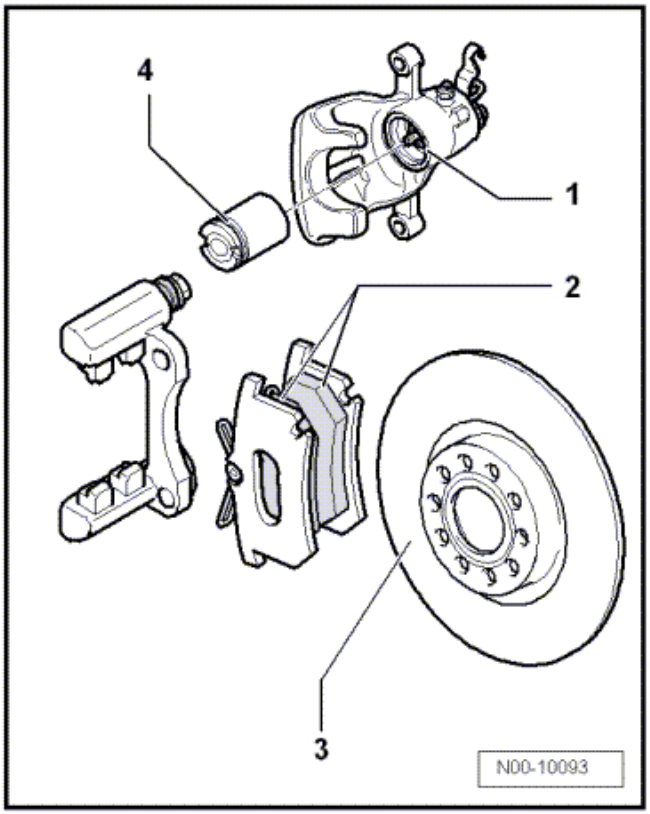


Item	PR Number		1LK/1LM
1	Brake caliper		FNR-G (17")
2	Brake pad thickness	mm	14
	Brake pad wear limit without back plate	mm	2

Front Brakes, FNR-G *(cont'd)*

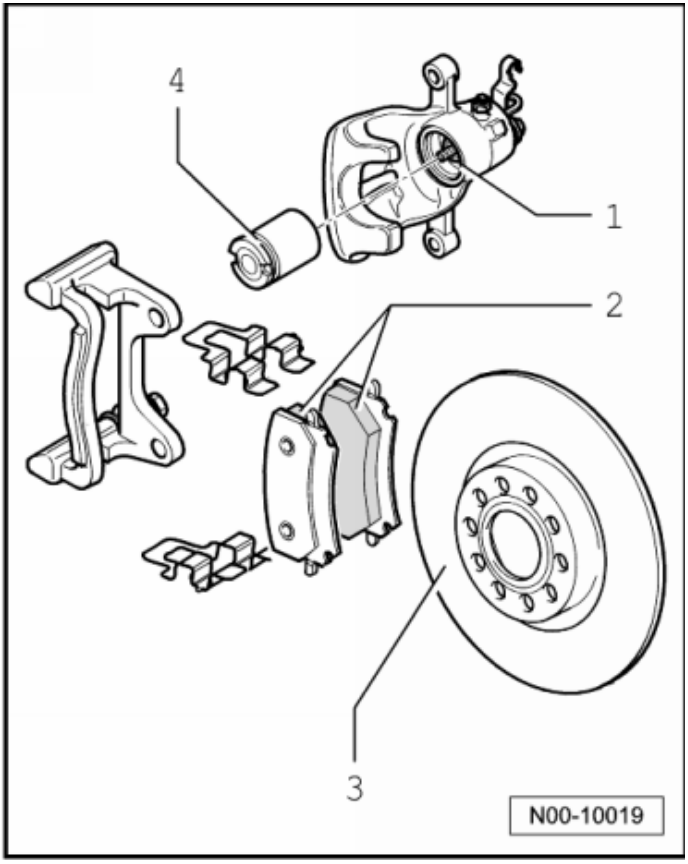
Item	PR Number		1LK/1LM
3	Brake rotor	Dia. in mm	345
	Brake disc thickness	mm	30
	Brake disc wear limit	mm	27
4	Brake caliper, piston	Dia. in mm	57

Rear Brakes CI 38



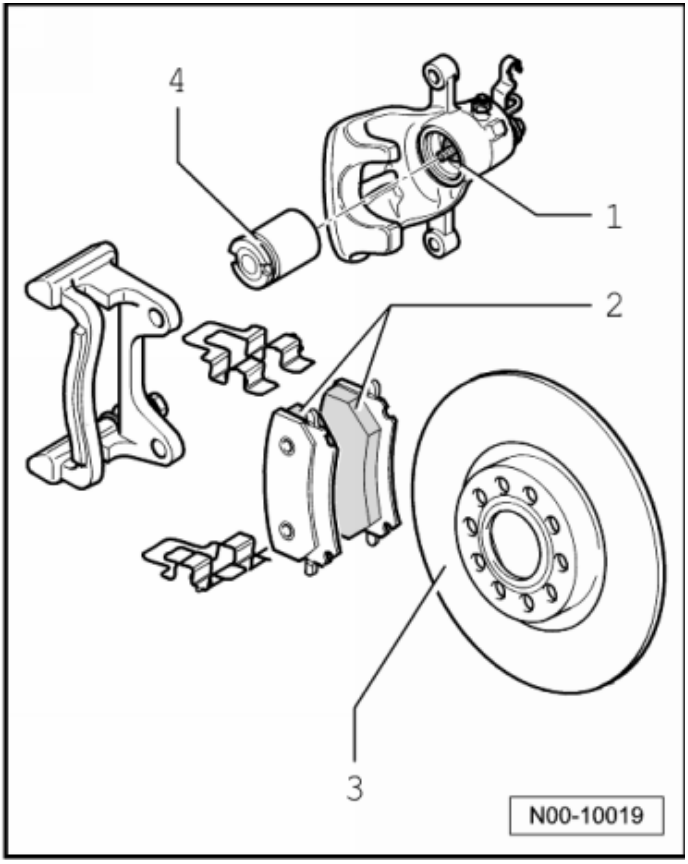
Item	PR number		1KQ/1KD
1	Brake caliper		CII 38 (15")
2	Brake pad thickness	mm	11
	Brake pad wear limit without back plate	mm	2
3	Brake rotor	Dia. in mm	255
	Brake disc thickness	mm	10
	Brake disc wear limit	mm	8
4	Brake caliper piston	Dia. in mm	38

Rear Brakes CII 38



Item	PR number		1KY/1KZ/1KV
1	Brake caliper		CII 38 (16”)
2	Brake pad thickness	mm	11
	Brake pad wear limit without back plate	mm	2
3	Brake rotor	Dia. in mm	286
	Brake disc thickness	mm	12
	Brake disc wear limit	mm	10
4	Brake caliper piston	Dia. in mm	38

Rear Brakes CII 41



Item	PR Number		1KJ
1	Brake caliper		CII 41 (16”)
2	Brake pad thickness	mm	11
	Brake pad wear limit without back plate	mm	2
3	Brake disc	Diameter in mm	282
	Brake disc thickness	mm	12
4	Brake caliper, piston	Diameter in mm	41

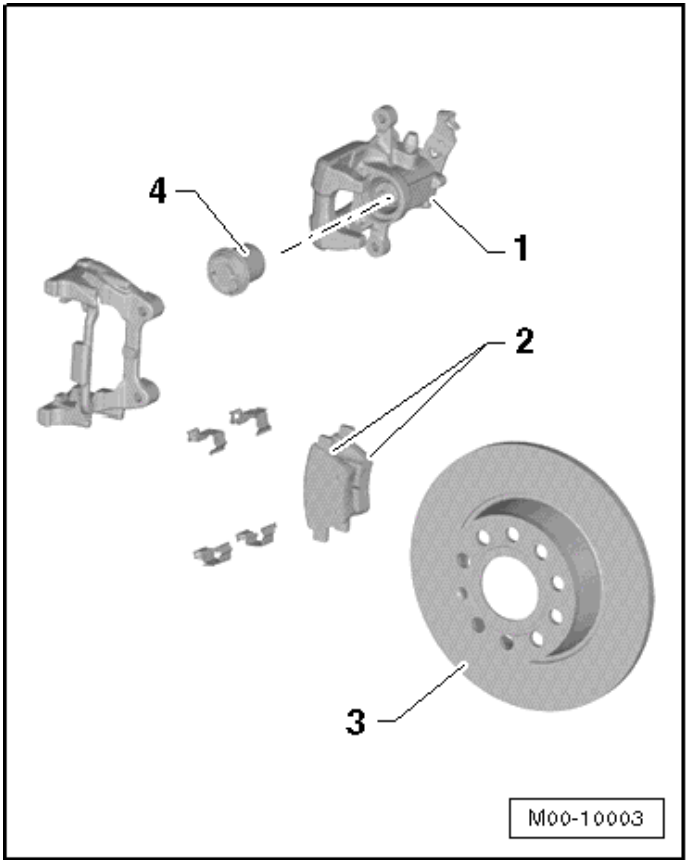
Rear Brakes CII 41 *(cont'd)*

Item	PR number		1KF/1KE
1	Brake caliper		CII 41 (15")
2	Brake pad thickness	mm	11
	Brake pad wear limit without back plate	mm	2
3	Brake rotor	Dia. in mm	260
	Brake disc thickness	mm	12
	Brake disc wear limit	mm	10
4	Brake caliper, piston	Dia. in mm	41

Item	PR Number		1KJ
1	Brake caliper		CII 41 (16")
2	Brake pad thickness	mm	11
	Brake pad wear limit without back plate	mm	2
3	Brake rotor	Dia. in mm	286
	Brake disc thickness	mm	12
	Brake disc wear limit	mm	10
4	Brake caliper, piston	Dia. in mm	41

Item	PR Number		2EL/2EA
1	Brake caliper		CII 41 (17")
2	Brake pad thickness	mm	11
	Brake pad wear limit without back plate	mm	2
3	Brake rotor	Dia. in mm	310
	Brake disc thickness	mm	22
	Brake disc wear limit	mm	20
4	Brake caliper, piston	Dia. in mm	41

Bosch ZOH 38, 16”



Item	PR number		1KS
1	Brake caliper		Bosch ZOH 38 (16”)
2	Brake pad thickness without back plate	mm	12
3	Brake rotor	Dia. in mm	272
	Brake disc thickness	mm	10
4	Brake caliper piston	Dia. in mm	38

Anti-lock Brake System (ABS)

Fastener Tightening Specifications

Component	Nm
ABS control module [1)]	5.5
ABS control module (ABS Mark 60) [1)]	2 + 0.8
ABS wheel speed sensor	8
ABS hydraulic unit bracket	8
Brake master cylinder nut [1)]	25
Heat shield [1)]	25
Heat shield (ABS Mark 60)	8
Heat shield (ABS Mark 60) bracket	20
ABS Mark 70 (ABS/ASR)	
Control module to ABS hydraulic unit [1)]	5.5
Hydraulic unit hex bolt to bracket	8
Brake lines at ABS aggregate:	
Thread M 10 x 1	14
Thread M 12 x 1	14
ABS Mark 60, ABS, EDL, ASR and ESP, from Calendar Week 22.2008	
Control module to ABS hydraulic unit [1)]	2 Nm + 0.8 Nm
TORX® bolt for the hydraulic unit to the retainer	8
Hex bolt, retainer to bracket	8
Brake lines at ABS aggregate:	
Thread M 10 x 1	14
Thread M 12 x 1	14

[1)] Replace fastener(s).

Mechanical Components

Fastener Tightening Specifications

Component	Fastener size	Nm
Front brakes, FS III caliper		
Brake hose with banjo fitting and union bolt	-	35
Brake rotor	-	4
Cover plate		
Hex bolt	M6 x 10	12
Torx® bolt	M6 x 12	12
Guide pins	-	30
Front brakes, FN 3 caliper, 15 inch		
ABS wheel speed sensor	-	8
Brake hose with banjo fitting and union bolt	-	35
Brake rotor	-	4

Fastener Tightening Specifications *(cont'd)*

Component	Fastener size	Nm
Guide pins	-	30
Wheel bearing housing	-	190
Front brakes, FN 3 caliper, 16 inch		
ABS wheel speed sensor	-	8
Brake hose with banjo fitting and union bolt	-	35
Brake rotor	-	4
Cover plate		
Hex bolt	M6 x 10	12
Torx® bolt	M6 x 12	12
Guide pins	-	30
Wheel bearing housing	-	190
Front brakes, FNR-G caliper		
Brake line	-	14
Brake rotor	-	4
Brake line bracket	-	15
Cover plate	-	12
Guide pins	-	30
Vibration damper	-	10
Bracket for brake hose	-	8
CII 38 rear brakes		
ABS wheel speed sensor	-	8
Brake caliper [1)]	-	35
Brake line	-	14
Brake rotor	-	4
Cover plate		
Hex head bolt	M6 x 10	9
Torx® bolt	M6 x 12	12
Wheel bearing housing [1)]	-	90 plus an additional 90° (¼ turn)
CII 38 rear brakes		
ABS wheel speed sensor	-	8
Brake caliper [1)]	-	35
Brake line	-	14
Brake rotor	-	4
Cover plate	-	12
Wheel bearing housing [1)]	-	90 plus an additional 90° (¼ turn)
CII 41 rear brakes		
ABS wheel speed sensor	-	8
Brake caliper[1]	-	35

Fastener Tightening Specifications *(cont'd)*

Component	Fastener size	Nm
Brake line	-	14
Brake rotor	-	4
Cover plate		
Hex bolt	M6 x 10	12
Torx® bolt	M6 x 12	12
Wheel bearing housing [1)]	-	90 plus an additional 90° (¼ turn)
Brake pedal nut	-	25
Mounting bracket nut	-	25
Parking brake lever nut	-	15

[1)] Replace fastener(s).

Front Brakes, FNR-G Caliper Tightening Specification for the Ribbed Bolts

Tighten the ribbed bolts in 2 steps.

Step 1	Tighten both ribbed bolts on the brake carrier to 15 Nm.
Step 2	Tighten both ribbed bolts on the brake carrier to 200 Nm.

Hydraulic Components

Fastener Tightening Specifications

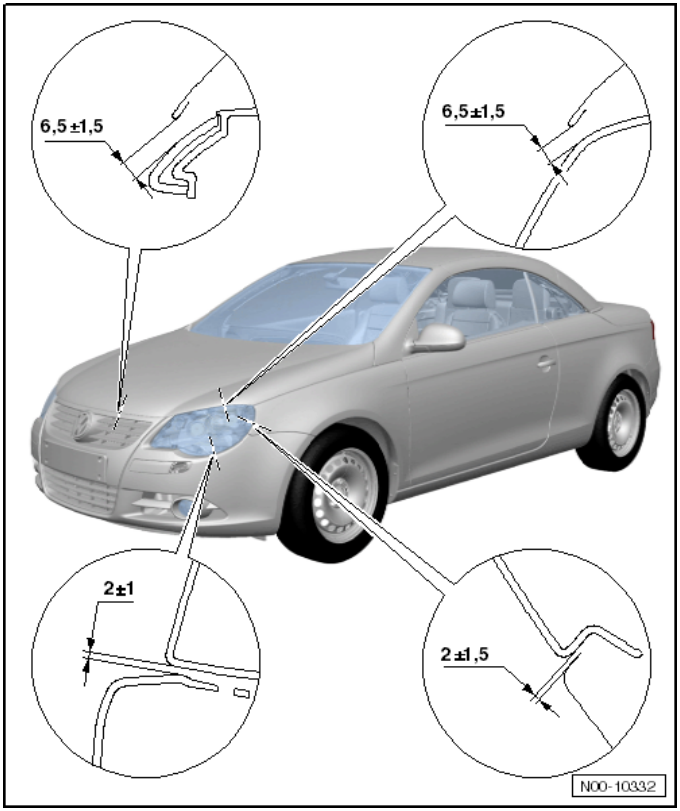
Component	Nm
Front brake caliper	
Bleeder valve	10
Bleeder valve (FNR-G brake caliper only)	12
Guide pins	30
Rear brake caliper	
Automatic transmission bracket	25
Bleeder valve	10
Brake caliper with parking brake cable lever[1)]	35
Brake lamp switch	5
Brake line	14
Brake system vacuum pump-to-bracket	8
Heat shield nut[1)]	25
Pedal assembly nut[1)]	25

[1)] Replace fastener(s).

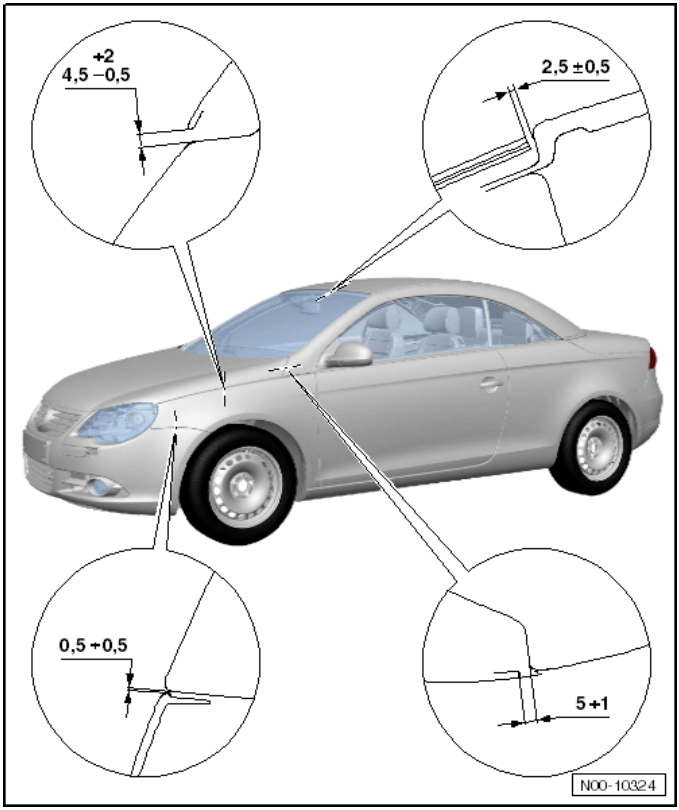
BODY

Air Gap Body Dimensions

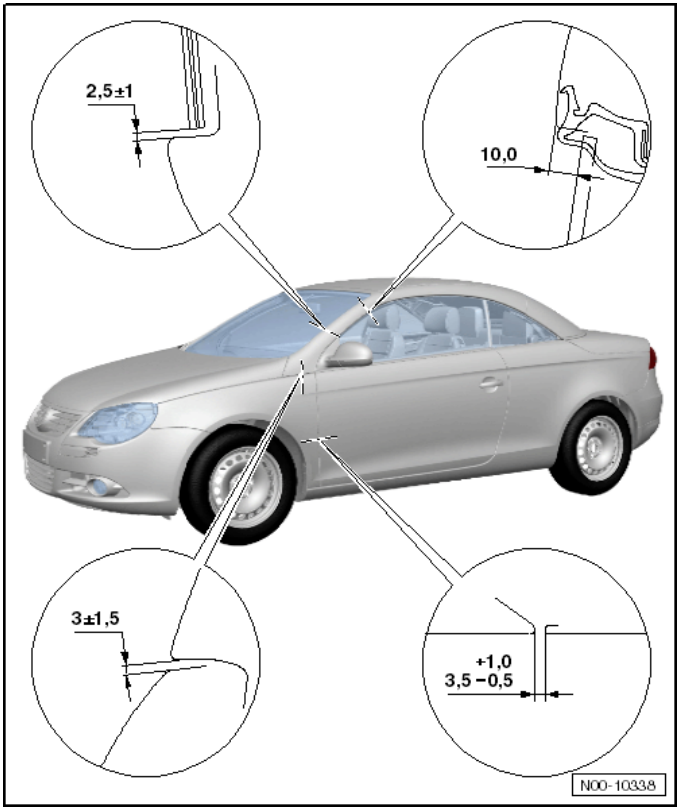
Body, Front



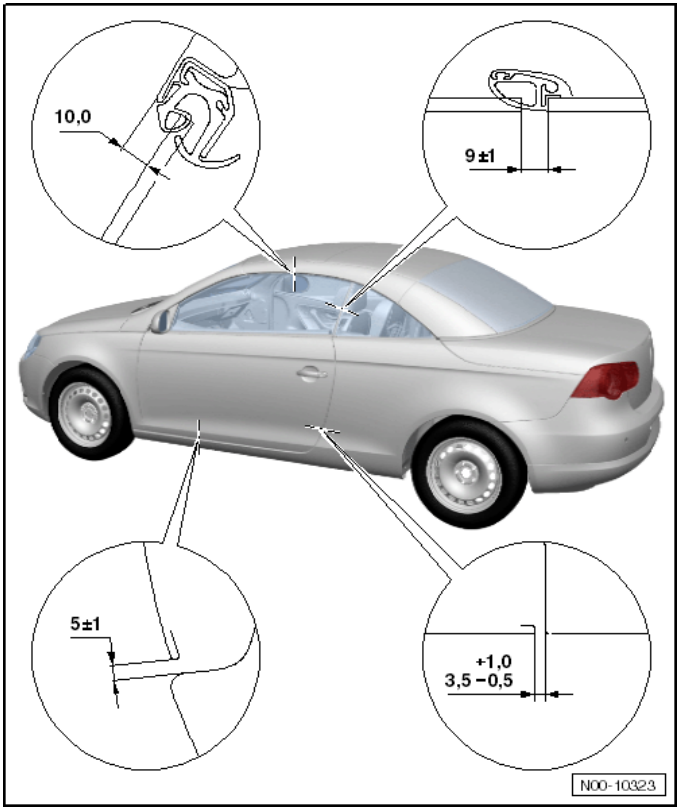
Body, Front (cont'd)



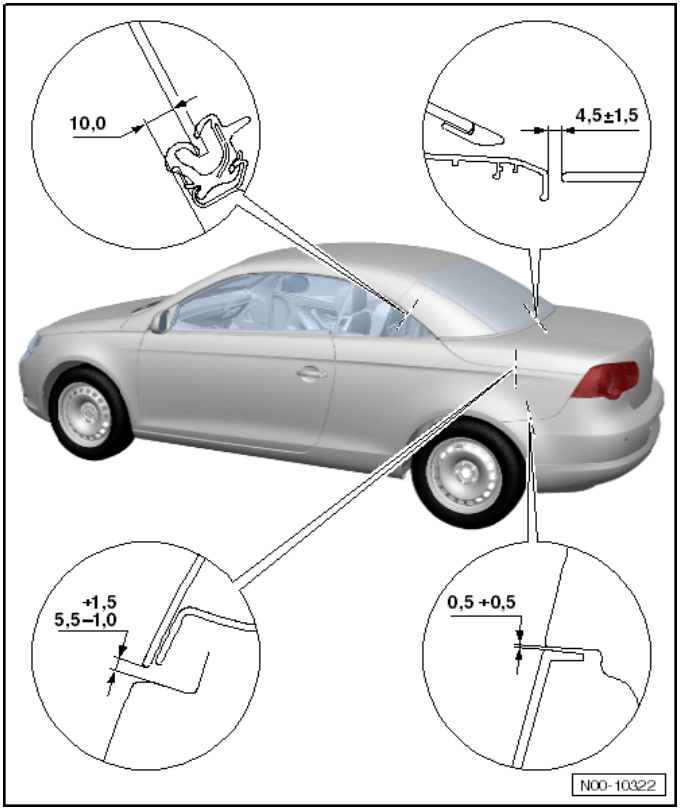
Body, Front (cont'd)



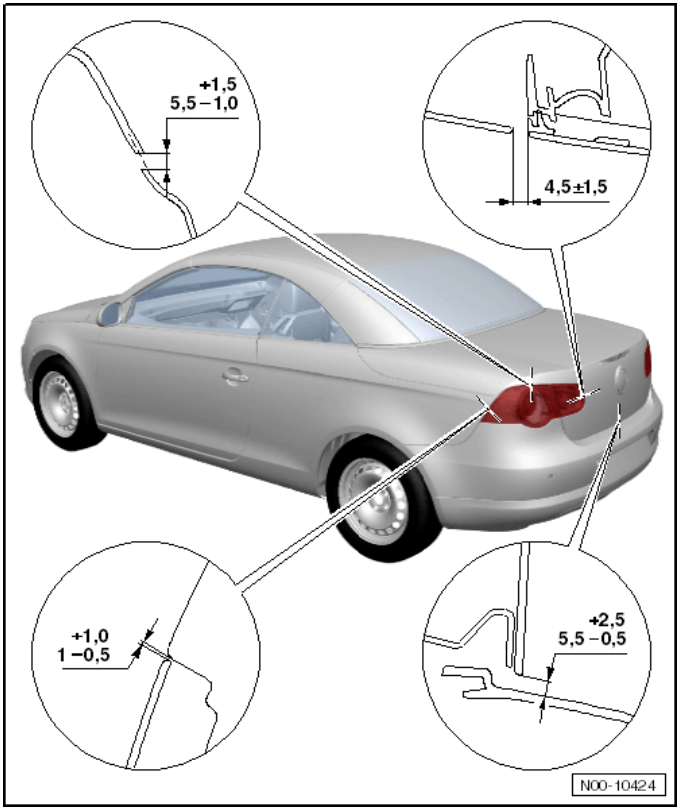
Body, Center



Body, Rear



Body, Rear (cont'd)



Body Exterior

Lock Carrier Tightening Specifications

Component	Nm
Lock carrier bolts [1]	2
	8
	60

[1] For bolt tightening clarification, refer to ElsaWeb, *Lock Carrier Service Position Assembly Overview*, items 2, 3 and 4.

Front Fender Tightening Specifications

Component	Nm
Front fender bolts	6
Front fender end plate nuts	2.5

Bulkhead and Plenum Chamber Bulkhead Tightening Specifications

Component	Nm
Bulkhead	25
Plenum chamber bulkhead nuts	8
Plenum chamber bulkhead bolts	8

Tension Strut and Tunnel Bridge Tightening Specifications

Component	Nm
Tension strut bolts [1]	90 plus an an additional 45° (⅛ turn)
	40 plus an an additional 45° (⅛ turn)
Front and rear tunnel bridge bolts	20

[1] For bolt tightening clarification, refer to ElsaWeb, *Tension Strut Assembly Overview*, items 3 and 4.

Front Hood Tightening Specifications

Component	Nm
Hood latch bolts	12
Hood catch bolts	10
Front hood hinge bolts	22
Hood release lever bolts	1.5

Rear Lid Tightening Specifications

Component	Nm
Lid lock	8
Rear lid hinge bolts and nuts	22
Rear lid striker pin bolts	23
Rear lid catch bolts	20
Release element bolts	4
Side striker pin	20
Striker pin with closing aid motor	23

Front and Rear Door Tightening Specifications

Component	Nm
Door hinge bolts	20 plus an additional 90° (¼ turn)
Door hex nuts	28
Door subframe bolts [1)]	4.5
	8
Door lock bolts	18
Door handle bracket bolts	4.5
Door catch bolts	20
Door window and regulator bolts	3.5
	4.5
	6
	8

[1)] For bolt tightening clarification, refer to ElsaWeb, *Door Window Assembly Overview,* items 4, 6, 9, 11 and 12.

Convertible Top Tightening Specifications

Component	Nm
Convertible top control module	3
Convertible top storage sensor -G56-, vehicles from VIN 8V036221	1
Convertible top storage sensor -G56 -, vehicles from VIN 8V036222	1
Front locking mechanism	
- Bolt	3
- Nut	9.5
Lock fitting	20
Main hinge bolts	20
Press cover bolts	4.5
Rear shelf bolts	22
Rear shelf lock sensors	3
Rear window frame bolts	9.5
Rear window frame lock sensors	3
Rear window frame opening sensor	3
Roof center section bolts	9.5
Roof pillar front position sensors	3
Roof pillar lock sensors	3
Roof pillar flap opening sensors	3
Slide rail bolts	4.5
Sunroof motor bolts	4.5
Upper retaining strip bolt	1.5
Wind deflector nut	3.5

Front Bumper Tightening Specifications

Component	Nm
Bumper cover bolts	2
Bumper carrier bolts [1)]	3.5
	8
	60

[1)] For bolt tightening clarification, refer to ElsaWeb, *Front Bumper Carrier Assembly Overview*, items 2, 3, 4, and 7.

Rear Bumper Tightening Specifications

Component	Nm
Rear bumper cover bolts [1)]	2
	8
Rear bumper guide bolts and nuts	2
Rear bumper carrier bolts	20
Trailer hitch	50 plus an additional 90° (¼ turn)

[1)] For bolt tightening clarification, refer to ElsaWeb, *Rear Bumper Cover Assembly Overview*, items 2, 3 and 4.

Side Window Tightening Specifications

Component	Nm
Side window assembly bolts and nuts [1)]	3.5
	6.5
	10
	13

[1)] For bolt tightening clarification, refer to ElsaWeb, *Side Window Assembly Overview*.

Wheel Housing Liner, Front Grille Tightening Specifications

Component	Nm
Wheel housing liner bolts	2
Radiator grille bolts	2

Exterior Mirror Tightening Specifications

Component	Nm
Mirror base bolts	10
Mirror trim bolts	1

Body Interior

Storage Compartments, Covers and Trim Tightening Specifications

Component	Nm
Driver side footwell cover	1.5
Glove compartment	1.5
Storage compartment/ashtray bolts	1.5
Trim screws and bolts	1.5
Roof grab handle bracket bolts	2
Center console bolts	1.5
Footwell trim bolts	1.5

Instrument Panel Tightening Specifications

Component	Nm
Instrument panel bolts [1)]	1.5
	3
	8
	10
Instrument panel assembly carrier bolts [2)]	4.5
	8
	9
	20

1) For bolt tightening clarification, refer to ElsaWeb, *Instrument Panel.*
2) For bolt tightening clarification, refer to ElsaWeb, *Assembly Carrier.*

Passenger Protection Fastener Tightening Specifications

Component	Nm
Airbag Control Module J234 nuts	9
Automatic belt retractor	40
Belt guide ring	40
Belt guide bracket bolts	20
	40
Driver and passenger side airbag bolts	9
Seat belt anchor nut	40
Seat belt latch bolt	40
Rear seat belt anchors nut	40
Rear seat belt latches nuts	40
Rollover Protection bolts	28.5
Rollover Protection Support Trim bolts	1.5

Seat Frames Tightening Specifications

Component	Nm
Backrest	6
Front seat bolts	40
Front seat support bracket bolts	3.5
Left Front Seat Backrest bolts	34.5
Mount from seat frame	2
Operating lever bolts	3.5
Pass-Through bolts	6
Seat Trim, Tunnel-Side bolt	3.5
Sill-Side Seat Trim bolt	2.5

HEATING, VENTILATION AND AIR CONDITIONING

General Information

Refrigerant Oil Distribution

Component	Approximate % of total amount of oil in component
A/C compressor	50
Condenser	10
Suction hose	10
Evaporator	20
Fluid reservoir	10

Refrigerant R134a Vapor Pressure Table

Temperature in °C	Pressure in bar (positive pressure) of R134a
-45	-0.61
-40	-0.49
-35	-0.34
-30	-0.16
-25	0.06
-20	0.32
-15	0.63
-10	1.00
-5	1.43
0	1.92
5	2.49
10	3.13
15	3.90
20	4.70
25	5.63
30	6.70
35	7.83
40	9.10
45	10.54
50	12.11
55	13.83
60	15.72
65	17.79
70	20.05
75	22.52
80	25.21
85	28.14
90	31.34

Heating, Ventilation

Fastener Tightening Specifications

Component	Nm
Cable bracket screw [1)]	4.5 ± 0.7
Cable bracket screw [2)]	4 ± 0.7
Fresh air blower	1
Heater core hose clamps	2
Heater core flange bolt	2
Heater and A/C housing bolts [3)]	9 ± 1.3
Intake air grille flange nuts	2.5 ± 0.4

1) For bolt clarification, refer to ElsaWeb, *Heater and A/C Unit,* item 1.
2) For bolt clarification, refer to ElsaWeb, *Heater and A/C Unit,* item 2.
3) For bolt clarification, refer to ElsaWeb, *Heater and A/C Unit* items 7, 10 and 12.

Air Conditioning

Fastener Tightening Specifications

Component	Fastener size	Nm
A/C compressor mounting bolts	M8 x 100	25 ± 2
A/C compressor auxiliary component bracket-to-engine		
2.0L FSI	M10 x 45	52
2.0L turbo FSI		40
Cable bracket screw [1)]		4.5 ± 0.7
Cable bracket screw [2)]		4 ± 0.7
Condenser-to-radiator		5
Expansion valve		5
Fluid reservoir with dryer cartridge		4.2 ± 0.7
Heater and A/C housing bolts[3]		9 ± 1.3
High pressure sensor		8 ± 1
Refrigerant lines-to-A/C compressor		22 ± 1
Refrigerant lines-to-condenser		12 ± 1.8
Refrigerant line bracket-to-condenser		5
Refrigerant lines-to-expansion valve		10 ± 1

1) For bolt clarification, refer to ElsaWeb, *Heating and A/C Unit,* item 1.
2) For bolt clarification, refer to ElsaWeb, *Heating and A/C Unit,* item 2.
3) For bolt clarification, refer to ElsaWeb, *Heating and A/C Unit*, items 7, 10 and 12.

ELECTRICAL SYSTEM

Electrical Equipment

Fastener Tightening Specifications

Component	Fastener size	Nm
Generator B+ lead	M8	15
Cap-to-generator (Bosch)	M5	4.5
Ribbed belt pulley with freewheel to generator	M10	80
Ribbed belt pulley without freewheel to generator	M10	65
Voltage regulator-to-generator (Bosch, Valeo)	M4	2
Wire retainer-to-generator	M8	23

Battery and Jump Start Point Tightening Specifications

Component	Fastener size	Nm
Additional terminal on battery terminal	M6	6
Air filter housing-to-body	-	10
Battery clamping plate	M8 x 35	20
Battery terminal-to-battery pole	M6	6
Outside starter point with suppressor-to-body	M6	9
Retaining bracket mounting bolt	M8 x 35	20
Terminal 30 wire junction wires	M8	15

Generator Tightening Specifications

Component	Fastener size	Nm
A/C compressor-to-accessories bracket	M8 x 100	23
Cap to generator		
- Bolts	M5 x 21	4.5
- Nuts	M8	15
Cylinder block accessories bracket	M10 x 45	40
Generator bolts	M8 x 110	20
Generator-to-accessories bracket	M8 x 90	23
Tensioner on the accessories bracket	M8 x 90	23

Main Fuse Box Tightening Specifications

Component	Fastener size	Nm
Main fuse box B+ wire nut	M8	15
Main fuse box-to-main fuse box bracket duo-bolt	-	9
Pyrotechnic battery isolator-to-main fuse box self-locking nut	M8	15
Securing clamp mounting nut	M6	9

Starter Tightening Specifications

Component	Fastener size	Nm
Air filter housing-to-body	-	10
Ground wire-to-starter mounting bolt	M8	15
Transmission ground wire	M8	15
Starter solenoid switch positive wire	M8	20
Starter-to-transmission	M12	75
Starter-to-transmission	M10	40
Wire retainer-to-starter mounting bolt	M8	15

Windshield Wiper/Washer Tightening Specifications

Component	Fastener size	Nm
Front wiper arm-to-wiper motor shaft	M8	20
Spray jets lift cylinder-to-front bumper cover	-	4.5
Motor crank-to-wiper motor shaft	M8	18
Windshield washer system and headlamp cleaning system filler tube	M6	2.5
Windshield washer system and headlamp cleaning system tank-to-longitudinal member	M6	8
Wiper frame-to-body	M6	8
Wiper motor-to-wiper frame	M6	8

Tail Lamps Tightening Specifications

Component	Nm
Diode circuit board cover-to-tail lamp	1.5
Flange nuts	3.0
Side marker lamp-to-tail lamp	1.0
Upper bolt (bracket-to-chassis)	2.0
Tail lamps in rear lid nuts	3.0

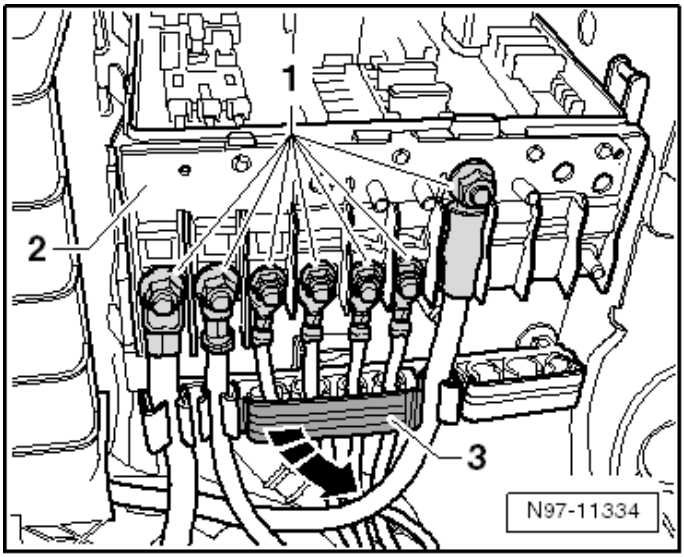
Exterior Lights, Switches Tightening Specifications

Component	Fastener size	Nm
Fog lamp bolts	-	9
Deformation Element	-	2
Upper Headlamp Mounting Bolt	-	3.5
Lower Headlamp Mounting Bolts	-	
HID Headlamp		
Bracket Bolts	-	8
Power Output Stage Screws	-	2
Control Module Mounting Bolts	-	2
Cornering Lamp and Headlamp Range Control Module Bolts	-	3
Fog Lamp Mounting Bolt	-	2
High-Mounted Brake Lamp	-	2.5
Parking Aid Control Module	-	1.5
Parking Aid Warning Buzzers	-	1
Parallel Parking Assistance Control Module	-	1.5
Rear Lid Tail Lamps Nut	-	3
Side Panel LED Tail Lamps Bolt	-	2
Side Panel LED Tail Lamps Nut	-	3
Steering Column Electronic Systems Control Module	-	1.5
Steering Lock Housing Shear Bolts	M8 x 20	Break-off torque: approximately 15 Nm

Wiring Tightening Specifications

Component	Nm
Comfort system central control module nuts	4.5
Deformation element	9
Fuse holder screws	4
Instrument Panel Fuse Panel	3
Towing recognition control module bracket-to-chassis bolts	9
Towing recognition control module-to-bracket bolts	2
Central E-box bolt	9

Left Engine Compartment E-Box Tightening Specifications



Component	Fastener size	Nm
Nuts (1)	M5 (8 mm)	4.5
Nuts (1)	M6 (10 mm)	6

DTC CHART

Fuel and Air Mixture, Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P000A	“A” Camshaft Position Slow Response (Bank 1)	• Difference between target position vs. actual position > 8.00°CRK • For time > 1.3 - 2.9 Sec. and • Adjustment angle >=2.50°CRK
P0010	“A” Camshaft Position Actuator Circuit/Open (Bank 1)	Signal voltage > 4.70 - 5.40 V
P0011	A Camshaft Position (Bank 1) Timing over-advanced or System Performance	• Difference between target position vs. actual position > 8.00°CRK • For time > 1.3 - 2.9 Sec. and • Adjustment angle >=2.50°CRK
P013A	O2 Sensor (Bank 1 Sensor 2) Slow Response - Rich to Lean	• EWMA filtered max differential transient time at fuel cut off >= 0.7 Sec. and • Number of checks (initial phase and step function) >=3.00
P0014	Out of Range High	Signal voltage > 4.75 V
P0016	Angular offset check	• Permissible deviation < -11° [°CRK] or • Permissible deviation > 11° [°CRK]
P0016	Out of Range Low	Signal voltage < 0.25 V
P0030	O2 Sensor Heater Control Circuit (Bank1 (1) Sensor 1)	Heater voltage 2.34 - 3.59 V
P0031	O2 Sensor Heater Control Circuit (Bank1 (1)Sensor 1) Low	Heater voltage < 2.34 V
P0032	O2 Sensor Heater Control Circuit (Bank1 (1) Sensor 1) High	Heater voltage > 3.59 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0036	HO2S Heater Control Circuit (Bank 1, Sensor 2) Open Circuit	SULEV heater voltage 4.50 - 5.50 V
P0037	HO2S Heater Control Circuit Low (Bank 1, Sensor 2) Short to Ground	Heater voltage < 3.00 V
P0038	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 2) High	Heater current 2.70 - 5.50 A
P0042	O2 Sensor Heater Control Circuit (Bank 1(1) Sensor 3)	Heater voltage 2.34 - 3.59 V
P0043	O2 Sensor Heater Control Circuit (Bank 1 (1) Sensor 3) Low	Heater voltage < 2.34 V
P0044	O2 Sensor Heater Control Circuit (Bank1 (1) Sensor 3) High	Heater voltage > 3.59 V
P0068	MAP/MAF – Throttle Position Correlation	• Plausibility with fuel system load calculation < -50% • Plausibility with fuel system load calculation > 50%
P0070	Ambient Air Temperature Sensor Circuit	Ambient air temperature < -50°C
P0071	Ambient Air Temperature Sensor Circuit Range/ Performance	• Difference in value between ECT vs IAT and at engine start (depending on engine off time) > |24.8| K and • Difference in value between IAT vs AAT at engine start (depending on engine off time) > |24.8| K and • Difference in value between AAT vs ECT at engine start (depending on engine off time) > |24.8| K
P0072	Ambient Air Temperature Sensor Circuit Low	Ambient air temperature > 87°C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0087	Fuel Rail/System Pressure - Too Low	• Pressure control activity > 5.00 mPa and • Fuel trim activity 0.90 - 1.15 and • Difference between target pressure vs. actual pressure > -16.38 mPa
P0100	Mass or Volume Air Flow A Circuit	MAF sensor signal 0 µs
P0101	Mass or Volume Air Flow A Circuit Range/Performance	• Mass air flow vs. lower threshold model < 0 - 417 kg/h • Mass air flow vs. upper threshold > 39 - 873 kg/h • Load calculation > 23% and • Fuel system (mult.) < -23% • Load calculation < -23% and • Fuel system (mult.) > 23%
P0102	Mass or Volume Air Flow A Circuit Low Input	MAF sensor signal < 66 µs
P0103	Mass or Volume Air Flow A Circuit High Input	MAF sensor signal > 4500 µs

DTC	Error Message	Malfunction Criteria and Threshold Value
P0106	Manifold Absolute Pressure or BARO Pressure Range/ Performance	• Difference manifold pressure to average value of all pressure sensors @ start < -6.5 kPa • Difference manifold pressure to average value of all pressure sensors @ start > 6.00 kPa • Manifold pressure signal: variation between state 1 and 2 < 1.00 kPa • Difference manifold pressure - lower threshold model < 0 kPa • Model range 0 - 1900 kPa • Difference manifold pressure - upper threshold model > 0 kPa • Model range 850 - 2500 kPa • Difference altitude sensor signal vs. manifold pressure signal at engine start > 9.00 kPa • Offset value manifold pressure for load calculation in driving condition range 2 > 8.00 kPa
P0107	Manifold Absolute Pressure or BARO Pressure Low Input	• Signal voltage < 0.20 V • Manifold pressure signal < 80 hPa
P0108	Manifold Absolute Pressure or BARO Pressure High Input	• Signal voltage > 4.80 V • Manifold pressure signal > 3000 hPa
P0111	Intake Air Temperature (Sensor 1 Bank 1) Circuit Range/Performance	• Difference in value between ECT vs IAT and at engine start (depending on engine off time) > |24.8| K and • Difference in value between IAT vs AAT at engine start (depending on engine off time) > |24.8| K and • Difference in value between AAT vs ECT at engine start (depending on engine off time) > |24.8| K

DTC	Error Message	Malfunction Criteria and Threshold Value
P0112	Intake Air Temperature (Sensor 1 Bank 1) Circuit Low	Intake air temperature > 141°C
P0113	Intake Air Temperature (Sensor 1 Bank 1) Circuit High	Intake air temperature < 46°C
P0116	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	Stuck high • No change on signal < 1.5 [K] and • Signal in range < 110 - 140 [°C] Stuck low • No change on signal < 1.5 [K] and • Signal in range (lower threshold) > 50 [°C] • Signal in range (upper threshold) < 88 [°C] Stuck in range • No change on signal < 1.5 [K and • Signal in range (lower threshold) > 89 [°C] • Signal in range (upper threshold) < 110 [°C] • Difference in value between ECT vs IAT and at engine start (depending on engine off time) > |24.8| K and • Difference in value between IAT vs AAT at engine start (depending on engine off time) > |24.8| K and • Difference in value between AAT vs ECT at engine start (depending on engine off time) > |24.8| K
P0117	Engine Coolant Temperature Sensor 1 Circuit Low	Engine coolant temperature > 140°C
P0118	Engine Coolant Temperature Sensor 1 Circuit High	Engine coolant temperature < -40°C

DTC	Error Message	Malfunction Criteria and Threshold Value
P0121	Throttle/Pedal Position Sensor A Circuit Range/Performance	• TPS 1 - TPS 2 > 6.30% and • Actual TPS 1 calculated value > actual TPS 2 calculated value or • TPS 1 calculated value > 9.00%
P0122	Throttle/Pedal Position Sensor A Circuit Low Input	Signal voltage < 0.20 V
P0123	Throttle/Pedal Position Sensor A Circuit High Input	Signal voltage > 4.81 V
P0130	O2 Sensor Circuit (Bank 1, Sensor 1) Malfunction	O2S ceramic temperature < 640°C
P0131	O2 Sensor Circuit (Bank 1, Sensor 1) Low Voltage	Nernst voltage (UN) < 1.30 V
		Adjustment voltage (IA) < .30 V
		Adjustment voltage (IP) < 0.30 V
P0132	O2 Sensor Circuit (Bank 1, Sensor 1) High Voltage	Nernst voltage (UN) > 4.40 V
		Adjustment voltage (IA) > 7 V
		Adjustment voltage (IP) > 7 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0133	O2 Circuit (Bank 1, Sensor 1) Slow Response	Symmetric fault: • Difference of R2L area ratio vs. L2R area ratio -0.35 - 0.35 • Max value of both counters for area ratio R2L and L2R >= 5 times Delay time: • Gradient ratio >= 0.00 • Lower value of both area ratios R2L and L2R < 0.20 Transient Time: • Gradient ratio >= 0.00 • Lower value of both area ratios R2L and L2R < 0.20 or Asymmetric fault: • Difference of R2L area ratio vs. L2R area ratio Not (-0.35 - 0.35 • Values of both counters for area ratio R2L and L2R >= 5 times Delay Time: • Gradient ratio >= 0.00 • Lower value of both area ratios R2L and L2R < 0.37 Transient Time: • Gradient ratio >= 0.00 • Lower value of both area ratios R2L and L2R < 0.37 or • Lower value of both gradient ratios R2L and L2R < 0.00
P0135	O2 Sensor Heater Circuit, (Bank 1-Sensor 1) Malfunction	• O2S ceramic temperature < 715°C and • Heater duty cycle > 90% • O2S ceramic temperature < 715°C and • Time after O2S heater on 40 Sec.
P0137	O2 Sensor Circuit, (Bank 1-Sensor 2) Low Voltage)	• Heater voltage < 3.00 V
P0138	O2 Sensor Circuit, (Bank 1-Sensor 2) High Voltage	• Heater current 2.70 - 5.50 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0140	O2 Sensor Circuit, (Bank 1-Sensor 2) No Activity Detected	• Signal voltage .40 - .50 V for time > 3 Sec and • Difference in sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) ≥ 2.80 V • Internal resistance > 40000 [Ohm] and • Exhaust temperature 600 [°C]
P0141	O2 Sensor Heater Circuit, (Bank 1-Sensor 2) Malfunction	Heater resistance > 702 - 5250 Ω
P0143	O2 Sensor Circuit, Bank 1-Sensor 3 Low Voltage	• Signal voltage < 0.06 V for time > 3 Sec and • Difference in sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) < 0.01 V
P0144	O2 Sensor Circuit, (Bank 1-Sensor 3) High Voltage	• Signal voltage < 1.26 V for time > 5 Sec
P0145	O2 Sensor Circuit, (Bank 1-Sensor 3) Slow Response	• EWMA filtered max differential transient time at fuel cut off >=0.7 Sec and • Number of checks >=3.00
P0146	O2 Sensor Circuit, (Bank 1-Sensor 3) No Activity Detected	• Signal voltage 0.40 - 0.50 V for time > 3 Sec and • Difference in sensor voltage with load pulse and voltage without load pulse (mean value of 3 measurements) >=2.80 V • Internal resistance > 40000 [Ohm] and • Exhaust temperature 600 [°C]
P0147	O2 Sensor Heater Circuit, (Bank 1-Sensor 3)	Heater resistance > 792 - 4560 Ω
P0169	Incorrect Fuel Composition	• Comparison with fuel quantity incorrect • Internal check failed

DTC	Error Message	Malfunction Criteria and Threshold Value
P0190	Fuel Rail Pressure Sensor “A” Circuit	Signal voltage > 4.9 V
P0191	Fuel Rail Pressure Sensor “A” Circuit Range/Performance	Actual pressure > 21.30 MPa
P0192	Fuel Rail Pressure Sensor A Circuit Low Input	Signal voltage < 0.2 V
P0201	Cylinder 1- Injector Circuit	• Open circuit signal current < 2.1 A • Internal logic failure
P0202	Cylinder 2- Injector Circuit	• Open circuit signal current < 2.1 A • Internal logic failure
P0203	Cylinder 3- Injector Circuit	• Open circuit signal current < 2.1 A • Internal logic failure
P0204	Cylinder 4- Injector Circuit	• Open circuit signal current < 2.1 A • Internal logic failure
P2015	Rationality Check	• Difference between target position vs. actual position > | 25.00 |% and • Actual position NOT (0 - 100)%
P2015	Rationality Check High	• Difference between target position vs. actual position > | 25.00 |% and • Actual position NOT (0 - 100)%
P2015	Rationality Check Low	• Difference between target position vs. actual position > | 25.00 |% and • Actual position NOT (0 - 100)%
P0221	Throttle/Pedal Position Sensor/Switch B Circuit Range/Performance	• TPS 1 - TPS 2 > 6.30% and • Actual TPS 2 calculated value > actual TPS 1 calculated value or • TPS 2 calculated value > 9.00%

DTC	Error Message	Malfunction Criteria and Threshold Value
P0222	Throttle/Pedal Position Sensor/Switch B Circuit Low Input	Signal voltage < 0.20 V
P0223	Throttle/Pedal Position Sensor/Switch B Circuit High Input	Signal voltage > 4.81 V
P0234	Turbocharger/Supercharger Overboost Condition	Difference of set value boost pressure vs. actual boost pressure value > 260 - 1275 hPa
P0236	Turbocharger Boost Sensor A Plausability Check	Difference in boost pressure signal vs. altitude sensor signal > 220 hPa or < 120 hPa
P0237	Turbocharger Boost Sensor (A) Circuit Low Input	Signal voltage < 0.2 V
P0238	Turbocharger Boost Sensor (A) Circuit High Input	Signal voltage > 4.88 V
P0243	Turbocharger/Supercharger Wastegate Solenoid A	Signal voltage > 5.60 - 4.40 V
P0245	Turbocharger/Supercharger Wastegate Solenoid A Low	Signal voltage < 3.25 - 2.15 V
P0246	Turbocharger/Supercharger Wastegate Solenoid A High	Signal current > 2.20 - 4.0 A
P025A	Fuel Pump Module Control Circuit/Open	Signal voltage > 4.4 - 5.6 V
P025C	Fuel Pump Module Control Circuit Low	Signal voltage < 2.15 - 3.25 V
P025D	Fuel Pump Module Control Circuit High	Signal current > 1.1 A
P0261	Cylinder 1 Injector Circuit Low	Signal current < 2.1 A
P0262	Cylinder 1 Injector Circuit High	Signal current > 14.70 A
P0264	Cylinder 2 Injector Circuit Low	Signal current < 2.1 A
P0265	Cylinder 2 Injector Circuit High	Signal current > 14.70 A
P0267	Cylinder 3 Injector Circuit Low	Signal current < 2.1 A
P0268	Cylinder 3 Injector Circuit High	Signal current > 14.70 A
P0270	Cylinder 4 Injector Circuit Low	Low side signal current < 2.1 A
P0271	Cylinder 4 Injector Circuit High	Signal current > 14.70 A

DTC	Error Message	Malfunction Criteria and Threshold Value
P0299	Turbocharger/Supercharger Underboost	Difference of set boost pressure vs. actual boost pressure value > 150 hPa
P2008	Intake Manifold Runner (Bank 1) Control Circuit/Open	Signal voltage 4.40 - 5.60 V
P2009	Intake Manifold Runner (Bank 1) Control Circuit Low	Signal voltage 2.15 - 3.25 V
P2010	Intake Manifold Runner (Bank 1) Control Circuit High	Signal current > 2.20 A
P2014	Intake Manifold Runner Position Sensor/Switch Circuit	Signal voltage > 4.75 V
P2015	Intake Manifold Runner Position Sensor/Switch Circuit Range/Performance	• Difference between target position vs. actual position > | 25.00 |% and • Actual position NOT (0...100)% or • Difference between target position vs. actual position > | 25.00 |% and • Actual position 0...100%
P2016	Intake Manifold Runner Position Sensor/Switch Circuit Low	• Permissible deviation < -11.01 [°CRK] or • Permissible deviation > 11.01 [°CRK] or • Signal voltage < 0.25 V
P2024	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Circuit	• Signal voltage 4.70 - 5.40 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2025	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Performance	• Communication with Smart Temperature Sensor response time > 1000.0 ms and • Number of checks > 3.00 or • Security bit incorrect and • Reset counter > 3.00 • Time difference between ECU and smart module > | 3.0 | s • Out of range high smart module temperature > 119°C • Out of range low smart module temperature < -39°C • Difference between smart temperature and ECT >=25.5 K and • Difference between smart temperature and IAT >=25.5 • Gradient smart temperature > 20 [K/10min]
P2026	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Circuit Low Voltage	• Signal voltage < 0 - 3.25 V
P2027	Evaporative Emissions (EVAP) Fuel Vapor Temperature Sensor Circuit High Voltage	• Signal current > 2.20 A
P2088	Camshaft Position A Actuator Control Circuit Low (Bank 1) Short to Ground	Signal voltage < 0.0 - 3.25 V
P2089	Camshaft Position A Actuator Control Circuit High (Bank 1) Short to B+	Signal current > 2.2 A
P2096	Post Catalyst Fuel Trim System (Bank 1) Too Lean	I-portion of 2nd lambda control loop < -0.030
P2097	Post Catalyst Fuel Trim System (Bank 1) Too Rich	I-portion of 2nd lambda control loop > 0.030

DTC	Error Message	Malfunction Criteria and Threshold Value
P3081	Engine Temperature Too Low	• Cooling system temperature to low after a sufficient air mass flow integral > 9.8 [K] or • Measured engine coolant temperature - reference model temperature > 191.3 [K]

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P0300	Random/Multiple Cylinder Misfire Detected	• Emission threshold misfire rate (MR) > 2.1% • Catalyst damage misfire rate (MR) > 2.9 - 20.0%
P0301	Cylinder 1 Misfire Detected	• Emission threshold misfire rate (MR) > 2.1% • Catalyst damage misfire rate (MR) > 2.9 - 20.0%
P0302	Cylinder 2 Misfire Detected	• Emission threshold misfire rate (MR) > 2.1% • Catalyst damage misfire rate (MR) > 2.9 - 20.0%
P0303	Cylinder 3 Misfire Detected	• Emission threshold misfire rate (MR) > 2.1% • Catalyst damage misfire rate (MR) > 2.9 - 20.0%
P0304	Cylinder 4 Misfire Detected	• Emission threshold misfire rate (MR) > 2.1% • Catalyst damage misfire rate (MR) > 2.9 - 20.0%
P0321	Ignition/Distributor Engine Speed Input Circuit Range/ Performance	• Comparison of counted teeth vs. reference = incorrect • Monitoring reference gap failure
P0322	Ignition/Distributor Engine Speed Input Circuit No Signal	• Camshaft signal > 3 • Engine speed = no signal
P0324	Knock Control System Error	• Signal fault counter (combustion) > 24 or • Signal fault counter (measuring window) > 2.00

DTC	Error Message	Malfunction Criteria and Threshold Value
P0327	Knock Sensor 1 Circuit Low Input	• Lower threshold < -70 V Value applies to Short to Ground, Port A and Port B • Signal range check < 0.00 - 1.60 V
P0328	Knock Sensor 1 Circuit High Input	• Upper threshold > 1.00 V (Short to B+, Port A and Port B) or • For signal range check > 15.00 - 115.87 V
P0341	Camshaft Position Sensor Circuit Range/Performance	• Signal pattern incorrect • Defect counter 12.00
P0342	Camshaft Position Sensor Circuit Low Input	• Signal voltage low and • Crankshaft signals = 8
P0343	Camshaft Position Sensor Circuit High Input	• Signal voltage high • Crankshaft signals = 8
P0351	Ignition Coil A Primary/ Secondary Circuit	• Signal current < 0.25 to -2.0 mA • Internal check failed
P0352	Ignition Coil B Primary/ Secondary Circuit	• Signal current < 0.25 to -2.0 mA • Internal check failed
P0353	Ignition Coil C Primary/ Secondary Circuit	• Signal current < 0.25 to -2.0 mA • Internal check failed
P0354	Ignition Coil D Primary/ Secondary Circuit	• Signal current < 0.25 to -2.0 mA • Internal check failed

Additional Exhaust Regulation

DTC	Error Message	Malfunction Criteria and Threshold Value
P0410	Secondary Air Injection System Malfunction	Difference ambient pressure vs. AIR pressure measured with AIR pressure sensor > 20.0 hPa
P0413	Secondary Air Injection System Switching Valve Circuit Open	Signal voltage 9.25 - 11.25 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0414	Secondary Air Injection System Switching Valve Circuit Low	• Signal voltage < 6.00 V or • Signal current 2.20 - 4.20 A
P0418	Air Pump Relay Open Circuit (PZEV)	Signal voltage 4.70 - 5.40 V
P0420	Catalyst System Efficiency Below Threshold (Bank 1)	Front: • Oxygen Storage Capacity (OSC) vs. OSC of borderline catalyst < 0.40 or • Front catalyst < 1.30 and • Main catalyst < 1.20 Main: • Oxygen Storage Capacity (OSC) vs. OSC of borderline catalyst < 0.90 • While value for front catalyst < 2.00
P0420	Catalyst System, (Bank1) Efficiency Below Threshold	Measured OSC/OSC of borderline catalyst. EWMA filter value for catalyst < .20
P0441	Evaporative Emission System Incorrect Purge Flow	Deviation -6.98 to 6.98% lambda control and 35% idle control
P0442	Evaporative Emission Control System (Small Leak) Leak Detected	Time for pressure drop < 1.6 - 1.8 Sec.
P0444	Evaporative Emission System Purge Control Valve Circuit Open	Signal voltage > 4.40 - 5.40 V
P0450	Evaporative Emission System Pressure Sensor/Switch	Signal voltage 0.39 - 0.55 V
P0451	Evaporative Emission System Pressure Sensor/Switch Range/Performance	Natural vacuum leak detection (NVLD) switch position closed
P0452	EVAP Emission Control System Pressure Sensor Low Input	Signal voltage < 0.24V
P0453	EVAP Emission Control System Pressure Sensor High Input	Signal voltage > 3.0 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P0455	Evaporative Emission Control System (Gross Leak) Leak Detected	Time for pressure drop < 1.0 Sec.
P0456	Evaporative Emission Control System (very small Leak) Leak Detected	• Time for pressure drop < 5 - 6.5 Sec. • Natural vacuum leak detection (NVLD) switch position open
P0458	Evaporative Emission System Purge Control Valve Circuit Low	Signal voltage < 2.15 - 3.25 V
P0459	Evaporative Emission System Purge Control Valve Circuit High	Signal current > 2.2 A
P0491	Secondary Air Injection System (Bank 1) insufficient flow	• Blockage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.60 • Leakage: relative AIR pressure measured with AIR pressure sensor vs. modeled < 0.62 and • Relative AIR pressure measured <=20.00 hPa or • Average pressure difference between absolute value and filtered <0.00 hPa • Relative AIR pressure measured <=20.00 hPa

Speed and Idle Control

DTC	Error Message	Malfunction Criteria and Threshold Value
P0501	Vehicle Speed Sensor “A” Range/Performance	Vehicle speed < 2 mph

DTC	Error Message	Malfunction Criteria and Threshold Value
P0506	Idle Air Control System - RPM Lower Than Expected	• Engine speed deviation > 80 RPM and • RPM controller torque value >= calculated max value • Integrated deviation of engine speed low and integrated deviation of engine speed high > 2000 RPM
P0507	Idle Air Control System - RPM Higher Than Expected	• Engine speed deviation < -80 RPM and • RPM controller torque value <= calculated min. value
P050B	Cold Start Idle Air Control System Performance	Difference between commanded spark timing vs. actual value > 18.00%
P050A	Cold Start Idle Air Control System Performance	Out of range - Low • Engine speed deviation > 80 RPM and • RPM controller torque value ≥ calculated max. value Out of range - High • Engine speed deviation < 80 RPM and • RPM controller torque value ≤ calculated min. value Plausibility check • Integrated deviation of engine speed low and integrated deviation of engine speed high > 2000 RPM
P052A	Cold Start “A” Camshaft Position Timing Over-Advanced	Difference between target position vs. actual position > 6.00 [°CRK]
P053F	Cold Start Fuel Pressure Performance	• Difference between target pressure vs. actual pressure < -1.50 MPa and • Difference between target pressure vs. actual pressure > 1.50 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P053F	Fuel Rail Control Valve High Pressure Side	• Difference between target pressure vs. actual pressure < -1.50 mPA • Difference between target pressure vs. actual pressure > 1.50 mPA
P0597	Thermostat Heater Control Circuit Open	Signal voltage 4.70 - 5.40 [V]
P0598	Thermostat Heater Control Circuit Low	Signal voltage 0.0 - 3.25 [V]
P0599	Thermostat Heater Control Circuit High	Signal current > 2.20 [A]

Control Module and Output Signals

DTC	Error Message	Malfunction Criteria and Threshold Value
P0606	ECM Processor	• Plausibility check signal gradient > 7.5 kPa/s • Plausibility check signal gradient < -7.5 kPa/s • Short to battery / open circuit signal voltage > 4.80 V • Short to ground signal voltage < 0.20 V • Out of range high measured ambient pressure > 1150.00 hPa • Out of range low measured ambient pressure < 450.00 hPa • Communication check internal check failure • Communication check SPI communications check Identifier failure
P0627	Fuel Pump A Control Circuit/ Open	• Internal error fuel pump control unit • Feedback from fuel pump control unit pump blocked short circuit to battery +, ground or open circuit
P0634	PCM/ECM/TCM Internal Temperature Too High	Over temperature > 150 [°C]

DTC	Error Message	Malfunction Criteria and Threshold Value
P0638	Throttle Actuator Control (Bank1) Range/Performance	Rationality check: • Time to close to reference point > 0.6 Sec. and • Reference point 2.88% • TPS 1 signal voltage ≠ 0.40 - 0.80 V or • TPS 2 signal voltage ≠ 4.20 - 4.60 V
P0641	Sensor Reference Voltage A Circuit/Open	Signal voltage deviation > ± 0.3 V
P0651	Sensor Reference Voltage B Circuit/Open	Signal voltage deviation > ± 0.3 V
P0657	Actuator Supply Voltage A Circuit/Open	Signal voltage > 4.4 - 5.6 V
P0658	Actuator Supply Voltage A Circuit Low	Signal voltage < 2.15 - 3.25 V
P0659	Actuator Supply Voltage A Circuit High	Signal current > 1.1 A
P0697	Sensor Reference Voltage C Circuit/Open	Signal voltage deviation > ± 0.3 V
P062B	Internal Control Module Fuel Injector Control Performance	SPI communications check Identifier failure
U0001	High Speed CAN Communication Bus	• CAN message, no feedback
U0002	High Speed CAN Communication Bus Performance	• Global time out, receiving no message
U0101	Lost Communication with TCM	Received CAN message, no message
U0121	Lost Communication With Anti-Lock Brake System (ABS) Control Module	Received CAN message - no message
U0155	Lost Communication With Instrument Panel Cluster (IPC) Control Module	Received CAN message - no message
U0302	Software Incompatibility with Transmission Control Module	Recieved AT vehicle data TCM signal

DTC	Error Message	Malfunction Criteria and Threshold Value
U0323	Software Incompatibility With Instrument Panel Control Module	Ambient temperature value module (not encoded for ambient temperature sensor) 00h
U0402	Invalid Data Received From Transmission Control Module	Received data implausible message
U0415	Invalid Data Received From Anti-Lock Brake System Control Module	Vehicle speed > 202 mph
U0415	CAN: Vehicle Speed Sensor	• Speed sensor signal: initialization error 203.282 mph • Speed sensor signal: low voltage error 203.387 mph • Speed sensor signal: sensor error 203.493 mph
U0423	Invalid Data Received From Instrument Panel Cluster Control Module	• Received data, implausible message • Ambient temperatur value (initialization) 01 h
U102E	Radiator identification sensor Implausible signal	LIN message
U102F	Radiator identification sensor No Communication	Time out
U1030	Local data bus Electrical error	Not active

Fuel and Air Ratios Control Module

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A1	Fuel Rail Pressure Sensor Inappropriately Low	• Pressure control activity > 0.20 MPa and • Fuel trim activity < 0.80 and • Difference between target pressure vs. actual pressure -16.38 - 16.38 MPa

DTC	Error Message	Malfunction Criteria and Threshold Value
P12A2	Fuel Rail Pressure Sensor Inappropriately High	• Pressure control activity < -0.15 MPa and • Fuel trim activity > 1.65 and • Difference between target pressure vs. actual pressure -16.38 - 16.38 MPa
P12A4	Fuel Rail Pump Control Valve Stuck Closed	• Pressure control activity < 6.0 MPa and • Fuel trim activity 0.90 to 1.15 and • Difference between target pressure vs. actual pressure < 16.38 MPa
P13EA	Cold Start Ignition Timing Performance Off Idle	Difference between commanded spark timing and actual value > 20.00%
P150A	Engine Off Time Performance	Comparison of engine off time from instrument cluster control unit with engine after run time. • Difference between engine off time and ECM after run time < -12.0 Sec. Comparison of engine off time from instrument cluster control unit with engine after run time • Difference between engine off time and ECM after run time > 12.0 Sec.
P2101	Throttle Actuator A Control Motor Circuit Range/ Performance	• Duty cycle > 80% and • ECM power stage, no failure • Deviation throttle valve angles vs. calculated value > 4.0 - 50.0%
P2106	Throttle Actuator Control System Forced Limited Power	Internal check failed
P2122	Throttle/Pedal Position Sensor/Switch D Circuit Low Input	Signal voltage < 0.61 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2123	Throttle/Pedal Position Sensor/Switch D Circuit High Input	Signal voltage > 4.79 V
P2127	Throttle/Pedal Position Sensor/Switch E Circuit Low Input	Signal voltage < 0.27 V
P2128	Throttle/Pedal Position Sensor/Switch E Circuit High Input	Signal voltage > 2.43 V
P2138	Throttle/Pedal Position Sensor/Switch D/E Voltage Correlation	Signal voltage: Difference between signal sensor 1 vs 2 > 0.17 - 0.70 V
P2146	Fuel Injector Group A Supply Voltage Circuit/Open	Short to ground (high side) • Signal current > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A Core connection (high side - low side) • Signal current < 2.60 A
P2149	Fuel Injector Group B Supply Voltage Circuit/Open	Short to ground (high side) • Signal current > 14.90 A Short to battery plus (high side) • Signal current < 2.60 A Core connection (high side - low side) • Signal current < 2.60 A
P2177	System too lean off idle, (Bank 1)	• Adaptive value > 26%
P2178	System too rich off idle, (Bank 1)	• Adaptive value < -26%
P2181	Cooling System Performance	Cooling system temp too low after a sufficient air mass flow integral 74 - 84 °C
P2184	Engine Coolant Temperature Sensor 2 Circuit Low	Short to ground ECT outlet > 141°C
P2185	Engine Coolant Temperature Sensor 2 Circuit High	Short to battery / open circuit ECT outlet < -43°C
P2187	System too lean at idle, (Bank 1)	• Adaptive value > 6.00%
P2188	System too rich at idle, (Bank 1)	• Adaptive value < -6.00%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2195	O2 Sensor Signal Stuck Lean (Bank 1 Sensor 1)	Delta lambda of 2nd lambda control loop > 0.07
P2196	O2 Sensor Signal Stuck Rich (Bank 1 Sensor 1)	Delta lambda of 2nd lambda control loop < -0.07
P2237	O2 Sensor Positive Current Control Circuit (Bank 1, Sensor 1) Open	• O2S signal front 1.49 - 1.51 and lambda set value > 1.03 V and • Delta lambda controller > | 0.10 |
P2243	O2 Sensor Reference Voltage Circuit/Open (Bank 1, Sensor 1) Open	• O2S signal front < 0.30 V and Internal resistance > 1000 Ohms • O2S signal front > 3.25 V and Internal resistance > 1000 Ohms
P2257	Secondary Air Injection System Air Flow/Pressure Bank 1 Sensor Circuit High	Signal voltage 0.0 - 3.26 V
P2258	Secondary air injektion System Control “A” Circuit high	Signal current 2.22 - 4.00 A
P2270	O2 Sensor Signal Stuck Lean; (Bank 1 Sensor 2)	• O2S signal rear not oscillating at reference < 0.62 - 0.65 V and • Enrichment after stuck lean 27.88%
P2271	O2 Sensor Signal Stuck Rich; (Bank 1 Sensor 2)	• O2S signal rear not oscillating at reference > 0.62 - 0.65 V and • Enrichment after stuck lean 14.99% • Sensor voltage (after fuel cut off) >=0.18 V • Number of checks >=1.0
P2274	O2 Sensor Signal Stuck Lean; Bank 1 Sensor 3	• O2S signal rear not oscillating at reference < 0.62 - 0.65 V and • Enrichment after stuck lean 27.88%

DTC	Error Message	Malfunction Criteria and Threshold Value
P2275	O2 Sensor Signal Stuck Rich; Bank 1 Sensor 3	• O2S signal rear not oscillating at reference < 0.62 - 0.65 V and • Enrichment after stuck lean 14.99% • Sensor voltage (after fuel cut off) >= 0.18 V and • Number of checks >= 1.0
P2279	Intake Air System Leak	• Threshold to detect a defective system > 1.33 and • Ratio of the tie system defective during the measurement window to the whole duration of the measurement window > 0.60
P2293	Fuel Pressure Regulator 2 Performance	• Difference between target pressure vs. actual pressure: > 1.50 mPa or • Difference between target pressure vs. actual pressure: < -1.50 mPa
P2294	Fuel Pressure Regulator 2 Control Circuit	• Signal voltage 1.40 - 3.20 V
P2295	Fuel Pressure Regulator 2 Control Circuit Low	Signal voltage < 1.40 - 3.20 V
P2296	Fuel Pressure Regulator 2 Control Circuit High	Signal voltage > 3.20 V

Ignition System

DTC	Error Message	Malfunction Criteria and Threshold Value
P2300	Ignition Coil A Primary Control Circuit Low	Signal current > 24.0 mA
P2301	Ignition Coil A Primary Control Circuit High	Signal current > 5.1 - 7.0 mA
P2303	Ignition Coil B Primary Control Circuit Low	Signal current > 24.0 mA
P2304	Ignition Coil B Primary Control Circuit High	Signal current > 5.1 - 7.0 mA

DTC	Error Message	Malfunction Criteria and Threshold Value
P2306	Ignition Coil C Primary Control Circuit Low	Signal current > 24.0 mA
P2307	Ignition Coil C Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA
P2309	Ignition Coil D Primary Control Circuit Low	Signal current > 24.0 mA
P2310	Ignition Coil D Primary Control Circuit High	Signal voltage > 5.1 - 7.0 mA

Additional Emissions Regulations

DTC	Error Message	Malfunction Criteria and Threshold Value
P2400	Evaporative Emission System Leak Detection Pump Control Circuit/Open	Signal voltage > 4.4 - 5.6 V
P2401	Evaporative Emission System Leak Detection Pump Control Circuit Low	Signal voltage < 2.15 to 3.25 V
P2402	Evaporative Emission System Leak Detection Pump Control Circuit High	Signal current > 3.0 A
P2403	Evaporative Emission System Leak Detection Pump Sense Circuit/Open	Low signal voltage > 0.5 Sec.
P2404	Evaporative Emission System Leak Detection Pump Sense Circuit Range/Performance	• High signal voltage > 12 Sec. • Number of checks = 30 • Cumulative time of high signal voltage during pumping > 50 Sec.
P2414	O2 Sensor Exhaust Sample Error (Bank 1, Sensor 1)	• Threshold 1 - Signal voltage 3.10 - 4.81 V • Threshold 2 - Signal voltage 2.5 to 3.10 V
P2431	Secondary Air Injection System Air Flow/Pressure Bank 1 Sensor Circuit Range/ Performance	Difference between SAI pressure and ambient pressure ≠ -25.0 - 25.0 hPa
P2432	Secondary Air Injection System Air Flow/Pressure Bank 1 Sensor Circuit Range/ Performance	Signal voltage < 0.40 V

DTC	Error Message	Malfunction Criteria and Threshold Value
P2433	Secondary Air Injection System Air Flow/Pressure Bank 1 Sensor Circuit High	Signal voltage > 4.65 V
P2440	Secondary Air Injection System Switching Valve Stuck Open (Bank 1)	• Ratio of relative AIR pressure @ phase 1 and relative AIR pressure @ phase 2 > 1.41 or • Difference of average pressure between absolute value and filtered value while both valves commanded closed > 2559.96 hPa
P2539	Low Pressure Fuel System Sensor Circuit	Signal voltage > 4.9 V
P2540	Low Pressure Fuel System Sensor Circuit Range/ Performance	Actual pressure deviation < 800 kPa < 80 kPa
P2541	Low Pressure Fuel System Sensor Circuit Low	Signal voltage < 0.2 V
P2568	Direct Ozone Reduction Catalyst Temperature Sensor Circuit Range/Performance	Electrical error via LIN • DOR temperature gradients (during measurement windows) < 0.6 - 2.8 [K/2S] or • DOR temperature difference (between begin of thermostat heating and end of measurement window) < 8.0 - 10.0 [K]
P2569	Direct Ozone Reduction Catalyst Temperature Sensor Circuit Low	Electrical error via LIN
P2570	Direct Ozone Reduction Catalyst Temperature Sensor Circuit High	Electrical error via LIN
P2626	O2 Sensor Pumping Current Trim Circuit/Open (Bank 1 Sensor 1)	O2S signal front > 4.81 V

Printed in the United States of America

EOSQUSPEC2013